CITY OF IRVINE

A Bicycle Friendly Community

Final

BICYCLE TRANSPORTATION PLAN

Amended 2011

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Chapter 1 – Executive Summary

Background

This document serves as an Amendment to the City's 2006 Bicycle Transportation Plan. In 2006, the City Council of the City of Irvine approved the Bicycle Transportation Plan (Plan) which serves as a guiding document for the development and maintenance of a city bicycle infrastructure network that is safe, efficient and enjoyable. The Plan was prepared in accordance with the requirements of Caltrans Bicycle Transportation Account (BTA) Program (Section 891.2 of California Streets and Highways Code) to maintain the City's eligibility to compete for grant funding. The BTA program requires the City Council to approve the Plan every five funding cycles to maintain program eligibility.

The City has amended the 2006 Plan to reflect the existing bicycle infrastructure network and the near term project list. The feasibility and cost of the future infrastructure projects were not conducted as part of this amendment. A summary of the minor amendments to the 2006 Plan are discussed below.

Community Involvement – Chapter 2

Chapter 2 of this Plan discusses the community involvement undertaken during this amendment process. This chapter has been updated to reflect the results of the community survey that was made available to the public from February 22, 2011 to May 2, 2011 to gauge the community interest in bicycling in Irvine.

Definitions – Chapter 3

Chapter 3 of this Plan defines the terminology specific to the description, analysis and assessment of the City's bikeway network. No changes were made to this chapter.

Existing Bikeways System – Chapter 4

Chapter 4 of this Plan describes the existing bikeway system in the City. The following changes were made to this chapter:

- The existing miles of on-street bikeways have been updated from 282 to 301 miles.
- The existing miles of off-street bikeways have been updated from 44.5 to 54 miles.
- Added discussion on Community Services Commission's adoption of Resolution 07-134 approving the names of public paved off-street bikeways and the procedures for naming these bikeways.
- Added discussion on the City's recognition as a Bicycle Friendly Community by the League of American Bicyclists in 2009.
- Updated names of the bikeways to be consistent with the adopted names of the public paved off-street bikeways.
- Updated bicycle commuter information.
- Added *i*Shuttle discussion under Alternative Transportation Modes.
- Added discussion on Caltrans directive requiring the installation of bicycle and motorcycle detection devices.
- Updated all figures to reflect the existing bikeway system.

Proposed Bikeways System – Chapter 5

Chapter 5 of this Plan discusses the City's proposed bikeways and bicycle amenities as identified in the General Plan. The following changes were made to this chapter:

- The proposed lists of infrastructure projects have been updated to reflect the bikeways that have been completed since the 2006 Plan adoption.
- The discussion on University of California, Irvine (UCI) projects has been updated based on input from UCI.

- All figures have been updated to reflect updated proposed lists of infrastructure projects.
- The discussion on the proposed network consistency with community outreach results has been updated to reflect the results of the community survey.
- The bicycle commuter estimates have been updated to reflect the recent data collected.
- Added *i*Shuttle discussion under Future Alternative Transportation Modes.

Implementation – Chapter 6

Chapter 6 of this Plan classifies infrastructure projects identified in Chapter 5 as either near-term or long-term projects. The near-term projects are projects prioritized by the community through the survey; the remaining infrastructure projects are identified as long-term projects. The near-term projects are unfunded projects to be implemented in the next 5 to 10 years through grants, local funds or developer obligation. The lists of infrastructure projects have been updated through this amendment.

Funding – Chapter 7

Chapter 7 of this Plan discusses the funding sources the City received to implement bikeway projects. The discussion on the amount of funding and type of funding available has been updated. The following changes were made to this chapter:

- Updated table reflecting funding received for bicycle projects from FY 2005-06 through FY 2011-12.
- Updated table detailing grant funding programs.

Design – Chapter 8

Chapter 8 of this Plan identifies City guidelines for planning, designing and constructing bikeways in the City. City planning and design standards for the construction of new bikeways defer to the Caltrans Highway Design Manual, Chapter 1000 – Bikeway Planning and Design, except where expressly noted that City standards take

precedence. The only changes made to this chapter was an update to the names of the Class I bikeways to be consistent with the adopted names of off-street bikeways.

Safety and Education – Chapter 9

Chapter 9 of this Plan discusses the bicycle education program provided by the City and presents the data on bicycle related collisions. The following changes were made to chapter 9.

- Updated statistics for 309 bicycle related collisions in the past six years (July 2005 through August 2011).
- Provided an overview of the City's current bicycle safety and education programs including, neighborhood traffic officer support, student workshops / assemblies / rodeos, community and parent workshops, DARE program, bicycle helmet program, bicycle / pedestrian safety diversion program, City's bikeways map, Suggested Routes to School Maps, and bicycle safety video.

Consistency – Chapter 10

Chapter 10 of this Plan describes the Plan's consistency with the City and regional policy documents. The reference to recently adopted regional plans has been updated.

Bicycle Transportation Account (BTA) Requirements

This Plan is also consistent with Sections 890 through 894.2 of the California Streets and Highways Code, which establishes the following elements as required for a city or county to include in a Bicycle Transportation Plan in order to maintain eligibility for the Bicycle Transportation Account funding program:

(a) Bicycle Commuters: The estimated number of existing bicycle commuters in the plan area and the estimated increase in the number of bicycle commuters resulting from implementation of the Plan.

(b) Land Use: A map and description of existing and proposed land use and settlement patterns which shall include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings, and major employment centers.

(c) Bicycle Plan: A map and description of existing and proposed bikeways.

(d) Bicycle Parking Facilities: A map and description of existing and proposed end-of-trip bicycle parking facilities. These shall include, but not be limited to, parking at schools, shopping centers, public buildings, and major employment centers.

(e) Transit Facilities and Amenities: A map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes. These shall include, but not be limited to, parking facilities at transit stops, retail and transit terminals, ferry docks and landings, park and ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels.

(f) End-of-Trip Amenities: A map and description of existing and proposed public facilities for changing and storing clothes and equipment. These shall include, but not be limited to, locker, restroom, and shower facilities near bicycle parking facilities.

(g) Bicycle Safety: A description of bicycle safety and education programs conducted in the area included within the plan, efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the Vehicle Code pertaining to bicycle operation, and the resulting effect on accidents involving bicyclists.

(h) Community Outreach: A description of the extent of citizen and community involvement in development of the plan, including, but not limited to, letters of support.

(i) Regional Consistency: A description of how the Plan has been coordinated and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, programs that provide incentives for bicycle community.

(j) Bicycle Facilities Improvements: A description of the projects proposed in the Plan and a listing of their priorities for implementation.

(k) Bicycle Facilities Expenditures: A description of past expenditures for bicycle facilities and future financial needs for projects that improve safety and convenience for bicycle commuters in the Plan area.

Table 1-A, *Caltrans Bicycle Transportation Account Requirements*, identifies the chapters, sections, figures and tables that meet the above requirements.

Table 1-A
Caltrans Bicycle Transportation Account Requirements

BTA Requirement	Irvine Bicycle Transportation Plan Section References	Figure & Table References
Estimated number of existing bicycle commuters	Section 4.10 Existing Bicycle Commuters	None.
Estimated increase in bicycle commuters	Section 5.9 Future Bicycle Commuter Estimates	Table 5-A, *Potential Bicycle Commuters*
Map & description of existing land use and settlement patterns	Section 4.5 Land Use and Settlement Patterns	Figure 4-4, *Existing Land Use & Settlement Patterns*
Map & description of future land use and settlement patterns	Section 5.6 General Plan Proposed Land Use & Settlement Patterns	Figure 5-4, *Future Land Use & Settlement Patterns*
Map & description of	Chapter 4 Existing Bikeways	Figure 4-2, *Existing Bikeways System*

BTA Requirement	Irvine Bicycle Transportation Plan Section References	Figure & Table References
existing bikeways	System	Figure 4-3, *Existing Grade Separations*
Map & description of proposed bikeways	Chapter 5 Proposed Bikeways System	Figure 5-1A, *General Plan Trails Network* Figure 5-1B, *IBC Planned Trails Network* Figure 5-2A, *Future Off-Street Projects* Figure 5-2B, *Future On-Street Projects* Figure 5-2C, *UCI Projects* Figure 5-3, *Future Grade Separation Projects*
Map & description of existing bicycle parking facilities	Chapter 4 Existing Bikeways System	Figure 4-5, *Existing End-of-Trip Facilities*
Map & description of proposed bicycle parking facilities	Chapter 5 Proposed Bikeways System	Figure 5-5, *Future End-of-Trip Facilities*
Map & description of existing connections with other transportation modes	Section 4.11 Alternative Transportation Modes	Figure 4-6, *Existing Connections with Alternative Transportation Modes*
Map & description of future connections with other transportation modes	Section 5.8 Future Alternative Transportation Modes	Figure 5-6, *Future Connections with Alternative Modes*
Map & description of existing facilities for changing and storing clothes & equipment	Chapter 4 Existing Bikeways System	Figure 4-5, *Existing End-of-Trip Facilities*
Map & description of future facilities for changing and storing clothes & equipment	Chapter 5 Proposed Bikeways System	Figure 5-5, *Future End-of-Trip Facilities*
Description of existing bicycle safety and education programs	Chapter 9 Bicycle Safety and Education Programs	Figure 9-1, *Bicycle Related Collisions*
Description of citizen participation in the development of the plan	Chapter 2 Community Involvement and Participation	None.
Description of consistency with other transportation, air quality or energy conservation plans	Chapter 10 Consistency with Regional Planning	None.
Description of projects proposed	Chapter 5 Proposed Bikeways System	None.

BTA Requirement	Irvine Bicycle Transportation Plan Section References	Figure & Table References
Listing of project prioritization	Chapter 6 Plan Implementation and Project Prioritization	Table 6-A, *Off-Street Projects* Figure 6-1, *Prioritized Off-Street Projects* Table 6-B, *On-Street Projects* Figure 6-2, *Prioritized On-Street Projects* Table 6-C, *Grade Separation Projects* Figure 6-3, *Prioritized Grade Separation Projects*
Description of past expenditures and future financial needs	Chapter 6 Plan Implementation and Project Prioritization Chapter 7 Funding Opportunities and Expenditures	Table 7-A, *Past Expenditures History* Table 7-B, *Bicycle Transportation Funding Programs*

Chapter 2 – Community Involvement and Participation

This chapter describes the City's approach to the community involvement component of this Plan. The final section of this chapter discusses recommendations received from the community and how these recommendations are incorporated into the rest of the Plan.

2.1 Community Involvement Approach

The City conducted a citywide survey to understand the community's bikeway needs. The survey allowed the community to voice their suggestions for improvements to existing bikeways and for future bikeways. Providing for community involvement also ensures the City of Irvine meets State requirements when seeking funding for bikeway improvements.

2.2 Community Survey

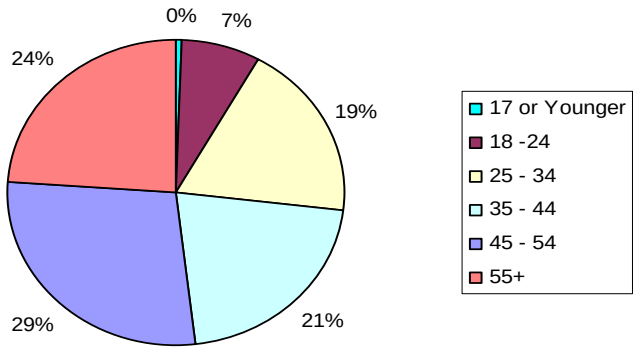
The survey was available from February 22, 2011 through May 2, 2011 at the City of Irvine's website. The City requested public participation of the survey in a number of ways: Announcement in the City, UCI, Spectrumotion and Bicycle Club of Irvine websites; advertisement in the City of Irvine Inside Irvine magazine and an e-mail blast to Spectrumotion, a transportation management association in the Irvine Spectrum, members.

Survey Results

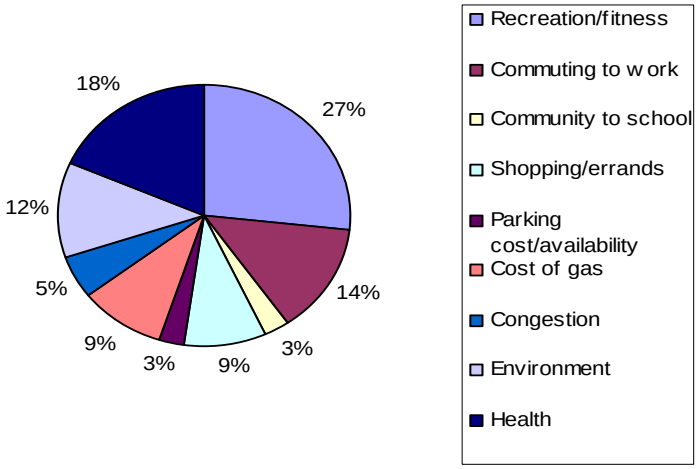
420 people completed the survey over the two-month time frame. A summary of the results is provided below.

The majority of the survey responses came from people who were between ages of 45 and 54. The majority of the respondents choose to bike for recreation/fitness reason, followed by health and commuting to work. The length of most frequent bicycle trips of respondents was over 45 minutes long.

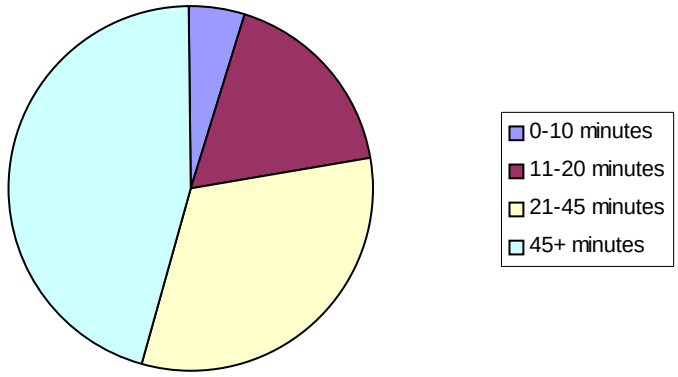
Question 4: What is your age?



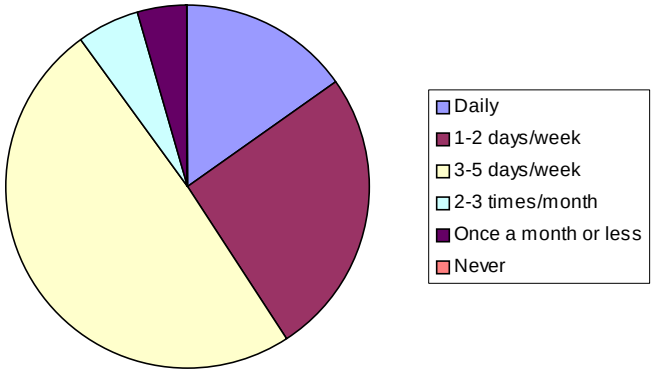
Question 1: What are the reasons you choose to bike (check all that apply)?



Question 2: How long are your most frequent bicycle trips (one-way)?



Question 3: How often do you ride your bike?



The survey asked the respondents about their reasons for riding, the routes they most frequently use, the destinations they currently ride to, and those destinations that they would like to ride to if bikeways were available. Additional questions focused on respondents' rating of proposed bikeway facilities. User information, such as age and length of bicycle trips were also collected. The survey contained 10 questions, with space to provide additional comments. Most of the questions were multiple-choice, while some rating scales were used to rate the importance of a particular aspect related

to bikeways and bicycling. The complete survey can be found in Appendix A, *Community Survey Materials*.

According to the survey, the most popular destinations to which respondents currently ride their bikes are (prioritized starting with most popular destination):

- The University of California, Irvine;
- The Market Place;
- Irvine Station;
- Irvine Business Complex;
- Irvine Spectrum Entertainment Center;
- Irvine Spectrum Employment Center; and
- Tustin Metrolink Station

In contrast, if routes were improved or established, respondents would most like to ride to the destinations identified below (prioritize starting with most popular destination).

- The Irvine Spectrum Entertainment Center;
- The Market Place;
- Irvine Station;
- University of California, Irvine;
- Tustin Metrolink Station;
- Irvine Business Complex; and
- Irvine Spectrum Employment Center

When asked about their preference on bikeway facilities, respondents indicated they most preferred Off-Street Bikeway followed by Grade Separated Crossing and On-Street Bikeway.

The respondents rated three proposed off-street bikeways. Below are the proposed segments listed in the priority order starting with the highest rating:

- New off-street bikeways connecting to and through the Orange County Great Park;
- New off-street bikeway connecting Irvine Station to the employment and retail centers in the Irvine Spectrum located north/east of I-5 freeway; and
- New off-street bikeway through the Irvine Business Complex

The survey results showed the ranking of the following grade separating crossings (starting with the highest rating):

- A new grade separated crossing over Culver Drive parallel to the I-405 freeway; north/east of I-405 freeway;
- A new grade separated crossing over the I-5 freeway adjacent to Jeffrey Road;
- A new grade separated crossing over Jeffrey Road parallel to the I-405 freeway; north/east side of I-405 freeway; and
- A new grade separated crossing over Walnut Avenue adjacent to Jeffrey Road

In addition to ranking bikeway facilities, the respondents also rated the importance of bicycle amenities. Below is a ranking of bicycle amenities, starting with the amenity deemed as most important by the respondents:

- Bicycle parking at retail centers;
- Bicycle parking at work place;
- Wayfinding signs;
- Bicycle parking at parks;
- Rest stop at parks (designated meeting areas with benches, drinking fountains and bike racks); and
- Benches along trails

2.3 Summary and Recommendations

Feedback received from the community surveys indicates that while people are generally pleased with the bikeway network and opportunities for bicycling in the City of Irvine, they see some opportunities to improve the network. Specifically, the community would like more off-street bikeways; extension of existing bikeways to destinations such as the Irvine Spectrum Entertainment Center.

