City of Irvine

IRVINE STATION FIRST LAST MILE PLAN | 2021

ATTACHMENT 1

IRVINE STATION FIRST LAST MILE PLAN | 2021

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EXECUTIVE SUMMARY

The Irvine Station is part of a network of transit rail stations that span the Southern California region. As an essential node for commuter and recreational transportation needs, the Irvine Station First Last Mile Plan marks an important step for future planning. Core focuses of the Plan include attention to pedestrian travel, bicycle transportation, and transit connections. Inherent to this Plan is the pursuit of improvements to users comfort and convenience while traveling within the area.

KEY FINDINGS

- Areas to the north of station are not fully developed; this Plan proposes improvements to better connect the surrounding areas.
- The station platform is host to millions of users annually; plans via the Orange County Transportation Authority (OCTA) and Metrolink Southern California Optimized Rail Expansion (SCORE) project poise the Irvine Station for dramatic multi-platform changes to meet user demands.
- The Station area is mostly utilized during the weekdays for traditional working hours, however access to recreational and commercial/shopping amenities supplements the usage throughout the week.
- A higher density of collisions took place along Irvine Center Drive, as compared to other corridors within the Station area.
- Stakeholder and community sentiment highlighted the assets available to users today in the form of a bicycle network and pedestrian pathways.
- The top two barriers to walking are 'distances are too far' and 'lack of sidewalk'; the top two barriers for bicycle travel are 'lack of bike infrastructure' and 'concerns about vehicle speed'.
- Concept plans are prepared at three Caltrans locations and five City intersections.
- Cross sections are prepared along five major and local corridors to show existing conditions and proposed improvements.
- Project prioritization ranked Alton Parkway as the highest followed by Barranca Parkway and Irvine Center Drive.
- Composite planning level cost estimates are prepared for the eight locations for a total of $1,430,000.

PLAN COMPONENTS

INTRODUCTION

- This chapter sets the scene for the project, identifying the purpose, vision, goals, benefits, and an overview of the Station today (2021).

OUTREACH & ENGAGEMENT

- This chapter includes outreach findings through engagement with the public and key stakeholders. Unique project engagement opportunities like online project portal, areas to submit comments virtually, and online town hall meetings are highlighted.

EXISTING CONDITIONS

- The analytical foundation of the Plan is formed here, where current barriers to travel are uncovered. A breakdown of pedestrian, bicycle, and transit attributes, user characteristic data, and collision and citation assessments are found here.

IMPROVEMENT PLANNING

- Concept plans for key locations, typical cross section details, and mapping exhibits for multi-modal transportation improvements are laid out within this chapter.

IMPLEMENTATION

- Implementation next steps include prioritizing improvements, planning level cost estimates, and possible funding strategies.


IRVINE STATIO
LOVE THY NEIGHBORHOOD. HELP PREVENT WILDFIRES.
SMOKEY
FROM THE DIRECTOR OF
TRAINWRECK, KNOCKED UP & THE 40-YEAR-OLD VIRGIN
PETE DAVIDSON IS
THE KING OF STATEN ISLAND
ON DEMAND JUNE 12
RESTROOMS

01

INTRODUCTION

PURPOSE & VISION

As a node for multi-modal transportation, the Irvine Station connects users from origins to destinations. The Irvine Station First Last Mile Plan reviews needs and identifies improvements for bicycle, pedestrian, and transit users to and from the Irvine Station. The Plan's area of influence covers a 1-mile buffer around the Station in all directions.

Planning for improvements within the Irvine Station area is essential to the long-term growth of the area. Currently, 47% of the land within 1-mile is classified as open space (Orange County Great Park), 36% commercial (Regional and Community Commercial), 9% multi-use (medium and high density residential, research, industrial, and offices), and 7% freeway. Numerous technology-based industries line Barranca Parkway, Alton Parkway, and many of the other corridors within the Station area. And with a majority of land represented as undeveloped, in particular, the Orange County Great Park and FivePoint Communities' land holdings, area has great potential for long-term planning of connectivity improvements.

First and last mile transportation is essential to link users of varying travel preferences to and from work, recreation, shopping, or home locations. Often, users utilize multiple transportation options to arrive at a given destination. Various options include iShuttle, Metrolink and Amtrak rail, OCTA buses or corporate shuttles, walking, bicycling, and ride-hailing services. The Irvine Station First Last Mile Plan is rich with analyses to understand these varying modes of travel, what barriers exist, what opportunities can be built on to holistically plan for improvements.

The core focuses of the Plan are to prioritize improvements for local and regional impact, plan for better connections that mitigate vulnerable user's exposure, foster comfortable travel, and encourage sustainability. First and last mile improvement options represented with this Plan include:

- Pedestrian infrastructure (sidewalks, shared-use paths, wayfinding signage, Americans with Disabilities Act of 1990 (ADA) curb ramps, signal operations, and crossing support).
- Bicycle infrastructure (bike lanes, buffered bike lanes, shared-use paths, wayfinding signage, visible pavement markings, signal operations, and crossing support).
- Transit connection improvements (transit network provider optimization, wayfinding, station platform, circulation optimization).

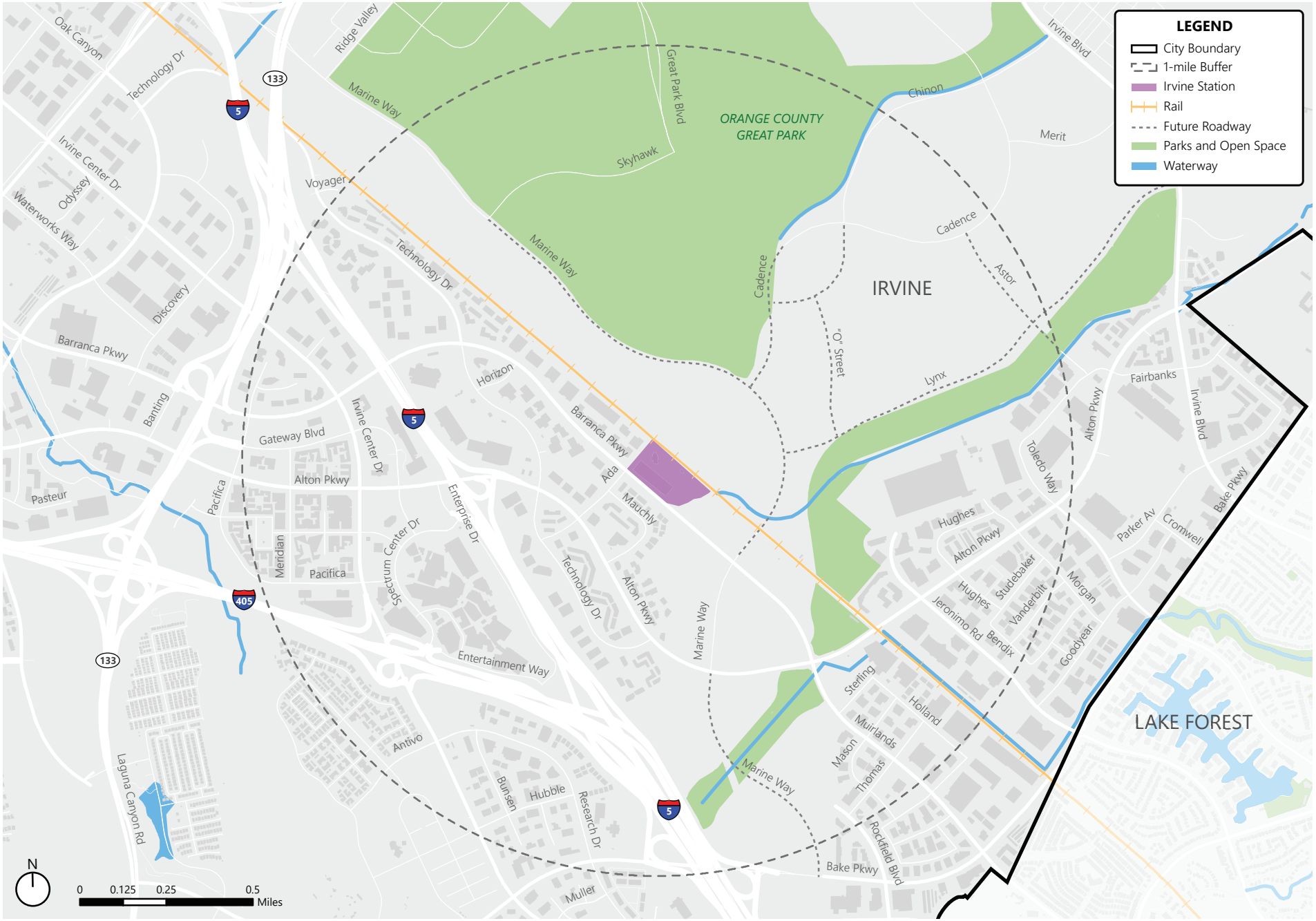


Figure 1.1 Overview and Project Area Map


IRVINE STATION
STATION
PASSENGER PICK UP & DROP OFF
TAXI


METROLINK
Track 1
Track 1

IRVINE STATION AREA TODAY

The Irvine Station is located in the City of Irvine at the northeast corner of the intersection with Barranca Parkway and Ada (City of Irvine Planning Areas 32, 33, and 51). Two interstate freeways (I-5 and I-405) are located to the south of the Station.

One regionally significant rail line meets the Irvine Station platforms for north and south connections via Metrolink and Amtrak services. The nearest station to the north and south are the Tustin Station and Laguna Niguel/Mission Viejo Station, respectively; however, both of those are Metrolink-only Stations and do not serve the Amtrak trains. The nearest Amtrak-serving stations are San Juan Capistrano and Santa Ana. The Irvine Station is a part of a network that services commuter and recreational needs Monday through Sunday with varying schedules.

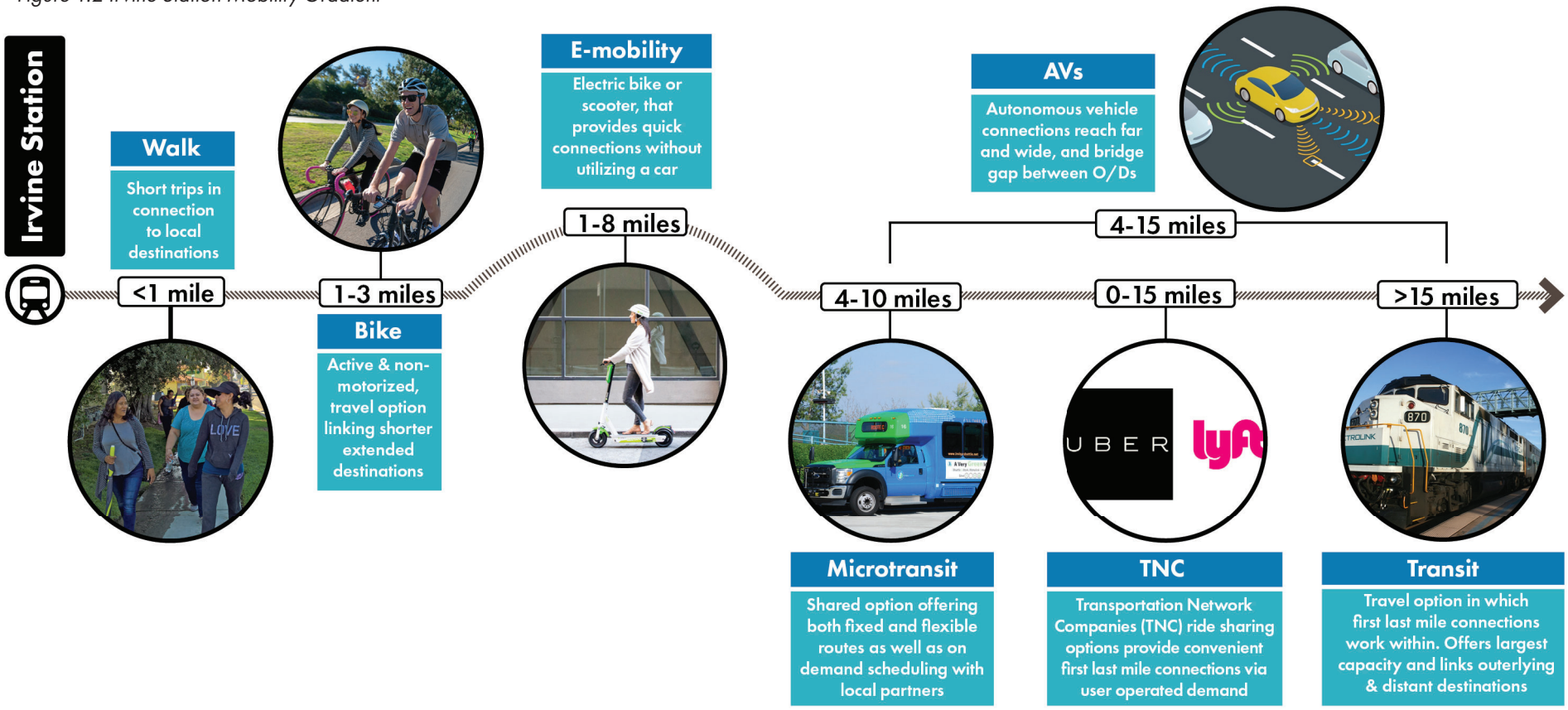
The Station parcel is roughly 15 acres, inclusive of parking facilities. Areas to the north of the Station are largely undeveloped (i.e. Orange County Great Park and FivePoint Communities). A vibrant mix of technology and commercial industries are located across the remainder of the Station area (***Figure 1.1***). The Station Platform and collateral amenities are forecasted for updates with the increasing population and service demand of the area and region (i.e. OCTA SCORE Project).

Transportation within the area is bound to major and local corridors, the former represents corridors that link regionally and the latter are represented by corridors that provide more acute linkages for localized connections. Major corridors include Barranca Parkway, Alton Parkway, and Irvine Center Drive. Local Corridors include Ada, Technology Drive, Antivo, Spectrum Center Drive, and Marine Way. Future build-out of the area will include portions of Marine Way, Cadence, Chinon, "O" Street, and Lynx. The Orange County Great Park's and Great Park Neighborhoods' planning documents serve as a foundation for planning improvements and alignment buildout.

The aforementioned work destinations are of high use during traditional working hours. In addition, the Irvine Spectrum is a multi-acre shopping experience destination that draws much use locally and regionally. Residential areas are located in the southwest sector and open space/undeveloped areas are located in the northern sector (i.e. Orange County Great Park). Currently, no direct alignment connects the Irvine Station to the Orange County Great Park.

The multi-modal ecosystem of the Station area is broad, with many options for users at varying scales of reach. As shown in ***Figure 1.2***, a variety of modes offers differing access to and from the Station.

Figure 1.2 Irvine Station Mobility Gradient



GOALS & OBJECTIVES

PRIORITIZE IMPROVEMENTS

The Irvine Station provides essential local and regional travel services. This network reach is an important aspect of this Plan, ensuring that users can connect between their origins and destinations. The Plan seeks to strike a balance between local and regional prioritized improvements.

Goal

Prioritize improvements within the Irvine Station First Last Mile Plan study area and where applicable locally and regionally for pedestrian, bicycle, and transit users.

1. Plan for pedestrian and bicycle improvements along roadways and cut-through paths, and integrate within existing trail and transit networks.
2. Optimize study area transit services (i.e. iShuttle, OCTA, rideshare, Transportation Network Companies (TNC) for near- and long- term improvements to increase transit ridership.

PLAN FOR BETTER CONNECTIONS

The Plan takes into account corridor completeness, intersection design considerations for all users, transit amenities, and universal reduction of barriers to transportation options within the study area.

Goal

Improve multi-modal transportation options within the Irvine Station area and remove barriers to transportation, and provides complete amenities for all users.

1. Identify barriers to pedestrian, bicycle, and transit travel.
2. Identify treatments that improve corridor and intersection connections for all roadway users, transit services, and vehicular transportation.
3. Provide amenities throughout the study area to improve wayfinding and informational feedback, greening/shade features, and end of trip facilities.

FOSTER COMFORTABLE TRAVEL

Comfortable access for travel options that originate and end at the Irvine Station should be comfortable for users of all ability levels. And the on- or off-site service waiting areas should seek to decrease exposure from excessive noise and weather.

Goal

Improve the level of comfort for all users within the surrounding area, including at on- and off-site waiting locations and along routes to the Station from home, work, recreation, and entertainment destinations.

1. Assess the level of comfort for pedestrians and bicycle users along roadways and at intersections to identify top priority locations.
2. Identify treatments for transit stops both on- and off-site that enhance user comfort at all times of the day and weather scenarios, incorporating safety enhancement elements.

ENCOURAGE SUSTAINABILITY

The Plan should remain flexible to attend to the demands of the future, while striking a balance between the needs of current users. A sustainable focus after adoption of the Plan will maximize economic, environmental, and resource allocations.

Goal

Invest in pedestrian, bicycle, and transit treatments, including technologies that enhance the Irvine Station area, and avoid economic losses related to congestion, collisions, pollution, and public health costs.

1. Use a data-driven approach to prioritize multi-modal treatments and technologies.
2. Define clear roles and responsibilities for the City of Irvine Staff to oversee the near- and long-term development of the Irvine Station study area.
3. Review funding opportunities for the Irvine Station study area regularly; position the City to pursue grant applications to increase funding availability; review key data markers regularly to track progress and attainment of the Plan's goals.

02

OUTREACH & ENGAGEMENT

OVERVIEW

Elements to engage with community members and local and regional stakeholders were used to understand their needs. Fundamental to this process was online engagement that allowed the project team to offer direct engagement opportunities throughout the COVID-19 pandemic. These elements included the Public Engagement Hub (project website), online surveys, public feedback tool, and virtual town hall meetings. Resulting public feedback was used to shape and refine proposed improvement plans for the project area into the future.

Early after project inception an Outreach and Engagement Plan was prepared to structure the engagement plans across the project duration. The three phases of outreach included:

- **Phase 1.** Engage and educate the community about the project, enable the ability to provide feedback and attend virtual outreach opportunities
- **Phase 2.** Showcase preliminary recommendations and receive feedback
- **Phase 3.** Showcase Draft Plan components and receive feedback

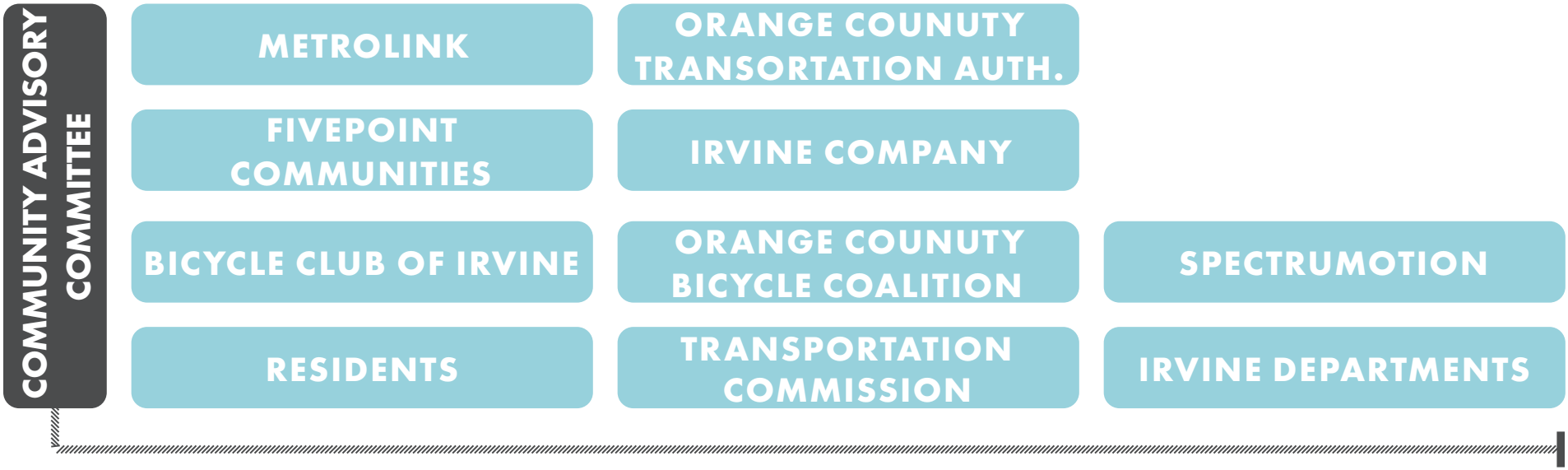
The target audiences for the Plan included people who live, work, shop, and recreate in the Irvine Station Plan Area (1-mile buffer around the Station). Furthermore, community-based organizations, businesses, and local advocacy groups were included and structured within the outreach efforts.

'IRVINE STATION CONNECTS' PARTNERS

'Irvine Station Connects' is the public branded project title used for the Irvine Station First Last Mile Plan. A Community Advisory Committee (CAC) was created, consisting of approximately eighteen members. Members represent the Plan's intended community partners and target audience's key representatives. Membership comprised of personnel from Bicycle Club of Irvine, City of Irvine departments, FivePoint Communities, Irvine Company, Metrolink, OCTA, Orange County Bicycle Coalition, residents, Spectrumotion, and a representative from the Transportation Commission. The project team used the diversity of agencies and personnel to seek feedback on project progress, deliverables, and milestones.

The CAC met three times, and followed the outline herein:

- *Meeting #1:* Project introduction, finalize goals / objectives, showcase preliminary outreach and existing conditions findings, outline upcoming outreach opportunities, and guide input and discussion. *[VIRTUAL GoToMeeting – July 28, 2020 – 18 participants]*
- *Meeting #2:* Showcase project progress (outreach, data mapping), and provide overview of bicycle, pedestrian, and transit improvement planning strategies. *[VIRTUAL GoToMeeting – November 10, 2020 – 17 participants]*
- *Meeting #3:* Showcase draft improvements and build consensus behind priority bicycle, pedestrian, and transit treatments. *[VIRTUAL GoToMeeting – February 17, 2021 – 16 participants]*



COMMUNITY OUTREACH & PUBLIC INVOLVEMENT

PUBLIC ENGAGEMENT HUB

Host to planning updates across the duration of the project, the Public Engagement Hub was fundamental to keeping the public and stakeholders up-to-date. An introduction video on the "Introduction" page along with an area map and the project goals formed a starting point for interested persons to learn about the project. As will be detailed herein, the Public Feedback Tool and Online Survey were hosted on the Hub for use in public outreach tasks. Lastly, information on Virtual Town Hall Meetings and social media channels was made available.

The complete display of all project information, especially for use in public feedback tasks during the COVID-19 Pandemic served the project team well.

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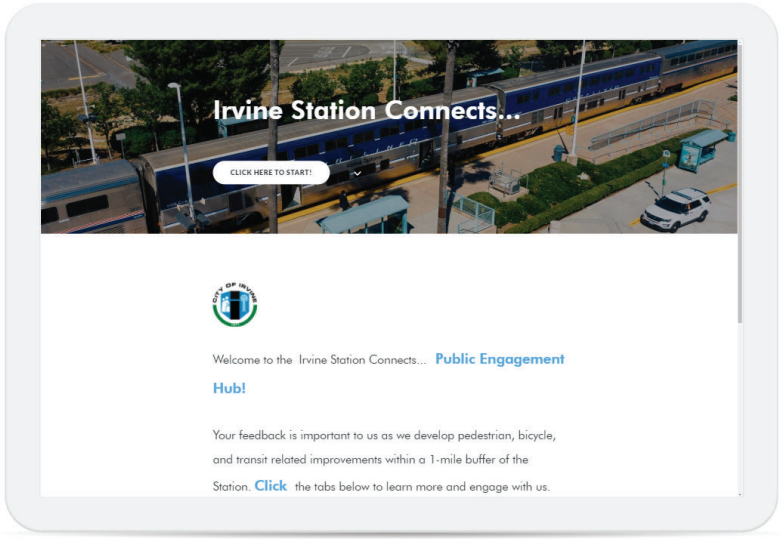
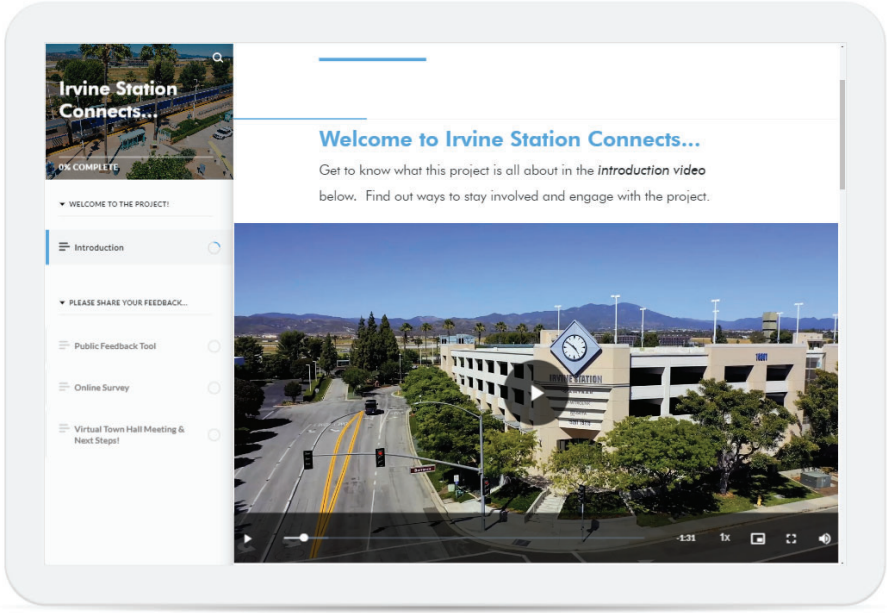
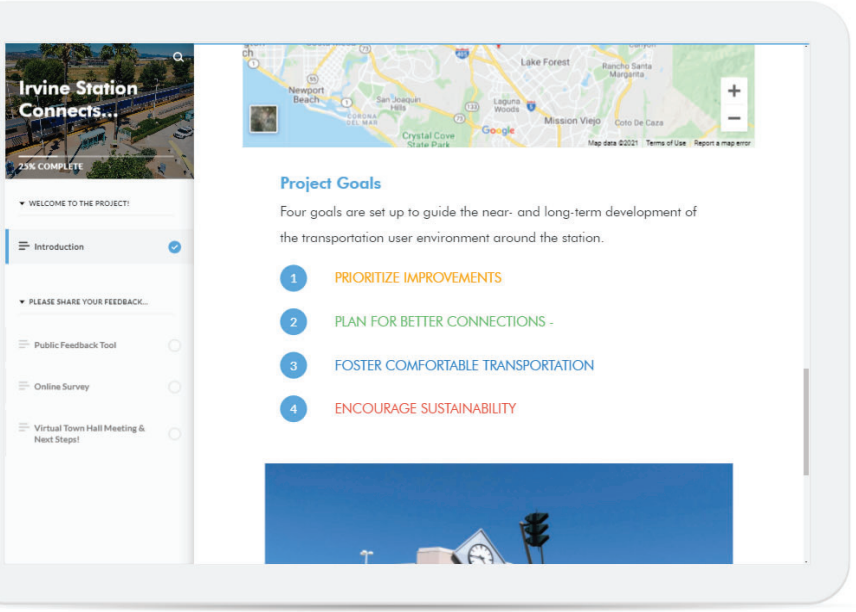
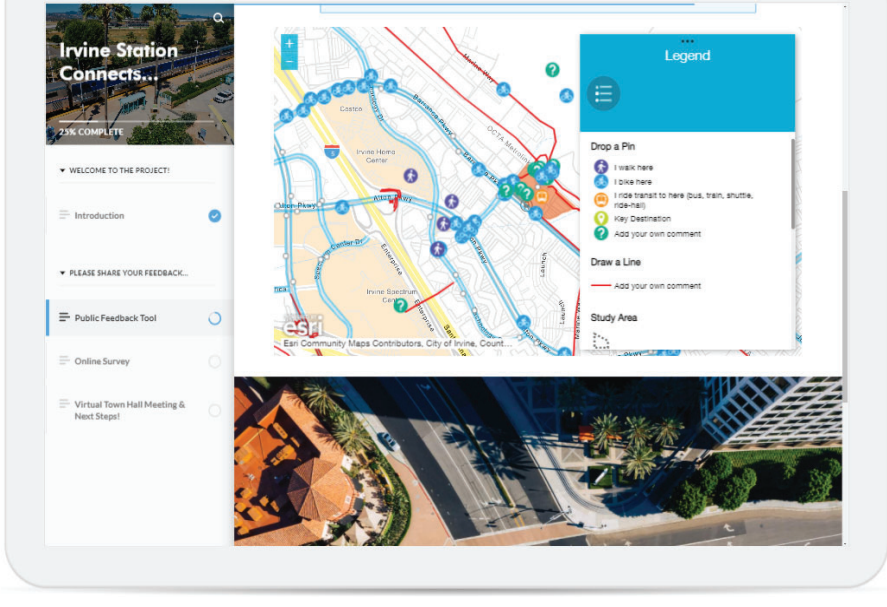
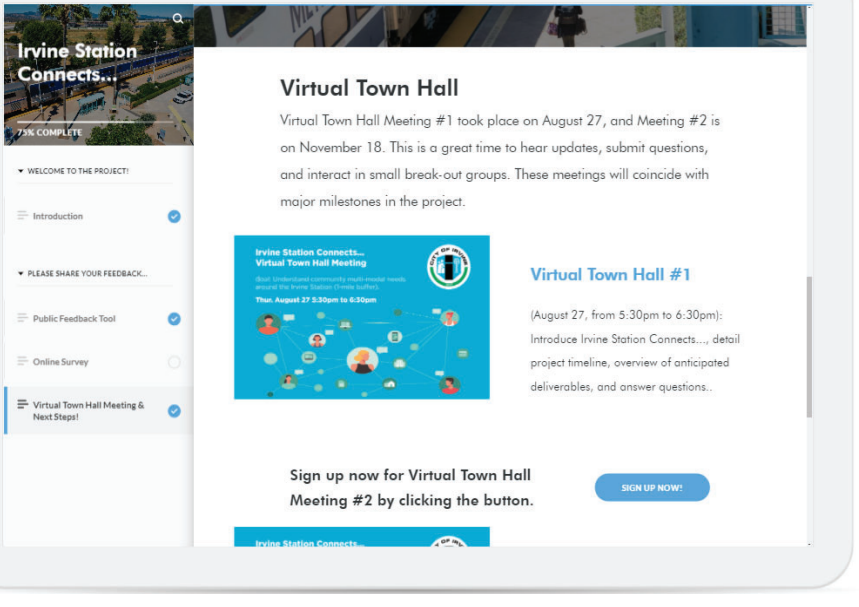



Irvine Station Connects...
0% COMPLETE
WELCOME TO THE PROJECT!
Introduction
PLEASE SHARE YOUR FEEDBACK...
Public Feedback Tool
Online Survey
Virtual Town Hall Meeting & Next Steps!
Welcome to Irvine Station Connects...
Get to know what this project is all about in the introduction video below. Find out ways to stay involved and engage with the project.


Irvine Station Connects...
25% COMPLETE
WELCOME TO THE PROJECT!
Introduction
PLEASE SHARE YOUR FEEDBACK...
Public Feedback Tool
Online Survey
Virtual Town Hall Meeting & Next Steps!
Project Goals
Four goals are set up to guide the near- and long-term development of the transportation user environment around the station.
1 PRIORITIZE IMPROVEMENTS
2 PLAN FOR BETTER CONNECTIONS -
3 FOSTER COMFORTABLE TRANSPORTATION
4 ENCOURAGE SUSTAINABILITY


Irvine Station Connects...
25% COMPLETE
WELCOME TO THE PROJECT!
Introduction
PLEASE SHARE YOUR FEEDBACK...
Public Feedback Tool
Online Survey
Virtual Town Hall Meeting & Next Steps!
Legend
Drop a Pin
I walk here
I bike here
I ride transit to here (bus, train, shuttle, ride-hail)
Key Destination
Add your own comment
Draw a Line
Add your own comment
Study Area


Irvine Station Connects...
25% COMPLETE
WELCOME TO THE PROJECT!
Introduction
PLEASE SHARE YOUR FEEDBACK...
Public Feedback Tool
Online Survey
Virtual Town Hall Meeting & Next Steps!
Virtual Town Hall
Virtual Town Hall Meeting #1 took place on August 27, and Meeting #2 is on November 18. This is a great time to hear updates, submit questions, and interact in small break-out groups. These meetings will coincide with major milestones in the project.
Irvine Station Connects...
Virtual Town Hall Meeting
Thur. August 27 5:30pm to 6:30pm
Virtual Town Hall #1
(August 27, from 5:30pm to 6:30pm): Introduce Irvine Station Connects..., detail project timeline, overview of anticipated deliverables, and answer questions..
Sign up now for Virtual Town Hall Meeting #2 by clicking the button.
SIGN UP NOW!

ONLINE SURVEY

As a part of the community engagement process for Irvine Station Connects, a survey on walking, biking, and transit preferences was conducted exclusively online. Questions included delineation between station use types to understand the consensus behind multi-modal travel within the study area.

Location

Among the respondents, 59% indicated their primary purpose of using the study area was for shopping, followed by 52% who visit the Great Park, 35% who use transit services, 25% who work within the area, and 22% who live within the area.

Mobility Use

Mobility trends for walking, biking, and transit within the 1-mile buffer of the Irvine Station show a majority of respondents "never" use these modes. Of respondents who were surveyed on how often they walk, 43% indicated they never walk, 13% indicated they either walk daily or 4-6 days a week, and 20% and 24% indicated they walk less than once a month or 1-3 days a month respectively.

Similarly, biking and transit use in the study area highlights a lesser use daily/weekly vs. monthly. Among respondents, 16% bike within the study area once a week, 27% at least once a month, and 58% never bike. Among transit users, 12% use it on a weekly frequency, 35% use it monthly, and 53% never use transit.

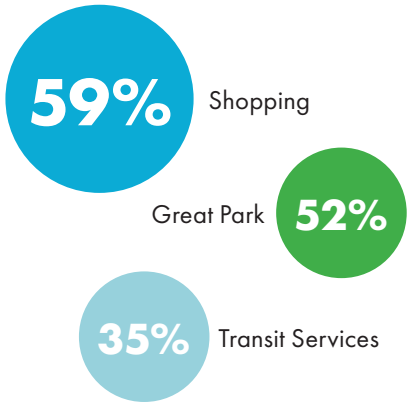
Travel Specific to the Irvine Station

Further delineation between Irvine Station use is divided between 28% who use it at least once a month and 72% who do not use it at least once a month. Of the 28% who monthly use the Irvine Station, 54% travel home after arriving at the station and 46% travel to work. Monthly destination choices are broad; as such multiple selection was optional – therefore the next top three choices were 19% Irvine Spectrum Center, 12% Retail/Grocery/ Department Store, and 12% school/university.

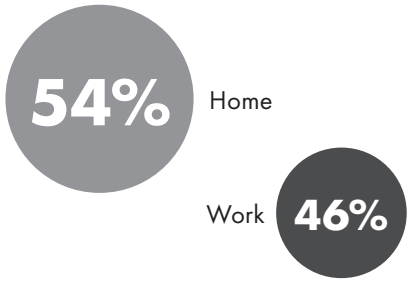
A primary draw for the Irvine Station use presently is access to rail services and bus services, of those who use the station monthly, 65% access Metrolink, 31% access Amtrak, and 4% access OCTA bus services. Other services such as vanpool, iShuttle, and corporate shuttles were options, but due to COVID-19 service limitation, these choices may have been impacted. Of survey respondents, 40% indicated they use rail greater than three times weekly and 36% indicated they use rail once a month.

Travel mode choices to and from the Station are broader, where 35% of respondents who use the station monthly drive, 21% use ride hailing or the iShuttle or get dropped off, 15% bike and 15% walk, and 12% use the OCTA bus.

Primary Purpose for Use of Study Area



Destination After Using the Station



Barriers to Alternative Mobility

The most selected reasons why users do not walk more often are: (88%) distances are too far, (27%) lack of sidewalk, (23%) challenges crossing at intersections, (19%) limited time, and (12%) feels unsafe and vehicles travel too fast.

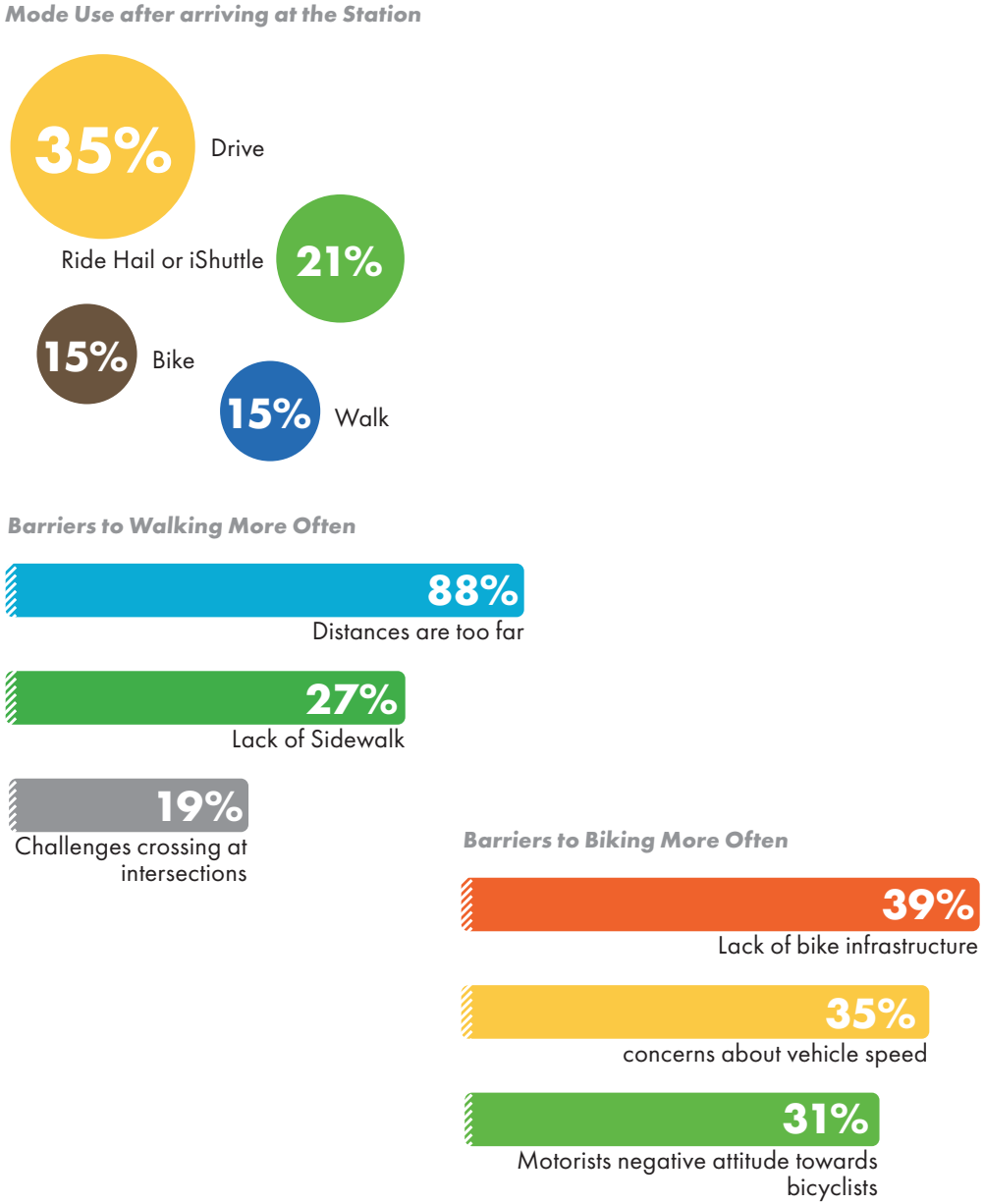
Similarly, respondents were surveyed on top reasons why they do not bike more often: (39%) lack of bike infrastructure, (35%) concerns about vehicle speed, (31%) motorists have negative attitude towards bicyclists, and (27%) distances are too far. Respondents were allowed to choose more than one option.

