Palm Avenue Revitalization Plan Technical Report

Final Report | March 2016

The City *of*
SAN DIEGO

Palm Avenue Revitalization Plan

Final Technical Report

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The City of San Diego

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Executive Summary

The Palm Avenue Revitalization Plan serves as a blueprint for encouraging investment, promoting economic development and improving vehicle, transit, pedestrian, and bicycle mobility along Palm Avenue between 13th Street and Hollister Street. The Plan seeks to support a more livable and sustainable environment by guiding future urban design, streetscape and mobility improvements along Palm Avenue. The Plan includes strategies to improve accessibility along Palm Avenue for all modes and user abilities, creating a livelier destination that in turn improves the corridor's economic vitality.

This Executive Summary provides an overview of the community engagement efforts undertaken in support of the project, summarizes key existing conditions findings, and introduces the recommended Preferred Alternative, operational improvements, and urban design guidelines.

Community Engagement

A variety of engagement methods were employed during this planning process to solicit input from community members, including community workshops, attending community events and public meetings, surveys, and a project webpage. The engagement was primarily organized around two project phases, the existing conditions analysis and the preferred alternative development. The existing conditions outreach informed the project team's understanding of perceived mobility issues and opportunities within the project area from community members. Three conceptual design alternatives were developed and presented to community members, incorporating the findings from the previously collected community input and existing conditions analysis.

Bike & Walk Audit

A Palm Avenue bike and walk audit was held with community members to gain a better understanding of existing issues along the corridor from cyclist and pedestrian vantage points. The findings were documented on route maps, separated for bicycles and pedestrians and site specific versus segment related comments.

Community Workshops

Two community workshops were held in support of the Palm Avenue Revitalization Plan. The initial workshop introduced community members to the project, summarized the project work completed to date, and assisted in collecting input on existing mobility issues and opportunities within the project area. The community input collected during this workshop was used to identify three conceptual design alternatives, a set of recommended operational improvements, and the urban design framework.

The second community workshop provided community members with an update on project progress, and collected feedback on the three conceptual design alternatives, recommended operational improvements and urban design framework developed based on the input collected during the initial workshop. The Raised Cycle Track concept emerged as the community

Preferred Alternative during the second workshop. A more detailed summary of community comments from both workshops can be found in **Appendix A**.

Survey Outreach & Community Events

A multimodal questionnaire was developed early in the project to solicit input from community members regarding the types of bicycle facilities, pedestrian crossings, streetscape features, and transit amenities are needed and suitable along Palm Avenue. The following methods were employed to distribute the survey:

- *On-the-Street Intercept Surveys* – Project staff walked the corridor, positioned themselves at transit stops and other high traffic locations to engage community members using the corridor. The staff member would then introduce the project to the community member and attempt to get them to complete a survey. This was also used as an opportunity to advertise upcoming project workshops.
- *Project Webpage* – The survey was made available online on the project webpage (www.PalmAvenueSD.com) in both English and Spanish.
- *Community Events* – Project staff attended several community events to introduce community members to the project, advertise upcoming community workshops and provide an opportunity for community members to complete the survey. Events attended include the South Bay Swap Meet, Imperial Beach Farmer's Market, South Bay Recreation Council, and IB Collaborative.

Survey participants generally reported as being in favor of Class I or Class IV bicycle facilities, high visibility continental crosswalks, bus shelters, and additional landscaping along the corridor. Participants also indicated a need for a safer bicycle and pedestrian environment. More detailed survey findings can be found in Appendix A with the workshop summaries.

Community Planning Group

City staff attended Otay Mesa-Nestor community planning group meetings to introduce the project to the group and community members, provide project updates, and advertise opportunities to further participate in the project.

Project Webpage

A project webpage (www.PalmAveSD.com) was hosted to provide community members with project updates, advertise opportunities for involvement, and to review draft deliverables. Additionally, the project survey was available to take on the webpage.

Existing Conditions Analysis

The existing conditions mobility analysis was performed for pedestrian, bicycle, transit, and vehicular transportation modes. Key findings from each of those analyses are summarized in this section, with detailed descriptions of the analysis methodologies provided in chapter 3, and more complete analysis results presented in chapter 4. The Existing Conditions Report was incorporated into the first four chapters of this Technical Report.

Walkability
Figure E-1 displays opportunities and constraints for pedestrians within the Palm Avenue corridor study area.

Due to the high vehicular speeds, high traffic volumes and auto-oriented urban designs, the pedestrian environment is generally unpleasant along most of the entire Palm Avenue corridor. There are sidewalks and curb ramps along the corridor, except for the south side of the street between Saturn Boulevard and Interstate 5 northbound ramps, where pedestrians are routed to the north side of the street.

Getting across Palm Avenue is challenging. Legal north-south crossing locations are infrequent, typically spaced about a quarter- to half-mile apart. At the crossings, the distances pedestrians must traverse range from 100 to 110 feet along the six-lane portion of Palm Avenue west of Interstate 5. Crossing from the west side of Interstate 5 to the east side of the freeway, as a pedestrian, is a major problem. Pedestrians are routed to the north side of Palm Avenue east of Saturn Boulevard. Pedestrians must cross three separate freeway ramps along the north side of the roadway, including the southbound free right-turn on-ramp. Interstate 5 consequently serves as a barrier between the majority of the Palm Avenue corridor in the west and the Palm Avenue Trolley Station, the neighborhood's only direct access to high frequency rapid transit. The area of highest pedestrian demand is at Hollister Street and Palm Avenue, near the Palm Avenue Trolley Station.

Opportunities along the corridor include a wide right-of-way, which in the future can potentially accommodate more comfortable pedestrian travelways. Some locations within the study area currently do have sidewalks greater than 12 feet, including parts of Palm Avenue west of 13th Street and portions between Thermal Avenue and Saturn Boulevard.

Bicycle Network
Figure E-2 displays opportunities and constraints for cycling within the Palm Avenue corridor study area.

Despite the presence of bike lanes along most of the corridor, high vehicular speeds and high traffic volumes make cycling along Palm Avenue viable for only the most stress-tolerant cycling demographic. Comfortably getting across the Interstate 5 interchange is especially challenging. Eastbound cyclists must traverse high-speed vehicular movements accessing the free-flowing I-5 southbound On-Ramp.

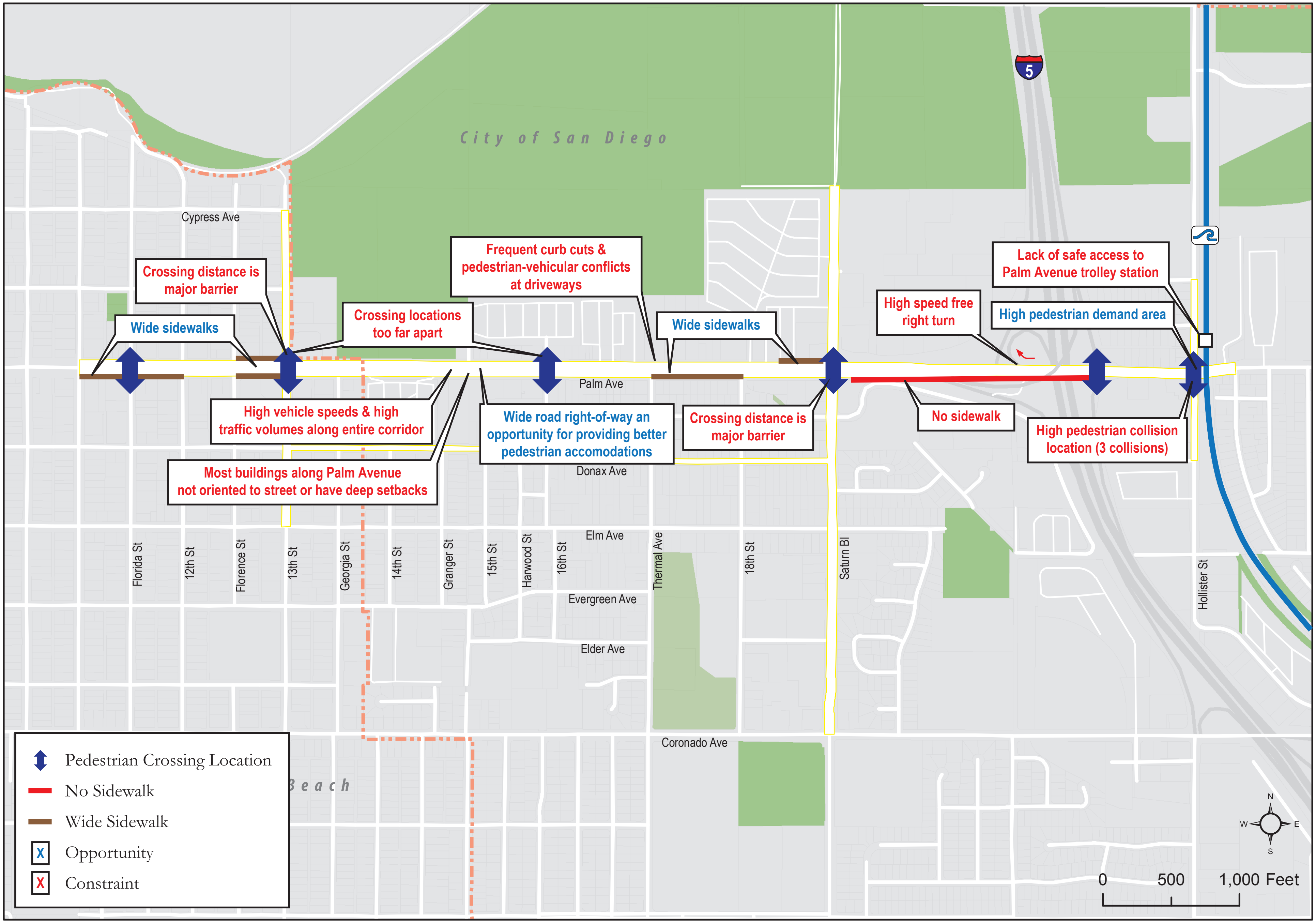


Figure E-1
Pedestrian Opportunities and Constraints

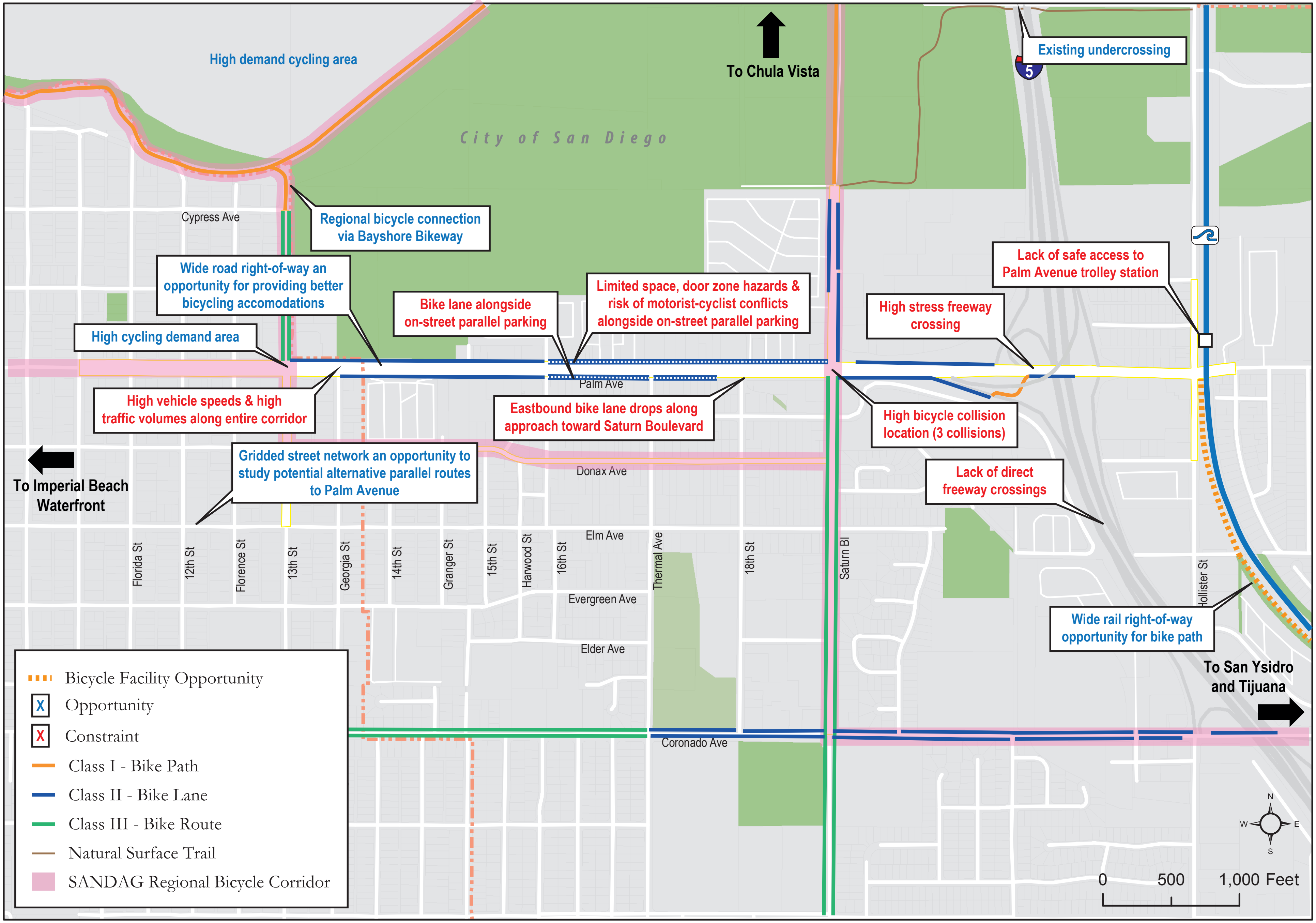
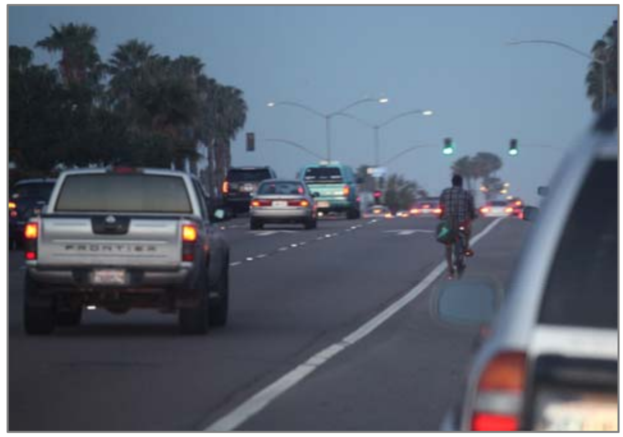


Figure E-2

Bicycle Opportunities and Constraints

Conditions going westbound are slightly better, with cyclists required to cross one lane of high-speed vehicular movements crossing the free-flowing I-5 southbound On-Ramp. The difficulty crossing Interstate 5 is relevant to transit riders who live or work west of the I-5, since they must cross the freeway to access the Palm Avenue Trolley Station.



Another cycling constraint is found between 16th Street and Saturn Boulevard, where the bike lanes are adjacent to on-street parallel parking. The single-striped outside lane, accommodating both cyclists and parked vehicles, is striped at an insufficient width of 12 feet. This segment requires cyclists to choose between riding in the "door-zone" next to parked cars or near the edge of the outside travel lane closer to the fast-moving vehicular traffic. The eastbound bike lane along this segment of Palm Avenue also drops entirely as it approaches Saturn Boulevard, where cyclists must negotiate frequent conflicts with driveways and heavy right-turning traffic volumes queuing up at the approach to the Saturn Boulevard intersection with Palm Avenue. It is therefore not surprising, given the level of constraints and conflicts at the Saturn Boulevard/Palm Avenue intersection, that it has the highest level of bicycle-involved collisions along the entire study corridor.

Opportunities along the study corridor include an especially wide right-of-way, which can potentially accommodate cyclists in the future with increased lateral separation. Many cyclists traverse Palm Avenue at the intersection of 13th Street, which is located several blocks south of a Bayshore Bikeway access point. The Bayshore Bikeway is a regional off-street bike path, which provides connections to the City of Coronado to the northwest and the cities of Chula Vista, National City and central San Diego to the northeast. A gridded street network in the study area is also an opportunity to explore potential lower-stress parallel alternative cycling routes to Palm Avenue.

Vehicular & Transit System

Figure E-3 displays opportunities and constraints for vehicles and public transportation within the Palm Avenue corridor study area. Palm Avenue is a six-lane major arterial west of Interstate 5 and a four-lane major arterial to the east.

Palm Avenue, between Saturn Boulevard and Interstate 5, has average daily traffic volumes greater than 60,000, far exceeding City of San Diego roadway functional classification capacity thresholds for a six-lane major arterial. This segment is considered a failing segment by the City's vehicular Level of Service standards. The intersection of Saturn Boulevard and Palm Avenue is failing by intersection Level of Service standards during both the AM and PM peak periods. Delays caused by insufficient roadway capacity also affect transit performance and reliability.

Palm Avenue Revitalization Plan

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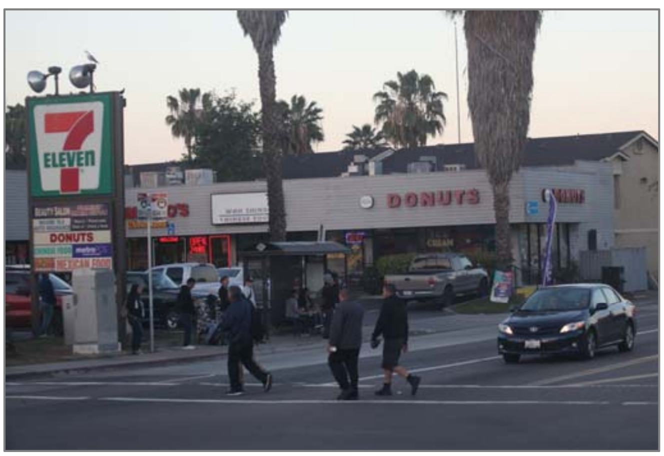
Figure E-3

Vehicle & Public Transit Opportunities and Constraints

The Saturn Boulevard and Palm Avenue intersection has the highest level of automobile collisions in the study area, with 64 collisions during the 5-year period from 2008 to 2013, nearly three times more than the next highest location at 16th Street and Palm Avenue (23 collisions). Along Palm Avenue, numerous driveway conflicts and heavy right-turning volumes also create friction for through-moving vehicular flow. Collisions near transit stops involving pedestrians and cyclists are the highest at

Hollister Street and Palm Avenue, where a total of 11 pedestrian and cyclist-involved collisions occurred within 500 feet of the transit stops, from 2008 to 2013.

Opportunities to increase vehicular and transit flow could potentially be improved with signal coordination and Intelligent Transportation Systems (ITS). Specific ITS strategies could



potentially include bicycle and pedestrian detection technologies, transit signal priority and real-time arrival information for future Bus Rapid Transit, coordinated traffic signal timing through the corridor, and improved corridor signal timing between the City of Imperial Beach and the City of San Diego. The Palm Avenue Trolley Station, which is the neighborhood's only direct access to the region's high frequency rapid transit network, is the busiest transit station in the study area with an average 4,300 daily boardings and alightings. The neighboring east-west bus stops on Palm Avenue at the intersection of Hollister Street are the busiest bus stops, with daily boardings and alightings over 1,000 in each direction. Accessing the trolley station by foot or bike requires people who live or work west of I-5 to traverse an environment characterized by high volume, high speed vehicular traffic.

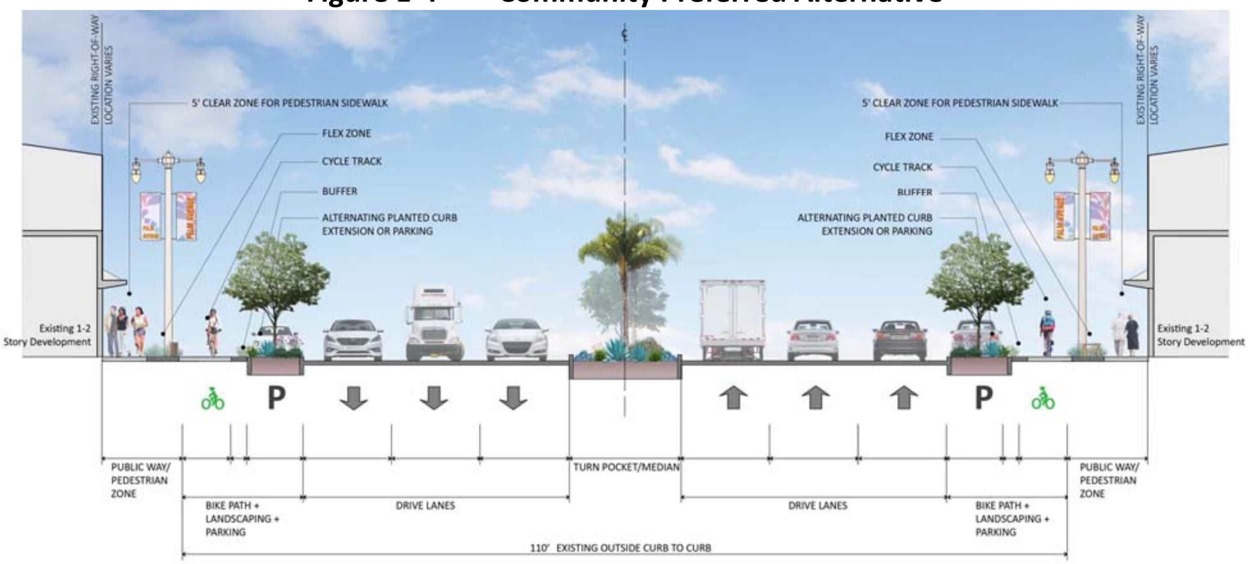
Preferred Alternative

Through a series of exercises conducted during the second community workshop, *Concept C - Raised Cycle Track* emerged as the community Preferred Alternative.

In the Preferred Alternative all travel lane widths will be reduced to 11', however, all six travel lanes will be maintained. One of the defining features of the Preferred Alternative is a six-foot wide raised cycle track on each side of Palm Avenue. The cycle track will provide for a bicycle facility that is physically separated from vehicular traffic by landscaping and/or a parking lane. Further, the cycle track is proposed to be raised to the sidewalk level to provide additional separation and comfort for cyclists, ultimately lowering the cycling stress level. Where space permits, the Plan recommends defining a Public Way / Pedestrian Zone that measures approximately 10’ in width. This dimension will accommodate the placement of street furniture and landscaping between the cycle track and the sidewalk. Because existing conditions vary along the study area, this dimension may vary and is intended only as a guideline. If the available width is under 10’, a setback easement is recommended to permit the development of the Public Way / Pedestrian Zone. If the width is not available and no easement is available, landscaping may be limited to the planted curb extension.

Figure E-4 displays a cross-section of the Preferred Alternative.

Figure E-4 Community Preferred Alternative



The striping plan for the preferred concept is provided in **Appendix B**.

The Preferred Alternative builds on the bicycle facility recommendation included in the City of San Diego Bicycle Master Plan, which calls for Class II bike lanes along Palm Avenue, from Saturn Boulevard to 24th Street. The Palm Avenue Revitalization Plan examined the corridor in greater detail than permitted in a citywide planning process, enabling the project team to identify the opportunity for the raised cycle track concept. Consistent with current City policy, this plan supports the Vision Zero concept.

As a part of its Climate Action Plan, the City is targeting a 12% transit mode share and 6% bicycle mode share citywide by 2020. By the year 2035, the City is targeting a 25% transit mode share and 18% bicycle mode share within Transit Priority Areas. The Preferred Alternative supports these targets by planning for an improved bicycling and walking experience along Palm Avenue.

The striping plan for the preferred concept is provided in Appendix B. Chapter 7 presents an analysis of the Preferred Alternative for the pedestrian, bicycle, transit, and vehicular network, along with a No Build analysis. In Chapter 8 there is a detailed description regarding all of the project recommendations, and provides an implementation strategy for short-term and long-term projects, cost estimates and potential funding sources.

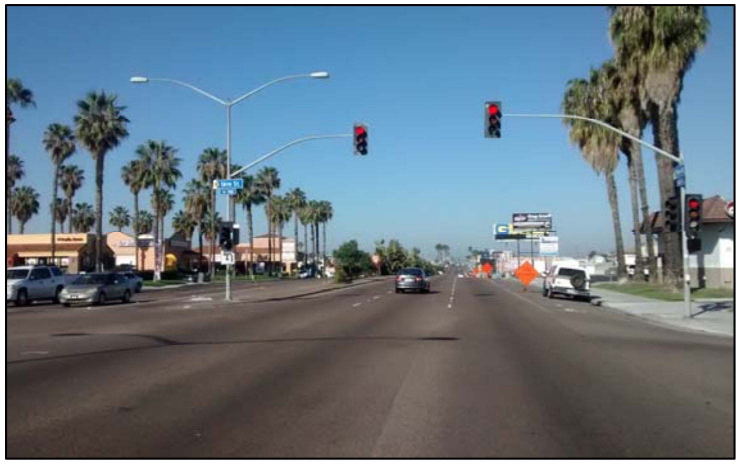
Urban Design Framework & Operational Improvements

The preferred design alternative shapes the physical dimensions of the roadway's pedestrian zone, bicycle facility, landscaping, parking and travel lanes, and medians. An urban design framework and a set of operational improvements are also proposed as part of this planning process.

The proposed urban design framework and operational improvements were developed based upon community feedback and further refined using City staff and consultant team expertise. These improvements were proposed as measures that could be implemented regardless of which design concept was selected as the Preferred Alternative. The following operational improvements are proposed:

- Install high visibility crosswalks at all pedestrian crossings
- Verify that pedestrian crossing times at traffic signals meet CA-MUTCD standards
- Consider widening crosswalks at Saturn Boulevard to help with pedestrian volume
- Install ADA curb ramps at all crossings
- Create a continuous/level sidewalk by reconstructing driveways concurrent with other street improvements and/or subsequent development
- Reconfigure the intersection of southbound Interstate 5 on-ramp and westbound Palm Avenue to eliminate conflicts between pedestrians/bicyclists and vehicles
- Consider new signalized intersection at Thermal Avenue and Palm Avenue
- Implement traffic signal synchronization and optimization to improve traffic flow
- Proposed improvements for the Hollister Street / Palm Avenue intersection include:
  - High visibility crosswalks across all four intersection legs. Crosswalks should be expanded in width, where feasible, to accommodate the high pedestrian volume from the Palm Avenue trolley stop.
  - Analyze the implementation of Lead Pedestrian Intervals (LPI) across all four intersection legs.
- The right turn lane pocket, located along westbound Palm Avenue at Saturn Boulevard, is proposed to be lengthened from the existing 50' to 250' in length.
- An additional left-turn lane is proposed (by others) from westbound Palm Avenue onto southbound Saturn Boulevard to help alleviate queuing vehicles that back up into the through lanes. *Note, this is a project assumed to be done by others as a condition of a development project outside the scope of this work, therefore has not been included in the cost estimate.*

1.0 Introduction



This report documents the technical mobility analyses conducted in support of the Palm Avenue Revitalization Plan. The future conditions analysis is based upon a preferred conceptual design alternative and also reflects buildout of the currently adopted community plan land uses. This report provides an overview of existing and preferred alternative conditions for pedestrian and bicycle facilities, transit systems, and vehicular operations along the study corridor. The report also describes the methodologies utilized for conducting these analyses and identifies the current deficiencies across the transportation system which drove the development of the preferred alternative.

1.1 Background & Purpose

The Palm Avenue Revitalization Plan will serve as a blueprint for encouraging investment, promoting economic development and improving vehicle, transit, pedestrian, and bicycle mobility. The Plan seeks to support a more livable and sustainable environment by guiding future urban design, streetscape and mobility improvements along Palm Avenue. The Plan includes strategies to improve accessibility along Palm Avenue for all modes and user abilities, creating a livelier destination that in turn improves the corridor's economic vitality.

The following key objectives and issues will guide the development of the Palm Avenue Revitalization Plan:

- Multimodal accessibility along Palm Avenue for all users;
- Propose strategies to improve the livability and economic vitality of the corridor;
- Establish an Urban Design Vision for the corridor;
- Prepare a Mobility Study that analyzes recommended multi-modal improvements; and
- Establish an Implementation Strategy to help bridge the planning and implementation processes and transform Palm Avenue into a vibrant multi-modal corridor that contributes to the health of the community and the regional economy.

1.2 Report Organization

This Technical Report summarizes analyses carried out over an almost two year period by the project team. The report is organized into the following chapters:

Chapter 1 – Introduction provides an overview of the report and background project information, including a discussion of the project location and area demographics, and a review of relevant planning efforts and policies.

Chapter 2 – Corridor Environment summarizes existing and planned land uses, urban design characteristics, and community health as they relate to mobility within the project area.

Chapter 3 – Mobility Analysis Methodology summarizes the methods employed to assess the pedestrian, transit, vehicular and bicycle mobility systems.

Chapter 4 – Mobility Analysis evaluates existing transportation facilities and operations, including a safety analysis of each mode within the project area.

Chapter 5 – Model Forecasting summarizes the future estimated traffic volumes along the Palm Avenue corridor.

Chapter 6 – Preferred Concept Plan identifies the process used to identify the preferred alternative and the key components of the preferred concept plan.

Chapter 7 – Preferred Plan Analysis presents the preferred future analysis for the Palm Avenue pedestrian, bicycle, transit, and vehicular network, along with a No Build analysis.

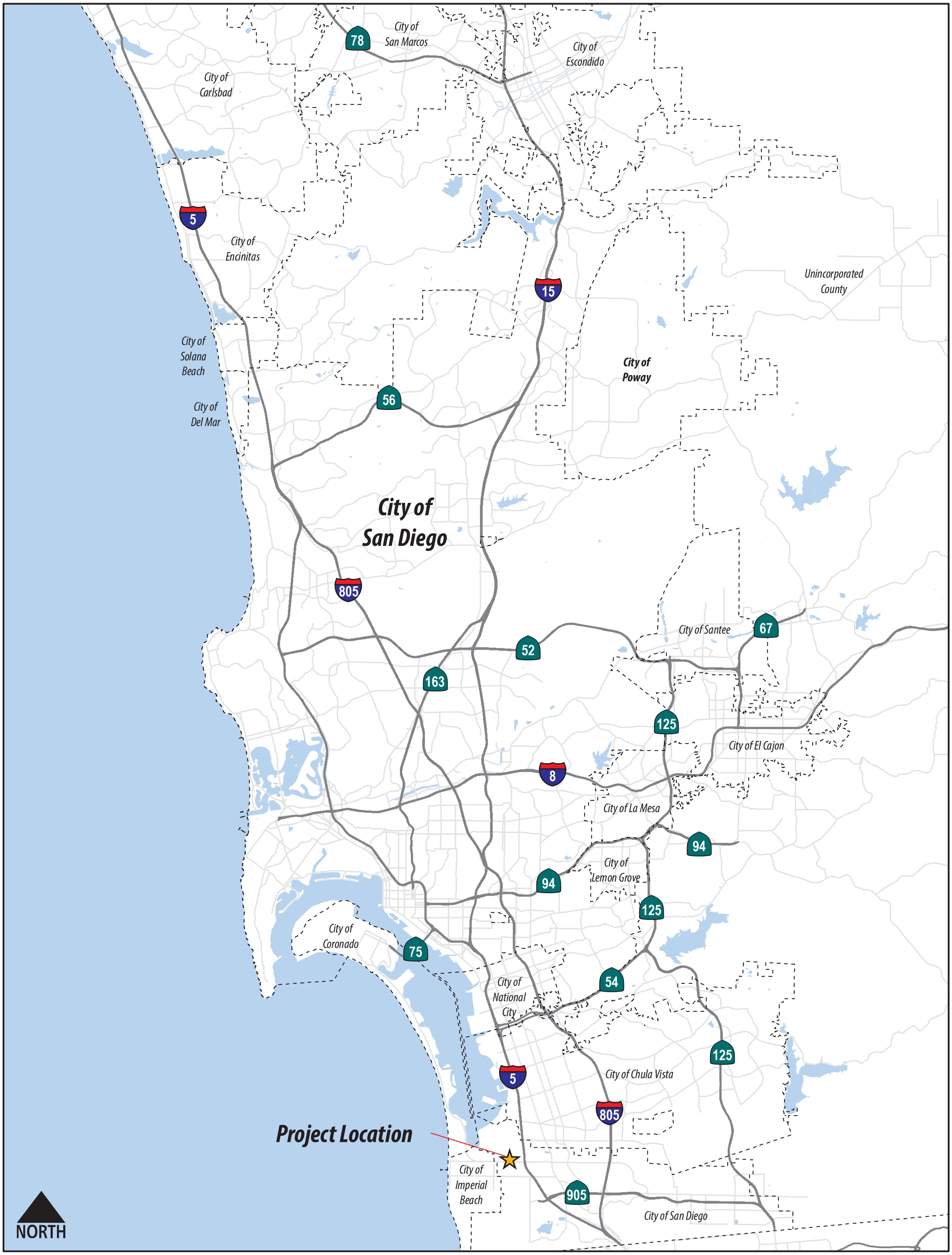
Chapter 8 – Implementation Strategy identifies a set of near-term and long-term projects and provides cost estimates and potential funding sources.

1.3 Project Location and Planning Area

The Palm Avenue corridor is located within the Otay Mesa-Nestor community planning area in the southern portion of San Diego County. The Otay Mesa-Nestor community planning area is bounded on the north by the City of Chula Vista, the Tijuana River Valley and San Ysidro community to the south, the community of Otay Mesa to the east, and the City of Imperial Beach on the west, as shown in **Figure 1-1**.

The City of Imperial Beach initiated a Palm Avenue Master Plan within their jurisdiction in 2000 to generate economic development, increase pedestrian and bicyclist safety, improve vehicular mobility, and enhance the overall appearance and urban design of Palm Avenue and its surrounding area.

The City of San Diego's project extent runs approximately one mile along Palm Avenue from Hollister Street in the east to the City of Imperial Beach municipal boundary in the west (13th Street). Palm Avenue is a high volume six-lane roadway with a raised median and bike lanes present in both directions west of Saturn Boulevard. The posted speed limit along the Palm Avenue study corridor is 45 MPH. The study area falls primarily within the Egger Highlands neighborhood, with a small portion also located within the Nestor neighborhood. **Figure 1-2** displays the project location and extent within the Otay Mesa-Nestor community, as well as the study intersections used for the vehicular analyses. The figure additionally shows the "corridor study area" which is defined by the six census tracts within a half-mile of the project area.