Recommendations gathered from the community have been incorporated into this Plan. Chapter 5 identifies how the proposed network is consistent with community outreach results. Specifically, it recommends additional off-street bikeways, extension of existing bikeways, and the creation of additional loops for recreational bicycling. Community ranking of proposed projects was also included within the overall project prioritization program, described in Chapter 6, *Plan Implementation and Project Prioritization*.

Chapter 3 – Definitions

This chapter of the Plan defines terminology specific to the description, analysis, and assessment of Irvine's bicycle network and used throughout this Plan.

3.1 Bikeway Facilities

The Caltrans Highway Design Manual, Chapter 1000, "Bikeway Planning and Design," defines the following bikeway facilities in Sections 1001.4 and 1002.1.

Bikeways. All facilities that provide primarily for bicycle travel.

Class I Bikeway (Bicycle Path). Provides a completely separated right-of-way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized.

Class II Bikeway (Bicycle Lane). Provides a striped lane for one-way bicycle travel on a street or highway.

Class III Bikeway (Bicycle Route). Provides for shared use with pedestrian or motor vehicle traffic.

Shared Roadway. Any roadway with no bicycle designation. In California, bicyclists cannot be banned from public streets, but can be banned from freeways. Therefore, all streets that are not freeways and have no bicycle designation are shared roadways.

The following definitions are not included in the Caltrans Highway Design Manual, but are relevant to the Plan and bikeway network.

At-Grade Crossing. When a Class I bikeway intersects with a roadway, and no grade separation is present to allow bicyclist to bypass crossing automobile traffic. At-grade crossings may or may not be signalized.

Caltrans Design Standards. Standards for the size and shape of bicycle facilities, as well as the use of signs, markings, and traffic signals established by the Caltrans Highway Design Manual, Chapter 1000.

Grade. The slope of a bikeway facility. The maximum accepted grade for a Class I bikeway is 5%, with 2% for sustained distances.

Grade Separation. When a Class I bikeway crosses over or under a roadway, allowing bicyclists to cross without interacting with automobile traffic. Grade separations in this Plan are also termed "overcrossings" and "undercrossings."

3.2 Types of Bicyclists

Within the City of Irvine, bicyclists vary significantly in their skill level, comfort with cars and traffic, reasons for bicycling, and common destinations. All of these factors can affect what facilities a bicyclist will use and value, and how a cyclist will use those facilities. The following definitions help to describe and assess the different needs of the City's cycling public; however, most bicyclists have attributes of multiple types of bicyclists.

Casual Bicyclist. Includes those who feel less comfortable negotiating traffic, often bicycle shorter distances than experienced riders, and may be unfamiliar with many of the rules of the road. Casual bicyclists benefit from route markers and wayfinding signage, bicycle lanes, wider curb lanes, and educational programs.

Commuter Bicyclist: Employee. Bicycle commuters who ride to work, making their entire commute by bicycle or by using their bicycle to link with other modes of transportation including buses, trains, or carpools and rideshares. Commuter bicyclists value direct routes between residential and employment areas, safe and secure bicycle parking facilities, and locker and shower facilities at their place of employment.

Commuter Bicyclist: Student. Bicyclists who travel to and from their home, school, college, or university. Grade school through high school bicycle commuters typically commute less than five miles to school, cross few arterials, and often use the sidewalk. College and university students are likely to bicycle less than five miles as well, but may travel as long as ten to fifteen miles. Within the City of Irvine, college students may also use their bicycle to travel around

campus and nearby retail centers. Like employee commuters, student commuters are likely to value direct routes, and may be more likely than employee commuters to prefer routes with less traffic and arterial crossings.

Experienced Bicyclist. Includes those who prefer the most direct route between origin and destination and prefer riding within or near the vehicle travel lanes. Experienced bicyclists negotiate streets in much the same manner as motor vehicles, merging across traffic to make left turns, and avoiding bicycle lanes and shoulders that contain gravel and glass. Experienced bicyclists benefit from wider curb lanes, bicycle-actuated loop detectors, and bicycle video detectors at signals, or most current technology.

Recreational Bicyclists: Casual Bicyclist. Casual recreational cyclists are those who generally want to ride on off-street bikeways and cover shorter trip distances at slower speeds. Casual cyclists will tend to take trips of less than 10 miles in length, and may ride as a family group with children. Recreational destinations are also important for casual cyclists, as they provide a place to stop and get off the bike. To this end, having secure bicycle parking at destinations is important.

Recreational Bicyclists: Road Cyclists. Road cyclists bicycle almost exclusively on roadways, which accommodate higher speeds, longer distances, and few conflicts with other recreational users. Typical trip distances for the road cyclist can range from 10 miles to over 50 miles. While the average road cyclist would likely prefer to ride on roads with little or no traffic, they are generally comfortable riding in traffic, if necessary. To this end, a road cyclist will tend to ride in a manner similar to a motor vehicle (e.g., when approaching traffic signals or making left turns). Road cyclists are typically not seeking a recreational destination along the route, as the ride itself is the recreation.

3.3 Bicycle Amenities

Bicycle amenities are physical items provided in the City to serve the bicycling community through the enhancement of safety, aesthetics, and enjoyment. Bicycle amenities include landscaping, lighting, rest amenities, and end-of-trip facilities. The following definitions are used to describe the types of amenities provided in the City of Irvine:

Class I Bicycle Parking Facilities. Class I bicycle racks are stationary storage racks designed to secure the frame and both wheels of the bicycle, where the cycle supplies only a padlock. Additionally, enclosed bicycle lockers, staffed bicycle parking lots, or unstaffed bicycle lots that are accessible only to an exclusive set of users, or any other facilities with a locking mechanism that is not provided by the bicycle user are also considered Class I bicycle parking facility.

Class II Bicycle Parking Facilities. The City of Irvine Zoning Code defines Class II bicycle racks as a stationary bicycle rack, typically a vertical loop or bar, where the cyclist provides both a padlock and a chain or cable to secure their bicycle.

End of Trip Facilities. Includes bicycle lockers, bicycle racks, and locker rooms and shower rooms that bicyclists may require at their destinations. End of trip facilities are especially important to bicycle commuters and are usually provided by employers. Other end of trip facilities may include restroom, parking stalls, monument signage, trash cans, kiosk or covered bulletin board, and security lighting.

Rest Amenities. Includes drinking fountains, benches, picnic tables and lawn areas that directly serve users of the on-street or off-street bikeway system. Rest amenities are important for less experienced bicyclists, families bicycling with children, walkers, joggers, and seniors using the bikeway network.

Chapter 4 – Existing Bikeways System

The City provides a system of bikeways that encourage the use of the bicycle as a safe and convenient means of transportation for both recreation and commuting purposes. The City was recognized by the League of American Bicyclists as a "Bicycle Friendly Community" in May 2009. This 3 year recognition is a reflection of the City's commitment to advocate bicycling as a viable alternative transportation mode. The City is the first within the County of Orange and one of the 22 cities within the State of California to receive this recognition.

Bicycle Friendly Community sign installed at the San Diego Creek.

4.1 Existing Class I Off-Street Bikeways

An additional 9.4 miles of off-street bikeways have been constructed since the 2006 Plan update. There are now approximately 54 miles of off-street bikeways, which branch throughout the City. In addition to the construction of new bikeways, the City adopted official names of bikeways since the last update of the Plan. On November 7, 2007, the City of Irvine Community Services Commission adopted Resolution 07-134 approving the names of public paved off-street bikeways and the procedures for naming these bikeways. Figure 4-1 depicts the named public paved off-street bikeways.

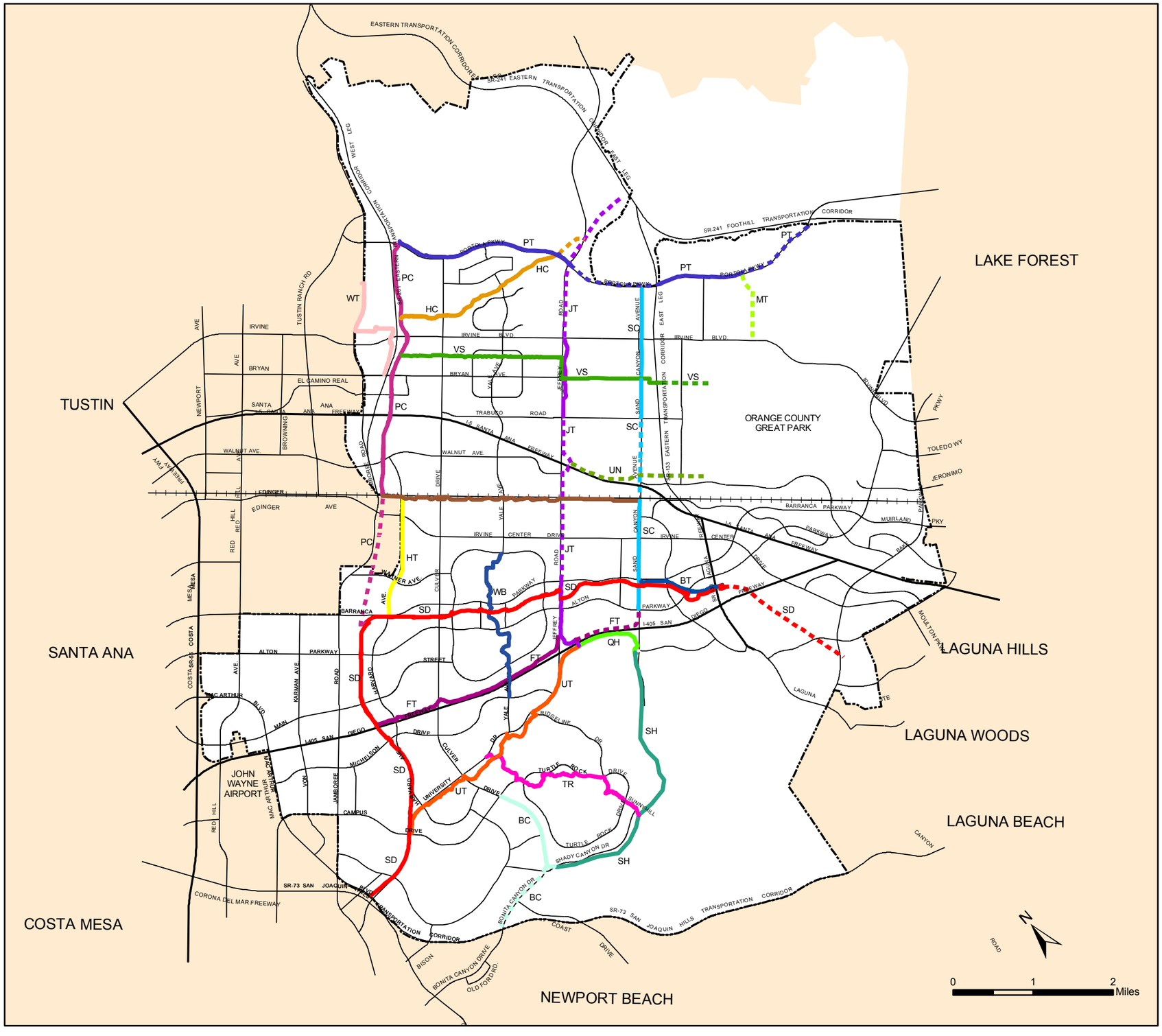
Below are descriptions of the existing off-street bikeways. The segments are based on the official names identified on Figure 4-1.

West Irvine Trail – This Class I bikeway runs north/south adjacent to Jamboree Road and turns into an east/west bikeway connecting Jamboree Road to the SR- 241 freeway, it then runs north/south adjacent to the SR- 241 freeway.

Peters Canyon Trail – This Class I bikeway is one portion of a regional connection which begins to the north in the City of Orange and extends south through Cities of Tustin, Irvine, and Newport Beach and ends in the Upper Newport Bay. Peters Canyon Trail enters the City of Irvine as it crosses Jamboree Road, south of Portola Parkway. From here the bikeway follows the east side of Jamboree Road, the west side of SR-261, and the east side of the Peters Canyon Wash Channel to the railroad tracks. The trail currently terminates at the railroad tracks; however, future plans will bring it south through the City of Tustin to the intersection of Barranca Parkway and the San Diego Creek Trail.

Looking south on Peters Canyon Trail

Figure 4-1, Named Public Paved Off-Street Trails



Legend

- Bonita Canyon Trail
- Barranca Trail
- Freeway Trail
- Hicks Canyon Trail
- Harvard Trail
- Jeffrey Open Space Trail
- Modjeska Trail
- Peters Canyon Trail
- Portola Trail
- Quail Hill Trail
- Sand Canyon Trail
- San Diego Creek Trail
- Shady Canyon Trail
- Turtle Rock Trail
- Un-named Trail
- University Trail
- Venta Spur Trail
- Woodbridge Trail
- West Irvine Trail
- Walnut Trail
- Irvine City Boundary
- Irvine Sphere of Influence

Note: Dashed lines indicate future trail segments or trail segments maintained by other jusrisdictions

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Jeffrey Open Space Trail – This Class I bikeway runs north/south, parallels Jeffrey Road and provides access to a number of communities and schools. The majority of the bikeway is constructed. When complete, the bikeway will extend from from Portola Parkway and end at I-405 freeway.

Sand Canyon Trail – This Class I bikeway provides a north/south connection and runs parallel to Sand Canyon Avenue. Currently, this bikeway extends from Portola Parkway to Trabuco Road and from Walnut Trail to Alton Parkway. When complete, the bikeway will provide continuous connection between Portola Parkway and I-405 freeway.

Portola Trail – This Class I bikeway is located along Portola Parkway and provides east/west access and currently connects Peters Canyon Trail to Sand Canyon Trail.

Hicks Canyon Trail – Hicks Canyon Trail in Northwood runs east/west from the SR-261 freeway to Portola Parkway.

Venta Spur Trail – The Venta Spur Trail runs east/west from Peters Canyon Trail to the SR-133 Freeway.

Walnut Trail – The Walnut Trail runs east/west adjacent to the Metrolink train tracks, between Harvard Avenue and Sand Canyon Avenue. At Sand Canyon Avenue, a street-adjacent off-street bikeway connects the Walnut Trail to the San Diego Creek Trail to the south.

San Diego Creek Trail – This Class I bikeway also forms a segment of a regional trail that connects the City of Orange with the Upper Newport Bay, and follows the east side of the San Diego Creek channel as it extends from its intersection with Peters Canyon Wash, near Barranca Parkway, to Newport Beach

in the south. Near Barranca Parkway, the San Diego Creek Trail also travels east through central Irvine. The bikeway follows both sides of the channel between Sand Canyon Avenue and SR-133 toll road and terminates before intersecting with the I-405 Freeway in the Irvine Spectrum.

Harvard Trail - This bikeway is located along Harvard Avenue and connects Walnut Trail, just south of the railroad tracks to San Diego Creek.

Woodbridge Trail – This trail is an extension of the San Diego Creek Trail and runs north and south of the San Diego Creek channel, through the neighborhood of Woodbridge. To the north, the trail follows the western edge of Woodbridge's North Lake to connect with Yale Loop. To the south, the trail follows the eastern edge to Woodbridge's South Lake, to connect with Yale Loop again to the south.

The San Diego Creek Trail, as it passes through central Irvine.

Freeway Trail – This bikeway runs east/west along the north side of the I-405 Freeway in the Southern California Edison easement, between the San Diego Creek Trail and the Jeffrey/I-405 bike bridge.

University Trail – This County of Orange bikeway facility is located on the south side of University Drive and runs east/west through Mason Regional Park, between Harvard Avenue and Ridgeline Drive.

Shady Canyon Trail – This bikeway begins at the Quail Hill trail head, just south of the I-405 Freeway. This bikeway connects Quail Hill in the northeast with the neighborhood of Turtle Rock and the University of California, Irvine to

the southwest, through the community of Shady Canyon, and terminates at the intersection of Culver Drive and Shady Canyon Drive

Barranca Trail – This Class I bikeway runs east/west and extends from Sand Canyon Trail to SR-133 freeway. This bikeway parallels the San Diego Creek and is located on the north side of San Diego Creek Trail.

Bonita Canyon Trail – This Class I bikeway parallels Culver Drive and connects Campus Drive to Shady Canyon Trail.

Turtle Rock Trail – This Class I bikeway goes through the community of Turtle Rock and connects University Trail to Shady Canyon Trail.

Class I Off-Street Bikeway Conditions

Paving material for off-street bikeways includes asphalt and concrete. Shoulder striping is fairly prevalent along asphalt bikeways, while centerline striping is typically not present, except along curves and steeper bikeway segments. Centerline striping provides guidance to fast moving bicycles as they navigate curves, which may help to prevent collisions with pedestrians, joggers and other bicyclists moving in the opposite direction, however centerline striping increases maintenance costs.

The San Diego Creek Trail is predominately asphalt and has shoulder striping along most segments.

4.2 Existing Class II On-Street Bikeways

A typical Irvine Class II bicycle lane is located along an arterial with no curb-adjacent parking and built to a width compliant with Caltrans Highway Design Manual, Chapter 1000.