Feedback for Change

To form a nexus for change, respondents were surveyed to understand preferences on walking and biking improvements. Respondents were able to select more than one option. Top preferences were: (56%) wider sidewalks, (56%) more cut through options, (52%) more shade trees, (44%) median refuge crossing, (36%) more lighting, and (36%) wayfinding signage.

Top preferences for bike related improvements were: (72%) more protected on-street bike lanes, (60%) more connections to off-street paths, (32%) better visual display of bike space in mixing zones at intersections and freeway on- and off-ramps, (28%) improved lighting, (24%) better left turn accessibility, and (24%) better video detection at intersections.

Top roadways identified as priority corridors were: (54%) Barranca Parkway, (46%) Alton Parkway, (27%) Irvine Center Drive, (27%) Marine Way, (19%) Technology Drive, and (15%) Ada.



PUBLIC FEEDBACK TOOL

An online mapping application was developed through ArcGIS Online to acquire public feedback about location specific concerns throughout the study area. The application was particularly valuable in acquiring the opinions and concerns of residents and stakeholders of the area to help support current and future project plans. The application allowed the user to select from a variety of comment types to be added to the map. Comment types included:

Points

- I walk here
- I bike here
- I ride transit (bus, train, shuttle, ride-hail)
- Key destination
- Add your own comment

Lines

- Add your own comment

The online mapping application could be accessed through a computer or a mobile device (tablet or personal phone). Users had the ability to attach a photo to each point or line that was dropped on the map.

Results

In total, 166 comments (114 points and 52 lines) were collected from the Public Feedback Tool.

Of the 88 "I bike here" comments, a majority were located leading into and out of an intersection or freeway on- and off-ramp. These called out a general lack of infrastructure as the cyclists travel through these areas, negotiating space with motorists. Locations of particular interest included segments along Barranca Parkway, Alton Parkway, and Ada. Intersections highlighted as hot-spots include: Barranca Parkway and Ada, Alton Parkway and Ada, Alton Parkway and Barranca Parkway, Pacifica and Barranca Parkway, and west of Technology Drive and Barranca Parkway.

There were a lof of "Add a line" comments along Marine Way, OCTA Metrolink alignment, Irvine Center Drive between Pacifica and Antivo. Comments highlighted missing bike lanes, desires for expanded off-street shared-use paths, and connection needs to popular existing off-street shared use paths.

A total of ten "I walk here" comments were received, primarily located at intersections and destinations of work or shopping. Twelve "add your own comments" highlight areas of need around the station platform, including detailed comments at intersections and key connection points (off-street shared-use paths and Great Park access points).

A total of 34% of comments (38 points and 18 lines) were received outside of the 1-mile Irvine Station study area. ***Figure 2.1*** displays the density of comment points received in heatmap symbology.

Figure 2.1 Public Feedback Tool Result Raster

Irvine Station Connects...Virtual Town Hall Meeting

Wednesday, August 19, 2020

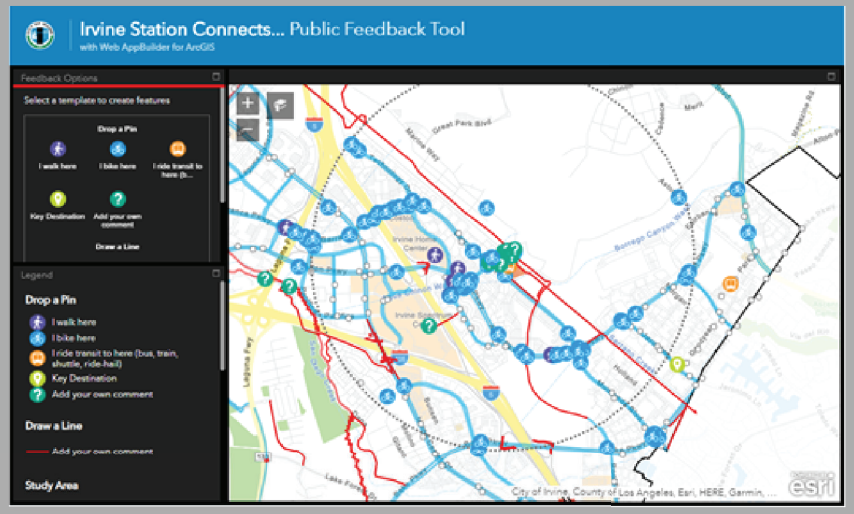
Irvine residents are invited to join in for a Virtual Town Hall Meeting on Thursday, August 27 from 5:30 to 6:30 p.m. to discuss community travel needs around the Irvine Station.

Irvine Station Connects... is a City effort to understand the needs for multi-modal access to and from the Irvine Station to enhance connectivity for pedestrians, bicyclists, and transit users of all types within a 1-mile buffer of the Irvine Station.

This Virtual Town Hall Meeting will be held via ZOOM. Visit Virtual Town Hall to register for the meeting and submit questions about the project. Visit irvinestationconnects.org to learn more about the project, fill out a survey, and interact with our web-mapping tool.

City of Irvine Transit Improvements

Give you input to the City of Irvine as they develop pedestrian, bicycle, and transit-related improvements within a 1-mile buffer of the Station.



SOCIAL MEDIA PRESENCE

The City of Irvine rolled out project-specific content to Citywide messaging. Facebook, Instagram, Twitter, Nextdoor, and targeted email lists were all used effectively to promote engagement in project events and key milestone communications.

VIRTUAL TOWN HALLS

Virtual Town Hall Meeting #1

On August 27, 2020 Virtual Town Hall Meeting #1 was held and was open to all residents and stakeholders. Promotion was made via City of Irvine social media channels and stakeholder email lists. A total of thirteen participants joined, including residents, City of Irvine Staff, stakeholders, project team members. The meeting was structured around core goals of educating participants on the project elements and status. Furthermore, breakout groups were formed at random to allow project team members space to facilitate conversations around multi-modal barriers and assets. Pedestrian, bicycle, and transit talking points yielded valuable community-based feedback that was used in improvement planning.

Virtual Town Hall Meeting #2

The second and final Virtual Town Hall Meeting was held on November 18, 2020 and was made accessible to all residents and stakeholders. Project team made a presentation that detailed project status, outreach results, existing conditions analysis (StreetLight, and barriers/ strengths mapping), and the collision and citation analysis. The second core component was a holistic review of improvement planning methods, treatments for pedestrian, bicycle, and transit transportation, preliminary cross section plans, and preliminary improvements. An open discussion was facilitated with consensus built behind the proposed next steps (improvement planning). Fifteen participants attended and notices for review of documents was allotted for two weeks following the meeting.

03

EXISTING CONDITIONS

EXISTING BICYCLE CONDITIONS

The study area has a range of existing on- and off-street bicycle facilities. These include strengths like existing bike lanes and parking facilities. Existing challenges include weaving and merging with vehicles entering into free-right turns and missing bicycle through lanes leading into and out of an intersection. Existing facilities are shown in ***Figure 3.1*** while challenges are shown in ***Figure 3.2***.

EXISTING ON-STREET FACILITIES

Class II bike lanes are on-street facilities that typically form a eight-foot space (inclusive of the gutter) adjacent to the curb for bicyclists to ride unobstructed from motorists. In cases where bike lanes are less than four-feet they are classified as non-compliant per the California Manual on Uniform Traffic Control Devices (CA MUTCD).

There are 13.2 miles of existing bike lanes within the study area. Bike lanes exist on most primary roadways throughout the study area, with a few exceptions. Bike lanes on Barranca Parkway, Alton Parkway, and Irvine Center Drive provide direct access to and from the study area, connecting Station users to the City of Irvine, adjacent cities, and regionally significant locations.

There are on-street bike lane network gaps within the study area, which are shown in ***Figure 3.1***. Irvine Center Drive between Antivo and Pacifica is the segment with the most sporadic bike lane coverage. Muirlands between Sterling and Alton Parkway, and proximal to the Irvine Spectrum along Spectrum Center east of Gateway are areas with bike lane gaps aside from the undeveloped land to the north of the station.

EXISTING OFF-STREET FACILITIES

Off-Street shared-use paths are existing facilities that the City is well known for and are typically greater than eight feet in width allowing bidirectional shared pedestrian and bicyclist use. Within the study area there are 1.2 miles of existing off-street shared-use paths. These facilities exist towards the perimeter of the study area, except the segment along Marine Way (between Barranca Parkway and Alton Parkway).

There are 2.7 miles of future shared-use paths that are planned within the study area, which are within the Great Park area along future extended Marine Way and Chinon.

EXISTING PUBLIC BIKE PARKING

End-of-trip bicycle facilities at the Irvine Station are provided via bike racks and bike lockers. There are 24 bike racks, covered by the parking garage south of the train platforms. City data shows usage of these racks hovers around 60% with an average usage of 14 slots per day.

In total, there are 54 bike lockers available for rent, based on a nominal fee. These are located just south of the train platforms. Recent use of these lockers has been the following:

- November 2018 through April 2019 – 38 users (70%)
- May 2019 through October 2019 – 40 users (74%)
- November 2019 through April 2020 – 42 users (78%)

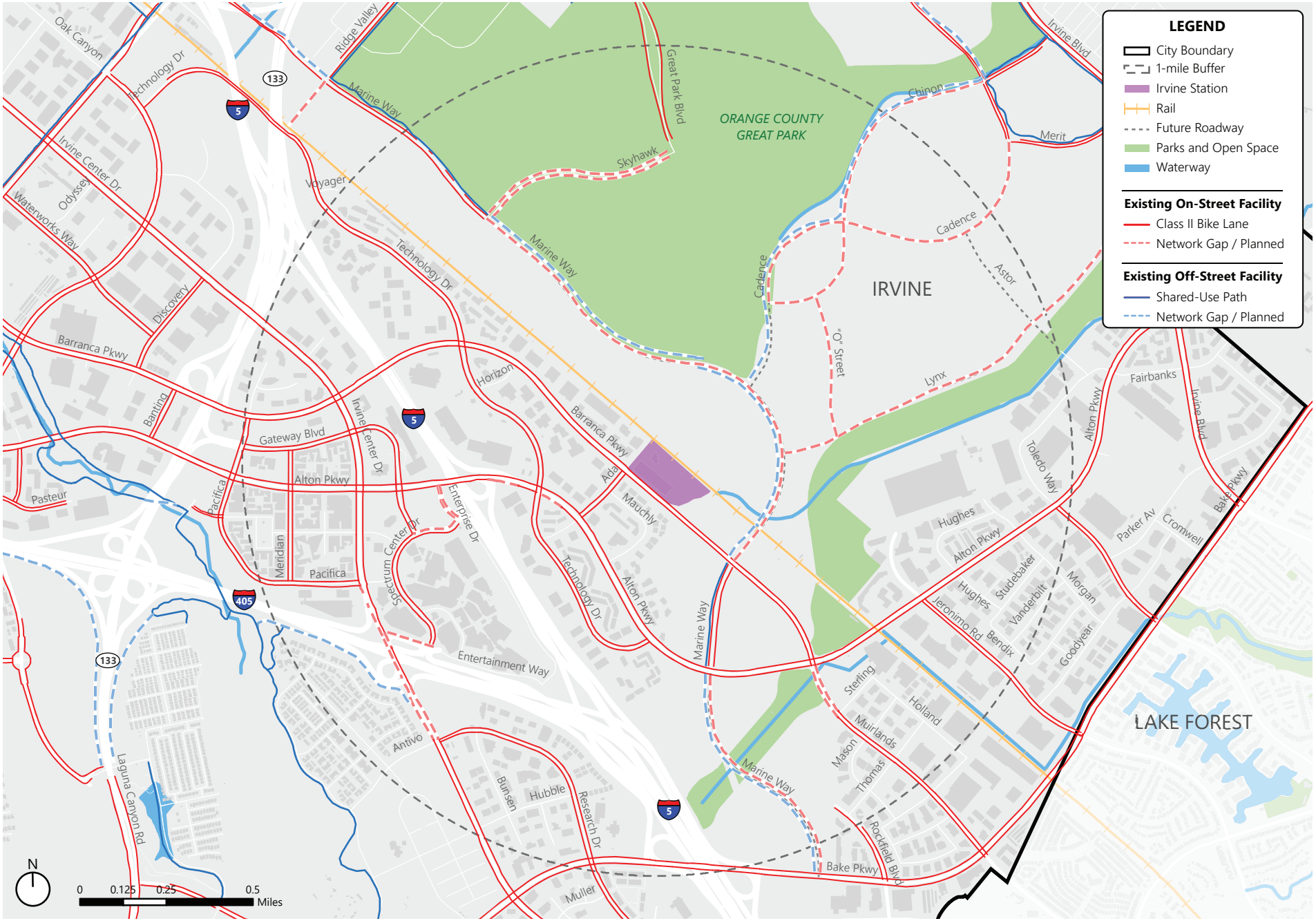
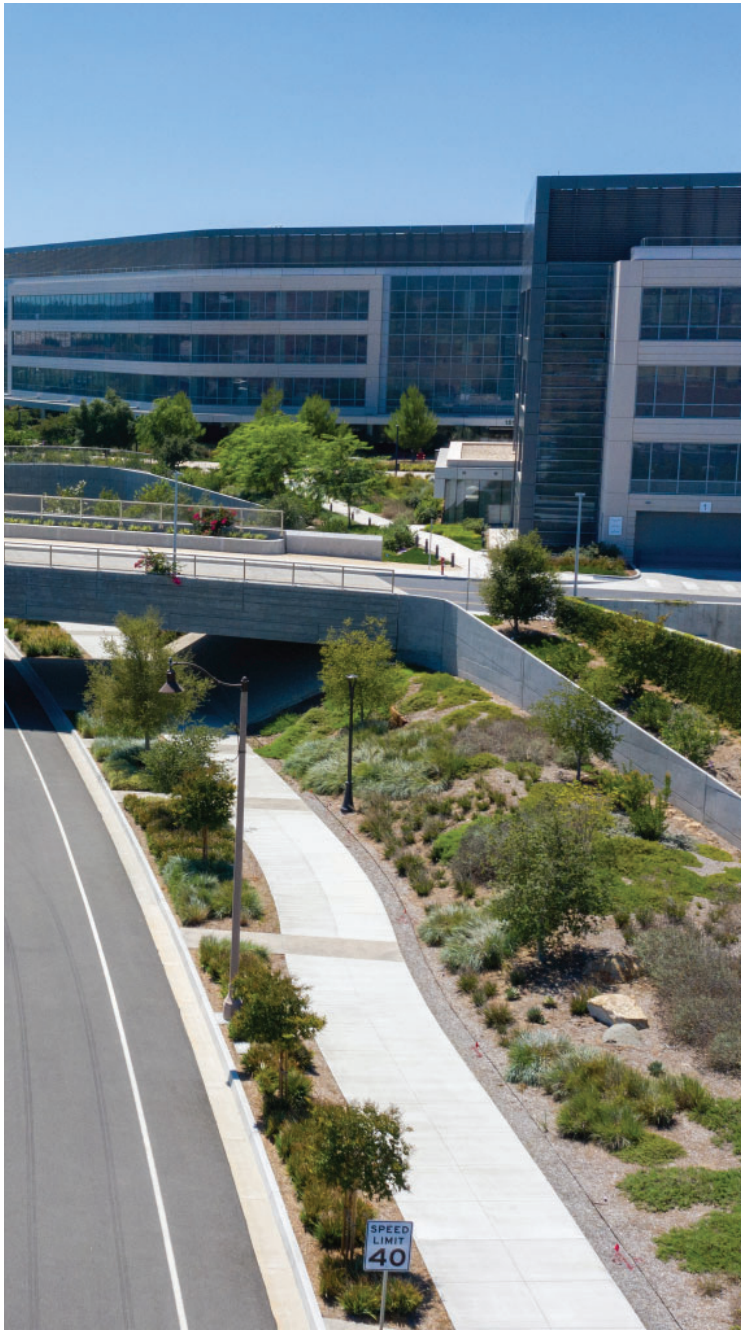


Figure 3.1 Existing Bicycle Infrastructure Conditions



CHALLENGES TO BICYCLE TRANSPORTATION

Existing challenges are catalogued and shown in ***Figure 3.2*** and include areas where free right turns exist, freeway ramps exist, lack of through bike lanes into and out of an intersection, and other items. In total, there were 73 point-based locations facing these challenges, not including the linear gaps identified previously.

Free right turns present conflicts to on-street cyclists due to the higher speeds and lack of vehicular control through the turns. In addition, bike facilities drop off leading into and out of such turn lanes, leaving users feeling vulnerable, and in some cases, in blind spots. Free right turns accounted for 15% of the challenging locations.

Freeway ramps account for 18% of the challenging locations within the study area. Both I-5 and I-405 bisect the study area to the southern section, however with Irvine Center Drive, Alton Parkway, and Barranca Parkway providing access on and off these freeways, these locations can be challenging for all users. In some cases, there are multiple sweeping lanes with no control devices, leaving users in challenging situations. Acceleration zones are typical within the study area and at the same time bike facilities are non-descript or void. The carpool only on- and off-ramp at I-5 at Barranca Parkway is controlled by a signalized intersection. Most off-ramps are signalized, however most on-ramps are not controlled.

Missing through bike lanes are present at intersections. These situations are allowable by the CA MUTCD and the Caltrans Highway Design Manual (HDM), however, it is know these can serve as barriers to those less comfortable with roadway riding. Through bike lanes, when present, allow cyclists to stay clear of right turn only lanes leading into an intersection. In the study area where through bike lanes are missing, the right turn only lane is either extra wide and can be modified to include a through bike lane or too narrow to allow for the inclusion of a four to five foot stripe for a bike lane. These situations account for 36% of challenges.

Other challenges that are not categorically captured within the three above categories account for 32% of challenges. In example, these represent areas where the bike lane is narrow (Alton Parkway eastbound east of Barranca Parkway), or crossing support lacking at an intersection. In general, these locations highlight needs for improvements.

BICYCLE FACILITY STRENGTHS

With the exception of a few gaps and

challenges, the on- and off-street bicycle network within the study area is largely complete. In addition, recent (mid-year 2020) roadway striping improvements were made along Technology Drive, proving enhancements that include continuous bike lane striping across driveways and additional intersection through bike lanes.

At intersections, **bicycle detection** exists via video or in-ground loop at intersections within the study area (***Figure 3.2)***. Detection at intersections is an essential asset to on-street bicyclists to ensure proper right-of-way is given for travel through an intersection and with enough time to clear the intersection. Video detection and in-ground loop detection alike are dynamic and must be triggered to actuate a signal phase. These assets work in tandem with existing through bike lanes by allowing cyclists to stay within the bike lane, eliminating the need to press a button for actuation in the gutter of a right turn lane.

There are **directional wayfinding signs** along roadways throughout the study area. Wayfinding signs offer directional information to users as they travel to and from the Irvine Station and key destinations. These signs serve a use to motor vehicle traffic, bicyclists, and pedestrians alike and occur at 33 locations along major roadways like Alton Parkway, Muirlands Boulevard, Gateway, Barranca Parkway, Enterprise, and Irvine Center Drive. For bicyclists traveling along these roadways, an advanced notice of upcoming turns can help in navigating across intersections and corridors safely and thoughtfully.

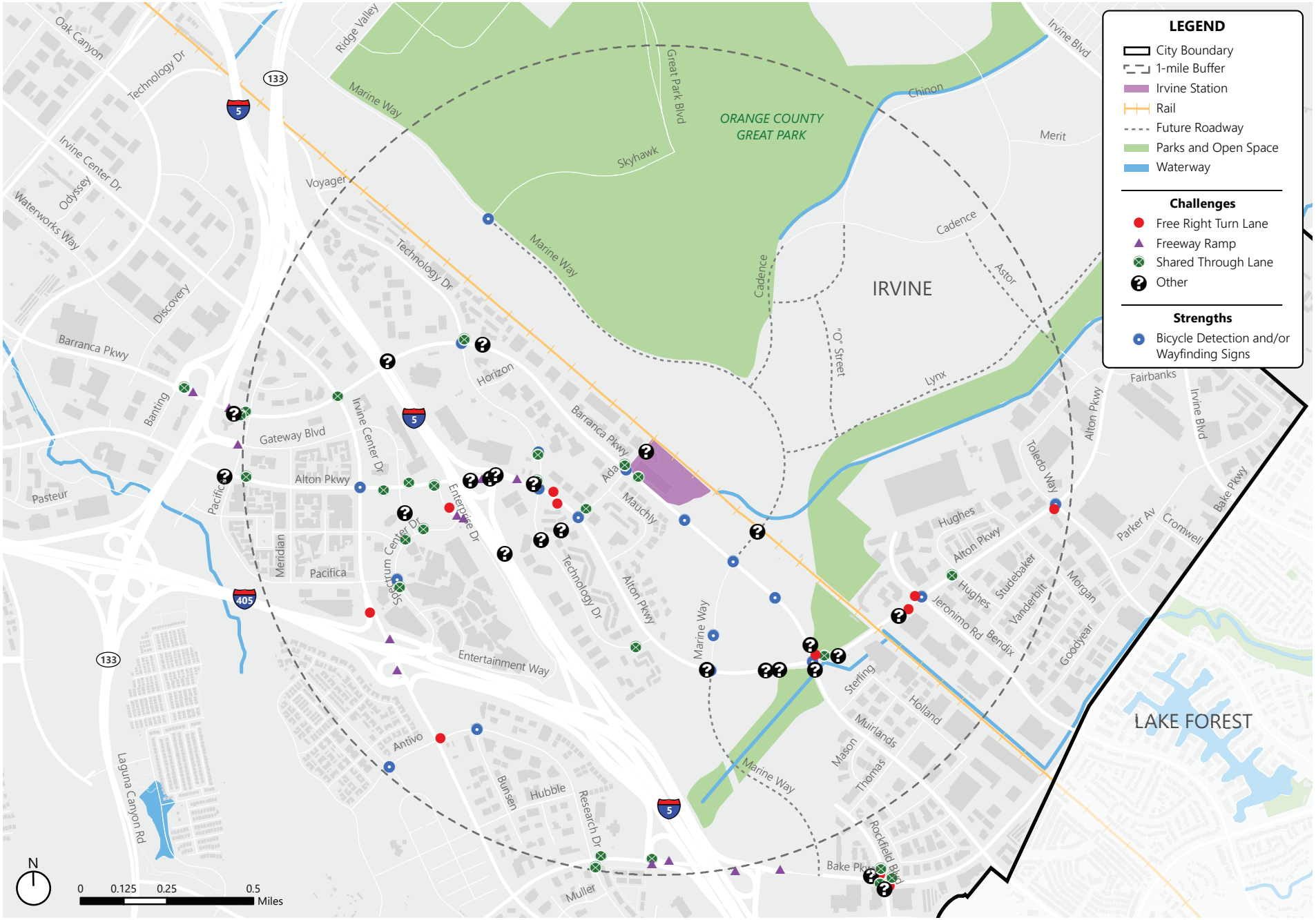


Figure 3.2 Existing Challenges and Strengths

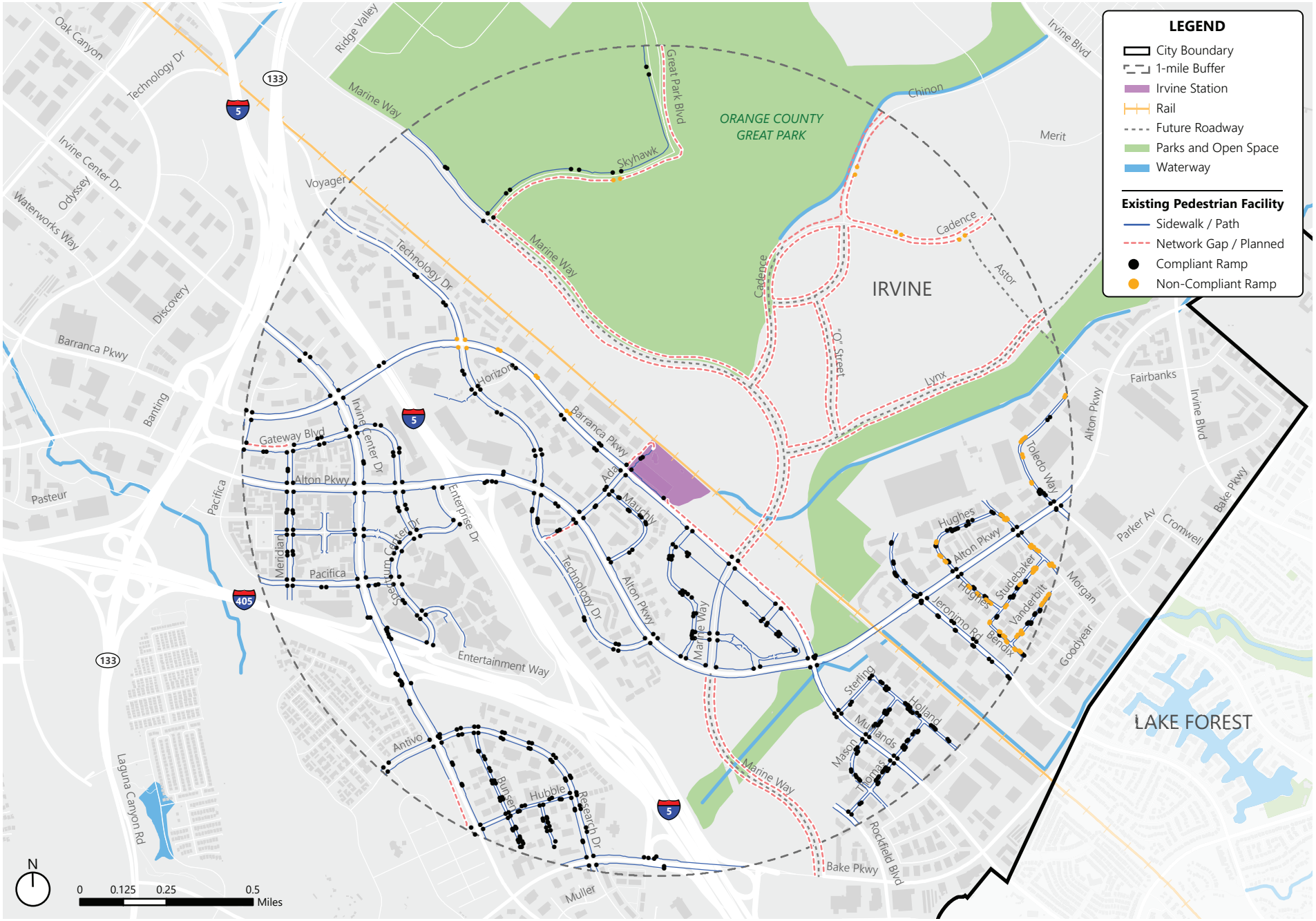


Figure 3.3 Existing Pedestrian Infrastructure Conditions


PUSH
BUTTON
FOR

EXISTING PEDESTRIAN CONDITIONS

Sidewalks, crosswalks, curb ramps, directional signs, and intersection controls impact the safety and comfortability of pedestrians walking to and from the Irvine Station. The existing pedestrian facilities network within the study area is largely complete. Infrastructure gaps including missing or inadequate sidewalks and non-compliant curb ramps are identified.

EXISTING PEDESTRIAN FACILITIES

The pedestrian network is equipped with space for users to travel free of interference with motor vehicles, transit services, and bicyclists (aside from shared-use paths). Existing sidewalks, crossings, crossing support, and paths are detailed herein and shown on ***Figure 3.3***.

Sidewalks are available for a total of 38.0 miles. Total available sidewalk is measured along both sides of the roadway, since portions can be missing on one side and available on the other. Of all sidewalk, 87% are three to five feet in width, 11% are six to eight feet in width, and 2% are greater than nine feet. Of existing sidewalks, 78% provide no separation from the streets. The remainder (22%) offer separation via hardscape or landscape buffer. Separation provides a buffer between the pedestrian and roadway users, allowing for a more comfortable experience.

Intersections control the movement and right-of-way of roadway users via a traffic signal, or stop sign control. Pedestrians utilize intersections to connect from destinations for travel corridors as well as cross multi-lane roadways. In total, there are 80 intersections where 47 are traffic signals. The other intersections are controlled by roundabouts (3), two-way stop control (21), and all-way stop control (9).

Curb Ramps allow users a consistent gradient from the sidewalk to the roadway. In total, 674 curb ramps were inventoried within the study area and 86% were found to be compliant with Americans with Disability Act (ADA) requirements. ADA requirements ensure people with disabilities can locate and use the facility in a safe manner.

Crosswalks visually designate the pedestrian crossing right-of-way at an intersection. Crosswalks help support shared-roadway experiences with motor vehicles by creating an expectation for where pedestrian crossings take place. There are 222 total crosswalks within the study area. Of these 26 are continental crosswalks (high-visibility roadway markings using thick vertical striping) located within the FivePoint Gateway. All other crosswalks are standard striped crossings. The average crossing distance of all crosswalks is 94 feet, with a minimum distance of 23 feet and a maximum distance of 178 feet. This contrast is representative of the mixture of roadways within the study area.

Off-Street Share-Use Paths are facilities that are utilized by both pedestrians and bicyclists, separated from the roadway. These paths are typically greater than eight feet in width and span a total of 1.7 miles within the study area. Within a close distance of the station, there is one existing segment (0.32 miles) along the west side of Marine Way (between Barranca Parkway and Alton Parkway). A network of shared-use paths exists towards the outer portion of the study area in the southwest sector via the San Diego Creek Trail. Portions of existing paths are present within the OC Great Park; however, the sector is largely undevelopment.

There are 2.7 miles of future paths that are identified within the study area, all of which are within the OC Great Park and its neighborhoods along the proposed Marine Way and supporting alignments.

Wayfinding signs offer pedestrians directional information for travel to and from the Irvine Station. While signage located within

the Irvine Station are at a pedestrian scale with high levels of directional details, the wayfinding signs found throughout the larger study area are typically only for motor vehicles and bicyclists.

Rectangular Rapid Flashing Beacons (RRFB) are present at one intersection (Spectrum Center Drive/Fortune Drive and Quasar Drive) within the study area. These flashing lights supplement other pedestrian crossing features to enhance attention to users moving across an intersection.

CHALLENGES TO PEDESTRIAN TRANSPORTATION

While pedestrian paths and crossings are already largely built within the study area, the existing environment is not without challenges. ***Figure 3.2*** shows theses challenges. The average crossing distance within the study area is 94 feet, which represents more than six travel lanes to cross.

Shared-use paths are off-street and completely separated from motor vehicle traffic. The study area, in the northern sector, is under development and is expected to provide gap closures in the near-term. However, in the southwest sector, the San Diego Creek Trail effectively passes by the study area, aside from a singular emergency access road spur that runs parallel and south of the I-405 ending at Irvine Center Drive. This segment is not a formal shared-use path.

Sidewalk is largely built out; however, there are 3.8 miles (centerline) of gaps in the sidewalk network. These are located at:

- West side of Irvine Center Drive from Antivo to Hubble/Encanto
- South side of Ada from Alton Parkway to Technology Drive
- North side of Barranca Parkway from Alton Parkway to the Irvine Station
- North side of Ada from Barranca Parkway to end of Loop Road in the Station
- North side of Gateway from Pacifica to Meridian
- Great Park development area (Marine Way, Lynx, Cadence, Chinon, and Merit)

Of the 38.0 miles of existing sidewalk, 78% have no separation from the roadway. Void of a separation, a pedestrian's path is more exposed to noise and roadway users.

Curb ramps function in tandem with sidewalks as they allow consistent access from the road service to the sidewalk at crossing locations. Within the study area, there are 93 curb ramps that are not ADA compliant (specifically missing tactile warning services), most notably along the north side of Barranca Parkway between Technology Drive and Ada. Other locations where ADA ramps are not compliant include those along Toledo, Hughes, Studebaker, and Vanderbilt (located in the eastern portion of the study area, proximal to Alton Parkway). Non-compliant ramps do not correlate with missing sidewalk segments. Additional detailed assessments are needed to confirm slope requirements are adhered to.

Free right turns present conflicts to pedestrians and bicyclists alike. Motor vehicles travel through free right turns at higher speeds and while doing so, are not controlled by stop signs or signals through the turns. Pedestrians must wait for safe crossing, often times unsupported by traffic control devices, at 11 locations in the study area.

Freeway ramps present challenges to pedestrian travel due to the high-speed acceleration zones, free right turn, and uncontrolled ramp access. There are 13 instances of these challenges as the I-405 and I-5 bisect the study area. Ramp widths are often two lanes wide, creating a wide distance for pedestrian crossing. Off ramps are controlled either by a signal or uncontrolled via a free right turn exit for specific movements. The I-405 and Irvine Center Drive northbound and southbound on and off ramps present challenges to pedestrians with a combination of multiple crossing areas, variable crossing distances, and variable control types. Roadway speeds and acceleration zones compound the pedestrian exposure at this location. Similar scenarios exist at I-5 and Alton Parkway on and off ramps.

EXISTING TRANSIT INTEGRATION & CONNECTIONS

TRANSIT SERVICE PROVIDERS

Current transit providers serving the Irvine Station use the sawtooth style bus bay transit loop. These providers include Metrolink, Amtrak, OCTA Stationlink, Express and Local Routes, and iShuttle as summarized in ***Table 3.1***. Private and corporate shuttles are detailed herein; however, the impacts of COVID-19 are yet to be clear across all services. A comprehensive transit catalog which details routes, fare information, capacity, bike access, service span and frequency, major destinations and ridership is found in the ***Appendix.***

Existing transit service (bus routes and rail lines) are provided throughout the study area, many of which have a direct connection to the Irvine Station. These routes are shown in ***Figure 3.4***.

From a volume standpoint, the Irvine Station is host to around 1.2 million rail users, which is the second highest ridership in the county and 6th in the state of California. A combined average weekday sees a total of 2,800 Metrolink users alone and 30,400 Amtrak users monthly before COVID-19 pandemic. The iShuttle provides direct bus services to 62 stops within the study area and averages monthly ridership of 4,711 (Route C), 4,263 (Route D), and 1,140 (Route E). OCTA Stationlink, Express, and Local services have monthly ridership volumes of 2,070, 5,700, and 72,200 respectively.

Location and Configuration of Bus Station Area

The bus station area is well located: It is immediately to the south of the southbound platform and close to the bridge connecting to the northbound platform. ***Figure 3.5*** shows the existing station layout and the locations of the bus docks.

Connecting transit service is provided in the bus station area at eight docks, configured in a sawtooth layout. The following transit service is provided:

- OCTA buses (Docks 1 and 5) – OCTA service 480 that connects to employment areas to the North East in City of Irvine and City of Lake Forest, and OCTA service 86 that connects to Mission Viejo and Costa Mesa.
- iShuttle – (Docks 2,3 and 4) – Three shuttle services 402C, 403D and 404E that connect to employment areas within the City of Irvine, close to the station. These services are partially funded by employers and are predominantly used for commuting.
- Private Shuttles – (Private shuttle area) – These shuttles are provided by employers, hotels and retail facilities located in the area around the station.
- Docks 6, 7 and 8 are currently unused.

OCTA service 206 connecting to Santa Ana and Lake Forest does not enter the Station area, but stops nearby on Barranca Parkway, either side of Ada, within 1,000 feet of the station platforms. Service is very limited with two buses in the early morning and two in the early evening. The route runs counter to the main rail direction of travel, with buses running southbound in the morning and northbound in the evening. Both bus stops on Barranca Parkway are west of the intersection with Ada. For westbound travel, there is no bus turnout, but the stop does have shelter and seating. For eastbound travel, there is a bus turnout, but no shelter or seating, however some shade protection is provided by trees.

It is proposed that rerouting service 206 into the Station area be investigated further by assessing demand connecting between service 206 and rail service in coordination with OCTA.

Service Timings

Bus service 86 runs on an hourly schedule between Costa Mesa and Mission Viejo. Integration with rail service is poor, due to rail service at the station not following pulsed schedules, with headway varying considerably from one service to the next. The SCORE rail vision and associated investment include potential plans for pulsed train service to be implemented in the coming years, which would allow bus operators to better coordinate their services. A detailed integration study could find some benefits associated with rescheduling existing service.

Service 480 is timed to connect with Metrolink service in the morning peak hour, with services leaving the station for Lake Forest immediately after connecting trains have arrived. The return bus service in the evening does not appear to be well integrated with Metrolink service, as buses arrive at Irvine Station with either a long gap to the next train service or a few minutes before or after train service, meaning connections would likely be unreliable. It is recommended that the evening service be considered for rescheduling.

Bus service 206 is not timed to link with Metrolink and Amtrak service and could be rescheduled. It is recommended that a rescheduling exercise be conducted in coordination with the rerouting study for this service mentioned above.