Palm Avenue Revitalization Plan

Figure 1-1

Project Regional Location

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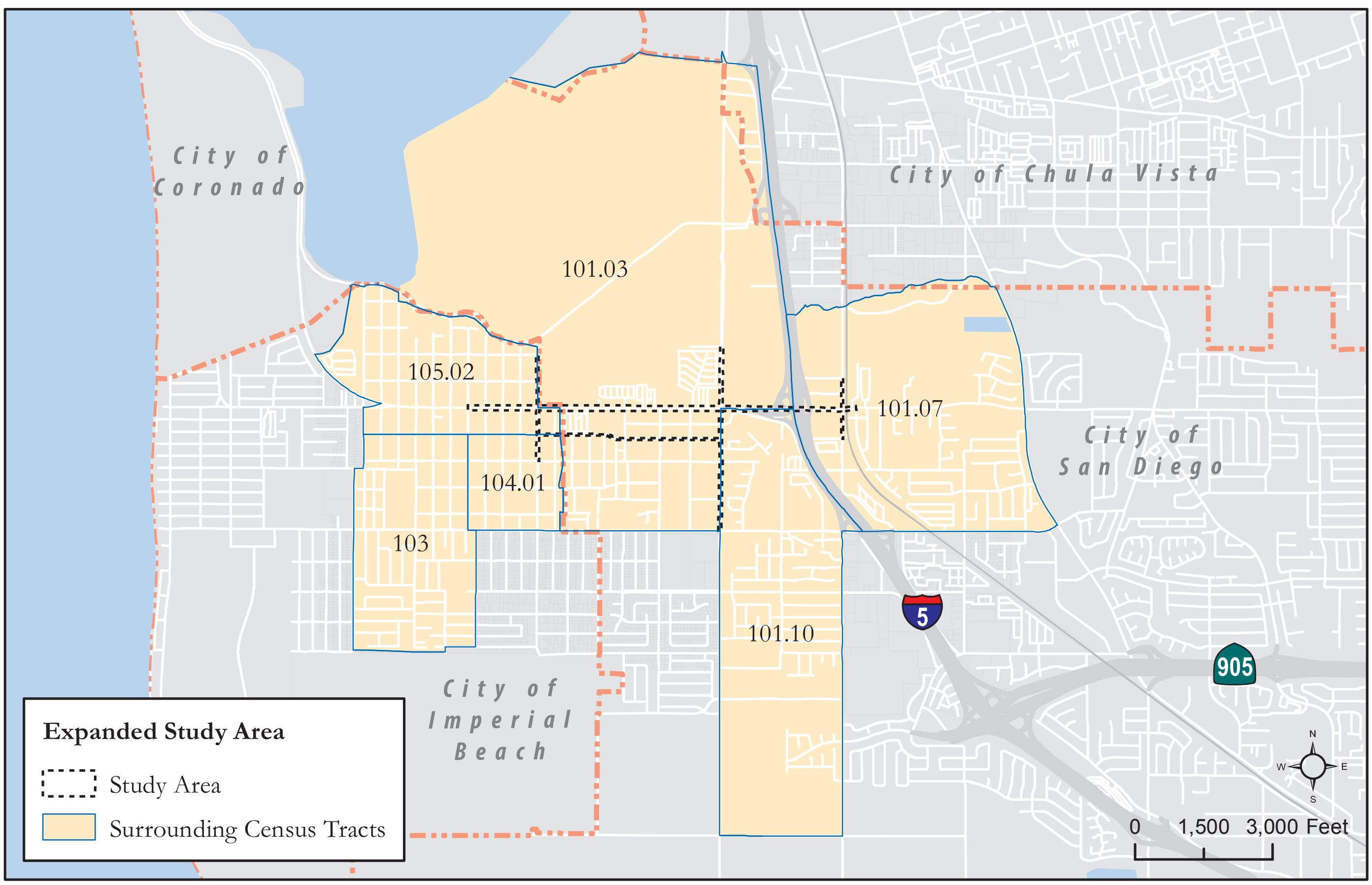

Figure 1-2

Project Location and Study Area

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1.4 Population Characteristics

Table 1-1 provides a snapshot of population characteristics along the Palm Avenue corridor study area as well as for the City of San Diego as a whole.

Compared to the City of San Diego, the Palm Avenue corridor study area tends to have slightly larger household sizes. The percentage of households in poverty is higher in the corridor study area and median household incomes are lower when compared to the City of San Diego. Spanish is the primary language spoken at home within the corridor study area, accounting for 54.7% of households, compared to 22.5% of households for the City of San Diego. Educational attainment tends to be lower in the corridor study area with 26.8% of people aged 25 or older having less than a high school degree, compared to just 13.0% across the City.

Table 1-1 2013 Population Characteristics for the Palm Avenue Corridor Study Area and the City of San Diego

Characteristic	Palm Avenue Corridor Study Area[1]	City of San Diego
Households	10,119	476,551
Average Household Size (persons per household)	3.3	2.8
Poverty Status (income below poverty level within last year) (%)	12.6%	10.8%
Median Household Income	$49,347	$64,058
Ethnicity (%)		
Hispanic	63.7%	29.3%
White	19.4%	44.2%
Asian	10.2%	16.2%
Black	3.6%	6.4%
Other	3.1%	4.0%
Language Spoken at Home (%)		
English	35.4%	60.2%
Spanish	54.7%	22.5%
Other	9.9%	17.3%
Educational Attainment (population aged 25+) (%)		
Less than High School Graduate	26.8%	13.0%
High School Graduate or GED	24.0%	16.4%
Some College (no degree)	25.6%	21.3%
College Degree	23.6%	49.3%

Source: American Community Survey, 2013 5-Year Estimates, 2015; Chen Ryan Associates, 2015

Note:
[1] The Palm Avenue Corridor Study Area includes the following census tracts: 101.03, 101.07, 101.10, 103.00, 104.01, 105.02

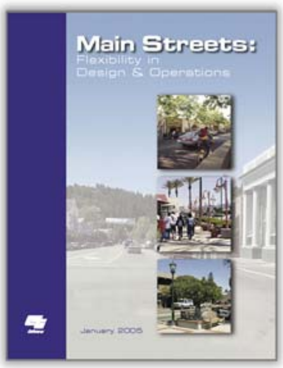
1.5 Relevant Planning Documents and Policies

This section provides an overview of planning documents relevant to the development of the Palm Avenue Revitalization Plan.

City of Imperial Beach Palm Avenue Mixed Use & Commercial Corridor Master Plan

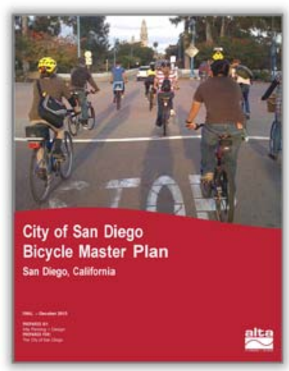
In 2000, the City of Imperial Beach initiated the Palm Avenue Mixed Use & Commercial Corridor Master Plan to enhance the public realm and redesign Palm Avenue within Imperial Beach to create a vibrant, safe, pedestrian and bicycle-friendly commercial hub. Proposed improvements include widened medians with additional landscaping; wider sidewalks with shade trees; additional crosswalks with ADA curb ramps; buffered bicycle lanes; and a number of traffic calming features to slow vehicular traffic and increase the safety of bicyclists and pedestrians. The environmental document (2012 certified PEIR) for the plan identified the intersection of Saturn Boulevard and Palm Avenue, which falls within the City of San Diego, as the only unmitigatable impact. To achieve the vision for Palm Avenue, the City of Imperial Beach is working with Caltrans to relinquish control of the roadway to enable greater design flexibility for future improvements.

Caltrans Main Streets: Flexibility in Design & Operations (2005)



Caltrans recognizes the importance main streets serve, and that main streets through a community can also be state highways. Caltrans developed this guide to assist communities in balancing social, economic, and environmental priorities with concerns for safe and efficient operations for drivers, pedestrians, bicyclists, and transit users. The guide provides a variety of potential traffic calming methods and features, pedestrian enhancements and streetscape improvements, including a description of each tool, and potential applications and benefits.

City of San Diego Bicycle Master Plan (2013)



The Bicycle Master Plan provides a future vision for bicycle transportation, recreation, and quality of life in San Diego. The plan includes a set of goals and policies partially derived from the 2008 General Plan, as well as additional policies that provide specific guidance for achieving an ideal cycling environment. The Bicycle Master Plan provides an inventory of existing bicycle facilities and conditions and a cycling needs analysis. The Bicycle Master Plan identifies citywide bicycle infrastructure recommendations consisting of bicycle facilities, intersections and other spot improvements and supporting facilities. The plan identifies the following proposed bicycle facilities within or adjacent to the project area:

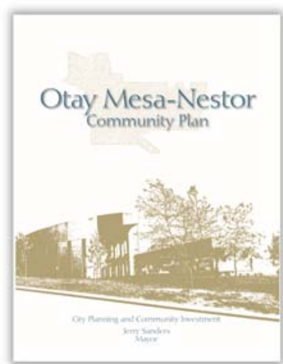
- Continuation of the Class II bike lanes along Palm Avenue from Saturn Boulevard to 24^{th} Street
- Bicycle Boulevard along Donax Avenue, from Saturn Boulevard to Georgia Street
- Class II bike lanes along Saturn Boulevard/19^{th} Street, from Leon Avenue to Palm Avenue

SANDAG's San Diego Regional Bicycle Plan (2010)

The San Diego Regional Bicycle Plan proposes a future vision for a regional bicycle network, support facilities, and programs to make cycling more practical and desirable to a broader range of people throughout the San Diego region. The Regional Bicycle Plan was developed by SANDAG as an appendix to the Regional Transportation Plan, ensuring consistency between the two documents. Two Regional Bicycle Corridors were identified within the project area:

- Imperial Beach Connector – "Enhanced Class III Bike Route" along Palm Avenue from Seacoast Drive to 13^{th} Street, then heading north along 13^{th} Street until connecting to the Bayshore Bikeway. This Regional Corridor also includes Donax Avenue from Saturn Boulevard to 13^{th} Street, which is classified as a Bicycle Boulevard.
- Border Access Corridor – "Enhanced Class II Bike Lane" along Coronado Avenue from east of Interstate 5, heading north along Saturn Boulevard to its northern terminus at Boundary Avenue, at which point the facility becomes a Class I Bike Path, eventually connecting to the Bayshore Bikeway.

Otay Mesa-Nestor Community Plan (1997)



The 1997 Otay Mesa-Nestor Community Plan is the currently adopted policy document guiding growth in the Otay Mesa-Nestor community. The plan includes guidance related to the Otay Valley Regional Park and Salt Ponds, Neighborhood Centers, Housing, Community Facilities, Public Safety and Enforcement, and Transportation Facilities. The plan identifies the concept of neighborhood centers as potential areas to catalyze community revitalization, and emphasizes a focus on geographic areas and communitywide issues in a comprehensive manner. The community plan identifies Palm Avenue as a focal point within the "Palm Avenue West in Egger Highlands" Neighborhood Center, and gave the following future vision for the area:

> "*This traditional automobile-oriented strip will become an attractive, revitalized commercial area that emphasizes the energy, movement, and vitality of its*

dominant linear form while providing a safe environment for pedestrians and transit users. Commercial uses will be intensified through redevelopment, infill development and efficient land utilization."

The plan identified the following guidelines to achieve the Palm Avenue West vision:

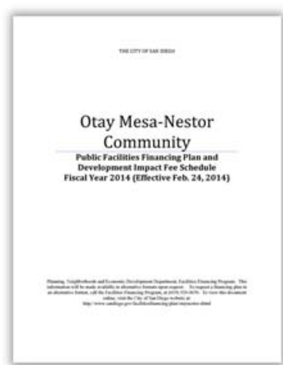
- Provide opportunities for intensified land use.
- Maximize on-street parking.
- Create a pedestrian-friendly environment by providing landscape or on-street parking areas as buffers and curb bulb-outs at intersections.
- Create a streetscape that establishes a sense of place and highlights the commercial strip as a gateway from Coronado and Imperial Beach to San Diego.

Some of the community plan's strategies for improving the existing transportation network are relevant to the Palm Avenue Revitalization Plan context, including the following:

- Palm Avenue/Saturn Boulevard Intersection Improvements – Four improvements are recommended for the intersection: 1) adding a westbound to southbound left-turn lane, 2) extending the length of the westbound to northbound right-turn lane, 3) add an eastbound to southbound right-turn lane, and 4) Add a southbound to westbound right-turn lane.
- Improve traffic flow along Palm Avenue by coordinating the traffic signals with the City's Master Traffic Control System.
- Utilize remaining Palm Avenue Improvement project funds to install community identification signs at both ends of Palm Avenue.
- Incorporate landscaping, street lights, unique community identification signs, and public art in transportation-focused Capital Improvement Projects.

Otay Mesa-Nestor Public Facilities Financing Plan FY2014 (2013)

The current Otay Mesa-Nestor Public Facilities Financing Plan was adopted by the City Council in December 2013, and serves to update and supersede the previously adopted 2006 Public Facilities Financing Plan. The Financing Plan identifies public facilities that are anticipated over the next 16 years, when full community buildout is expected, and serves to establish a financing strategy for the provision of those facilities, and to establish a Development Impact Fee schedule for new development. The following improvements are recommended in the FY 2014 Financing Plan:

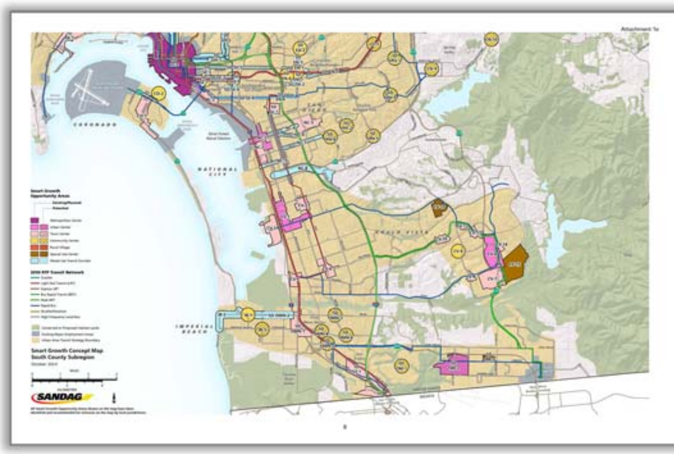

Otay Mesa-Nestor Community
Public Facilities Financing Plan and Development Impact Fee Schedule
Fiscal Year 2014 (Effective Feb. 24, 2014)

- Palm Avenue/Saturn Boulevard Intersection Improvements – This project would provide for improvements to the Palm Avenue/Saturn Boulevard intersection by extending the length of the westbound to northbound right-turn lane, and by adding a westbound to southbound left-turn lane and an eastbound to southbound right-turn lane.

- Streets and Transportation Improvements – This project would provide for necessary street, traffic and transportation-related improvements within the Otay Mesa-Nestor community planning area that may include, but are not limited to, curbs, gutters, paving, sidewalks, pedestrian ramps, retaining walls, storm drains, drainage improvements, flashing beacons, traffic signals, signal modifications and synchronizations, traffic calming measures, and improvements to promote and provide alternative transportation modalities.
- Transportation Facilities Accessibility Compliance – This project would provide funding for American Disabilities Act (ADA) Barrier Removal and disability related citizen complaints, at all Otay Mesa-Nestor public transportation facilities.

Smart Growth Concept Map (2014)

The initial Smart Growth Concept Map (SGCM) was adopted by SANDAG in 2006 to illustrate the location of existing, planned, and potential smart growth areas. The SGCM was developed as a "key implementation action of the Regional Comprehensive Plan (RCP)." Seven smart growth "place types" were used to categorize each opportunity area identified in the RCP and SGCM.



Smart growth designated areas serve to determine eligibility to participate in the Smart Growth Incentive Program (SGIP) which is funded through TransNet. The SGIP provides funding for local transportation-related infrastructure and planning projects that support smart growth.

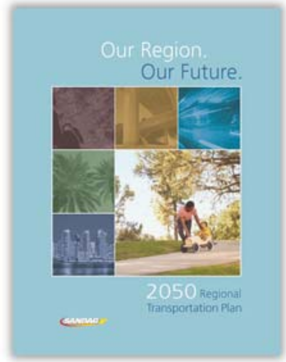
Palm Avenue from Interstate 5 to 13th Street is identified as a potential Mixed-Use Transit Corridor "place type" while west of 13th Street is identified as an existing/planned Mixed-Use Transit Corridor. Additionally, the area east of Mendoza Elementary School, generally from Coronado Avenue in the south to Palm Avenue in the north to the railroad tracks in the east, is classified as an existing/planned Town Center.

The following definitions of these place types are provided in SANDAG's *Designing for Smart Growth* guidelines:

- *Mixed-Use Transit Corridor* – These are roadways serving as major transit corridors with residential, commercial and mixed-use development along the corridor, as well as similar development within one or two blocks of the arterial. A Mixed-Use Transit Corridor is served by high-frequency bus service. The minimum residential target density for this place type is 25 units/acre, while no minimum employment target density is provided.

- *Town Center* – Town Centers are areas with a mix of office and commercial development, including residential mixed-use, that draw from their subregional areas and are served by regional or corridor transit lines, local bus services or shuttle services. The minimum residential target density for this place type is 20 units/acre, while the minimum employment target density is 30 employees/acre.

San Diego 2050 Regional Transportation Plan (2011)



The 2050 Regional Transportation Plan (RTP) provides long-range guidance for the regional transportation system. Looking ahead 40 years, the RTP envisions new jobs and housing to be situated in environmentally sustainable communities that are more conducive to walking and cycling. The plan also envisions these communities having more access to public transit. To achieve a more multi-modal regional transportation network, the 2050 RTP outlines projects for transit, rail and bus services, express or managed lanes, highways, local streets, bicycling, and walking. Projects identified in the RTP within the project area include the following:

- 2035 High Frequency Local Bus Routes – The entire extent of Palm Avenue is proposed as having High Frequency Local Bus service, defined as headways of 10 minutes or less throughout the day.

2.0 Corridor Environment

This chapter presents a summary of the existing and planned corridor environment as it relates to land use, urban design, community health, and storm water runoff.

2.1 Existing and Planned Land Uses

Land use planning along the Palm Avenue corridor is guided by the current Otay Mesa-Nestor Community Plan, adopted in 1997 and last amended in 2007. **Figure 2-1** displays the existing land uses throughout the study area. As shown, land uses along Palm Avenue are primarily designated as commercial/office with three large mobile home parks also fronting the corridor. Additionally, the Salt Ponds, designated as open space, also front a portion of the north side of Palm Avenue between Georgia Street and 15th Street. Single family residential land uses are present to the south of the corridor.

Figure 2-2 summarizes existing land uses by acreage for the blocks within the Palm Avenue study area. As shown, commercial/office land uses represent the greatest acreage by a single land use within the study area, followed by mobile home parks and single family residential.

Figure 2-3 displays the planned land uses as identified by SANDAG, and which should reflect the community's 2007 plan. As shown, mixed use sites emerge in many locations along the corridor within Imperial Beach and in one large parcel southwest of the Hollister Street and Palm Avenue intersection. Three of the four existing mobile home parks along the corridor are planned as future multi-family residential sites.

Table 2-1 summarizes changes in land use acreage from existing to planned for the Palm Avenue study area. As shown, multi-family residential acreage increases substantially, by 26 acres, to account for 41 acres of the study area. Mixed use sites, of which there are none in the study area currently, account for nearly 22 acres in the future. The increases in those aforementioned categories are at the expense of mobile home parks and single family residential, which declined in coverage by 35 acres and 9 acres, respectively.

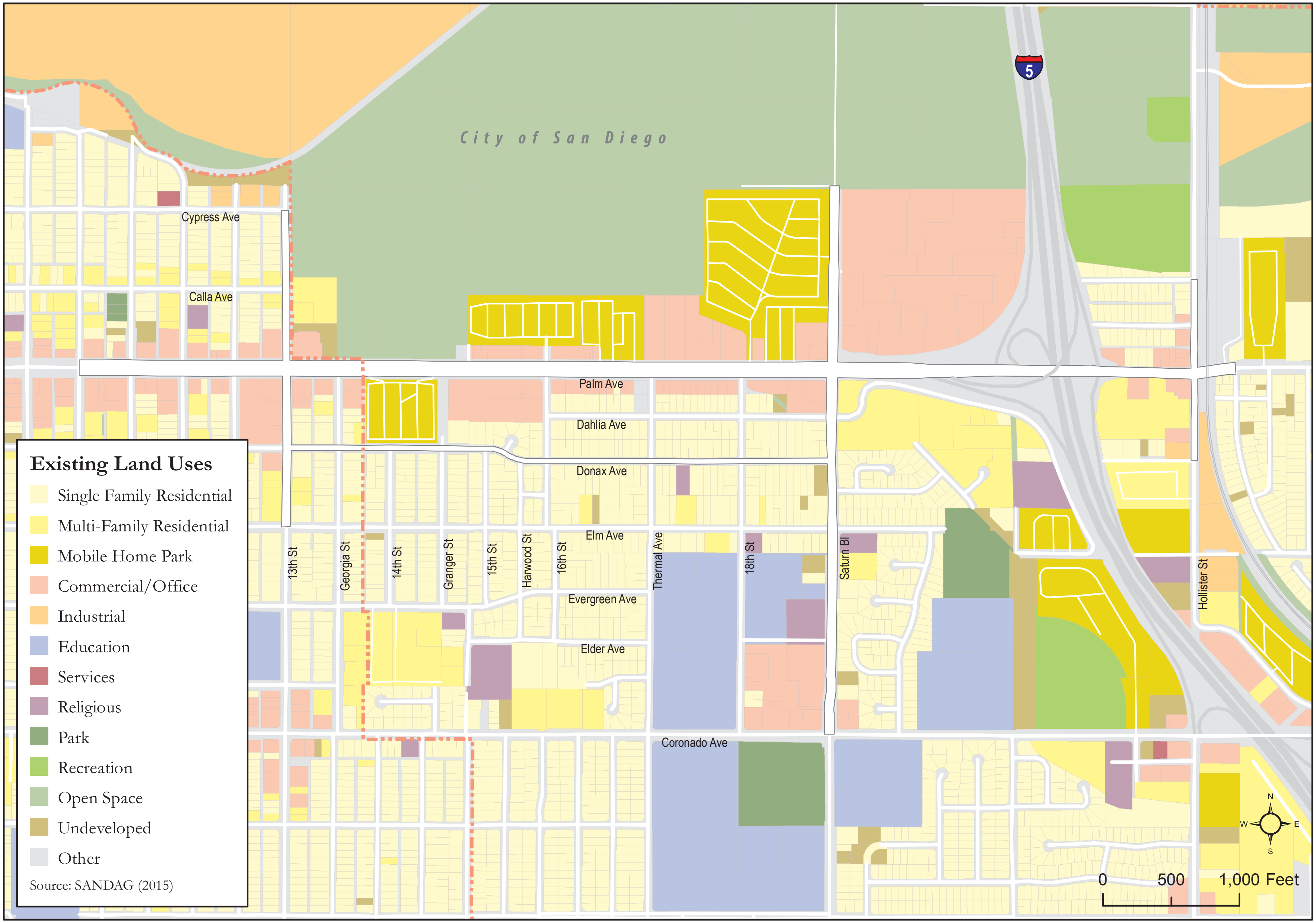
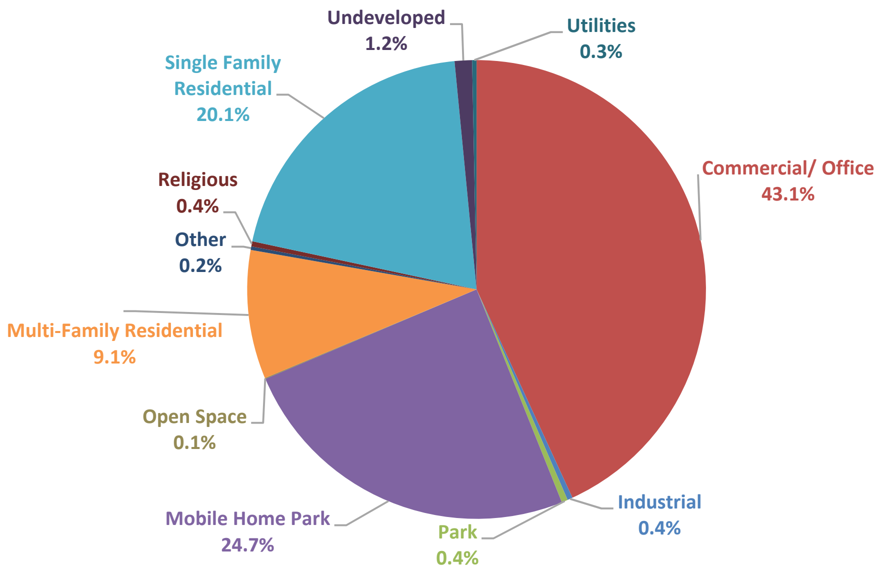


Figure 2-1
Existing Land Uses

Figure 2-2 Summary of Existing Land Uses Adjacent to Palm Avenue



Source: SANDAG, 2015; Chen Ryan Associates, 2015

Note:
[1] Does not include public right-of-way

Table 2-1 Existing Acreage, Planned Acreage, & Acreage Change

Land Use	Existing Acreage	Planned Acreage	Acreage Change
Commercial/Office	70.4	69.9	-0.5
Industrial	0.6	0.0	-0.6
Mobile Home Park	40.3	5.3	-35.0
Multi-Family Residential	14.8	41.0	26.2
Open Space	0.1	0.1	0.0
Other	0.4	0.2	-0.2
Park	0.7	0.7	0.0
Religious	0.6	0.0	-0.6
Single Family Residential	32.8	23.8	-9.0
Undeveloped	2.0	0.0	-2.0
Utilities	0.5	0.5	0.0
Mixed Use	0.0	21.8	21.8

Source: SANDAG, 2015; Chen Ryan Associates, 2015

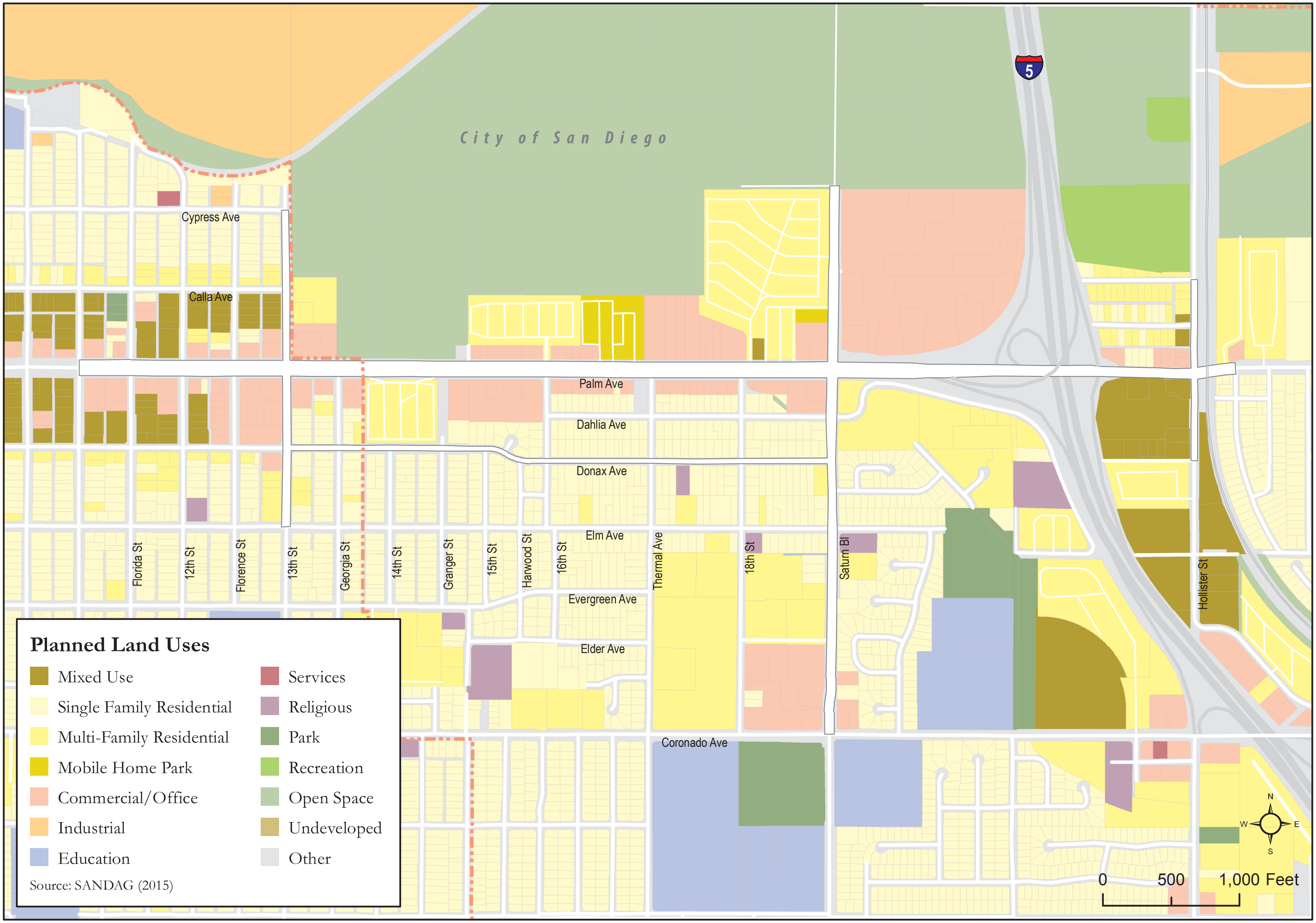
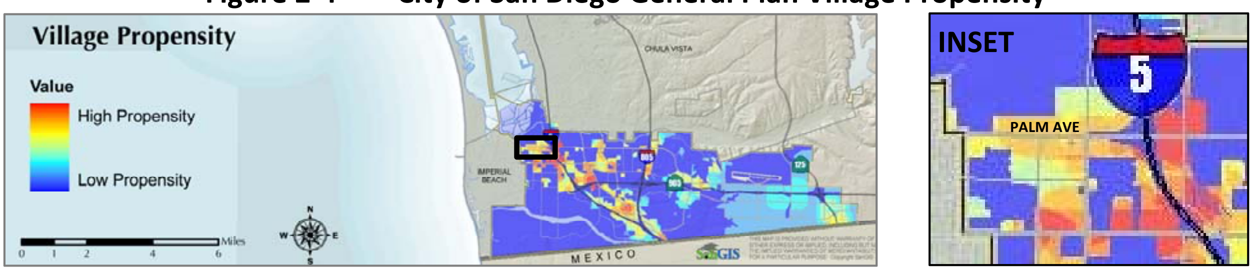


Figure 2-3
Planned Land Uses

Village Propensity
The City of San Diego General Plan includes a village propensity model which identifies concentrations of village characteristics, including land use features such as parks, fire stations, multifamily residential, mixed-use, commercial uses, and transportation features such as high-frequency transit routes and stations/stops. These land use and transportation features reflect factors likely to encourage and support active transportation and the use of public transportation. The propensity model results are displayed in the citywide General Plan, illustrating the varying degrees of village propensity with a color ramp.

Figure 2-4 provides a snapshot of the City of San Diego's General Plan Village propensity map, displaying the southernmost portion of the City of San Diego, including the project area and surrounding communities. As shown, Palm Avenue, west of I-5 within the City of San Diego is predominantly displayed as having medium-high village propensity, likely due to the presence of commercial and multi-family residential land uses, and bus routes and stops. The area east of I-5, within the project area, is characterized by the highest level of propensity, likely due to the trolley station, bus routes and stops, and commercial and multi-family residential land uses.

Figure 2-4 City of San Diego General Plan Village Propensity



Source: City of San Diego General Plan, 2008

2.2 Urban Design

The Palm Avenue corridor provides a major connection between I-5 and the Pacific Ocean, as well as the cities of Imperial Beach and Coronado. The surrounding community was developed following a grid pattern, resulting in a network of north-south and east-west running streets and alleys that provide strong connections throughout the community. A wide median is present on Palm Avenue, from the western extent of the project area to the I-5 northbound ramps. The median is intermittently landscaped from the western study area extent to Saturn Boulevard, with a fence also present from the City of San Diego boundary to Saturn Boulevard to deter pedestrians from crossing. The median restricts north-south movements for all transportation modes. Only five intersections within the project area provide for north-south connections across Palm Avenue.

The Palm Avenue corridor was developed as a traditional automobile-oriented strip, with many automotive related businesses lining the roadway, and street parking largely permitted along both sides of Palm Avenue. Larger commercial developments, such as the Southland Plaza

Shopping Center (located on the northeastern corner of Saturn Boulevard and Palm Avenue) and the Bay City Plaza (located on the southwestern corner of 16th Street and Palm Avenue) have parking lots fronting Palm Avenue, the businesses setback from the street.

Roadway Network & Parcel Patterns

Figure 2-5 displays roadway network and parcel patterns within the study area. As shown, parcel sizes on the south side of Palm Avenue, from 16th Street to 18th Street are relatively small, approximately 50 feet wide, providing for a mix of commercial businesses. These businesses generally do not have a setback from the street, making the environment more inviting to pedestrians. Conversely, parcels on the north side vary in width, but are generally much larger, and are commonly setback from the street, with parking in the fronts of buildings. Pedestrians and cyclists, despite the automobile-oriented conditions along Palm Avenue, benefit from the connectivity and density of the roadway network in the adjacent neighborhoods created from the small block sizes and grid pattern development. Roadways intersecting and parallel with Palm Avenue are much narrower in width.

Figure 2-6 displays the typical roadway cross-sections along Palm Avenue within the study area. As shown, the width of Palm Avenue west of Interstate 5 varies from 110 to 118 feet, presenting long crossing distances for pedestrians. Cyclists benefit from wider than typical 8 foot bike lanes to the west of 15th Street. East of 15th Street, the shared bike lane/parking lane is 12 feet wide, creating a constrained environment for cyclists with only three feet of space between the travel lane and the "door zone" (the lateral width of a parked car with the driver side door fully open is estimated to be about 9 feet).

Palm Avenue provides one of the only east-west connections for residents/visitors in the community therefore traffic funnels onto Palm Avenue due to a lack of alternative routes. This results in large volumes of vehicular traffic and an unpleasant environment for bicycles and pedestrians.