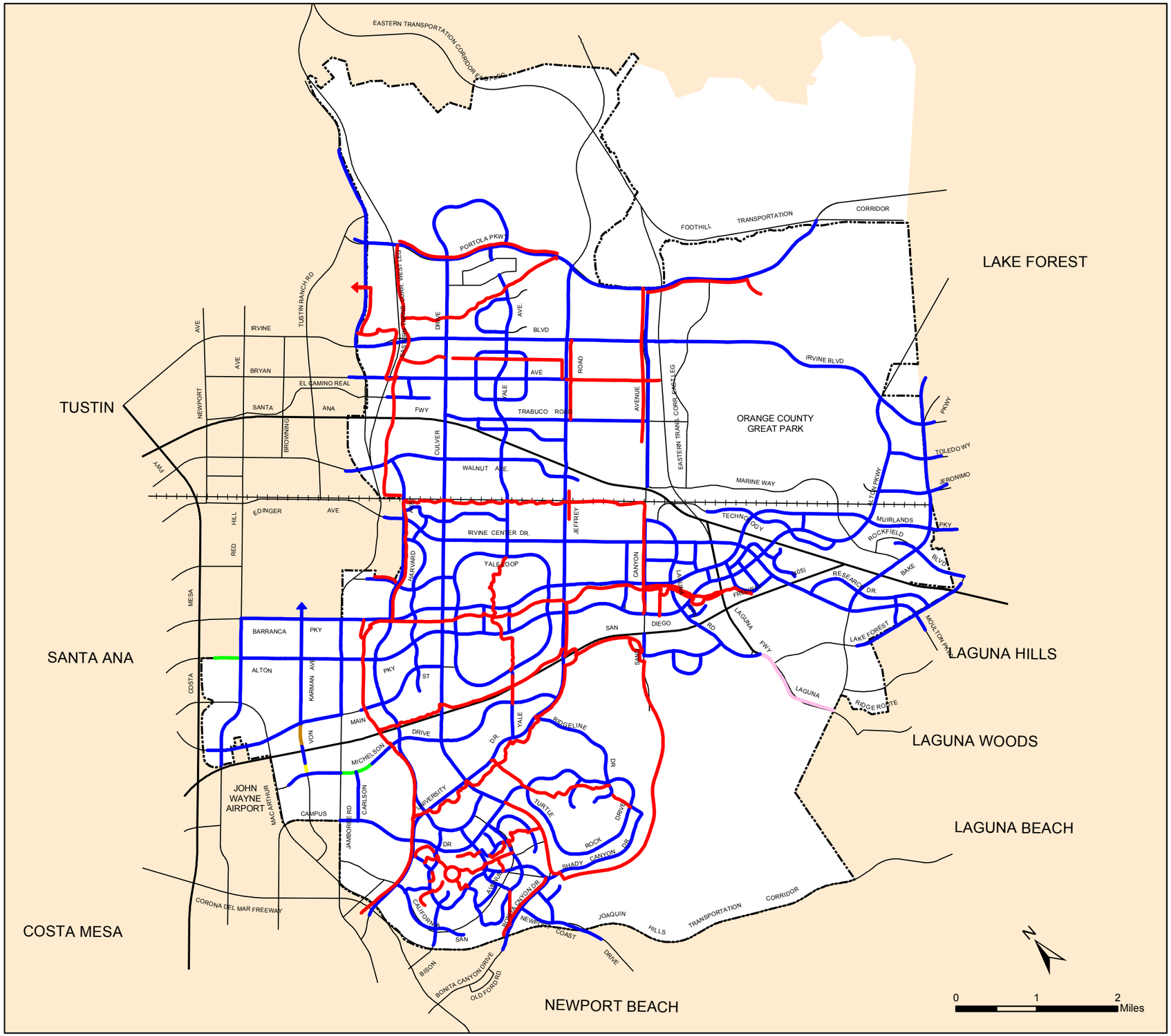
Within the City, there are approximately 301 miles of on-street bikeways branching throughout the City, interconnecting with each other and with the Class I off-street bikeways. Currently, on-street bikeways are present on all major City arterials, with the following exceptions:

- **Jamboree Road**, between Main Street and the southern City boundary;
- **Main Street**, between Jamboree Road and the San Diego Creek;
- **Von Karman Avenue**, between Michelson and Campus Drive;
- **Sand Canyon Drive**, between Alton Parkway and the I-405 Freeway; and
- **MacArthur**, between Jamboree and the northwest City limits.

On-street bikeways are present on the majority of the City's Major and Primary Highways, and some Secondary and Commuter Highways, but not present on most residential collector streets.

In nearly all instances, on-street bikeways are present on both sides of the street, with the following exceptions:

Figure 4-2, Existing Bikeways System



Legend

- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

2011 Bicycle Transportation Plan

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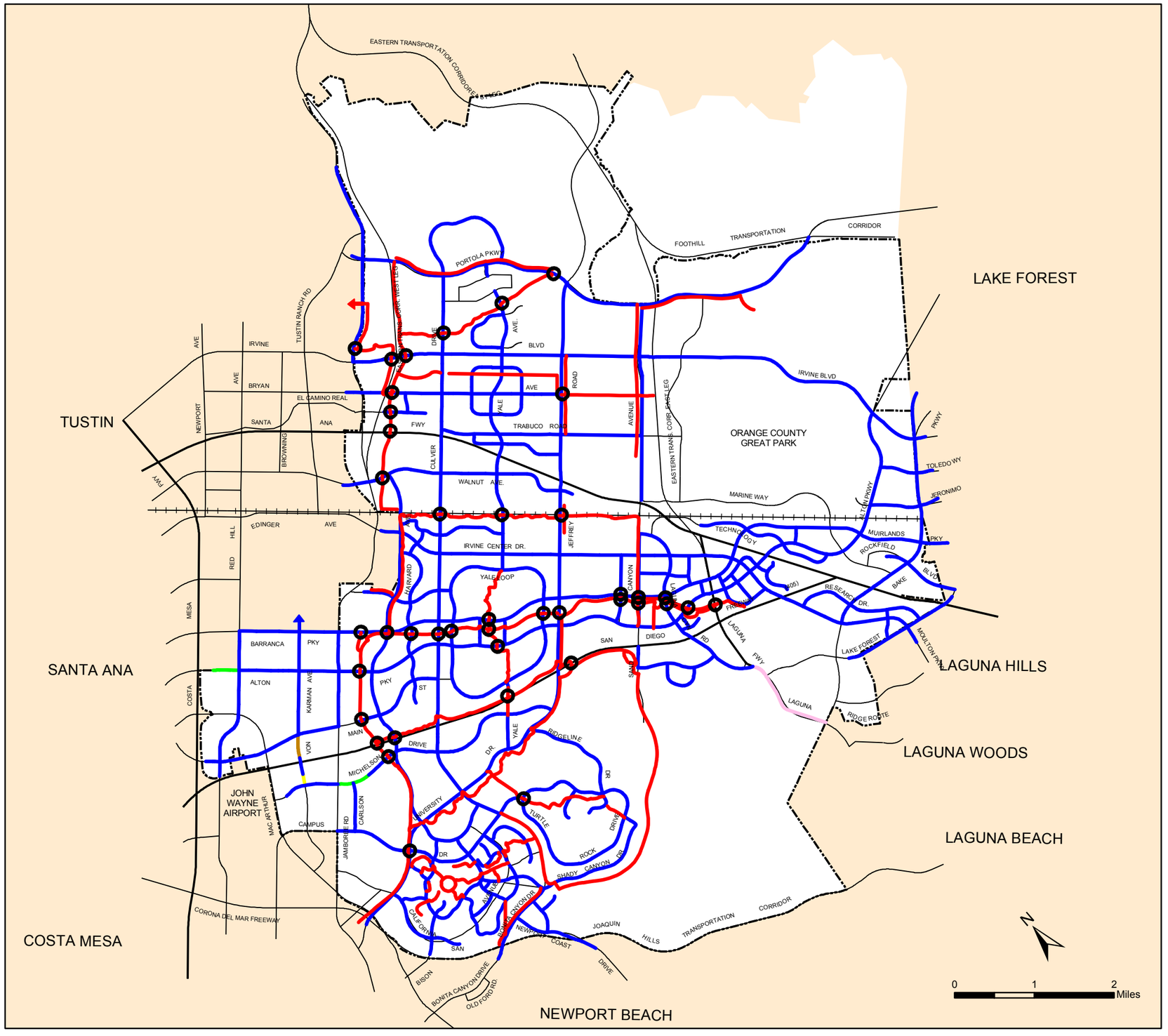
Figure 4-3, Existing Grade Separations



Legend

- Existing Grade Separation
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

2011 Bicycle Transportation Plan

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- **Alton Parkway**, between Redhill Avenue and the western City boundary;
- **Von Karman Avenue**, just south of Main Street and just north of Michelson Drive; and
- **Michelson Drive**, between Jamboree Road and the San Diego Creek.

Class II bikeways in the City of Irvine are built to or exceed Caltrans standards as identified in the latest adopted Caltrans *Highway Design Manual*, Chapter 1000, "Bikeway Planning and Design":

4.3 Existing Grade Separations

Grade separations are overcrossings and undercrossings that provide opportunities for Class I bikeway users to avoid interaction with motor vehicles. Objective B4, Policy (h) of the City of Irvine General Plan requires "grade-separated crossings for Class I bikeways at major intersections, wherever feasible, to increase safety and efficiency."

Currently, grade separations are located along many of the City's Class I bikeways, including San Diego Creek Trail, Peters Canyon Trail, Walnut Trail, Hicks Canyon Trail, and Freeway Trail. See Figure 4-2, *Existing Grade Separations*.

A typical approach to an arterial undercrossing; to the left a trail user can approach Yale Avenue at grade, while to the right a trail user can cross underneath Yale Avenue unimpeded by automobile traffic.

Approach to an overcrossing of Barranca Parkway, within Woodbridge. The overcrossing allows trail users to move from a residential area on the north side of Barranca Parkway to a shopping center and a connection to the San Diego Creek trail on the south side, without navigating through traffic or having to move east or west along Barranca Parkway to reach a controlled intersection.

4.4 Land Use and Settlement Patterns

The majority of the City of Irvine's residential land uses are concentrated in the center of the City and separated into distinct neighborhoods, each containing its own retail and community facilities. See Figure 4-3, *Existing Land Use & Settlement Patterns*

Non-residential land uses including office, commercial, industrial, and multi-use are concentrated on the east and west sides of the residential areas. The eastern portion of the City is referenced as the "Irvine Spectrum," and primarily consists of industrial, office, and commercial, with some entertainment and residential land uses. The Irvine Business Complex (IBC), located on the western edge of the City adjacent to the John Wayne Airport, is a mixed-use area composed of office, commercial, industrial, and some residential land uses. Residential uses are likely to be expanded in both the IBC and the Irvine Spectrum as part of future development. The University of California, Irvine (UCI) is located within the western and central portions of the City, bordering the City of Newport Beach. The Irvine Spectrum, the IBC, and UCI are the City's primary employment centers.

Approximately 12,000 acres of land – more than one-third of the City – is identified as permanent open space, with the majority located within the Natural Community Conservation Plan and Habitat Conservation Plan (NCCP/HCP) areas located in the southern hillside areas of the City.

The existing land use and settlement pattern of the City can be described as being organized into five major areas:

Central Portion of the City

The following land uses are present within the central portion of the City of Irvine:

- Residential neighborhoods and their auxiliary neighborhood-serving commercial centers, including the neighborhoods of Walnut Village, El

Camino Real, Oakcreek, Westpark, Westpark II, Woodbridge, Rancho San Joaquin, University Park, Turtle Rock, and University Town Center.

- Open space, habitat conservation, and recreational uses, including the Rancho San Joaquin Golf Course and the William R. Mason Regional Park.
-

Southern Portion of the City

The following land uses are present within the southern portion of the City of Irvine:

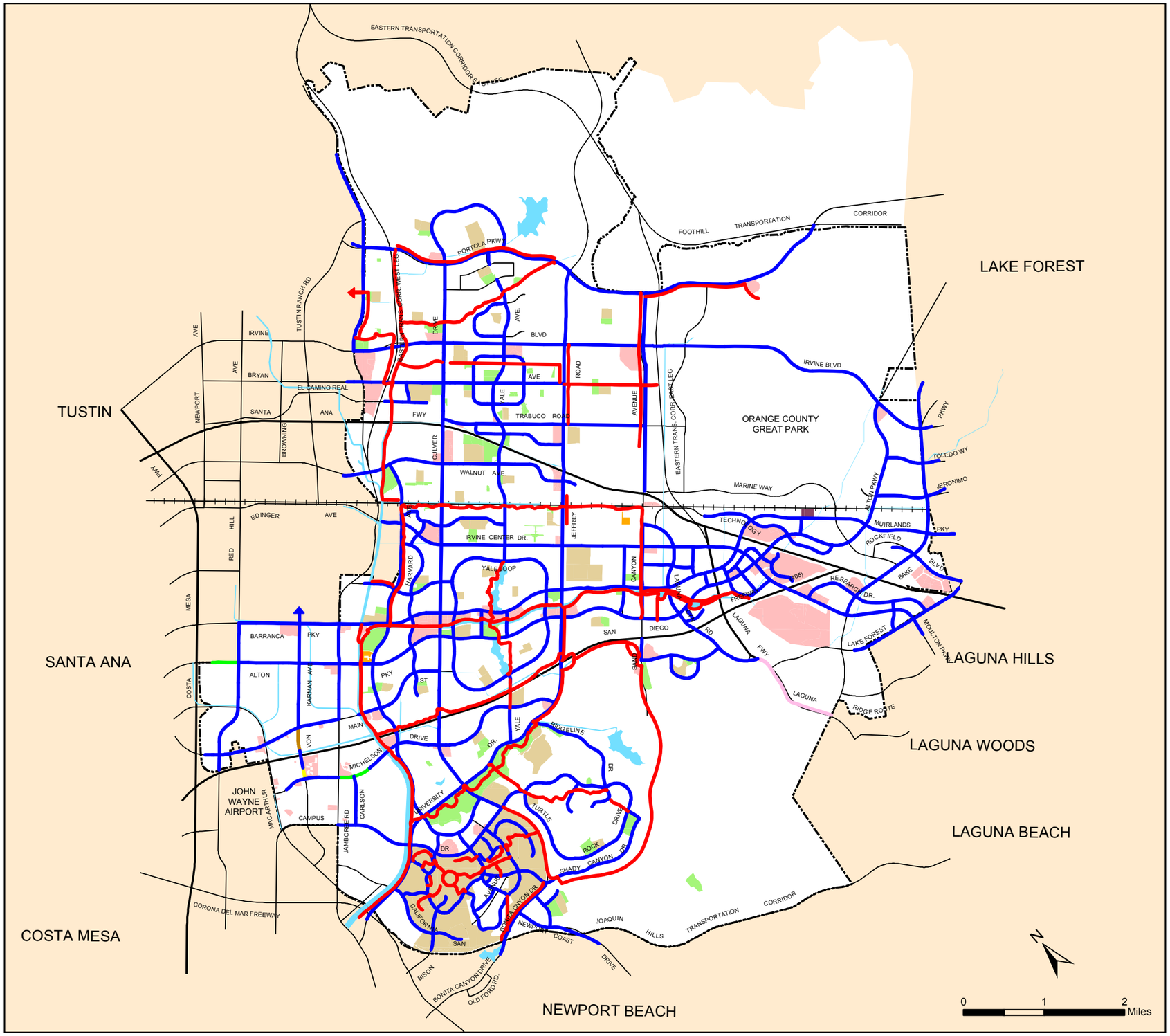
- The residential development and auxiliary neighborhood serving commercial uses of Quail Hill, as well as the villages of Shady Canyon, Turtle Ridge and Turtle Rock.
- Open space, habitat conservation, and recreational uses, including the Laguna Coast Wilderness Park which borders on the City of Laguna Hills, and the Shady Canyon Golf Course.
- Institutional use, specifically the University of California at Irvine campus, which borders on the City of Newport Beach, and the University Research Park.

Northern Portion of the City

The following land uses are present within the northern portion of the City of Irvine:

- The residential communities of Northwood, Northwood Pointe, Northpark Square, Northpark, Woodbury, Woodbury East and Portola Springs.
- Future community of Orchard Hills and the remaining residential homes and retail center of Portola Springs.
- Great Park Neighborhoods to be developed for institutional, recreational, commercial and residential uses.
- Orange County Great Park

Figure 4-4, Existing Land Use & Settlement Patterns



Legend

- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Schools, Universities
- Parks
- Waterways, Water Bodies
- Irvine Station
- City Hall, City Yard
- Retail Center/Entertainment Center
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

2011 Bicycle Transportation Plan

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Eastern Portion of the City

The following land uses are present within the eastern portion of the City of Irvine:

- Research and development, industrial, and general office uses, including the Irvine Medical and Science Complex, the Irvine Technology Center, the Irvine Spectrum Center, the Irvine Research Center, and the Irvine Industrial Complex-East.
- Commercial/entertainment use of the Verizon Wireless Amphitheater.
- Great Park Neighborhoods to be developed for institutional, commercial, and residential uses.
- Orange County Great Park.

Western Portion of the City

The following land uses are present within the western portion of the City of Irvine:

- Research and development, industrial, and general office uses, including the IBC.
- Regional commercial uses, including the Irvine Marketplace.
- Residential uses, including the community of West Irvine, bounded by Irvine Boulevard, Portola Parkway, Jamboree Road and SR-261.

4.5 Connectivity

Local Connections

Irvine's bikeways follow the City's spinal infrastructure, including major transportation corridors, utility and railroad easements, creek channels, and greenbelts, which allows them to span and connect the City's central, northern, southern, eastern, and western portions. The following describes how the City's existing network currently provides connectivity within and between the City's five major areas:

Bikeways Within the Central Portion of the City

The following bikeways provide connectivity within central Irvine:

- Walnut Trail: Residents of the neighborhoods of Walnut Village, El Camino Real, Deerfield and The Ranch have direct access to the Walnut Trail, connecting them to adjacent residential neighborhoods, public and private parks, and neighborhood-serving commercial centers. Residents can also use the Walnut Trail to access Peters Canyon Trail and the San Diego Creek Trail to the west, and the Sand Canyon Trail to the east, providing further connections to Irvine's employment centers, including the IBC, the Irvine Spectrum, and UCI.