Table 3.1 Transit Service Providers for the Irvine First Last Mile Plan Area

Operator	Route	To/From		Service	Transit Stop
OCTA	86	Costa Mesa	Mission Viejo	Local	Irvine Station
OCTA	90	Tustin	Dana Point	Local	Irvine Center Drive/ Alton Parkway
OCTA	206	Santa Ana	Lake Forest Express	Express	Barranca Parkway/ Ada
OCTA	480	Irvine Transportation Center (ITC)	Lake Forest	Stationlink	Irvine Station
Metrolink	600	Los Angeles Union Station	Oceanside	Commuter Rail	Irvine Station
Metrolink	800	San Bernardino Downtown	Oceanside	Commuter Rail	Irvine Station
Amtrak	---	Los Angeles Union Station	Downtown San Diego	Pacific Surfliner	Irvine Station
OCTA	402C	Capital Group	Irvine Station	iShuttle	Irvine Station
OCTA	403D	Waterworks	Irvine Station	iShuttle	Irvine Station
OCTA	404E	Los Olivos Apartments	Irvine Station	iShuttle	Irvine Station

Potential Long-Term Redesign of Bus Station Area

The proposed new station design via the Metrolink SCORE funding moves the bus station slightly south west, but essentially retains its position within the station, in close proximity to the southbound platform and close to the underpass connecting to the northbound platform.

With the redesign of the station, there is an opportunity to fundamentally reconsider the layout of the bus station area. The bus station was designed to accommodate long buses of 40 feet, however many small shuttles currently use the bus station area and the overall layout could be optimized for the current and potential future vehicle mixes.

It is recommended that a planning and redesign exercise for the bus station area be undertaken for inclusion in the overall redesign of the station.

Potential Short-Term Reconfiguration of Bus Station Area

With the potential for a future long-term redesign of the bus station area, in the meantime, any recommendations on layout changes should be minimal, making best use of the existing layout.

A potential reconfiguration of the existing bus station area has been identified, which would move OCTA transit service 480 currently using Dock 1 to Dock 6. This move would free up Dock 1, which could then be used as a staging area for iShuttle. It would also simplify the layout, with OCTA bus services being located on the southern side of the bus station and iShuttles services on the northern side.

STATION AMENITIES

General Station Facilities

The station has a good provision of facilities appropriate to its levels of ridership. It is a staffed station, with ticket office, eateries and restrooms. There are elevators to assist with crossing the bridge between platforms. There are 54 existing bike lockers that are leased at $30 every six months.

ADA Facilities

The ADA ramp between the bus station area and the platforms is very narrow and links to a part of the bus station area that has a very narrow sidewalk. Comments received that the elevator does not always function properly and capacity is limited.

Transit Waiting Facilities

Travelers' waiting times factor heavily into their travel decisions. Part of the dislike for waiting is associated with the uncertainty surrounding if and when a traveler's service will arrive. A way of improving the waiting experience is to provide real time information, giving riders the assurance that service is on the way and also knowing how long they have to wait, in case they would like to wait somewhere else, or make a visit to the restroom or station stores.

Existing waiting facilities do not include the provision of real time information. However, OCTA provides real time location and capacity information through its app. Provision of this information on electronic boards at transit waiting facilities would improve the waiting experience significantly and it is recommended that these are implemented.

Existing waiting facilities offer a very limited capacity with protection from the sun or from inclement weather. Better tree coverage could offer shade, however with the station being redesigned, a better use of resources in the short-term, would be to provide structured protection, that could be reused for the redesign. Generally, very limited waiting is needed for shuttle services and so it is recommended that new bus stop waiting facilities are installed for OCTA services, on the southern side of the bus station area.

VEHICULAR CONNECTIONS

As shown in ***Figure 3.5***, there are two separate pick-up and drop-off (PUDO) areas located onsite:

- Loop Road adjacent to station building – there is room to fit approximately six cars. This area is signed for "Passenger Pick Up & Drop Off" with no signage for TNCs.
- Fire Lane south of station building – there is room to fit approximately nine cars in the "Passenger Pick Up & Drop Off" area, with an additional two spaces for "Taxi Parking Only". There is no signage for TNCs.

Most large public facilities such as train stations, airports, and sporting venues have segregated public and TNC PUDO areas in order to facilitate a clear understanding of where each type of user should go and to limit circling and congestion. TNC users are more likely to require less time for PUDO than public PUDO because they have the ability to be more organized and efficient using in-app features.

EXISTING STUDY AREA WAYFINDING

There are presently 35 signs posted on 14 unique poles within the study area; most of which are car-focused and concentrated near major commercial and residential areas.

- With the exception of one sign, all signs are car-focused (regulatory or guidance)
- Wayfinding signage placement and design does not comply with the CA MUTCD wayfinding types
- There is no wayfinding tailored to the specific needs of pedestrians or cyclists
- Limited signage/information at transit stops
- Planned development at Great Park, presently no signage along key access routes (Marine Way)

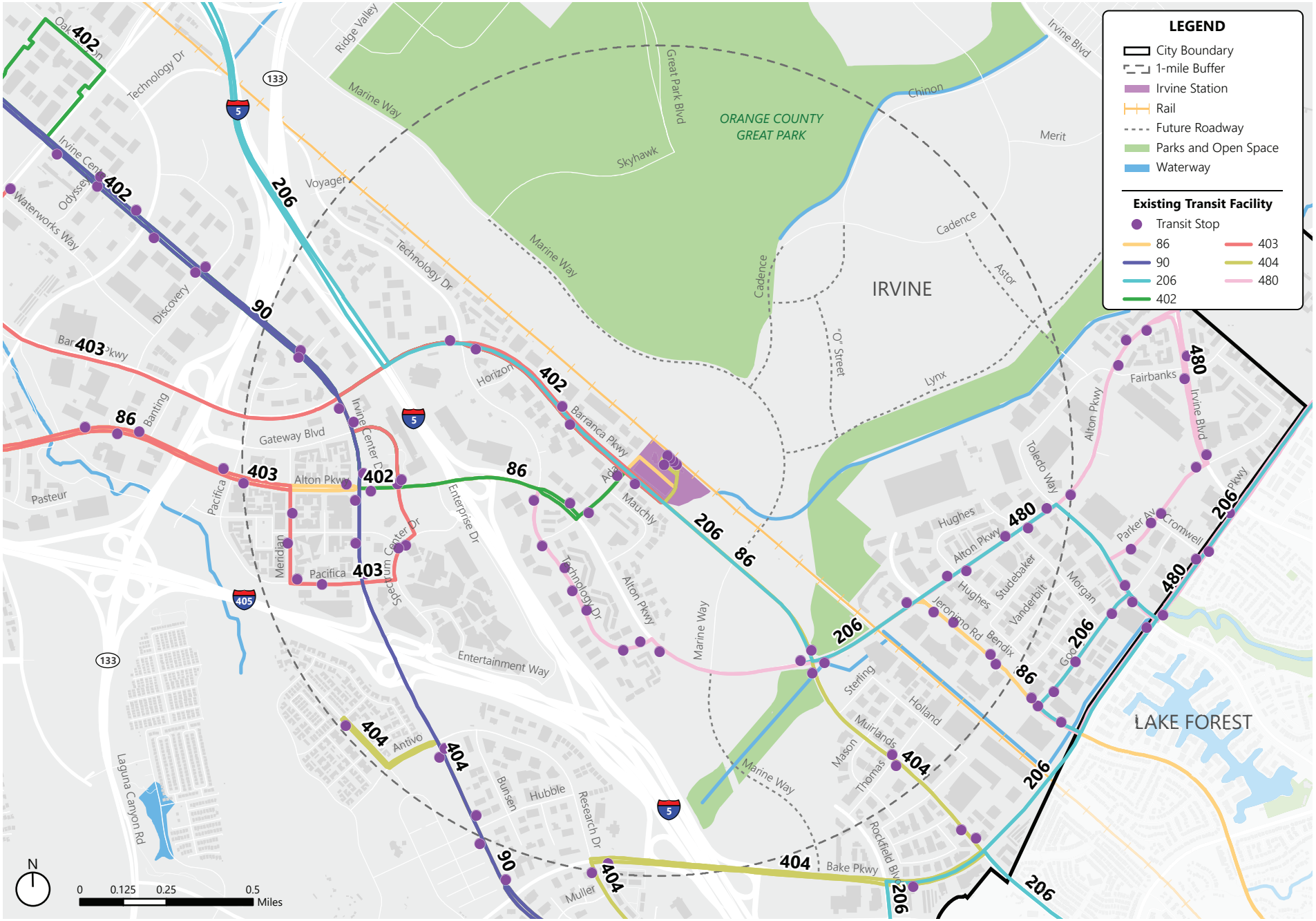


Figure 3.4 Existing Transit Facility Connections

SHUTTLES, TRANSPORTATION NETWORK COMPANY (TNC), & CAR/VANPOOLING

Shuttle services provided privately, and fully or in partnership with government funding are connected to the Irvine Station. Shuttle services, prior to the pandemic, are identified with COVID-19 impacts detailed as known:

- Capital Group – Operated an employee shuttle that met all trains. This was replaced by iShuttle Route C.
- Ten X/Aution.com – Operated a private shuttle pre-pandemic. Since then, they have split into two companies, and services have been terminated.
- Oakley – Operated an employee shuttle funded by Project V through OCTA.
- UC Irvine – Operated a shuttle for students.
- DoubleTree Hotel – Operated a shuttle for guests. Hotel is on Pacifica in Spectrum

Table 3.2 describes the curb space at the station for passenger loading, bus or shuttle loading, and parking. ***Figure 3.5*** presents an aerial view of the station and designated loading and parking areas.

Table 3.2 Curb Space/Area Descriptions

Curb Space/ Area	Description
Passenger Loading (TNC/TAXI)	There are two passenger loading areas. The plaza area is accessible from Loop Road, which is one way. The second can be accessed by entering the station from Barranca Parkway and heading north to Ada, across from the parking garage. Taxis appear to queue in this second area.
Passenger Loading (Shuttle)	There are two passenger-loading areas northwest of the sawtooth bus bays for private/corporate shuttles.
Bus Loading	There are eight bus bays in the sawtooth bus bay loading areas, which serve OCTA route 480, as well as OCTA-operated iShuttles 402C, 403D, and 403E.
Surface Parking	There are three surface lots at the station: **1.** located in the center of the bus loading loop, **2.** to the west of the bus loading areas adjacent to the garage, which includes designated bike parking (lockers) and EV charging, and **3.** the largest lot to the southeast which is currently leased to car sales companies.
Parking Structure	There is one 1500-space parking structure on the southwest side of the Station area, with long-term parking options up to 72 hours.


DOCK 2
SOLO IDOLOS
91.9 LA RAZA
SOLO IDOLOS
91.9 LA RAZA

Figure 3.5 Existing Station Facilities

REGIONAL INTEGRATIONS

The following overview of documents in ***Table 3.3*** demonstrates how the Irvine First Last Mile Plan integrates, conforms and aligns with regional and local policies and plans, capital improvements, transit service, and safe routes to school efforts, among others. This information was consolidated to ensure that the Plan's improvement plans avoid or provide solutions to address conflicts with other plans. Complete details for each reviewed document are available in the ***Appendix***.

Table 3.3 Summary of Reviewed Regional Integration Plans and Policy Documents

Agency	Document
Southern California Association of Governmnets (SCAG)	• SCAG Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS): 2020 Connect SoCal (Passenger Rail Technical Report)
LOSSAN[1]/Metrolink/Amtrak/	• State Rail Plan (2013) • LOSSAN[1] Rail Corridor Agency Business Plan (2020-2021) • LOSSAN[1] Corridorwide Strategic Implementation Plan • 10-Year Strategic Plan (2015-2025) • Five-Year Short-Range Transit Plan • Metrolink Gateways Plan (Project T) • Draft Recovery Plan
Orange County Transportation Authority (OCTA) / Orange County Council of Governments (OCCOG)	• 2018 Long Range Transportation Plan • Orange County Transit Vision (Transit Master Plan) • OCTA Metrolink Station Access Report (2013) • 2020 Complete Bus Book • OC Active • Orange County Safe Routes to School Action Plan • Orange County Complete Streets Design Guidelines
City of Irvine	• General Plan • Irvine Bicycle Transportation Plan (2011) • Active Transportation Plan (2015) • Strategic Active Transportation Plan (in progress) • League of American Bicyclists (LAB) Bicycle Friendly Community Feedback Report • City of Irvine Municipal Code • Heritage Fields Project 2012 General Plan Amendment and Zone Change Traffic Impact Analysis • Great Park Neighborhoods Master Landscape and Trails Plan No. 17008
Rideshare and Vanpool Programs	• Orange County Vanpool • Trips • iShuttle • Rideshare assistance and incentives

LOSSAN[1]: Los Angeles – San Diego – San Luis Obispo Rail Corridor

USER TRAVEL CHARACTERISTICS

January to May 2019 StreetLight Data (continuous cellular phone location-based data) were used to analyze historical mobility trends across vehicular, bicycle, and pedestrian modes. To quantify multi-modal characteristics and metrics at a small scale, a total of nine roadway segments that feed into the Irvine Station were defined. Additionally, a single zone was defined to encompass the footprint of the Irvine Station. Core analysis questions were:

1. Where Station users are traveling to/from
2. What routes they take to travel to/from the Station
3. The peak periods of travel to/from the Station
4. Who is traveling to/from the Station

1. WHERE ARE STATION USERS TRAVELING TO AND FROM?

Station users traveling by vehicle commute from across Orange County. About 50% of all vehicle trips start or end either within the City of Irvine or within adjacent cities including Lake Forest and Laguna Woods.

Day of Week

Nearly twice as many vehicle and bicycle trips occurred on weekdays than weekend days. Three times as many pedestrian trips occurred on weekdays than weekend days. The large difference in trip volumes between weekdays and weekend days, across all modes of transportation, indicates that the Irvine Station primarily serves as a commuter hub.

Travel Distance

Over half of all vehicle trips to or from the Irvine Station travel less than 10 miles. About 35% of vehicle trips are within a 5-mile distance. The high proportion of short vehicle trips gives opportunity for a potential mode shift to alternative modes of travel.

Station users traveling by bicycle typically travel less than five miles (60%). However, almost 22% of bicyclists travel more than seven miles, suggesting that the connections to and from the Irvine Station accommodate bicycle travel of greater distances.

Nearly all pedestrian trips are less than one mile. This suggests that users are typically driving and parking in a nearby parking lot and then walking the rest of the way, or they work within a one-mile distance of the Irvine Station.

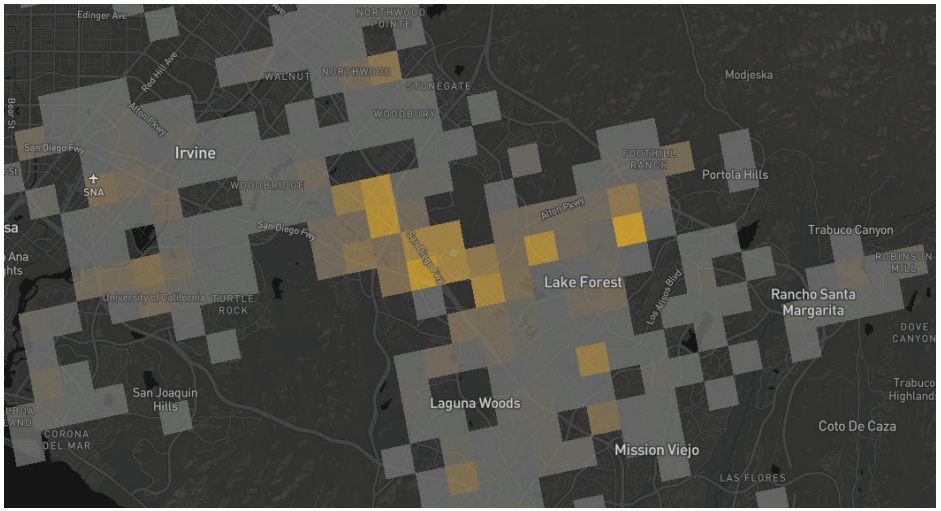


Figure 3.6 Work Locations of Station Users Traveling by Vehicle

Figure 3.7 Home Locations of Station Users Traveling by Vehicle

Home and Work Locations

Approximately 58% of people who drive to and from the Station work within 10 miles of the Station, and 40% work within 5 miles of the Station (***Figure 3.6***). This highlights a correlation between home and work location and travel distance. Furthermore, this suggests that the Station acts as an integral connection hub for workers/employers within the area.

Conversely, when analyzing the home distances of Station users, the trend is slightly different. About 43% of people who drive to and from the Station live within 10 miles of the Station, and only 23% live within 5 miles of the Station (Figure 3.7). While most vehicular Station users live within the Irvine area, small clusters of home locations are also scattered in the Inland Empire.

2. RESULTS: WHICH SEGMENTS ARE THE MOST HEAVILY UTILIZED?

Popular routes for people driving, biking, and walking to and from the Station were analyzed based on volumes for segments that both feed in and directly connect to the Irvine Station. Volumes based on the average weekday.

Vehicular Demand

Ada, between Barranca Parkway and Alton Parkway, is the most heavily utilized segment for people driving to the Station. Barranca Parkway, between Technology Drive and Ada is the most heavily utilized for people leaving the Station by car. ***Table 3.4*** summarizes vehicle volume distribution across all segments.

Table 3.4 Vehicle Volume Distribution by Segment

Segment	Traveling To (Volume)	Traveling From (Volume)	Traveling To (%)	Traveling From (%)
Ada (Between Barranca Parkway and Alton Parkway)	405	126	25.6%	16.8%
Alton Parkway (Between Ada and Barranca Parkway)	20	11	1.3%	1.5%
Alton Parkway (Between Barranca Parkway and Jeronimo Lane)	209	77	13.2%	10.3%
Alton Parkway (Between Technology Drive and Ada)	262	80	16.6%	10.7%
Barranca Parkway (Between Irvine Station and Alton Parkway)	345	144	21.8%	19.2%
Barranca Parkway (Between Technology Drive and Irvine Station)	313	217	19.8%	28.9%
Marine Way (Between Barranca Parkway and Alton Parkway)	10	10	0.6%	1.3%
Technology (Between Barranca Parkway and Alton Parkway)	12	5	0.8%	0.7%
Technology Drive (North of Barranca Parkway)	4	80	0.3%	10.7%

Bicycle Usage

Ada, between Barranca Parkway and Alton Parkway, and Barranca Parkway between Irvine Station and Alton Parkway is the most heavily utilized segment for people biking to the Station. Barranca Parkway, between Irvine Station and Alton Parkway, and Alton Parkway, between Barranca Parkway and Jeronimo Lane is the most heavily utilized by people leaving the station by bike. ***Table 3.5*** summarizes bicycle volume distribution across all segments.

Pedestrian Demand

Ada, between Barranca Parkway and Alton Parkway is the most heavily utilized segment for people walking to and from the Station. An important consideration to note for pedestrian travel within the Irvine Station area is the abundance of parking lots. This promotes an

increase in cut-through pedestrian trips that are not quantified to a specific roadway segment.

More specifically, when analyzing the difference in StreetLight Index for the Ada segment, there are roughly 2.5 times as many pedestrian trips traveling to than from the Station. After crossing the intersection at Barranca Parkway, pedestrians may have walked into the parking lots adjacent to the Ada segment, therefore missing the Ada segment gate.

While there is a clear difference in volume between pedestrian trips to and from the station, volume share was relatively homogenous for to and from trips. ***Table 3.6*** summarizes pedestrian volume distribution across all segments.

3. WHAT ARE THE PEAK PERIODS OF TRAVEL FOR USERS?

Motorists, bicyclists, and pedestrians all travel to or from the Station most frequently on weekdays during morning and late afternoon hours. More specifically, Friday between 3:00 p.m. and 6:00 p.m. highlighted the highest volumes for each individual mode (***Figure 3.8*** to ***Figure 3.10***).

Table 3.5 Bicycle Volume Distribution by Segment

Segment	Traveling To (Volume)	Traveling From (Volume)	Traveling To (%)	Traveling From (%)
Ada (Between Barranca Parkway and Alton Parkway)	4	2	26.7%	15.4%
Alton Parkway (Between Ada and Barranca Parkway)	0	0	0.0%	0.0%
Alton Parkway (Between Barranca Parkway and Jeronimo Lane)	3	5	20.0%	38.5%
Alton Parkway (Between Technology Drive and Ada)	3	1	20.0%	7.7%
Barranca Parkway a (Between Irvine Station and Alton Parkway)	4	5	26.7%	38.5%
Barranca Parkway (Between Technology Drive and Irvine Station)	1	0	6.7%	0.0%
Marine Way (Between Barranca Parkway and Alton Parkway)	0	0	0.0%	0.0%
Technology Drive (Between Barranca Parkway and Alton Parkway)	0	0	0.0%	0.0%
Technology Drive (North of Barranca Parkway)	0	0	0.0%	0.0%

Table 3.6 Pedestrian Volume Distribution by Segment

Segment	Traveling To (Volume)	Traveling From (Volume)	Traveling To (%)	Traveling From (%)
Ada (Between Barranca Parkway and Alton Parkway)	210	89	56.0%	51.1%
Alton Parkway (Between Ada and Barranca)	10	3	2.7%	1.7%
Alton Parkway (Between Barranca Parkway and Jeronimo Lane)	34	9	9.1%	5.2%
Alton Parkway (Between Technology Drive and Ada)	39	22	10.4%	12.6%
Barranca Parkway (Between Irvine Station and Alton Parkway)	40	15	10.7%	8.6%
Barranca Parkway (Between Technology Drive and Irvine Station)	36	30	9.6%	17.2%
Marine Way (Between Barranca Parkway and Alton Parkway)	3	4	0.8%	2.3%
Technology Drive (Between Barranca Parkway and Alton Parkway)	0	1	0.0%	0.6%
Technology Drive (North of Barranca Parkway)	3	1	0.8%	0.6%

Figure 3.8 Vehicle Volume by Time and Day

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12am - 3am	5	2	5	3	5	3	1
3am - 6am	83	88	104	80	58	15	6
6am - 9am	402	398	398	391	368	243	98
9am - Noon	184	156	185	162	228	300	192
Noon - 3pm	146	179	164	165	233	219	297
3pm - 6pm	615	730	707	701	801	204	181
6pm - 9pm	163	136	165	176	250	108	149
9pm - 12am	32	24	26	35	71	67	56

Figure 3.9 Bicycle Index by Time and Day

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sun
12am - 3am		4					
6am - 9am	3	4	9	8	4		
9am - Noon		7			4	4	
Noon - 3pm	4		4		4		
3pm - 6pm	4	15		11	16		
6pm - 9pm	3		2	4			
9am - 12am						6	

Figure 3.10 Pedestrian Index by Time and Day

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12am - 3am		10					
3am - 6am	9	14		9			
6am - 9am	596	406	364	465	287	50	107
9am - Noon	238	196	146	168	191	75	30
Noon - 3pm	142	122	254	143	312	86	114
3pm - 6pm	683	722	640	759	818	107	109
6pm - 9pm	137	59	84	83	128	11	127
9pm - 12am	7	55	27	48	10	113	44

4. WHAT ARE THE DEMOGRAPHICS OF THE USERS?

Demographic data was compiled for all Station users who bike, walk, and drive. About 33% of Station users have a median household income of $50K or less (***Figure 3.11***). However, 37% of Station users have a median household income more than $100K. Approximately 60% of station users are white, 28% are of Hispanic ethnicity, and 20% are Asian (***Figure 3.12***). Data across all motorist, bicyclist, and pedestrian Station users showed little difference between demographics and mode choice.

Figure 3.11 Income Characteristic for All Modes

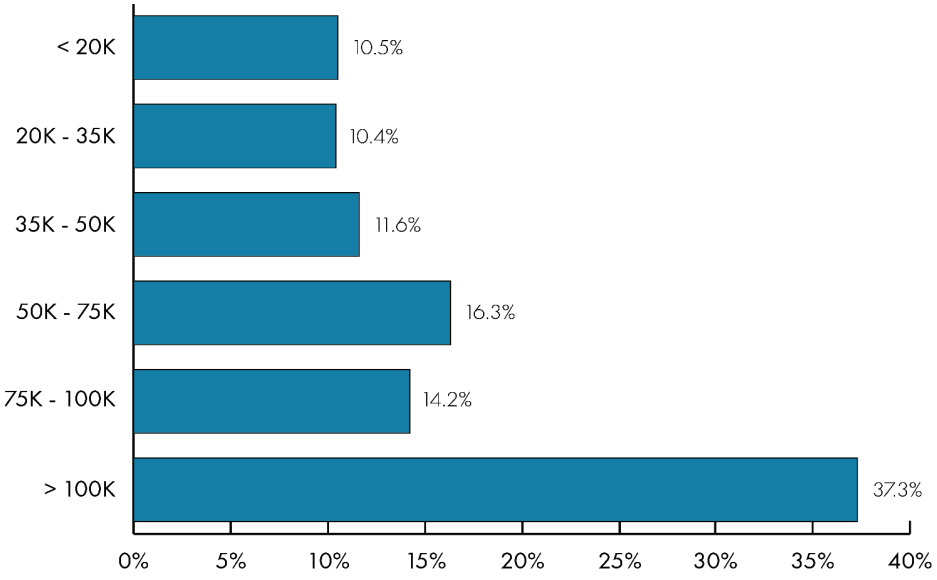
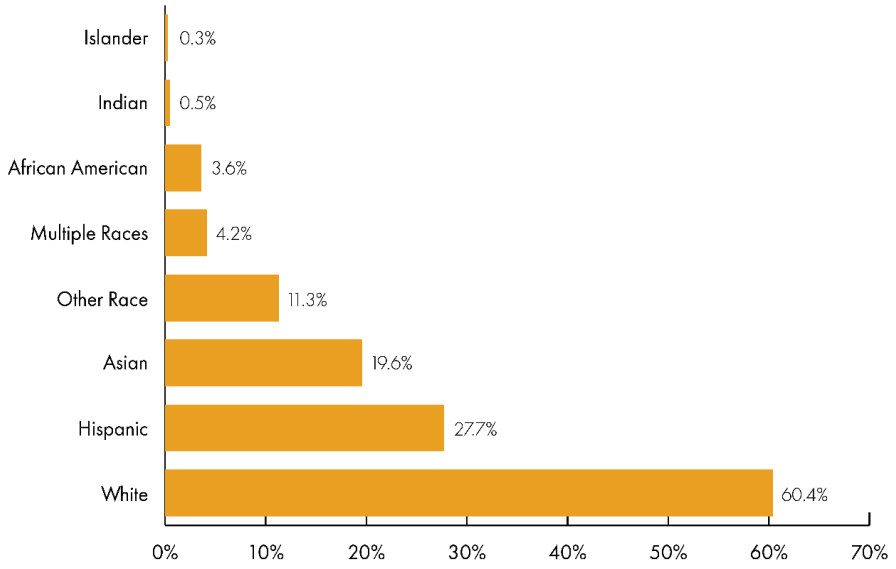


Figure 3.12 Race/Ethnicity for All Modes



COLLISION & CITATION ANALYSIS

The section consists of two parts: 1) collisions analysis and 2) citation analysis. Collisions are incidents that involve a pedestrian, bicyclist, and/or vehicle. Within the 1-mile study area around the Irvine Station, top locations and respective characteristics of these collisions were assessed. Citation data, although does not reflect an actual collision incident, can be indicative of behavior that could result in a collision. By looking at both sets of data, this analysis helps identify locations in need of improvements.

COLLISION ANALYSIS

Collision data (January 2015 to December 2019) for both the Irvine Station study area and the City of Irvine were obtained through the Traffic Injury Mapping System (TIMS). The study area collision dataset analyzed collisions within a 1-mile radius of the Irvine Station. Of the 231 collisions that occurred within this area, 209 were vehicle-to-vehicle, 13 involved a bicyclist, and nine involved a pedestrian. Over the 5-year timeframe, bicyclist-involved collisions have doubled, while pedestrian-involved collisions followed a sporadic trend, ultimately seeing a reduction in 2019. Additionally, vehicle-to-vehicle collisions have remained steady within the given timeframe, with little to no change in volume.

Top Collision Hotpots

Intersections that showcased multiple bicyclist- and pedestrian-involved collisions included Alton Parkway and Technology Drive (3), and Quasar Drive and Spectrum Center Drive (3); a complete hotspot map is shown in ***Figure 3.13***. Approximately 89% of pedestrian-involved collisions and 70% of bicyclist-involved collisions occurred within 250 feet of the intersection. Intersections with five or more multimodal collisions (vehicle, bicycle, and pedestrian) are outlined in ***Table 3.7***. The intersection of Alton Parkway and Gateway makes up approximately 11% of all study area collisions. Intersection collisions are classified as occurring within 250 feet of the intersection.

Table 3.7 Top 10 Collision Hotspots (All Modes & within 1-mile Buffer of Station)

Intersection	Fatal or Severe Injury	Visible Injury	Complaint of Pain	Property Damage Only	Bicycle/ Pedestrian Involved	Total
Alton Parkway and Gateway	2	13	9	2	1	27
Alton Parkway and Irvine Center Drive	0	1	16	1	0	18
Alton Parkway and Technology Drive	1	4	8	0	3	16
Alton Parkway and Enterprise Drive	0	6	5	1	1	13
Entertainment Way and Irvine Center Drive	0	2	6	2	0	10
Alton Parkway and Jeronimo Road	0	4	4	1	1	10
Barranca Parkway and Irvine Center Drive	0	3	5	1	0	9
Alton Parkway and Meridian Parkway	0	3	4	1	0	8
Alton Parkway and Barranca Parkway	1	1	3	1	0	6
Irvine Center Drive and Pacifica	0	0	5	1	0	6

Source: Traffic Injury Mapping System (TIMS); January 2015 to December 2019; includes counts of vehicle/ pedestrian, rear-end, hit object, sideswipe, broadside, other, head-on, ot stated, and overturned collisions.

Figure 3.13 Study Area Collision Heatmap

Top Collision Corridors

A corridor analysis assesses the primary road of travel where a collision occurs. The collisions could occur at intersections along the corridor or outside of an intersection. The top corridors with multiple bicyclist- and pedestrian-involved collisions include:

- Alton Parkway (6)
- Spectrum Center Drive (4)
- Gateway (2)
- Pacifica (2)
- Technology Drive (2)
- Barranca Parkway (2)

The top collision corridors for vehicle-to-vehicle collisions include:

- Alton Parkway (94)
- Irvine Center Drive (49)
- Barranca Parkway (16)
- Bake Parkway (6)
- Gateway (5)

Alton Parkway had the highest collision density for both bicyclist- and pedestrian-involved collisions and collisions of all modes, of all corridors within the study. Additionally, nearly 35% of all fatal and severe injury collisions (all modes) occurred along Alton Parkway.

Primary Collision Factors

The two most frequent collision factors for bicyclist-involved collisions were bicyclists violating the automobile right-of-way and unsafe speed of travel (***Table 3.8***). Unsafe speed of travel can indicate that either the motorist or bicyclist was traveling at an unsafe speed.

The two most frequent collision factors for pedestrian-involved collisions were motorists violating the pedestrian right-of-way and pedestrian violation (***Table 3.9***). A pedestrian violation is typically defined as a pedestrian violating the automobile right-of-way (crossing at unmarked location, walking in road).

The two most frequent collision factors for vehicle-to-vehicle collisions were traffic signals and signs, and unsafe speed (***Table 3.10***).

Collision Type

The top bicyclist-involved collision types were other and hit object (***Table 3.11***). Other is defined as any collision type not specified within the TIMS collision type classifications. Hit object involves a bicyclist colliding with a stationary object.

Vehicle-to-vehicle collisions most frequently occurred as broadside or rear end collision types (***Table 3.12***). Broadside collisions are classified as side impact, side angle, or T-Bone collisions.

Table 3.8 Bicyclist-Involved Collision Primary Collision Factors

Violation	Total	Percent of Total
Automobile ROW	5	38.5%
Unsafe Speed	4	30.8%
Unknown	2	15.4%
Unsafe Lane change	1	7.7%
Other than driver	1	7.7%

Table 3.9 Pedestrian-Involved Collision Primary Collision Factors

Violation	Total	Percent of Total
Pedestrian ROW	4	44.4%
Pedestrian Violation	1	11.1%
Improper Turning	1	11.1%
Unsafe Starting or Backing	1	11.1%

Table 3.10 Top Primary Collision Factors for Vehicle-to-Vehicle Collisions

Violation	Total	Percent of Total
Traffic Signals and Signs	79	38.0%
Unsafe Speed	49	23.6%
Automobile ROW	19	9.1%
Driving or Bicycling Under the Influence	17	8.2%
Improper Turning	15	7.2%

Table 3.11 Top Collision Types for Bicyclist-Involved Collisions

Collision Type	Total	Percent of Total
Other	8	61.5%
Hit Object	2	15.4%
Broadside	1	7.7%
Overturned	1	7.7%
Head-On	1	7.7%

Table 3.12 Top Collision Types for Vehicle-to-Vehicle Collisions

Collision Type	Fatal or Severe Injury	Percent of Fatal or Sever Injury	Total	Percent of Total
Broadside	6	46.2%	99	47.4%
Rear End	1	7.7%	63	30.1%
Hit Object	2	15.4%	16	7.7%
Sideswipe	1	7.7%	12	5.7%
Head-On	0	0.0%	10	4.8%
Not Stated	2	15.4%	5	2.4%
Other	0	0.0%	2	1.0%
Overturned	1	7.7%	2	1.0%

CITATION ANALYSIS

Analysis of police citation data supplements traditional collision analyses. Police citation data from 2015 to early 2020 was acquired from the City of Irvine Public Safety Department.

Citation Data Summary

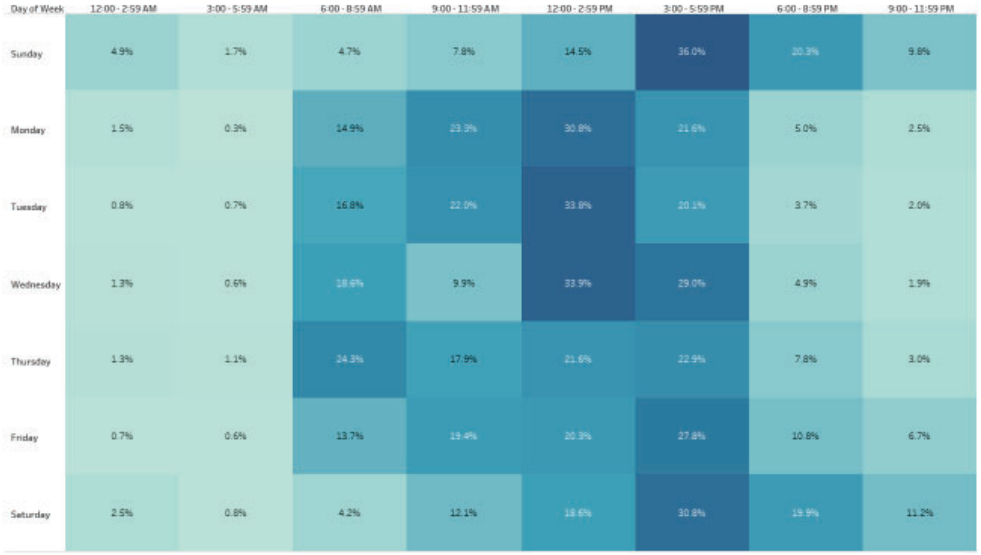
In total, 3,504 citations were logged within a 1-mile buffer of the Irvine Station between 2015 and 2020. ***Table 3.13*** highlights the citation vehicle codes that were used for this analysis and their totals. Approximately 35% of all study area citations were a result of a motorist using a wireless phone while driving. This citation type is of particular concern because a distracted motorist has a direct impact on the safety of all other modes. Additionally, 21% of citations were motorists cited for either failing to obey a traffic signal or sign, or a red light violation. These violations could potentially impose on the bicycle and pedestrian right-of-way and compromise the safety of bicyclists and pedestrians crossing at or traveling through an intersection.

Citations most frequently occurred during afternoon hours. About half of all citations were cited between 12:00 p.m. and 6:00 p.m. (***Figure 3.14***). Additionally, approximately 85% of citations were cited on weekdays, most frequently occurring on Thursday (18%) and Friday (20%).

Table 3.13 Top 10 California Vehicle Code Definitions and Citation Totals

Violation Code	Description	Count	Percent
23123(A)	Using wireless phone while driving	1,206	34.4%
21461(A)	Failure to obey sign or signal	383	10.9%
21453(A)	Red light violation	354	10.1%
26708(A)	Window tint violation	236	6.7%
22101(D)	Disobeying the directions of a traffic control device	138	3.9%
27602(A)	Operating a vehicle containing unauthorized video screen	120	3.4%
22350	Speeding greater than is reasonable	114	3.3%
24603(B)	One or both rear lights improperly functioning	109	3.1%
21651(A2)	Improperly making left, semicircular, or U-turn on divided highway	99	2.8%
21453(C)	Failure to obey red arrow signal	74	2.1%

Figure 3.14 Study Area Citations by Time of Day and Day of the Week



Top Citation Hotspots

The highest citation violation is CVC 23123(A) using wireless phone while driving. Distracted driving increases the exposure on all roadway users since reaction times and adherence to roadway right-of-way and posted signs is lowered. Four of the top five citation intersections also ranked within the top ten collision intersections. The top five citation hotspots include and are also shown in ***Figure 3.15***:

1. *Irvine Center Drive and Pacifica – 362 Citations*

Table 3.14 highlights the top five citation violations at Irvine Center Drive and Pacifica; use of wireless phone while driving accounted for 31.5% of citations followed by failure to obey sign or signal (15.2%). This intersection also ranked 10th in the top ten collisions intersections with six total collisions (***Table 3.7***).

2. *Alton Parkway and Enterprise Drive – 344 Citations*

Table 3.15 highlights the top five citation violations at Alton Parkway and Enterprise Drive. Failure to obey sign or signal accounted for 34.6% of citations. This intersection also ranked 4th on the top ten collisions list with 13 total collisions (***Table 3.7***).

3. *Alton Parkway and Irvine Center Drive – 285 Citations*

Table 3.16 highlights the top five citation violations at Alton Parkway and Irvine Center Drive; use of wireless phone while driving accounted for 123 of citations or 43.2% of all citations. This intersection also ranked 2nd on the top ten collisions list with 18 total collisions (***Table 3.7***).

4. *Alton Parkway and Technology Drive – 243 Citations*

Table 3.17 highlights the top five citation violations at Alton Parkway and Technology Drive; use of wireless phone while driving accounted for 35.4% of citations followed by speeding (11.9%). This intersection also ranked 3rd in the top ten collisions intersections with 16 total collisions (***Table 3.7***).