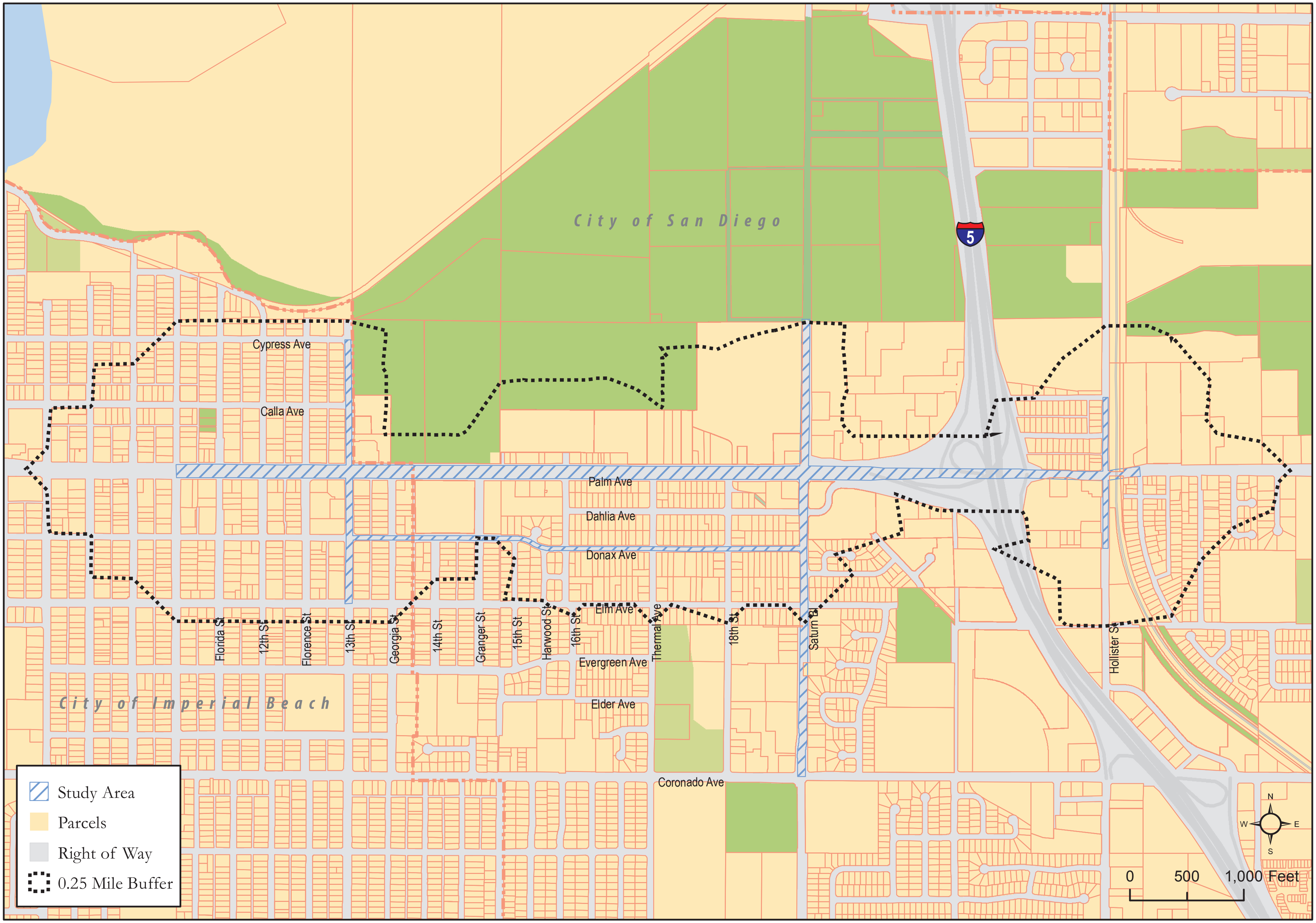


Figure 2-5
Parcels and Right-of-Way in the Study Area

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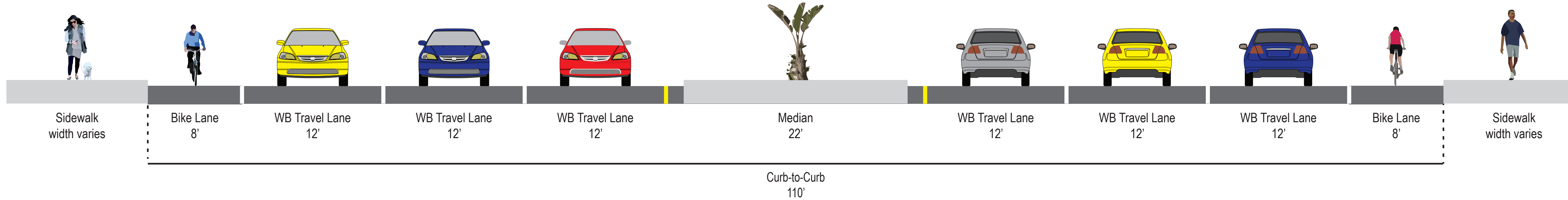
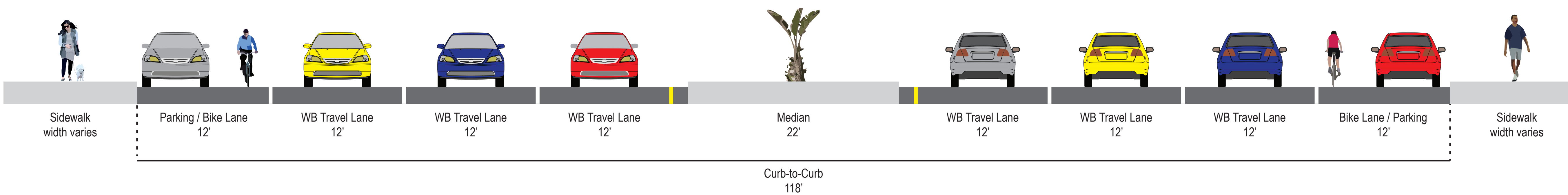
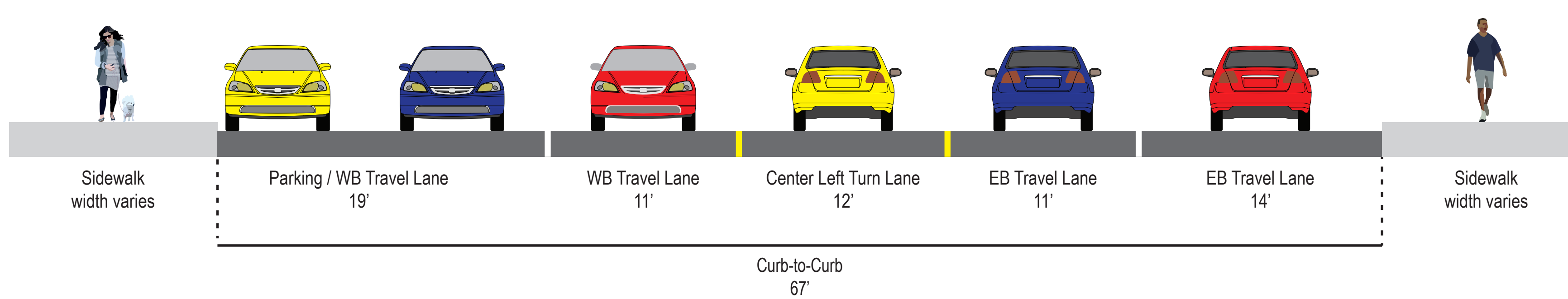
Palm Avenue
between 13th Street and 15th Street



Palm Avenue
between 15th Street and Saturn Boulevard



Palm Avenue
between I-5 NB Ramps and Hollister Street



Scale = 1":10'

Figure 2-6

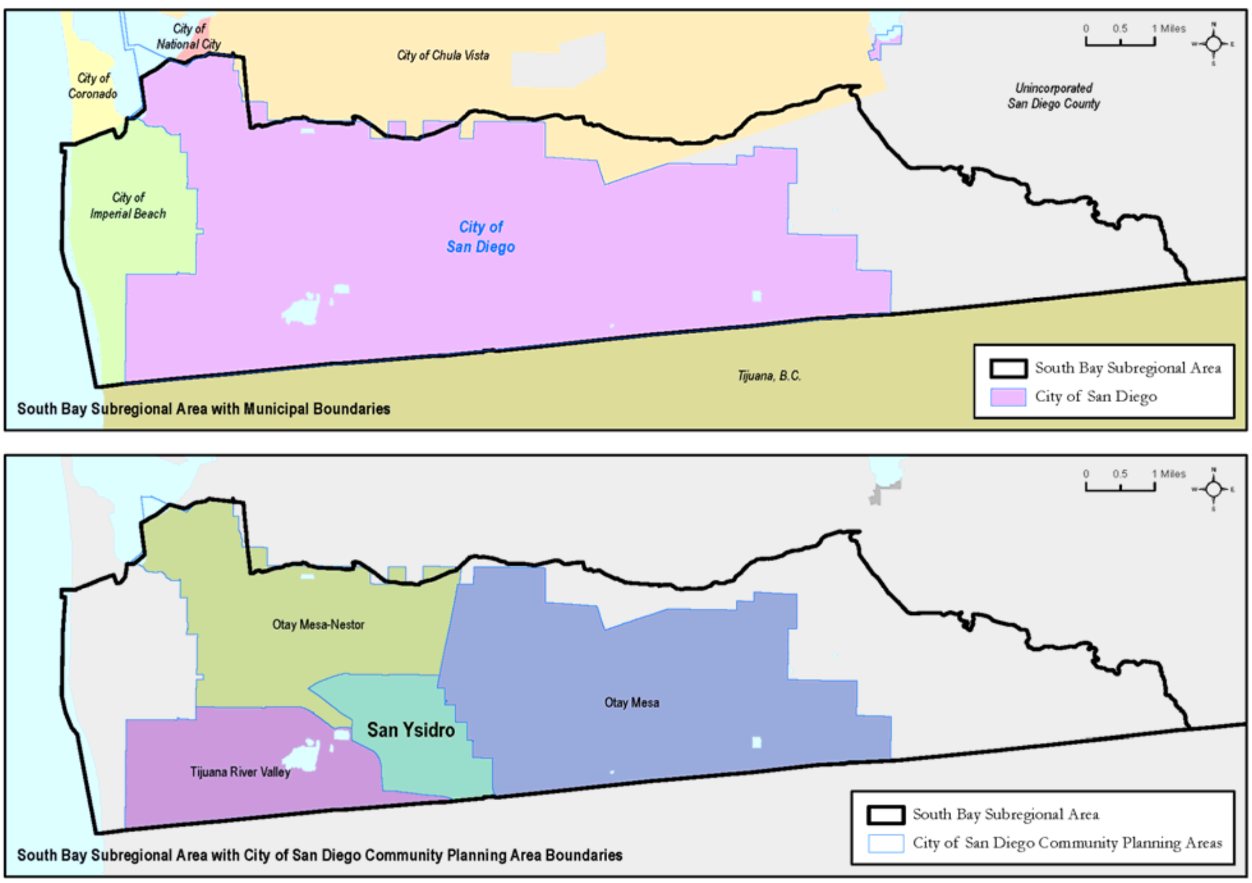
Typical Cross-sections Along Palm Avenue

2.3 Community Health

Linkages between community health and the built environment are increasingly gaining attention. The type, concentration, and proximity of land uses and transportation facilities impact the lives of community members. Comparing health outcome rates between geographies is one method to determine whether a particular community or neighborhood is experiencing adversely high rate of negative health outcomes.

The County of San Diego Health and Human Services Agency Public Health Services – Community Health Statistics Unit prepared the 2013 Community Profiles for 41 South Bay Sub-Regional Areas (SRA) across the region, providing an overview of health behavior, disease, and injury data. The Palm Avenue Revitalization Plan study area is located within the South Bay SRA, which also includes the City of Imperial Beach; the City of San Diego communities of Otay Mesa-Nestor, Tijuana River Valley, San Ysidro, and Otay Mesa; and small portions of unincorporated San Diego County adjacent to the US-Mexico border and the Otay Mesa community. **Figure 2-7** illustrates the community planning area boundaries, city boundaries, and the South Bay SRA boundary.

Figure 2-7 City, Community Planning Area, and South Bay SRA Boundaries



Source: SANDAG, 2015; Chen Ryan Associates, 2015

Table 2-2 compares key health outcomes for residents in the South Bay SRA and the San Diego Region. As shown, populations within the South Bay SRA were reported to experience much higher rates of diabetes, chronic obstructive pulmonary disease (COPD), asthma, and pedestrian injury when compared to the San Diego Region. Lower rates of cyclist injury, cancer, psychological disorder, substance abuse, and crime injury were reported for the South Bay SRA.

Table 2-2 2010 Health Outcome Rates – Comparing the South Bay SRA to the San Diego Region (Emergency Room Discharges per 1,000 Population)

Health Outcome	South Bay SRA Rate	San Diego Region Rate	Percent Difference
Diabetes	2.05	1.36	+25.1%
COPD	3.71	2.70	+20.1%
Asthma	4.10	3.09	+17.8%
Pedestrian Injury	0.35	0.29	+13.7%
CHD	0.32	0.29	+6.2%
Stroke	0.49	0.46	+3.9%
Motor Vehicle Injury	5.18	5.17	+0.1%
Cyclist Injury	0.23	0.29	-15.5%
Cancer	1.29	1.64	-17.0%
Substance Abuse	0.47	0.66	-23.1%
Crime Injury	0.19	0.27	-24.1%
Psychological Disorder	0.71	1.06	-28.4%

Source: County of San Diego Health and Human Services Agency Community Health Statistics, 2010; Chen Ryan Associates, 2015

3.0 Mobility Analysis Methodology

This chapter summarizes the methods employed to assess the pedestrian, bicycle, transit, and vehicular mobility systems, including demand, safety, and an analysis of the environment as it relates to the context of each mode. The resultant analysis of each travel mode can be found in Chapter 4 of this report.

3.1 Pedestrian

This section describes the methods used to evaluate pedestrian demand, safety, and the quality of the pedestrian environment.

Pedestrian Demand
An analysis of pedestrian demand was performed drawing from two sources of pedestrian activity data, including the Census Bureau survey data on resident's work trip mode shares and peak period pedestrian volume counts performed in support of this project. Areas of higher pedestrian demand represent locations where more people were observed or are anticipated to be walking. This information was factored into the project prioritization process in chapter 8 and may help justify additional pedestrian improvements, such as wider sidewalks or crosswalks.

Pedestrian Safety
Historic vehicular-pedestrian collision data was obtained from the Statewide Integrated Traffic Records Service (SWITRS) and from the City of San Diego for the 5-year period from 2008 to 2013. The two collision databases were merged together to form a complete picture of the corridor due to the multi-jurisdictional location of the project area, as well as the facility being under Caltrans control. This process was replicated for each mode's safety analysis. This data was geocoded and mapped to display locations along Palm Avenue where collisions have occurred and may require additional pedestrian safety considerations.

Pedestrian Analysis
The pedestrian environment is assessed by evaluating roadway segments and intersections using the Pedestrian Environmental Quality Index[1] (PEQI). PEQI assigns a score to each roadway segment and intersection which characterizes the quality of the pedestrian environment. Scoring requires data collection on a variety of attributes of the roadway, intersection and edge space of the roadway – each attribute is weighted differently.

Table 3-1 displays the attributes influencing roadway segment and intersection PEQI scores. The weights of each attribute are provided in **Appendix C**.

[1] Originally developed by the San Francisco Department of Public Health, the PEQI was refined by researchers from UCLA and applied in Los Angeles as well as in San Diego for the *47th Street Trolley Station Area Planning: A Health Benefits and Impacts Analysis*. The PEQI methods used in Los Angeles and San Diego are utilized for the purposes of this Plan, and are described in detail in a document entitled *Walkability & Pedestrian Safety in Boyle Heights*. A data collection checklist and weights for all attributes are shown in **Appendix C**.

Table 3-1 PEQI Analysis Inputs

PEQI Roadway Segment Analysis Inputs	
• Number of Lanes	• Public Art/Historical Sites
• Posted Speed Limit	• Presence of Illegal Graffiti and Litter
• Street Traffic Calming Features	• Pedestrian-Scale Lighting
• Sidewalk Width	• Construction Sites
• Sidewalk Surface Condition	• Abandoned Buildings
• Sidewalk Obstructions	• Vacant Lots
• Presence of Curbs	• Bike Racks
• Driveway Cuts	• Street Noise
• Trees & Landscaping	• Odors
• Public Seating	• Safety Perception
• Presence of Buffers	• Perception of Segment Attractiveness
• Storefront/Retail Use	
PEQI Intersection Analysis Inputs	
• Crosswalk Presence and Type	• "No Turn On Red" Signs/Signals
• Pedestrian Signals and Signs	• Crossing Time and Distance
• Signals and Stop Signs	• Intersection Traffic Calming Features

Source: UCLA School of Center for Occupational and Environmental Health, 2013

3.2 Bicycle

This section describes the methods used to evaluate bicycle demand, safety, and the quality of the cycling environment.

Bicycle Demand
An analysis of bicycle demand was performed drawing from two sources of bicycle activity data, Census Bureau survey data reflecting resident's work trip mode shares and peak period bicycle volume counts performed in support of this project. Areas of higher bicycle demand represent locations where more people were observed or are anticipated to be bicycling. This information was factored into the project prioritization process in chapter 8 and may help justify additional bicycle infrastructure, such as signage, bicycle parking, or more bicycle facilities.

Bicycle Safety
Historic vehicular-bicycle collision data was obtained from SWITRS and the City of San Diego for the 5-year period from 2008 to 2013. This data was geocoded and mapped to display locations along Palm Avenue where collisions have occurred and may require additional bicycle considerations.

Bicycle Analysis
The bicycle environment is assessed using the Bicycle Level of Traffic Stress (LTS) methodology for characterizing cycling environments as developed by Mekuria, et al. (2012) of the Mineta Transportation Institute and reported in *Low-Stress Bicycle and Network Connectivity*. LTS

classifies the street network into categories according to level of stress it causes cyclists, taking into consideration a cyclist's physical separation from vehicular traffic, vehicular traffic speeds along the roadway segment, number of travel lanes, and factors related to intersection approaches with right-turn lanes and unsignalized crossings.

Portland Bicycle Coordinator Roger Gellar released a paper for the Portland Bureau of Transportation entitled "Four Types of Cyclists" which presented four categories of cyclists that classify the full population of existing and potential cyclists. **Table 3-2** shows these categories, including a description of the population and the estimated percent of the population represented by each category.

Table 3-2 Cyclist Traffic Tolerance Categories

Cyclist Category (Traffic Tolerance Demographic)	Description	Estimated Percent of Population
Strong & Fearless	Cycling population is undeterred by any type of roadway conditions	<1%
Enthused & Confident	Cycling population may prefer separate facilities, but are generally comfortable sharing roadway with traffic in all but the most stressful conditions	7%
Interested but Concerned	This population would ride if they felt safer on the roadways – generally will only ride on separated facilities or very low stress roadway conditions	60%
No Way No How	This population is not at all interested in cycling	33%

Source: Gellar, et al., 2006

The LTS analysis classifies the street network to reflect the "traffic tolerance demographic" categories presented in Table 3-2 according to the estimated level of stress it causes cyclists, taking into consideration a cyclist's physical separation from vehicular traffic, vehicular traffic speeds along a roadway segment, number of travel lanes, and factors related to intersection approaches with right-turn lanes and unsignalized crossings. LTS scores range from 1 (lowest stress) to 4 (highest stress), and correspond to roadways that different cycling populations find suitable for riding on considering their stress tolerance.

Table 3-3 shows the LTS categories with descriptions of traffic stress experienced by the cyclist and the cycling conditions associated with each category. As shown, each LTS classification is associated with Gellar's traffic tolerance categories, with the exception of the "No Way No How" demographic from Table 3-2. This population was assumed to represent virtually no opportunity for engaging in cycling, and therefore it was left out of the LTS classifications. The "Interested but Concerned" demographic is split across two categories, differentiating the levels of traffic stress affecting average, mainstream adult populations (LTS 2) from the levels of traffic stress affecting youth and other vulnerable populations (LTS 1).

Table 3-3 Level of Traffic Stress Classifications and Descriptions

Level of Stress Category	Level of Stress Description	Cycling Conditions Fitting LTS Category	Baseline Acceptability to Populations
LTS 1	Presenting little traffic stress and demanding little attention from cyclists; Suitable for almost all cyclists, including children trained to safely cross intersections	▪ Facility that is physically separated from traffic or an exclusive cycling zone next to a slow traffic stream with no more than one lane per direction ▪ A shared roadway where cyclists only interact with the occasional motor vehicle with a low speed differential ▪ Ample space for cyclist when alongside a parking lane ▪ Intersections are easy to approach and cross	Interested but Concerned – Vulnerable Populations
LTS 2	Presenting little traffic stress but demanding more attention than might be expected from children	▪ Facility that is physically separated from traffic or an exclusive cycling zone next to a well-confined traffic stream with adequate clearance from parking lanes ▪ A shared roadway where cyclists only interact with the occasional motor vehicle (as opposed to a stream of traffic) with a low speed differential ▪ Unambiguous priority to the cyclist where cars must cross bike lanes (e.g. at dedicated right-turn lanes); design speed for right-turn lanes comparable to bicycling speeds ▪ Crossings not difficult for most adults	Interested but Concerned – Mainstream Adult Populations
LTS 3	Presenting enough traffic stress to deter the Interested but Concerned demographic	▪ An exclusive cycling zone (lane) next to moderate-speed vehicular traffic ▪ A shared roadway that is not multilane and has moderately low automobile travel speeds ▪ Crossings may be longer or across higher-speed roadways than allowed by LTS 2, but are still considered acceptably safe to most adult pedestrians	Enthused & Confident
LTS 4	Presenting enough traffic stress to deter all but the Strong & Fearless demographic	▪ An exclusive cycling zone (lane) next to high-speed and multi-lane vehicular traffic ▪ A shared roadway with multiple lanes per direction with high traffic speeds ▪ Cyclist must maneuver through dedicated right-turn lanes containing no dedicated bicycling space and designed for turning speeds faster than bicycling speeds	Strong & Fearless

Source: Mekuria, et al., 2012

3.3 Transit

This section describes the methods used to evaluate transit demand, safety, and the quality of the transit environment.

Transit Demand
Transit commute mode share was compared between the Palm Avenue corridor study area, the City of San Diego, and the County of San Diego, as reported by the 2013 American Community Survey (ACS) 5-Year Estimates.

In addition, Fiscal Year 2014 boarding and alighting data was obtained from Metropolitan Transit System (MTS) and used to understand the relative level of transit demand by transit stop along the corridor.

Safety around Transit Stops
Every transit rider is a pedestrian or cyclist at some point during their trip. Historic vehicular-pedestrian and vehicular-bicycle collision data were obtained from SWITRS and the City of San Diego for the 5-year period from 2008 to 2013. This data was geocoded and mapped to display collision locations within 500 feet of transit stops along Palm Avenue.

Transit Stop Environment
Each bus stop and transit station in the project area was reviewed for the presence of the following amenities:

- Shelter
- Seating
- Trash Receptacle
- Maps/Route Information
- Lighting
- ADA Compliance

3.4 Vehicular

Vehicular level of service (LOS) is a quantitative measure representing quality of service from the driver's perspective. These conditions are generally influenced by speed, travel time, freedom to maneuver, comfort, convenience, and safety. LOS A represents the best operating conditions from a driver's perspective, while LOS F represents the worst. **Table 3-4** presents definitions of vehicular LOS A through F as described in the Highway Capacity Manual (2000).

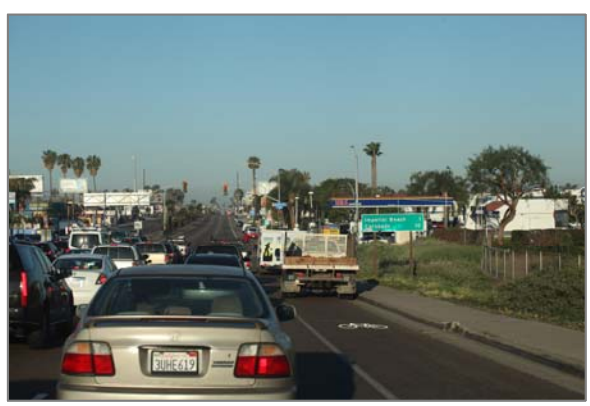


Table 3-4 Vehicular Level of Service Definitions

LOS	Characteristics
A	Primarily free-flow operation. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Controlled delay at the boundary intersections is minimal. The travel speed exceeds 85% of the base free-flow speed.
B	Reasonably unimpeded operation. The ability to maneuver within the traffic stream is only slightly restricted and control delay at the boundary intersections is not significant. The travel speed is between 67% and 85% of the base free-flow speed.
C	Stable operation. The ability to maneuver and change lanes at mid-segment locations may be more restricted than at LOS B. Longer queues at the boundary intersections may contribute to lower travel speeds. The travel speed is between 50% and 67% of the base free-flow speed.
D	Less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volume, or inappropriate signal timing at the boundary intersections. The travel speed is between 40% and 50% of the base free-flow speed.
E	Unstable operation and significant delay. Such operations may be due to some combination of adverse signal progression, high volume, and inappropriate signal timing at the boundary intersections. The travel speed is between 30% and 40% of the base free-flow speed.
F	Flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay and extensive queuing. The travel speed is 30% or less of the base free-flow speed. Also, LOS F is assigned to the subject direction of travel if the through movement at one or more boundary intersections have a volume-to-capacity ratio greater than 1.0.

Source: 2000 Highway Capacity Manual, 2000

Roadway Segment Level of Service Standards and Thresholds

The analysis of roadway segment LOS is based on the functional classification of the roadway, the maximum capacity, roadway geometrics, and existing or forecasted average daily traffic (ADT) volumes. **Table 3-5** presents the City of San Diego roadway segment daily capacity and level of service thresholds.

Table 3-5 Roadway Segment Daily Capacity and Level of Service Standards

Roadway Functional Classification	Level of Service				
	A	B	C	D	E
Expressway (6-lane)	< 30,000	< 42,000	< 60,000	**< 70,000**	< 80,000
Prime Arterial (6-lane)	< 25,000	< 35,000	< 50,000	**< 55,000**	< 60,000
Major Arterial (6-lane, divided)	< 20,000	< 28,000	< 40,000	**< 45,000**	< 50,000
Major Arterial (4-lane, divided)	< 15,000	< 21,000	< 30,000	**< 35,000**	< 40,000
Collector (4-lane w/ center left-turn lane)	< 10,000	< 14,000	< 20,000	**< 25,000**	< 30,000
Collector (3-lane w/ center left-turn lane)	< 7,500	< 10,500	< 15,000	**< 19,000**	< 22,500
Collector (4-lane w/o center lane)	< 5,000	< 7,000	< 10,000	**< 13,000**	< 15,000
Collector (2-lane w/ center left-turn lane)					
Collector (2-lane no fronting property)	< 4,000	< 5,500	< 7,500	**< 9,000**	< 10,000
Collector (2-lane w/ commercial fronting)	< 2,500	< 3,500	< 5,000	**< 6,500**	< 8,000
Collector (2-lane multi-family)					
Sub-Collector (2-lane single-family)	-	-	< 2,200	**-**	-

Source: City of San Diego Traffic Impact Study Manual, 1998

Note:
Bold numbers indicate the ADT thresholds for acceptable LOS.

These standards are generally used as long-range planning guidelines to determine the functional classification of roadways. The actual capacity of a roadway facility varies according to its physical and operational attributes. LOS D is considered acceptable for Mobility Element roadway segments in the City of San Diego. In some cases, a roadway segment that functions at LOS E or F based on theoretical capacity, is found to operate acceptably in practice. In such cases, HCM arterial analysis may be conducted and utilized (or intersection analysis, if arterial analysis is not applicable) to provide a more accurate indication of LOS.

Peak Hour Intersection Level of Service Standards and Thresholds

This section presents the methodologies used to perform peak hour intersection capacity analysis, for both signalized and unsignalized intersections. The following assumptions were utilized in conducting all intersection level of service analyses:

- *Pedestrian Calls per Hour***:** Obtained from existing pedestrian counts.
- *Heavy Vehicle Factor***:** Obtained from existing vehicle classification counts. The counts indicated a heavy vehicle factor of 6% in the eastbound direction and 9% westbound.
- *Peak Hour Factor***:** Obtained from existing peak hour counts.
- *Signal Timing***:** Obtained from existing signal timing plans (as of January 2015).

Signalized Intersection Analysis

The signalized intersection analysis utilized in this study conforms to the operational analysis methodology outlined in *2000 Highway Capacity Manual (HCM), Transportation Research Board Special Report 209*. This method defines LOS in terms of delay, or more specifically, average control delay per vehicle (seconds/vehicle).

The *2000 HCM* methodology sets 1,900 passenger-cars per hour per lane (pc/hr/pl) as the ideal saturation flow rate at signalized intersections based upon the minimum headway that can be sustained between departing vehicles at a signalized intersection. The service saturation flow rate, which reflects the saturation flow rate specific to the study facility, is determined by adjusting the ideal saturation flow rate for lane width, on-street parking, bus stops, pedestrian volume, traffic composition (or percentage of heavy vehicles), and shared lane movements (e.g. through and right-turn movements sharing the same lane). The LOS criteria used for this technique are described in **Table 3-6**. The computerized analysis of intersection operations was performed utilizing the *Synchro 8.0 (2000 HCM methodology)* traffic analysis software (by Trafficware, 2011).

Table 3-6 Signalized Intersection Level of Service
Highway Capacity Manual Operational Analysis Method

Average Control Delay Per Vehicle (seconds)	Level of Service (LOS) Characteristics
<u><</u>10.0	*LOS A* occurs when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.
10.1 – 20.0	*LOS B* occurs when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.
20.1 – 35.0	*LOS C* occurs when progression is favorable or the cycle length is moderate. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.
35.1 – 55.0	*LOS D* occurs when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.
55.1 – 80.0	*LOS E* occurs when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.
>80.0	*LOS F* occurs when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Source: 2000 Highway Capacity Manual, Transportation Research Board Special Report 209

Unsignalized Intersection Analysis

Unsignalized intersections, including two-way and all-way stop controlled intersections were analyzed using the *2000 HCM* unsignalized intersection analysis methodology. The Synchro 8.0 software supports this methodology and was utilized to produce LOS results. The LOS for a two-way stop controlled (TWSC) intersection is determined by the computed or measured control delay and is defined for each minor movement. The LOS for an all-way stop controlled (AWSC) intersection is determined by the computed or measured average control delay of all movements. **Table 3-7** summarizes the level of service criteria for unsignalized intersections. Consistent with City policy, LOS E was used in this study as the minimum acceptable LOS for peak hour intersection operations.

Table 3-7 Level of Service Criteria for Stop Controlled Unsignalized Intersections

Average Control Delay (sec/veh)	Level of Service (LOS)
<u><</u>10.0	A
10.1 – 15.0	B
15.1 – 25.0	C
25.1 – 35.0	D
35.1 – 50.0	E
>50.0	F

Source: 2000 Highway Capacity Manual

Arterial Speed Analysis

The arterial speed analysis was performed utilizing the Synchro 8.0 software which follows the HCM 2000 methodology. Arterial speed analysis takes the following factors into consideration to produce an arterial LOS for each direction of travel along the roadway segment:

- Length of Roadway Segment
- Flow Speed (posted speed limit)
- Running Time (roadway segment distance divided by flow speed)
- Signal Delay
- Travel Time (running time + signal delay)
- Arterial Speed (length of roadway segment divided by travel time)

An arterial LOS is assigned after the software classifies the roadway segments based on distances between intersections and roadway segment speeds. **Table 3-8** shows the LOS thresholds used for the arterial analysis.

Table 3-8 Arterial Analysis Level of Service Thresholds

Arterial Class	I	II	III
Range of Free Flow Speed (mph)	45 to 35	35 to 30	30 to 25
Typical Free Flow Speed (mph)	40	33	27
Level of Service	**Average Travel Speed (mph)**		
A	35	30	25
B	28	24	19
C	22	18	13
D	17	14	9
E	13	10	7
F	< 13	< 10	< 7

Source: 2000 Highway Capacity Manual

VISSIM Micro-Simulation Model

A micro-simulation model was developed using the *PTV VISSIM* micro-simulation software (by PTV group, Version 7). The micro-simulation model was calibrated to existing volumes and field conditions using the following traffic volume calibration criteria, as outlined in the Federal Highway Administration's (FHWA) Traffic Analysis Toolbox Volume 3:

- Individual Link Flows are within 15% of the observed volume for 85% of the cases.
- GEH (Geoffrey E. Havers) Statistic <5% for individual link flows for 85% of the cases.
- GEH statistic is used to compare observed traffic volumes with simulated traffic volumes as follows:

$$GEH = \sqrt{\frac{(E-V)^2}{(E+V)/2}}$$

where:

E = model estimated volume
V = field count

- Queuing visually accepted to analyst's satisfaction.

Intersection Queuing Analysis

A queuing analysis using the VISSIM micro-simulation model was conducted at each of the study intersections to assess potential overflow issues at exclusive turn-lanes and closely spaced intersections. Closely spaced intersections include all ramp intersections and intersections less than 500 feet from each other. Limitations in turn-lane storage capacity can result in turning vehicles overflowing into adjacent travel lanes. Excessive queuing at closely spaced intersections (when queue lengths exceed the distance to upstream intersections) can negatively affect the operations of upstream intersections. When either situation occurs, traffic operations can deteriorate, while it would otherwise show acceptable levels of service.

Freeway Segment Analysis

Freeway level of service analysis is based upon the procedures discussed in the Caltrans *Guide for the Preparation of Traffic Impact Studies, December 2002*. The procedure for calculating freeway level of service involves estimating a peak hour volume capacity (V/C) ratio. Peak hour volumes are estimated from the application of design hour ("K"), directional ("D") and truck ("HV") factors to Average Annual Daily Traffic (AADT) volumes. The base capacities were assumed to be 2,350 passenger-car per hour per main lane (pc/hr/ln) and 1,410 pc/hr/ln for auxiliary lane, respectively. A 0.95 peak-hour factor (PHF) is utilized for this analysis.

The resulting V/C ratio is then compared to acceptable ranges of V/C values corresponding to the various levels of service for each facility classification, as shown in **Table 3-9**. The corresponding level of service represents an approximation of existing or anticipated future freeway operating conditions in the peak direction of travel during the peak hour. LOS D or better is used in this study as the threshold for acceptable freeway operations based upon Caltrans requirements.

Table 3-9 Basic Freeway Segments @ 65 mph

LOS	Maximum Density (pc/mi/ln)	Minimum Speed (mph)	Maximum V/C	Maximum Service Flow Rate (pc/hr/ln)
A	11	65.0	0.30	710
B	18	65.0	0.50	1,170
C	26	64.6	0.71	1,680
D	35	59.7	0.89	2,090
E	45	52.2	1.00	2,350

Source: Caltrans Guide for the Preparation of Traffic Impact Studies, 2012; Chen Ryan Associates, 2015

Vehicular Safety Analysis

Vehicular safety analysis was performed in accordance with the California Highway Safety Manual methodology for calculating collision frequency and collision rates. Historic vehicular collision data was obtained from SWITRS and the City of San Diego for the 5-year period from 2008 to 2013 to perform the frequency and rate analyses. Collision frequency is defined as the number of collisions occurring within the determined study area. All collisions were mapped to assist in identifying locations with the greatest number of collisions in the given 5-year study period.

Collision rates were calculated for all study roadway segments and study intersections. The collision rate represents the ratio of collision frequency (collisions per year) to vehicle exposure (number of vehicles entering the intersection). Collision rates were normalized to display the number of collisions per 100 million vehicle-miles of travel on study roadway segments, and the number of collisions per one million entering vehicles at study intersections. **Equation 1** and **Equation 2** were used to calculate roadway collision rates and intersection collision rates, respectively.

Equation 1: Roadway Collision Rate

$$R = (C\ x\ 100{,}000{,}000)/(V\ x\ 365\ x\ N\ x\ L)$$

Where:

R = Road segment collision rate, expressed as collisions per 100 million vehicle-miles of travel
C = Total number of collisions in the study period
V = Traffic volumes using Average Annual Daily Traffic (AADT) volumes
N = Number of years of data
L = Length of the roadway segment in miles

Equation 2: Intersection Collision Rate

$$R = (1{,}000{,}000\ x\ C)/(365\ x\ N\ x\ V)$$

Where:

R = Intersection collision rate, expressed as collisions per million entering vehicles (MEV)
C = Total number of intersection-related collisions in the study period
N = Number of years of data
V = Traffic volumes entering the intersection daily

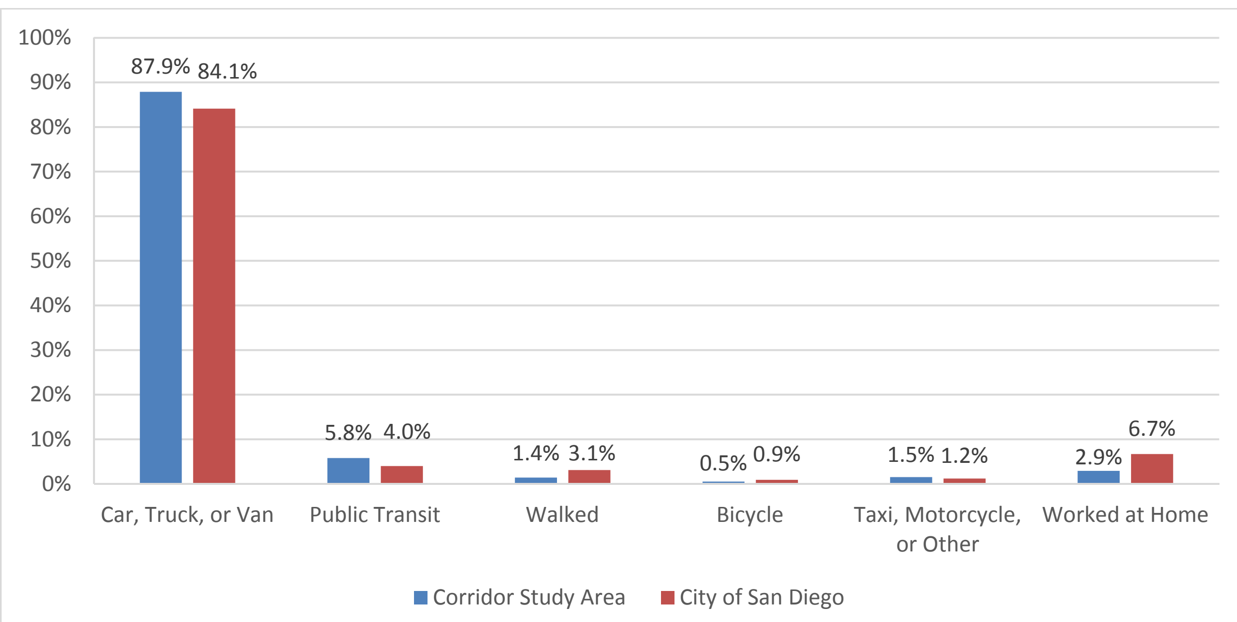
4.0 Current Conditions Mobility Analysis

This chapter presents an analysis of performance, safety, and activity patterns under current conditions for all modes of travel within the project area, including walking, cycling, riding transit, and driving. The currently adopted Otay Mesa-Nestor Community Plan identifies the following vision for transportation facilities:

> *"A safe, efficient, attractive, and environmentally sensitive transportation system consisting of vehicular, pedestrian, bicycle, and transit facilities will be provided to all who reside and conduct business in Otay Mesa-Nestor. Transportation improvement projects will enhance the community through the creative use of street lighting, public art, community signs and landscaping."*

Figure 4-1 provides an overview of the journey to work travel mode share for the corridor study area and the City of San Diego as a whole. As described in Section 1.3, the corridor study area reflects census data from the six census tracts within a half-mile of the Palm Avenue project extent. As shown, in both the corridor study area and the City of San Diego, commuting by private automobile is by far the dominant mode and commuting by bicycle is the least common mode. Public transit commuting is greater in the study area than the City of San Diego, while commuters who walked, worked at home, or rode a bicycle are greater in the City of San Diego.