- Peters Canyon Trail: Residents of the neighborhood of Walnut Village can access the Peters Canyon Trail directly, which is part of a regional bikeway connecting several cities, including Tustin and Orange to the north and Newport Beach to the south. Peters Canyon Trail also connects directly to multiple bikeway-adjacent parks. Peters Canyon Trail also connects with the San Diego Creek Trail, allowing residents to connect to the IBC, the Irvine Spectrum, and UCI (via the San Diego Creek Trail).

- Woodbridge Trail: Residents of Woodbridge can directly access the Woodbridge Trail north and south of Barranca Parkway. This bikeway connects residents with the neighborhood's private parks, community centers and pools, lakes, and the Woodbridge shopping center. The Woodbridge Trail also provides direct access to the San Diego Creek Trail, which connects residents with the IBC, the Irvine Spectrum, UCI, and Newport Beach.

- Freeway Trail: Residents of Westpark, Woodbridge, and Oakcreek can directly access this bikeway to connect to the San Diego Creek Trail, west of this trail.

- San Diego Creek Trail: Residents of Westpark, Woodbridge, and Oakcreek have direct access to this trail. This bikeway connects them to the western and eastern portions of the City, as well as to multiple neighborhood-serving commercial centers, and local and regional open space and park areas.

- Sand Canyon Trail: This bikeway provides a connection between the eastern terminus of the Walnut Trail to the San Diego Creek Trail to the south, Venta Spur Trail and Portola Trail to the north.

- On-street bicycle lanes along the corridors of Yale Avenue, West and East Yale Loops, Culver Drive, Jeffrey Road, and Sand Canyon Avenue provide north/south links for residents and employees of central Irvine, connecting with addditional on-street bicycle lanes and off-street bikeways in both the northern and southern portions of the City.

- On-street bicycle lanes along the corridors of Bryan Avenue, Trabuco Road, Walnut Avenue, Deerfield, Irvine Center Drive, Barranca Parkway, and Alton Parkway provide east to west links for residents and employees of central

Irvine, connecting with addditional on-street bicycle lanes and off-street bikeways in both the eastern and western portions of the City.

Bikeways Within the Northern Portion of the City

The following bikeways provide connectivity within northern Irvine:

- Hicks Canyon Trail: This bikeway connects the Peters Canyon Trail to Portola Parkway, providing residents of northern Irvine with access to the Peters Canyon, the central portion of the City, and to Portola Parkway.

- Peters Canyon Trail: Within the northern portion of the City, Peters Canyon Trail connects northern Irvine with central Irvine and beyond, as well as connects to the cities of Tustin and Orange to the north.

- Portola Trail: Within the northern portion of the City, this bikeway provides connection and connects Peters Canyon Trail to Sand Canyon Trail.

- Sand Canyon Trail: Within the northern portion of the City, the Sand Canyon Trail provides north/south connection to Venta Spur Trail.

- Venta Spur Trail: Within the northern portion of the City, the Venta Spur Trail connects residential areas to commercial areas to the west, several parks, and Jeffrey Road, a major City arterial, to the east.

- On street bicycle lanes on Portola Parkway, Irvine Boulevard, Bryan Avenue provide residents with east/west connections to on-street bicycle lanes along corridors of Culver Drive, Jeffrey Road and Sand Canyon Avenue.

Bikeways Within the Eastern Portion of the City

The following bikeways provide connectivity within eastern Irvine:

- San Diego Creek Trail: This bikeway connects the research and development, industrial, and general office uses of eastern Irvine to residential uses located within central Irvine.

- Sand Canyon Trail: This bikeway connects the Walnut Trail at its intersection with Sand Canyon Avenue and with Alton Parkway to the south.

- On-street bicycle lanes located on Alton Parkway, Bake Parkway, and Lake Forest Drive provide north/south connections for employees of the Irvine Spectrum, Irvine Medical and Science Complex, the Irvine Technology Center, the Irvine Research Center, and the Irvine Industrial Complex-East.

- On-street bicycle lanes located on Irvine Boulevard, Toledo Way, Jeronimo Road, Muirlands Boulevard, Barranca Parkway, Technology Drive, Research Drive, and Irvine Center Drive provide east to west connections for employees of east Irvine, providing routes to the residential and neighborhood serving commercial uses in central and southern Irvine.

Bikeways Within the Western Portion of the City

The following bikeways provide connectivity within western Irvine:

- San Diego Creek Trail: UCI accesses the San Diego Creek Trail directly, connecting the university with central, northern, and eastern Irvine. The San Diego Creek Trail can also be accessed by employees of the IBC via on-street bicycle lanes.

- Shady Canyon Trail: This bikeway can be accessed near UCI and the communities of Turtle Rock, Shady Canyon and Quail Hill. It provides connections to southern and eastern Irvine, as well as open space, habitat

conservation, and commercial recreation areas including the Shady Canyon Golf Course and the Laguna Hills Wilderness Park.

- Mason Regional Park Trail: This bikeway connects residents and employees of western Irvine, including UCI, to open space and recreational uses within the park. It also provides a connection between the San Diego Creek Trail in the southwest to central Irvine residential and commercial uses.

Regional Connections

The City's bikeways network provides key connections in the regional network of trails branching through Orange County. The following Class I on-street bicycle lanes provide regional bikeway connections:

- San Diego Creek Trail: This bikeway provides connection to Newport Beach to the south and the cities of Tustin and Orange to the north.

- Peters Canyon Trail: Also part of a regional trail, this bikeway connects the cities of Tustin and Orange to the north, and the San Diego Creek Trail and the City of Newport Beach to the south.

The following Class II on-street bicycle lanes also connect to Orange County's regional bikeway system:

- Portola Parkway: Connects to City of Tustin bikeways and Orange County Regional Trail in northern Irvine.

- Irvine Boulevard: Connects to City of Tustin bikeways and Orange County Regional Trail in Lake Forest.

- Bryan Avenue: Connects to City of Tustin bikeways.

- Walnut Avenue: Connects to City of Tustin bikeways.

- Irvine Center Drive: Connects to City of Tustin bikeways and Orange County Regional Trail in Lake Forest.
- Barranca Parkway: Connects to Orange County Regional Trail in Tustin.
- Main Street: Connects to Orange County Regional Trail in Santa Ana.
- Michelson Drive: Connects to Orange County Regional Trail in Newport Beach.
- Campus Drive: Connects to City of Newport Beach bikeways.
- University Drive: Connects to City of Newport Beach bikeways.
- Bison Avenue: Connects to City of Newport Beach bikeway.
- Bonita Canyon Drive: Connects to City of Newport Beach bikeway.
- Irvine Center Drive: Connects to Orange County Regional Trail in City of Laguna Hills.
- Rockfield Boulevard: Connects to Orange County Regional Trail segment (connection stops at Lake Forest Dr.)
- Muirlands Boulevard: Connects to Orange County Regional Trail in City of Lake Forest.
- Jeronimo Road: Connects to Orange County Regional Trail in City of Lake Forest.
- Toledo Way: Connects to Orange County Regional Trail in City of Lake Forest.

- Irvine Boulevard: Connects to Orange County Regional Trail in City of Lake Forest.

- Jeffrey Road: Connects to Orange County Regional Trail.

- Bake Parkway: Connects to Orange County Regional Trail in Lake Forest.

4.6 Identification of Bikeways System Gaps

Although further discussion of potential future bikeway gap closures is provided in Chapter 5, *Proposed Bikeways System*, and Chapter 6, *Plan Implementation and Project Prioritization* of this Plan, the existing gaps are generally located in the following areas within the City of Irvine:

- West of the UCI – Network gaps exist to the west of the UCI within the IBC. Specifically, on-street bicycle lanes along Jamboree, Von Karman, Campus Drive, and Michelson currently have gaps, and connections between Jamboree and the San Diego Creek Trail do not presently exist.

- Within the UCI campus – Network gaps through undeveloped portions of the university currently separate the housing and research and development portions of the campus, west of Peltason Drive. Chapter 5 identifies the future bikeways planned for the campus. Gaps on the campus will be the responsibility of the University to fund.

- Jeffrey Road – The future completion of the Jeffrey Open Space Trail north of the I-5 freeway will provide gap closure along this off-street corridor; however gaps still exist between I-5 and Barranca Parkway.

- Irvine Spectrum – Network gaps exist in east Irvine, within the research and development, industrial, and general office uses of the Irvine Medical and

Science Complex, the Irvine Technology Center, the Irvine Spectrum Center, the Irvine Research Center, and the Irvine Industrial Complex-East. The termination of the San Diego Creek Trail before the I-405 freeway creates a gap between that bikeway and the Irvine Spectrum Entertainment Center as well as future development south of the I-405 Freeway.

4.7 Bikeway Signage

Bikeway signage present in the City of Irvine includes the following:

- Standardized regulatory, warning, and guide signs, as used on highways but scaled down in size, along Class I bikeways, as recommended (but not required) by the Caltrans Highway Design Manual, Chapter 1000, "Bikeway Planning and Design."

- Standardized signing and pavement markings along Class II bicycle lanes as required by the Caltrans Highway Design Manual, Chapter 1000, "Bikeway Planning and Design."

- Directional, wayfinding, and naming signage along Class I bikeways.

- Temporary and detour signage along Class I bikeways and Class II bicycle lanes.

Signage along Class I bikeways is not consistent throughout the City's off-street network. The following signage observations for Irvine's Class I off-street bikeways were recorded as part of the field survey:

- **Peters Canyon Trail:** Signage along Peters Canyon Trail includes warning and guide signage identifying potential flood areas, railroad crossings, and sharp turns. Directional, wayfinding and naming signage is present as both freestanding signs and pavement stencils.

- **San Diego Creek Trail:** Signage along the San Diego Creek Trail includes warning and directional signage along both the north/south and east/west portions of the bikeway. Both freestanding signs and pavement stencils are only present along that portion of the bikeway that runs south to the City of Newport Beach. County of Orange bikeway signage is also present. Naming signage present along the remainder of the bikeway identifies the trail only as "Regional Trail."

- **Hicks Canyon Trail:** Present along Hicks Canyon Trail is County of Orange bikeway signage, including directional and wayfinding, yielding, and warning signage.

- **The Venta Spur:** Signage along this bikeway includes warning and directional signage, as needed. City naming signage identical to a typical street sign is also present.

A city street sign marks the trail at all roadway crossings.

- **Walnut Trail:** Signage along the Walnut Trail includes standard warning and directional signage. City standardized naming signage identical to a typical street sign is also present.

- **Sand Canyon Trail:** No bicycle specific signage is present along this street adjacent trail.

- **Woodbridge Trail:** Bicycle signage along the Woodbridge Trail is present

only to direct trail users through a shopping center and along the Barranca Parkway overpass.

- **Freeway Trail:** Signage along the Freeway Trail includes standardized highway signage, scaled down in size, and City directional and wayfinding signage.

- **Mason Regional Park Trail:** No bicycle specific signage was observed along the Mason Regional Park Trail. As this trail is within a County Park, signage and maintenance are the responsibility of the County of Orange.

- **Turtle Rock Trail:** Signage along the Turtle Rock Trail includes standardized warning and guiding signage, as well an informational kiosk.

Signage along Class II on-street bikeways was observed to be in compliance with Caltrans Highway Design Manual standards, which requires the R81 bike lane sign be placed at the beginning of all bicycle lanes, on the far side of every arterial street intersection, at all major changes, and at 0.5 mile intervals of each designated bike lane.

Bike lane signage within the City of Irvine is designed to California Highway Design Manual standards.

4.8 Bicycle Amenities

To enhance the safety, aesthetics, and experience of the existing bikeways system, the City encourages bicycle amenities, including:

- Landscaping;

- Lighting;
- Rest amenities such as drinking fountains and benches;
- End-of-trip bicycle parking facilities, including bicycle racks and bicycle lockers;
- End-of-trip shower and locker facilities for bicycle riders; and
- Bicycle detection at roadway intersections

The following describes the existing bicycle amenities present in the City of Irvine.

Landscaping

Extensive landscaping is most apparent along the following Class I off-street bikeways:

- The Venta Spur Trail
- Hicks Canyon Trail
- Peter's Canyon Trail, northern segments only
- The Turtle Rock Trail

Landscaping along the Venta Spur trail in northern Irvine.

Landscaping is also present along the central segments of the San Diego Creek Trail, and along some segments of the Walnut Trail.

The San Diego Creek Trail is a County Flood Control facility, which restricts landscaping along this portion of the trail.

Landscape elements separate the asphalt bicycle path from the decomposed granite riding and hiking trail along the Hick's Canyon Trail.

In general, extensive landscaping is less prevalent along the bikeways that span central Irvine, and most common along the City's northern and newer bikeways.

Some bikeways that presently lack a landscape element may have site constraints that affect the ability to provide trees, shrubbery, and lawn areas; for example, the San Diego Creek Trail is constrained by mandates governing flood control channels and existing site conditions. Maintenance requirements and costs can also constrain the City's ability to incorporate landscape.

Landscaping along Class II bicycle lanes was not surveyed, as landscaping is provided as part of the streetscape.

Lighting

Lighting is not uniform along all Class I bikeways within the City of Irvine, and is most prevalent along newer off-street bikeways. Changes in the Security Code in 1995 require lighting on all paved bikeways. Along older bikeways, lighting is, in most cases, not present or present only in areas where the bikeway crosses or is adjacent to a homeowner association's jurisdiction. Bikeways adjacent to the street often can achieve the lighting standard from spill-over from nearby street lights.

Existing overhead lighting along the Walnut Trail enhances safety and visibility at night.

Lighting was found to be present only along the following stretches of Irvine's Class I off-street bikeway system:

- **Hicks Canyon Trail**, in its entirety.
- **Peters Canyon Trail**, from Jamboree Road to Bryan Avenue.
- **The Venta Spur**, in its entirety.
- **Walnut Trail**, between Harvard Avenue and Culver Drive.
- **San Diego Creek Trail**, only as it is street adjacent to Harvard Avenue and within some underpasses.
- **Woodbridge Trail**, in its entirety.

As with landscaping, lighting along Class II bicycle lanes was not surveyed, as lighting for the bicycle lane is provided through street lights along the roadway. Where Class I bikeways are adjacent to streets, lighting may also be provided by existing streetlights.

Existing bollard lighting along the Venta Spur Trail keeps the trail lit.

Rest Amenities

Rest amenities include drinking fountains, benches, picnic tables and lawn areas that directly serve users of on-street bicycle lanes or off-street bikeways. As with landscaping and lighting, rest amenities are most common along newer bikeways in the northern part of Irvine, and along older bikeways where they traverse or are adjacent to homeowner associations. Rest amenities are found on the following bikeways:

- **Hicks Canyon Trail**, benches and drinking fountains at irregular intervals.
- **Peters Canyon Trail**, benches and drinking fountains, north of the I-5 Freeway only.
- **San Diego Creek Trail**, benches and drinking fountains, south of Barranca only.
- **Venta Spur Trail**, benches at regular intervals.
- **Woodbridge Trail**, benches and drinking fountains at irregular intervals.

Rest amenities are also present at most City and private parks within Irvine, many of which are adjacent to and accessible by bikeways.

End-of-Trip Facilities: Bicycle Racks and Lockers

Like bikeways, bicycle parking facilities are classified as Class I and Class II facilities by the City of Irvine Zoning Ordinance. Class I parking facilities either require a bicyclist to provide a padlock or have their own locking mechanism, such as a bicycle locker.

Class II bicycle parking facilities include all bicycle racks which require a cyclist to provide both a padlock and a chain or cable to secure their bicycle.

City of Irvine bicycle parking requirements are established in Chapter 4-3 of the City of Irvine Zoning Ordinance, Section 4-3-7 “Bicycle Parking Requirements,” which is included in Appendix B. Bicycle parking is required for a number of specific land uses, including:

- Regional shopping malls;
- Shopping centers of more than 50,000 square feet of retail space;
- Commercial recreation uses such as bowling alleys, arcades, and miniature golf courses;
- Community facility uses such as libraries and swim clubs, banks, hospitals, fast food and pizza parlor restaurants; and
- Medical and dental offices.

Bicycle parking is prevalent in the City of Irvine, and is oftentimes not used to its capacity. However, in some areas demand for bicycle parking exceeded what was provided per the Zoning Ordinance. This is common in shopping centers adjacent to schools and universities, which see increased bicycle parking demand from students. See Figure 4-4, *Existing End-of-Trip Facilities*, for a map identifying land uses that provide bicycle parking facilities.

The following Class I and Class II bicycle parking facilities were observed in the City of Irvine:

- **Bicycle lockers:** These Class I bicycle parking and storage facilities were observed at the Irvine Station.
- **Bicycle yards:** These bicycle parking facilities were common at schools within the City of Irvine. Although the bicyclist uses his or her own lock to secure the bicycle within the yard, the yard itself is locked by school administrators during the school day.

- **Traditional comb and toast racks:** These were observed to be most common at City schools and within City parks. Comb and toast racks secure the bicycle by its front wheel.

Bicycle lockers at the Irvine Station provide security for bicycle commuters.

Along the Venta Spur Trail, benches are placed at every intersection, providing both a place for socialization and a convenient resting point for bikeway users.

- **Wave racks:** These were observed most frequently in the City's older shopping centers. Like comb and toast racks, wave racks only secure bicycles by their front tires, but some consider them more aesthetically acceptable than comb or toast racks.

- **Post and loop racks:** These were observed most frequently in the City's newer shopping centers. These racks can secure a bicycle by its frame and not just its front tire, which may make them more desirable to cyclists.