5. *Irvine Center Drive and Research Drive – 203 Citations*

Table 3.18 highlights the top five citation violations at Irvine Center Drive and Research Drive; use of wireless phone while driving accounted for 46.8% of citations. This intersection was not on the top 10 collisions list with one reported collision.

Table 3.14 Irvine Center Drive and Pacifica Top Citation Violations

Violation	Description	Count	Percent
23123(A)	Using wireless phone while driving	114	31.5%
21461(A)	Failure to obey sign or signal	55	15.2%
21651(A2)	Improperly making left or U-turn on divided highway	30	8.3%
26708(A)	Driving with windshield or rear window obstruction	29	8.0%

Table 3.15 Alton Parkway and Enterprise Drive Top Citation Violations

Violation	Description	Count	Percent
21461(A)	Failure to obey sign or signal	119	34.6%
23123(A)	Using wireless phone while driving	64	18.6%
21453(A)	Red light violation	63	18.3%
21453(B)	Failing to properly turn right or left from a one-way street onto a one-way street	32	9.3%

Table 3.16 Alton Parkway and Irvine Center Drive Top Citation Violations

Violation	Description	Count	Percent
23123(A)	Using wireless phone while driving	123	43.2%
21453(A)	Red light violation	30	10.5%
24603(B)	One or both rear lights improperly functioning	18	6.3%
26708(A)	Driving with windshield or rear window obstruction	18	6.3%

Table 3.17 Alton Parkway and Technology Drive Top Citation Violations

Violation	Description	Count	Percent
23123(A)	Using wireless phone while driving	86	35.4%
22350	Speeding greater than is reasonable	29	11.9%
21461(A)	Failure to obey sign or signal	25	10.3%
21453(A)	Red light violation	24	9.9%

Table 3.18 Alton Parkway and Research Drive Top Citation Violations

Violation	Description	Count	Percent
23123(A)	Using wireless phone while driving	95	46.8%
26708(A)	Driving with windshield or rear window obstruction	33	16.3%
27602(A)	Operating a vehicle containing unauthorized video screen	11	5.4%
21453(A)	Red light violation	7	3.4%

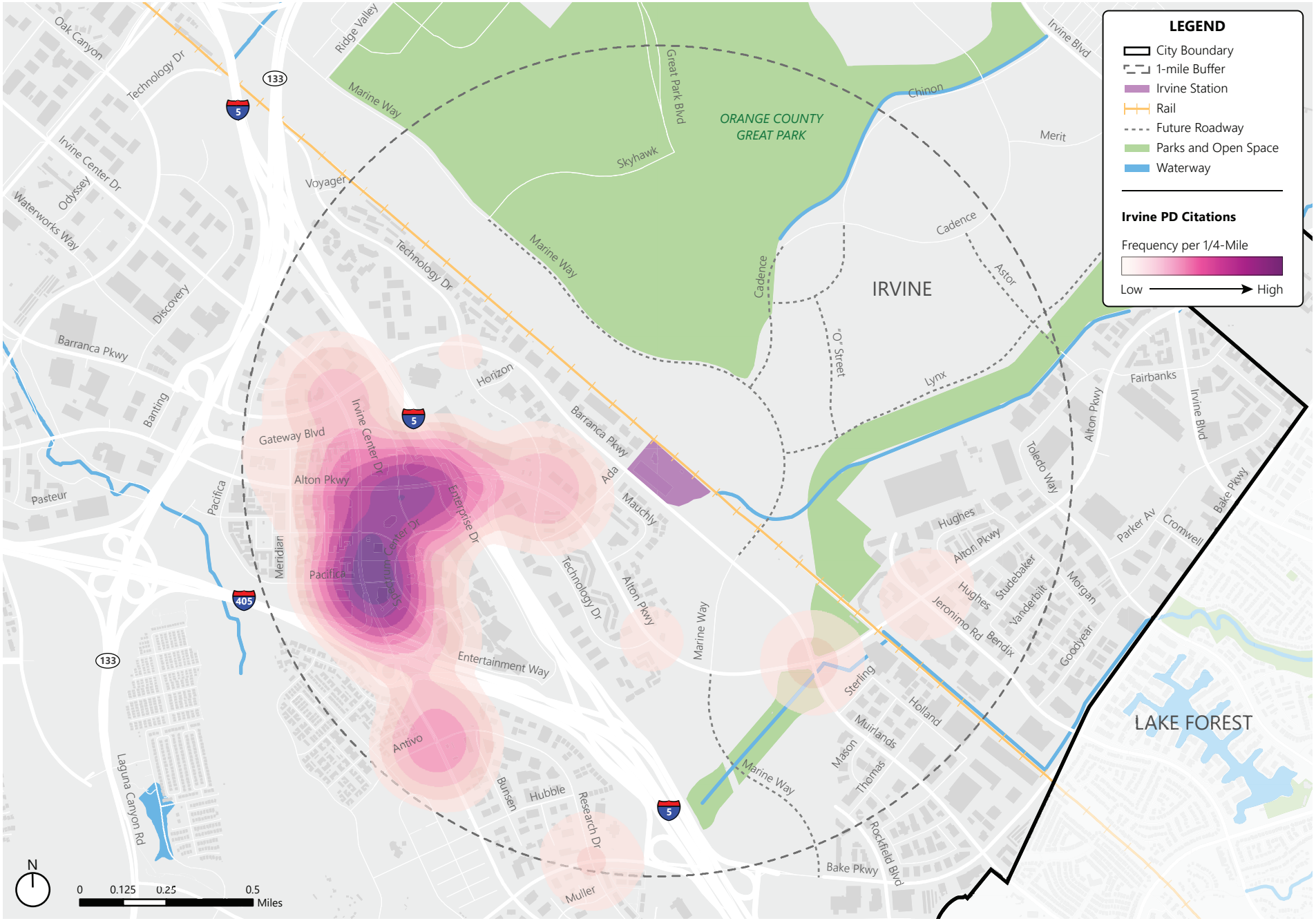


Figure 3.15 Study Area Citation Heatmap


04
Connecting OC Bus
Irvine Transportation Center
OCBUS
Together we ride
fatherhood.gov

IMPROVEMENT PLANNING

OVERVIEW

Improvement planning for the Irvine Station First Last Mile Plan represents a culmination of findings throughout the development of the Plan. A foundation of analytical work is prepared in the existing conditions chapter (Chapter 3) and additional public outreach findings are presented in Chapter 2.

Four improvement planning components are prepared:

1. Pedestrian Improvements
2. Bicycle Improvements
3. Transit Connection Improvements
4. Concept & Cross Section Plans

Assessed corridors are classified as either "Major" or "Local" Corridors, and if not yet constructed "Future Roadway". Major Corridors offer both regional connections that extend beyond the City scale, into surrounding regional jurisdictions and offer localized linkage. Local Corridors offer localized connections bound within the City limits. Future Roadways are those identified in City planning documents as alignments planned into the future. An overview of these corridors is shown in ***Figure 4.1*** and proposed multi-modal elements are listed in ***Table 4.1***.

MAJOR CORRIDORS

- Barranca Parkway
- Alton Parkway
- Irvine Center Drive

LOCAL CORRIDORS

- Ada
- Technology Drive
- Marine Way
- Research Drive/Antivo
- Spectrum Center Drive/Enterprise Drive

FUTURE ROADWAYS[1]

- Marine Way
- Lynx
- "O" Street
- Cadence
- Chinon

Treatments for pedestrian and bicycle improvements were filtered through the 2020 Irvine Strategic Active Transportation Plan (ISATP) for application to this Plan. An overview of bicycle and pedestrian improvements are shown in detail in ***Figure 4.2*** and ***Figure 4.3*** respectively. Attending to core project goals, in collaboration with City and Stakeholder oversight, and sensitive to Station area needs these treatments seek to decrease gaps in the pedestrian and bicycle network and form an increasingly more comfortable environment to travel to and from the Irvine Station.

[1] Roadways determined as future as of the date of the existing conditions analysis - 2020

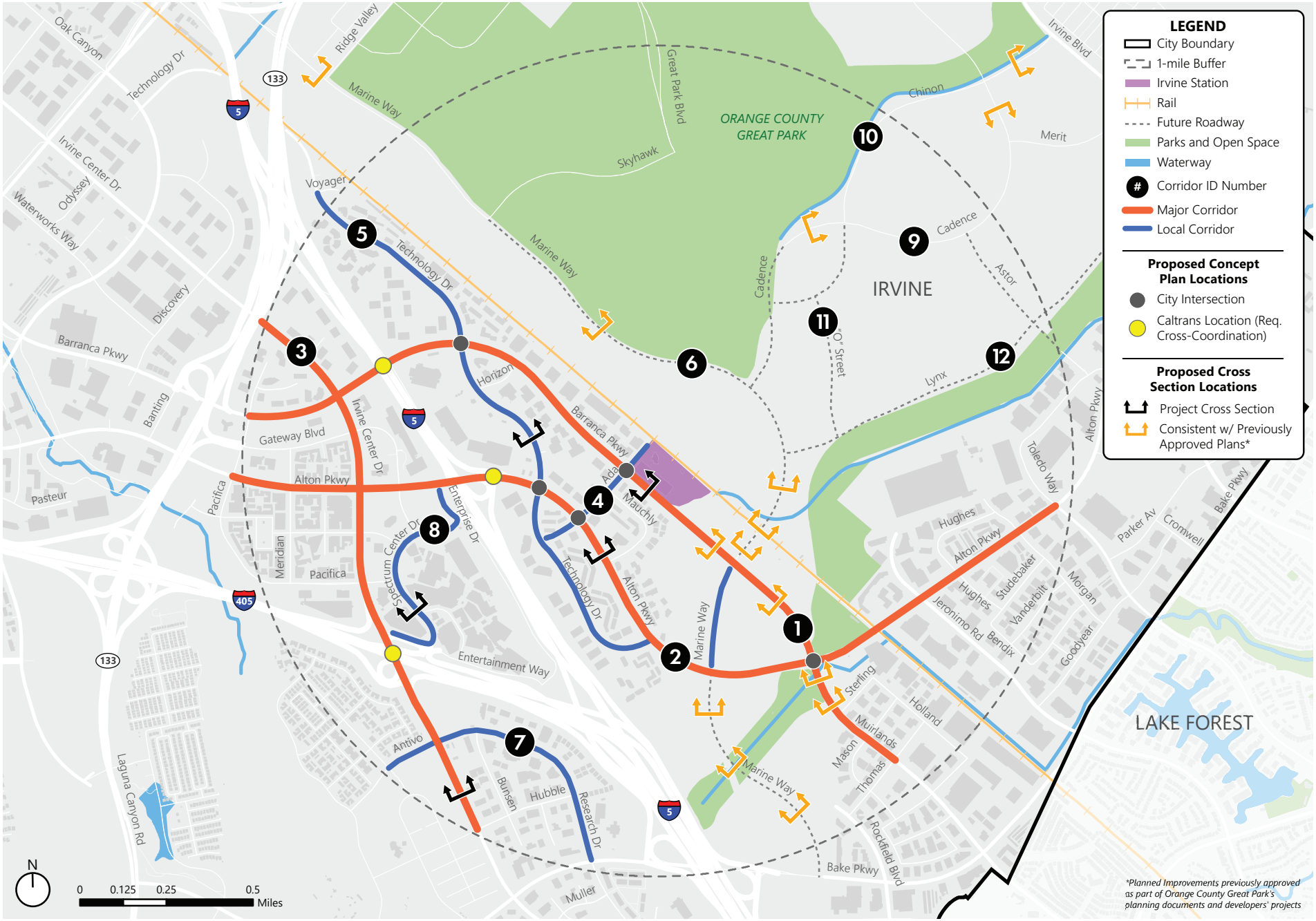


Figure 4.1 Improvement Overview

Table 4.1 Improvement Overview

					Pedestrian Elements					
ID	**Corridor**	**Road Type**	**Road Extents**	**Conditions**	**Sidewalk/ Gap Closure**	**Accessibility Enhancements**	**Leading Pedestrian Interval**	**[1]Transit Shelter Enhancement**	**Crosswalk Enhancement**	**Scramble Crossing**
			Irvine Station First Last Mile Plan Appendix: Active Transportation Plan Toolbox Reference(s)		*p. 8*	*p. 8*	*p. 9*	---	*p. 8*	---
			Supplemental Reference(s)		*[2]Standard Plan 201*	*[2]Standard Plan 202*	---	*[2]Standard Plan 209; NACTO Small Transit Shelter*	*[2]Standard Plan 203*	*Global Street Design Guide: Crossing Types*
1	Barranca Parkway	Major	State Route 133 to Thomas	Existing: Sidewalk, bike lanes; four lanes divide by a raised center median	**X**	**X**	**X**	**[1]X**	**X**	
2	Alton Parkway	Major	Pacifica to Toledo Way	Existing: Sidewalk, bike lanes; six lanes divide by a raised center median			**X**	**[1]X**	**X**	
3	Irvine Center Drive	Major	State Route 133 to Hubble	Existing: Sidewalk, bike lanes; six lanes divide by a raised center median	**X**		**X**	**[1]X**	**X**	
4	Ada	Local	Technology Drive to End of Loop Road	Existing: Sidewalk, bike lanes; four lanes divided by TWLTL	**X**		**X**	**[1]X**	**X**	
5	Technology Drive	Local	Voyager to Alton Parkway (East)	Existing: Sidewalk, bike lanes; four lanes divided by TWLTL		**X**	**X**	**[1]X**	**X**	
6	Marine Way	Local / Future Roadway	East of Ridge Valley to Bake parkway	Existing: Sidewalk, shared-use path, bike lane; four lanes divided by raised center median. Future development underway (Skyhawk to Barranca Parkway and Alton Parkway to Bake Parkway)	**X/F**	**F**	**X**	**[1]F**	**X**	
7	Research Drive/ Antivo	Local	Gitano to Bake Parkway	Existing: Sidewalk, bike lanes; four lanes divided by TWLTL			**X**	**[1]X**	**X**	
8	Spectrum Center Drive/Enterprise Drive	Local	Irvine Center Drive to Alton Parkway	Existing: sidewalk, partial bike lane coverage; four lanes divide by a raised center median			**X**	**[1]X**	**X**	**X**
9	Cadence	Future Roadway	Merit to Marine Way	Existing: Land development underway	**F**	**F**	**O**	**[1]O**	**O**	
10	Chinon	Future Roadway	Cadence to "O" Street	Existing: Land development underway	**F**	**F**	**O**	**[1]O**	**O**	
11	"O" Street	Future Roadway	Cadence to Marine Way	Existing: Land development underway	**X/F**	**F**	**O**	**[1]O**	**O**	
12	Lynx	Future Roadway	Irvine Boulevard to Marine Way	Existing: Land development underway	**X/F**	**F**	**O**	**[1]O**	**O**	

X: Proposed project element on existing roadway. **O**: Proposed project element on future roadway (where applicable), pending finalized development plans **F**: Future roadway build out element planned; consistent with proposed cross section plan from Great Park Neighborhood's Master Landscape and Trail Plan No. 17008 (20200914). **TWLTL**: Two way left turn lane. [1]With available funding, the City could place shelters at all locations. Without funding, shelters are placed only at the busiest stops in the City, using warrants (i.e. daily boarding volume) as noted in the OCTA Guidelines. [2]City of Irvine Standard Plan. [3]National Association of City Transportation Officials (NACTO). [4]Massachusetts Department of Transportation (MassDOT).

	Bicycle Elements									Roadway Configuration Elements	
Street Greening	***Bike Lane***	***Buffered Bike Lane***	***Bike Route***	***Shared-Use Path***	***Bike-head-start***	***Bicycle Signal Detection***	***Thru/Egress Bike Lane***	***Conflict Zone Markings/ Green Paint***	***Prohibit Wrong Way Bicycling***	***Wayfinding (All Modes)***	***Freeway On-/Off-Ramp Enhancement***
---	*p. 4*	*p. 4*	*p. 4*	*p. 7*	---	---	---	*p. 5*	*p. 6*	---	*p. 11 "Enhanced Free-Right Turn Crossing"*
Tree Planting Guidelines, Landscape Manual, of Green Streets by EPA	*[3]NACTO Bike Lanes*	*[3]NACTO Buffered Bike Lanes*	*[3]NACTO Bike Boulevard*	---	*[4]MassDOT 'Signals' Ref: 6.1.4*	*Section 104, Traffic Signals, [3]NACTO Signal Detection and Actuation*	*[3]NACTO Through Bike Lanes*	*[3]NACTO Intersection Crossing Markings*	---	*2012 Irvine Wayfinding Signage Study*	---
X		X		X	X	X	X	X	X	X	X
X		X			X	X	X	X	X	X	X
X		X			X	X	X	X	X	X	X
X			X		X	X	X	X	X	X	
X		X			X	X	X	X	X	X	
F	F			F	X	X/O	X/O	X/O	X/O	X/F	
X		X			X	X	X	X	X	X	
X		X			X	X	X	X	X	X	X
F	F			F	O	O	O	O	X	X	
F	F			F	O	O	O	O	X	X	
X	X				O	O	O	O	X	X	
X	X				O	O	O	O	X	X	

See p. 59 for subscript callouts

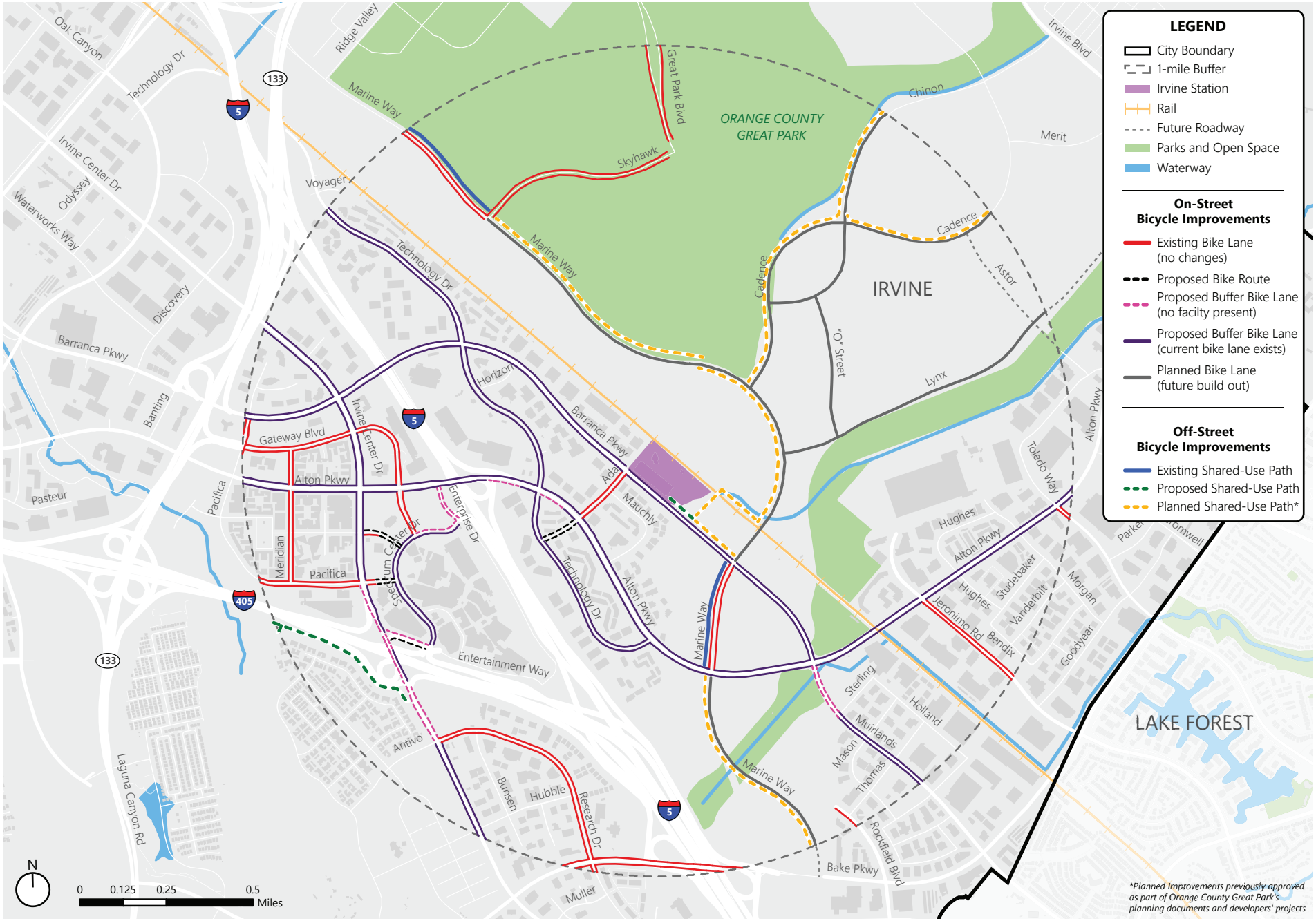


Figure 4.2 Bicycle Improvements Overview

BICYCLE IMPROVEMENTS

The surrounding area of the Irvine Station and City of Irvine, for that matter, have existing bicycle infrastructure both on- and off-street. In working with community stakeholders, City staff, and balancing feasibility, this Plan recommends improvements that close on- and off-street gaps in the existing circulation environment and plan for improved connections upon full build out of the Orange County Great Park and the Great Park Neighborhoods.

Improvements that attend to on-street bicycle concerns include adding buffers to existing bike lanes (increasing the separation between motor vehicles), closing gaps where bike facilities do not exist (i.e. bike lane or buffered bike lane), and lastly adding bike routes. Areas where gap closures are recommended include Muirlands, Alton Parkway at I-5, Irvine Center Drive at I-405, and Spectrum Center Drive - all improvements are shown on ***Figure 4.2***.

The addition of off-street shared-use paths was made to be consistent with existing cross section plans prepared in collaboration between the City and Great Park Neighborhoods. The Irvine Station First Last Mile plan translated these existing planned improvements to remain consistent with City planning efforts. Areas where these exist are along the Marine Way future roadway alignment, Cadence, and Barranca Parkway leading towards the Station on the north side of the roadway.

Detailed concept plans are prepared to display intersection specific treatments for movement of bicycles leading into, through, and out of the intersection.

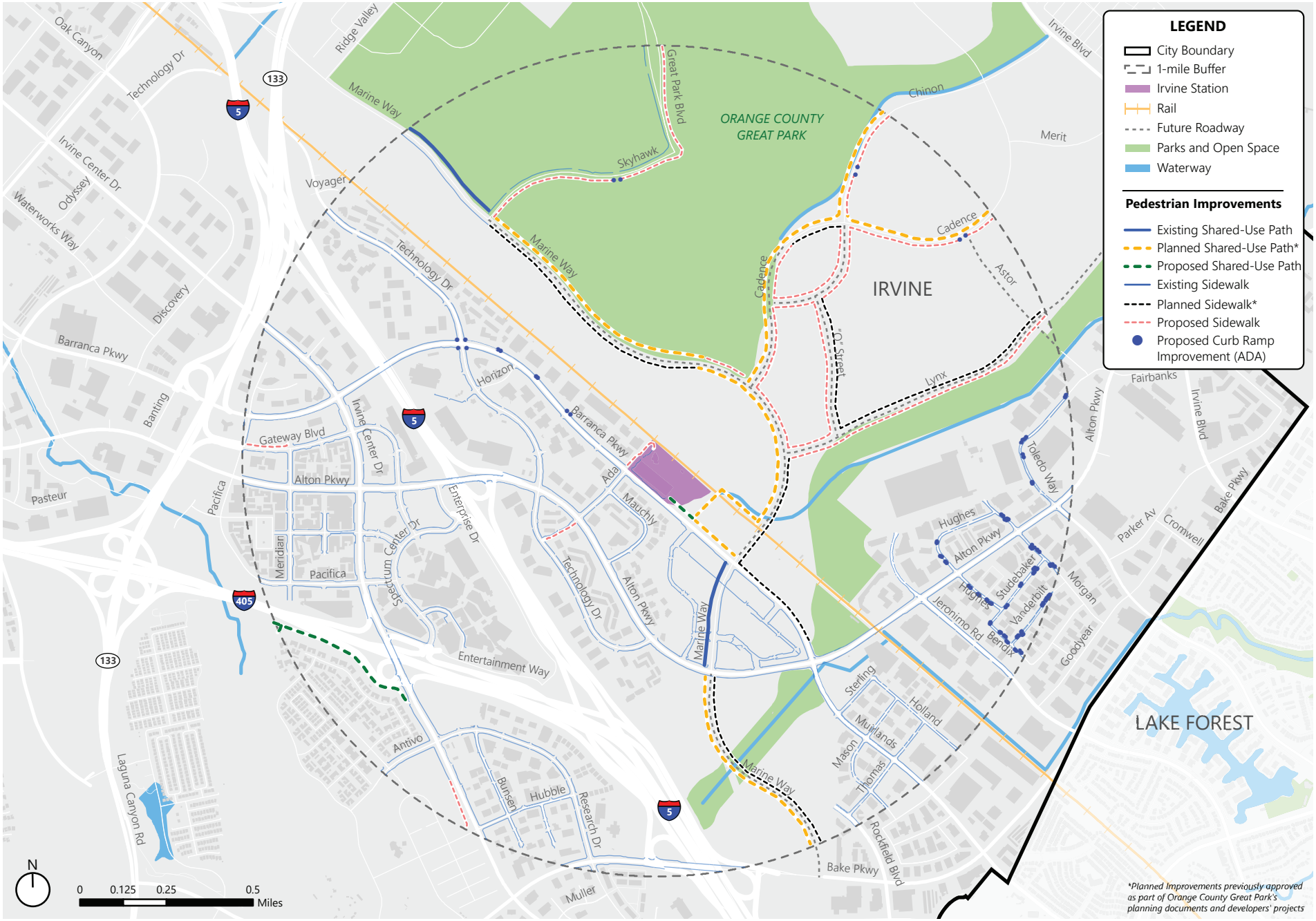


Figure 4.3 Pedestrian Improvements Overview

PEDESTRIAN IMPROVEMENTS

The Station area is rich with existing pedestrian facilities, including sidewalk, crossing support at intersections, and accessible treatments like curb ramps. Gap closures and enhanced user comfort of pedestrian travel was prioritized. Improvement feasibility was balanced throughout the planning efforts.

Future build out of Marine Way, "O" Street, Lynx, Cadence, and Chinon represent the largest area for unbuilt improvements in the Station area. The project team sought to be consistent with existing planning efforts (i.e. The Orange County Great Park's planning documents and the Great Park Neighborhoods plans). As such, existing cross section plans across this area (locations shown on ***Figure 4.1***) supplemented the pedestrian improvement map (***Figure 4.3***). "Planned" improvements are approved within preceding plans while "proposed" improvements are those suggested via this Plan.

Linear improvements like "Proposed Shared-Use Paths" and "Proposed Sidewalk" close gaps in the area to further connect users to and from the Station. Lastly, accessibility improvements are proposed i.e ADA curb ramp enhancements and improvements to intersection crossings. These are called-out within concept plans presented later in this chapter.

POTENTIAL PEDESTRIAN AND BICYCLE GRADE SEPARATION LOCATIONS

There are three potential grade separation locations and one potential bicycle and pedestrian bridge location. Coordination with OCTA, Caltrans, and Metrolink is required for the advancement of these projects. These locations are shown in ***Figure 4.4*** with the corresponding ID# listed below:

1. The "potential grade separation location" on the station parcel represents the long-term Metrolink SCORE program that identifies a tunnel to be constructed under the existing and proposed rail lines.
2. Potential underpass planned within the 2013 Orange County Great Park Trails Plan to connect bicycle and pedestrian proposed alignments.
3. Potential grade separation along Marine Way at the rail track as a part of the vehicular grade separation of the Great Park Neighborhoods' Master Landscape and Trail Plan No. 17008 on p. 63 and p.64.
4. A potential bicycle and pedestrian bridge is proposed to cross the I-5 and Caltrans right-of-way to connect the "local corridor" Ada, which links from the Station to the Irvine Spectrum. Additional bicycle and pedestrian improvements pending further engineering design phase of bridge and connections to existing and proposed networks. Project feasibility and approvals are required before the City moving to the next phase in project progression towards build-out.

Figure 4.4 Grade Separation Improvements

TRANSIT IMPROVEMENTS

SUMMARY OF RECOMMENDATIONS

General Transit Connection Recommendations

- Short-term reconfiguration of the bus station area by moving OCTA service 480 from Dock 1 to Dock 6, with Dock 1 becoming a shuttle staging area
- Provision of weather protection structures on southern edge of bus station area
- OCTA 206 - investigation into rescheduling and rerouting of the service into the bus station area
- OCTA 480 - investigation into rescheduling evening service
- Provision of real time transit timing and capacity data at transit stops
- E-bike charging in bike lockers
- E-scooter charging provision and space designations
- Reconfigure pick-up and drop-off (PUDO) areas to separate public PUDO (Loop Road) and transportation network company (TNC) PUDO (Fire Lane)
- Designate and assign vanpool parking within the Bus Loop lot and parking structure
- Designate carpool parking within the Lower Lot, south of the bus loop, and parking structure
- Improve and update vehicular wayfinding on and adjacent to the station site

Wayfinding Specific Recommendations

- Implement highway guide signs consistently on principal vehicular routes to Irvine Station
- Implement enhanced transit information within the Irvine Station
- Implement pedestrian scale wayfinding signage and maps within and around (up to ¼ mile) the Irvine Station (including car parks), and at key locations across the study area, i.e. transit stops, shared-use paths, and commercial zones such as Irvine Spectrum, the Orange County Great Park development, Irvine Center Drive residential and mixed-use development
- Implement bicycle wayfinding signage to Irvine Station bicycle facilities, i.e. secured parking – and consider development of a city wide bicycle wayfinding strategy to integrate the Irvine Station with the wider Irvine bicycle network
- Partner with developments and businesses to coordinate consistent use of naming and symbology on third party wayfinding products and ensure a seamless hand-off between different wayfinding systems
- All signage must meet ADA design requirements

PICK UP AND DROP OFF RECOMMENDAITONS

Figure 4.5 illustrates the recommended designated areas for PUDO, including access and circulation for vehicles. The main advantage of separating the public PUDO and TNC PUDO is to improve the efficiency of space and make it easier for both passengers meeting family and friends as well as TNC drivers to meet their passengers. Both areas are conveniently located near the station building and platforms. In addition, circulation for TNC and taxis avoids conflicts with the bus/shuttle area and the public will avoid turning movements into the bus/shuttle access.

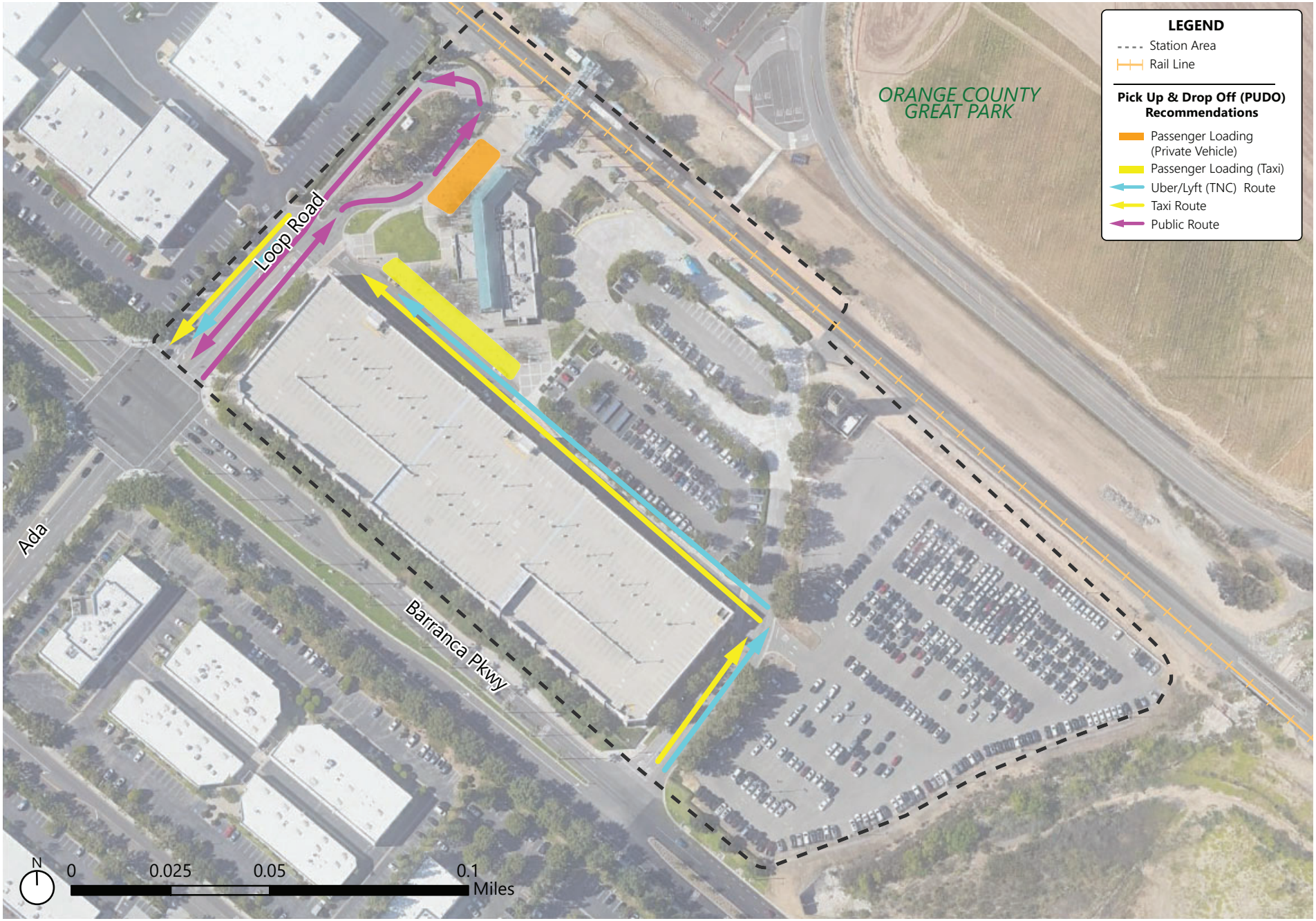


Figure 4.5 Pick Up and Drop Off Improvements

PARKING FACILITIES[1]

Connections to Irvine Station via shared options such as carpooling and vanpooling may already occur, but incentives to increase their use could increase use of these options and efficiency of space. Currently, there are several parking lots, including surface parking and a parking structure. A common strategy is to prioritize carpool and vanpool parking by providing them with the 'best' locations, which may include parking spaces closest to the station building or platforms, those covered or protected from the elements, or providing reduced fees (not applicable at Irvine as all parking is free).

Some transit agencies have developed carpool/vanpool programs to maximize the utilization of these options. Examples include:

- BART (San Francisco Bay Area) operates a Carpool to BART program where carpoolers gain access to permit parking areas and higher chances of getting a parking space through the use of an app connecting their carpoolers with their smart payment card. While Irvine does not currently face parking constraints, the concept could be used to manage prioritized parking areas.

www.bart.gov/guide/parking/carpool

- GO Transit (Greater Toronto Region) operates a Carpool Parking Permit program at many of their commuter rail stations. Permits allow users to park in designated carpool parking spaces although a space is not guaranteed.

www.gotransit.com/en/stations-stops-parking/carpool-parking

Opportunities to increase carpool and vanpool connections include:

- Designated vanpool spaces – vanpools are generally more consistent than carpool as riders have invested in a leased vehicle, usually for an extended period of time (six months or more). As a result, priority vanpool parking could benefit from being 'assigned'. Potential vanpools could apply for a parking permit which, if granted, could be assigned to a space number in a specified lot. Vanpools have the highest number of riders (usually five or more) so should get the highest priority parking spaces.
- Designated carpool spaces – as carpooling is less consistent and has lower people per vehicle, assigned parking doesn't make as much sense. Designated spaces in priority locations with a permit program similar to BART or GO Transit would likely achieve desired results.
- New covered parking – the closest parking lot to the station platforms is the Bus Loop lot, but as it is an open surface lot, cars are subject to getting hot when temperatures are high. Constructing a covered roof would provide an additional benefit if this lot (non-EV spaces) were dedicated for vanpools and carpools. There is even potential to install solar panels on the roof which could then connect to the EV charging network to support electric self-sufficiency. Several of these 'carports' have been built at the San Diego Community College District: www.borregosolar.com/solar-project-portfolio/san-diego-community-college-district. Additional parking could be provided in the lower surface lot south of the Bus Loop.
- Priority covered parking – priority vanpool and carpool parking could also be designated on the ground floor of the parking structure near the central crosswalk as an option for those who prefer covered parking more than the closest proximity to the station platforms.

Parking Facility Recommendations

To promote vanpool and carpool parking, designated and assigned vanpool parking could be provided within the Bus Loop lot and near the central crosswalk on the ground floor of the parking structure. A benefit of assigned vanpool parking in the Bus Loop lot is reduced circling of cars looking for parking, reducing conflicts with transit vehicles, cyclists and pedestrians in the vicinity of the station. Consideration of a covered solar panel covered carport should be given to enhance the vanpooling experience.

Designated but unassigned carpool parking could be provided in the Lower Lot south of the Bus Loop and near the central crosswalk on the ground floor of the parking structure. An app-based carpool permit program could be considered to manage these spaces. ***Figure 4.6*** illustrates these recommendations.