Figure 4-1 2013 Journey to Work Travel Mode Share (5-Year Estimates)



Source: 2009 – 2013 American Community Survey 5-year Estimates, 2015; Chen Ryan Associates, 2015

4.1 Walkability

Walkability refers to the comfort, safety, convenience and connectivity of the pedestrian network and is an important mobility and quality of life consideration for communities. The degree to which people walk for transportation and recreation is influenced by the comfort, safety and convenience of their walking experience. Comfort is influenced by traffic volumes, travel speed, and separation from through traffic, topography, the presence of sidewalks and improved paths, and climate. Safety is influenced by the speed and volume of conflicting vehicle traffic, street widths and pedestrian crossing distances, traffic control, number of conflict points, and infrastructure design. Convenience is influenced by distance and directness of travel. As network connectivity and route options increase for the pedestrian, travel distances typically decrease.

The walkability goals as expressed in the City's General Plan Mobility Element include the following:

- A city where walking is a viable travel choice, particularly for trips of less than one-half mile;
- A safe and comfortable pedestrian environment;
- A complete, functional, and interconnected pedestrian network, that is accessible to pedestrians of all abilities; and
- Greater walkability achieved through pedestrian friendly streets, sites and building design.

The 1997 Otay Mesa-Nestor Community Plan identifies the following guidelines related to pedestrian mobility within the Palm Avenue West in Egger Highlands Neighborhood Center:

- Create a pedestrian-friendly environment in this automobile-oriented streetscape by providing landscape or on-street parking areas as buffers between the sidewalk and the traffic lanes; and by providing sidewalk "pop-outs" at intersections.
- Create a streetscape along Palm Avenue West that establishes a sense of place, and highlights the commercial strip as a gateway from Coronado and Imperial Beach to San Diego. Improve the appearance of the strip by implementing building repairs and upgrades; paving and repairing sidewalks; creating and implementing signage plans and controls; and providing banners, street furniture and landscaping.

The following subsections describe existing pedestrian facilities, activity levels and safety within the project area.

4.1.1 Pedestrian Facilities

Pedestrian facilities generally refer to sidewalks, crosswalks and curb ramps. However, various pedestrian amenities such as lighting, seating, landscaping and street trees, public art, shading also contribute to the pedestrian environment and a pedestrian's perception of safety and comfort. Additionally, traffic calming features such as curb bulb-outs, medians, and speed bumps can also play a role in enhancing pedestrian safety.

Figure 4-2 displays the existing sidewalks and curb ramps throughout the study area. Sidewalks within the study area are continuous along both sides of Palm Avenue with the exception of the south side of Palm Avenue from Saturn Boulevard to the Interstate 5 northbound off-ramp, where pedestrian access is prohibited.

Curb ramps are present at all intersections along Palm Avenue within the study area. Of the 49 curb ramps, 22 were identified as non-ADA-conforming due to lacking the federally required truncated dome. Truncated domes are the only detectable warning approved by the Americans with Disabilities Act Accessibility Guidelines (ADAAG), after being proven to be the most detectable curb ramp warning device.

Sidewalks along the corridor are at least 5 feet wide, with widths ranging from 5 to 15 feet. Pedestrians benefit from 15 feet wide sidewalks along the south side of Palm Avenue from Thermal Avenue to Saturn Boulevard, and along the north side of Palm Avenue from Claire Street to Saturn Boulevard. A wide bike lane from 13th Street to 16th Street and a 12-foot combined bike lane/parking lane from 16th Street to Saturn Boulevard create a buffer between the sidewalk and vehicular traffic.

4.1.2 Pedestrian Demand

Table 4-1 displays estimated pedestrian commute rates as reported by the 2013 American Community Survey (ACS) 5-Year Estimates for the corridor study area, the City of San Diego, and the County of San Diego. The corridor study area has the lowest pedestrian commute mode share at 1.4% of commuters, compared to 3.1% and 2.8% in the City of San Diego and the County, respectively.

Table 4-1 Pedestrian Commute Mode Share

	Corridor Study Area	City of San Diego	County of San Diego
Number of walking commuters	193	19,661	39,916
Workers 16 years and older	13,959	641,412	1,436,094
Percent of total commuters	1.4%	3.1%	2.8%

Source: 2009 – 2013 American Community Survey 5-year Estimates, 2015; Chen Ryan Associates, 2015

Figure 4-2
Existing Pedestrian Facilities

Figure 4-3A and **Figure 4-3B** display observed pedestrian intersection volumes for the AM and PM peak periods, respectively. **Appendix D** provides the AM and PM peak period pedestrian count sheets for each intersection.

Figure 4-4 presents the AM and PM peak period intersection movements observed at the ten (10) study intersections, collected in support of this project. As shown, the intersections of Hollister Street/Palm Avenue, and Saturn Boulevard/Palm Avenue experience the highest level of pedestrians. Relatively high pedestrian volumes were also observed crossing the north leg of the I-5 SB off-ramp/Palm Avenue and I-5 NB ramps/Palm Avenue intersections.

4.1.3 Pedestrian Safety

During the 5-year period from 2008 to 2013, 18 pedestrian-vehicle collisions were reported along Palm Avenue within the City of San Diego. **Figure 4-5** displays collisions within the vicinity of the study area. As shown, the Hollister Street/Palm Avenue intersection has the highest number of collisions, where three pedestrian-vehicle collisions were reported and one additional collision occurred just west of the intersection. Palm Avenue between the Interstate 5 ramps, also shows relatively high pedestrian-vehicle collision frequency, where a total of five collisions occurred in this ¼ mile stretch.

Table 4-2 summarizes the reported pedestrian-vehicle collisions by collision cause. As shown, the leading collision cause was attributed to "pedestrian violations," accounting for half of all pedestrian-involved collisions, which is three times as frequent as the second leading cause, "violated pedestrians right-of-way," with a 16% share of collision causes.

Table 4-2 Primary Pedestrian-Involved Collision Cause (2008 – 2013)

Primary Collision Cause	Number of Collisions	Percent of Total
Pedestrian Violation	9	50%
Violated Pedestrian's R/W	3	16%
Violated Vehicle's R/W	2	10%
Vehicle Driving on Wrong Side of Road	1	6%
Ran Traffic Signal	1	6%
Improper Driving	1	6%
Other	1	6%
Total	**18**	**100%**

Source: SWITRS, March 2015; Chen Ryan Associates, 2015

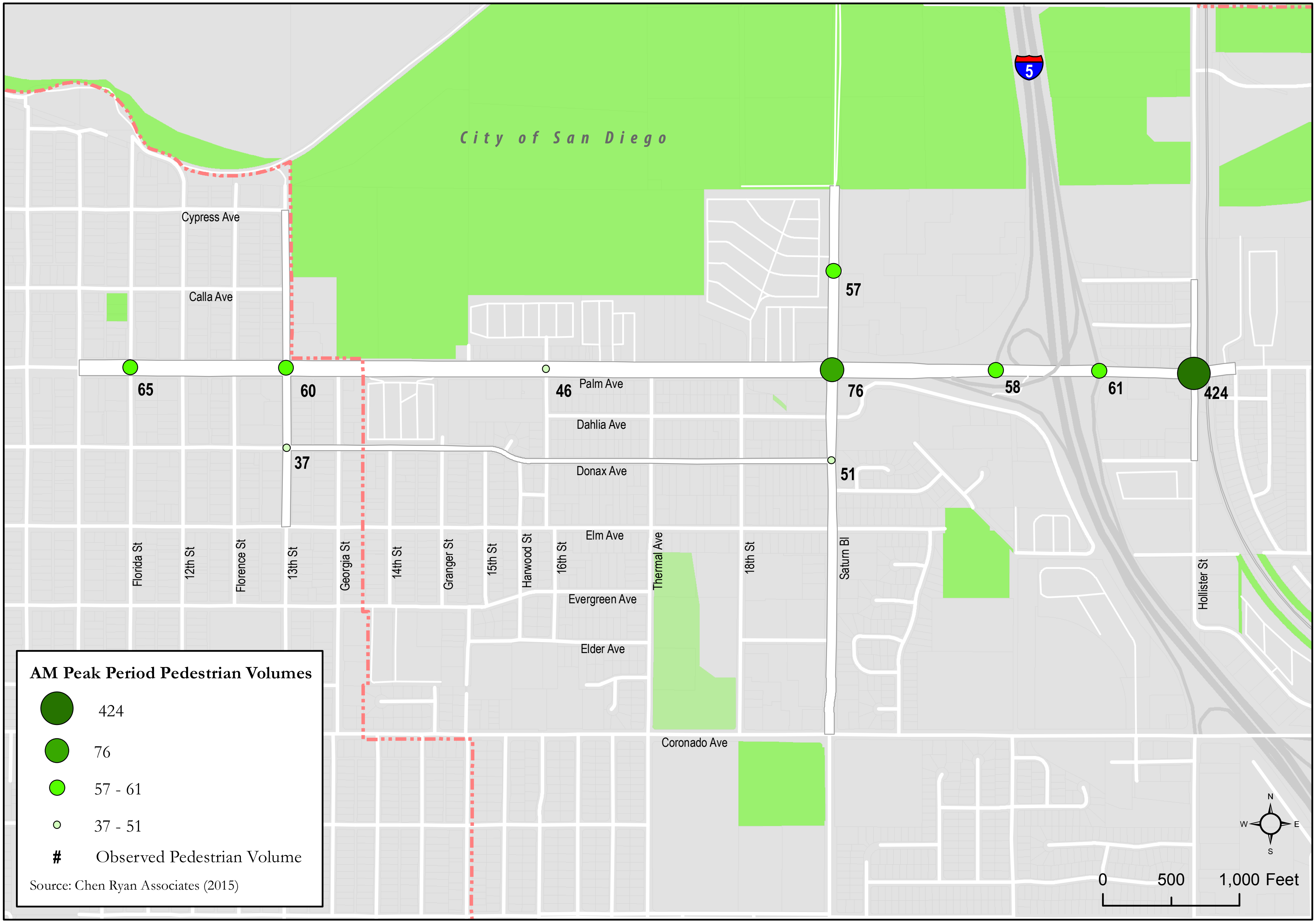
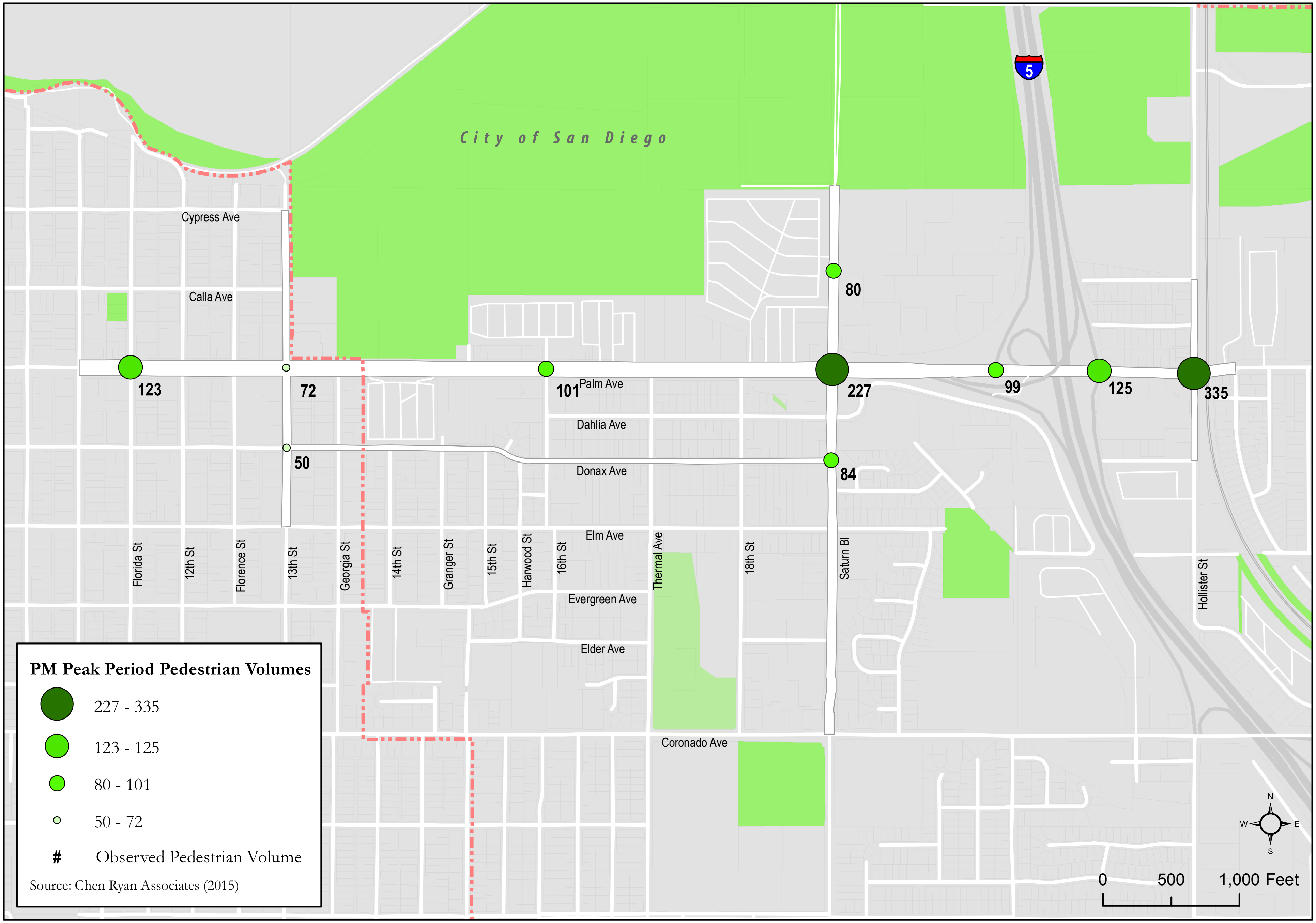


Figure 4-3A
AM Peak Period Intersection Pedestrian Volumes

CHEN RYAN



Palm Avenue Revitalization Plan

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Figure 4-3B
PM Peak Period Intersection Pedestrian Volumes

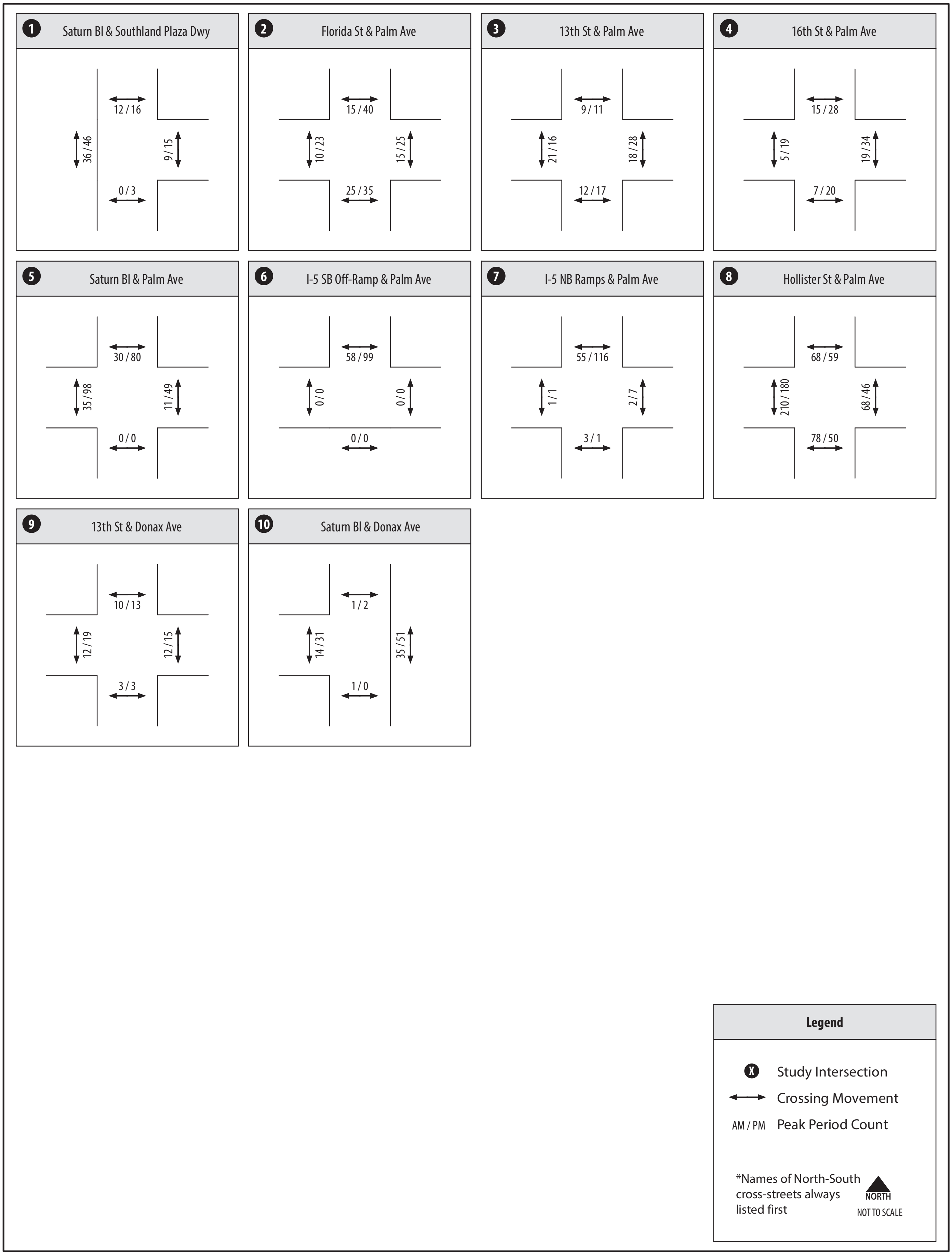


Figure 4-4

Existing AM/PM Pedestrian Peak Period Volumes (Intersections 1-10)

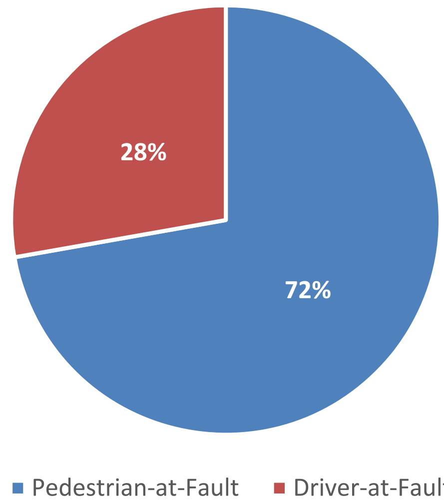
Figure 4-5

Pedestrian-Involved Collisions (2008-2013)

Figure 4-6 displays pedestrian-involved collisions by party-at-fault. Approximately 72% of all pedestrian-involved collisions along Palm Avenue during the 5-year analysis period can be described as pedestrian at-fault. This information, combined with the leading pedestrian collision cause attributed to pedestrian violations, indicates a need for increased legal crossings, wayfinding to legal crossings, or other mechanisms for reducing illegal crossing attempts.

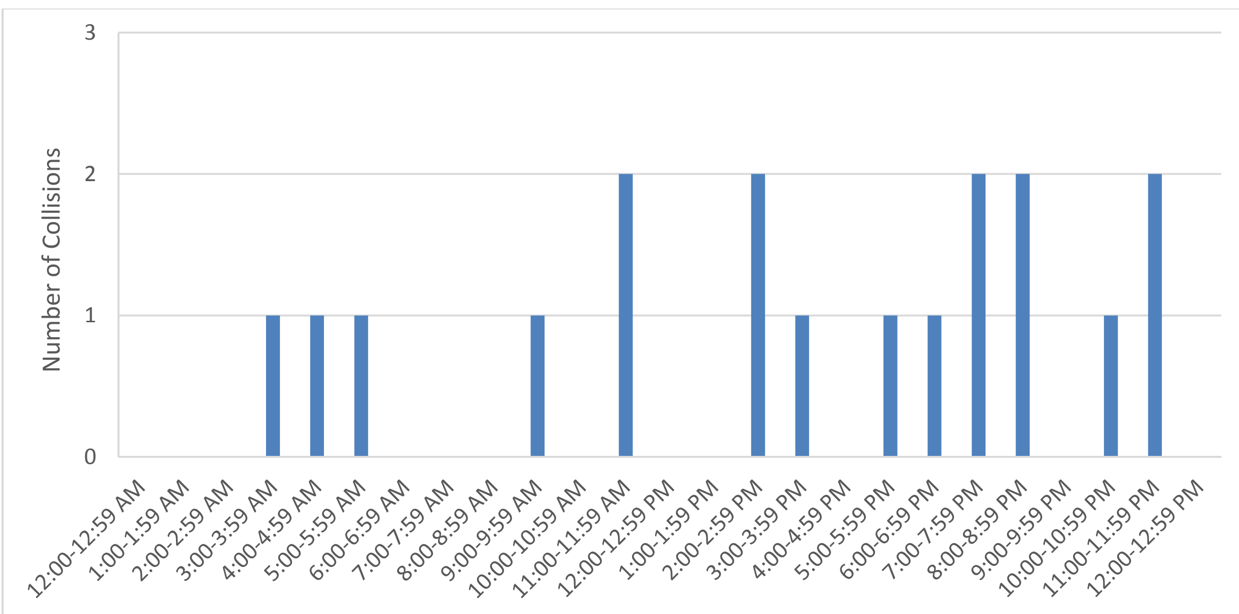
Figure 4-7 displays pedestrian-involved collisions by time of day. As shown, 11 of the 18 collisions occurred during hours when natural light is reduced (6:00PM – 6:00AM).

Figure 4-6 Pedestrian Collisions by Party-at-Fault (2008 – 2013)



Source: SWITRS, March 2015; Chen Ryan Associates, 2015

Figure 4-7 Pedestrian Collisions by Time of Day (2008 – 2013)



Source: SWITRS, 2015; Chen Ryan Associates, 2015

4.1.4 Pedestrian Environment Evaluation

The Pedestrian Environmental Quality Index (PEQI) analysis generates a pedestrian environment quality score for each roadway segment and intersection by assigning weighted values to each of the analysis inputs, related to design, adjacent land use, and perceived safety and walkability. A complete list of PEQI data inputs is provided in the methodology chapter of this report (Section 3.1). **Figure 4-8** identifies the walkway segments and intersections in the Palm Avenue corridor that were analyzed using the PEQI analysis.

Figure 4-9 maps the PEQI results for each walkway in the Palm Avenue study area. PEQI uses a 100-point scale to categorize the results. The total possible points for both intersection and roadway segments were normalized to a 100-point scale with five equally distributed score ranges, as follows:

81 – 100 (Ideal Pedestrian Conditions Exist)
61 – 80 (Reasonable Pedestrian Conditions Exist)
41 – 60 (Basic Pedestrian Conditions Exist)
21 – 40 (Poor Pedestrian Conditions Exist)
0 – 20 (Environment Not Suitable for Pedestrians)

Table 4-3A displays PEQI analysis results for each walkway segment under evaluation. As shown in Figure 4-9 and Table 4-3A the PEQI scoring results in characterizing the pedestrian environment along most of Palm Avenue as ranging from basic to poor. The ten segments identified with poor conditions account for approximately 1.3 miles of the 2.7 miles surveyed. The south side of Palm Avenue between Saturn Boulevard and the I-5 northbound ramps was excluded from the PEQI analysis since pedestrians are prohibited from traversing this segment. Had those segments been included, they would have been judged by the PEQI scale as “not suitable for pedestrians”. Generally, the north side of Palm Avenue provides a more favorable environment for pedestrians than the south side.

Appendix C shows all of the PEQI inputs gathered within the study area and sorted by roadway segment and intersection. The data collection form and associated weights are also provided in Appendix C.

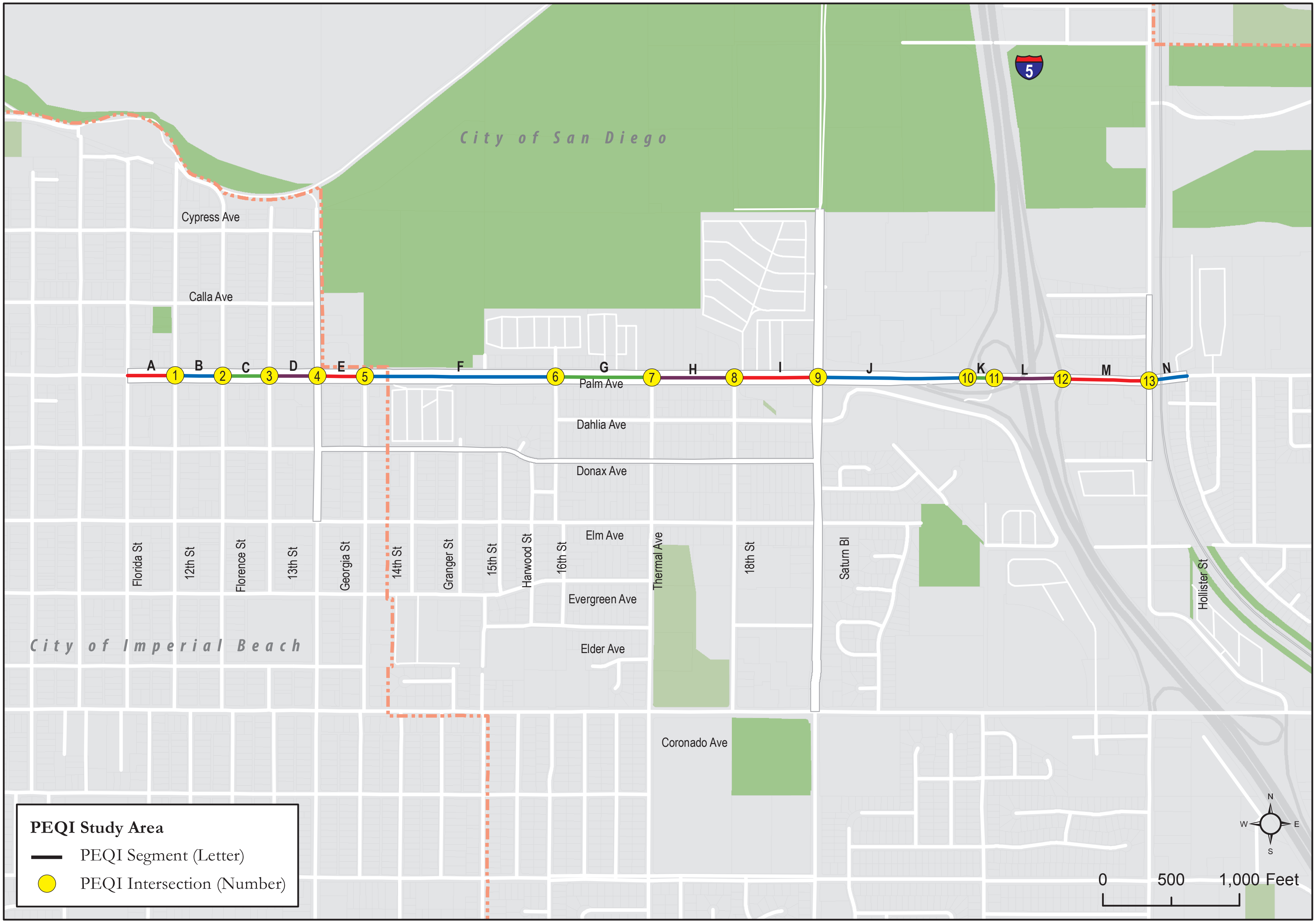


Figure 4-8
PEQI Study Area

Figure 4-9

Pedestrian Environmental Quality Index (PEQI) Intersection and Street Scores

Table 4-3A PEQI Study Segment Score

Segment ID	From	To	Street Side	Segment Score	Environment Quality
A	11th Street	Florida Street	North Side	45	Basic Conditions
B	Florida Street	12th Street	North Side	44	Basic Conditions
C	12th Street	Florence Street	North Side	47	Basic Conditions
D	Florence Street	13th Street	North Side	48	Basic Conditions
E	13th Street	Georgia Street	North Side	44	Basic Conditions
F	Georgia Street	16th Street	North Side	44	Basic Conditions
G	16th Street	Thermal Street	North Side	44	Basic Conditions
H	Thermal Street	18th Street	North Side	42	Basic Conditions
I	18th Street	Saturn Boulevard	North Side	44	Basic Conditions
J	Saturn Boulevard	I-5 SB Off Ramp	North Side	35	Poor Conditions
K	I-5 SB Off Ramp	I-5 SB On Ramp	North Side	33	Poor Conditions
L	I-5 SB On Ramp	I-5 NB Ramps	North Side	32	Poor Conditions
M	I-5 NB Ramps	Hollister Street	North Side	33	Poor Conditions
N	Hollister Street	Harris Avenue	North Side	40	Poor Conditions
A	11th Street	Florida Street	South Side	44	Basic Conditions
B	Florida Street	12th Street	South Side	49	Basic Conditions
C	12th Street	Florence Street	South Side	45	Basic Conditions
D	Florence Street	13th Street	South Side	43	Basic Conditions
E	13th Street	Georgia Street	South Side	40	Poor Conditions
F	Georgia Street	16th Street	South Side	38	Poor Conditions
G	16th Street	Thermal Street	South Side	39	Poor Conditions
H	Thermal Street	18th Street	South Side	45	Basic Conditions
I	18th Street	Saturn Boulevard	South Side	46	Basic Conditions
J	Saturn Boulevard	I-5 SB Off Ramp	South Side	N/A	Pedestrians Prohibited
K	I-5 SB Off Ramp	I-5 SB On Ramp	South Side	N/A	Pedestrians Prohibited
L	I-5 SB On Ramp	I-5 NB Ramps	South Side	N/A	Pedestrians Prohibited
M	I-5 NB Ramps	Hollister Street	South Side	36	Poor Conditions
N	Hollister Street	Harris Avenue	South Side	38	Poor Conditions

Source: Chen Ryan Associates, 2015

Table 4-3B displays the PEQI analysis results intersection under evaluation. As shown, 12 of the 13 intersections were scored as having either poor or unsuitable conditions. The long north-south crossing distances (ranging from 118 feet to 125 feet) along Palm Avenue contribute to poor pedestrian crossing conditions at all intersections. Many intersections are characterized as environments not suitable for pedestrians due to prohibited north-south crossings.

The remaining intersections exhibit poor conditions with the exception of Hollister Street and Palm Avenue, which is scored as having basic conditions. Additional variables factoring into the low scoring intersections include a lack of marked crosswalks, pedestrian signal heads without countdowns, and a long crossing time. The Palm Avenue crossing distance is great enough to warrant the installation of center median pedestrian activated push buttons at Saturn Boulevard, 16th Street, and 13th Street. Additional points are awarded for the median under both the segment and intersection evaluation.

Table 4-3B PEQI Study Intersection Score

Intersection ID	Intersection	Intersection Score	Environment Quality
1	11th Street / Palm Avenue	38	Poor Conditions
2	Florida Street / Palm Avenue	33	Poor Conditions
3	12th Street / Palm Avenue	36	Poor Conditions
4	Florence Street / Palm Avenue	30	Poor Conditions
5	13th Street / Palm Avenue	30	Poor Conditions
6	Georgia Street / Palm Avenue	12	Not Suitable for Pedestrians
7	16th Street / Palm Avenue	34	Poor Conditions
8	Thermal Avenue / Palm Avenue	18	Not Suitable for Pedestrians
9	18th Street / Palm Avenue	18	Not Suitable for Pedestrians
10	Saturn Boulevard / Palm Avenue	28	Poor Conditions
11	I-5 NB On- Off-Ramp / Palm Avenue	15	Not Suitable for Pedestrians
12	Hollister Street / Palm Avenue	41	Basic Conditions
13	I-5 SB On-Ramp (westbound) / Palm Avenue	9	Not Suitable for Pedestrians
14	I-5 SB Off-Ramp / Palm Avenue	9	Not Suitable for Pedestrians

Source: Chen Ryan Associates, 2015

4.2 Cycling

Bicycle facilities are an integral component of a transportation system. Adequate bicycle facilities encourage active transportation, enhance recreational opportunities, and help attract visitors. Bikeways not only provide opportunities for local trip-making, but also serve longer regional trip-making and connections to transit. This section discusses existing bicycle facilities, activity levels, and safety considerations along Palm Avenue.

The City of San Diego Bicycle Master Plan (2013) identifies the following goals:

- A city where bicycling is a viable travel choice, particularly for trips of less than five miles
- A safe and comprehensive local and regional bikeway network
- Environmental quality, public health, recreation, and mobility benefits through increased bicycling

The Otay Mesa-Nestor Community Plan (1997) did not identify specific goals related to cycling, however, it sought to study alternative routes for the Bayshore Bikeway to bypass Palm Avenue. Since the adoption of the current Community Plan, additional Bayshore Bikeway segments have been constructed, including the segment extending from the SR-75 in the City of Coronado, to the Salt Ponds, and eventually becoming an on-road facility at the intersection of W. Frontage Road and Main Street in the City of Chula Vista. SANDAG is planning the Border to Bayshore Bikeway to provide safe bikeway connections between the Bayshore Bikeway and the San Ysidro Port of Entry. The project is part of the $200 million Regional Bike Plan Early Action Program approved by the SANDAG Board of Directors approved in 2013. The project is currently in the conceptual planning phase, which includes defining the alignment and development of preliminary concept designs.

4.2.1 Bicycle Facilities

Table 4-4 describes the four classifications of bicycle facilities recognized by most governing bodies including the City and Caltrans, including bike path, bike lane, bike route, and cycle track. **Figure 4-10** displays the location of existing bicycle facilities within the vicinity of the project area.

As shown, bike facilities are present along the following study segments:

Palm Avenue

- Westbound: Class II bike lane from I-5 SB off-ramp to just east of Saturn Boulevard, then beginning again west of the intersection, continuing until 13th Street. From Saturn Boulevard to 15th Street, the facility is a shared parking/Class II bike lane.
- Eastbound: Shared parking/Class II bike lane from Georgia Street to just west of 18th Street, beginning again east of Saturn Boulevard. A short bike path is provided after crossing the I-5 SB on-ramp, connecting under the freeway overpass and back to Palm Avenue where it continues as a bike lane, terminating at the east end of the freeway overpass.

13th Street

- 13th Street is classified as a Class III bike route from Cypress Avenue to Palm Avenue per the SANDAG Regional Bicycle Plan and the City of Imperial Beach Bicycle Transportation Plan, however no sharrows or signage are present along the route. North of Cypress Avenue the route joins with the Bayshore Bikeway.

Saturn Boulevard

- Class II bike lanes are present from Saturn Boulevard's northern terminus to Palm Avenue in the northbound direction, and from the northern terminus to Doris Street in the southbound direction.
- South of Palm Avenue, Saturn Boulevard is classified as a Class III bike route, however no sharrows or signage are present along the route.

Table 4-4 California Bicycle Facility Classifications

Class Description	Example
Class I Bikeway (Bike Path) – Also referred to as shared-use paths or multi-use paths, Class I facilities provide a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with crossflows by motorists minimized. Bike paths can provide connections where roadways are non-existent or unable to support bicycle travel. The minimum paved width for a two-way bike path is 8 feet and 5 feet for a one-way bike path, with a minimum 2 foot wide graded area adjacent to the pavement.	
Class II Bikeway (Bike Lane) – Provides a striped lane designated for the exclusive or semi-exclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited, but with pedestrian and motorist crossflows permitted. The minimum bike lane width where parking stalls are marked is 5 feet. The minimum width for a shared bike lane and parking lane is 11 feet.	
Class III Bikeway (Bike Route) – Provides shared use of traffic lanes with cyclists and motor vehicles, identified by signage and street markings such as "sharrows". Bike routes are best suited for low-speed, low-volume roadways with an outside lane width of 14 feet.	
Class IV Bikeway (Cycle Track) – Also referred to as separated bikeways, cycle tracks provide a right-of-way designated exclusively for bicycle travel within the roadway and physically protected from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, or on-street parking.	