- **Bollard racks:** These were observed throughout older and newer city shopping centers. Like the post and loop racks, bollard racks can secure a bicycle by its frame.

- **Custom racks:** Some parts of City have custom racks installed.

Post and loop racks allow cyclists to secure their bicycle by its frame, not just the front tire, and are common at newer Irvine shopping centers.

Bollard racks allow cyclists to secure their bicycle by its frame, not just the front tire, and are common at both newer and older Irvine shopping centers.

End-of-Trip Facilities: Shower and Locker Facilities

The City of Irvine General Plan Policy B-4(f) requires that "bicycle trip destinations, including community facilities, commercial centers, and transit facilities be equipped with appropriate bicycle facilities including, but not limited to, showers and bicycle racks." The provision of shower and locker facilities encourages bicycle commuting by providing bicycle commuters a place to change clothes, shower and secure personal items. These facilities are primarily provided by employers and located within private commercial and office buildings and thus were not a part of the existing conditions field survey undertaken as part of this Plan.

Bicycle Detection

In September 2009, the California Department of Transportation (Caltrans) issued a directive requiring the installation of bicycle and motorcycle detection.

Section 4D.105(CA) Bicycle/Motorcycle Detection Standard (California MUTCD):

All new limit line detector installations and modifications to the existing limit line detection on a public or private road or driveway intersecting a public road shall either provide Limit Line Detection Zone in which the Reference Bicycle-Rider is detected or be placed on permanent recall of fixed time operation.

All new and modified bike path approaches to a signalized intersection shall be equipped with either a Limit Line Detection Zone or a bicyclist push button, or else the phase serving the bike path shall be placed on permanent recall or fixed time operation. A bicyclist push button, if used, shall be located on the right side of the bike path where it can be reached from the bike path.

At new signalized intersections or when the advance detection is being replaced at existing signalized intersections, phases with advance detection only shall be placed on permanent recall.

The City of Irvine has bicyclist push buttons available at signalized intersections and complies with the directive by installing video detection at new signalized intersections, replacing in-pavement loops with video detection when more than 50% of the existing loops need replacement and by allowing more signal timing for bicyclists to start and clear the intersection. Recently, the City has secured grant funding to add video detection at additional locations in the City.

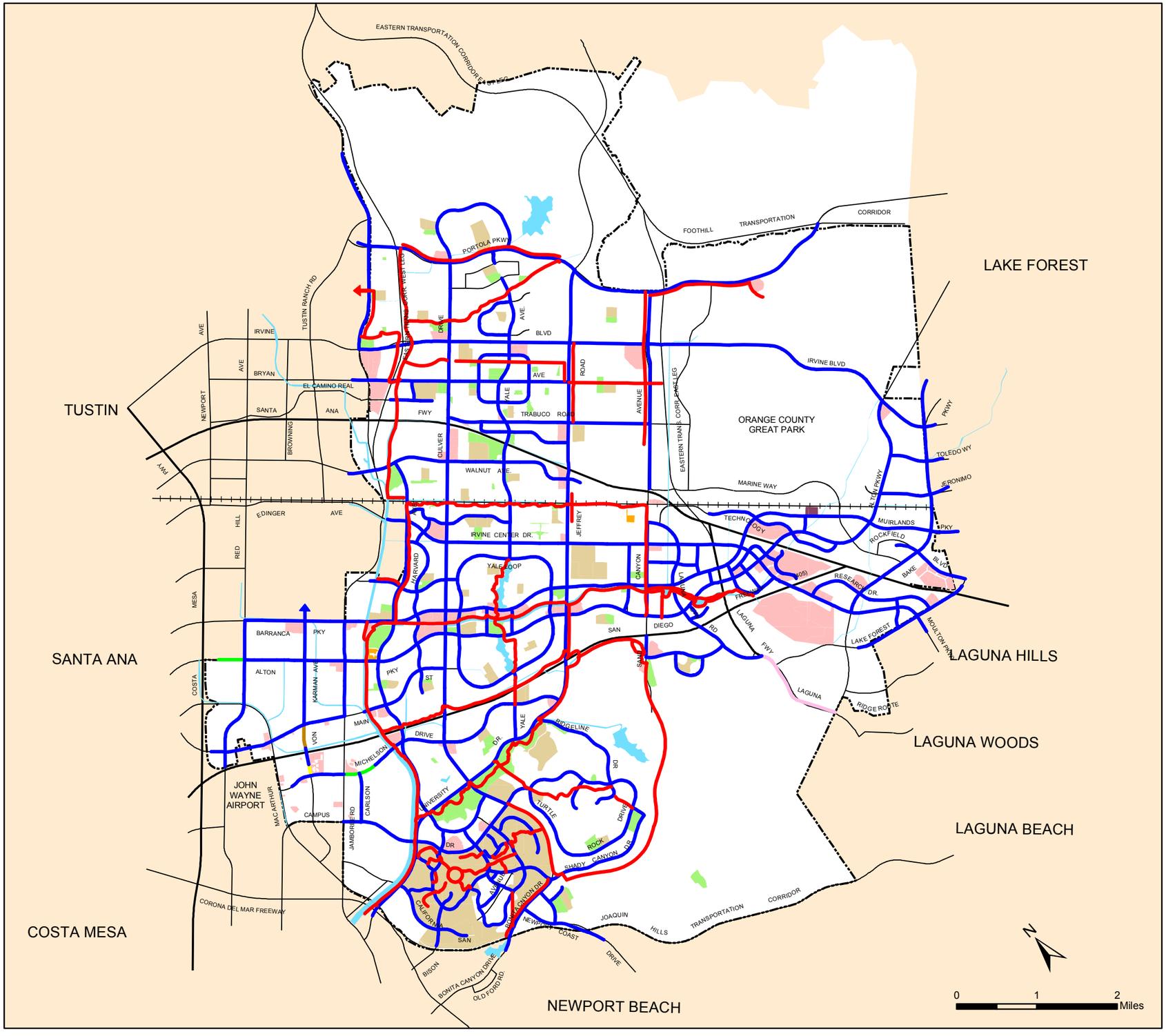
4.9 Existing Bicycle Commuters

Based on the 2005-2009 American Community Survey 5-Year Estimates published by the U.S. Census Bureau, there are 98,081 employed persons living within the City of Irvine. Of these, the Census reported that 1,569 persons commute to work primarily by bicycle. The percentage of existing commuters that commute primarily by bicycle is termed the "bicycle mode split" and within the City of Irvine, accounts for 1.6% of all commuters.

4.10 Alternative Transportation Modes

A number of opportunities exist for commuters and other bicycle riders within the City of Irvine to transfer from bicycle to another alternative mode of transportation. The Irvine Station, which provides Amtrak and Metrolink connections, is located via Class II bicycle lanes along Barranca Parkway and Ada. Additionally, the *i*Shuttle, which is operated by the City, and OCTA buses are equipped with bicycle racks at the front of buses, to which bicycle riders can load bicycles. Additionally, park-and-ride facilities are located within the City. See Exhibit 4-6, *Connections with Alternative Transportation Modes,* for the locations of these connections.

Figure 4-5, Existing End-of-Trip Facilities



Legend

- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Schools, Universities
- Parks
- Waterways, Water Bodies
- Irvine Station
- City Hall, City Yard
- Retail Center/Entertainment Center
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

Per the City of Irvine Zoning Ordinance, bicycle parking facilities are installed at the locations of the following land uses: regional shopping centers; shopping centers with more than 50,000 SF of gross floor area; restaurants; commercial recreation activities (including bowling alleys, arcades, movie theaters, etc.); community facilities (including swim clubs, libraries, and City Hall); office developments with more than 100,000 SF of floor area; banks; hospitals; and medical and dental offices.

Shower and locker facilities are located at a number of private commercial and office buildings by private employers.

Bicycle locker facilities are provided at the Irvine Transportation Center.

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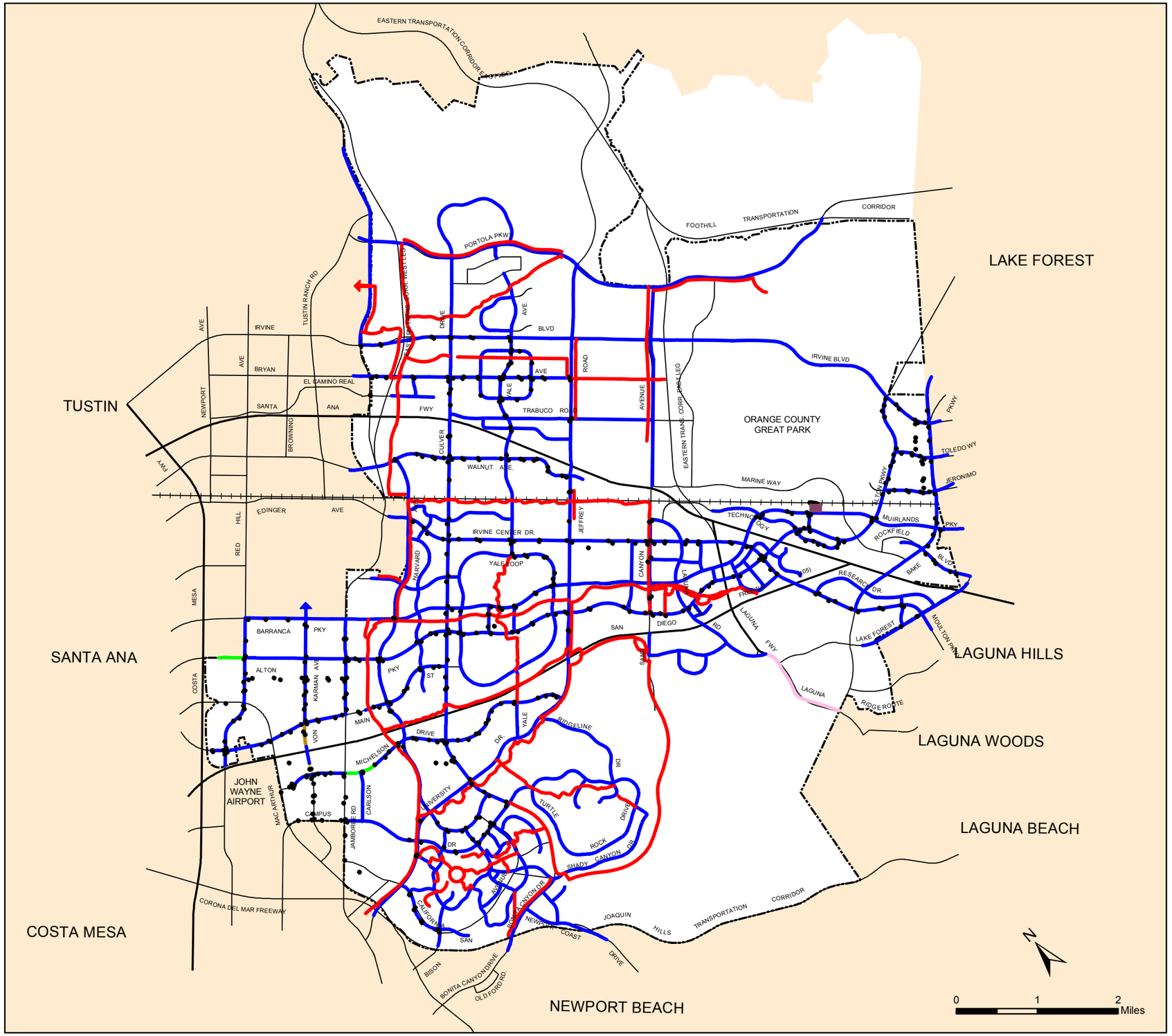
Figure 4-6, Existing Connections with Alternative Transportation Modes



Legend

- Existing Bus Stop
- Irvine Station
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

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Chapter 5 – Proposed Bikeways System

This chapter discusses the City's proposed bikeways and bicycle amenities as identified in the City General Plan, as well as recommendations for additional bicycle facilities. Consistency between the proposed bikeway network and the needs of the Irvine cycling public, as identified through the community outreach program of this Plan, is also evaluated.

5.1 Identifying Future Projects

The General Plan Circulation Element establishes policy direction for future circulation infrastructure enhancements and expansions, including those that are part of the City's bikeway network. The General Plan Trails Network identifies bikeways proposed at the build-out of the City of Irvine. Most of the bikeways identified in the General Plan Trails Network already exist; however, some are not yet constructed. See Figure 5-1, *General Plan Trails Network.*

Bikeways identified in the General Plan Trails Network which are not yet constructed are identified in this Plan as future projects. Figures 5-2a and Figure 5-2b reflect future bikeways identified through the field survey of existing bikeways and an analysis of existing gaps and potential loop closures.

The proposed infrastructure bikeway projects include on-street bicycle lanes, off-street bikeways and grade separated crossings. Several projects are developer obligated projects, to be constructed or funded by developers, in many cases concurrent with development.

Many bikeway infrastructure projects are proposed for future implementation on the UCI campus. While funding strategies for projects within the interior of the campus are the responsibility of the University, the City encourages a comprehensive network of bicycle facilities with connections to City facilities in order to promote bicycle commuting.

Projects that are adjacent to City roadways may be partially funded by the City and cooperatively implemented.

5.2 Future Class I Bikeways

Future Class I bikeways within the City of Irvine include projects that are developer obligated, City funded, UCI funded, and unfunded projects. Future Class I bikeways are shown on Figure 5-2a, *Future Off-Street Projects.*

Proposed Class I Off-Street Bikeways – Developer Obligated

The following future off-street bikeways, not listed in priority order, are proposed within the City of Irvine and are developer obligated projects:

- Extension of the Jeffrey Open Space Trail, between Portola Parkway to north of Gateway Park entrance.
- Extension of the Jeffrey Open Space Trail, between Irvine Boulevard and Portola Parkway
- Extension of the Jeffrey Open Space Trail, between Trabuco Road and the I-5 Freeway
- Extension of the Jeffrey Open Space Trail, between Smoketree and the San Diego Creek
- Extension of the Freeway Trail, between the Jeffrey Bicycle Bridge and Sand Canyon Avenue
- Extension of the Peters Canyon Wash Trail, between Barranca Parkway and Warner Avenue
- Extension of Portola Trail between Jeffrey Road and Sand Canyon Avenue
- Extension of Portola Trail between Portola Springs and City limits
- New Class I bikeway in Planning Area 6 along Modjeska between Portola Springs and Irvine Boulevard

- Extension of Sand Canyon Trail between south of Trabuco and I-5 northbound ramps
- Extension of Sand Canyon Trail between Alton Parkway and the I-405 freeway
- New Class I bikeway along I-5 freeway connecting Jeffrey Road to Sand Canyon Avenue
- Extension of the San Diego Creek Trail, between its current terminus at I-405 freeway and Lake Forest Drive

Proposed Class I Off-Street Bikeways – City Funded

The following off-street bikeways, not listed in priority order, are planned within the City of Irvine and are funded with local funds and grants.

- Extension of the Walnut Trail through an off-street bikeway parallel to Sand Canyon Avenue from the existing terminus of Walnut Trail to I-5 freeway northbound ramps.
- New Class I bikeway on Campus Drive between California and Culver (joint project with UCI).

Proposed Class I Off-Street Bikeways – Unfunded

(Not listed in priority order)

- Extension of the Jeffrey Open Space Trail, between north of Gateway Park entrance to existing Haul Road.
- New Class I bikeway through the Irvine Spectrum from the Irvine Station
- Extension of the Walnut Trail, between the Sand Canyon and Bake Parkway
- Extension of the Jeffrey Open Space Trail, between Walnut Avenue and the I-5 freeway
- New Class I bikeways through the IBC following the railroad right of way.
- New Class I bikeways through the IBC adjacent to the canal: (1) along Armstrong Avenue, (2) east of Von Karman from Barranca to the San Diego Creek; (3) west of San Diego Creek and (4) two trails located between the canal and Main Street.
- New Class I bikeway connecting to/through the Great Park, running north/south between Irvine Boulevard and the railway right-of-way (east side of the park)
- New Class I bikeway connecting to/through the Great Park, running north/south between Irvine Boulevard and the railway right-of-way (west side of the park)
- New Class I bikeways connecting to/through the Great Park, running east/west between SR-133 and the center of the Great Park
- New Class I bikeway connecting to/through the Great Park running north/south between Irvine Boulevard and the new Class I bikeway located east side of the Great Park.

Concurrent with future development, these projects may become conditions of approval on new development, moving them to the list of developer obligated projects.