[1] Recommendation might be impacted by the SCORE program (i.e. bus loop reconfiguration and parking facilities), see further p. 79

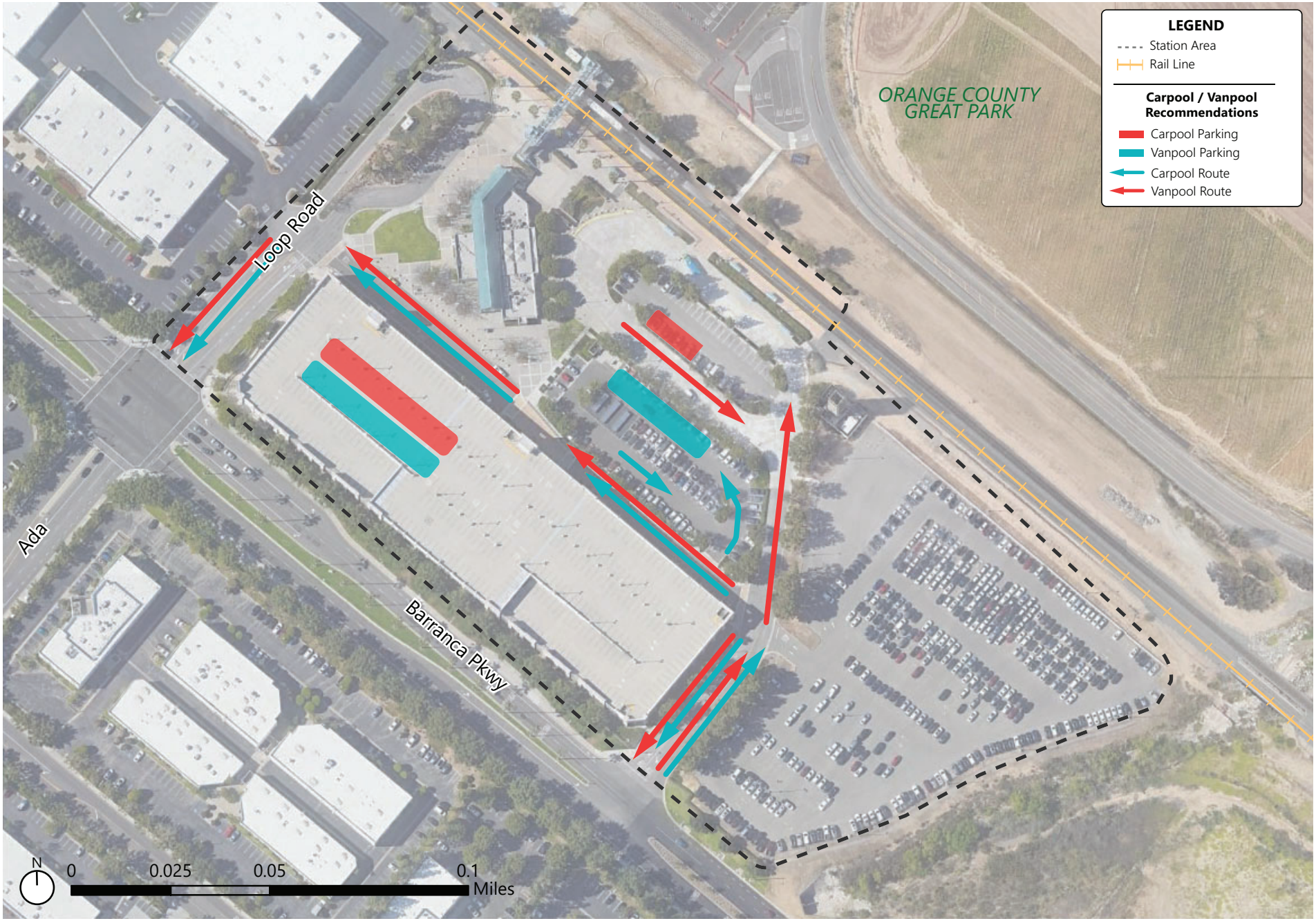


Figure 4.6 Designated Vanpool and Carpool Parking Improvements

WAYFINDING SIGNAGE RECOMMENDATIONS

There are two types of signage that are useful in supporting multi-modal navigation – directional wayfinding and regulatory signage.

A *wayfinding signage* system enables people to orient themselves and navigate from place to place with confidence. Wayfinding can be more than signs – and also covers the consistent use and presentation of information such as landmarks, neighborhoods, destinations, and connections alongside elements of the public realm such as lighting, street furniture and public art – all of which help make a place understandable, memorable, and recognizable for users.

There is an existing signage program for the Irvine Station and parking structure developed and coordinated by the City's Department of Community Development. New wayfinding signage should coordinate with this City department.

Effective wayfinding should provide:

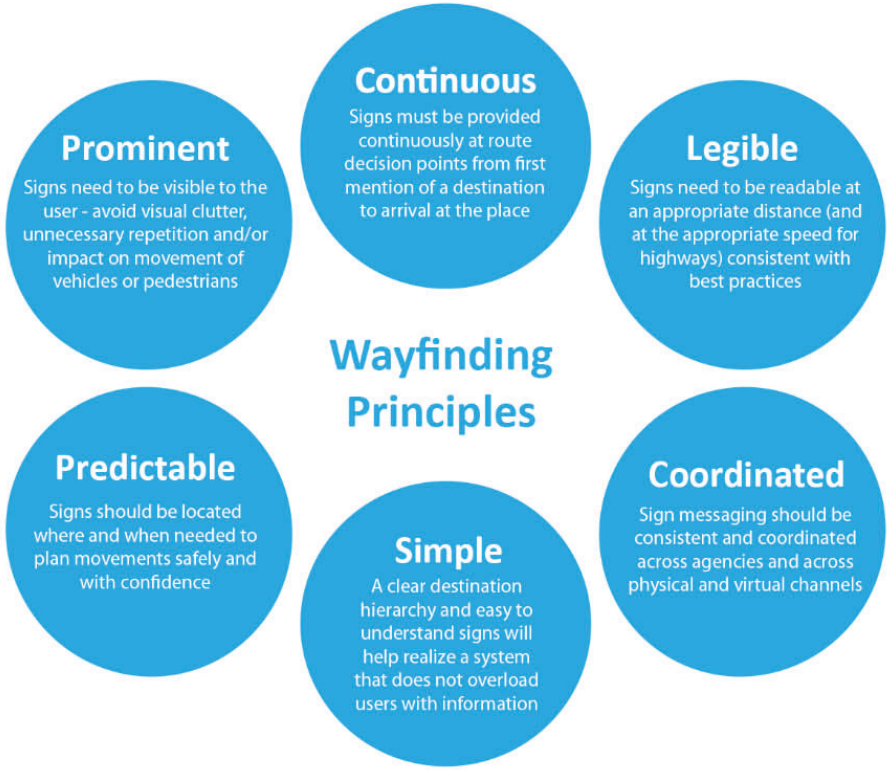
- Consistent, continuous, predictable and accessible information where and when users need it to support intuitive movement and navigation
- Seamless transition across modes of transportation
- Directional information to and between places (stations, commercial centers, parks, trails, and more)

Signs are also used to provide regulatory information to improve roadway safety regarding right-of-way, restricted turning movements, speed limits, and more.

Regulatory signage indicates or reinforces traffic laws and requirements of the roadway and is intended to enhance safety among all roadway users. While signage on roadways should be used to communicate key information, careful consideration to their placement should be given to keep visual clutter at a minimum.

Design of highway signage in terms of sign placement, legibility, contrast, font size and design must comply with national and local signage standards, for example the CA MUTCD. Pedestrian signage must comply with ADA (Americans with Disabilities Act) rules and regulations and consideration should be given to the use of digital navigation aids.

Fundamental *wayfinding principles* need to be followed to establish a consistent and efficient signage system for the Irvine Station, and also to inform how information is communicated within third-party systems.



Pedestrian Wayfinding

There is currently a limited amount of pedestrian wayfinding onsite but it is generally located at key decision points and uses the same branding as the car-focused wayfinding. Current wayfinding is limited to directional messaging for the station/platforms, passenger PUDO, taxi, and buses and does not include other options such as TNC PUDO, bike lockers/racks, or local points of interest beyond the Station area. A train departures sign is also present near the platforms.

Pedestrian wayfinding has evolved significantly over the past 10 years and many rail and transit systems around the world have extremely high-quality signage that helps to improve the customer experience. There are three key concepts that Irvine Station could benefit from:

1. Real-time departures totem: Transport for London in the UK has developed high quality totems outside their stations that list departures in real time and provide directional and local area information.
2. Local area mapping: With the increase in development potential around Irvine Station, more local area maps would provide pedestrians with more information about how to get to and from the station and local destinations. The City of Toronto has embarked on a citywide pedestrian wayfinding program called TO360 which has included outdoor wayfinding in the downtown core, parks, the PATH networks (indoor walkways), and at transit stops and stations. www.toronto.ca/services-payments/streets-parking-transportation/walking-in-toronto/wayfinding/
3. Rail and bus network mapping: The government of Mexico City (CDMX) operates several public transit services, including a Nochebus (night bus) service that recently overhauled their wayfinding system to include a full network map and local area map.

Pedestrian Wayfinding Recommendations

Updating and adding new forms of pedestrian wayfinding such as a real-time totem, local area mapping, and transit system network mapping should be considered in the near term to improve pedestrian connections and the customer experience. ***Figure 4.7*** illustrates recommendations for the site. Additional wayfinding for bicyclists should also be considered, both within the pedestrian wayfinding (e.g. locations of onsite bike facilities, local area maps) and external to the site for local area navigation.

- Updating existing signage to a higher quality, including making them more visible and including additional detail
- Adding new signage, particularly at the site periphery to aid with connections to local destinations including Alton Marketplace, Irvine Spectrum Center, Various Business Parks, Future FivePoint Development, Great Park, Local bike trails
- Incorporating real time departure information into the wayfinding infrastructure
- Providing maps and illustrations to support a better understanding of bus connections, local area connections and the site layout

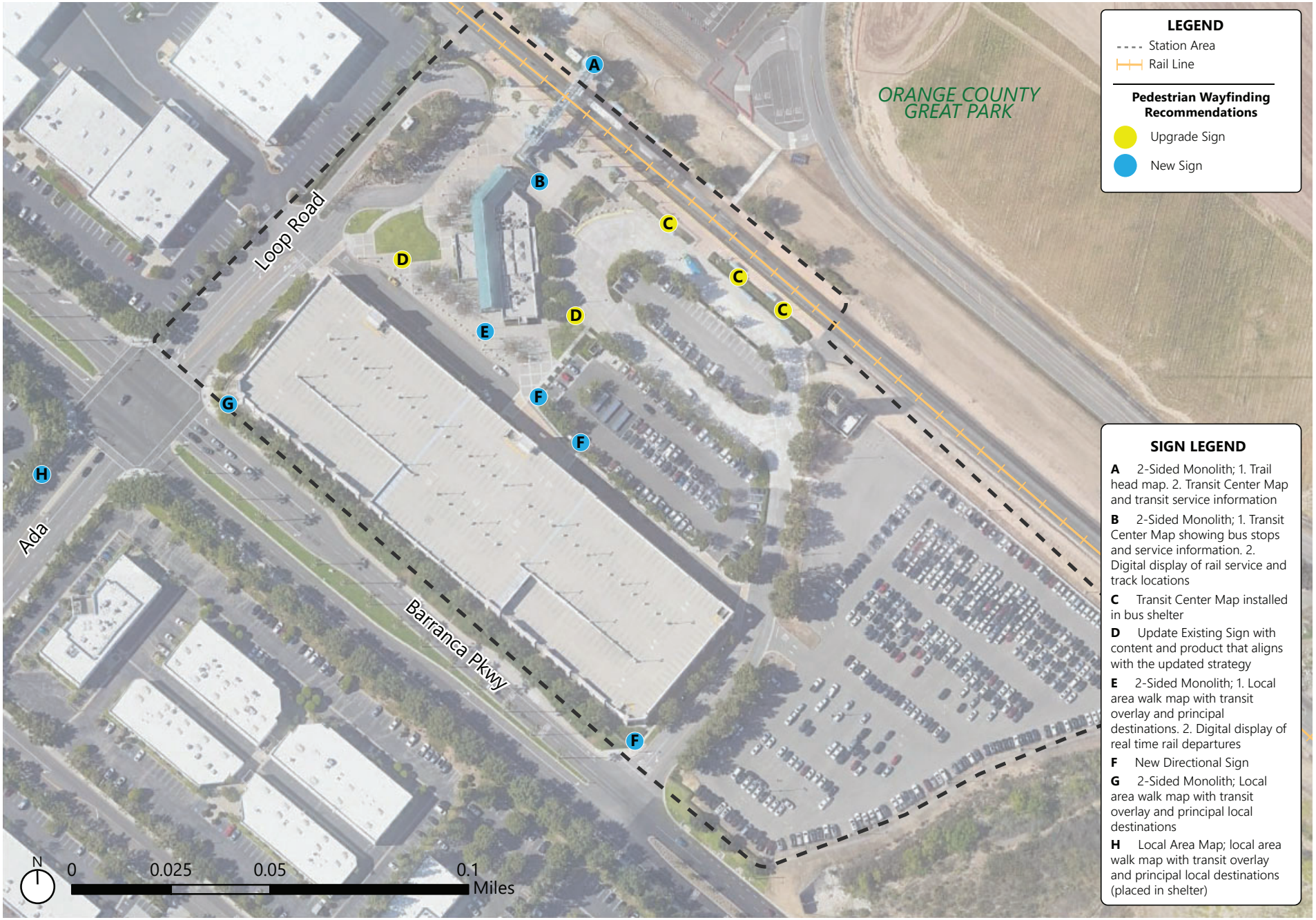


Figure 4.7 Pedestrian Wayfinding Improvements

Bicycle Wayfinding

As noted in the existing conditions chapter, there are no bicycle provisions for wayfinding on the Station parcel or along corridors within the study area. Much of roadway signage is vehicular focused.

Bicycle Wayfinding Recommendations

- Bicycle signage directing to bicycle facilities within the Irvine Station (i.e. secure parking) should be included on directional highway signs in the immediate vicinity of the transit center.
- Regulatory bicycle signage and markings should be implemented on any new bicycle infrastructure.
- A strategic bicycle wayfinding program including the Irvine Station should be planned and implemented as part of a city-wide bicycle wayfinding strategy with the Irvine Station included as a destination on signs within a 2-mile radius of the facility.
- Principal bicycle connections in the local area include: Barranca Parkway, Alton Parkway, Technology Drive, Spectrum/ Irvine Center Drive.

Figure 4.8 illustrates recommendations for new bicycle wayfinding on-site and on Barranca Parkway.

Vehicular Wayfinding

As noted in the Existing Conditions Chapter, there is vehicular wayfinding signage within the vicinity of Irvine Station to aid drivers in navigating there and there are also Irvine Station-branded signs on site, directing drivers to passenger PUDO areas, bus facilities and reserved parking.

Vehicular Wayfinding Recommendations

- Updating signage to include additional uses such as EV parking, shuttles, bike lockers (cyclists will be using the same roads as cars), PUDO (public, TNCs and taxis), and carpool and vanpool parking.
- Add more signage at key decision points, particularly to improve circulation by spreading ingress and egress via the two access points.
- Add signage on Barranca Parkway to identify ideal access points for the various modes of travel.

Figure 4.9 illustrates recommendations for new and updated car-focused wayfinding on-site and on Barranca Parkway.

Oakland, CA

Concept

Portland Metro Cities, OR

Figure 4.8 Bicycle Wayfinding Improvements

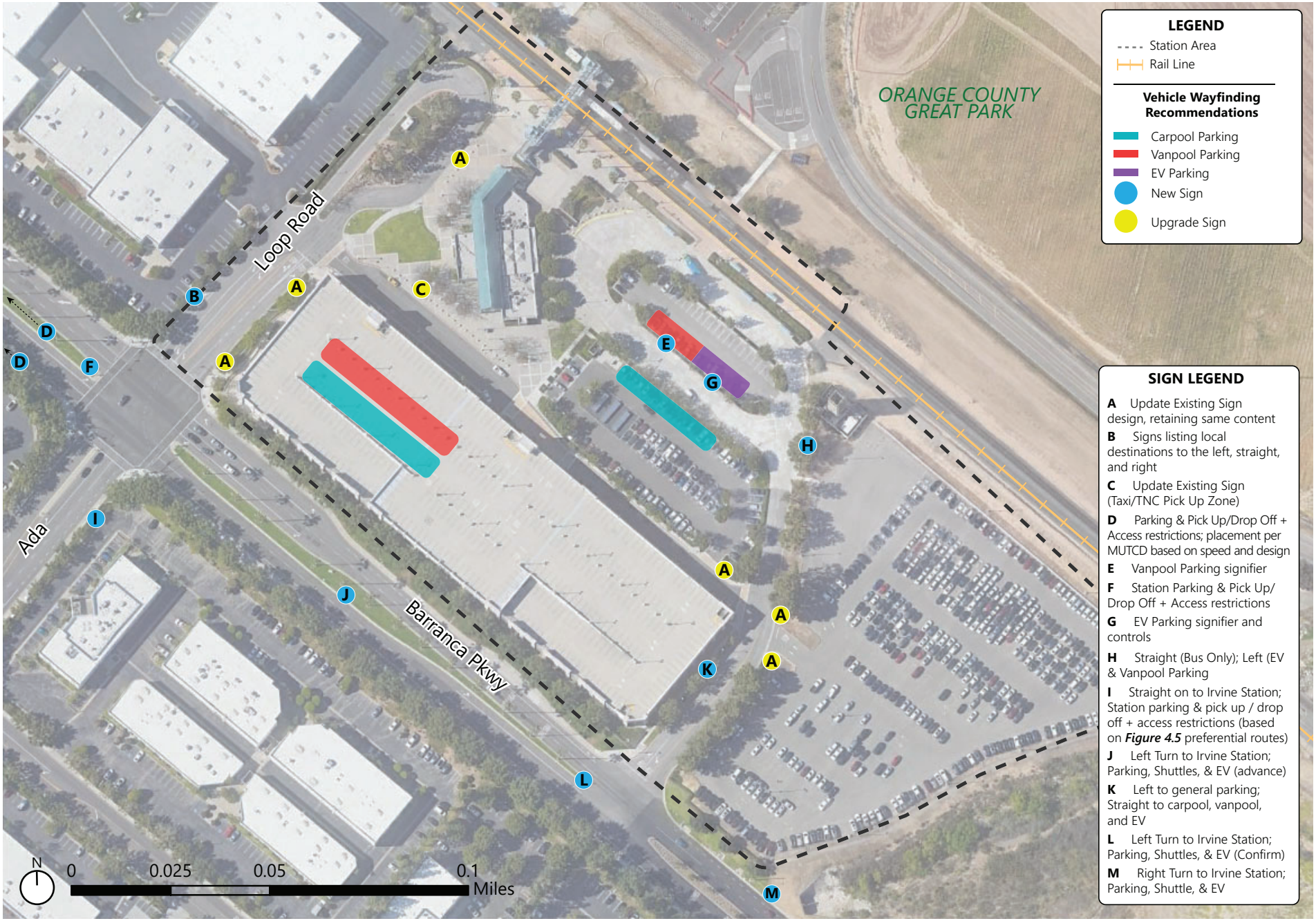


Figure 4.9 Vehicular Wayfinding Improvements

Additional Wayfinding Recommendations

Implement highway guide signs consistently on principal vehicular routes to Irvine Station:

- Current directional signage is fragmented and poorly located - providing limited benefit to motorists.
- Highway directional signage should be designed and implemented in compliance with the California MUTCD Part 2, Chapter 2D, to provide a consistent and continuous route from principal gateways, e.g. Santa Ana Freeway exits, to the station entrance.
- Highway signage in the immediate vicinity of the Irvine Station should direct drivers to the relevant entrances and facilities within the Irvine Station.

Implement enhanced transit information within the Irvine Station and in surrounding transit shelters:

- Providing clear and simple transit information, e.g. route and system, schedules, and real-time arrival times will make the system more attractive and simpler to use, and improve rider satisfaction. Good information can also enhance the transit stop as a gateway to surrounding destinations.
- Passenger information including real time departure displays should be included on new pedestrian signs within the Station, and integrated within transit stops and train platforms. https://nacto.org/publication/transit-street-design-guide/station-stop-elements/stop-elements/passenger-information-wayfinding/

Implement pedestrian scale wayfinding signage and maps within and around the Irvine Station (including car parks), and at key locations across the study area:

- Pedestrian scale wayfinding encourages active travel - making it easier for people to walk, use bicycles and public transport and helps to reduce single occupancy vehicle trips. Increased walking can deliver benefits to personal health, reduce crime through increased activity, promote equality, and strengthen social bonds.
- Implementation of pedestrian wayfinding in and around the Station will promote opportunities to walk to destinations within a walk radius of up to ½ mile or 10 minutes from the Irvine Station.
- Wayfinding should direct to principal destinations surrounding the Irvine Station, such as Irvine Technology Center and Spectrum Center.
- Pedestrian maps should clearly indicate pedestrian crossings, privately owned publicly accessible spaces (such as car parks), and barriers to movement such as the Santa Ana Freeway.
- Walk maps overlaid with transit information should be implemented in transit shelters across the study area
- Pedestrian monolith signs should be installed at key decision points surrounding the Irvine Station and at the access from the FivePoint Amphitheatre.

Partner with developments and business to coordinate consistent use of naming and symbology on third party wayfinding products and ensure a seamless hand-off between different wayfinding systems:

- Irvine Station wayfinding should seamlessly integrate with wayfinding systems implemented by surrounding destinations and developments such as the Orange County Great Park and the Great Park Neighborhoods

All signage must meet ADA design requirements:

- Wayfinding should be designed to support the needs of all users and comply with ADA rules and regulations.
- Consideration should also be given to digital pedestrian wayfinding. There are specific companies that specialize in digital signs, including: Aira, Wayfindr, AudiblEye, BlindNavi, BlindSquare, Streetco, and RightHear.

BUS SHELTER RECOMMENDATIONS

Typical arterial roadway bus stop in the Irvine Station area includes:

- Flag pole with OCTA panel, and iShuttle panel (where relevant), a schedule panel and a map
- Shelter with advertising panel, benches, and roof
- Trash can (not in all cases)
- Back panels for wind protection (not in all cases)
- Lighting in the shelter (not in all cases)

The above was observed to be the standard along Barranca Parkway, Alton Parkway, and Ada but not on Technology Drive. These amenities are largely sufficient, but can be made improved by the following:

Flag Pole

- The OCTA brand is not well represented in the panel, the flag is not noticeable enough and could be bigger.
- Placement should be adjacent to the roadway – in most cases sidewalk needs to be wider to allow for this.
- Route numbers and names should be on the main/top panel and should not be different panels (i.e. OCTA panel and iShuttle panel).
- Schedule and map should be integrated on one panel
- Adding the lighting element to the flag is recommended for busier stops.

Shelter

- Should incorporate passenger information panel – makes it more obvious and provides more space than the tiny panels on the flag pole.
- Some element of lighting is important, even if it's just a lit advertising panel.
- Include for stops with higher frequency routes, the leaning bars (vs. proper seats) are useful as takes up less space.

Other Amenities

- Ensure a trash can is provided at all stops.
- Network maps should be provided of the local bus route to start building better transit awareness.
- Real time information can be useful for more frequent routes and multi-route stops. Positioning totems at the Station would be the highest priority.
- Include tactile panels on the sidewalk for visually impaired and mobility impaired users so they know where the boarding zone is.

METROLINK'S SCORE IMPROVEMENTS

Metrolink's Southern California Optimized Rail Expansion (SCORE) program is an ambitious capital program that will upgrade Metrolink's system in time for the 2028 Olympic and Paralympic Games. SCORE is a $10 billion capital improvement program — grade crossing, station and signal improvements as well as track additions and work that accelerates progress towards Metrolink's zero-emissions future.

SCORE projects will be starting in 2023, with the program complete by 2028. With SCORE the region gets:

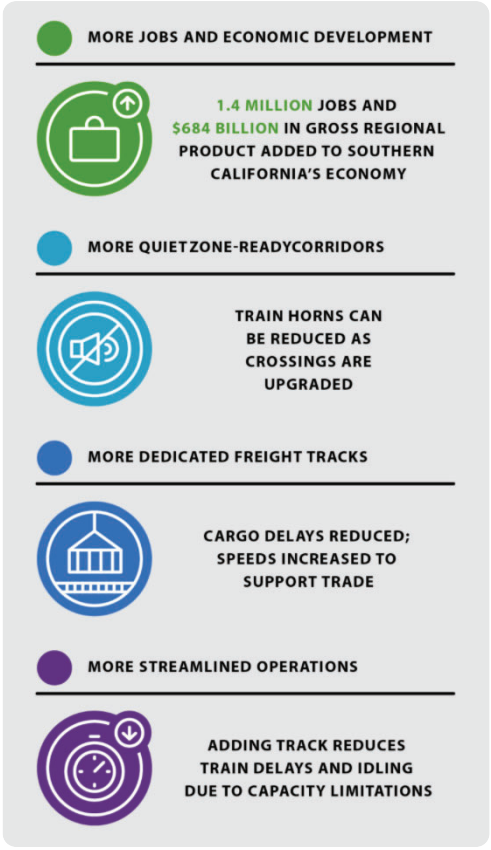
- More safety improvements
- More peak and off-peak rail service
- More access to job centers and affordable housing
- More seamless connections to other rail providers
- More jobs and economic development
- And healthier air for all

How does it affect the Irvine Station?

Elements proposed within the Irvine First Last Mile Plan are considered interim improvements. These include signage upgrades, circulation improvements, and multi-modal accommodations.

As a part of the SCORE program, the Irvine Station by 2028 will realize major and long-term improvements, which build upon the parcel improvements identified in the Irvine First Last Mile Plan. The final inclusions of the SCORE program require approval and coordination with the partnering agencies (OCTA and Metrolink) prior to next phases.

More information can be found on the program website at: https://metrolinktrains.com/score



CONCEPT & CROSS SECTION PLANS

Planning level concept and cross section plans are prepared to highlight multi-modal improvements along corridors and at intersections within the Station area.

Major and local corridor designations (as shown in ***Figure 4.1***) delineate between corridors with regional linkage that extends beyond the City and those corridors that offer local connections bound within the City respectively.

Selection of intersections took into consideration stakeholder and City staff insight as well as collision and citation analysis findings, public comments, and field review. A total of five City intersections and three Caltrans locations were identified.

CALTRANS COORDINATION

Caltrans locations require additional coordination between Caltrans and the City of Irvine for final design. Some options will require coordination due to right-of-way and other master planning policies. Any substantial improvements to Alton Parkway, Barranca Parkway and Irvine Center Drive may also require coordination with OCTA under the Master Plan of Arterial Highways (MPAH). City intersections and Caltrans locations are subject to additional design and constructability review, as well as community/ stakeholder input. Concept Plans within this Plan should not be considered final.

Recommendations in the Plan include new traffic signage, roadway striping and pavement markings, traffic signal upgrades, and sidewalk/curb ramp improvements, all of which shall undergo Caltrans' standard thorough design review and approval during the engineering and permitting phases. The City of Irvine should account for Caltrans' review in its future implementation schedule of the improvements within this Plan, as well as a fuller consideration of how the proposed improvements might align with other proposed improvements Caltrans District 12 has planned in the vicinity along I-5 and I-405.

CONCEPT PLAN LOCATIONS

City Intersection

- Barranca Parkway and Alton Parkway
- Barranca Parkway and Ada
- Barranca Parkway and Technology Drive West
- Alton Parkway and Ada
- Alton Parkway and Technology Drive

Caltrans Location

- Barranca Parkway and I-5
- Alton Parkway and I-5
- Irvine Center Drive and I-405

CROSS SECTION PLAN LOCATIONS

- Barranca Parkway East of Ada
- Alton Parkway East of Ada
- Irvine Center Drive North of Research Drive / Antivo
- Technology Drive North of Alton Parkway
- Spectrum Center Drive north of Restaurant Way

NOTE: All concept and cross section plans presented within the Plan should not be considered final. These elements are subject to additional design and constructibility review, as well as community input.

BARRANCA PARKWAY

MAJOR CORRIDOR

Barranca Parkway is a major corridor that runs directly adjacent to the Irvine Station. Regional and local linkages are made available along this east / west corridor.

Concept Plans Along Corridor

- Barranca Parkway & Alton Parkway (City Intersection)
- Barranca Parkway & Ada (City Intersection)
- Barranca Parkway & Technology Drive (City Intersection)
- Barranca Parkway & I-5 (Caltrans Location)

Cross Sections Along Corridor

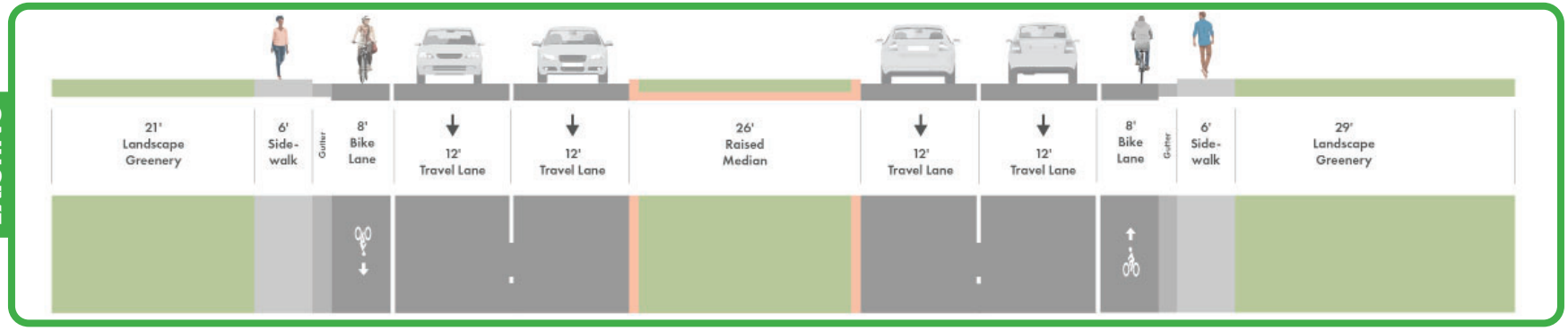
- Barranca Parkway East of Ada

Recommendations

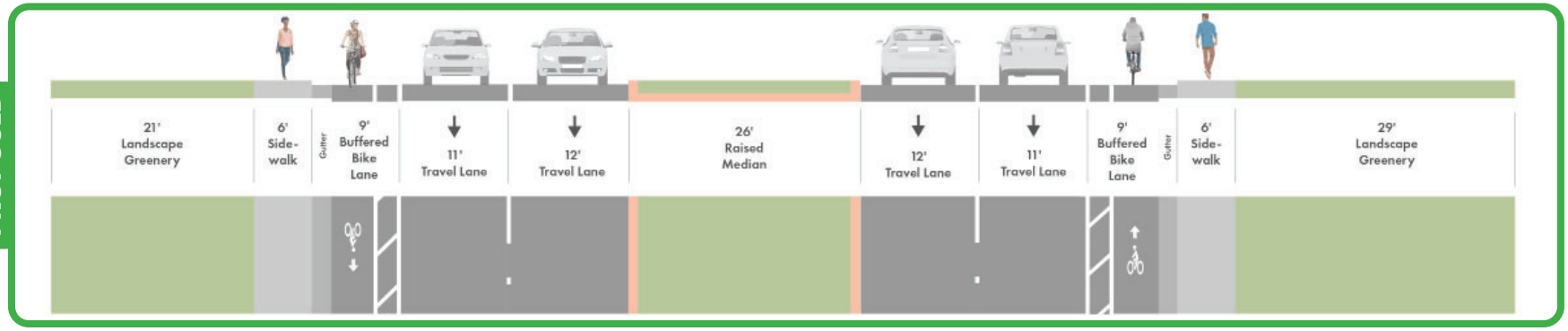
- Traffic signal modification, LED-illuminated bike detection indicator, buffer bike lane striping, high visibility crosswalk, green bike lane markings, pavement markings, new/ updated signage, video detection

PREFERENTIAL CROSS SECTION

EXISTING



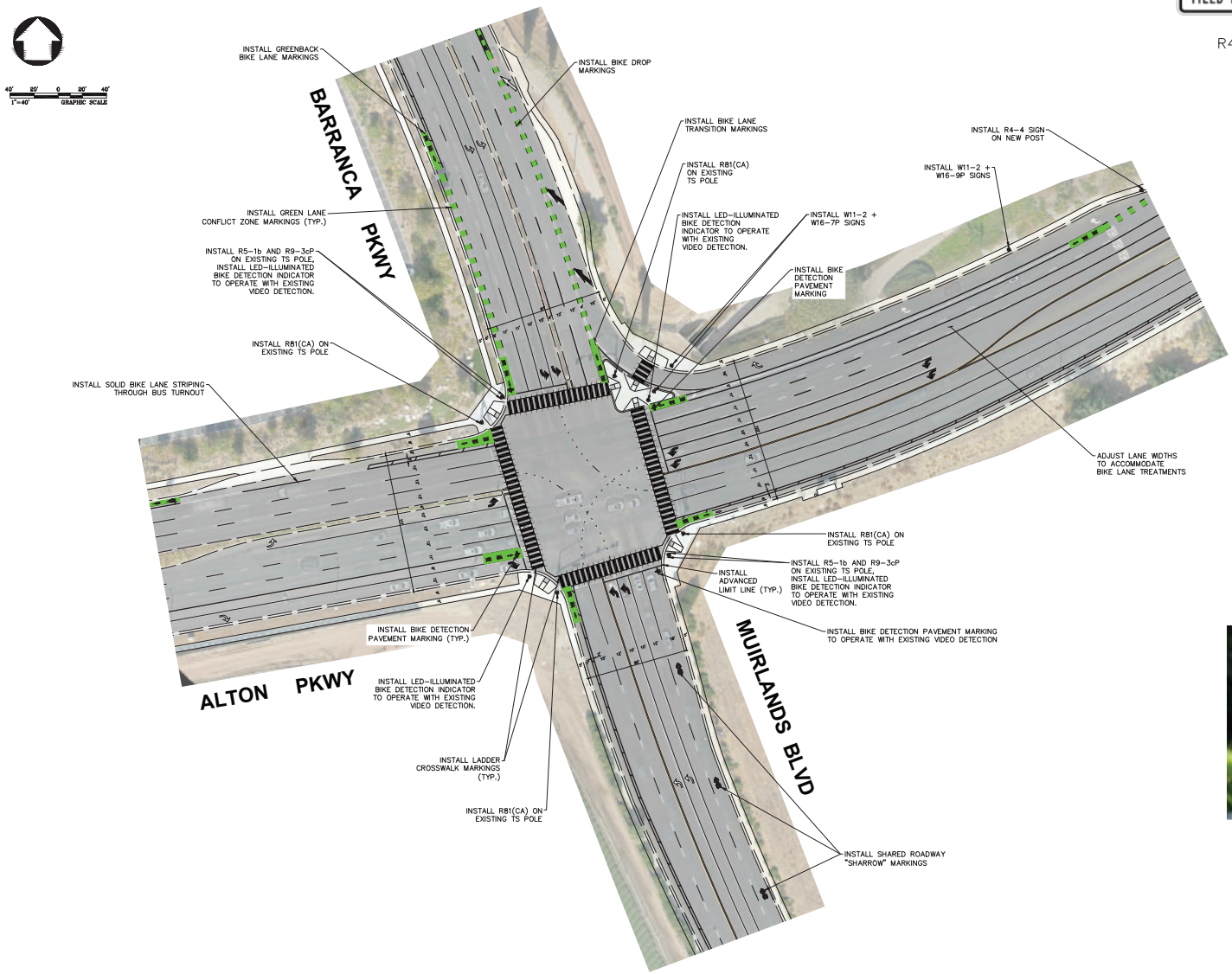
PROPOSED



BARRANCA PARKWAY

PRELIMINARY CONCEPTS

BARRANCA PARKWAY & ALTON PARKWAY



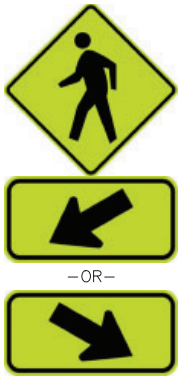
SIGN LEGEND

R4-4

R81(CA)

R5-1b

R9-3cP



W11-2 + W16-7(L/R)

W16-9P

LED-ILLUMINATED BIKE DETECTION INDICATOR


BIKE DETECTION PAVEMENT MARKING

CITY INTERSECTION

BARRANCA PARKWAY & ADA

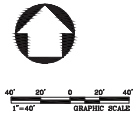
SIGN LEGEND

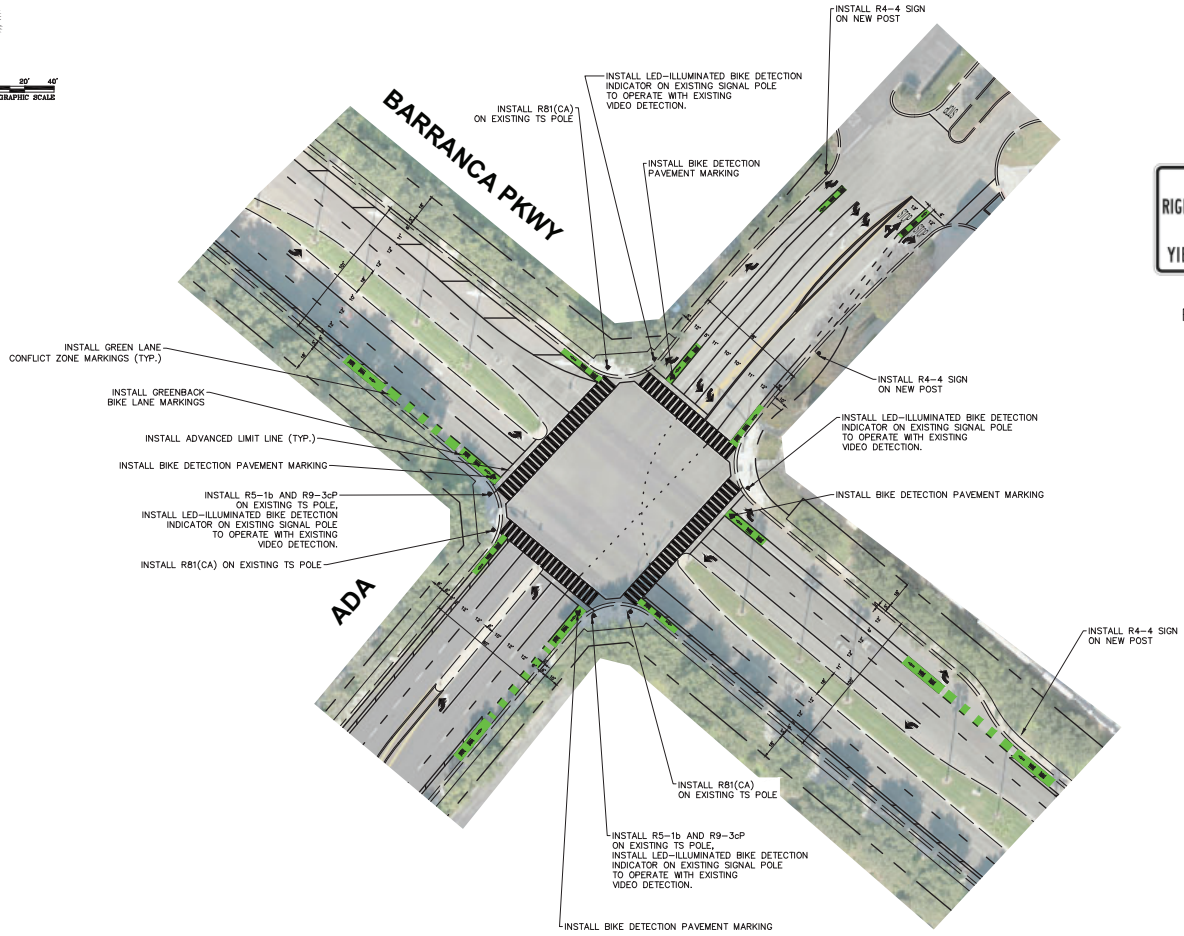
D11–1

R81(CA)