Source: California Streets and Highway Code, 2014; Chen Ryan Associates, 2015

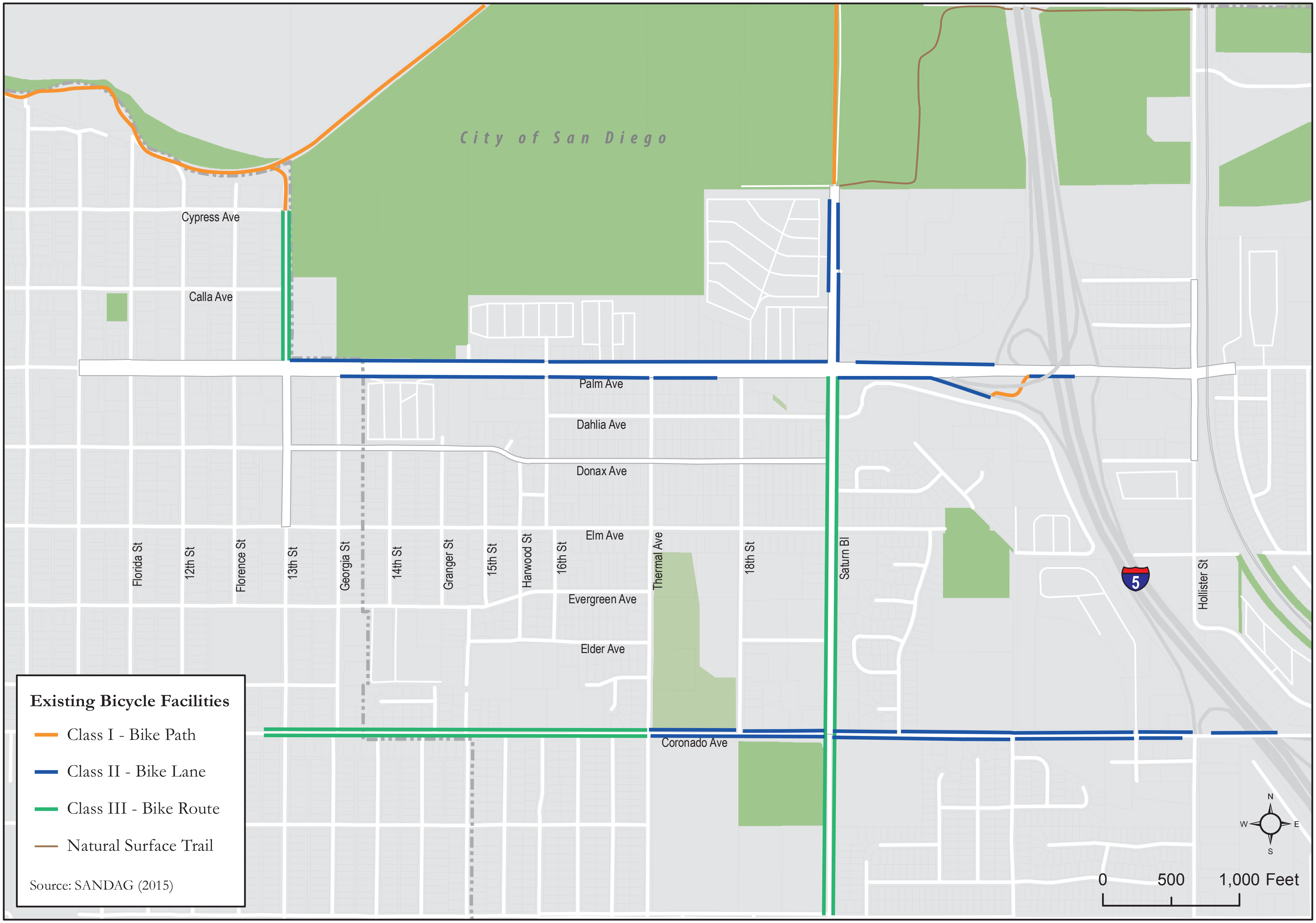


Figure 4-10
Existing Bicycle Facilities

4.2.2 Bicycle Demand

Table 4-5 displays estimated cycling commute rates reported by the 2013 American Community Survey (ACS) 5-Year Estimates for the corridor study area, the City of San Diego, and the County of San Diego. The corridor study area has the lowest bicycle commute mode share at just 0.5% of commuters, compared to 0.9% and 0.7% in the City of San Diego and the County, respectively.

Table 4-5 Bicycle Commute Mode Share

	Corridor Study Area	City of San Diego	County of San Diego
Number of bicycle commuters	68	5,966	9,996
Workers 16 years and older	13,959	641,412	1,436,094
Percent of total commuters	0.5%	0.9%	0.7%

Source: 2009 – 2013 American Community Survey 5-year Estimates, 2015; Chen Ryan Associates, 2015

Figure 4-11A and **Figure 4-11B** display the distribution of the observed bicycle volumes for the AM and PM peak periods combined. As shown, the intersections of 13th Street and Palm Avenue, and 16th Street and Palm Avenue experienced the highest level of peak period cyclists.

Figure 4-12 presents the AM and PM peak period bicycle turning movements observed at the ten (10) study intersections, collected in support of this project. **Appendix E** provides the AM and PM peak hour bicycle count sheets for each intersection.

13th Street provides a connection to the Bayshore Bikeway just to the north of Palm Avenue. According to the AM and PM-combined peak hour bicycle turning movements at the 13th Street/Palm Avenue intersection (see intersection #3 in Figures 4-10A and 4-10B), 54 of the 66 cyclists observed riding through the intersection were either heading south on 13th Street (37), most likely from the Bayshore Bikeway, or north on 13th Street (17), again connecting to the Bayshore Bikeway.

4.2.3 Bicycle Safety

Bicycle collision data obtained from SWITRS for the 5-year period from 2008 to 2013 was utilized for this collision analysis. **Figure 4-13** displays the distribution of bicycle-involved collisions within the project area. As shown, 9 bicycle collisions were reported along Palm Avenue within the City of San Diego project area. Six of the nine bicycle collisions occurred between the intersection of Saturn Boulevard and Palm Avenue and the Interstate 5 southbound off-ramp. Two additional collisions were also reported near the Saturn Boulevard and Palm Avenue intersection, one on the north leg and one on the south leg.

Table 4-6 summarizes the reported bicycle-involved collisions by collision cause. As shown, the leading collision causes were attributed to "wrong side of the road" and "other" causes, each accounting for one-third of all bicycle-involved collisions.

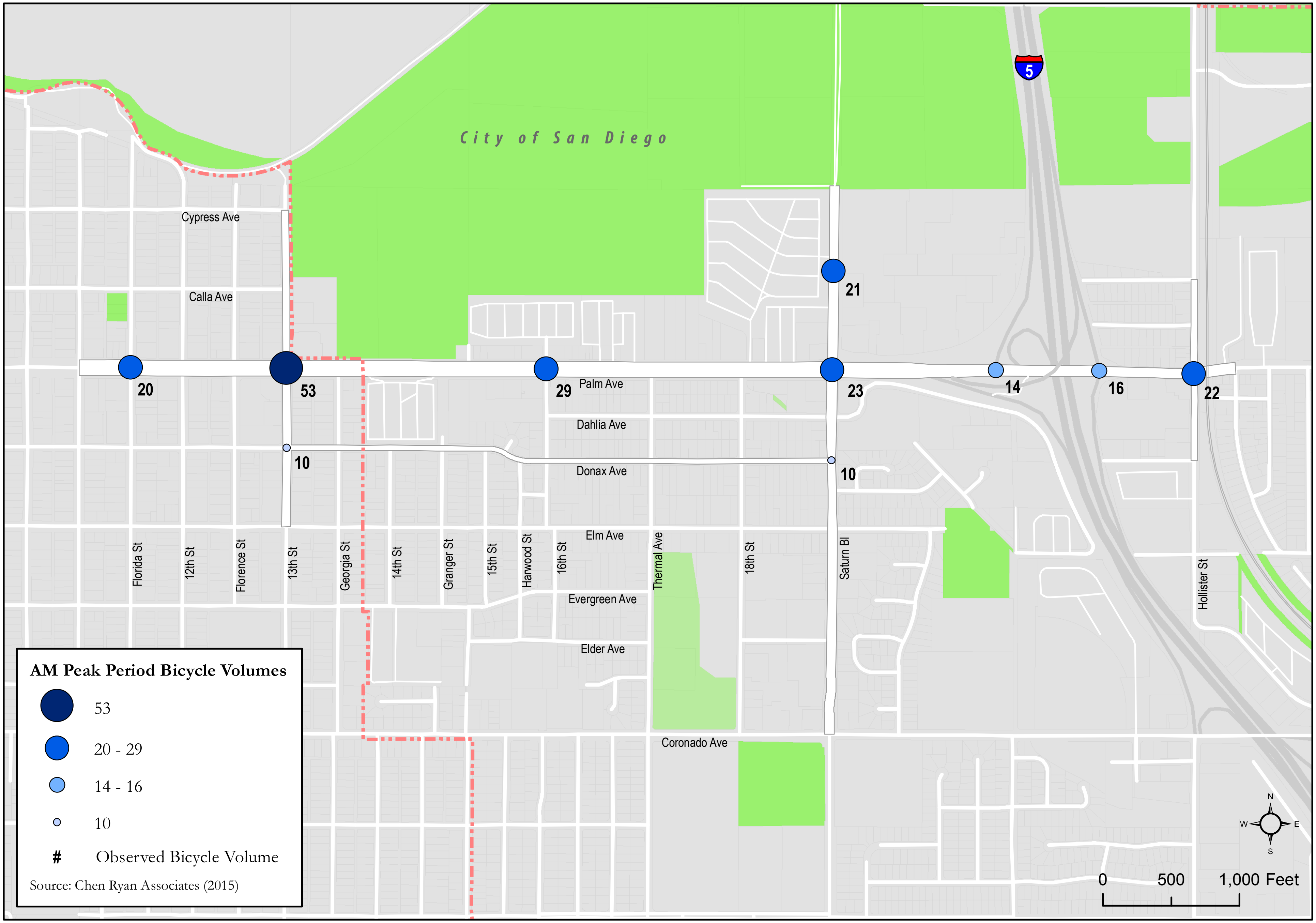


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Figure 4-11A

AM Peak Period Intersection Bicycle Volumes

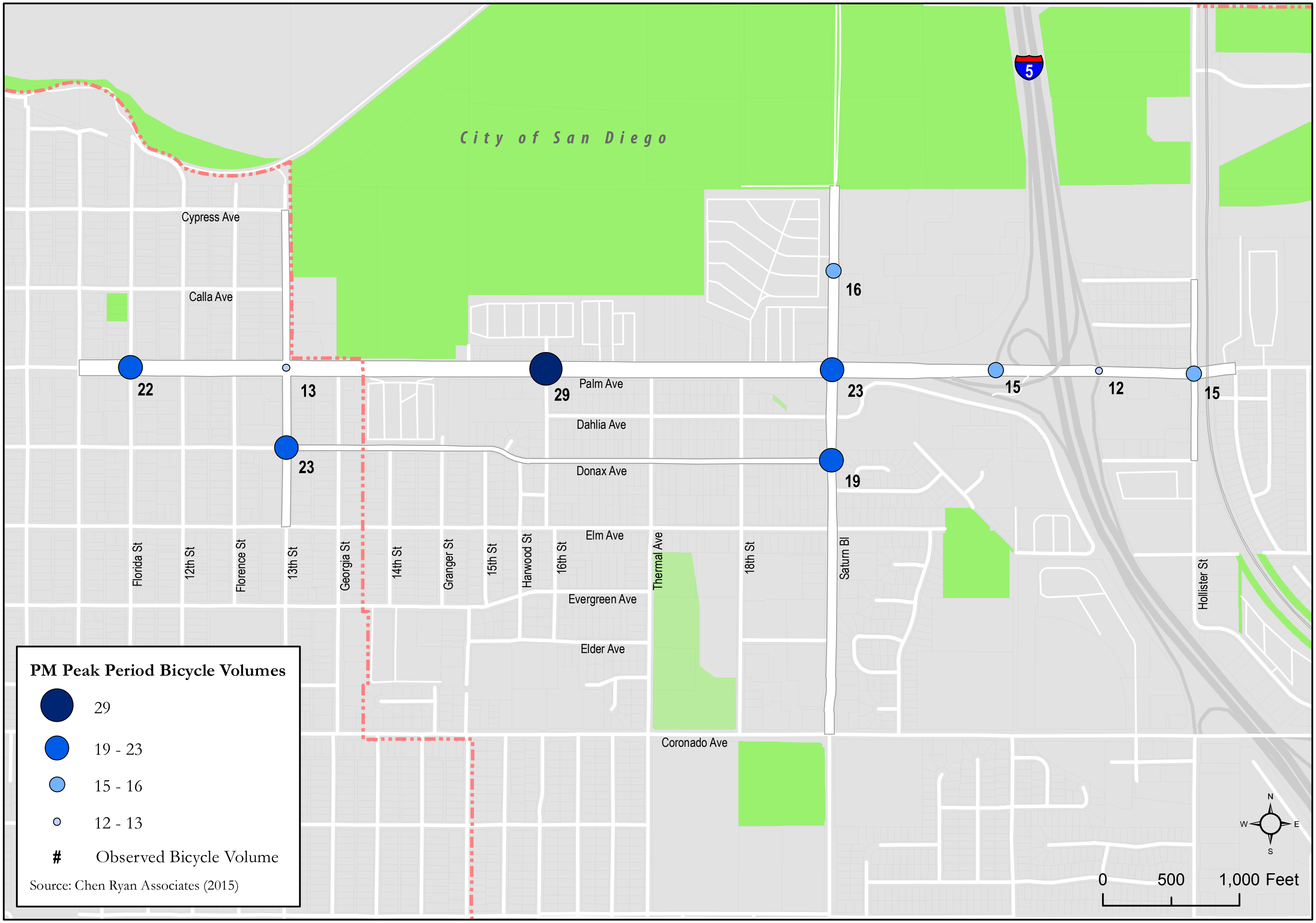

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Figure 4-11B

PM Peak Period Intersection Bicycle Volumes

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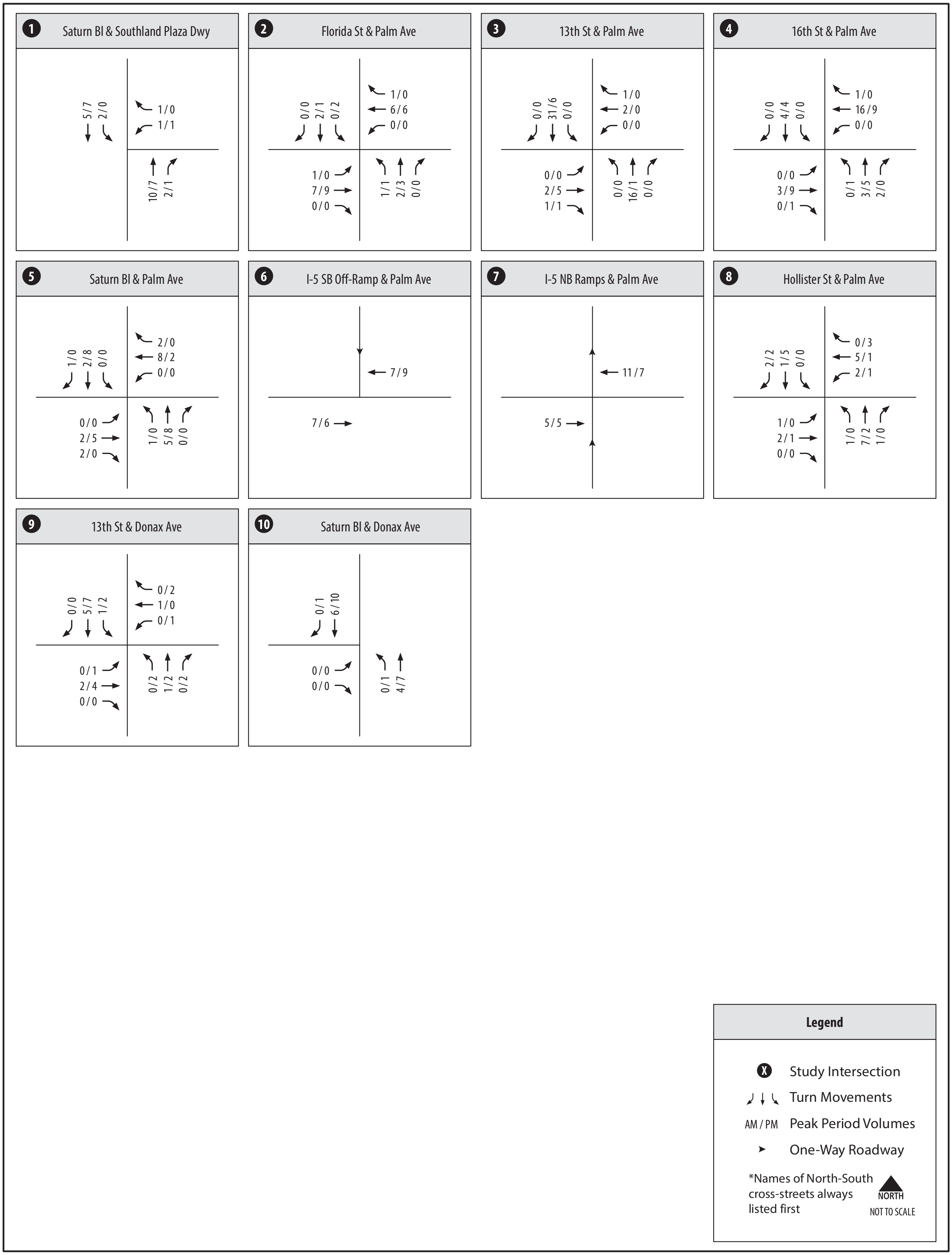

Figure 4-12

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Existing AM/PM Peak Period Volumes (Intersections 1-10)

Figure 4-13
Bicycle-Involved Collisions (2008-2013)

Table 4-6 Primary Bicycle-Involved Collision Cause (2008 – 2013)

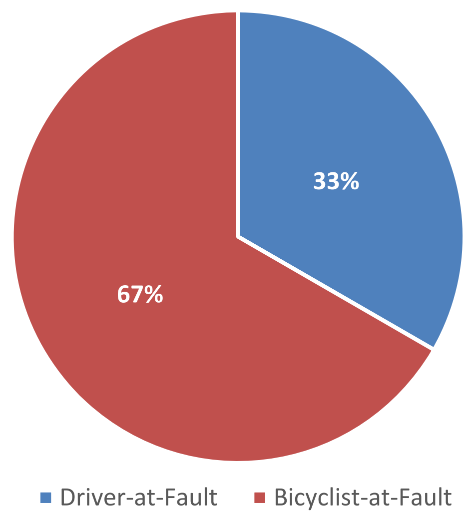
Primary Collision Cause	Collisions	Percent of Total Collisions
Cyclist Driving on Wrong Side of Road	3	33%
Other	3	33%
Motorist Improper Turn	1	11%
Cyclist Ran Traffic Signal	1	11%
Cyclist Violated Vehicle's Right-of-Way	1	11%
Total	**9**	**100%**

Source: SWITRS, March 2015; Chen Ryan Associates, 2015

Figure 4-14 displays the bicycle-involved collisions by party-at-fault. Approximately 67% of all bicycle-involved collisions along Palm Avenue during the 5-year analysis period were reported as being the cyclist's fault. This information, combined with the leading bicycle collision cause attributed to "wrong side of the road" potentially indicates a need for improved bicycle facilities and increased education regarding proper bicycle facility use.

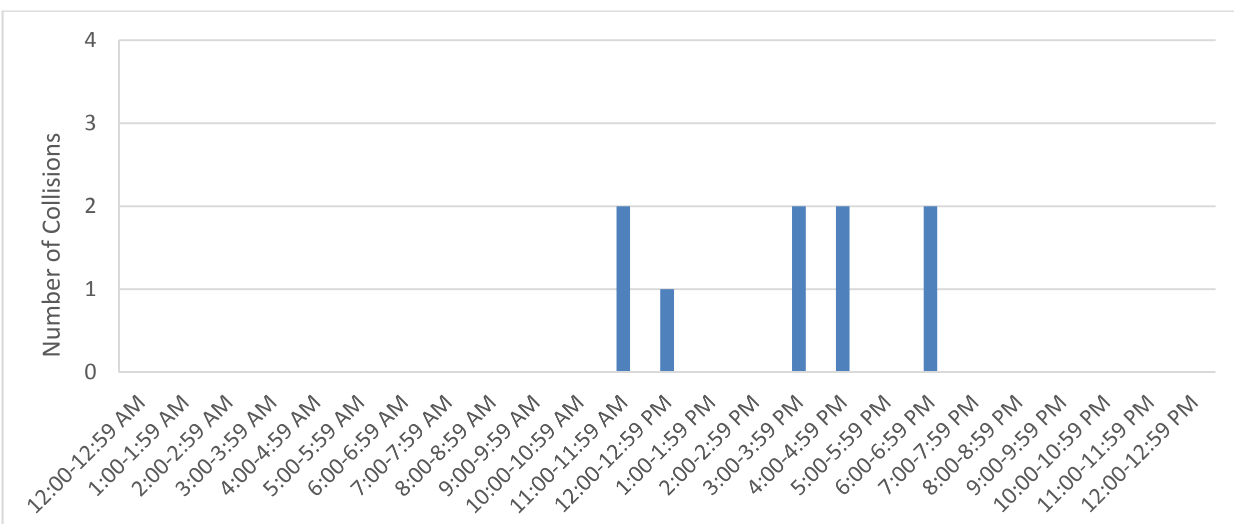
Figure 4-15 displays bicycle-involved collisions by time of day. As shown, all 9 collisions occurred between the hours of 11:00AM and 7:00PM.

Figure 4-14 Bicycle Collisions by Party-at-Fault (2008 – 2013)



Source: SWITRS, March 2015; Chen Ryan Associates, 2015

Figure 4-15 Bicycle Collisions by Time of Day (2008 – 2013)



Source: SWITRS, March 2015; Chen Ryan Associates, 2015

4.2.4 Bicycle Level of Stress

Bicycle Level of Traffic Stress (LTS) scoring is based on seven possible criteria or "look-up" tables developed to consider a wide variety traffic conditions experienced by cyclists. The criteria tables and resulting scores distinguish between the location of the cyclist – either riding along the roadway segment, or approaching an intersection.

Table 4-7 lists the seven LTS scoring criteria tables that were developed for cyclists riding along a roadway segment or approaching an intersection. A criteria table is selected based upon the cyclist location and the roadway segment conditions.

LTS only generates a score for the roadway segments. The LTS score is governed by the "weakest link" principle, which means the criteria factor with the lowest score along the segment becomes the overall score of the segment. This implies that a cyclist's overall stress along a route is derived from the *worst* aspect of that route, not from an *averaging* of all route characteristics. A roadway segment with low stress conditions can have its overall LTS score degraded if it also has high-stress intersection approaches with right-turn only lanes.

Table 4-7 Overview of LTS Criteria Tables

Cyclist Location	Roadway Segment Conditions	Criteria Factors
Roadway segment	No bicycle facility	▪ Number of travel lanes ▪ Posted speed limit
	Bike lane next to on-street parking	▪ Number of travel lanes ▪ Posted speed limit ▪ Combined width of bike and parking lane ▪ Presence of frequent obstructions in bike lane
	Roadway segment with bike lane and no on-street parking	▪ Number of travel lanes ▪ Posted speed limit ▪ Width of bike and parking lane ▪ Presence of frequent obstructions in bike lane
Intersection approach	No bicycle facility and presence of right-turn lane	▪ Length of right-turn lane ▪ Intersection angle as it influences vehicular turning speed
	Pocket bike lane and presence of right-turn lane	▪ Length of right-turn lane ▪ Intersection angle as it influences vehicular turning speed ▪ Right turn lane causes bicyclist to make a leftward maneuver
	Unsignalized crossing without median refuge	▪ Number of travel lanes of street being crossed ▪ Posted speed limit of street being crossed
	Unsignalized crossing with median refuge	▪ Number of travel lanes of street being crossed ▪ Posted speed limit of street being crossed

Figure 4-16 displays the results of the Bicycle Level of Stress analysis for all study segments. **Appendix F** presents the input values used for the Bicycle Level of Traffic Stress analysis.

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Figure 4-16
Bicyclist Level of Traffic Stress

As shown, the entire length of Palm Avenue within the project area is classified as LTS 4, indicating the environment is tolerable to only the "strong and fearless" cyclist population, representing an estimated <1% of the population. Additionally, 13th Street south of Palm, Saturn Boulevard just north of Palm Avenue, and Saturn Boulevard south of Palm Avenue within the project area were also categorized as LTS 4. Donax Avenue, from Georgia Street to 18th Street, was categorized as LTS 1, indicating acceptable conditions to the "interested but concerned – all ages" cyclists, representing an estimated 60% of the population. The only other LTS 1 study segment was Saturn Boulevard north of the Southland Plaza Market driveway.

Potential changes that may improve LTS scores along study segments include lowering traffic speeds and volumes, as well as implementing a separated bicycle facility, such as a cycle track. Continuing bicycle facilities through intersections and various intersection treatments such as bike boxes, or bicycle priority signals may also result in improved LTS scores and bicycling environments.

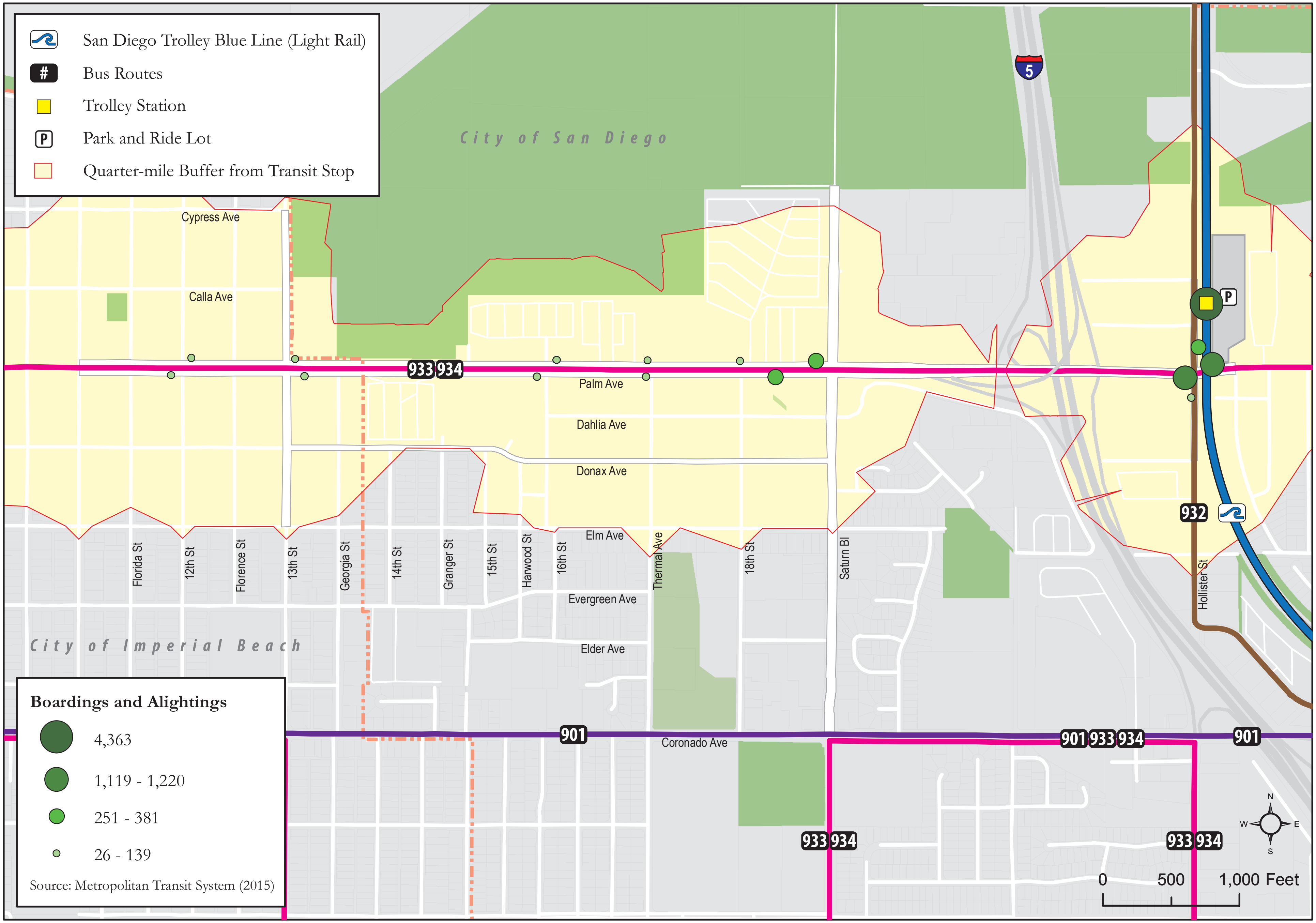
4.3 Transit System

Public transit within the project area is provided by the San Diego Metropolitan Transit System (MTS) and consists of light rail (Trolley) and local bus. The 1997 Otay Mesa-Nestor Community Plan identifies the following vision and strategies related to public transit within the study area:

- Redevelop the Palm City neighborhood, including the Palm Avenue/Hollister Street intersection, as a cohesively planned transit-oriented development, providing linkages and access to the Otay Valley Regional Park, and residential and shopping opportunities.
- Redevelopment of this area shall be pedestrian/transit-oriented and be based on Transit-Oriented Development (TOD) guidelines.
- Plans shall incorporate the trolley station and shall consider a mix of commercial, residential, civic, public plaza, and shared parking uses.
- Provide bus shelters at established bus stops. Where possible, create opportunities for bus stops to be located where they will not impede the flow of traffic.

Figure 4-17 displays the transit routes and stops serving the project area, including local bus routes 932, 933, and 934, and the Blue Line Trolley. The figure also includes a ¼ mile buffer around each stop, indicating a 5-minute walking distance centered around each bus stop on Palm Avenue.

As shown, bus service is accessible within a ¼ mile of the entirety of Palm Avenue, with the exception of a very small portion at the southbound Interstate-5 ramps. A description of each bus route and the Trolley are provided in the following subsection.



Palm Avenue Revitalization Plan

Figure 4-17

Existing Public Transportation Routes and Ridership by Transit Stop

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4.3.1 Bus & Trolley Systems

Route 932 – Route 932 runs north/south between the 8th Street Transit Center located in National City and the Iris Avenue Transit Center via 8th Street, National City Boulevard, E Street, Woodlawn Avenue, F Street, Broadway, Main Street, Hollister Street, Outer Road, Coronado Avenue, Beyer Boulevard, Del Sol Boulevard, and 30th Street. Route 932 currently runs between 4:23 AM and 12:20 AM on weekdays, 4:38 AM and 12:20 AM on Saturdays, and 5:38 AM and 8:19 PM on Sundays. Holidays operate with either Saturday or Sunday schedule. Route 932 runs at 15-minute headways during its peak period and 30-minute headways during off-peak periods.

Route 933 – Route 933 runs counterclockwise from the Iris Avenue Transit Center and the Palm Avenue Trolley Station via Beyer Boulevard, Del Sol Boulevard, Dennery Road, Palm Avenue, Seacoast Drive, Imperial Beach Boulevard, 13th Street, Iris Avenue, Satellite Boulevard, Saturn Boulevard, Coronado Avenue, Hollister Street, Tocayo Avenue, Oro Vista Road, and Iris Avenue. Route 933 currently runs between 4:41 AM and 12:57 AM on weekdays and Saturdays, and between 5:07 AM and 7:09 PM on Sundays/Holidays. Route 933 runs at 12-minute headways during its peak period and 15-minute headways during off-peak periods.

Route 934 – Route 934 runs clockwise from the Iris Avenue Transit Center and the Palm Avenue Trolley Station via Oro Vista Road, Tocayo Avenue, Hollister Street, Coronado Avenue, Saturn Boulevard, Satellite Boulevard, 13th Street, Imperial Beach Boulevard, Seacoast Drive, Palm Avenue, Dennery Road, Del Sol Boulevard, Beyer Boulevard, and Iris Avenue. Route 934 currently runs between 4:41 AM and 1:13 AM on weekdays and Saturdays, and between 6:57 AM and 8:56 PM on Sundays/Holidays. Route 933 runs at 12-minute headways during its peak period and 15-minute headways during off-peak periods.

Blue Line Trolley – The Blue Line Trolley is a light rail trolley line operating north-south from the San Ysidro Transit Center to America Plaza in Downtown San Diego, generally following the alignment of Interstate-5. The Palm Avenue Station is located adjacent to the project study area, located on the east side of Hollister Street between Conifer Avenue and Citrus Avenue. The Blue Line operates between 4:02 AM and 1:43 AM on weekdays with 8-minute headways throughout the day with the exception of 15-minute headways from 8:28 AM to 3:28 PM. On Saturdays and Sundays the Blue Line operates between 4:17 AM and 1:43 AM, with 15-minute headways from 6:58 AM to 8:58 PM and 30-minute headways at other times.

4.3.2 Transit Demand

Table 4-8 displays estimated public transportation commute rates as reported by the 2013 American Community Survey (ACS) 5-Year Estimates for the corridor study area, the City of San Diego, and the County of San Diego. The corridor study area has the highest level of transit commute mode share at 5.8% of commuters, compared to 4.0% and 3.1% in the City of San Diego and the County, respectively.

Table 4-8 Public Transportation Commute Mode Share

	Corridor Study Area	City of San Diego	County of San Diego
Number of transit commuters	813	25,789	44,193
Workers 16 years and older	13,959	641,412	1,436,094
Percent of total commuters	5.8%	4.0%	3.1%

Source: 2009 – 2013 American Community Survey 5-year Estimates, 2015; Chen Ryan Associates, 2015

Table 4-9 lists the Palm Avenue project area transit stops and amenities found at each location, including 13 stops on Palm Avenue and 2 on Hollister Avenue. As shown, 11 of the 17 stops have shelters, and all but 2 of the 17 stops have benches present.

Table 4-9 also displays the average daily boardings and alightings for FY 2014 at each of the 17 transit stops within the project area. As shown, there are approximately 4,377 boardings and 4,143 alightings on an average weekday, for an estimated 8,520 average daily transit trip ends, either originating, transferring, or terminating within the project area.

Figure 4-17 displays the total average daily boardings and alightings by stop for FY 2014. As shown, there are higher levels of transit ridership near the intersection of Hollister Street and Palm Avenue, adjacent to the Palm Avenue Trolley Station.

The three bus stops with the highest number of average daily boardings and alightings within the project area, as well as the average daily boardings and alightings for the Blue Line Trolley are displayed below.

Three Highest Activity Bus Stops
Palm Avenue, east of Hollister Street – Westbound (1,220 average daily boardings/alightings)
Palm Avenue, west of Hollister Street – Eastbound (1,119 average daily boardings/alightings)
Palm Avenue, west of Saturn Boulevard – Westbound (381 average daily boardings/alightings)

Blue Line Trolley
Palm Avenue Trolley Station – Northbound (2,162 average daily boardings/alightings)
Palm Avenue Trolley Station – Southbound (2,201 average daily boardings/alightings)

4.3.3 Transit User Safety

As stated in Chapter 3, transit user safety was evaluated by examining bicycle and pedestrian collisions within 500 feet of transit stops, based upon the likelihood that the majority of transit users either bike or walk at some point during their trip. **Figure 4-18** displays transit stops, along with the total number of combined bicycle and pedestrian collisions (27 collisions) that occurred within a 500-foot roadway network buffer of each transit stop between 2008 and 2013. As shown, there are relatively greater numbers of bicycle and pedestrian collisions near the intersections of Hollister Street and Palm Avenue, and Saturn Boulevard and Palm Avenue.