Figure 5-1A, General Plan Trails Network
General Plan Supplement 8 - February 2011

TRAILS NETWORK

TUSTIN

SANTA ANA

LAKE FOREST

NEWPORT BEACH

LAGUNA BEACH

JOHN WAYNE AIRPORT

EASTERN TRANSPORTATION CORRIDOR

FOOTHILL TRANSPORTATION CORRIDOR

SAN DIEGO (I-405) FWY

Although the City has detached all of Planning Area 26 and portions of Planning Area 27, these areas are subject to agreements between the City of Irvine, the Irvine Company and the City of Newport Beach

N

0 1 2 Miles

LEGEND

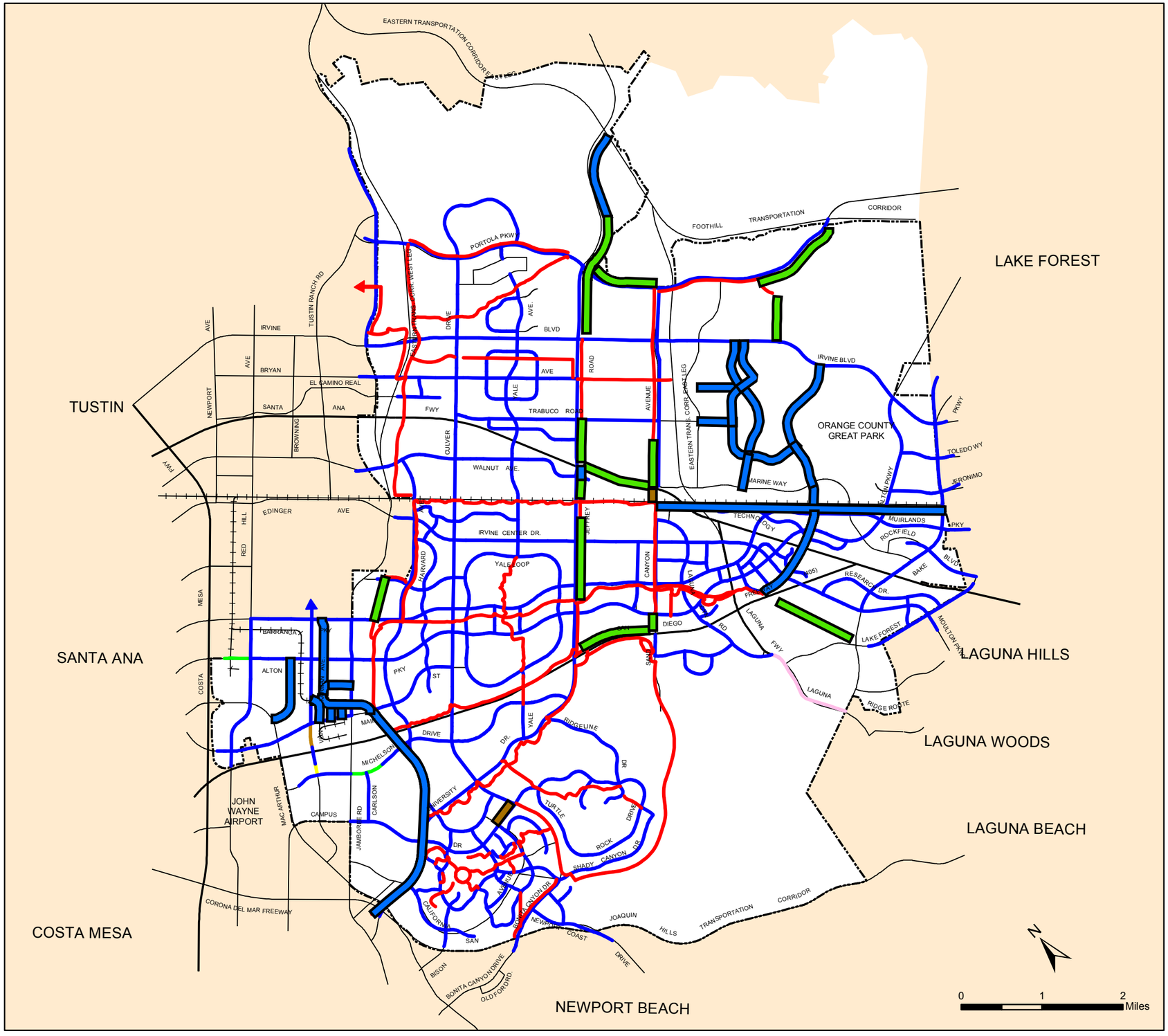
- City Sphere of Influence
- Class I (Off-Street) Trails
- Class II (On-Street) Trails are on all street shown on this exhibit except for Barranca between Jamboree and Redhill, along Mac Arthur between Jamboree Road, northwest to city limits, and along the west side of Jamboree Road between Michelson Drive and the San Diego (I-405) Freeway.
- Riding and Hiking Trails
- See Figure 5-1B for planned trail network in Irvine Business Complex.

NOTE: The Trail Network Diagram is illustrative only and not indicative of precise alignments

CITY OF IRVINE 1971

Figure 5-1B, Planned Trail Network in Irvine Business Complex

Figure 5-2A, Future Off-Street Projects



Legend

- Funding to be Determined Off-Street Bikeway
- Proposed Developer Obligated Off-Street Bikeway
- Proposed City Obligated Off-Street Bikeway
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on Eest Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

NOTE: See Figure 5-2C for Future Off-Street Projects in UCI

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Proposed Class I Off-Street Bikeways – UCI Projects

The following off-street bikeway projects, not listed in priority order, are proposed for construction within the UCI campus. The UCI bikeway network provides bicycle access to campus buildings and green spaces, as well as provides connections within the City of Irvine bikeway network at large. The following UCI projects may be pursued by the university or in some cases, as joint projects between the City and the UCI. The UCI Projects are shown on Figure 5-2c, *UCI Projects.*

- New Class I bikeway following Anteater Drive, between Peltason Drive and Bonita Canyon Drive
- New Class I bikeway extending from Ring Mall, south to Peltason Drive Portion from Aldrich Park to Ring Mall is complete
- New Class I bikeway extending from Aldrich Park at the center of campus, east to Pereira Drive.
- Extension of an existing Class I bikeway along Palo Verde between California Avenue and Arroyo Drive, on the east side of campus adjacent to the Anteater Recreation Center playing fields.
- Extension of an existing Class I bikeway between its current terminus in the Health Sciences west of West Peltason to California Avenue.
- New Class I bikeway from West Peltason to the medical sciences buildings west of West Peltason.
- New Class I bikeway westward from West Peltason north of its intersection with Bison Avenue to Health Sciences Complex.
- New Class I bikeway in the center of the Health Science Complex to connect an existing and planned bikeway.
- Extension of an existing Class I bikeway along Pereira Drive from Pereira Drive to Palo Verde.

- New Class I bikeway eastward from the Ring Mall to Pereira Drive and from Pereira Drive to East Peltason.
- Two new Class I bikeways connecting Adobe Circle to Palo Verde.
- New Class I bikeway along Gabrielino Road from California Avenue to Bonita Canyon Road.
- New Class I bikeway eastward along East Peltason to Gabrielino Drive
- New Class I bikeway from University Drive at California Avenue adjacent the north and west sides fo the San Joaquin Marsh Reserve to Campus Drive.
- New Class I bikeway connecting to the new Class I bikeway between University Drive and Campus Drive to Fairchild Road.

5.3 Future Class II On-Street Bikeways (On-Street Bicycle Lanes)

Future Class II on-street bikeways within the City include projects that are developer obligated, City funded, UCI funded, and unfunded projects. Future Class II on-street bikeways are shown on Figure 5-2b, *Future On-Street Projects.*

Proposed Class II Bikeways– Developer Obligated

The following on-street bikeway is proposed within the City, and is considered to be a developer obligated project, to be constructed or funded by developers, possibly concurrent with new development:

- Class II bikeway along Sand Canyon Avenue, over the I-405 Freeway[1]

[1] Funding for this developer obligated project (up to $1.5 million) can be transferred towards funding for a bicycle bridge over the I-405 freeway at Sand Canyon.

Proposed Class II On-Street Bicycle Lanes – City Funded

- Class II bikeway along Sand Canyon Avenue, between the railroad tracks and the I-5 northbound ramps.

Proposed Class II Bikeway (on-street bicycle lane) – Unfunded

The following are existing gaps identified in the on-street bikeway system with the City of Irvine. Projects are not listed in priority order.

- Class II bikeway along Sand Canyon Avenue, between the I-405 freeway and Alton Parkway
- Class II bikeway along northside of Michelson Drive, between Jamboree Road and Prince Way
- Class II bikeway along Campus Drive, between MacArthur Boulevard and Jamboree Road
- Class II bikeway along Michelson Drive, between MacArthur Boulevard and Dupont Drive
- Class II bikeway along Main Street, between Jamboree Road and the San Diego Creek Channel
- Class II bikeway along Von Karman Avenue, between Michelson Drive and Campus Drive
- Class II parallel to Quartz from Von Karman Avenue to Jamboree Road
- Class II along Teller Avenue connecting to the Central Park West development
- Class II along Coronado connecting to the San Diego Creek
- Class I along McGaw between Red Hill Avenue and Murphy Avenue

The above listed segments have physical constraints that limit the implementation of Class II bikeways. However, as future development plans are submitted for re-design at

these locations, Class II bikeways could become conditions of approval on new development, moving them to the list of developer obligated projects.

Proposed Class II On-Street Bikeways – UCI Projects

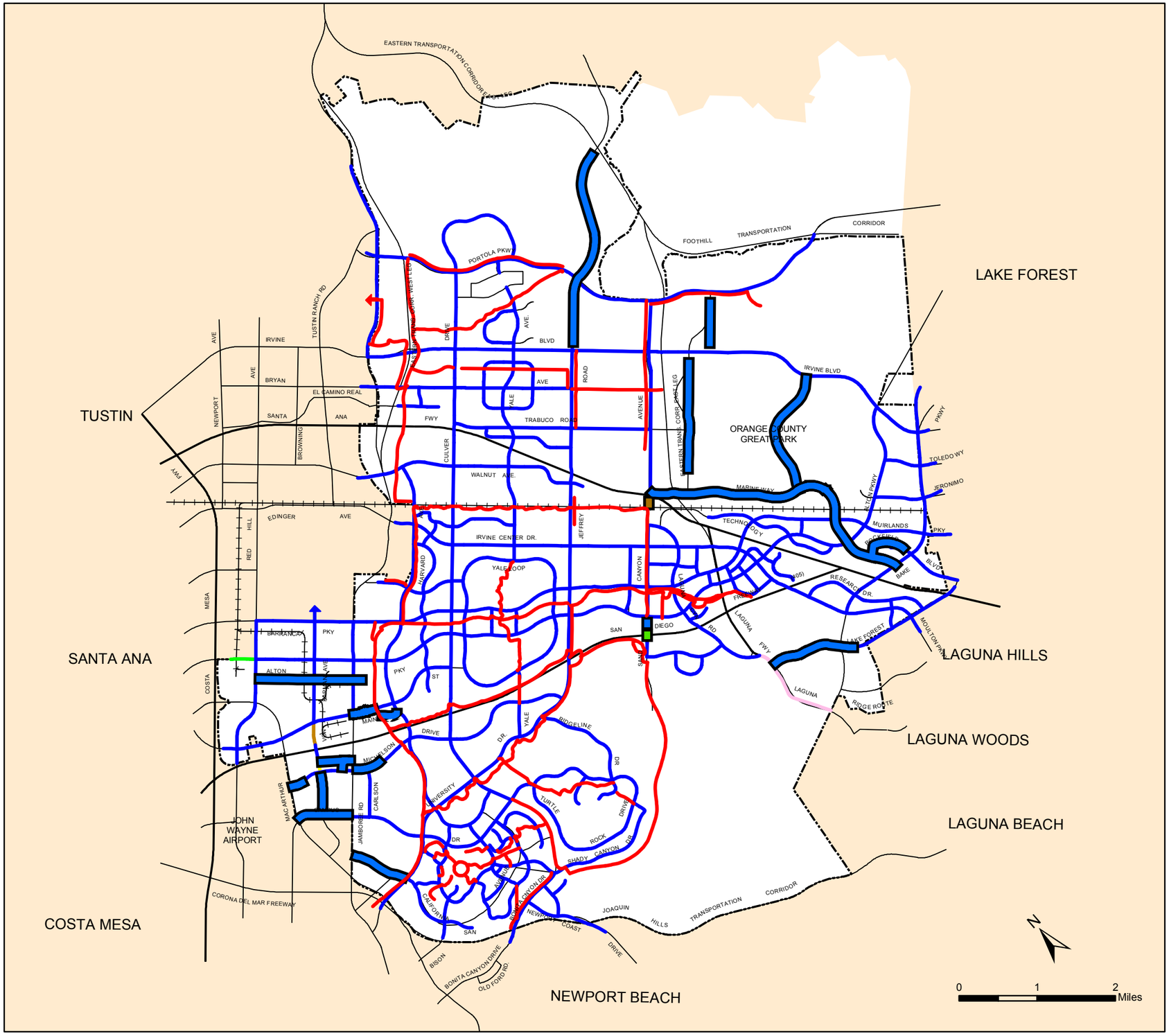
The following on-street bikeways, not listed in priority order, are proposed for construction within the UCI campus. The UCI Projects are shown on Figure 5-2c, *UCI Projects*

- Extension of existing on-street bikeway along Arroyo Drive from its current terminus to California Avenue.
- New Class II bikeway between Campus Drive and Arroyo Drive.
- New Class II bikeway along new roadway connecting Anteater Drive and Bonita Canyon Road at its intersection with Turtle Ridge Drive.
- Extension of the bicycle lane along Bison Avenue between the bicycle lane's current terminus and Aldrich Park.
- New Class II bikeway along Health Sciences Road connecting California Avenue and Bison Avenue.
- New Class II bikeway connecting to the new class II along Health Sciences Road at approximately its midpoint between California Avenue and Bison Avenue.
- New Class II bikeway from California Avenue connecting the future off-street bikeway that connects to West Peltason.

5.4 Future Grade Separation Projects

Future grade separation projects within the City of Irvine include projects that are developer obligated, City funded, Great Park projects, and unfunded. These future grade separation projects are shown on Figure 5-3, *Future Grade Separations.*

Figure 5-2B, Future On-Street Projects



Legend

- Funding to be Determined On-Street Bikeway
- Proposed Developer Obligated On-Street Bikeway
- Proposed City Obligated On-Street Bikeway
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

NOTE: See Figure 5-2C for Future On-Street Projects in UCI

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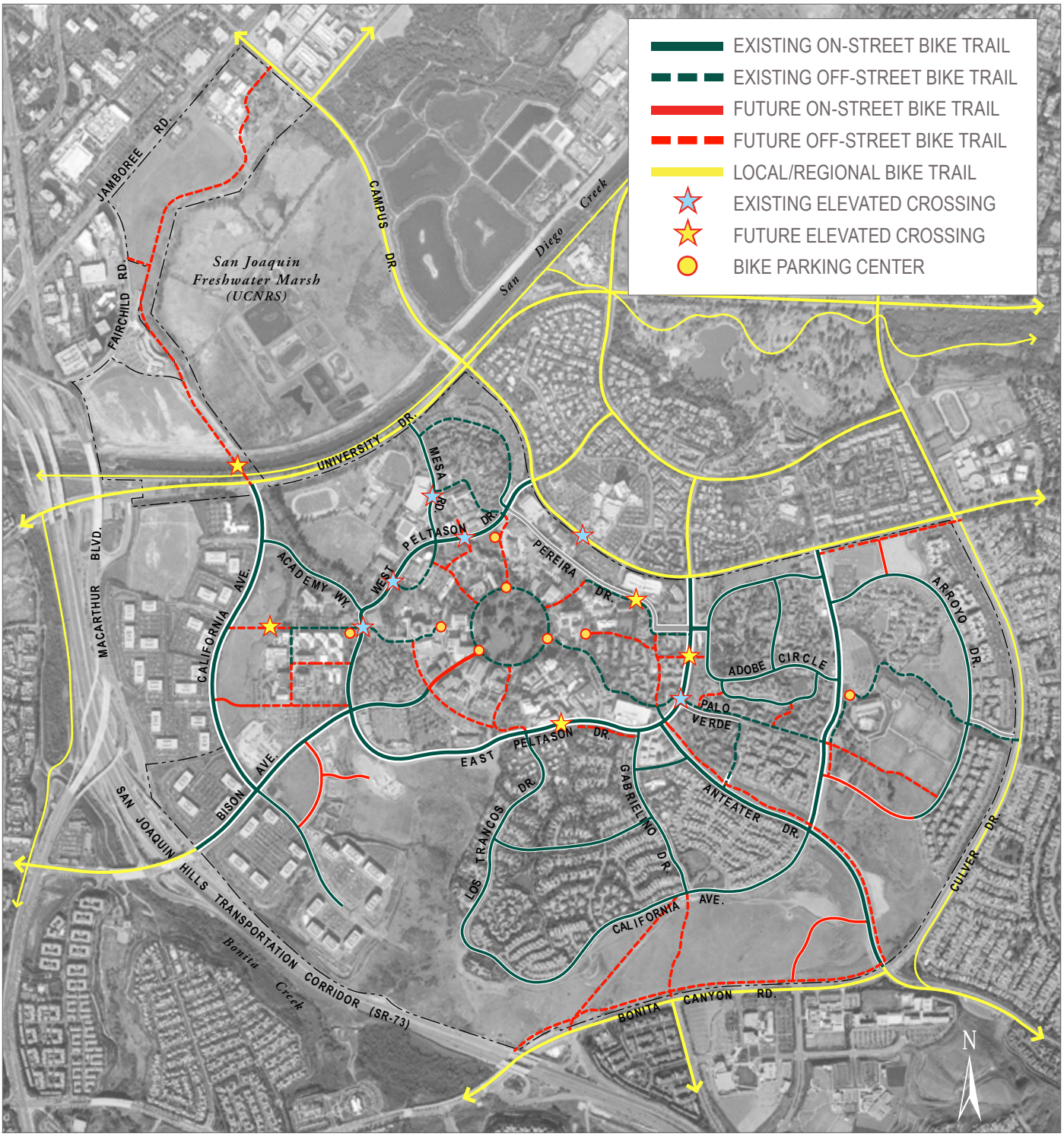
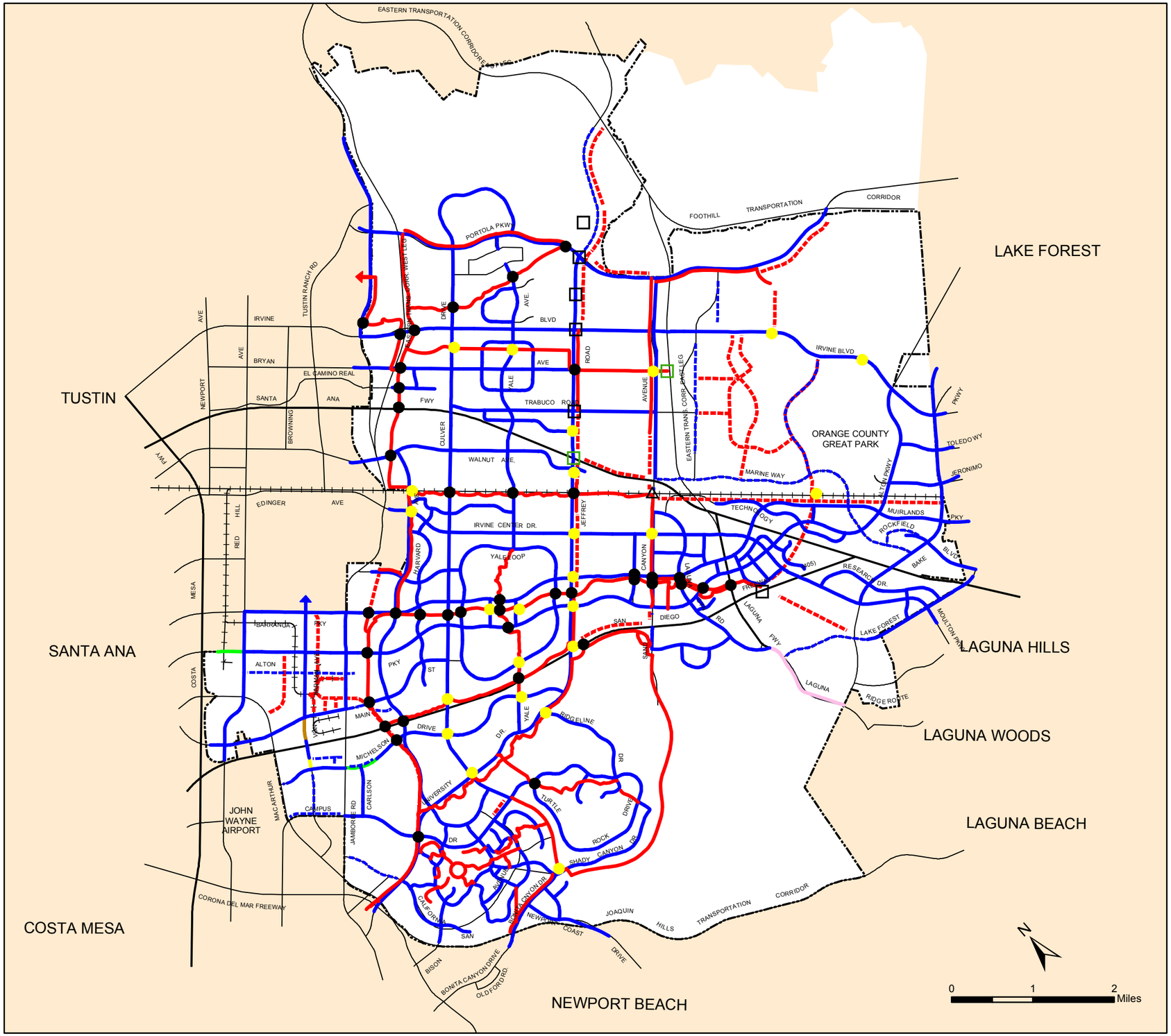
Figure 5-2c, Future UCI Projects