R5–1b

R9–3cP





R4–4

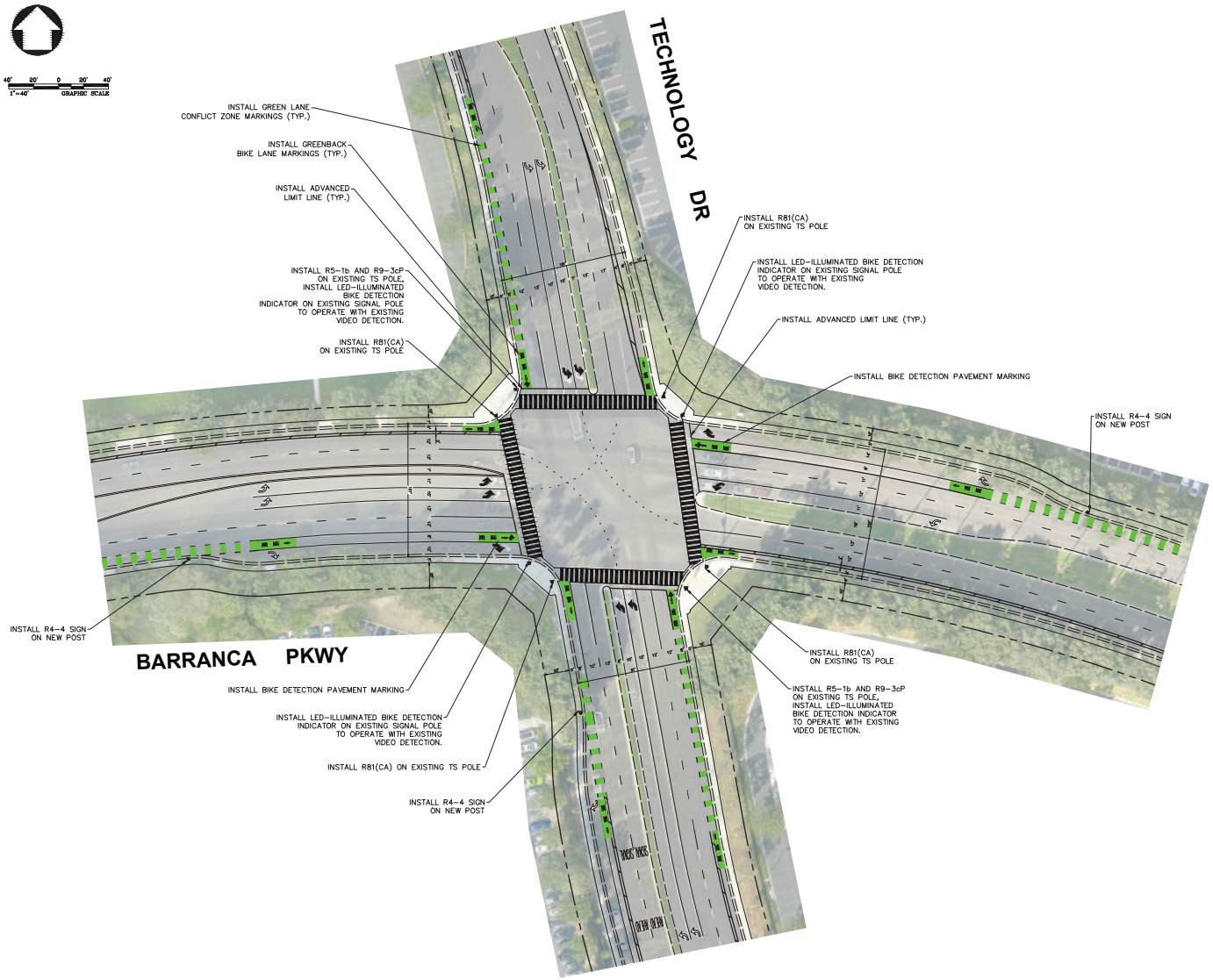
LED–ILLUMINATED BIKE DETECTION INDICATOR

BIKE DETECTION PAVEMENT MARKING

CITY INTERSECTION

PRELIMINARY CONCEPTS

BARRANCA PARKWAY & TECHNOLOGY DRIVE



SIGN LEGEND

R4-4

R81(CA)

R5-1b

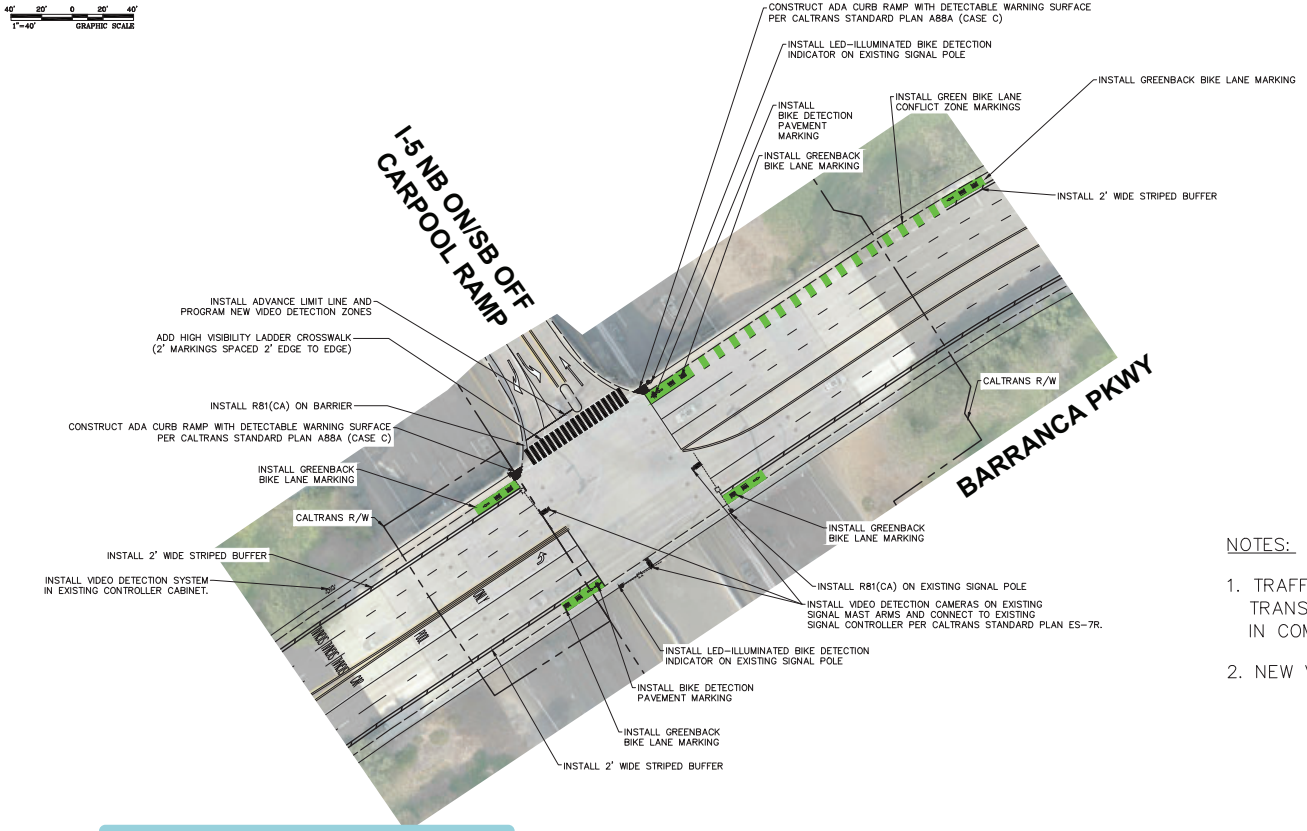
R9-3cP

LED-ILLUMINATED BIKE DETECTION INDICATOR


BIKE DETECTION PAVEMENT MARKING

CITY INTERSECTION

BARRANCA PARKWAY & I-5 CARPOOL RAMP



CALTRANS INTERSECTION

SIGN LEGEND

R81(CA)

ITERIS SMARTCYCLE BIKE INDICATOR

BIKE DETECTION PAVEMENT MARKING

NOTES:

1. TRAFFIC SIGNAL UNDER JURISDICTION OF THE CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION (CALTRANS). COORDINATE WITH CALTRANS DISTRICT 12 IN COMPLIANCE WITH THE LATEST HIGHWAY DESIGN MANUAL (HDM, 2018).
2. NEW VIDEO DETECTION CAMERA INSTALLATION PER CALTRANS DETAIL ES-7R.

Note: Further study is recommended prior to this location progressing to the design phase to allow for a detailed review and considerations.

ALTON PARKWAY

MAJOR CORRIDOR

Alton Parkway is a major corridor that does not directly provide access to the Irvine Station. Regional linkage is made available along this east / west corridor that parallels Barranca Parkway.

Concept Plans Along Corridor

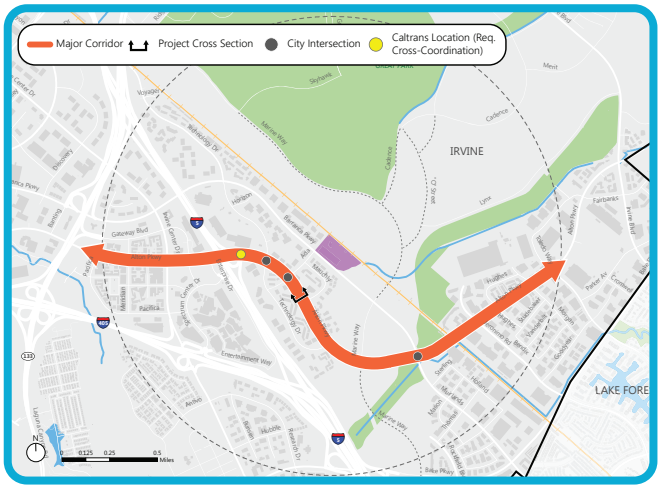
- Alton Parkway and Ada (City Intersection)
- Alton Parkway and Technology Drive West (City Intersection)
- Alton Parkway and I-5 (Caltrans Location)

Cross Sections Along Corridor

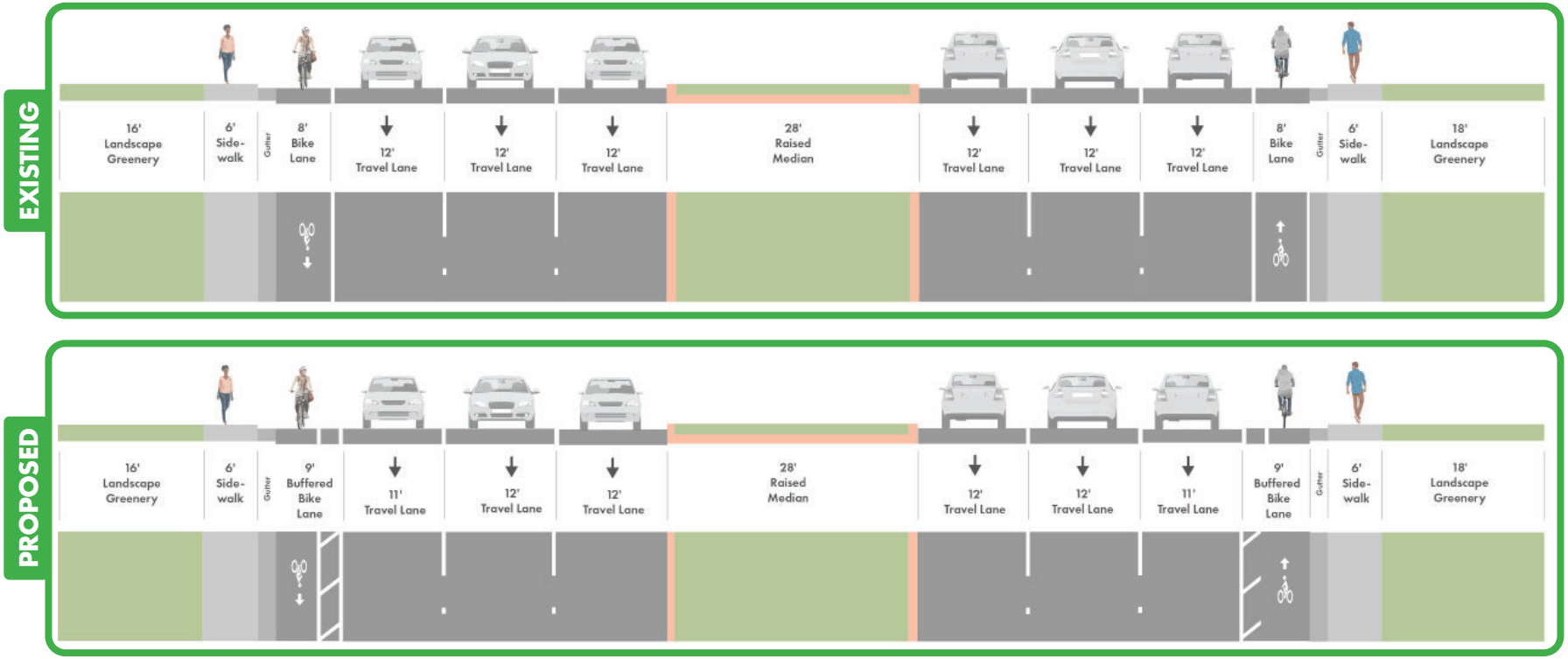
- Alton Parkway East of Ada

Recommendations

- Traffic signal modification, LED-illuminated bike detection indicator, buffer bike lane striping, high visibility crosswalk, green bike lane markings, pavement markings, new/updated signage, video detection, sidewalk

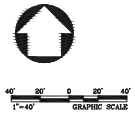


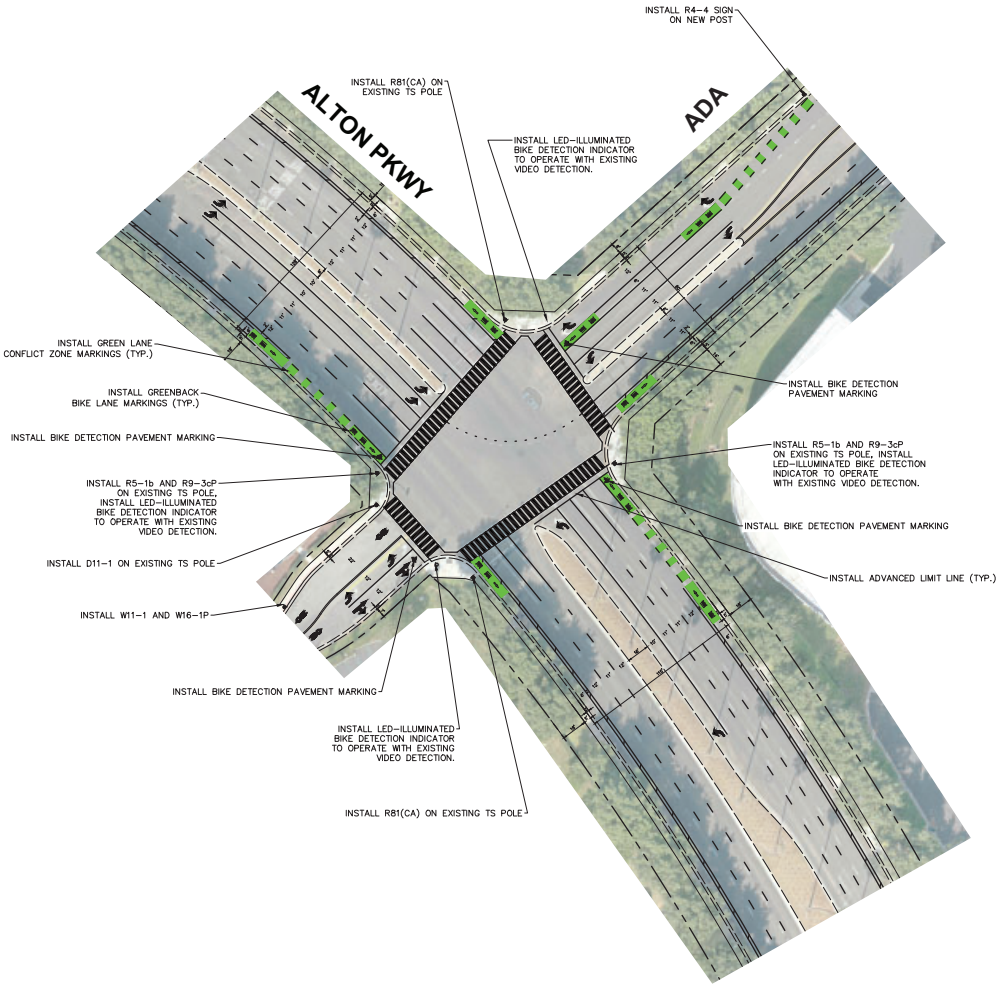
PREFERENTIAL CROSS SECTION



ALTON PARKWAY

ALTON PARKWAY & ADA





SIGN LEGEND

R4-4

D11-1

R81(CA)

R5-1b

R9-3cP


W11-1

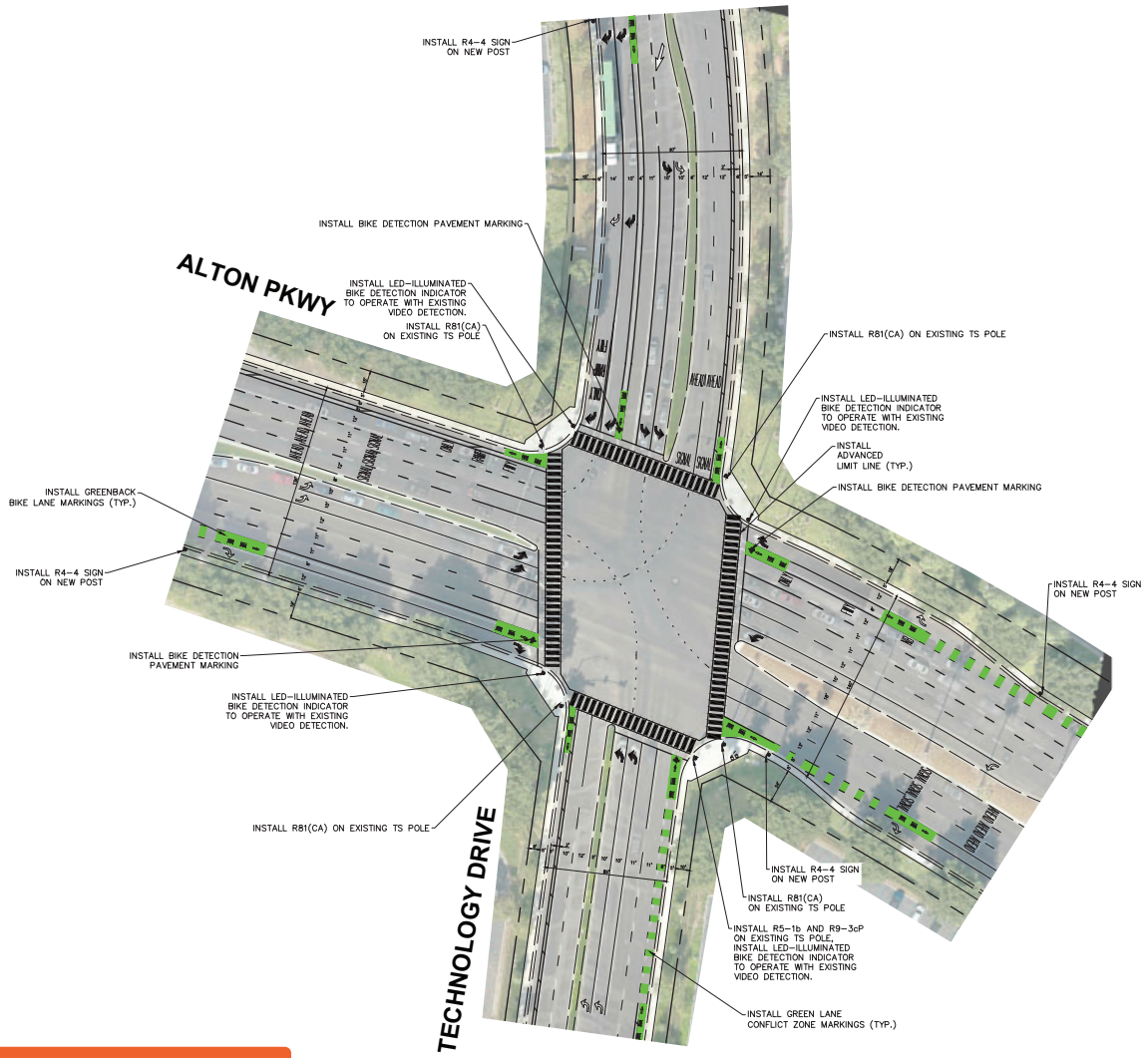
W16-1P

LED-ILLUMINATED BIKE DETECTION INDICATOR


BIKE DETECTION PAVEMENT MARKING

CITY INTERSECTION

ALTON PARKWAY & TECHNOLOGY DRIVE WEST



CITY INTERSECTION

SIGN LEGEND

R4-4

R81(CA)

R5-1b

R9-3cP

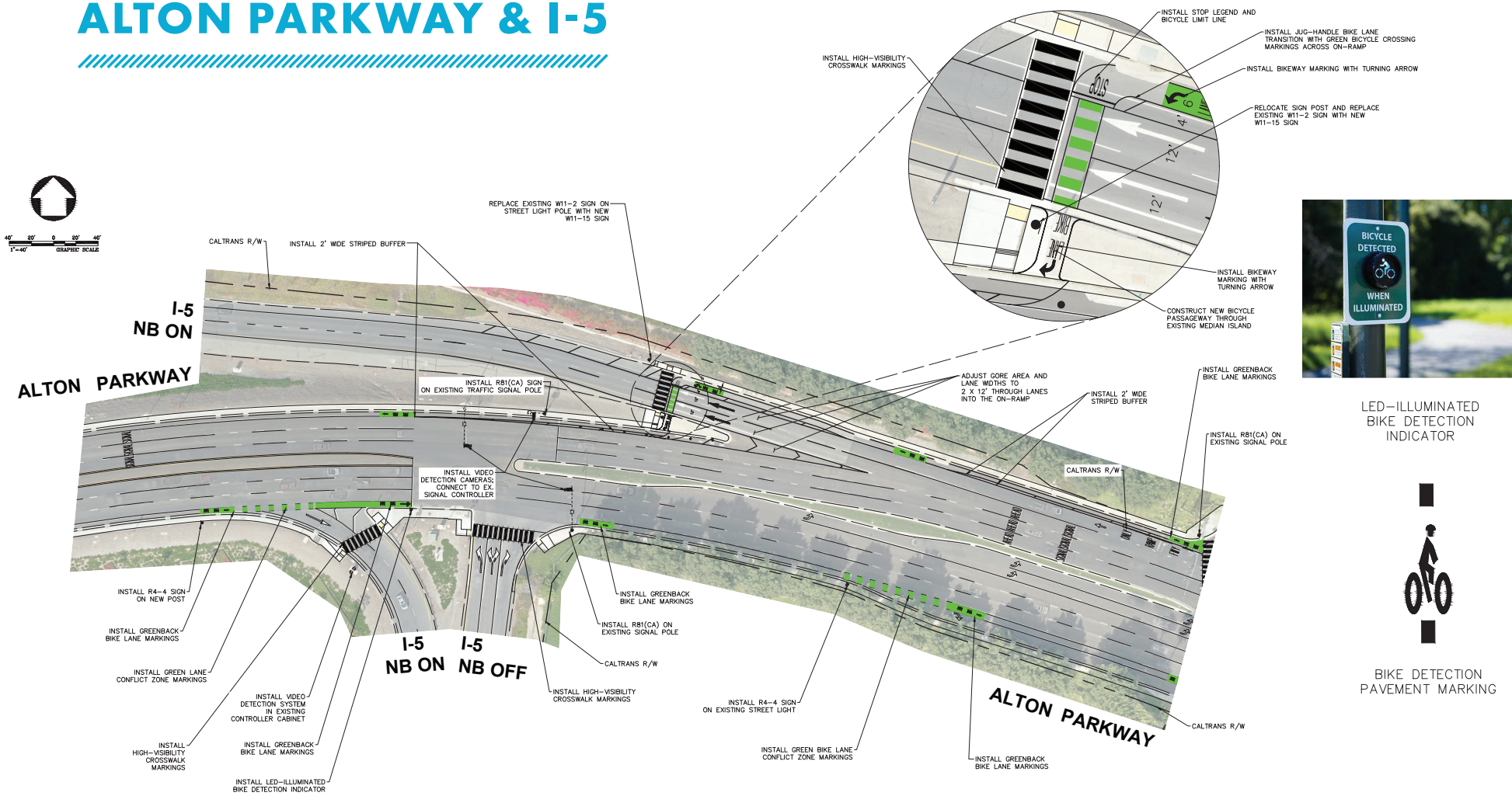
R10-10b

R13A(CA)

LED-ILLUMINATED BIKE DETECTION INDICATOR


BIKE DETECTION PAVEMENT MARKING

ALTON PARKWAY & I-5



LED-ILLUMINATED BIKE DETECTION INDICATOR

BIKE DETECTION PAVEMENT MARKING

NOTES:

1. TRAFFIC SIGNAL UNDER JURISDICTION OF THE CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION (CALTRANS). COORDINATE WITH CALTRANS DISTRICT 12 IN COMPLIANCE WITH THE LATEST HIGHWAY DESIGN MANUAL (HDM, 2018).
2. NEW VIDEO DETECTION CAMERA INSTALLATION PER CALTRANS DETAIL ES-7R.

CALTRANS INTERSECTION

R4-4

R81(CA)

W11-15

SIGN LEGEND

Note: Further study is recommended prior to this location progressing to the design phase to allow for a detailed review and considerations.

ALTON PARKWAY

IRVINE CENTER DRIVE

MAJOR CORRIDOR

Irvine Center Drive is a major corridor that runs north / south within the southwest sector of the Station area. Direct linkage to the Station is not available along this corridor, however linkage to local and regional destinations are made.

Concept Plans Along Corridor

- Irvine Center Drive and I-405 (Caltrans Location)

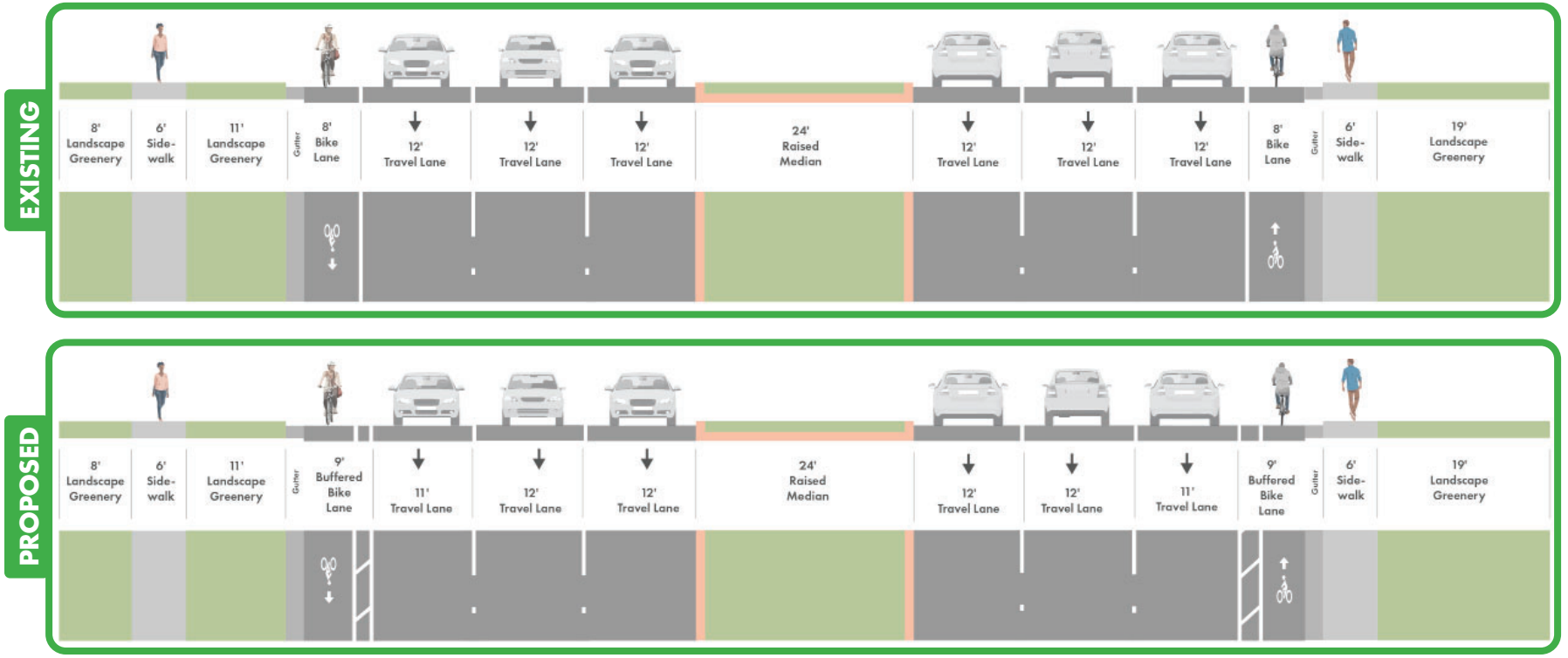
Cross Sections Along Corridor

- Irvine Center Drive South of Research Drive / Antivo

Recommendations

- ADA curb ramps and push buttons, lighting, Traffic signal modification, LED-illuminated bike detection indicator, buffer bike lane striping, high visibility crosswalk, green bike lane markings, pavement markings, new/updated signage, video detection, sidewalk

PREFERENTIAL CROSS SECTION



IRVINE CENTER DRIVE

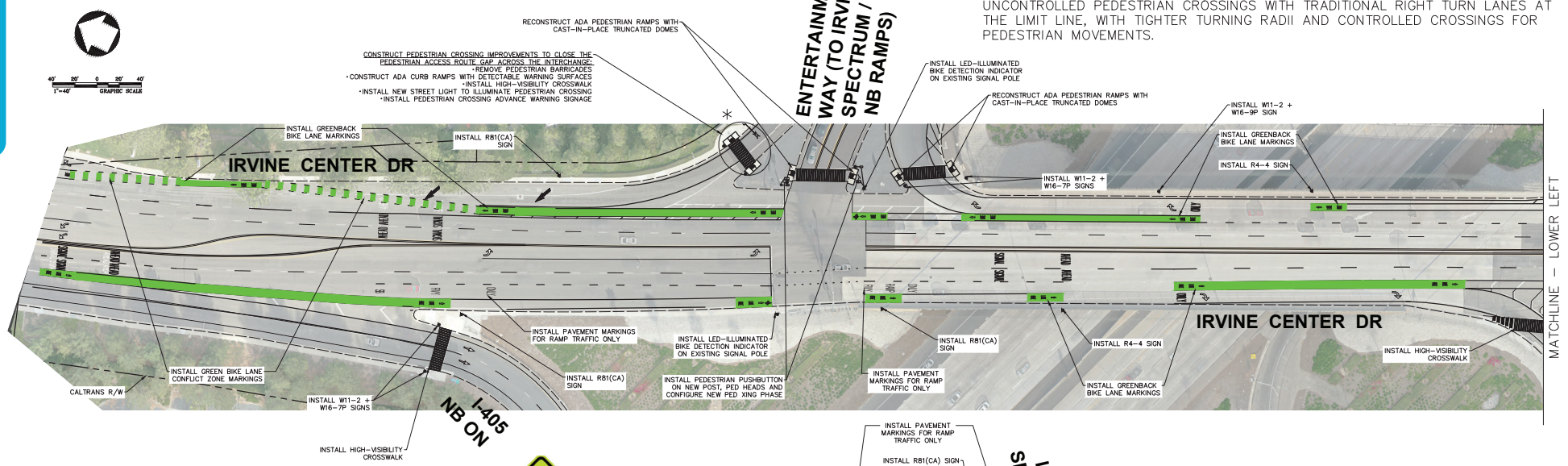
IRVINE CENTER DRIVE & INTERSTATE FREEWAY 405

ALTERNATIVE #1

NOTES:

1. TRAFFIC SIGNAL UNDER JURISDICTION OF THE CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION (CALTRANS). COORDINATE WITH CALTRANS DISTRICT 12 IN COMPLIANCE WITH THE LATEST HIGHWAY DESIGN MANUAL (HDM, 2018).
2. NEW VIDEO DETECTION CAMERA INSTALLATION PER CALTRANS DETAIL ES–7R.

* CONSIDER FUTURE REPLACEMENT OF EXISTING FREE RIGHT–TURN SLIP LANES AND UNCONTROLLED PEDESTRIAN CROSSINGS WITH TRADITIONAL RIGHT TURN LANES AT THE LIMIT LINE, WITH TIGHTER TURNING RADII AND CONTROLLED CROSSINGS FOR PEDESTRIAN MOVEMENTS.



SIGN LEGEND

R81(CA)

R4–4

W11–2 + W16–7(L/R)

LED–ILLUMINATED BIKE DETECTION INDICATOR

BIKE DETECTION PAVEMENT MARKING

W16–9P

CALTRANS INTERSECTION

Note: Further study is recommended prior to this location progressing to the design phase to allow for a detailed review and considerations.

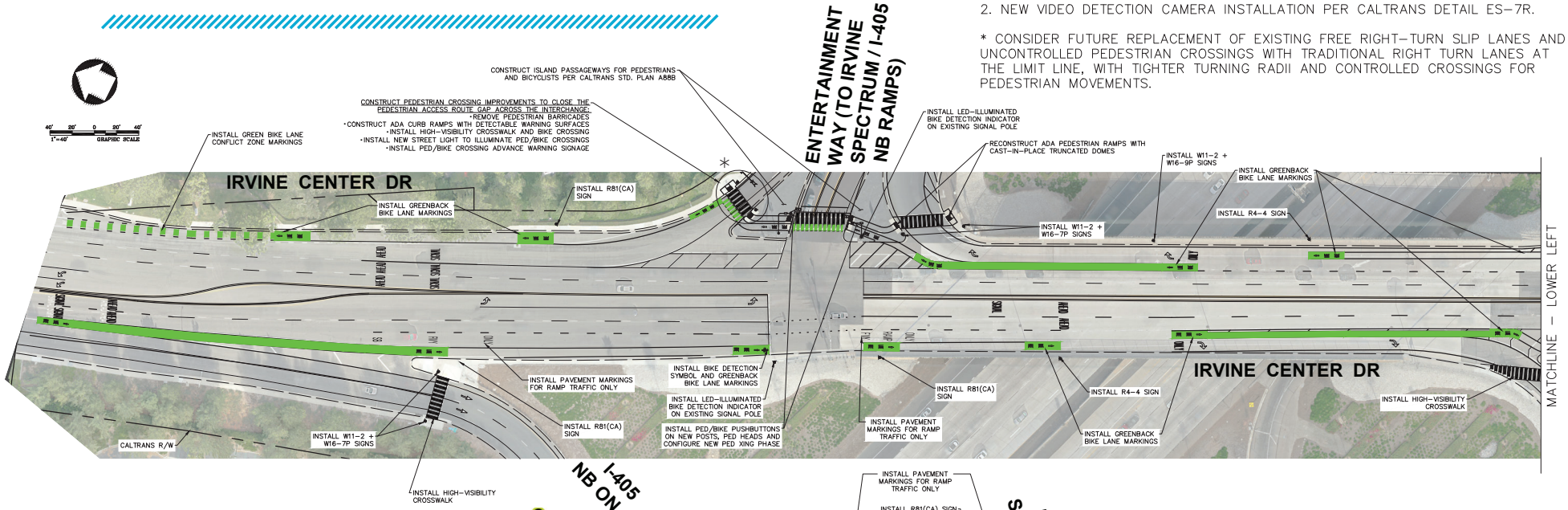
IRVINE CENTER DRIVE & INTERSTATE FREEWAY 405

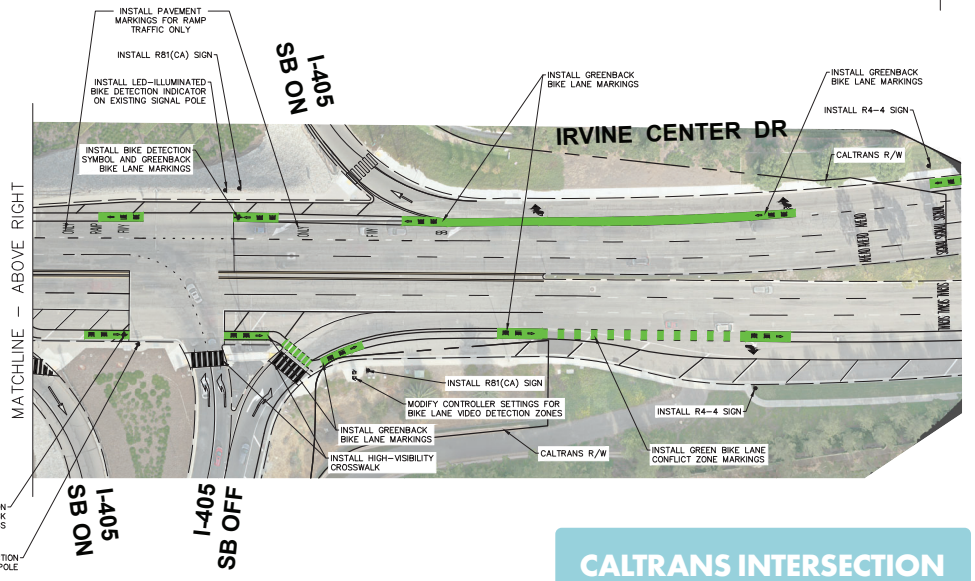
ALTERNATIVE #2

NOTES:

1. TRAFFIC SIGNAL UNDER JURISDICTION OF THE CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION (CALTRANS). COORDINATE WITH CALTRANS DISTRICT 12 IN COMPLIANCE WITH THE LATEST HIGHWAY DESIGN MANUAL (HDM, 2018).
2. NEW VIDEO DETECTION CAMERA INSTALLATION PER CALTRANS DETAIL ES–7R.