Table 4-9 Existing Transit Stops, Amenities, and Average Weekday Boardings and Alightings (FY 2014)

Stop ID	Location	Amenities			Route(s)	Average Daily Boardings	Average Daily Alightings	Average Daily Boardings & Alightings
		Shelters	Benches	Trash Cans				
60029	12th Street / Palm Avenue	✓	✓	✓	933	107	20	127
60141	Palm Avenue / 12th Street			✓	933	9	75	84
60078	Palm Avenue / 13th Street	✓	✓	✓	934	84	22	106
60143	Palm Avenue / 13th Street		✓		933	33	95	128
60034	Palm Avenue / 16th Street		✓		934	90	23	113
60145	Palm Avenue / 16th Street	✓	✓	✓	933	23	69	92
60036	Palm Avenue / Thermal Avenue	✓	✓	✓	934	16	10	26
60185	Palm Avenue / Thermal Avenue		✓		933	14	30	44
60509	Palm Avenue / 18th Street		✓		933	23	43	66
60040	Palm Avenue / Saturn Blvd	✓	✓	✓	934	143	108	251
91026	Palm Avenue / Saturn Blvd		✓		933	147	234	381
60149	Palm Avenue / Hollister Street	✓		✓	932,933,934	877	343	1,220
60042	Palm Avenue / Hollister Street	✓	✓	✓	932,933,934	389	730	1,119
60297	Hollister Street / Palm Avenue	✓	✓		932,933,934	58	81	139
60354	Hollister Street / Palm Avenue	✓	✓	✓	932,933,934	191	70	261
75006	Hollister Street / Palm Avenue	✓	✓	✓	Blue Line	1,418	783	2,201
75007	Hollister Street / Palm Avenue	✓	✓	✓	Blue Line	755	1,407	2,162
					Total	**4,377**	**4,143**	**8,520**

Source: Fiscal Year 2014 Data from MTS; Chen Ryan Associates, 2015

Figure 4-18

Bicycle and Pedestrian Collisions Near Public Transportation Stops

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4.4 Vehicular Analysis

This section presents operational analyses for roadway study segments and intersections in the Palm Avenue study corridor. The currently adopted citywide General Plan Mobility Element identifies the following goals for the street and freeway system:

- A street and freeway system that balances the needs of multiple users of the public right-of-way.
- An interconnected street system that provides multiple linkages within and between communities.
- Vehicle congestion relief.
- Safe and efficient street design that minimizes environmental and neighborhood impacts.
- Well maintained streets.

The 1997 Otay Mesa-Nestor Community Plan identifies improving traffic flow along Palm Avenue, as well as other thoroughfares within the community such as Saturn Boulevard, Coronado Avenue, Beyer Boulevard and Beyer Way as a goal.

4.4.1 Roadway Geometry

Figure 4-19 displays existing roadway functional classifications and average daily traffic (ADT) volumes for study area roadway segments. The roadway segment and study area intersection traffic counts were conducted in February 2015. Vehicular segment and intersection count worksheets are provided in **Appendix G**. As shown, the highest traffic volume recorded along Palm Avenue is 63,032 ADT, between Saturn Boulevard and the Interstate 5 ramps where the roadway functions as a Major Arterial. The lowest traffic volume recorded along Palm Avenue is 12,707 ADT, between Hollister Street and Harris Avenue where the roadway functions as a 4–lane Collector. Of the three study roadways intersecting Palm Avenue, Saturn Boulevard experienced the greatest level of traffic volumes, with 24,969 ADT along the segment just north of Palm Avenue, and 16,542 ADT to the south.

East-West Roadways

Palm Avenue – From the western extent of the project area to the Interstate 5 southbound ramps, Palm Avenue is a six-lane roadway with a raised median. Between the southbound ramps and northbound ramps, it is a 4-lane roadway with a raised median. East of the northbound ramps, the raised median becomes a center left-turn lane. 45 MPH posted speed limit signs are present throughout the study area. The paved width of Palm Avenue within the study area ranges between 70 feet and 118 feet. Parking is generally permitted along Palm Avenue within the study area, except for near I-5, between Saturn Boulevard and the I-5 NB off-ramp. There are sidewalks along the entire length of Palm Avenue, with the exception of the south side of the roadway segment between Saturn Boulevard and the I-5 NB off-ramp. Class II bicycle facilities are continuously present, from 13th Street to 18th Street, and then become intermittent east of 18th Street.

Figure 4-19

Existing Roadway Classifications and Average Daily Traffic Volumes

Donax Avenue – Within the project study area, Donax Avenue is an undivided residential two-lane roadway with a paved width of 34 feet. Parallel parking is permitted on both sides of the roadway. Sidewalks, although intermittent, are present on both sides and have a width of 5 feet. No bicycle facilities are present along Donax Avenue within the study area.

North-South Roadways

Saturn Boulevard – Within the project study area, Saturn Boulevard transitions from a three-lane roadway with a continuous-left-turn-lane between Palm Avenue and Coronado Avenue, to a divided four-lane roadway between Palm Avenue and Southland Plaza Driveway. The last segment of Saturn Boulevard within the study area, between Southland Plaza Driveway and the northern terminus, transitions from an undivided three-lane roadway into an undivided two-lane roadway. 35 MPH and 25 MPH WCAP (When Children Are Present) posted speed limit signs are present along Saturn Boulevard between Palm Avenue and Coronado Avenue. Parking is generally permitted along Saturn Boulevard with the exception of the west side of the roadway segment between Palm Avenue and Donax Avenue, as well as, on both sides of the roadway segment to the north of Palm Avenue. Sidewalks are present intermittently on the west side of Saturn Boulevard, while on the east side, pedestrian facilities are constant between Coronado Avenue and the northern terminus of Saturn Boulevard. South of Palm Avenue, Saturn Boulevard is classified as a bicycle route, while north of Palm Avenue bicycle lanes are intermittent.

13th Street – Within the project study area, 13th Street is an undivided two-lane roadway. 30 MPH posted speed limit signs are present along 13th Street. Parking is permitted on both sides of the roadway. Sidewalks are present on both sides of the roadway. North of Palm Avenue 13th Street is classified as a bicycle route according to the City of Imperial Beach Bicycle Transportation Plan and SANDAG's Regional Bicycle Plan, however, no signage or sharrows are present.

Hollister Street – Within the project study area, Hollister Street is an undivided two-lane roadway. 35 MPH posted speed limit signs are present between Main Street and Conifer Avenue and 30 MPH posted speed limit signs are present between Conifer Avenue and Coronado Avenue. Parking is generally permitted along Hollister Street, with the exception of a segment between Manya Street and Conifer Avenue, where parking is prohibited on both sides. Sidewalks are intermittent along Hollister Street within the study area. There are no bicycle facilities present on Hollister Street.

4.4.2 Roadway Level of Service

Figure 4-20 and **Table 4-10** display the level of service (LOS) analysis results for key study area roadway segments under existing conditions. As shown, all study roadway segments operate at acceptable LOS D or better with the exception of the following:

- Palm Avenue, between Saturn Boulevard and I-5 SB Off-Ramp (LOS F).

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Figure 4-20
Roadway Level of Service

Table 4-10 Roadway Level of Service

Roadway	Segment	Functional Classification	Threshold (LOS E)	ADT	V/C	LOS
Palm Avenue	From 9th Street to Florida Street	6-Lane Major Arterial	50,000	33,346	0.667	C
	From Florida Street to 13th Street	6-Lane Major Arterial	50,000	34,228	0.685	C
	From 13th Street to 16th Street	6-Lane Major Arterial	50,000	39,249	0.785	C
	From 16th Street to Saturn Blvd	6-Lane Major Arterial	50,000	42,922	0.858	D
	From Saturn Blvd to I-5 SB Off-Ramp	6-Lane Major Arterial	50,000	63,032	1.261	**F**
	From I-5 SB Off-Ramp to I-5 NB Off-Ramp	4-Lane Major Arterial	40,000	23,516	0.588	C
	From I-5 NB Off-Ramp to Hollister Street	4-Lane Secondary Arterial	30,000	20,672	0.689	D
	From Hollister Street to Beyer Boulevard	4-Lane Secondary Arterial	30,000	12,707	0.424	B
Donax Avenue	From 13th Street to 16th Street	2-Lane Sub Collector	2,200[2]	1,395	0.634	C or better
	From 16th Street to Saturn Boulevard	2-Lane Sub Collector	2,200[2]	1,287	0.585	C or better
13th Street	From northern terminus to Palm Avenue	3-Lane Collector (multi-family)	12,000[1]	4,438	0.370	B
	From Palm Avenue to Donax Avenue	4-Lane Collector	15,000	8,625	0.575	C
	From Donax Avenue to Elm Avenue	4-Lane Collector	15,000	9,183	0.612	C
Saturn Boulevard	From northern terminus to Southland Plaza Driveway	2-Lane Collector	8,000	149	0.019	A
	From Southland Plaza Driveway to Palm Avenue	4-Lane Major Arterial	40,000	24,969	0.624	C
	From Palm Avenue to Donax Avenue	3-Lane Collector W/CLTL	22,500[1]	16,542	0.735	D
	From Donax Avenue to Coronado Boulevard	3-Lane Collector with CLTL	22,500[1]	12,305	0.547	C
Hollister Street	From Main Street to Palm Avenue	2-Lane Collector (commercial)	8,000	5,773	0.722	D
	From Palm Avenue to Coronado Boulevard	2-Lane Collector (multi-family)	8,000	4,311	0.539	C

Source: NDS, 2015; Chen Ryan Associates, 2015

Notes:
[1] Capacity assumed to be 75% of a 4-Lane Collector.
V/C = Volume to Capacity Ratio.
LOS = Level of Service.
Bold letters indicate unacceptable LOS.
[2] 2-lane sub collector threshold is LOS C.

4.4.3 Intersection Geometrics and Traffic Volumes

As described in Chapter 3, a total of ten (10) study intersections were analyzed as part of this existing conditions assessment. Seven (7) of the intersections are located on Palm Avenue, two (2) on Saturn Boulevard, and one (1) on 13th Street. **Figure 4-21** displays current intersection geometry for the study intersections, while **Figure 4-22** shows existing peak period turning movements for AM and PM peak periods. The intersection traffic counts are provided in Appendix G.

4.4.4 Intersection Level of Service

Table 4-11 displays the level of service analysis results for the key study area intersections, while **Figure 4-23** displays the intersection level of service results. **Appendix H** presents the peak hour intersection level of service analysis worksheets.

Table 4-11 Peak Hour Intersection Level of Service

ID	Intersection	Intersection Control Type	AM Peak Hour		PM Peak Hour	
			Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS
1	Saturn Boulevard / Southland Plaza	Signalized	10.5	B	13.6	B
2	Florida Street / Palm Avenue	Signalized	13.1	B	12.9	B
3	13th Street / Palm Avenue	Signalized	35.4	D	38.2	D
4	16th Street / Palm Avenue	Signalized	13.8	B	22.2	C
5	Saturn Blvd / Palm Avenue	Signalized	56.6	**E**	124.7	**F**
6	I-5 SB Off-Ramp / Palm Avenue	Signalized	22.6	C	28.6	C
7	I-5 NB Off-Ramp / Palm Avenue	Signalized	12.1	B	10.0	B
8	Hollister Street / Palm Avenue	Signalized	18.3	B	20.1	C
9	13th Street / Donax Avenue	SSSC	13.4	B	18.6	C
10	Saturn Boulevard / Donax Avenue	SSSC	25.0	D	26.4	D

Source: NDS, 2015; Chen Ryan Associates, 2015

Notes:
Bold letters represent unacceptable LOS.
SSSC = Side Street Stop Control

As shown in the table above, all of the study area intersections operate at acceptable LOS D or better with the exception of:

- Saturn Boulevard / Palm Avenue – LOS E during the AM peak hours and LOS F during the PM peak hours.

The primary reason this intersection operates at LOS E and F is due to the high westbound left-turn traffic volumes on a single lane approach, as well as excessive northbound right-turn volumes during both the AM and PM peak hours.

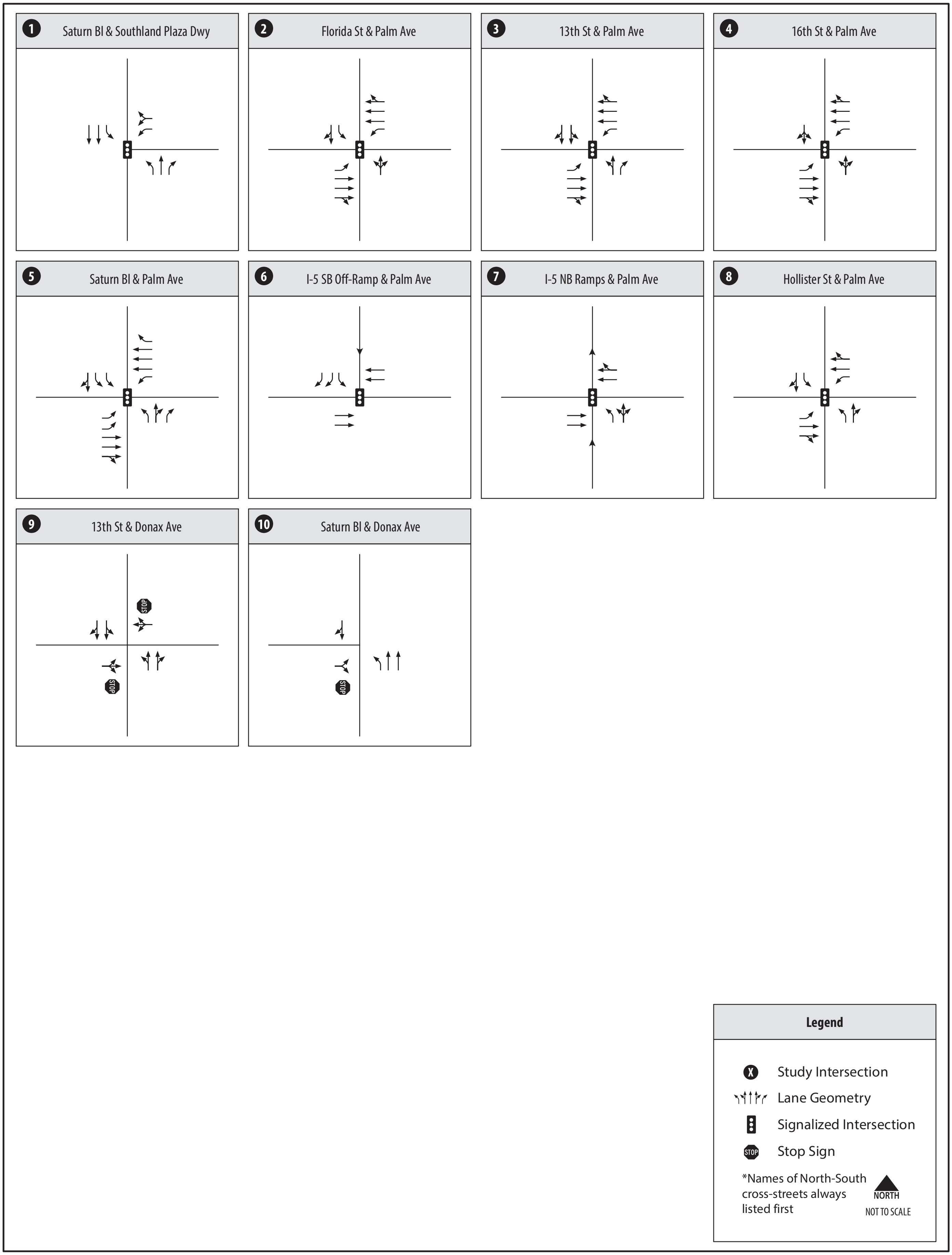


Figure 4-21

Intersection Geometrics - Existing Conditions (Intersections 1-10)

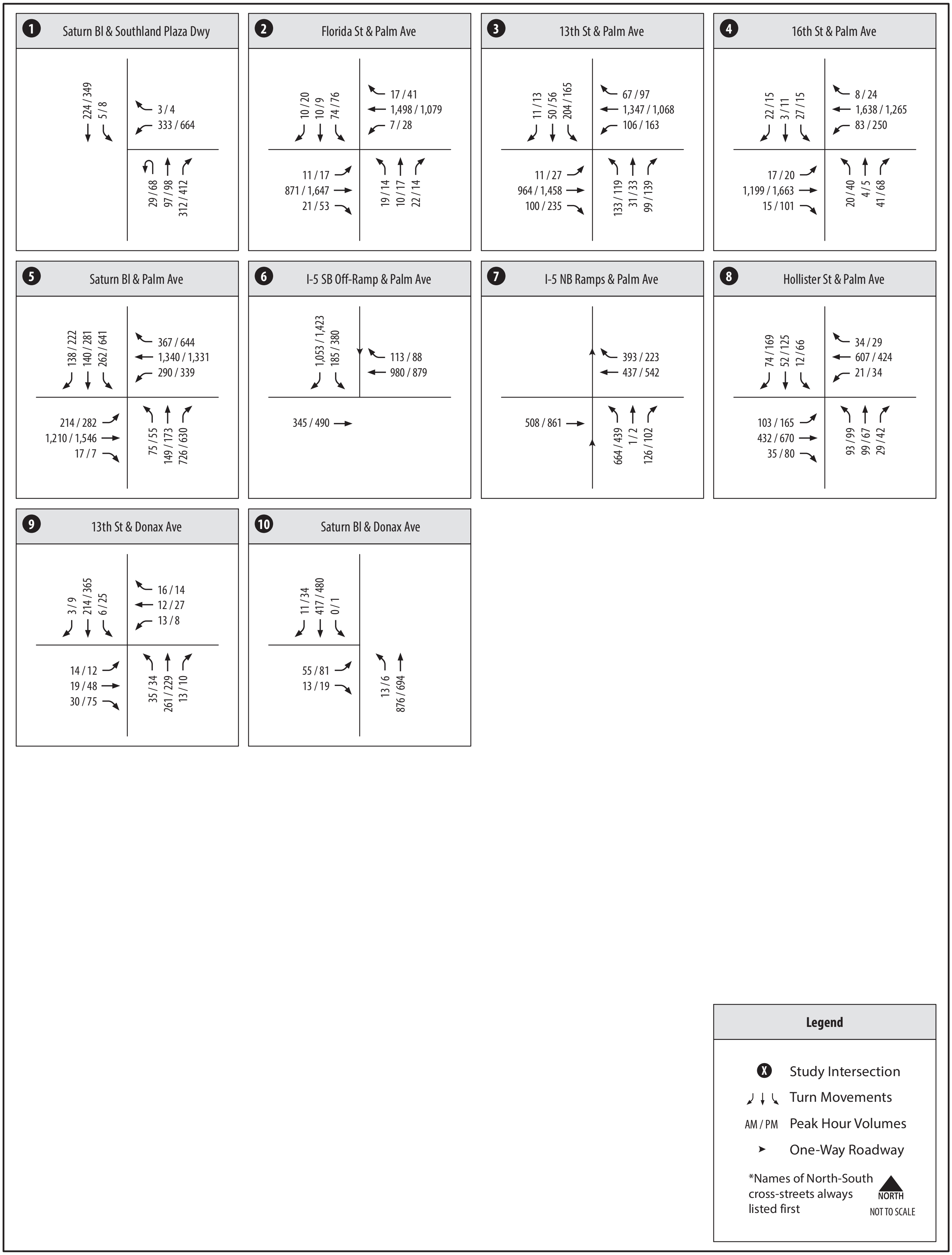


Figure 4-22

AM/PM Peak Hour Intersection Traffic Volumes - Existing Conditions (Intersections 1-10)

Figure 4-23

Peak Period Intersection Level of Service

4.4.5 Arterial Speed Analysis

Table 4-12 summarizes the existing arterial LOS and speed analysis for Palm Avenue study segments. Peak hour arterial speed analysis worksheets are provided in **Appendix I**.

Table 4-12 Arterial Speed Analysis

Roadway	Segment	Direction	AM Peak Hours		PM Peak Hours	
			Speed	LOS	Speed	LOS
Palm Avenue	Florida Street to 13th Street	EB	17.1	D	14.8	**E**
		WB	23.0	C	21.8	D
	13th Street to 16th Street	EB	25.7	C	19.6	D
		WB	24.0	C	22.0	C
	16th Street to Saturn Boulevard	EB	13.6	**E**	8.6	**F**
		WB	28.4	B	28.2	B
	Saturn Boulevard to I-5 SB Off-Ramp	EB	20.8	D	16.0	**E**
		WB	11.7	**F**	10.0	**F**
	I-5 SB Off-Ramp to I-5 NB Off-Ramp	EB	18.1	D	17.9	D
		WB	12.4	**F**	9.7	**F**
	I-5 NB Off-Ramp to Hollister Street	EB	16.9	**E**	15.5	**E**
		WB	20.2	D	19.2	D

Source: Chen Ryan Associates, 2015

4.4.6 VISSIM Micro-Simulation and Intersection Queuing Analysis

The Existing Condition VISSIM model was calibrated using the criteria described in Chapter 3. VISSIM calibration results are provided in **Appendix J**. The calibrated VISSIM model was used to conduct queueing analysis under the existing conditions.

Table 4-13 displays potential intersection queuing issues during the AM and PM peak hours.

As shown, there are currently five (5) study intersections including seven (7) different movements within the Palm Avenue study area that are operating with potential queuing issues during either the AM or PM peak hour. The spillovers could degrade traffic operations within the intersection or at closely spaced upstream intersections.

Table 4-13 Existing Peak Hour Intersection Queuing Analysis

ID	Intersection	Traffic Control	Turning Movement	Peak Hour	Pocket Length (ft)	95% Queue Length (ft)	Excess Queue (ft)
2	Florida Street / Palm Avenue	Signalized	SBL	AM / PM	70	150 / 150	80 / 80
			EBL	AM / PM	120	50 / 50	-
			WBL	AM / PM	260	25 / 75	-
3	13th Street / Palm Avenue	Signalized	EBL	AM / PM	110	50 / 75	-
			WBL	AM / PM	220	250 / 400	30 / 180
4	16th Street / Palm Avenue	Signalized	EBL	AM / PM	105	50 / 50	-
			WBL	AM / PM	430	150 / 350	-
5	Saturn Boulevard / Palm Avenue	Signalized	NBL	AM / PM	120	125 / 100	5 / 0
			SBL	AM / PM	410	225 / 600	0 / 190
			SBR	AM / PM	380	50 / 50	-
			EBL	AM / PM	280	150 / 240	-
			WBL	AM / PM	330	450 / 700	120 / 370
6	I-5 SB Off-Ramp / Palm Avenue	Signalized	SBL	AM / PM	500	100 / 180	-
			SBR	AM / PM	500	350 / 625	0 / 125
7	I-5 NB Off-Ramp / Palm Avenue	Signalized	NBL	AM / PM	520	150 / 100	-
8	Hollister Street / Palm Avenue	Signalized	NBL	AM / PM	85	60 / 70	-
			SBL	AM / PM	90	25 / 50	-
			EBL	AM / PM	125	125 / 170	0 / 45
			WBL	AM / PM	90	50 / 50	-

Source: Chen Ryan Associates, 2015

4.4.7 Freeway Segment Level of Service

Interstate 5

Interstate 5 (I-5) is a major north-south regional facility providing access between the U.S.-Mexico International Border to the south and Orange County, and Los Angeles County to the north. The segment of I-5 with ramps at Palm Avenue has eight mixed flow/general purpose lanes (four in each direction).

The California Department of Transportation (Caltrans) maintains and operates I-5. In 2013, I-5 accommodated 101,000 to 145,000 ADT along the segments perpendicular to Palm Avenue. Trucks comprise approximately 4.2% of total traffic on I-5. **Table 4-14** displays the existing freeway segment level of service results.

As shown, all freeway segments currently operate at acceptable levels of service.

Table 4-14 Existing Freeway Segment Level of Service Results

Freeway	Segment	ADT[a]	Direction	# of Lanes	Capacity[b]	D[c]	K[d]	HVF[e]	Peak Hour Volume	V/C	LOS
I-5	Palomar Street to Main Street	147,000	NB	4M+1A	10,810	76.0%	6.3%	4.2%	7,400	0.68	C
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	7,900	0.73	D
I-5	Main Street to Palm Avenue	145,000	NB	4M+1A	10,810	76.0%	6.3%	4.2%	7,300	0.68	C
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	7,700	0.71	D
I-5	Palm Avenue to Coronado Avenue	113,000	NB	4M	9,400	76.0%	6.3%	4.2%	5,700	0.61	C
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	6,000	0.56	C
I-5	Coronado Avenue to State Route 905	101,000	NB	4M+1A	10,810	76.0%	6.3%	4.2%	5,100	0.47	B
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	5,400	0.50	C

Source: Caltrans District 11, 2015; Chen Ryan Associates, 2015.

Notes:
M = Main Lane; A = Auxiliary Lane
(a) Traffic volumes provided by Caltrans (2013)
(b) Capacity is calculated as 2,350 ADT per main lane and 1,410 ADT (60% of the main lane capacity) per auxiliary lane.
(c) D = Directional split. Values in the table reflect the nearest segment values provided by Caltrans (2013).
(d) K = Peak hour %. Values in the table reflect the nearest segment values provided by Caltrans (2013).
(e) HVF = Heavy vehicle %. Values in the table reflect the nearest segment values provided by Caltrans (2013).

4.4.8 Vehicular Safety

The automobile collision analysis covers the 5-year period from 2008 to 2013. The data indicate a total of 329 vehicular collisions along the study roadways during this period. Of those, 120 were vehicle-vehicle collisions that occurred on Palm Avenue.

Figure 4-24 displays the distribution of all vehicular collisions recorded along study segment roadways during the five-year analysis period. As shown, collisions are largely concentrated at intersections and intersection approaches. Intersections with relatively high numbers of vehicular collisions include the following:

- Saturn Boulevard / Palm Avenue (64)
- 16th Street / Palm Avenue (23)
- Saturn Boulevard / Coronado Avenue (22)
- 13th Street / Donax Avenue (15)
- 13th Street / Palm Avenue (14)

Figure 4-24

Automobile Collisions (2008-2013)

Table 4-15 summarizes the 120 vehicle-vehicle collisions that occurred on Palm Avenue by the primary collision cause for the five-year analysis period. As shown, the leading collision cause was attributed to "Unsafe Speed" accounting for approximately 38% of collisions, followed by "Following Too Close" which was the primary collision cause for 18% of collisions.

Table 4-15 Primary Collision Causes (2008 – 2013)
(Vehicle – Vehicle Collisions)

Primary Collision Cause	Collisions	Percent of Total
Unsafe Speed	46	38%
Following Too Close	22	18%
Ran Traffic Signal / Ran Stop Sign	12	10%
Improper Turning	12	10%
Other	8	7%
Violated Vehicle's R/W	6	5%
Unsafe Starting or Backing	6	5%
Unknown	4	3%
D.U.I or N/A Not Paying Attention	1	1%
Impeding Traffic	1	1%
Improper Passing	1	1%
Unsafe Movement – Lane Change	1	1%
Total	**120**	**100%**

Source: SWITRS; Chen Ryan Associates, 2015

Table 4-16 summarizes Palm Avenue collisions by collision type from 2008 to 2013. As shown, the leading collision type was "Rear End" accounting for approximately 61% of collisions, followed by "Right Angle" collisions which accounted for 13% of collisions on Palm Avenue.

Table 4-16 Collision Type (2008 – 2013)
(Vehicle – Vehicle Collisions)

Collision Type	Collisions	Percent of Total
Rear End	73	61%
Right Angle (Broadside)	15	13%
Side Swipe	14	12%
Other	10	7%
Hit Object / Hit "Fixed" Object	4	3%
Head-On	2	2%
Overturned in Road	2	2%
Total	**120**	**100%**

Source: SWITRS; Chen Ryan Associates, 2015

Table 4-17 displays the roadway collision rate analysis results for all study segments, normalized by 100 million vehicle-miles of travel.

As shown, the highest collision rate was found along Saturn Boulevard between its northern terminus and the Southland Plaza Driveway, however, it should be noted this segment experienced extremely low ADT levels when compared to other study segments, as well as the lowest total collisions. The next three highest collision rate locations include the following:

- Saturn Boulevard, between Palm Avenue and Donax Avenue
- 13th Street, between Palm Avenue and Donax Avenue
- Donax Avenue, between 13th Street and 16th Street

Table 4-17 Roadway Collision Rate per 100 Million Vehicle-Miles of Travel (2008 – 2013)

Roadway	From	To	Number of Collisions	ADT	Segment Length (miles)	Collision Rate[1]
Palm Avenue	11th Street	Florida Street	14	33,346	0.07	329
	Florida Street	13th Street	35	34,228	0.22	255
	13th Street	16th Street	53	39,249	0.36	206
	16th Street	Saturn Boulevard	117	42,922	0.40	373
	Saturn Boulevard	I-5 SB Off-Ramp	90	63,032	0.22	356
	I-5 SB Off-Ramp	I-5 NB Off-Ramp	25	23,516	0.14	416
	I-5 NB Off-Ramp	Hollister Street	38	20,672	0.14	719
	Hollister Street	Harris Avenue	16	12,707	0.06	1,150
Donax Avenue	13th Street	16th Street	12	1,395	0.36	1,309
	16th Street	Saturn Boulevard	6	1,287	0.4	639
13th Street	Cypress Avenue	Palm Avenue	15	4,438	0.22	842
	Palm Avenue	Donax Avenue	31	8,625	0.11	1,790
	Donax Avenue	Elm Avenue	16	9,183	0.11	868
Saturn Boulevard	Northern Terminus	Southland Plaza Driveway	2	149	0.11	6,686
	Southland Plaza Driveway	Palm Avenue	73	24,969	0.13	1,232
	Palm Avenue	Donax Avenue	75	16,542	0.13	1,911
	Donax Avenue	Coronado Boulevard	34	12,305	0.39	388
Hollister Street	Conifer Avenue	Palm Avenue	12	5,773	0.13	876
	Palm Avenue	Donax Avenue	12	4,311	0.12	1,271

Source: SWITRS; Chen Ryan Associates, 2015

Note:
[1] Collision Rate is displayed as the number of collisions per 100 million vehicle miles of travel.

Table 4-18 displays the inputs and results of the study intersection collision rate analysis, normalized by one million entering vehicles.

As shown, the intersections with the greatest collision rates include the following:

- 13^{th} Street & Donax Avenue
- Saturn Boulevard & Palm Avenue
- 16^{th} Street & Palm Avenue

Table 4-18 Intersection Collision Rate per One Million Entering Vehicles (2008 – 2013)

Intersection	Number of Collisions	ADT Entering the Intersection[1]	Collision Rate[2]
13^{th} Street / Donax Avenue	13	9,511	0.749
Saturn Blvd / Palm Avenue	64	68,344	0.513
16^{th} Street / Palm Avenue	23	38,633	0.326
I-5 NB Off-Ramp / Palm Avenue	12	24,100	0.273
Hollister Street / Palm Avenue	10	21,889	0.250
13^{th} Street / Palm Avenue	14	39,700	0.193
Florida Street / Palm Avenue	8	33,500	0.131
I-5 SB Off-Ramp / Palm Avenue	7	36,222	0.106
Saturn Boulevard / Donax Avenue	1	14,611	0.038
Saturn Boulevard / Southland Plaza Driveway	1	17,811	0.031

Source: SWITRS; Chen Ryan Associates, 2015

Note:
[1] Intersection ADT was calculated by extrapolating the PM peak period intersection volume counts. PM peak period intersection volume was estimated to equal 9% of daily intersection volume. The 24-hour segment counts provided in Appendix G were used to calculate the PM peak period percentage.
[2] Collision Rate is displayed as the number of collisions per one million vehicles entering the intersection.

5.0 Model Forecasting

This chapter summarizes the approach to developing future year traffic forecasts in the Palm Avenue study area. Future year traffic volumes were derived from the SANDAG Series 12 Traffic Volume Forecast for Year 2035 and from the 2015 Naval Base Coronado Coastal Campus Expansion Environmental Impact Statement traffic study.

5.1 Series 12 Model 2035 Traffic Volume Forecast

The SANDAG Series 12 regional transportation model is used to estimate automobile and transit forecasts for years 2008, 2020, 2035, and 2050. For the purposes of the Palm Avenue Revitalization Plan future year conditions analysis, Year 2035 volumes were utilized. The forecasts reflect anticipated transportation network changes, population and employment growth, land use changes, and also utilize the Revenue Constrained Transit Network identified in the 2050 Regional Transportation Plan.

Table 5-1 displays anticipated growth in traffic volumes between the years 2015 and 2035 as forecast by the SANDAG Series 12 Model. As shown, increases between 10.4 and 51.3 percent are anticipated, resulting in an average expected increase of 33.5 percent.

Table 5-1 SANDAG Series 12 Model 2035 Traffic Volume Forecast

Roadway	Segment	Existing ADT (2015)	SANDAG Series 12 (2035)	Percent Growth
Palm Avenue	From 9th Street to Florida Street	33,346	36,800	10.4%
	From Florida Street to 13th Street	34,228	51,800	51.3%
	From 13th Street to 16th Street	39,249	53,900	37.3%
	From 16th Street to Saturn Blvd	42,922	61,600	43.5%
	From Saturn Blvd to I-5 SB Off-Ramp	63,032	84,300	33.7%
	From I-5 SB Off-Ramp to I-5 NB Off-Ramp	23,516	29,500	25.4%
	From I-5 NB Off-Ramp to Hollister Street	20,672	29,500	42.7%
	From Hollister Street to Beyer Boulevard	12,707	15,700	23.6%

Source: SANDAG Transportation Forecast Information Center 2013; Chen Ryan Associates 2015

5.2 Naval Base Coronado Coastal Campus Expansion Considerations

The 2015 Naval Base Coronado Coastal Campus Expansion Environmental Impact Statement (EIS) included a traffic study citing anticipated traffic volumes in the year 2040 due to predicted Naval Base traffic generation. Due to the limited number of routes accessing the Naval Base, which is located on the Silver Strand between the cities of Imperial Beach and Coronado, Palm Avenue was identified as a primary access route to this proposed development project.

Table 5-2 displays the forecast 2040 volumes for Palm Avenue as presented in the EIS, compared to the volumes collected in support of the Palm Avenue Revitalization Plan. As shown, increases between 40.8 and 71.4 percent are anticipated.

Table 5-2 Naval Base Coronado Coastal Campus Expansion 2040 Traffic Forecast

Roadway	Segment	Existing ADT (2015)	Naval Study (2040)	Percent Growth
Palm Avenue	From 9th Street to Florida Street	33,346	46,967	40.8%
	From Florida Street to 13th Street	34,228	57,527	68.1%
	From 13th Street to 16th Street	39,249	66,846	70.3%
	From 16th Street to Saturn Blvd	42,922	73,566	71.4%
	From Saturn Blvd to I-5 SB Off-Ramp	63,032	96,366	52.9%
	From I-5 SB Off-Ramp to I-5 NB Off-Ramp	23,516	34,244	45.6%
	From I-5 NB Off-Ramp to Hollister Street	20,672	n/a	n/a
	From Hollister Street to Beyer Boulevard	12,707	n/a	n/a

Source: Naval Base Coronado Coastal Campus Environmental Impact Statement Appendix D; Chen Ryan Associates 2015

5.3 Series 12 Model 2035 Traffic Volume Forecast with Added Naval Traffic

SANDAG Series 12 land use assumptions generally account for anticipated cumulative projects. Cumulative projects are near term land development projects that may or may not be included in the transportation model due to evolving information and development trends. It was brought to the team's attention that one major near-term project development (the Naval Base Coronado Coastal Campus) was being proposed in the southern portion of the City of Coronado on the Silver Strand by the US Navy. To determine whether these trip volumes were accounted for in the base SANDAG Series 12 2035 transportation model, the Chen Ryan team compared trip generation reports for TAZ 4288, where the Naval Base Coronado Coastal Campus is planned to be sited. It was determined that the base SANDAG Series 12 2035 transportation model does not account for this proposed land use. This requires that the additional traffic volumes be added to Series 12 2035 forecast volumes. **Appendix K** shows the trip reports for Year 2008 and Year 2035 for TAZ 4288.

The Chen Ryan team therefore used the Naval Base Coronado Coastal Campus project traffic (presented in the traffic impact study for the *Naval Base Coronado Coastal Campus Environmental Impact Statement Appendix D,* March 2015) in combination with the base SANDAG Series 12 Year 2035 forecast volumes to develop the most conservative estimate of future year 2035 traffic volumes. **Appendix L** and **Appendix M** show the project trip assignments from the Naval study and the SANDAG Series 12 model plot, respectively.

Table 5-3 shows the data used to generate forecast 2035 traffic volumes along Palm Avenue, along with the equations employed. The existing count data as collected in February 2015 for the Palm Avenue Revitalization Plan are provided in Table 5-3, along with the existing count data collected in July 2007 for the Naval Base Coronado Coastal Campus study. It is interesting to note that existing count data collected in 2015 is consistently lower than count data collected in July 2007. Relative to the existing count data, the proposed forecast 2035 traffic volumes (column C and D) appear reasonable and very conservative. These volumes were compared to 2030 forecast volumes calculated for the City of Imperial Beach's Palm Avenue Master Plan Traffic Study undertaken in 2009. Volumes were not calculated for segments beyond 13^{th} Street, although it can be seen that SANDAG Series 12 forecast volumes for the segment between Florida Street and 13^{th} Street are substantially higher than the traffic study forecast.