Source: UCI 2007 Long Range Development Plan

Figure 5-3, Future Grade Separations



Legend

- Existing Grade Separations
- Developer Obligated Grade Separations
- City Obligated Grade Separations
- Partial Developer Contribution Grade Separation
- Funding to be Determined Grade Separations
- Off-Street Bikeway
- Future Off-Street Bikeway
- On-Street Bikeway
- Future On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

NOTE: See Figure 5-2C for Future Projects in UCI

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Proposed Grade Separation Projects – Developer Obligated

The following grade separated crossings, not listed in priority order, are proposed within the City, and are considered to be developer obligated projects, to be constructed or funded by developers:

- Overcrossing of Irvine Boulevard at Jeffrey Open Space Trail and Irvine Boulevard
- Overcrossing of Trabuco Road at Jeffrey Open Space Trail and Trabuco Road
- Undercrossing of a potential village entry between Irvine Boulevard and Portola Parkway at the intersection of this entry way and the Jeffrey Open Space Trail
- Undercrossing of Portola Parkway at Portola Parkway and the Jeffrey Open Space Trail
- Undercrossing of Jeffrey Road at Jeffrey Road and Hicks Canyon Trail (north of Portola Parkway)
- Grade Separation crossing the I-405 freeway at the San Diego Creek Trail (Irvine Spectrum)

Proposed Grade Separation Projects – With Partial Developer Funding

(Not listed in priority order)

- Grade Separation crossing the I-5 Freeway at the Jeffrey Open Space Trail
- Grade Separation crossing the SR-133 at the Venta Spur Trail

Proposed Grade Separation Projects – Unfunded

(Not listed in priority order)

- Grade Separation crossing Roosevelt at the Jeffrey Open Space Trail
- Grade Separation crossing Culver Drive at the Freeway Trail

- Grade Separation crossing Harvard Avenue at the Walnut Trail
- Grade Separation crossing Walnut Avenue at the Jeffrey Open Space Trail
- Grade Separation crossing Jeffrey Road at the Freeway Trail
- Grade Separation crossing Barranca Parkway at the Jeffrey Open Space Trail
- Grade Separation crossing Shady Canyon/Bonita Canyon Drive Trail at the Shady Canyon Trail
- Grade Separation crossing Irvine Center Drive at the Jeffrey Open Space Trail
- Grade Separation crossing Culver Drive at the Mason Community Park Trail
- Grade Separation crossing Alton Parkway at the Jeffrey Open Space Trail
- Grade Separation crossing Creek Road at the San Diego Creek Trail
- Grade Separation crossing Lake Road at the San Diego Creek Trail
- Grade Separation crossing Ridgeline Drive at the Mason Community Park Trail
- Grade Separation crossing Irvine Center Drive at the Harvard Trail
- Grade Separation crossing Culver Drive at the Venta Spur Trail
- Grade Separation crossing Irvine Center Drive at the Sand Canyon Trail
- Grade Separation crossing Yale Avenue at the Venta Spur Trail
- Grade separation crossing Sand Canyon Avenue at the Venta Spur Trail
- Grade Separation crossing Yale Loop at its southern intersection of the Woodbridge Trail
- Grade Separation over/under Irvine Boulevard at its intersection with a potential Great Park Trail, (western entry point)
- Grade Separation over/under Irvine Boulevard at its intersection with a potential Great Park Trail, (eastern entry point)
- Grade Separation over/under the railway easement, at its intersection with a potential Great Park Trail (between the I-5 Freeway and the Irvine Station)

- Grade Separation crossing the SR-133 Freeway, at its intersection with a potential Great Park Trail

Concurrent with future development, these projects may become conditions of approval on new development, moving them to the list of developer obligated projects.

5.5 Proposed Network Consistency with Community Outreach Results

The proposed bikeways projects described above, and the resultant future bikeway network, are consistent with the results of the community outreach program undertaken as part of this Plan.

Community feedback, gathered through the community survey identified a number of community needs. The following describes how the implementation of the above described bikeway projects meet these community identified needs:

- *Community identified need: New off-street bikeway connecting Irvine Station to the employment and retail centers in the Irvine Spectrum located north/east of the I-5 freeway*. This Plan identifies off-street bikeways to connect the Irvine Station to the employment and retail centers in the Irvine Spectrum.
- *Community identified need: New off-street bikeways connecting to and through the Orange County Great Park.* This Plan identifies a number of proposed bikeways throughout the Great Park, providing both north/south and east/west connections through the site. Additionally, grade separated entry points into the Great Park have been identified by this Plan.
- *Community identified need: New off-street bikeways through the Irvine Business Complex.* A number of off-street bikeways are identified in this Plan to provide connections throughout the IBC.

5.6 General Plan Proposed Land Use and Settlement Patterns

The City of Irvine General Plan Land Use Element establishes the development policies and Land Use Plan for the ultimate build-out of the City. Figure A-3 of the City General Plan identifies the proposed organization of land uses throughout the City and its Sphere of Influence. See Figure 5-4, *Future Land Use and Settlement Patterns.*

In addition to the expansion of land uses into currently undeveloped peripheral areas of the City, the incorporation of new residential uses is also anticipated in portions of the City that now include office, research and light industrial uses, specifically the Irvine Business Complex and the Irvine Spectrum. Additional office, commercial, and industrial developments are also anticipated over the next five years within these areas.

Future proposed development, as identified above, will increase demand for bicycle infrastructure and facilities, provide new destinations and origins for bicycle trips, and create opportunities to expand the City's current bicycle network.

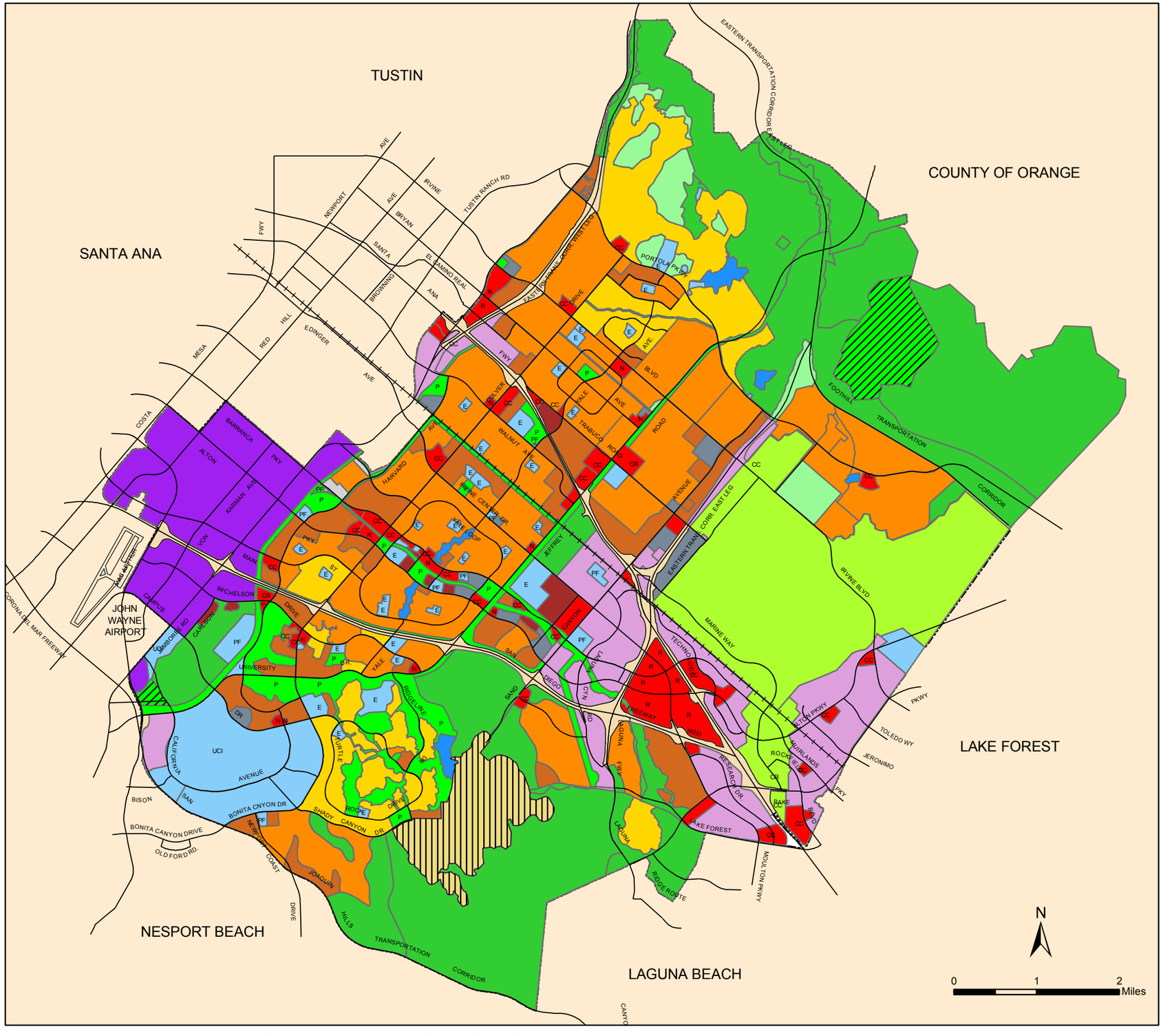

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Figure 5-4, Future Land Use & Settlement Pattens

From the City General Plan Land Use Element

Legend

- Landfill Overlay
- Golf Course Overlay
- Recreation
- Preservation
- Water Bodies
- Agriculture
- Residential - Estate
- Residential - Low Density
- Residential - Medium density
- Residential - Medium High Desnsity
- Residential - High Density
- Multi-Use
- Great Park
- N — Neighborhood Commercial
- CC — Community Commercial
- R — Regional Commercial
- CR — Commercial Recreation
- Vehicle Commercial
- Research and Industrial
- Urban and Industrial
- E — Educational Facilities
- PF — Public Facilities
- Freeway
- Lifelond Learning District
- Medical Science
- Military
- Retail Office

2011 Bicycle Transportation Plan

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5.7 Proposed Bicycle Amenities and Program

Parking

Section 4-3-7 of the City of Irvine Zoning Code requires that bicycle parking be provided at several different types of land uses. As future development includes the following land uses, the City shall require the provision of bicycle parking facilities:

- Shopping Centers;
- Restaurants;
- Commercial Recreation;
- Community Facilities;
- Libraries;
- Government Offices;
- Office developments over 100,000 square feet;
- Banks;
- Hospitals; and
- Medical and Dental Offices.

It should be noted that bicycle racks that are not specifically required by the Zoning Code will also be provided at schools and parks within the City. See Figure 5-5, *Future End-of-Trip Facilities.*

Signage

The findings of the community survey showed that “Wayfinding Signs” are extremely important to bikeway users. The following bikeways signage improvements are recommended for implementation:

Example of a wayfinding sign; City of Gresham, Oregon

- Adoption of a distinctive directional and network signage design, directing bikeway users to destinations and access points.
- Mileage signage and/or pavement markers along major bikeways.
- Street identification signage at the intersection of Class I bikeways with City roadways, to orient bikeway users.

Rest Amenities

Rest amenities should be provided along any new off-street bikeways, and may include benches, drinking fountains, picnic tables, and trash receptacles. All rest amenities shall be designed to meet current Americans with Disabilities Act (ADA) requirements.

Lighting

Lighting shall be provided along all paved bikeways per the City Security Code. Lighting should be implemented along those bikeways constructed prior to the current Security Code requirements as funding becomes available.

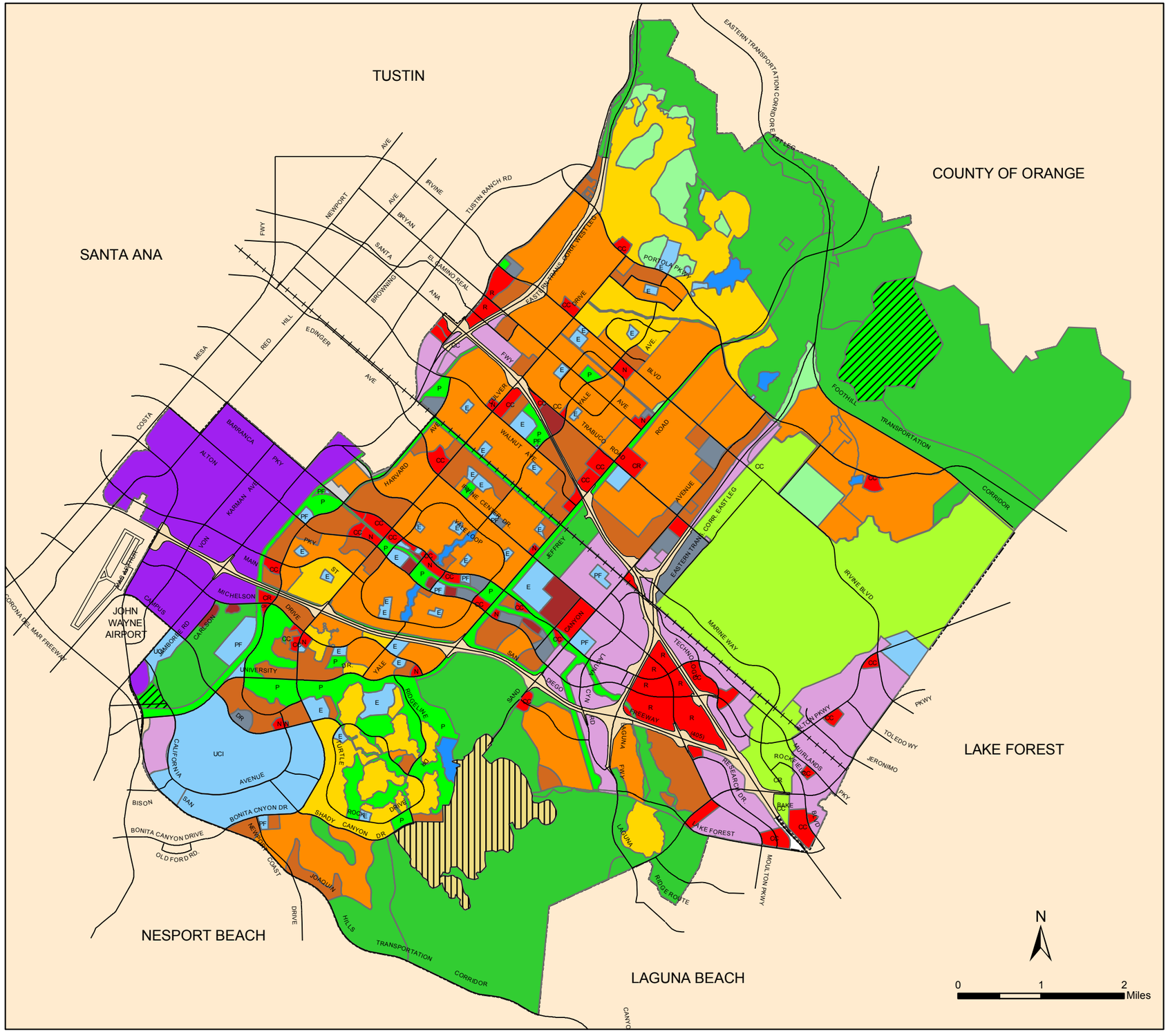

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Figure 5-5, Future End-of-Trip Facilities

Legend

- Landfill Overlay
- Golf Course Overlay
- Recreation
- Preservation
- Water Bodies
- Agriculture
- Residential - Estate
- Residential - Low Density
- Residential - Medium density
- Residential - Medium High Desnsity
- Residential - High Density
- Multi-Use
- Great Park
- N — Neighborhood Commercial
- CC — Community Commercial
- R — Regional Commercial
- CR — Commercial Recreation
- Vehicle Commercial
- Research and Industrial
- Urban and Industrial
- E — Educational Facilities
- PF — Public Facilities
- Freeway
- Lifelond Learning District
- Medical Science
- Military
- Retail Office

Per the City of Irvine Zoning Ordinance, future bicycle parking facilities will be installed at the locations of the following land uses, as shown on this General Plan Land Use Map depicting City build-out conditions: regional shopping centers, shopping centers with more than 50,000 SF of gross floor area; restaurants, commercial recreation activities (including bowling alleys, arcades, movie theaters, etc.); community facilities (including swim club, libraries, and City Hall); office developments with more than 100,000 SF of floor area; banks; hospitals; and medical and dental offices.