* CONSIDER FUTURE REPLACEMENT OF EXISTING FREE RIGHT–TURN SLIP LANES AND UNCONTROLLED PEDESTRIAN CROSSINGS WITH TRADITIONAL RIGHT TURN LANES AT THE LIMIT LINE, WITH TIGHTER TURNING RADII AND CONTROLLED CROSSINGS FOR PEDESTRIAN MOVEMENTS.





SIGN LEGEND

R81(CA)

R4–4

–OR–

W11–2 + W16–7(L/R)

W16–9P

LED–ILLUMINATED BIKE DETECTION INDICATOR

BIKE DETECTION PAVEMENT MARKING

CALTRANS INTERSECTION

Note: Further study is recommended prior to this location progressing to the design phase to allow for a detailed review and considerations.

ADA

LOCAL CORRIDOR

Ada is a local corridor that connects the Irvine Station to Barranca Parkway and Alton Parkway. Local connections are made possible via this northeast / southwest corridor.

Concept Plans Along Corridor

- Barranca Parkway and Ada (City Intersection) - Shown on ***p.84***
- Alton Parkway and Ada (City Intersection) - Shown on ***p.89***

Recommendations

- ADA curb ramps and push buttons, lighting, Traffic signal modification, LED-illuminated bike detection indicator, buffer bike lane striping, high visibility crosswalk, green bike lane markings, pavement markings, new/updated signage, video detection, sidewalk


ADA

TECHNOLOGY DRIVE

LOCAL CORRIDOR

Technology Drive is a local corridor that runs northwest / southeast within the west sector of the Station area. Direct linkage to the Station is not available, however linkage to major corridors Barranca Parkway and Alton Parkway are made.

Concept Plans Along Corridor

- Barranca Parkway and Technology Drive (City Intersection) - Shown on ***p.85***
- Alton Parkway and Technology Drive (City Intersection) - Shown on ***p.90***

Cross Sections Along Corridor

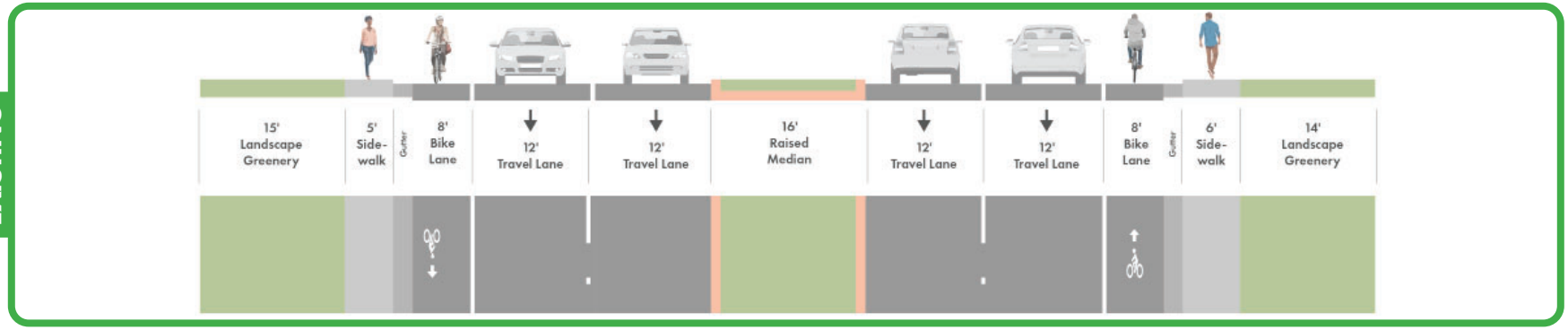
- Technology Drive North of Alton Parkway

Recommendations

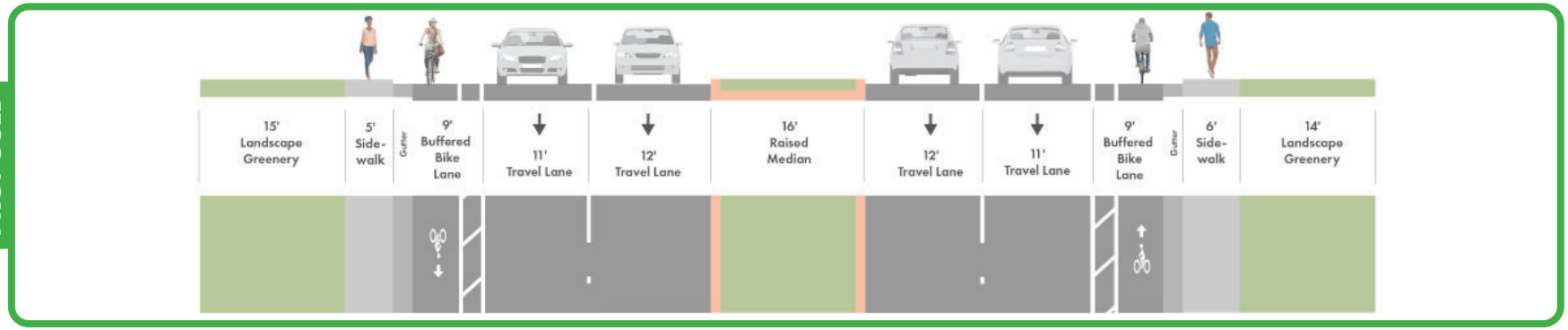
- Traffic signal modification, LED-illuminated bike detection indicator, buffer bike lane striping, high visibility crosswalk, green bike lane markings, pavement markings, new/updated signage, video detection

PREFERENTIAL CROSS SECTION

EXISTING



PROPOSED



Cross section plans (existing and proposed) showcase conditions where a raised median exists, but this is not the conditions along the entirety of the corridor extents. Where raised medians do not exist and two way left turn lanes are not needed for large/small vehicle turning movements, raised medians can be a consideration. Further engineering studies should be completed to understand impacts for all modes.

TECHNOLOGY DRIVE

SPECTRUM CENTER DRIVE

LOCAL CORRIDOR

Spectrum Center Drive is a local corridor bound between I-5 and I-405 providing local access for the Irvine Spectrum Center development. The corridor links to major corridors Irvine Center Drive and Alton Parkway.

Cross Sections Along Corridor

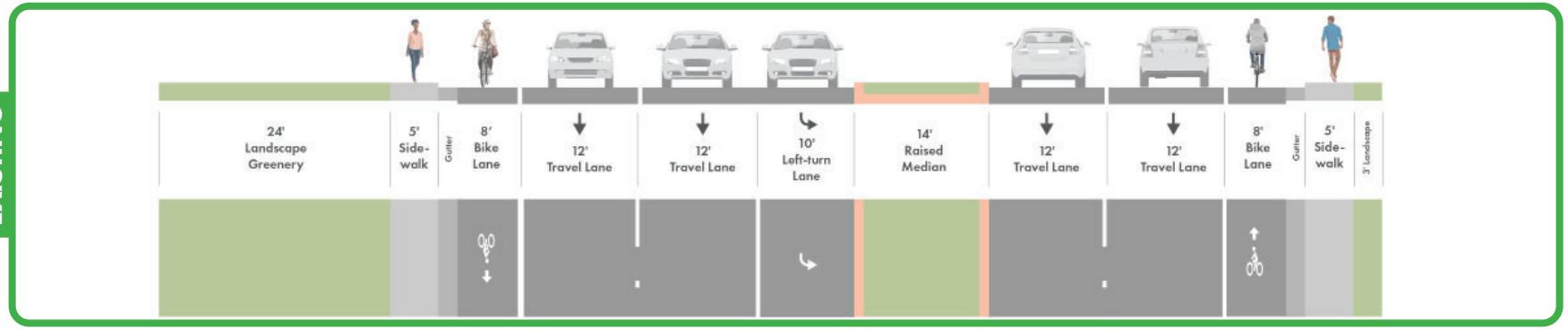
- Spectrum Center Drive north of Restaurant Way

Recommendations

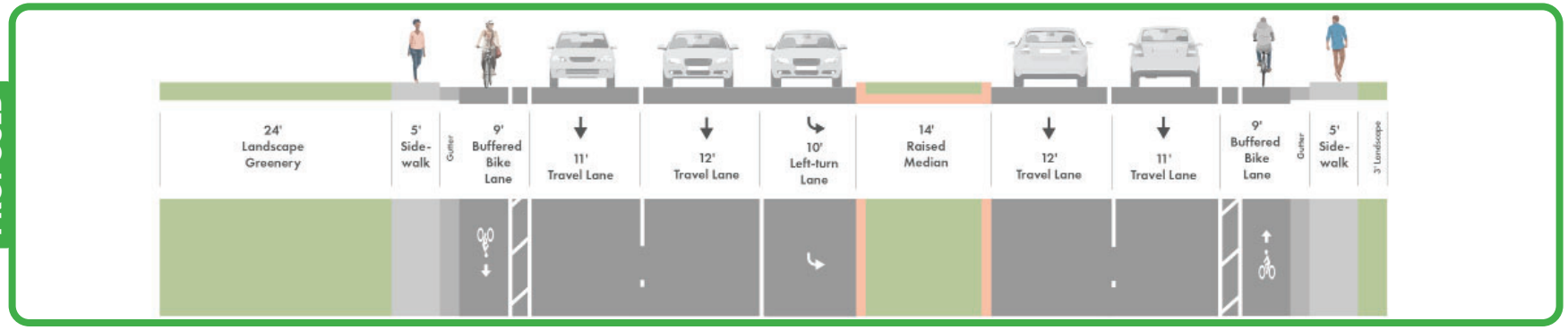
- Buffer bike lane striping, sidewalk / landscape reconfiguration

PREFERENTIAL CROSS SECTION

EXISTING



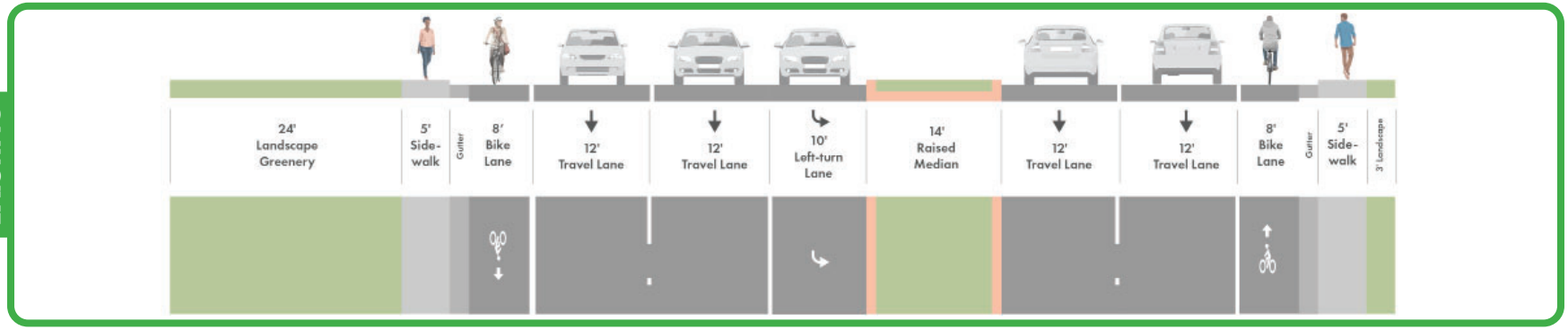
PROPOSED



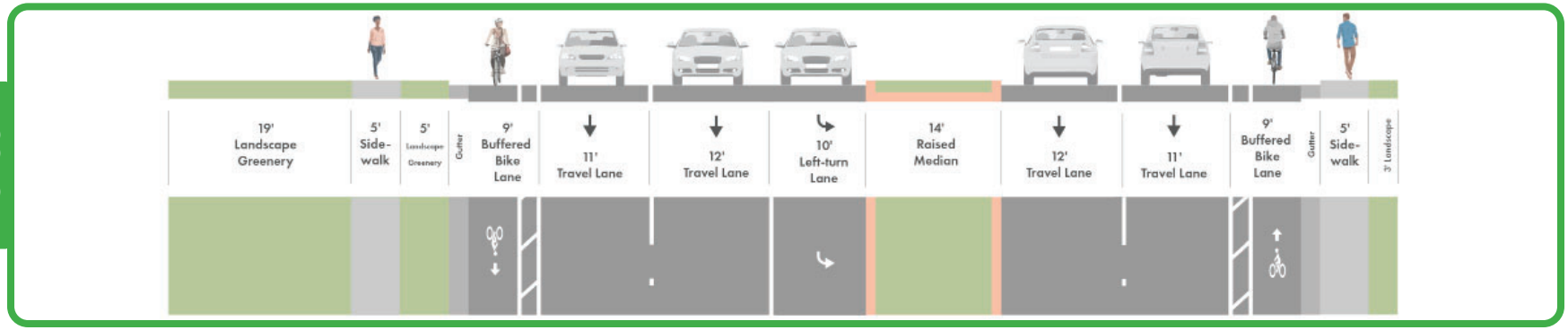
Cross section plans (existing and proposed) showcase conditions where a raised median exists, but this is not the conditions along the entirety of the corridor extents. Where raised medians do not exist and two way left turn lanes are not needed for large/small vehicle turning movements, raised medians can be a consideration. Further engineering studies should be completed to understand impacts for all modes.

ALTERNATIVE CROSS SECTION

EXISTING



PROPOSED




05
XING
PED

IMPLEMENTATION

PROJECT PRIORITIZATION

The purpose of the prioritization analysis is to provide the City with an implementation guide to the improvement planning elements that offer the greatest potential benefit to multi-modal users within the Irvine Station area.

While projects with higher rankings should be considered for implementation before projects with a lower rank, the City may choose to advance specific projects for other interests or as certain types of funding become available. Additional analyses should be conducted periodically in response to major changes in population, the environment, completion of planned corridors, and the transportation network.

The project prioritization model used for this Plan was developed with considerations to five key categories:

- Citations & Collisions
- Transit Access
- Comfort
- Connectivity
- Project Implementation

The specific measures for each category are shown in ***Table 5.1***. Weighting factors were adjusted to allocate a higher priority to measures with greater importance. Composite scores are listed in ***Table 5.2***.

Some corridors share right-of-way with Caltrans. Higher priority was allocated to these corridors to represent the inherent demands of cross coordination between the City and Caltrans. Treatments that are acceptable with Caltrans concept plan locations can set the precedents for acceptable and consistent treatments across the study area and those concept plan locations that do not require Caltrans coordination.

The prioritization methodology scores the results of each criterion relative to all corridor results. Thus, a low prioritization score does not necessarily reflect an undesirable project. Additionally, due to the range of factors considered within the prioritization, projects can score well in some categories, but not as high in others. The City can consider scoring across all categories, as well as the overall score when evaluating a project for funding.

Based on the scoring criteria, the seven existing focus corridors are ranked below by priority and shown in ***Figure 5.1***.

Priority Rank

1. Alton Parkway
2. Barranca Parkway
3. Irvine Center Drive
4. Spectrum Center Drive
5. Technology Drive
6. Ada
7. Antivo/Research Drive

Future considerations impact the build out of alignments (i.e. within the Orange County Great Park) and the corresponding improvements planned herein. These corridors are:

8. Marine Way
9. Cadence
10. Chinon
11. O Street
12. Lynx

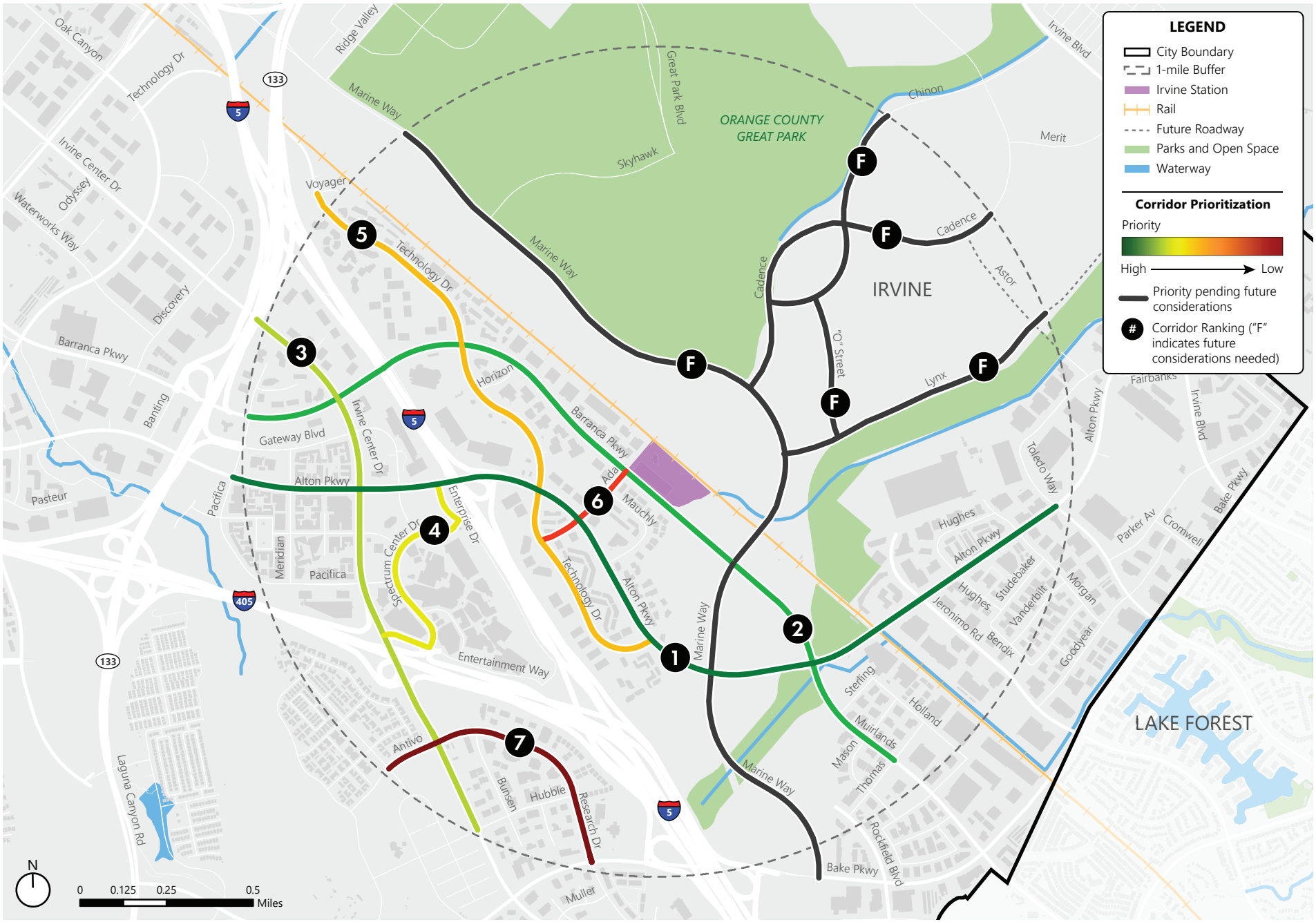


Figure 5.1 Project Prioritization Overview

Table 5.1 Project Prioritization Overview

Category	Item	Description	Metric/Scale	Item Weight	Category Weight
Citations & Collisions	Citations	Quantifies the number of Irvine PD citations per 500 feet.	Integer	10	***25***
	Collisions	Quantifies the number of Pedestrian- and Bicyclist-Involved collisions per 500 feet.		15	
Transit Access	OCTA Bus Stops	Quantifies the number of bus stops per 500 feet.	Integer	5	***10***
	OCTA Bus Routes	Quantifies the variety of bus routes along the corridor of interest.		5	
Comfort	Bicycle Level of Traffic Stress (LTS)	Average bicycle LTS score standardized by length along the corridor of interest.	Integer	10	***20***
	Pedestrian Level of Comfort (LOC)	Average pedestrian LOC score standardized by length along the corridor of interest.		10	
Connectivity	Connection Type	Corridor provides direct connection to or from Irvine Station or corridor is a feeder route that facilitates connection to or from Irvine Station.	Primary (10pts) or Secondary (5pts)	10	***10***
Project Implementation	Feasibility	Quantifies the ease of construction	Scale (1-10); higher values represent corridors that are more feasible	15	***35***
	Coordination	Requires coordination with other locality, Caltrans, or both.	Yes or No	20	
TOTAL SCORE					**100**

Table 5.2 Project Prioritization Summary

Rank	Corridor Name	Overall Score	Citation & Collisions	Transit Access	Comfort	Connectivity	Project Implementation
1	Alton Parkway	**73.6**	10.0	8.5	20.0	5.0	30.0
2	Barranca Parkway	**62.9**	1.6	6.4	14.8	10.0	30.0
3	Irvine Center Drive	**60.0**	12.5	8.3	14.2	5.0	20.0
4	Spectrum Center Drive	**43.2**	25.0	1.9	6.3	5.0	5.0
5	Technology Drive	**33.4**	2.5	3.0	7.9	5.0	15.0
6	Ada	**33.2**	0.2	8.0	0.0	10.0	15.0
7	Antivo/Research Drive	**32.2**	10.6	0.0	6.6	5.0	10.0


IRVINE STATION
AMTRAK
METROLINK


TICKETS
METROLINK
AMTRAK
615
Tickets
METROLINK
TICKETS

COST SUMMARY

This section summarizes the planning level cost estimates for each of the eight improvement concept plans, the transit specific improvements, and the cost assumptions used to prepare overall costs for implementation

COST ASSUMPTIONS

Improvement costs are estimated to reflect actual cost of implementation as accurately as possible (based on 2021 dollars). As such, cost assumptions include considerations for design, construction management, mobilization, and traffic control. A more detailed cost breakdown for each concept plan is provided.

While other project specific factors such as grading, acquisition costs, or landscaping may increase the actual cost of construction, an additional 30 percent contingency has been added to each project to account for these factors and additional design considerations that may arise during the design phase.

As the City pursues funding for improvements and components, it should be noted that construction costs may fluctuate based on when funding becomes available and when the project is actually constructed.

Cost estimates for each concept plan are summarized in ***Table 5.3***. Detailed cost estimates for each concept plan are summarized in the ***Appendix***.

Cost estimates for transit specific improvements on and immediately proximal to the Station parcel are shown in ***Table 5.4***.

Table 5.3 Concept Plan Cost Summary

Concept Location	Agency	Total Cost
Barranca Parkway & Ada	City of Irvine	$130,000
Barranca Parkway & Technology Drive	City of Irvine	$100,000
Barranca Parkway & Alton Parkway	City of Irvine	$120,000
Alton Parkway & Technology Drive	City of Irvine	$130,000
Alton Parkway & Ada	City of Irvine	$130,000
I-5 Carpool Ramp & Barranca Parkway	City of Irvine and Caltrans	$100,000
I-5 Carpool Ramp & Alton Parkway	City of Irvine and Caltrans	$100,000
I-405 & Irvine Center Drive (Alternative A)	City of Irvine and Caltrans	$290,000
I-405 & Irvine Center Drive (Alternative B)	City of Irvine and Caltrans	$330,000

TOTAL COST = $1,430,000

Table 5.4 Transit Specific Cost Summary

Improvement	Quantity	Unit Cost[1]	Total Cost
Reconfiguration of bus station	1	$2,000	$2,000
Weather protection structure in bus station	1	$12,000	$12,000
OCTA service planning study for 206 and 480	1	$20,000	$20,000
Provision of real time information at transit stops	1	$25,000	$25,000
E-bike charging lockers	10	$3,000	$30,000
E-scooter charging hub (10 spaces)	1	$12,000	$12,000
Reconfigure pick up and drop off (PUDO)	1	$10,000	$10,000
Designate and assign vanpool parking	10	$250	$2,500
Solar parking shade for vanpool parking spaces[2]	10	$7,000	$70,000
Designate and assign carpool parking	40	$250	$10,000
Wayfinding study[3]	1	$10,000	$10,000
New high visibility road signs	11	$1,100	$12,100
Upgrade road signs	7	$550	$3,850
New pedestrian and bicycle wayfinding signs	12	$900	$10,800
Upgrade pedestrian and bicycle wayfinding signs	5	$450	$2,250

TOTAL COST = $232,500

[1] Planning level unit costs estimated with reference to Los Angeles Metro Countywide Active Transportation Strategic Plan, communications with manufacturers and professional judgement.
[2] Solar parking shades vary in the degree of infrastructure. Depending on degree of infrastructure/electrificaton may run up to $300,000.
[3] Estimate based on using existing sign templates and guidance. Wayfinding Study could cost up to $50,000 if includes development of new strategy to include study area, templates, and guidance.

FUNDING OPPORTUNITIES

The following section presents potential federal, state, regional, and local funding sources that the City can seek for Plan implementation. These are shown in ***Table 5.5***, ***Table 5.6***, and ***Table 5.7***.

Funding opportunities are listed by program source, known due date, general funding amounts, match requirements, project eligibility, and a description for context. The City can consider applying for a variety of funding opportunities to implement both infrastructure and non-infrastructure improvements.

Based on the project prioritization, the City could seek grant funding to design and construct the improvements along corridors, using the rankings as a guide.

The City may also individually advance the implementation of other project improvements where there is interest, available funding, or potential of incorporation into an existing infrastructure improvement project or feasibility study.

Table 5.5 Federal Funding Programs

Federal Funding Programs

Program Source	Due Date	Agency	Annual Total	Match Requirements	Eligible Applicants	Eligible Projects		
						Commute	Recreation	Education
Congestion Mitigation and Air Quality (CMAQ) Program via FAST Act	Variable	OCTA	$455m Statewide, and formula based by MPO	Established by OCTA	MPOs, Cities, Counties, Transit Operators.	X	X	X
Highway Safety Improvement Program (HSIP)	Cycle 11: April 2021; Cycle 12: TBD	Caltrans	+$140 million	10% Match	County, City, tribal government	X	X	---
Land and Water Conservation Fund	July; Variable	California Department of Parks and Recreation	Varies	50% Match	Cities, Counties, JPA, Federally recognized Native American tribes, Non-State agency recreation and parks districts	---	X	---
Surface Transportation Block Grant Program (STBG)	Ongoing	OCTA	Varies by availability	Not Stated	Cities, Counties	X	X	---
Rivers, Trails, and Conservation Assistance Program	August 1 for the following FFY	US National Park Service	No Direct Funds, Technical Assistance	N/A	State, local, Tribal, Non- Profits	X	X	X
Better Utilizing Investments to Leverage Development (BUILD)	Variable	United States Dept. of Transportation	+$1 Billion nationally	20%	States, MPOs, local governments	X	X	X
Community Development Block Grant (CDBG)	April; Variable	Housing and Urban Development	Varies by availability	Not Stated	States, MPOs, local governments	X	X	X

Table 5.6 State Funding Programs

State Funding Programs

Program Source	Due Date	Agency	Annual Total	Match Requirements	Eligible Applicants	Eligible Projects		
						Commute	Recreation	Education
Local Roadway Safety Plan (LRSP) replaces SSARP	*April 2022*	Caltrans	*$72,000 maximum*	*N/A*	Cities and counties in California *LRSP funding priority to allot to those who have not received SSARP funding*	X	---	X
Active Transportation Program (ATP)	Cycle 6 TBD	Caltrans	$440 total through FY 2025	Not Required	Local, regional or state agencies. Transit agencies, natural resources or public land agencies. Public schools or school districts, tribal governments, and eligible nonprofits.	X	X	X

Description	Applicable to First Last Mile
The program funds transportation projects likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution, and be included in the MPO's current transportation plan and transportation improvement program. OCTA directs these funds mainly to transit and high occupancy vehicle lane projects, but 10% is set aside for bike and pedestrian projects.	Yes
Projects that improve safety for any public road, publicly owned bicycle, pedestrian pathway, or trails. Project must show safety improvement and cost benefits.	Yes
When an LWCF project is completed, the boundary map is placed under federal protection to preserve the public's outdoor recreational use in perpetuity. Projects that acquire and develop outdoor recreation areas and facilities qualify, including an active transportation path corridor connecting neighborhoods to workplaces, schools, homes, and other recreational opportunities.	Yes
The Surface Transportation Block Grant program (STBG), formerly the Surface Transportation Program (STP), provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.	Yes
Technical assistance for community-led natural resource conservation and outdoor recreation initiatives. Provide guidance to develop shared-use paths and greenways.	Yes
Formerly the TIGER grant, the BUILD focuses on projects with significant regional or local impacts. While biking and walking projects are eligible, the emphasis is on larger transportation projects	Yes
CDBG is a flexible program that provides communities with resources to address a wide range of unique community development needs. On the local level, these funds are administered by the OC Housing and Community Development and can fund a range a projects including, neighborhood revitalization, transportation services, public safety programs, flood and drainage facilities, water/sewer improvements, and street improvements/sidewalks.	Yes

Description	Applicable to First Last Mile
The purpose of the program is to provide approximately $1.5 billion per year to cities and counties for basic road maintenance, rehabilitation, and critical safety projects on the local streets and roads system. To be eligible, each year, cities and counties must submit a proposed project list adopted at a regular meeting by their board or council that is then submitted to the California Transportation Commission (CTC). Once reviewed and adopted by the CTC, the list of eligible cities and counties to receive funding is sent to the State Controller to begin the apportionment process for that fiscal year. Projects are required to be completed within three years.	Yes, Non-Infrastructure
Funds active transportation related infrastructure projects, plans, and education/encouragement/enforcement activities. Consolidates previous programs (Transportation Alternatives Program, Bicycle Transportation Account, and Safe Routes to Schools)	Yes

Table 5.6 State Funding Programs (Cont.)

State Funding Programs (Cont.)

Program Source	Due Date	Agency	Annual Total	Match Requirements	Eligible Applicants	Eligible Projects		
						Commute	Recreation	Education
Environmental Enhancement and Mitigation (EEM) Grant Program	Solicitation expected April annually	CA Natural Resources Agency	Up to $7 million per year	Not Required	State, County, City, Federal Govt, Non-Profits	X	X	---
Habitat Conservation Fund - Trails Category	Future funding cycle due date pending	CA Dept. of Parks and Recreation	$2 million	Dollar for dollar match of g rant funds	Counties, Cities, and Districts	X	X	---
Sustainable Transportation Planning Grant Program	Variable	Caltrans	$29.5 million	11.47% minimum	MPOs, RTPAs, Transit Agencies, Cities, Counties, Native American Tribal Governments, Other Public Transportation Planning Entities	X	X	X
Community-Based Transportation Planning Grant (CBTP) Program	Variable	Caltrans	Variable	Not Stated	Counties	X	X	X
Office of Traffic Safety (OTS) Grants	FFY 2020 applications out Dec 2018	CA Office of Traffic Safety	--	Not Required	A public entity that cleared the Single Audit, and has a DUNS #.	---	---	X
Recreational Trails Program (RTP) for Non-Motorized Trails	2019/2020 or later	CA Dept. of Parks and Recreation	$1.7 million	Varies	Federal Agencies, State Agencies, Counties, Cities, Districts, Non- Profits	X	X	---
Rubberized Pavement Grant Program	Variable	CA Dept. of Resources Recycling and Recovery	$350,000 maximum per application; $7,750,000 for FY 18-19	Varies	Cities, Counties, JPAs, State Agencies, Qualifying Indian Tribes	X	X	---
Transportation Development Act (TDA) Funds	Variable	OCTA	Varies	Varies	Counties, Cities, and Districts	X	X	---
Urban Greening Grant Program	Variable	CA Natural Resources Agency	$80 million	Not Stated	Counties, Cities, and Districts	X	X	---
State Highway Operation and Protection Program (SHOPP)	Variable	Caltrans	--	Not Stated	Counties, Cities, and Districts	X	X	---
Strategic Partnership	---	Caltrans	+$5 million; variable	Not Stated	Counties, Cities, and Districts	X	X	---

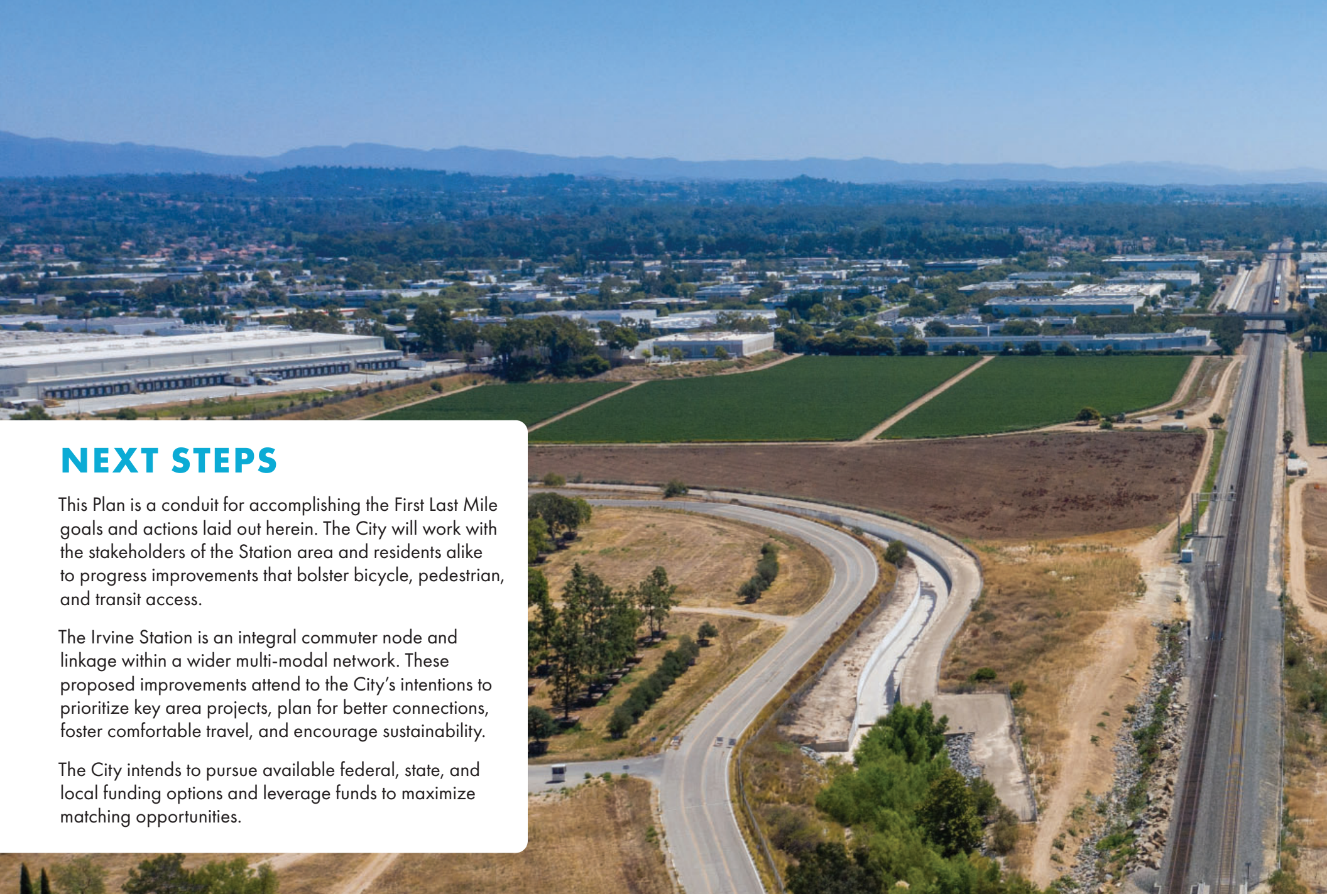
Description	*Applicable to First Last Mile*
Roadside Recreation - Projects that enhance or mitigate environmental impacts caused by future transportation projects; can include acquisition or development of roadside recreational facilities.	Yes
Funding for land acquisition or shared-use path development which brings people to a park and/or wildlife environment.	Yes
Projects that plan for reductions in GHG and VMT, and/or integrate Land Use and Transportation planning are eligible. This includes: SRTS, ATP, shared-use path master plans, pedestrian master plans, bicycle master plans, Vision Zero, bike parking facilities planning, educational outreach, traffic calming, health equity studies, first mile/last mile, station area planning, etc.	Yes, Non-Infrastructure
The Community-Based Transportation Planning grant program aims to engage the community in transportation and land use projects. Projects support concepts such as livable and sustainable communities with a transportation or mobility focus. They should also promote community identity and quality of life, as well as, provide transportation and land use benefits to communities.	Yes, Non-Infrastructure
Bicycle and pedestrian projects have been funded through this program. Promotes traffic safety education, pedestrian and bicycle safety, police traffic services, public relations programs, and roadway safety and traffic records.	X
The Recreational Trails Program (RTP) provides funds annually for recreational shared-use paths and trails-related projects.	X
Funding for on-street bikeway and roadway projects that use 100% California waste tires. The Grant Program is designed to promote markets for recycled-content surfacing products derived from only California-generated waste tires. It is aimed at encouraging first-time or limited users of rubberized pavement in two project types – Hot-Mix and Chip Seal. Projects can combine with Class I bikeways, green-ways, and disability access at parks with eligible roadway projects.	X
Funds for planning and construction of bicycle and pedestrian facilities.	X
"The Urban Greening Program receives its funding from revenue generated from the state's Cap and Trade program. Projects that qualify for grants from the program are required to show net GHG benefits along with other benefits; additionally, they must include one of three project activities: Sequester and store carbon by planting trees Reduce building energy use by strategically planting trees to shade buildings; Reduce commute vehicle miles traveled by constructing bicycle paths, bicycle lanes or pedestrian facilities that provide safe routes for travel between residences, workplaces, commercial centers, and schools. "	X
SHOPP offers funding for capital improvement projects that relates to the state highway system. Projects focus on reducing collisions, enhancing mobility, restoring damage to roadways, and preserving bridges and roadways. This can include pedestrian and bicycle facility projects.	X
Strategic Partnerships grants are intended to identify and address statewide, interregional, or regional transportation deficiencies on the State highway system in partnership with Caltrans. Successful Strategic Partnerships will strengthen government-to-governments relationships and result in programmed improvements. Example project types include corridor studies, and corridor preservation studies, studies that identify interregional, inter-county, and/or statewide mobility and access needs, and projects that evaluate accessibility and connectivity of the multi-modal transportation network.	Yes, Non-Infrastructure

Table 5.7 Local Funding Programs

Local Programs

Program Source	Due Date	Agency	Annual Total	Match Requirements	Eligible Applicants	Eligible Projects		
						Commute	Recreation	Education
Developer Fees or Exactions	Ongoing	City of Irvine	Varies	---	---	X	X	---
Renewed Measure M (M2) Local Fair Share	Annually	OCTA	Varies	---	Cities within Orange County	X	X	---
State Gas Tax (Local Share)	Ongoing	State Auditor Controller	Varies	---	---	X	X	---
Systems Development Charge (SDC) - Non-Circulation	Ongoing	City of Irvine	Varies	---	---	X	X	---
Project O Regional Capacity Program	Varies	OCTA	$32 million	Varies	Local cities or OCTA	X	---	---
Comprehensive Transportation Funding Program (CTFP) / OC Go	Varies	OCTA	Varies	Varies	Local cities or OCTA	X	---	---
Sustainable Planning Grant	Annually	Southern California Association of Governments (SCAG)	$23 million	---	Local cities or OCTA	X	X	X
Bicycle Corridor Improvement Program (BCIP)	Annually	OCTA	$25 million total through FY 2024	Variable	Local cities	X	X	---

Description	*Applicable to First Last Mile*
Funds sourced from developer fees may be required for development of bikeways.	Yes
Funding for streets, roads, and transit projects. This includes various traffic signal and street rehabilitation projects along with replacement of LED lamps for traffic signals. Bicycle and pedestrians projects can be a component of this application.	Yes
Solely for street-related purposes such as new street construction, rehabilitation, and maintenance. Includes traffic sign repair and upgrades for traffic components and networks.	Yes
Funds received through the City's Building Permit Process for design and construction of Capital Improvement Projects including bikeways and trails.	Yes
Streets and road improvement funding including safety oriented improvements for three RCP programs: ACE, ICE, and FAST. Bicycle and pedestrians projects can be a component of this application.	Yes
CTFP represents a collection of competitive grant programs offered to local agencies to assist in funding street improvements, transit expansion, and even environmental mitigation projects. The CTFP was created to provide a common set of guidelines and project selection criteria for a variety of funding programs, establishing a simplified and consistent process. Each program has a specific objective, funding source and set of selection criteria.	Yes
Provides technical support to members in SCAG's jurisdictions. Grants can be used toward planning and policy efforts that allow for the implementation of the regional RTP/SCS. Grants in the program falls into three categories: Integrated Land Use – Sustainable Land Use Planning, Transit Oriented Development (TOD) and Land Use & Transportation Integration; Active Transportation – Bicycle, Pedestrian and Safe Routes to School Plans; Green Region – Natural Resource Plans, Climate Action Plans (CAPs) and Green House Gas (GHG) Reduction programs	Yes, Non-Infrastructure
"The Bicycle Corridor Improvement Program (BCIP) makes funding available to local Orange County agencies for bicycle and pedestrian projects that reduce traffic congestion and improve air quality. The goals of the BCIP are to: Increase the number of biking and walking trips; Provide regional linkages to key destinations; Close bikeways corridor gaps; Promote mobility options by increasing safety; and Implement projects with community support. Improve air quality across Orange County."	Yes



NEXT STEPS

This Plan is a conduit for accomplishing the First Last Mile goals and actions laid out herein. The City will work with the stakeholders of the Station area and residents alike to progress improvements that bolster bicycle, pedestrian, and transit access.