Table 5-3 Estimating Future Volumes along Palm Avenue in the City of San Diego

Roadway	Segment	(A) Existing ADT (2015)[1]	(B) Naval Study (2007)[2]	(C) Naval Campus Project Trips	(D) SANDAG Series 12 (2035)[3]	SANDAG Series 12 (2035) w/Naval Traffic (column C + D)[4]	City of Imperial Beach Palm Avenue Master Plan Traffic Study Future Volumes (2030)[5]
Palm Avenue	From 9th Street to Florida Street	33,346	35,600	7,114	36,800	**43,900**	43,083
	From Florida Street to 13th Street	34,228	44,400	7,114	51,800	**58,900**	44,359
	From 13th Street to 16th Street	39,249	52,200	7,114	53,900	**61,000**	n/a
	From 16th Street to Saturn Blvd	42,922	57,800	7,114	61,600	**68,700**	n/a
	From Saturn Blvd to I-5 SB Off-Ramp	63,032	76,800	7,114	84,300	**91,400**	n/a
	From I-5 SB Off-Ramp to I-5 NB Off-Ramp	23,516	28,200	4,800	29,500	**34,300**	n/a
	From I-5 NB Off-Ramp to Hollister Street	20,672	n/a	534	29,500	**30,000**	n/a
	From Hollister Street to Beyer Boulevard	12,707	n/a	534	15,700	**16,200**	n/a

Source: Chen Ryan Associates, 2015

Notes:

1. *Chen Ryan Associates,* July 2015.
2. *Naval Base Coronado Coastal Campus Environmental Impact Statement Appendix D,* March 2015.
3. *SANDAG Transportation Forecast Information Center,* October 2013.
4. Forecast volumes rounded to 100
5. *City of Imperial Beach Traffic Impact Study,* February 2009.

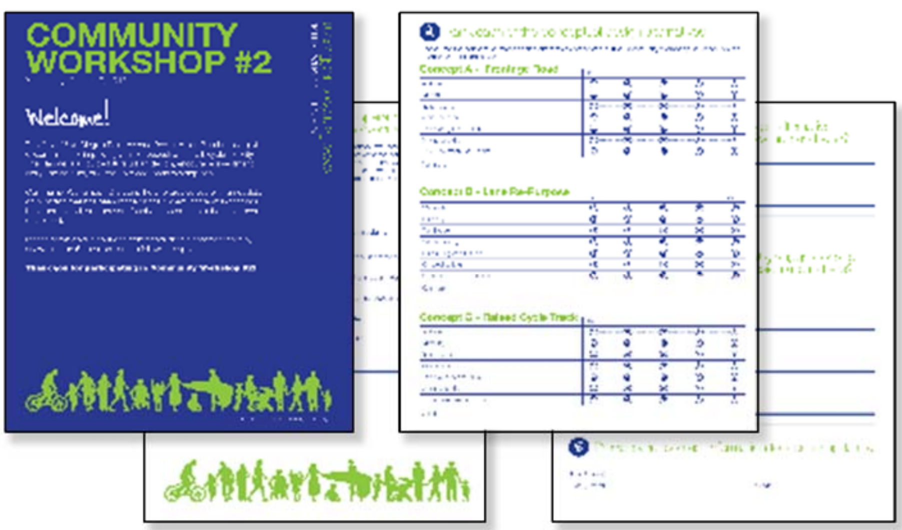
6.0 Preferred Concept Plan

This chapter describes the process used to identify the preferred alternative. A summary of the urban design guidelines and the main components of the preferred concept are also provided.

6.1 Identification of the Preferred Plan – Community Workshop #2

The second of three community workshops in support of the Palm Avenue Revitalization Plan was held October 28, 2015 at the American Legion Imperial Beach Post 820. The workshop provided community members with an update on project progress and collected feedback on the conceptual design alternatives developed based on input collected during the initial community workshop held June 4, 2015. Ultimately, the public input collected during the second workshop was used to select the preferred design alternative.

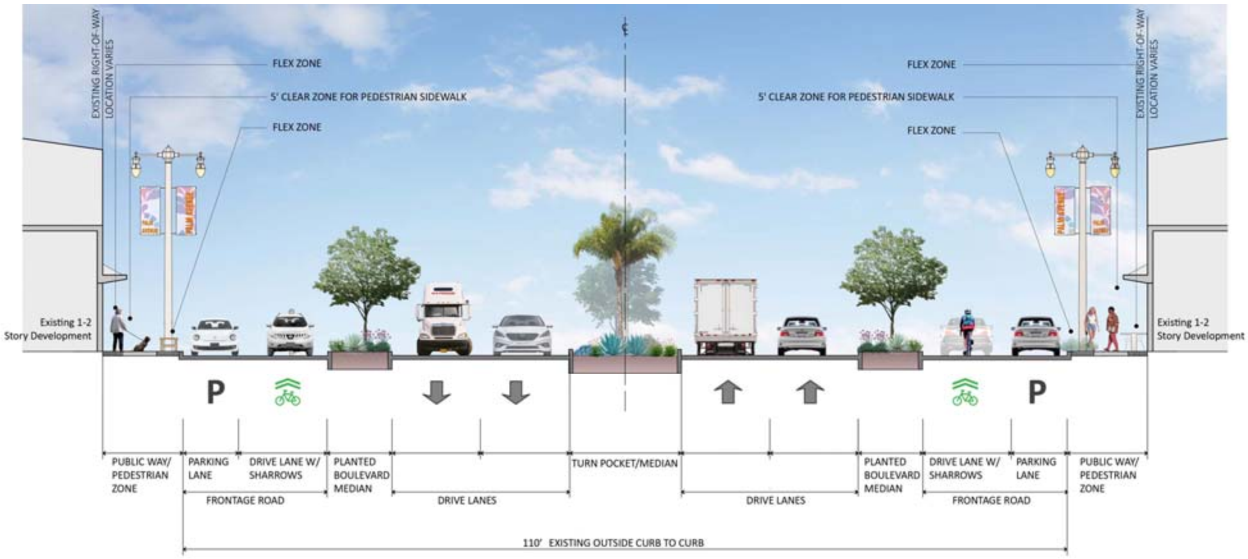
The workshop began with a PowerPoint presentation reviewing the work completed to date and a summary of the community input collected during the first community workshop and through project surveys. The remainder of the presentation and workshop focused on presenting and receiving input on the conceptual design alternatives and proposed urban design framework and operational improvements.



A series of questions were used to prompt specific feedback on each of the design alternatives.

The three conceptual design alternatives were developed based upon previously collected community feedback as well as information from the existing conditions analysis, and presented at the October community workshop. Each alterative incorporated complete streets concepts for integrating pedestrian and bicycle mobility improvements, and urban design features such as landscaping, lighting, and other streetscape improvements. The alternatives were presented as long-term visions for future corridor projects. **Figure 6-1** through **Figure 6-3** display the three design alternatives presented during the workshop and the pros and cons of each design.

Figure 6-1 Concept A[2] – Frontage Road[3]



PROS

- Maintains existing number of travel lanes
- Improves walkability and access to transit
- Medians reduce crossing distance
- Median Landscaping improves street character
- Parking and slower traffic along frontage road may benefit businesses

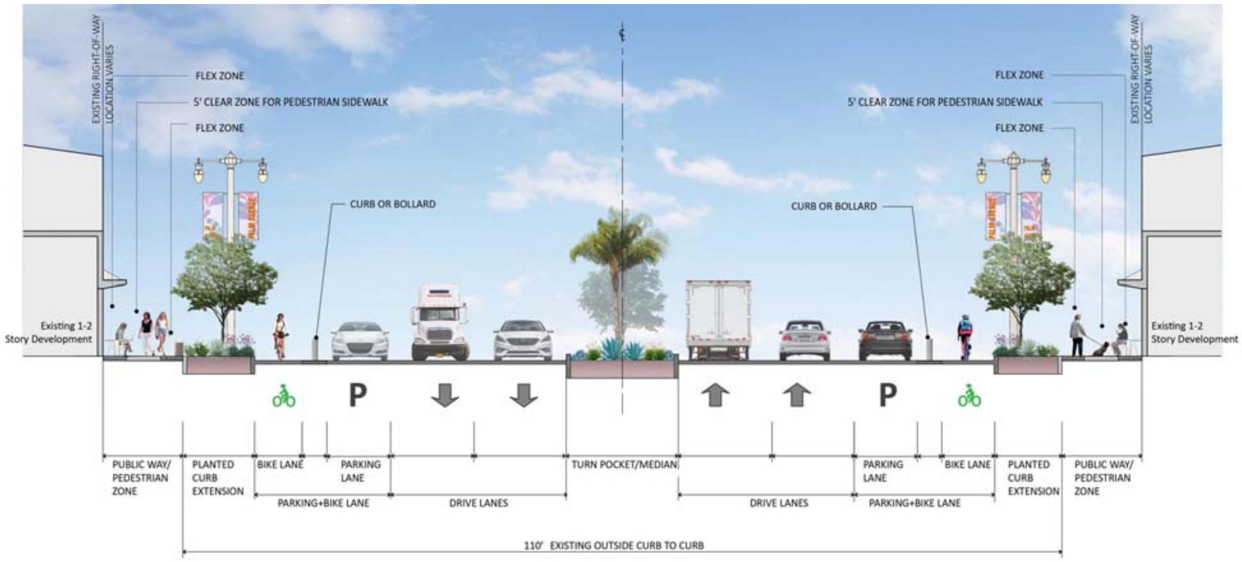
CONS

- Pedestrians cross 4 “streets”
- No dedicated bike lane
- Requires maintenance of 3 median landscaping areas
- May reduce roadway capacity
- Bus loading from median is not ideal for pedestrians
- Bus loading along frontage road is not ideal for traffic

[2] Note that cross sections and conceptual plan illustrations are provided to demonstrate general feasibility of the subject proposal only. Actual improvements will require additional engineering studies and design work shall be the satisfaction of the City Engineer.

[3] Non-standard items such as banners, street trees and other landscaping may require additional funding mechanisms in place, such as a maintenance assessment district.

Figure 6-2 Concept B[4] – Lane Re-purpose[5]



PROS

- Improves walkability and access to transit
- Allows some parking
- Protected bike lane is more friendly for all users
- Reduces pedestrian crossing distance
- Includes expanded pedestrian-realm
- Includes more area for landscaping and street furniture between the pedestrian/bike area and traffic

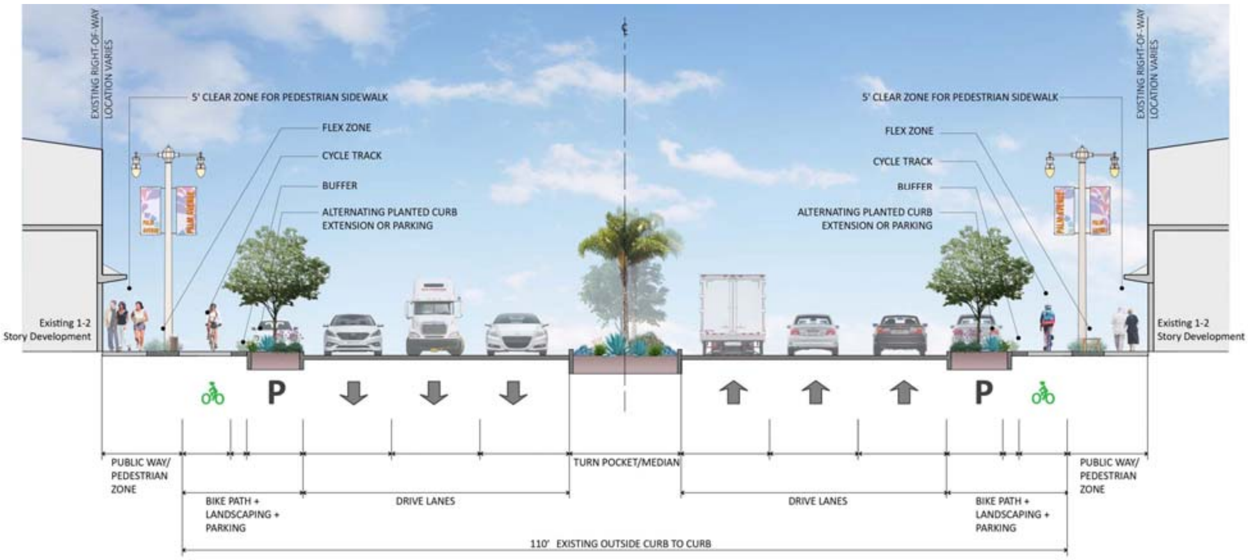
CONS

- Eliminates 1-2 vehicle travel lanes
- Limited ability to expand public realm area
- Decreases roadway capacity
- Reduced capacity may affect transit
- Does not align with Imperial Beach 6-lane road

[4] Note that cross sections and conceptual plan illustrations are provided to demonstrate general feasibility of the subject proposal only. Actual improvements will require additional engineering studies and design work shall be the satisfaction of the City Engineer.

[5] Non-standard items such as banners, street trees and other landscaping may require additional funding mechanisms in place, such as a maintenance assessment district.

Figure 6-3 Concept C[6] – Raised Cycle Track[7]



PROS

- Maintains existing number of travel lanes
- Allows some parking
- Improves walkability and access to transit
- Reduces crossing distance for pedestrians
- Raised off-street cycle track is easier for less experienced cyclists to use
- Includes expanded pedestrian-realm
- Includes more area for landscaping and street furniture between the pedestrian/bike area and vehicular travel lanes

CONS

- Some cyclists prefer cycle-track at road level
- Existing frequent curb-cuts will take time to phase out

Appendix A provides a more detailed summary of community workshop #2, including the specific public comments and responses received.

6.2 Preferred Concept Plan

Through a series of exercises conducted during the second community workshop, *Concept C: Raised Cycle Track* displayed as **Figure 6-4**, emerged as the community Preferred Alternative.

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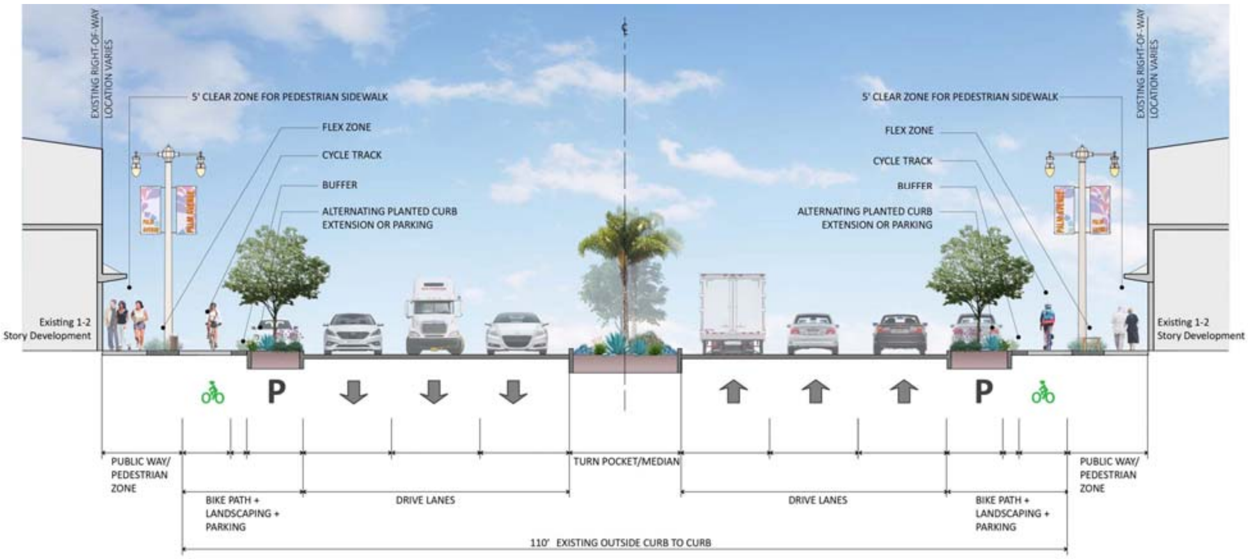
[6] Note that cross sections and conceptual plan illustrations are provided to demonstrate general feasibility of the subject proposal only. Actual improvements will require additional engineering studies and design work shall be the satisfaction of the City Engineer.

[7] Non-standard items such as banners, street trees and other landscaping may require additional funding mechanisms in place, such as a maintenance assessment district.

Figure 6-4 Community Preferred Alternative[8]



As shown, all travel lane widths will be reduced to 11’, however, all six travel lanes will be maintained. One of the defining features of the Preferred Alternative is a 6-foot wide raised cycle track on each side of Palm Avenue. The cycle track will provide for a bicycle facility that is physically separated from vehicular traffic by landscaping and/or a parking lane. Further, the cycle track is proposed to be raised to the sidewalk level to provide additional separation and comfort for cyclists. Where space permits, the Plan recommends defining a Public Way / Pedestrian Zone that measures approximately 10’ in width. This dimension will accommodate the placement of street furniture and landscaping between the cycle track and the sidewalk. Because existing conditions vary along the study area, this dimension may vary and is intended only as a guideline. If the available width is under 10’, a setback easement is recommended to permit the development of the Public Way / Pedestrian Zone. If the width is not available and no easement is available, landscaping may be limited to the planted curb extension.

The Preferred Alternative builds on the bicycle facility recommendation included in the City of San Diego Bicycle Master Plan, which calls for Class II bike lanes along Palm Avenue, from Saturn Boulevard to 24th Street. The Palm Avenue Revitalization Plan examined the corridor in greater detail than permitted in a Citywide planning process, enabling the project team to identify the opportunity for the raised cycle track concept. Consistent with current City policy, this plan supports the Vision Zero concept.

As a part of its Climate Action Plan, the City is targeting a 12% transit mode share and 6% bicycle mode share citywide by 2020. By the year 2035, the City is targeting a 25% transit mode share and 18% bicycle mode share within Transit Priority Areas. The Preferred Alternative supports these targets by planning for an improved bicycling and walking experience along Palm Avenue.

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[8] Non-standard items such as banners, street trees and other landscaping may require additional funding mechanisms in place, such as a maintenance assessment district.

The striping plan for the preferred concept is provided in Appendix B. Chapter 7 presents analysis of the Preferred Alternative for pedestrian, bicycle, transit, and vehicular networks, along with a No Build analysis. In Chapter 8 there is a detailed description of the project recommendations, and an implementation strategy including short-term and long-term projects, cost estimates and potential funding sources.

6.3 Urban Design Framework & Operational Improvements

The preferred design alternative defines the physical dimensions of the roadway's pedestrian zone, cycling environment, landscaping, parking and travel lanes, and medians. In addition to the Preferred Alternative, an urban design framework and a set of operational improvements are also proposed to guide future development along the corridor. The proposed urban design framework and operational improvements were developed based upon community feedback.

The following operational improvements are proposed:

- Install high visibility crosswalks at all pedestrian crossings
- Examine pedestrian crossing time
- Consider widening crosswalks at Saturn Boulevard to help with pedestrian volume
- Install ADA curb ramps at all crossings
- Create a continuous/level sidewalk by reconstructing driveways concurrent with other street improvements and/or subsequent development
- Reconfigure the intersection of southbound Interstate 5 on-ramp and westbound Palm Avenue to eliminate conflicts between pedestrians/bicyclists and vehicles
- Consider new signalized intersection at Thermal Avenue and Palm Avenue
- Investigate whether further traffic signal coordination could help the corridor
- Proposed improvements for the Hollister Street / Palm Avenue intersection include:
    - High visibility crosswalks across all four intersection legs. Crosswalks should be expanded in width, where feasible, to accommodate the high pedestrian volume from the Palm Avenue trolley stop.
    - Lead pedestrian intervals (LPI) across all four intersection legs.
- The right turn lane pocket, located along westbound Palm Avenue at Saturn Boulevard, is proposed to be lengthened from the existing 50' to 250' in length.
- An additional left-turn lane is proposed (by others) from westbound Palm Avenue onto southbound Saturn Boulevard to help alleviate queuing vehicles that back up into the through lanes. *Note, this is a project assumed to be done by others as a condition of a development project outside the scope of this work, therefore has not been included in the cost estimate.*

The last two operational improvements listed above are consistent with recommendations made in the currently adopted Otay Mesa-Nestor Community Plan (1997), as well as the Otay Mesa-Nestor Public Facilities Financing Plan FY2014 (2013).

7.0 Preferred Plan Mobility Analysis

This chapter presents the future conditions analysis, assuming implementation of the Preferred Alternative. As described in the previous chapter, the year 2035 is the Preferred Alternative horizon year, and the analyses described in this chapter take into account the estimated population, employment, land use and infrastructural improvements projected through that year. The Preferred Plan scenario is also compared to the No Build scenario for vehicular intersection level of service, and includes comparisons to existing conditions for pedestrian and bicycle modes.

7.1 Walkability

This section provides a description of the future pedestrian conditions along Palm Avenue following implementation of the Preferred Alternative. Future conditions were analyzed using the pedestrian environmental quality index (PEQI) methodology described in chapter 3. The preferred alternative design includes components for improving pedestrian comfort with additional landscaping and safety by expanding the buffer between pedestrians and vehicular traffic. The raised cycle track will serve as a buffer, with additional separation provided between pedestrians and the cycle track in the flex zone.

Figure 7-1 displays the PEQI results for the Preferred Alternative. As shown, the evaluation includes 12 intersections, instead of 13 as analyzed for existing conditions. This is due to the consolidation of the southbound Interstate 5 ramps (westbound Palm Avenue) into a single intersection and crossing location. All intersections and segments along the corridor experienced improved pedestrian conditions when analyzing the Preferred Alternative.

Table 7-1 presents a comparison between existing conditions and the Preferred Alternative PEQI results for study segments, while **Table 7-2** shows a comparison between study intersections. **Appendix N** presents the input variables used to perform the PEQI analysis for the Preferred Alternative.

The walking environment improves along the following segments under the Preferred Alternative when compared to existing conditions:

- Palm Avenue, from Hollister Street to Harris Avenue (north side)
- Palm Avenue, from 13th Street to Georgia Street (south side)
- Palm Avenue, from Georgia Street to 16th Street (south side)
- Palm Avenue, from 16th Street to Thermal Avenue (south side)

In addition to the four segments identified above, 12 more segments would experience improved scores, however, these improved scores did not shift the segments into a higher performing category.

Table 7-1 PEQI Study Segment Score Comparison

ID	From	To	Street Side	Existing Score	Environment Quality - Existing	Preferred Plan Score	Environment Quality – Preferred Alternative
A	11th Street	Florida Street	N	45	Basic	45	Basic
B	Florida Street	12th Street	N	44	Basic	44	Basic
C	12th Street	Florence Street	N	47	Basic	47	Basic
D	Florence Street	13th Street	N	48	Basic	48	Basic
E	13th Street	Georgia Street	N	44	Basic	50	Basic
F	Georgia Street	16th Street	N	44	Basic	50	Basic
G	16th Street	Thermal Street	N	44	Basic	48	Basic
H	Thermal Street	18th Street	N	42	Basic	45	Basic
I	18th Street	Saturn Boulevard	N	44	Basic	47	Basic
J	Saturn Boulevard	I-5 SB Off Ramp	N	35	Poor	40	Poor
K	I-5 SB Off Ramp	I-5 SB On Ramp	N	33	Poor	36	Poor
L	I-5 SB On Ramp	I-5 NB Ramps	N	32	Poor	35	Poor
M	I-5 NB Ramps	Hollister Street	N	33	Poor	33	Poor
N	Hollister Street	Harris Avenue	N	40	Poor	43	Basic
A	11th Street	Florida Street	S	44	Basic	44	Basic
B	Florida Street	12th Street	S	49	Basic	49	Basic
C	12th Street	Florence Street	S	45	Basic	45	Basic
D	Florence Street	13th Street	S	43	Basic	43	Basic
E	13th Street	Georgia Street	S	40	Poor	46	Basic
F	Georgia Street	16th Street	S	38	Poor	44	Basic
G	16th Street	Thermal Street	S	39	Poor	42	Basic
H	Thermal Street	18th Street	S	45	Basic	51	Basic
I	18th Street	Saturn Boulevard	S	46	Basic	52	Basic
J	Saturn Boulevard	I-5 SB Off Ramp	S	N/A	Peds. Prohibited	20	Peds. Prohibited
K	I-5 SB Off Ramp	I-5 SB On Ramp	S	N/A	Peds. Prohibited	20	Peds. Prohibited
L	I-5 SB On Ramp	I-5 NB Ramps	S	N/A	Peds. Prohibited	20	Peds. Prohibited
M	I-5 NB Ramps	Hollister Street	S	36	Poor	39	Poor
N	Hollister Street	Harris Avenue	S	38	Poor	38	Poor

Source: Chen Ryan Associates, 2015

Walking environments improved at the following intersections under the Preferred Alternative condition when compared to the existing conditions:

- 13th Street & Palm Avenue
- 16th Street & Palm Avenue
- Saturn Boulevard & Palm Avenue
- I-5 SB Off-Ramp & Palm Avenue

In addition to the four intersections identified above, 3 other intersections experienced improved scores, however, the resulting score was not high enough to change the environment quality category.

Table 7-2 PEQI Study Intersection Score Comparison

ID	Intersection	Existing Score	Environment Quality - Existing	Preferred Plan Score	Environment Quality – Preferred Alternative
1	11th Street / Palm Avenue	38	Poor	38	Poor
2	Florida Street / Palm Avenue	33	Poor	33	Poor
3	12th Street / Palm Avenue	36	Poor	36	Poor
4	Florence Street / Palm Avenue	30	Poor	30	Poor
5	13th Street / Palm Avenue	30	Poor	44	Basic
6	Georgia Street / Palm Avenue	12	Not Suitable for Peds.	19	Not Suitable for Peds.
7	16th Street / Palm Avenue	34	Poor	44	Basic
8	Thermal Avenue / Palm Avenue	18	Not Suitable for Peds.	18	Not Suitable for Peds.
9	18th Street / Palm Avenue	18	Not Suitable for Peds.	18	Not Suitable for Peds.
10	Saturn Boulevard / Palm Avenue	28	Poor	44	Basic
11	I-5 NB On- Off-Ramp / Palm Avenue	15	Not Suitable for Peds.	19	Not Suitable for Peds.
12	Hollister Street / Palm Avenue	41	Basic	44	Basic
13	I-5 SB On-Ramp (westbound) / Palm Avenue	9	Not Suitable for Peds.	N/A	Consolidated with Intersection ID 14
14	I-5 SB Off-Ramp / Palm Avenue	9	Not Suitable for Peds.	38	Poor

Source: Chen Ryan Associates, 2015

Figure 7-1

Preferred Alternative Pedestrian Environmental Quality Index (PEQI) Results

7.2 Bicycling

This section provides a description of future cycling conditions along Palm Avenue following implementation of the Preferred Alternative. Future conditions were analyzed using the level of traffic stress (LTS) methodology described in chapter 3. A critical component of the Preferred Alternative is a raised one-way cycle track on each side of Palm Avenue which creates physical separation between cyclists and vehicular traffic.

Improved conditions for cyclists were identified early on as a project goal. As indicated in Figure 4-16, the entire Palm Avenue corridor was identified as demonstrating existing qualities reflective of an LTS 4 environment, tolerable only by the "strong and fearless" cyclists, which are estimated to represent less than 1% of the population.

Figure 7-2 displays the LTS analysis results for the Preferred Alternative. **Table 7-3** presents a comparison between existing conditions and the Preferred Alternative LTS analysis along Palm Avenue.

Table 7-3 LTS Score Comparison

From	To	Existing Score	Existing Bicycle Facility	Preferred Plan Score	Preferred Alternative Bicycle Facility
11th Street	Florida Street	4	Bike Lane	4	Bike Lane
Florida Street	12th Street	4	Bike Lane	4	Bike Lane
12th Street	Florence Street	4	Bike Lane	4	Bike Lane
Florence Street	13th Street	4	Bike Lane	4	Bike Lane
13th Street	Georgia Street	4	Bike Lane	1	Raised Cycle Track
Georgia Street	16th Street	4	Bike Lane	1	Raised Cycle Track
16th Street	Thermal Street	4	Bike Lane	1	Raised Cycle Track
Thermal Street	18th Street	4	Bike Lane	1	Raised Cycle Track
18th Street	Saturn Boulevard	4	Bike Lane	1	Raised Cycle Track
Saturn Boulevard	I-5 SB Ramps	4	Bike Lane	1	Raised Cycle Track
I-5 SB Ramps	I-5 NB Ramps	4	Mixed Traffic	1	Cycle Track
I-5 NB Ramps	Hollister Street	4	Mixed Traffic	3	Bike Lane
Hollister Street	Harris Avenue	4	Mixed Traffic	3	Bike Lane

As shown, LTS scores improved from the lowest score, 4, to the highest score, 1, from 13th Street to the northbound Interstate 5 ramps. Additionally, LTS scores improved from 4 to 3, between the northbound Interstate 5 ramps and Harris Avenue, as a result of the proposed bicycle lanes which provide a dedicated right-of-way intended for the exclusive use by cyclists. A cycle track is not feasible within the existing curb-to-curb widths east of Interstate 5. **Appendix O** provides input variables used to perform the LTS analysis for the Preferred Alternative.

Figure 7-2
Preferred Alternative Bicycle Level of Traffic Stress Analysis

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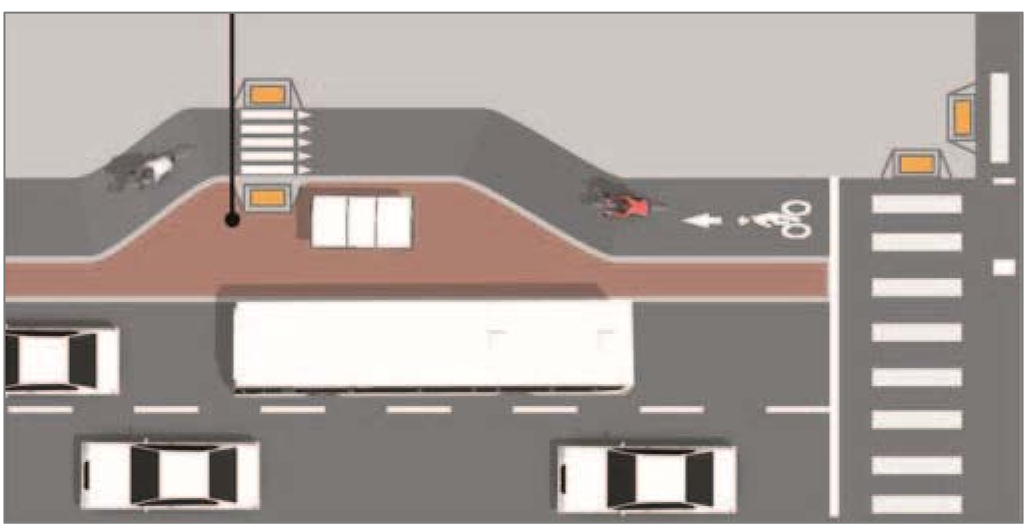
7.3 Transit System

Transit within the project area consists of bus and light rail and is operated by MTS. SANDAG is responsible for planning and implementing regional transportation projects throughout the County. SANDAG's 2050 Regional Transportation Plan (RTP) proposes investing an estimated $214 billion in transportation funds across the San Diego region through the year 2050. Within the project area, the RTP identifies High Frequency Local Bus service along the entire extent of Palm Avenue within the project area. High Frequency Local Bus service is defined as headways of 10 minutes or less throughout the day.

Transit riders arrive at transit stops by walking or bicycling and will therefore benefit from the pedestrian and bicycle related improvements described in the previous sections. Additionally, bus service will benefit from the vehicular improvements listed in the following section.

Several options for integrating bus stops and the proposed raised cycle track can be considered when engineering designs are prepared for the Palm Avenue study area. The current striping plan provided in Appendix B shows the cycle track and the bus stop sharing space at the bus stop locations. This is currently the most commonly seen interaction between bike lanes and bus stops. Green pavement treatment could be used to increase the visibility of users in this conflict area. The proposed design minimizes right-of-way acquisition and construction costs.

An alternative design could potentially run the cycle track behind the bus stop in order to minimize bike-pedestrian conflicts in the bus stop area. The image below shows a prototypical design where the cycle track runs behind the bus stop. Finer-detail engineering of the proposed facility would take place at the project level.



Source: National Association of City Transportation Official (NACTO), ***Urban Bikeway Design Guide***, Second Edition, 2014

7.4 Vehicular Analysis

The future vehicular analysis evaluates the Preferred and No Build alternatives under year 2035 conditions. The vehicular analysis includes segment level of service, intersection level of service, intersection queuing, and freeway segment level of service. The following vehicular improvements were included in the analysis:

- A second westbound to southbound left-turn lane at the Palm Avenue/Saturn Boulevard intersection.
- The extension of the westbound to northbound right-turn lane at the Palm Avenue/Saturn Boulevard intersection from the existing 50' to 250' in length. This would also require widening the roadway 6' to the north.
- Narrowing all vehicle lanes to 11'.

7.4.1 Roadway Level of Service

The roadway segment analysis results for the Preferred Alternative and No Build are identical due to the recommended vehicular-related projects primarily consisting of intersection improvements. It should be noted that the narrowing of all vehicular travel lanes along Palm Avenue may have an impact on roadway capacity. The roadway segment level of service analysis results are presented in **Table 7-4**. **Figure 7-3** displays the roadway segment level of service results.

Table 7-4 Preferred Alternative Roadway Segment Level of Service

Roadway	From	To	Threshold (LOS E)	ADT	V/C	LOS
Palm Avenue	9th Street	Florida Street	50,000	43,900	0.878	D
	Florida Street	13th Street	50,000	58,900	1.178	**F**
	13th Street	16th Street	50,000	61,000	1.220	**F**
	16th Street	Saturn Boulevard	50,000	68,700	1.374	**F**
	Saturn Boulevard	I-5 SB Off-Ramp	50,000	91,400	1.828	**F**
	I-5 SB Off-Ramp	I-5 NB On-Ramp	40,000	34,300	0.858	D
	I-5 NB On-Ramp	Hollister Street	30,000	34,300	1.143	**F**
	Hollister Street	Beyer Boulevard	30,000	16,200	0.541	C
Donax Avenue	13th Street	16th Street	2,200	1,500	0.666	A
	16th Street	Saturn Boulevard	2,200	1,400	0.614	A
13th Street	Northern Terminus	Palm Avenue	12,000	4,700	0.388	B
	Palm Avenue	Donax Avenue	15,000	9,100	0.604	C
	Donax Avenue	Elm Avenue	15,000	9,700	0.643	C
Saturn Boulevard	Northern Terminus	Southland Plaza	8,000	200	0.021	A
	Southland Plaza	Palm Avenue	40,000	26,300	0.657	C
	Palm Avenue	Donax Avenue	22,500	17,400	0.772	D
	Donax Avenue	Coronado Boulevard	22,500	12,900	0.574	C
Hollister Street	Main Street	Palm Avenue	8,000	9,400	1.170	**F**
	Palm Avenue	Coronado Boulevard	8,000	12,400	1.556	**F**

Palm Avenue Revitalization Plan

Figure 7-3
Preferred Alternative Roadway Level of Service

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As shown, the following segments are projected to operate at a substandard LOS E or F:

- Palm Avenue, from Florida Street to 13th Street
- Palm Avenue, from 13th Street to 16th Street
- Palm Avenue, from 16th Street to Saturn Boulevard
- Palm Avenue, from Saturn Boulevard to I-5 SB Off-Ramp
- Palm Avenue, from I-5 NB On-Ramp to Hollister Street
- Hollister Street, from Main Street to Palm Avenue
- Hollister Street, from Palm Avenue to Coronado Boulevard

7.4.2 Intersection Geometry

A total of ten (10) study intersections were analyzed as part of the future conditions assessment. Seven (7) of the intersections are located on Palm Avenue, two (2) on Saturn Boulevard, and one (1) on 13th Street. **Figure 7-4** displays future intersection geometry for the study intersections, while **Figure 7-5** shows future peak period turning movements for AM and PM peak periods.

7.4.3 Intersection Level of Service Analysis

Intersection level of service was evaluated using the methodologies described in chapter 3. **Table 7-5** presents the intersection level of service results for the Preferred Alternative. The preferred alternative intersection level of service analysis worksheets can be found in **Appendix P**.

Table 7-5 Preferred Alternative Intersection Level of Service

ID	Intersection	Control Type	AM		PM	
			Delay	LOS	Delay	LOS
1	Saturn Boulevard & Southland Plaza Driveway	Signal	12.9	B	14.0	B
2	Florida Street & Palm Avenue	Signal	21.2	C	13.7	B
3	13th Street & Palm Avenue	Signal	40.7	D	49.2	D
4	16th Street & Palm Avenue	Signal	16.8	B	34.0	C
5	Saturn Boulevard & Palm Avenue	Signal	67.8	**E**	149.6	**F**
6	I-5 SB Ramps & Palm Avenue	Signal	26.8	C	35.4	D
7	I-5 NB Ramps & Palm Avenue	Signal	15.7	B	11.4	B
8	Hollister Avenue & Palm Avenue	Signal	26.5	C	49.2	D
9	13th Street & Donax Street	TWSC	15.6	B	26.1	D
10	Saturn Boulevard & Donax Street	TWSC	33.4	D	36.4	**E**

Source: Chen Ryan Associates, 2015

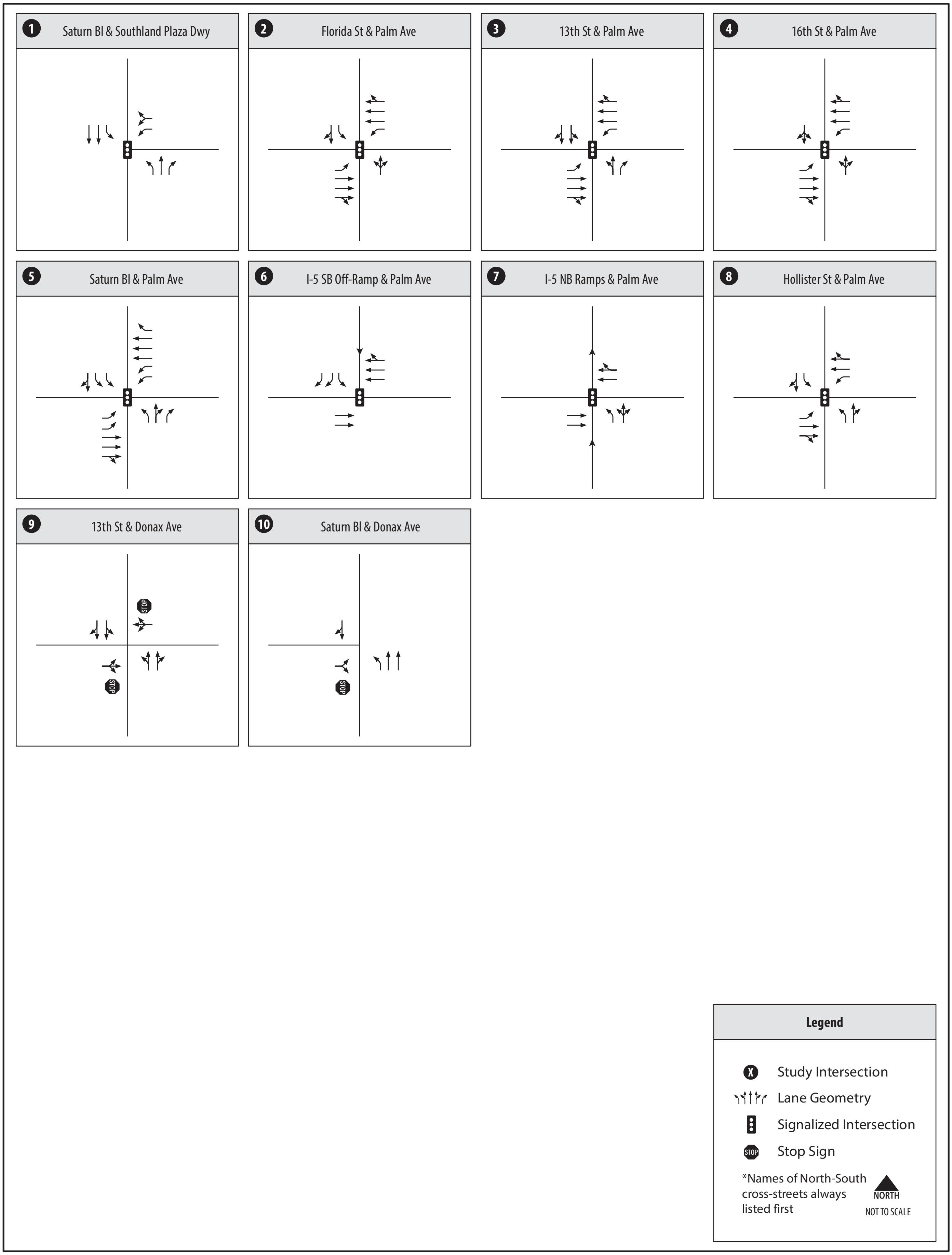

Figure 7-4

Future Intersection Geometrics (Intersections 1-10)

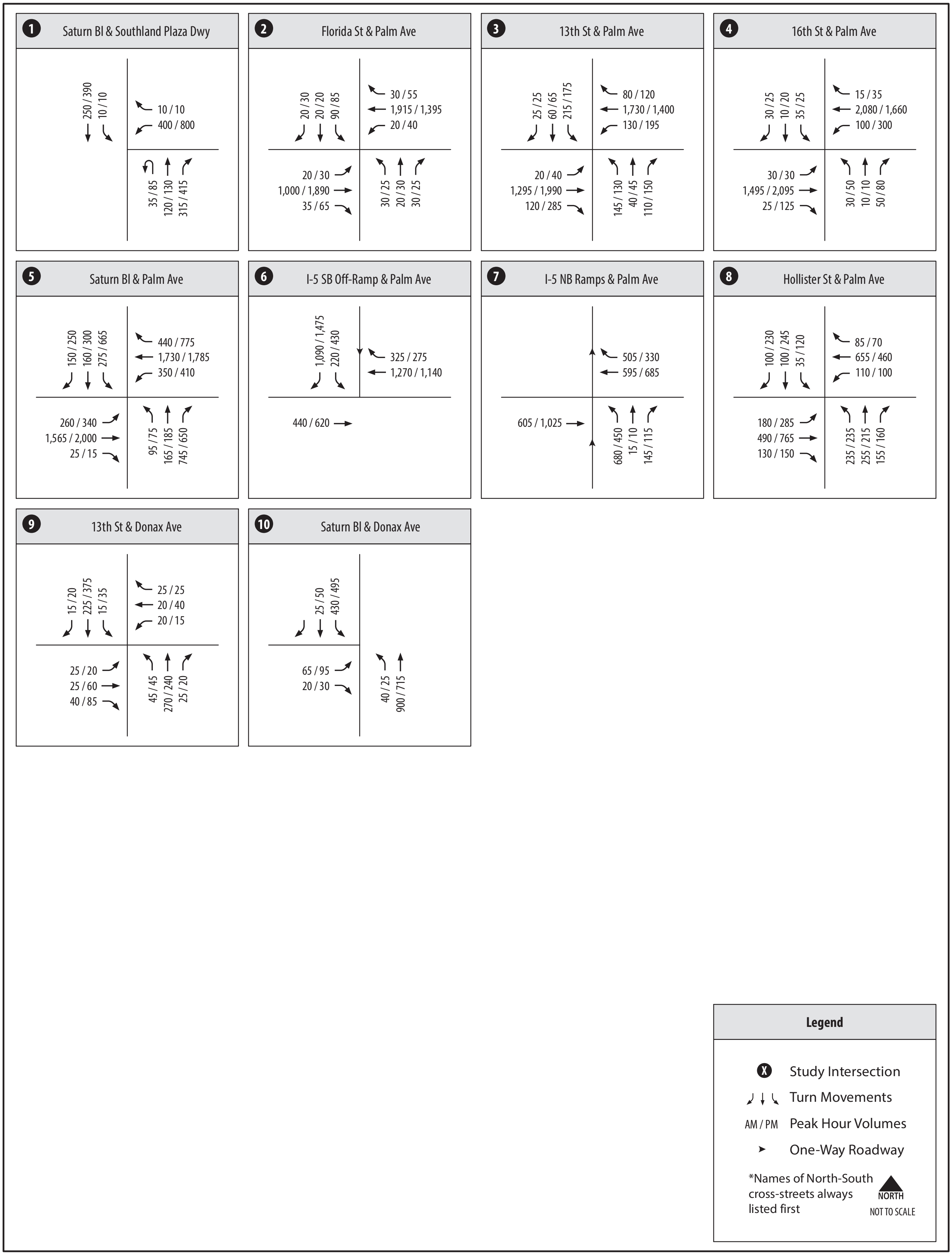

Figure 7-5

Future AM / PM Peak Period Intersection Turning Movements (Intersections 1-10)

Figure 7-6 graphically displays the Preferred Alternative intersection level of service analysis results. As shown, the following study intersections are projected to experience LOS of E or F during either the AM or PM peak hour under the Preferred Alternative future conditions analysis:

- Saturn Boulevard & Palm Avenue – LOS E (AM)
- Saturn Boulevard & Palm Avenue – LOS F (PM)
- Saturn Boulevard & Donax Street – LOS E (PM)

Table 7-6 displays the No Build Alternative level of service analysis results, assuming no intersection improvements (i.e. no change from existing conditions) and year 2035 turning movement volumes. As shown, the following study intersections would experience an LOS of E or F during either the AM or PM peak hour under the No Build Alternative future conditions analysis:

- Saturn Boulevard & Palm Avenue – LOS F (AM & PM)
- Saturn Boulevard & Donax Street – LOS E (PM)

Table 7-6 No Build Alternative Intersection Level of Service

ID	Intersection	Control Type	AM		PM	
			Delay	LOS	Delay	LOS
1	Saturn Boulevard & Southland Plaza Driveway	Signal	12.9	B	14.0	B
2	Florida Street & Palm Avenue	Signal	21.2	C	13.7	B
3	13th Street & Palm Avenue	Signal	40.7	D	49.2	D
4	16th Street & Palm Avenue	Signal	16.8	B	34.0	C
5	Saturn Boulevard & Palm Avenue	Signal	84.4	**F**	175.1	**F**
6	I-5 SB Ramps & Palm Avenue	Signal	36.6	D	46.3	D
7	I-5 NB Ramps & Palm Avenue	Signal	15.7	B	11.4	B
8	Hollister Avenue & Palm Avenue	Signal	26.5	C	49.2	D
9	13th Street & Donax Street	TWSC	15.6	B	26.1	D
10	Saturn Boulevard & Donax Street	TWSC	33.4	D	36.4	**E**

Source: Chen Ryan Associates, 2015

When compared to the No Build Alternative, the Preferred Alternative exhibits reduced intersection delay, during the AM or PM peak period, at the following intersections:

- Saturn Boulevard & Palm Avenue – AM and PM
- I-5 SB Ramps & Palm Avenue – AM and PM

Figure 7-6

Preferred Alternative Intersection Level of Service

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7.4.4 Intersection Control Evaluation

Consistent with Caltrans policy, a roundabout was considered at the two intersections where modifications are proposed (Saturn Boulevard & Palm Avenue and I-5 SB Ramps & Palm Avenue). Roundabouts were determined infeasible due to vehicular volumes and travel speeds. A copy of the Intersection Control Evaluation (ICE) Caltrans Policy Directive is provided in **Appendix Q**.

7.4.5 VISSIM Micro-Simulation and Intersection Queuing Analysis

The calibrated VISSIM model, as presented in the Existing Conditions chapter, was used to conduct queueing analysis under future conditions.

Table 7-7 displays potential intersection queuing issues during the AM and PM peak hours under future conditions. VISSIM queuing analysis results are provided **Appendix R**.

Table 7-7 Preferred Alternative Peak Hour Intersection Queuing Analysis

ID	Intersection	Traffic Control	Turning Movement	Peak Hour	Pocket Length (ft)	95% Queue Length (ft)	Excess Queue (ft)
2	Florida Street / Palm Avenue	Signalized	SBL	AM / PM	70	170 / 190	100 / 120
			EBL	AM / PM	120	60 / 80	0 / 0
			WBL	AM / PM	260	45 / 90	0 / 0
3	13th Street / Palm Avenue	Signalized	EBL	AM / PM	110	60 / 90	0 / 0
			WBL	AM / PM	220	300 / 490	80 / 270
4	16th Street / Palm Avenue	Signalized	EBL	AM / PM	105	55 / 65	0 / 0
			WBL	AM / PM	430	160 / 510	0 / 80
5	Saturn Boulevard / Palm Avenue	Signalized	NBL	AM / PM	120	190 / 130	70 / 10
			SBL	AM / PM	410	245 / 605	0 / 195
			SBR	AM / PM	380	50 / 80	0 / 0
			EBL	AM / PM	280	225 / 330	0 / 50
			WBL	AM / PM	660	285 / 405	0 / 0
6	I-5 SB Off-Ramp / Palm Avenue	Signalized	SBL	AM / PM	500	110 / 215	0 / 0
			SBR	AM / PM	500	420 / 670	0 / 170
7	I-5 NB Off-Ramp / Palm Avenue	Signalized	NBL	AM / PM	520	220 / 135	0 / 0
8	Hollister Street / Palm Avenue	Signalized	NBL	AM / PM	85	210 / 315	125 / 230
			SBL	AM / PM	90	35 / 105	0 / 15
			EBL	AM / PM	125	180 / 360	55 / 235
			WBL	AM / PM	90	125 / 170	35 / 80

Source: Chen Ryan Associates, 2015

As shown, six (6) of seven study intersections along Palm Avenue, including twelve (12) different movements, are projected to operate with potential queuing issues during either the AM or PM peak hour. The spillovers could degrade traffic operations within the intersection or at closely spaced upstream intersections.

7.4.6 Freeway Segment Level of Service Analysis

The projected freeway segment level of service for Year 2035 is presented in **Table 7-8**. As shown, the only segment to operate at LOS E is southbound I-5 from Palomar Street to Main Street.

Table 7-8 Year 2035 Freeway Segment Level of Service

Freeway	Segment	ADT[(a)]	Direction	# of Lanes	Capacity[(b)]	D[(c)]	K[(d)]	HVF[(e)]	Peak Hour Volume	V/C	LOS
I-5	Palomar Street to Main Street	188,300	NB	4M+1A	10,810	76.0%	6.3%	4.2%	9,400	0.87	D
			SB	4M+1A	10,8170	62.3%	8.1%	4.2%	10,100	0.93	**E**
I-5	Main Street to Palm Avenue	177,700	NB	4M+1A	10,810	76.0%	6.3%	4.2%	8,900	0.82	D
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	9,500	0.88	D
I-5	Palm Avenue to Coronado Avenue	156,500	NB	4M	9,400	76.0%	6.3%	4.2%	7,900	0.84	D
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	8,400	0.78	D
I-5	Coronado Avenue to State Route 905	146,400	NB	4M+1A	10,810	76.0%	6.3%	4.2%	7,300	0.68	C
			SB	4M+1A	10,810	62.3%	8.1%	4.2%	7,800	0.72	D

Source: Caltrans District 11, 2015; Chen Ryan Associates, 2015.

Notes:
M = Main Lane; A = Auxiliary Lane
(a) Traffic volumes provided by Caltrans (2013)
(b) Capacity is calculated as 2,350 ADT per main lane and 1,410 ADT (60% of the main lane capacity) per auxiliary lane.
(c) D = Directional split. Values in the table reflect the nearest segment values provided by Caltrans (2013).
(d) K = Peak hour %. Values in the table reflect the nearest segment values provided by Caltrans (2013).
(e) HVF = Heavy vehicle %. Values in the table reflect the nearest segment values provided by Caltrans (2013).

7.4.7 Parking

On-street parking is an important consideration when evaluating roadway changes, even more so when the study area is heavily commercial, as is the case for the Palm Avenue corridor. Providing adequate parking supply in an area involves balancing the availability of parking on a given corridor with the availability of parking on adjacent streets, as well as off-street parking. Good parking policies allow for parking to be readily available, while not creating an oversupply of parking stalls. Too much space devoted to parking can negatively impact the visual quality of an area and limit the potential for other amenities such as landscaping areas, bike lanes, and wider sidewalks. Determining the appropriate amount of parking is done through an evaluation of the existing supply (on-street and off-street of the main corridor and adjacent streets) as well as the demand for parking.

A parking inventory was performed to estimate the total number of on-street parking spaces available along the north and south sides of Palm Avenue between the following segments within the project area:

- City Limits to 16th Street
- 16th Street to Saturn Boulevard
- Saturn Boulevard to I-5 SB Ramp
- I-5 SB Ramps to I-5 NB Ramps
- I-5 NB Ramps to Hollister Street

Table 7-9 displays the results of the existing parking inventory, assuming 19 feet for each parking space. The table also presents the number of proposed parking spaces following implementation of the Palm Avenue Revitalization Plan. As shown, the project may result in the loss of an estimated 51 on-street parking spaces.

Table 7-9 Existing On-Street Parking Inventory and Proposed Parking Spaces

Segment	Existing Parking Spaces (19 feet)	Proposed Parking Spaces	Change in Parking Spaces
City Limits to 16th St (north side)	13	12	-1
City Limits to 16th St (south side)	12	12	0
16th St to Saturn Blvd (north side)	31	8	-23
16th St to Saturn Blvd (south side)	26	5	-21
Saturn Blvd to I-5 SB Ramps (north side)	0	0	0
Saturn Blvd to I-5 SB Ramps (south side)	0	0	0
I-5 SB Ramps to I-5 NB Ramps (north side)	0	0	0
I-5 SB Ramps to I-5 NB Ramps (south side)	0	0	0
I-5 NB Ramps to Hollister St (north side)	6	0	-6
I-5 NB Ramps to Hollister St (south side)	0	0	0
TOTAL	**88**	**37**	**-51**

Additionally, a parking occupancy or parking utilization study was conducted to inform the project team of existing parking demand along the corridor. The occupancy study was performed on Saturday, 1/16/2016 from 2:00 pm to 3:00 pm in an effort to capture the period with the greatest parking demand for a commercial corridor.

Table 7-10 summarizes the results of the on-street parking occupancy study. As shown, on-street parking occupancy ranges from a low of 0% along the south side of Palm Avenue, from the City limits to 16th Street, to a high of 100% occupancy along the north side of Palm Avenue, from I-5 NB Ramps to Hollister Street.

Table 7-10 On-Street Parking Occupancy Study Results

Segment	Existing Parking Spaces (19 feet)	Number of Occupied Spaces	Percent Occupied
City Limits to 16th St (north side)	13	7	54%
City Limits to 16th St (south side)	12	0	0%
16th St to Saturn Blvd (north side)	31	24	77%
16th St to Saturn Blvd (south side)	26	18	75%
Saturn Blvd to I-5 SB Ramps (north side)	0	0	--
Saturn Blvd to I-5 SB Ramps (south side)	0	0	--
I-5 SB Ramps to I-5 NB Ramps (north side)	0	0	--
I-5 SB Ramps to I-5 NB Ramps (south side)	0	0	--
I-5 NB Ramps to Hollister St (north side)	6	6	100%
I-5 NB Ramps to Hollister St (south side)	0	0	--
TOTAL	**88**	**55**	**63%**

Figure 7-7 graphically displays the location and supply of existing on-street parking spaces and the occupancy study results by segment for the Palm Avenue corridor, from City limits to Hollister Street.

The on-street parking along Palm Avenue is supplemented by surface lots. All but two parcels fronting the Palm Avenue project corridor have some existing supply of off-street parking, including a relatively large lot located at the Southland Plaza Shopping Center which serves businesses such as Starbucks, Home Depot, Vons, Wal-Mart, among others. The two parcels without off-street parking are located on the south side of Palm Avenue, just east of 16th Street. In addition to the on-street parking accessible on Palm Avenue, parking is permitted along 16th Street.

Figure 7-8 displays the location of the proposed parking spaces as following implementation of the recommendations identified in the Palm Avenue Revitalization Plan. Additionally, the two parcels without off-street parking are identified. In addition to the on-street parking described on 16th Street, on-street parking will be available just to the east of the two parcels.

Side street parking, such as the spaces described along 16th Street, is readily available along all local roadways intersecting with Palm Avenue, with the exception of Saturn Boulevard. Side streets should be further analyzed during prior to implementation to determine the feasibility of increasing the parking supply by adding angled or head-in parking (90 degree parking), as well as an examination of existing parking restrictions. Additional parking restrictions, such as time-restricted, should also be considered as a means to facilitate increased parking turnover.

Implementation of the preferred roadway alternative would eliminate some on-street parking. However, much of that parking is not utilized even at the peak usage time. In addition, the availability of parking off-street as well as on adjacent streets, coupled with increased parking management strategies, could lessen any potential impacts from the removal of this on-street parking.

Palm Avenue Revitalization Plan

Figure 7-7

Parking Occupancy along Palm Avenue (City Limits to Hollister Street)

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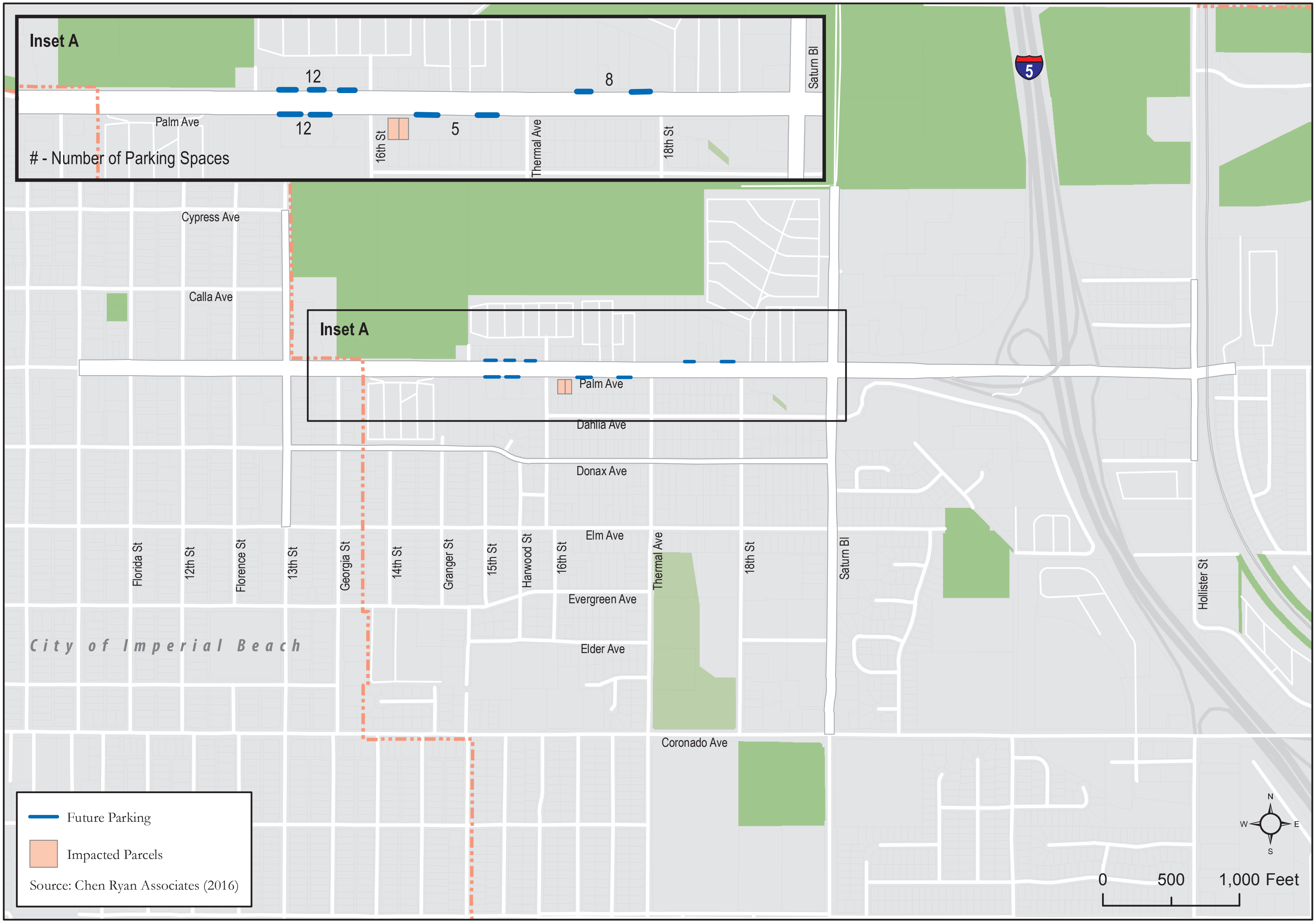

Palm Avenue Revitalization Plan

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Figure 7-8

Future Parking along Palm Avenue (City Limits to Hollister Street)

8.0 Implementation Strategy

The preferred concept plan, urban design framework and operational improvements presented in Chapter 6 create a long-term vision for the corridor. This chapter identifies a set of eight individual projects, that, when combined, achieve the long-term corridor vision. Creating a list of individual projects is a valuable implementation strategy in that, as funds are identified, individual improvements can be selected rather than looking at the report recommendations in their totality. The individual projects were ranked based on the anticipated safety benefits, estimated project cost, and ease of implementation using the methodology described in Section 8.1. It should be noted that Palm Avenue is a Caltrans-controlled facility. Any improvements along the facility would require Caltrans approval, and that some recommendations, including those requiring modifications to lane widths and shoulder widths would require design exceptions from Caltrans.

8.1 Near-Term and Long-Term Projects

This section presents the results of a ranking system used to help separate the projects into near-term and long-term projects. The prioritization evaluation was performed by assigning a ranking of 1 to 3 to the following project characteristics: safety, cost, and ease of implementation. Higher points were awarded for relatively greater safety benefits, lower costs, and greater ease of implementation. Lower points were awarded for relatively lower safety benefits, higher costs, and lower ease of implementation. **Table 8-1** presents the prioritization results. Projects with the highest score (project #'s 3, 6, 7 and 8) are considered near-term projects, while projects with the lowest score (project #'s 1, 2, 4, and 5) are considered long-term projects.

Table 8-1 Project Prioritization

Project	Safety	Cost	Ease of Implement-ation	Total
1. I-5 SB On-Ramp Reconfiguration	3	2	2	7
2. Palm Ave / Saturn Blvd Intersection Vehicular Improvements	3	2	2	7
3. Palm Avenue / Hollister Street Pedestrian Improvements	3	3	3	9
4. Palm Avenue Cycle Track from west City Boundary to 16th St	3	1	1	5
5. Palm Avenue Cycle Track from 16th St to I-5 NB Ramps	3	1	1	5
6. Palm Ave / Saturn Blvd Intersection Pedestrian Improvements	3	2	3	8
7. Palm Avenue Bike Lanes from I-5 NB Ramps to Hollister Street	2	3	3	8
8. Cyclists Activated Signal across I-5 SB On-Ramp	3	3	3	9

Source: Chen Ryan Associates, 2016

Project #1: I-5 Southbound Ramp Reconfiguration – This proposed improvement consists of "squaring up" the southbound on-ramp for vehicles traveling westbound along Palm Avenue. This modification will eliminate the westbound Palm Avenue to southbound I-5 free right-turn for vehicles as well as the uncontrolled pedestrian crossing at this location. The improvement will also enhance safety by directing pedestrians to utilize a single signalized crossing, located just west of the existing on-ramp. Cyclists will benefit from the reduced vehicular exposure. Squaring the intersection will improve pedestrian and bicycle visibility to motorists. Proposed improvements at this intersection will also include moving the existing signal to a new location.

Project #2. Palm Avenue / Saturn Boulevard Intersection Vehicular Improvements: Recommendations include the following:

- An additional left-turn lane is proposed (by others) from westbound Palm Avenue onto southbound Saturn Boulevard to help alleviate queuing vehicles that back up into the through lanes. *Note, this is a project assumed to be done by others as a condition of a development project outside the scope of this work, therefore it has not been included in the cost estimate.*
- The right-turn lane pocket, located along westbound Palm Avenue, is proposed for lengthening from the existing 50' to 250'. This would also require widening the roadway to the north by 6'. This recommendation would help prevent turning vehicles from queuing in the through travel lane and/or bicycle facility.

Project #3: Palm Avenue / Saturn Boulevard Intersection Pedestrian Improvements – Proposed pedestrian improvements at this intersection would include:

- High visibility crosswalks. Crosswalks should be expanded in width, where feasible, to accommodate the high pedestrian volume from the retail center.
- Analyze the implementation of Lead pedestrian interval (LPI) signal phasing to give crossing pedestrians a head start into the intersection.

Project #4: Palm Avenue / Hollister Street Intersection Pedestrian Improvements – Proposed improvements at this intersection include the following:

- High visibility crosswalks along all four intersection legs. Crosswalks should be expanded in width, where feasible, to accommodate the high pedestrian volumes from the Palm Avenue trolley stop.
- Analyze the implementation of Lead pedestrian intervals (LPI) across all four intersection legs.
- Segment of raised median (assume 100 feet).

Project #5: Cycle Track (Between western City boundary and 16th Street) – A raised one-way cycle track is proposed in both the westbound and eastbound directions along Palm Avenue, and would include the following components:

- The proposed cycle track is 6' wide with an additional 7' landscaped buffer. This design is proposed between 13th Street and 15th Street which has relatively fewer intersections and driveways and an existing curb-to-curb width of approximately 110'.
- This improvement would require the existing 18' raised center median island to be reduced to 14', and vehicle lanes reduced from 12' to 11'.
- This project would include median landscaping.
- Cycle track could be pervious and/or colored material.

- High visibility crosswalks at 16th street.

The proposed cross-section for this improvement is presented in Figure 6-4 of section 6.3.

Project #6: Cycle Track (Between 16th Street to I-5 Northbound Ramps) – This segment of the raised one-way cycle track will run in both the westbound and eastbound directions along Palm Avenue between 15th Street and the Interstate 5 northbound ramps.

- A landscaped buffer will separate cyclists from vehicular traffic.
- On the roadway section that is located on the I-5 bridge, the buffer will be striped, and not landscaped.
- This project would include median landscaping.
- Cycle track could be pervious and/or colored material.

The proposed cross-section for this improvement is presented in Figure 6-4 of section 6.3.

Project #7: Bike Lanes from I-5 Northbound Ramps to Hollister Street – Bike lanes are proposed along Palm Avenue between the Interstate 5 northbound ramps and Hollister Street. Currently there are no existing bicycle lanes along either side of Palm Avenue in this area, which may pose safety issues to cyclists traveling between the Palm Avenue Trolley Station and Imperial Beach along Palm Avenue. There is sufficient roadway width to provide an additional 2' buffer for a bike lane in the westbound direction.

Project #8: Cyclist Activated Signal across I-5 Southbound On-Ramp (eastbound Palm Avenue) – A signal is proposed at this location to improve cyclist visibility and safety while crossing the southbound on-ramp. This project will include the following components:

- The signal is recommended to be sited at the existing marked bicycle crossing location. The proposed signal could be a Pedestrian Hybrid Beacon or a full pedestrian signal.
- In the eastbound direction, between Saturn Boulevard and the southbound on-ramp, the cycle track is proposed to be at-grade and follow the southbound on-ramp alignment, using the existing ramp crossing location.
- A raised median buffer would be located between the cycle track and the vehicle lanes.

The following additional corridor-wide improvements were identified as part of the Palm Avenue Revitalization Plan, but were not included in the above project list:

1. **Wayfinding and Signage** – The following components should be integrated into the design of the corridor:
    - Entry monument / gateway signage at the I-5 freeway off-ramps
    - The following trail signage and/or directional signs:
        - Three signs at 13th Street
        - One sign at Saturn Boulevard
        - Two signs at Hollister Street

2. **Gateway Signage** – One community identity/ gateway sign along Palm Avenue, just west of Saturn. The sign can either be an arch-type sign that spans the width of the corridor, or is mounted in the median.

3. **Lighting** – The following components should be integrated into the design of the corridor:
    - Street lighting, dual head fixtures with banners. (Non-standard items such as banners, street trees and other landscaping may require additional funding mechanisms in place, such as a maintenance assessment district.)
    - Pedestrian lighting at transit stops

4. **Street furniture** – The following components should be integrated into the design of the corridor:
    - Transit shelters at all transit stops along Palm, as well as at the intersections of Palm/Saturn, and Palm/ Hollister.
    - Seating, trash receptacles, etc., at transit stops, and at a regular interval along the corridor.
    - Bike racks at transit stops, and at a regular interval along the corridor.
    - Street Trees and landscaping along the corridor, excluding priority projects identified in item A.
    - Median improvements, including fence improvements, upgraded hardscape, landscaping, and trees.

8.2 Cost Estimates

Table 8-2 presents cost estimates for the eight improvements recommended by the Palm Avenue Revitalization Plan. The cost estimates are reflective of the removal of existing facilities where necessary, roadway striping, infrastructural improvements, and include a 25% contingency.

The cost estimates were used in the prioritization of the recommendations as presented in Table 8-1. A summary of the items factored into each cost estimate is provided in **Appendix S**. As shown, total buildout of all recommendations is estimated at $8.5 million.

Table 8-2 Project Cost Estimates

Project	Estimated Cost
1. I-5 SB On-Ramp Reconfiguration	$1,410,000
2. Palm Ave / Saturn Blvd Intersection Vehicular Improvements	$489,000
3. Palm Avenue / Hollister Street Pedestrian Improvements	$250,000
4. Palm Avenue Cycle Track from west City Boundary to 16th St	$1,939,000
5. Palm Avenue Cycle Track from 16th St to I-5 NB Ramps	$3,873,000
6. Palm Ave / Saturn Blvd Intersection Pedestrian Improvements	$260,000
7. Palm Avenue Bike Lanes from I-5 NB Ramps to Hollister Street	$72,000
8. Cyclists Activated Signal across I-5 SB On-Ramp	$219,000
TOTAL ESTIMATES	$8,512,000

Source: Chen Ryan Associates, 2016

Notes:
1. As existing striping is shifted for cycle track and median narrowing work, full width slurry seal, striping and pavement markings is included in Projects 4, 5, and 7.
2. Rates taken from FY2015 Ocean Beach Public Facilities Finance Plan unless otherwise noted.
3. Due to unknown conditions and extent of existing City and franchise utilities, this cost estimate does not include allowance for utility relocation.
4. Street lighting is not known at this stage and is not included in the cost estimates.
5. As each project has different phasing characteristics and could be implemented individually or combined with other projects, traffic control is not included in the cost estimates.
6. 25% contingency added to each project.

8.3 Funding Sources

Potential funding sources to help implement infrastructure recommendation can be found at all levels of government. Many funding sources are highly competitive, making it necessary for local governments to stay informed about available funds and associated requirements so they are prepared to pursue when applications are open. This is not intended to be a fully comprehensive list, but rather a summary of potential funding sources to explore.

Transportation Alternatives Program

This program is funded by the Federal Highway Administration (FHWA) and administered by Caltrans. Grant funds may be used to cover costs related to the construction, planning and design of on-road and off-road trail facilities for non-motorized uses, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting, ADA projects, and other safety related infrastructure. A 20% local match is required. The Transportation Alternatives Program is available once a year.

Active Transportation Program

Caltrans administers the Active Transportation Program to fund capital improvements, including the environmental, design, right-of-way acquisition, and construction phases of a capital project. A local match is not required. The Caltrans Active Transportation Program is available once a year.

TransNet Active Transportation Program

SANDAG administers the Active Transportation Program funded by TransNet sales tax revenue. Eligible activities include bicycle facilities and connectivity improvements, pedestrian and walkable community projects, bicycle and pedestrian safety projects, and traffic calming projects. All applications must include a Resolution passed by the local city council or governing board, detailing source(s) of matching funds. The TransNet Active Transportation Program is available once a year.

TransNet Smart Growth Incentive Program

SANDAG administers the Smart Growth Incentive Program funded by TransNet sales tax revenue. Funds may be used within designated Smart Growth Opportunity Areas to fund local agency salaries, professional services, preliminary engineering, right-of-way acquisition, construction, project management costs, and other direct expenses incurred on behalf of the project. Palm Avenue west of Interstate 5 is identified as a Mixed Use Transit Corridor, and a Town Center east of Interstate 5. All applications must include a Resolution passed by the local city council or governing board, detailing source(s) of matching funds. The TransNet Smart Growth Incentive Program is available once a year.