The Irvine Station is an integral commuter node and linkage within a wider multi-modal network. These proposed improvements attend to the City's intentions to prioritize key area projects, plan for better connections, foster comfortable travel, and encourage sustainability.

The City intends to pursue available federal, state, and local funding options and leverage funds to maximize matching opportunities.

City of Irvine

IRVINE STATION FIRST LAST MILE PLAN | 2021

APPENDIX

ACTIVE TRANSPORTATION TOOLBOX

This Active Transportation Toolbox can be used to create walking and biking environments that bolster user comfort and local and regional connectivity.

The icons shown in ***Figure A.1*** categorize the different recommendation types that can be found within this Toolbox. The features represented within the Toolbox generally fall under three categories: Bicycle, Pedestrian, and Operational Improvements. The use and intent for each "tool" is outlined on the following pages, noting improvement benefits and design considerations. Please refer to the latest editions of Caltrans Highway Design Manual (HDM), Federal Highway Administration (FHWA), California Manual on Uniform Traffic Control Devices (MUTCD), and other federal or state guidelines for specific design and signage standards.

References:

1. MUTCD (CA)
2. FHWA Small Town and Rural Multimodal Networks (2016)
3. National Association of City Transportation Officials (NACTO) Urban Design Bikeway Guide
4. Essentials of Bike Parking (APBP) (2016)
5. ADA Best Practices Toolkit for State and Local Governments
6. National Center for Safe Routes to School
7. FHWA Safety Program - Road Diet Information Guide
8. Safety Benefits of Raised Medians and Pedestrian Refuge Areas - FHWA
9. pedbikesafe.org (FHWA)
10. Pedestrian Hybrid Beacon Guide-Recommendations and Case Study
11. Flexing Rumble Strip Design for Bicycle Accommodation (Rumble Strips and Rumble Stripes - FHWA)
12. Caltrans HDM

Figure A.1 Active Transportation Toolbox Overview

BICYCLE

Bicycle-related treatments in this toolbox include bikeway facilities, bicycle parking, amenities, signage, and intersection elements. While bikeway facilities can be classified into three categories— off-street, on-street, and shared street— these broad categories include more specific bikeway types. Recommended treatments are context-sensitive and include street type, vehicle traffic speed, and vehicle and bicycle volumes.

PEDESTRIAN

Pedestrian-related treatments focus on enhancing pedestrian visibility, reducing motorist speed, and improving pedestrian infrastructure. Providing and improving pedestrian facilities like sidewalks and crossing treatments can help create a more comfortable experience for pedestrians as they travel within the City.

OPERATIONAL IMPROVEMENT

The purposes of operational improvements are to reduce vehicle collision factors and create a safer environment for active transportation users within the City. Recommended treatments are context-sensitive and include street type, vehicle traffic speed, volume, and pedestrian and bicyclist demand on existing facilities.

CLASS I: BIKE PATH

An off-street bicycle facility that is physically separated from any street or highway, commonly planned along rights-of-way such as waterways, utility corridors, flood control access roads, railroads, and similar paths that offer continuously separated riding opportunities[12].

BENEFITS:

- Generally used to serve corridors not served by streets and highways or where wide right-of-way exists
- Can provide recreational opportunities or serve as commute routes
- Offers bicycling opportunities not provided by the road system

DESIGN & OTHER CONSIDERATIONS:

- Right-of-way availability
- High costs associated with new construction and long-term maintenance
- Possible shared use with pedestrians (see also "shared-use path")

CLASS II: BIKE LANE

A portion of the roadway that is designated by striping, signing, and/or pavement markings for the exclusive use of bicyclists. They are established along streets and corridors where there is bicycle demand, and where there are distinct needs that can be served by them[12].

BENEFITS:

- Delineates right-of-way assigned to bicyclists and motorists and provides for more predictable movements by each

DESIGN & OTHER CONSIDERATIONS:

- Roadway reconfiguration may be needed if insufficient room exists for side-by-side sharing of existing streets by motorists and bicyclists
- Locations with right-turn-only lanes should provide a minimum four-foot width for bicycle use between the right-turn and through lane when bikes are permitted. Where posted speed is greater than 40 miles per hour, minimum width should be six feet[12]
- Installation of rumble strips allowed by HDM Chapter 300 Index 302.1

CLASS II: BUFFERED BIKE LANE

An additional striped buffer can provide greater separation between bicyclists and vehicular traffic. Buffered bike lanes are recommended where roadway space allows[12].

BENEFITS:

- Provides greater shy distance between motor vehicles and bicyclists
- Provides space for bicyclists to pass another bicyclist without encroaching into the adjacent motor vehicle travel lane

DESIGN & OTHER CONSIDERATIONS:

- Different design guidelines for each striping pattern
- More suitable than un-buffered Class II bike lanes on roadways with high vehicle speeds or volumes
- Typically wider than traditional Class II bike lanes in order to accommodate buffer

CLASS III: BIKE ROUTE/ SHARROWS

Class III bikeways are designated roadways where bicycles and motor vehicles share the space. Design standards require specific signage, but additional enhancement can be provided by using shared roadway markings, or "sharrows"[12].

BENEFITS:

- Provides continuity to other bicycle facilities
- Designates preferred routes through low volume roads

DESIGN & OTHER CONSIDERATIONS:

- Assure that these routes are suitable as shared roadways
- Prior to designation as a bikeway, routes may need additional improvements for bicycle travel
- Maintain routes in a manner consistent with the needs of bicyclists

CLASS III: BIKE BOULEVARD

A bicycle boulevard is a shared roadway Class III bicycle facility, designed to offer priority for bicyclists operating within a roadway shared with motor vehicle traffic. Low stress vehicle corridors are suitable for a bicycle boulevard as they are characterized by lower volumes of vehicles and lower speeds.

BENEFITS:

- Increases comfort for bicyclists by reducing motorist speeds and volumes, if diversion is included
- Connects residential roads to commercial corridors/community services

DESIGN & OTHER CONSIDERATIONS:

- May require additional paved surface to provide sidewalk space for pedestrians
- Diversion design restricts vehicle movements.

CLASS IV: CYCLE TRACK

A cycle track is a protected bikeway that includes a physical barrier between bicyclists and motor vehicle traffic. It combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane.

BENEFITS:

- Provides lateral separation space for bicyclists in order to improve perceived comfort and safety
- Eliminates risk and fear of collisions with over-taking vehicles
- Reduces risk of "dooring" compared to a bike lane

DESIGN & OTHER CONSIDERATIONS:

- Streets with high bicycle volumes, motor vehicle volumes/speeds
- Requires additional maintenance for debris due to limited vehicle access
- Caltrans Design Information Bulletin (DIB) 89-01

CONFLICT ZONE MARKINGS

Conflict zone markings are used to increase the visibility of bikeways or, more commonly, zones with a high potential for motor vehicle/bicycle conflicts, by indicating cyclist right-of-way with a distinctive symbol and/or color. They are intended to regulate, warn, or guide traffic.

BENEFITS:

- Increases awareness of bicyclists
- Can be used to indicate an area of potential conflict between bicyclists and motor vehicle traffic

DESIGN & OTHER CONSIDERATIONS:

- Currently under Interim Approval by FHWA for optional use (colored marking)
- Can be costly to maintain
- Green, blue, and red are among the colors that have been tested
- Multiple meanings; dedicated cycling corridor, can also mean a shared mode facility or a "mixing zone" with cars

RUMBLE STRIP

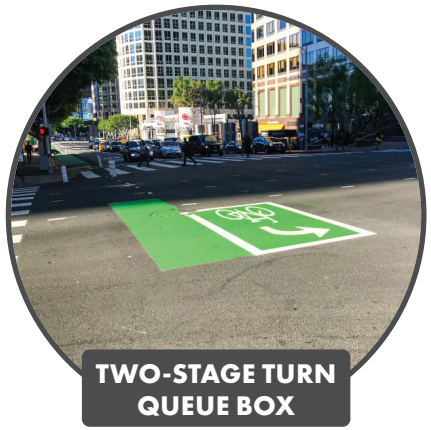
Rumble strips use both noise and vibration to alert the driver that he or she is leaving the appropriate travel path. The strategic placement of rumble strips is important as practitioners balance safety effects for motorists and bicyclists[11]. Installation of rumble strips allowed by HDM Chapter 300 Index 302.1.

BENEFITS:

- Effective countermeasure for reducing roadway departure crashes
- Flexibility in design and strategic placement can successfully accommodate variety of users

DESIGN & OTHER CONSIDERATIONS:

- Offset of the rumble strip from the lane can be adjusted to best accommodate bicyclists. This may mean using edgeline rumble strips to provide additional paved shoulder space beyond the rumble strip, or increasing the offset where narrow paved shoulders exist
- Implementation of rumble strips should always consider bicycle-friendly design such as "skip" rumble strips.
- Potential noise impacts should be monitored



TWO-STAGE TURN QUEUE BOX

Two-stage turn queue boxes offer bicyclists a way to make left turns at multi-lane signalized and unsignalized intersections from a cycle track or bike lane.

BENEFITS:

- Designates area for bicyclists waiting to proceed in a different direction and formalizes two-stage turn maneuvers in a predictable pattern
- Reduces turning conflicts between bicyclists and motor vehicles[3]

DESIGN & OTHER CONSIDERATIONS:

- Should be placed in a location downstream of the cross street intersection stop line and downstream of the crosswalk across the cross street
- Multiple positions available, depending on intersection configuration[3]
- Under Interim Approval by FHWA, allowing interim use, pending official rulemaking

INTERSECTION BICYCLE BOX

The bike box is an intersection improvement design to prevent bicycle/vehicle collisions, especially between drivers turning right and bicyclists proceeding forward[1].

BENEFITS:

- Increases the visibility of stopped bicycle traffic at a intersection
- Reduces the number of conflicts between bicyclists and turning motorists at intersections
- Reduces the number of bicycles and motor vehicles encroaching into pedestrian crosswalks when stopped at an intersection
- Can help mitigate intersection right-turn ("right-hook") conflicts

DESIGN & OTHER CONSIDERATIONS:

- Placed at least ten feet in advance of the pedestrian crosswalk or the intersection stop line
- Limited to signalized intersections

BICYCLE PARKING

Bicycle parking provides a location for bicyclists to securely lock or store their bikes. Short-term bicycle parking includes bike racks (inverted U, post and ring) and bike corrals. Long-term parking can include bike lockers and stations[4].

BENEFITS:

- Improves first and last mile connections when installed near bus stops, schools, and parks
- Supports bike upright without putting stress on wheels
- Allows for locking of frame and at least one wheel

DESIGN & OTHER CONSIDERATIONS:

- Placement varies based on facility type
- Long-term bicycle parking more costly to maintain and implement over short-term bicycle parking

SIGNS

Regulatory and advisory signs can be used to convey preferential riding behavior for predictable behavior. Common conflicts with motor vehicle occur when operating a bicycle contrary to the design of the infrastructure (i.e. wrong way riding). R5-1b "WRONG WAY" and "RIDE WITH TRAFFIC" R9-3c[1].

BENEFITS:

- Increases compliance with local traffic regulations and elimiantes visibility derived conflicts at intersections with motor vehicles.
- Encourages cyclists to ride with traffic in a predictable and safe manner.

DESIGN & OTHER CONSIDERATIONS:

- Placement should be considered along split roadways to eliminate wrong way riding on one-way roads and on all other classifications.
- Signs may be mounted back-to-back with other signs to minimize visibility to other traffic[1].

SHARED-USE PATH

Shared-use paths are separated from roadway traffic and offer network connectivity opportunities outside the traditional roadway network. The separated facility provides a pathway for bicyclists, pedestrians, and other non-motorized transportation users to travel on[2].

BENEFITS:

- Provides a low-stress separated facility for active transportation users
- Supports tourism through convenient access to natural areas or as an enjoyable recreational opportunity itself[2]

DESIGN & OTHER CONSIDERATIONS:

- Eight foot minimum for low traffic scenarios[2]
- 12 to 14 feet recommended for heavy use pathway[2]
- Often located in parks, greenbelts, or utility corridors
- Bike only facility noted in "Class I: Bike Path"

SIDEPATH

Sidepaths are bidirectional shared-use paths located immediately adjacent and parallel to a roadway. They can offer a more comfortable experience compared to on-roadway facilities, allow for reduced roadway crossing distances, and maintain community character[2].

BENEFITS:

- Completes networks where high-speed roads provide the only corridors available[2]
- Provides a more appropriate facility for users of all ages and abilities than shoulders or mixed traffic facilities on roads with moderate or high traffic intensity[2]

DESIGN & OTHER CONSIDERATIONS:

- Requires a wide roadside environment to provide for separation and pathway area outside of the adjacent roadway[2]
- Absolute minimum pathway width is eight feet, ten feet prefered minimum. Provide a minimum of two feet of clearance to signposts or vertical elements[2]

BICYCLE & PEDESTRIAN FRIENDLY CORRIDOR

Bicycle and Pedestrian Friendly Corridors establish low stress interior community roadways that offer bicycle and pedestrian priority; inclusions encompass: curb extensions, bike-only access, traffic circles, median islands, and roundabouts. The goal is to calm traffic within this corridor.

BENEFITS:

- Provides for lower stress environment for pedestrians and bicyclists
- Bolsters city connectivity to existing systems

DESIGN & OTHER CONSIDERATIONS:

- Average daily traffic volumes for motor vehicles should be assessed - typically lower ADT corridors have higher suitability for implementation
- Combination of pedestrian and bicycle features should attend to existing attractors to remain locally sensitive to needs
- See further Design Guidelines

OVER- & UNDER-CROSSING

Pedestrian and bicycle overcrossings and undercrossings provide for enhanced connections over/under freeways/highways, rail corridors, and flood channels.

BENEFITS:

- Eliminates barriers for pedestrian and bike transportation (i.e. freeways, or major roads)
- Eliminate need for user to move through intersection

DESIGN & OTHER CONSIDERATIONS:

- Minimum horizontal widths match requirements for Class I or shared-use paths
- ADA requirements impact slope of feature as well as railing height

Sidewalks are physically separated from the roadway by a curb or unpaved buffer space, providing dedicated space intended for use by pedestrians that is separated from the roadway, comfortable, and accessible to all.

BENEFITS:

- Enhances pedestrian network connectivity
- Provides safe mode of travel
- Provides opportunities for walking
- Provides connections to neighborhoods and key community destinations

DESIGN & OTHER CONSIDERATIONS:

- Right-of-way availability
- Utility conflicts
- Maintenance costs

A curb ramp is a ramp cutting through a curb or built up to it to provide a route to transition from a roadway to a curbed sidewalk and vice versa.

BENEFITS:

- Eliminates the vertical edge of the curb for easy access
- Provides accessibility to people with physical disabilities and who use wheelchairs

DESIGN & OTHER CONSIDERATIONS:

- Must meet specific standards for width, slope, cross slope, placement, and other features in order to be compliant with Title II of the ADA[6]
- Additional detectable warnings are required

Median refuge islands are protected spaces placed in the center of the street to facilitate bicycle and pedestrian crossings.

BENEFITS:

- Provides a protected space for pedestrians and bicyclists to wait for an acceptable gap in traffic
- Reduces the overall crossing length and exposure to vehicle traffic for a bicyclist or pedestrian
- Decreases the amount of delay that a bicyclist will experience to cross a street

DESIGN & OTHER CONSIDERATIONS:

- Right-of-way availability
- Should be at least 4 feet wide (preferably 8 feet wide for accommodation of pedestrian comfort and safety)

High-visibility ladder crosswalks provide a designated walkway for pedestrians to cross from one side of a street to the other[3].

BENEFITS:

- More visible to approaching vehicles and have been shown to improve yield behavior[3]
- Creates a more comfortable crossing experience for pedestrians[3]

DESIGN & OTHER CONSIDERATIONS:

- Supplemental measures may be required to reduce traffic speeds, shorten crossing distances, and/or provide an active warning of pedestrian presence
- Site location and pedestrian demand
- Engineering judgment may be required to assess need
- Yellow school crosswalks are to be installed within 500 ft of school

PUSH BUTTONS

Pedestrian push buttons are electronic buttons used by pedestrians to change traffic signal timing to accommodate pedestrian street crossings[7].

BENEFITS:

- Provides pedestrians at a traffic signal with sufficient time to cross a roadway

DESIGN & OTHER CONSIDERATIONS:

- Shall clearly indicate which crosswalk signal is actuated by each pedestrian pushbutton
- Are not needed if pedestrian recall is already in place for the traffic signal.
- Refer to MUTCD Chapter 4E. Pedestrian Control Features for specific design standards

PEDESTRIAN SIGNAL

Pedestrian signal heads provide special types of traffic signal indications exclusively intended for facilitating pedestrian traffic - consisting of illuminated symbols of a walking person, upraised hand, and countdown timer[8].

BENEFITS:

- Indicates to pedestrians when to cross, when not to cross, and how many seconds are left to cross

DESIGN & OTHER CONSIDERATIONS:

- Need to have pedestrian push button to supplement it
- Refer to MUTCD Chapter 4E. Pedestrian Control Features for specific design standards

MID-BLOCK CROSSING

Midblock crosswalks facilitate crossings to places that people want to go but that are not well served by the existing traffic network.

BENEFITS:

- Allows pedestrians to cross in the middle of a long block without walking all the way to a signalized intersection crosswalk

DESIGN & OTHER CONSIDERATIONS:

- Pedestrian demand for the facility
- May be supplemented with traffic control devices for optimal effect
- Design needs to consider stopping sight distances, effects of grade, cross slope, need for lighting, and other factors, making use of warrants similar to those used for standard intersections

ADVANCED YIELD LINES

Advanced yield lines are roadway markings that encourage drivers to slow down in advance when approaching a pedestrian crossing and provides guidance as to where drivers should wait while a pedestrian is crossing.

BENEFITS:

- Offers more visibility of pedestrians crossing the roadway
- Reduces the likelihood of multiple-threat crashes

DESIGN & OTHER CONSIDERATIONS:

- Must be supplemented with a crosswalk that is 20-50' from the facility and R1-5 or R1-5a MUTCD signage

SPEED FEEDBACK SIGN

A dynamic message sign that uses radar or laser technology to determine the speed of an approaching vehicle and then displays the speed to the driver. If motorists are speeding, the sign flashes the exceeded speed along with 'SLOW DOWN' or 'YOUR SPEED'.

BENEFITS:

- Activates when drivers exceed posted speed limit by five miles per hour
- Can be effective in reducing motorist speeds on wide roadways

DESIGN & OTHER CONSIDERATIONS:

- Physical constraints include requiring a special type of pole, space for footing, and if the signs are not solar — a source of electricity

PHB

A pedestrian hybrid beacon (PHB) is a traffic control device used to increase motorists' awareness of pedestrian crossings at uncontrolled marked crosswalk locations. A PHB is distinct from pre-timed traffic signals and constant flash warning beacons because it is only activated by pedestrians when needed[10].

BENEFITS:

- PHBs can lead to lower conflict and crash rates for pedestrians and vehicles[10]
- Clearly indicates that a crosswalk is being used and that all motorists must come to a complete stop[10]

DESIGN & OTHER CONSIDERATIONS:

- Should be located outside the functional area of a signalized intersection[10]
- CA MUTCD allows for installation at intersections or driveways, turn lanes may be present[1]
- In addition to the signal head displays, stop lines and marked crosswalks are required at PHB crossings. Advance stop lines should be used on multi-lane crossings to reduce the potential for multiple-threat crashes[10]

RRFB

Rectangular rapid flash beacons (RRFBs), a type of active warning beacon combine a pedestrian warning sign with user-activated light-emitting diodes (LEDs). The device flashes amber when activated through a pedestrian push button or by pedestrian detection.

BENEFITS:

- Increases driver yielding behavior at crossings because they use an irregular flash pattern similar to emergency flashers on police vehicles

DESIGN & OTHER CONSIDERATIONS:

- Use in combination with a crosswalk, wheelchair ramps, advance warning signs or pavement markings, and overhead lighting
- Usually implemented at high-volume pedestrian crossings

CURB EXTENSION

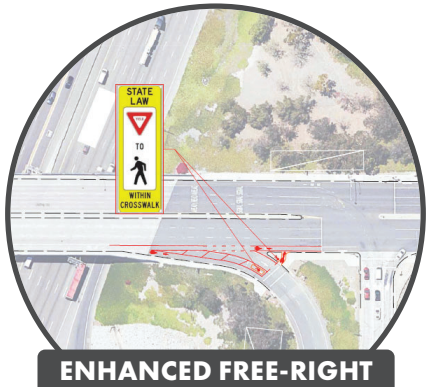
Curb extensions visually and physically narrow the roadway, creating shorter crossings for pedestrians while increasing the available space for street furniture, benches, plantings, and street trees.

BENEFITS:

- Improves ability of pedestrians and motorists to see each other
- Reduces speed of turning vehicles
- Shortens pedestrian crossing distances

DESIGN & OTHER CONSIDERATIONS:

- Appropriate where there is an on-street parking lane
- May require relocation of fire hydrants to maintain adequate curbside access in case of a fire and/or relocation of other existing underground utilities
- Impacts on drainage



ENHANCED FREE-RIGHT TURN CROSSING

Enhanced free-right turn crossings aid pedestrian and bicycle traffic with traffic calming features to decrease vehicle speeds. This can be accomplished via lane reduction into and out of the on and off ramps, advanced warning signs/beacons of pedestrian and/or bicycle traffic, and raised islands.

BENEFITS:

- Decreased crossing distance for bicylists and pedestrians via lane reduction
- Additional crossing option support for bicyclists of all ability levels (straight through intersection or to cross with pedestrians)
- Advanced warning for motorists

DESIGN & OTHER CONSIDERATIONS:

- Conflict zones should comply with minimum MUTCD Standards[1]
- Ramp geometry reconfiguration may require Caltrans coordiantion
- May require relocation of existing underground utilities

ROUNDABOUT

Roundabouts eliminate signalized or all-way-stop controlled intersections, replacing these devices with yield signs and markings to optimize traffic flow. Pedestrians benefit from having decreased crossing distances, and bicyclists benefit from either a by-pass option and/or elimination of right-angle collisions.

BENEFITS:

- Allows motorists and bicyclists to yield instead of making complete stops, improving travel times
- Reduces vehicle speeds
- Eliminate right-angle collisions between bicyclists and motorists
- Decreased pedestrian crossing distances

DESIGN & OTHER CONSIDERATIONS:

- Rounabout provision of a by-pass option for bicyclists should be considered based on ADT, number of lanes/width, and anticipated vehicle speeds
- Ensure landscaping does not impede visibility of pedestrians, bicyclists, and other motor vehicles
- May require relocation of existing underground utilities and alteration of the number of lane and widths

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization (10%)	1	LS	$9,000	$9,000
1.01	Traffic control (5%)	1	LS	$4,500	$4,500
1.02	Construction survey and monumentation (5%)	1	LS	$4,500	$4,500
General Subtotal					$18,000
Traffic Signal					
2	Traffic Signal Modifications	1	LS	$5,000	$5,000
2.01	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
Traffic Signal Subtotal					$12,200
Signing & Striping					
3	Remove existing striping	1	LS	$8,000	$8,000
3.01	Install lane line striping	8,000	LF	$2	$16,000
3.02	Install continental x-walk	4,400	SF	$2	$8,800
3.03	Install green bike lane markings	800	LF	$5	$4,000
3.04	Install pavement legend/marking	37	EA	$500	$18,500
3.05	Install sign panel	7	EA	$100	$700
3.06	Install sign and post	3	EA	$500	$1,500
Signing & Striping Subtotal					$57,500
Total					$87,700
30% Contingency					$26,310
10% Design					$8,770
6% Construction Engineering					$5,262
Grand Total					**$128,042**
Rounded Total					**$130,000**

Table A.2 Detailed Cost Overview: Barranca Parkway & Technology Drive

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$6,880	$6,880
1.01	Traffic control	1	LS	$3,440	$3,440
1.02	Construction survey and monumentation	1	LS	$3,440	$3,440
General Subtotal					$13,760
Traffic Signal					
2	Traffic Signal Modifications	1	LS	$5,000	$5,000
2.01	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
Traffic Signal Subtotal					$12,200
Signing & Striping					
3	Remove existing striping	1	LS	$2,000	$2,000
3.01	Install lane line striping	4,200	LF	$2	$8,400
3.02	Install continental x-walk	4,800	SF	$2	$9,600
3.03	Install green bike lane markings	1085	LF	$5	$5,425
3.04	Install pavement pavement legend/marking	26	EA	$500	$13,000
3.05	Install sign panel	8	EA	$100	$800
3.06	Install sign and post	3	EA	$500	$1,500
Signing & Striping Subtotal					$40,725
Total					$66,685
30% Contingency					$20,006
10% Design					$6,669
6% Construction Engineering					$4,001
Grand Total					**$97,360**
Rounded Total					**$100,000**

Table A.3 Detailed Cost Overview: Barranca Parkway & Alton Parkway

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$8,400	$8,400
1.01	Traffic control	1	LS	$4,200	$4,200
1.02	Construction survey and monumentation	1	LS	$4,200	$4,200
General Subtotal					$16,800
Traffic Signal					
2	Traffic Signal Modifications	1	LS	$5,000	$5,000
2.01	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
Traffic Signal Subtotal					$12,200
Signing & Striping					
3	Remove existing striping	1	LS	$6,000	$6,000
3.01	Install lane line striping	7,965	LF	$2	$15,930
3.02	Install ladder x-walk	4,600	SF	$2	$9,200
3.03	Install green bike lane markings	810	LF	$5	$4,050
3.04	Install pavement pavement legend/marking	29	EA	$500	$14,500
3.05	Install sign panel	8	EA	$100	$800
3.06	Install sign and post	4	EA	$500	$2,000
Signing & Striping Subtotal					$52,480
Total					$81,480
30% Contingency					$24,444
10% Design					$8,148
6% Construction Engineering					$4,889
Grand Total					**$118,961**
Rounded Total					**$120,000**

Table A.4 Detailed Cost Overview: Alton Parkway & Technology Drive

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$8,650	$8,650
1.01	Traffic control	1	LS	$4,325	$4,325
1.02	Construction survey and monumentation	1	LS	$4,325	$4,325
General Subtotal					$17,300
Traffic Signal					
2	Traffic Signal Modifications	1	LS	$5,000	$5,000
2.01	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
Traffic Signal Subtotal					$12,200
Signing & Striping					
3	Remove existing striping	1	LS	$4,500	$4,500
3.01	Install lane line striping	7,500	LF	$2	$15,000
3.02	Install ladder x-walk	5,500	SF	$2	$11,000
3.03	Install green bike lane markings	850	LF	$5	$4,250
3.04	Install pavement pavement legend/marking	34	EA	$500	$17,000
3.05	Install sign panel	6	EA	$100	$600
3.06	Install sign and post	4	EA	$500	$2,000
Signing & Striping Subtotal					$54,350
Total					$83,850
30% Contingency					$25,155
10% Design					$8,385
6% Construction Engineering					$5,031
Grand Total					**$122,421**
Rounded Total					**$130,000**

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$9,000	$9,000
1.01	Traffic control	1	LS	$4,500	$4,500
1.02	Construction survey and monumentation	1	LS	$4,500	$4,500
General Subtotal					$18,000
Traffic Signal					
2	Traffic Signal Modifications	1	LS	$5,000	$5,000
2.01	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
Traffic Signal Subtotal					$12,200
Signing & Striping					
3	Remove existing striping	1	LS	$8,500	$8,500
3.01	Install lane line striping	10,600	LF	$2	$21,200
3.02	Install continental x-walk	4,200	SF	$2	$8,400
3.03	Install green bike lane markings	510	LF	$5	$2,550
3.04	Install pavement pavement legend/marking	29	EA	$500	$14,500
3.05	Install sign panel	8	EA	$100	$800
3.06	Install sign and post	2	EA	$500	$1,000
Signing & Striping Subtotal					$56,950
Total					$87,150
30% Contingency					$26,145
10% Design					$8,715
6% Construction Engineering					$5,229
Grand Total					**$127,239**
Rounded Total					**$130,000**

Table A.6 Detailed Cost Overview: I-5 Carpool Ramp & Barranca Parkway

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$6,400	$6,400
1.01	Traffic control	1	LS	$3,200	$3,200
1.02	Construction survey and monumentation	1	LS	$3,200	$3,200
General Subtotal					$12,800
Civil Improvements					
2	Construct ADA curb ramp	2	EA	$4,400	$8,800
Civil Improvements Subtotal					$8,800
Traffic Signal					
3	Video Detection	1	LS	$22,000	$22,000
3.01	LED-Illuminated bike detection indicator	2	EA	$1,800	$3,600
Traffic Signal Subtotal					$25,600
Signing & Striping					
4	Remove existing striping	1	LS	$2,000	$2,000
4.01	Install lane line striping	2,600	LF	$2	$5,200
4.02	Install continental x-walk	880	SF	$2	$1,760
4.03	Install green bike lane markings	350	LF	$5	$1,750
4.04	Install pavement pavement legend/marking	7	EA	$500	$3,500
4.05	Install sign panel	2	EA	$100	$200
Signing & Striping Subtotal					$14,410
Total					$61,610
30% Contingency					$18,483
10% Design					$6,161
6% Construction Engineering					$3,697
Grand Total					**$89,951**
Rounded Total					**$100,000**

Table A.7 Detailed Cost Overview: I-5 Carpool Ramp & Alton Parkway

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$6,500	$6,500
1.01	Traffic control	1	LS	$3,250	$3,250
1.02	Construction survey and monumentation	1	LS	$3,250	$3,250
General Subtotal					$13,000
Civil Improvements					
2	Demo/ Unclassified excavation	5	CY	$70	$350
2.01	PCC sidewalk	250	SF	$8	$2,000
2.02	PCC curb and gutter	40	LF	$50	$2,000
2.03	Asphalt concrete pavement	2	TON	$150	$300
Civil Improvements Subtotal					$4,650
Traffic Signal					
3	Video Detection	1	LS	$22,000	$22,000
3.01	LED-Illuminated bike detection indicator	1	EA	$1,800	$1,800
Traffic Signal Subtotal					$23,800
Signing & Striping					
4	Remove existing striping	1	LS	$2,000	$2,000
4.01	Install lane line striping	3,500	LF	$2	$7,000
4.02	Install continental x-walk	1,000	SF	$2	$2,000
4.03	Install green bike lane markings	510	LF	$5	$2,550
4.04	Install pavement pavement legend/marking	13	EA	$500	$6,500
4.05	Install sign panel	6	EA	$100	$600
4.06	Install sign and post	1	EA	$500	$500
Signing & Striping Subtotal					$21,150
Total					$62,600
30% Contingency					$18,780
10% Design					$6,260
6% Construction Engineering					$3,756
Grand Total					**$91,396**
Rounded Total					**$100,000**

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$20,200	$20,200
1.01	Traffic control	1	LS	$10,100	$10,100
1.02	Construction survey and monumentation	1	LS	$10,100	$10,100
General Subtotal					$40,400
Civil Improvements					
2	Construct ADA curb ramp	6	EA	$4,400	$26,400
Civil Improvements Subtotal					$26,400
Lighting					
3	Furnish and install marbelite street light pole with base plate and anchor bolts	1	EA	$3,000	$3,000
3.01	Furnish and install concrete street light foundation	1	EA	$1,000	$1,000
3.02	Furnish and install luminaire on mast arm	1	EA	$1,700	$1,700
3.03	Furnish and install street light pullbox	1	EA	$600	$600
3.04	Furnish and install street light conduit and conductors	100	LF	$40	$4,000
3.05	Furnish and install service enclosure	1	EA	$6,500	$6,500
Lighting Subtotal					$16,800
Traffic Signal					
4	Furnish and install Type 1-A pole	2	EA	$4,400	$8,800
4.01	Furnish and install countdown ped head	2	EA	$1,500	$3,000
4.02	Furnish and install pedestrian push button	2	EA	$1,850	$3,700
4.03	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
4.04	Traffic signal modifications	1	LS	$6,000	$6,000
Traffic Signal Subtotal					$28,700
Signing & Striping					
5	Remove existing striping	1	LS	$6,000	$6,000
5.01	Install lane line striping	13,600	LF	$2	$27,200
5.02	Install continental x-walk	3,000	SF	$2	$6,000
5.03	Install green bike lane markings	1615	LF	$5	$8,075
5.04	Install pavement pavement legend/marking	52	EA	$500	$26,000
5.05	Install sign panel	2	EA	$100	$200
5.06	Install sign and post	19	EA	$500	$9,500
Signing & Striping Subtotal					$82,975
Total					$195,275
30% Contingency					$58,583
10% Design					$19,528
6% Construction Engineering					$11,717
Grand Total					**$285,102**
Rounded Total					**$290,000**

Item No.	Item Description	Qty	Measure	Cost	Item Total
General					
1	Mobilization	1	LS	$23,000	$23,000
1.01	Traffic control	1	LS	$11,500	$11,500
1.02	Construction survey and monumentation	1	LS	$11,500	$11,500
General Subtotal					$46,000
Civil Improvements - Curb Ramps & Bikeway					
2	Construct ADA curb ramp	6	EA	$4,400	$26,400
2.01	Demo/ Unclassified excavation	35	CY	$70	$2,450
2.02	PCC sidewalk	1,900	SF	$8	$15,200
2.03	PCC curb	40	LF	$50	$2,000
2.04	Asphalt concrete pavement	6	TON	$150	$900
Civil Improvements Subtotal					$46,950
Lighting					
3	Furnish and install marbelite street light pole with base plate and anchor bolts	1	EA	$3,000	$3,000
3.01	Furnish and install concrete street light foundation	1	EA	$1,000	$1,000
3.02	Furnish and install luminaire on mast arm	1	EA	$1,700	$1,700
3.03	Furnish and install street light pullbox	1	EA	$600	$600
3.04	Furnish and install street light conduit and conductors	100	LF	$40	$4,000
3.05	Furnish and install service enclosure	1	EA	$6,500	$6,500
Lighting Subtotal					$16,800
Traffic Signal					
4	Furnish and install Type 1-A pole	2	EA	$4,400	$8,800
4.01	Furnish and install countdown ped head	2	EA	$1,500	$3,000
4.02	Furnish and install pedestrian/bike push button	4	EA	$1,850	$7,400
4.03	LED-Illuminated bike detection indicator	4	EA	$1,800	$7,200
4.04	Traffic signal modifications	1	LS	$6,000	$6,000
Traffic Signal Subtotal					$32,400
Signing & Striping					
5	Remove existing striping	1	LS	$7,000	$7,000
5.01	Install lane line striping	11,400	LF	$2	$22,800
5.02	Install continental x-walk	3,000	SF	$2	$6,000
5.03	Install green bike lane markings	1,970	LF	$5	$9,850
5.04	Install pavement pavement legend/marking	50	EA	$500	$25,000
5.05	Install sign panel	2	EA	$100	$200
5.06	Install sign and post	19	EA	$500	$9,500
Signing & Striping Subtotal					$80,350
Total					$222,500
30% Contingency					$66,750
10% Design					$22,250
6% Construction Engineering					$13,350
Grand Total					**$324,850**
Rounded Total					**$330,000**