Future shower and locker facilities may be located at future private commercial and office buildings by private employers.

No public future bicycle locker facilities are planned in the City of Irvine at this time.

2011 Bicycle Transportation Plan

5.8 Future Alternative Transportation Modes

Bus service in Irvine is operated by the *i*Shuttle and Orange County Transportation Authority (OCTA). The *i*Shuttle provides service through the IBC and connects to the Tustin Metrolink Station and the John Wayne Airport. Rail service is operated by Amtrak and the Southern California Regional Rail Authority (Metrolink). Future enhancements to the connectivity between the bicycle network and alternative modes of transportation include future bikeways from Irvine Station to the Irvine Spectrum employment and retail centers and future bikeways within the Orange County Great Park that provide connections to the Irvine Station.

The City will continually work to accommodate changes in bus and rail service as the respective operators deem appropriate. As new villages are developed, the City will ensure connectivity of bikeways with these alternative modes of transportation. See Figure 5-6, *Future Connections with Alternative Transportation Modes.*

5.9 Future Bicycle Commuter Estimates

Based on available census data on Irvine residents who commute to work via bicycle, a rough projection of future bicycle ridership in Irvine and the accompanying trip reduction and air quality benefits can be developed. Research conducted throughout the U.S. by the U.S. Department of Transportation shows a definitive link between bicycle use and the age of the user, and the miles of bicycle facilities provided. Because the City already has a comprehensive network of bikeways in place, the projected increase in ridership will be tied in large part to improvements that enhance safety and increase convenience on the existing network. These may include crossing improvements, intersection and traffic signal improvements, or additional bicycle parking and amenities at major destinations. Educational and encouragement programs will also be very important to increasing ridership, by raising awareness of the City's excellent network of bicycle facilities, and to make residents feel safe and comfortable using the bicycle as an alternative to a motor vehicle trip.

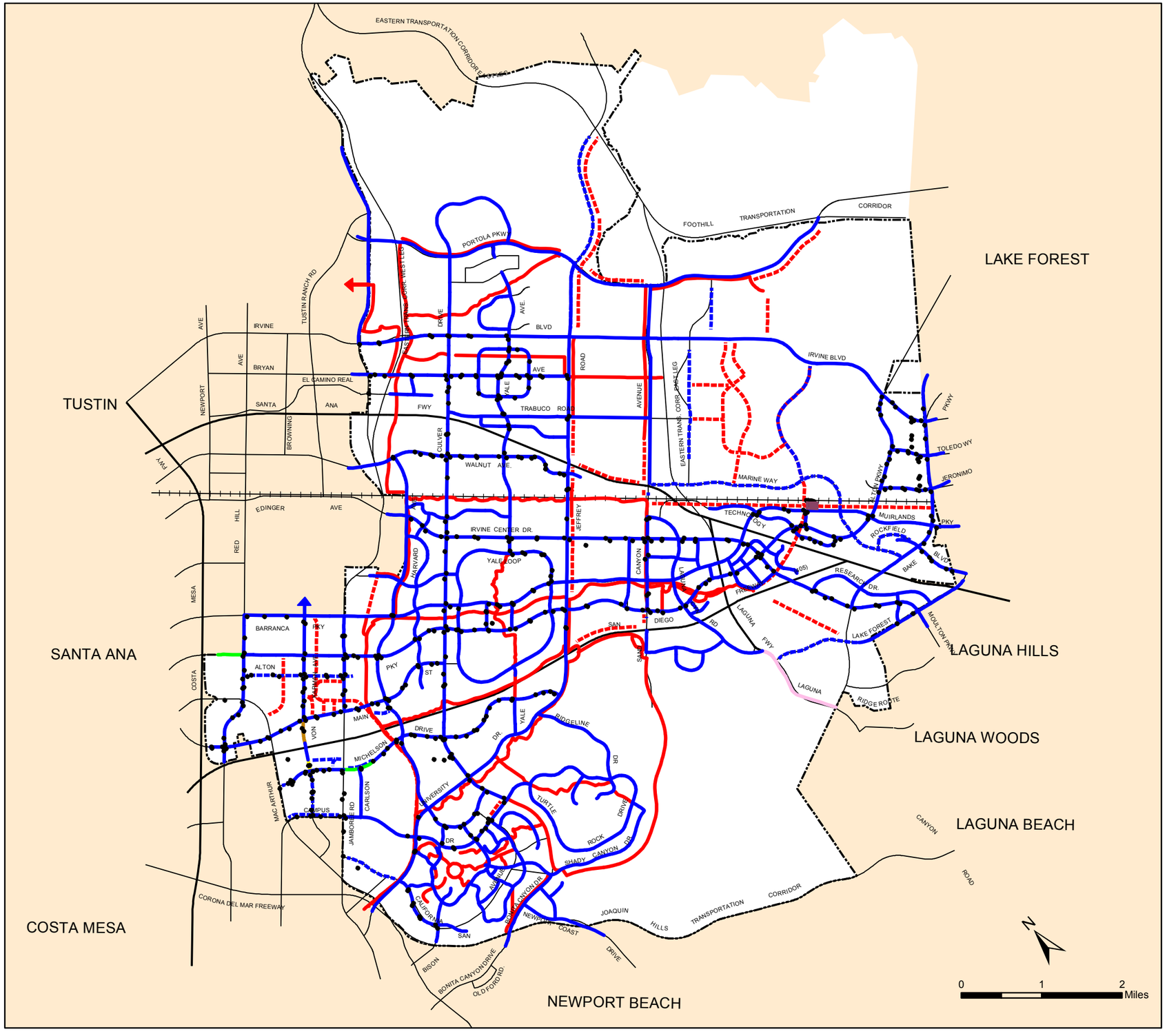
According to the 2005-2009 American Community Surveys conducted by the U.S. Census Bureau, approximately 1.6% of the Irvine residents commute to work via bicycle. There appears to be a substantial opportunity to capture some of Irvine's short-distance motor vehicle commute trips and convert them to bicycle commute trips through the implementation of this Plan. As shown in Table 5-A, 8,829 Irvine residents currently drive nine minutes or less to work. A nine-minute motor vehicle commute at an average of thirty-five miles per hour is equivalent to a reasonable thirty minute bicycle commute at a leisurely pace (10 mph).[2] If only 10% of the 8,829 current short-distance motor vehicle commuters were to bicycle instead of drive, bicycle commuters in the City of Irvine, which now account for only 1.6% of Irvine commuters could increase to 2.5%.

Table 5-A
Potential Bicycle Commuters

Commuters with a less than a 10 min driving commute (2005-2009)	*8,829*				
Percent of commuters to capture	5%	10%	20%	35%	50%
New bicycle commuters	441	883	1,766	3,090	4,414
Total existing bicycle commuters	1,569	1,569	1,569	1,569	1,569
Total bicycle commuters (new + existing)	2,010	2,452	3,335	4,659	5,983
Total existing commuters	98,081	98,081	98,081	98,081	98,081
New mode share	2.0%	2.5%	3.4%	4.8%	6.6%

[2] Bicycling at a rate of 10 miles per hour, this translates to a 5.25 mile commute.

Figure 5-6, Future Connections with Alternative Transportation Modes



Legend

- Existing Bus Stop
- Irvine Station
- Off-Street Bikeway
- Future Off-Street
- On-Street Bikeway
- Future On-Street
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

NOTE: See Figure 5-2C for Future Project in UCI

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Chapter 6 – Plan Implementation and Project Prioritization

6.1 Introduction

This chapter provides the foundation for the implementation of this Plan. Through the identification of City implementation policies and results of the community survey, this chapter guides the development and construction of the City of Irvine bikeways network, including on-street, off-street, and grade separation projects.

6.2 City of Irvine Implementation Policies

The City has adopted the following policies and requirements for implementation of bikeway infrastructure improvements throughout the City:

1. The City shall seek funding administered by the Orange County Transportation Authority for routes on the Orange County Commuter Bikeway Strategic Plan, dated May 2009.
2. Class II bicycle lanes shall be built and paid for as part of required road improvements. Paved shoulders, serving as Class II bicycle lanes, shall be included on partially constructed roadways.
3. Developers shall pay for bikeways facilities and links to the City system in conjunction with required improvements for subdivision processing.
4. The City and/or developers shall pay for bikeways system segments within the existing areas of the City to connect with undeveloped areas, or interim bikeways through undeveloped planning areas.
5. The City shall apply for State and Federal bikeway funds where available and appropriate.

6.3 Project Prioritization

A key component of the implementation of this Plan is the prioritization of bikeway projects. Prioritizing bikeway projects aids the City in focusing funding, as it becomes

available, on those projects with the most impact and largest contribution to the completion of the City bikeways network.

The community survey asked respondents to rate a number of off-street bikeways and grade separated crossings. The results of these ratings led to prioritization of projects.

For purposes of the Plan, developer obligated bikeway projects are not prioritized, as these projects are the direct responsibility of private developers to construct or fund. The prioritization is applied to projects that are currently unfunded to aid the City in determining where bikeway funding should be first applied.

Projects within the UCI campus are also not prioritized. Projects on the campus are the responsibility of the university to complete; however projects adjacent to City roadways may be partially funded by the City. Additionally, the City encourages connections to City bikeways in an effort to entice students, faculty and staff to commute via bicycle.

Class I Off-Street Proposed Projects

A list of unfunded off-street bikeway projects are proposed in Chapter 5, *Proposed Bikeways System.* The community survey asked the respondents to rate the following three segments from that list using a scale from 1 to 5; where 1 = Don't like it and 5 = Really like it.

- New off-street bikeway connecting Irvine Station to the employment and retail centers in the Irvine Spectrum located north/east of I-5 freeway.
- New off-street bikeways connecting to and through the Orange County Great Park.
- New off-street bikeways through the Irvine Business Complex.

The results of the survey are as follow:

Segment	**Rating Average**
New off-stret bikeway connecting Irvine Station to the employment and retail centers in the Irvine Spectrum located north/east of I-5 freeway.	4.03
New off-street bikeways connecting to and through the Orange County Great Park.	4.47
New off-street bikeways through the Irvine Business Complex.	3.92

Taking the results of the community survey into consideration, the near term unfunded projects are prioritized in *Table 6-A Off-Street Projects.* Projects are grouped into near-term and long-term categories. Near-term projects are anticipated to be initiated within the next 5 – 10 years funded with grants, local and developer funds. Long-term projects are long range infrastructure projects anticipated to be initiated after near-term projects are completed. The long-term projects are envisioned to be implemented to support the buildout of City's land uses. Due to competiveness for grant funding program and cost benefit, these projects could be implemented in different order. The Developer Obligated and City Funded projects have funding identified and are therefore not ranked.

The bikeway alignments for the unfunded projects shown on *Figure 6-1, Prioritized Off-Street Projects* are not the ultimate location of the bikeways, the actual alignment for each proposed bikeway will be further defined during project development phase.

TABLE 6-A – Prioritized Off-Street Projects

MAP #	RANKING	SEGMENT	BETWEEN/PARALLEL
Near-Term Projects - Unfunded			
OS1	1-3	New Class I bikeway connecting to/through the Great Park	Irvine Boulevard and the railway right-of-way (east side of the park)
OS2		New Class I bikeway connecting to/through the Great Park	Irvine Boulevard and the railway right-of-way (west side of the park)
OS3		New Class I bikeways connecting to/through the Great Park	SR-133 and the center of Great Park
OS4	4	New Class I bikeway through Irvine Spectrum	Irvine Station and Irvine Spectrum
OS5	5-8	New Class I bikeway through Irvine Business Complex	Along Armstrong Avenue
OS6		New Class I bikeway through Irvine Business Complex	East of Von Karman, between Barranca and the San Diego Creek.
OS7		New Class I bikeway through Irvine Business Complex	West of San Diego Creek
OS8		Two new Class I bikeways through Irvine Business Complex	Between the canal and Main Street
Long-Term Projects – Unfunded			
OS9	N/A	Extension of the Jeffrey Open Space Trail	North of the Gateway Park and entrance to existing Haul Road
OS10	N/A	Extension of the Walnut Trail	Sand Canyon Avenue and Bake Parkway
OS11	N/A	Extension of the Jeffrey Open Space Trail	Walnut Avenue and I-5 freeway

TABLE 6-A – Prioritized Off-Street Projects (continued)

MAP #	RANKING	SEGMENT	BETWEEN/PARALLEL
Developer Obligated			
OS12	N/A	Extension of the Jeffrey Open Space Trail	Between Portola Parkway to north of Gateway Park entrance
OS13	N/A	Extension of the Jeffrey Open Space Trail	Between Irvine Boulevard and Portola Parkway
OS14	N/A	Extension of the Jeffrey Open Space Trail	Between Trabuco Road and I-5 Freeway
OS15	N/A	Extension of the Jeffrey Open Space Trail	Between Walnut Avenue and San Diego Creek
OS16	N/A	Extension of Freeway Trail	Between Jeffrey Bicycle Bridge and Sand Canyon Avenue
OS17	N/A	Extension of Peters Canyon Trail	Between Barranca Parkway and Warner Avenue
OS18	N/A	Extension of Portola Trail	Between Jeffrey Road and Sand Canyon Avenue
OS19	N/A	Extension of Portola Trail	Between Portola Springs and City limits
OS20	N/A	New Class I bikeway in Planning Area 6 along Modjeska	Between Portola Springs and Irvine Boulevard
OS21	N/A	Extension of Sand Canyon Trail	Between south of Trabuco and I-5 Freeway northbound ramps
OS22	N/A	Extension of Sand Canyon Trail	Between Alton Parkway and I-405 Freeway
OS23	N/A	New Class I bikeway along I-5 Freeway	Between Jeffrey Road and Sand Canyon Avenue
OS24	N/A	Extension of San Diego Creek Trail	Between current terminus at I-405 Freeway and Lake Forest Drive

TABLE 6-A – Prioritized Off-Street Projects (continued)

MAP #	RANKING	SEGMENT	BETWEEN/PARALLEL
City Funded			
OS25	N/A	Extension of Walnut Trail; parallel to Sand Canyon Avenue	Between existing terminus of Walnut Trail to the I-5 Freeway
OS26	N/A	New Class I bikeway on Campus Drive	Between California Avenue and Culver Drive

Class II On-Street Proposed Projects

A list of unfunded on-street bikeway projects are proposed in Chapter 5, *Proposed Bikeways System.* Table 6-B identifies these projects, which are to be considered equally because these projects have physical constraints that limit their implementation. However, as future development plans are submitted for re-design near these locations, the sites could be re-designed to accommodate implementation of Class II bikeways or Class II bikeways could become conditions of approval on new development.

TABLE 6-B – *On-Street Projects*

MAP #	RANKING	CLASS II LANE(S) PROPOSED ALONG	BETWEEN
Unfunded			
ON1	N/A	Sand Canyon Avenue	I-405 freeway and Alton Parkway
ON2	N/A	Michelson Drive (north side)	Jamboree Road and Prince Street
ON3	N/A	Campus Drive	MacArthur Boulevard to Jamboree Road
ON4	N/A	Michelson Drive	MacArthur Boulevard and Dupont Drive
ON5	N/A	Main Street	Jamboree Road and the San Diego Creek Channel
ON6	N/A	Von Karman	Michelson Drive and Campus Drive
ON7	N/A	Quartz	Von Karman Avenue to Jamboree Road
ON8	N/A	Teller Avenue	Michelson to Central Park West development
ON9	N/A	Coronado	Harvard to San Diego Creek
Developer Obligated			
ON10	N/A	Sand Canyon Avenue	Over the I-405 freeway
City Funded			
ON11	N/A	Sand Canyon Avenue	Railroad tracks and I-5 freeway northbound ramps

Grade Separation Proposed Projects

A list of unfunded grade separation projects are proposed in Chapter 5, *Proposed Bikeways System.* The community survey asked the respondents to rate the following three segments from that list using a scale from 1 to 5; where 1 = Don't like it and 5 = Really like it.

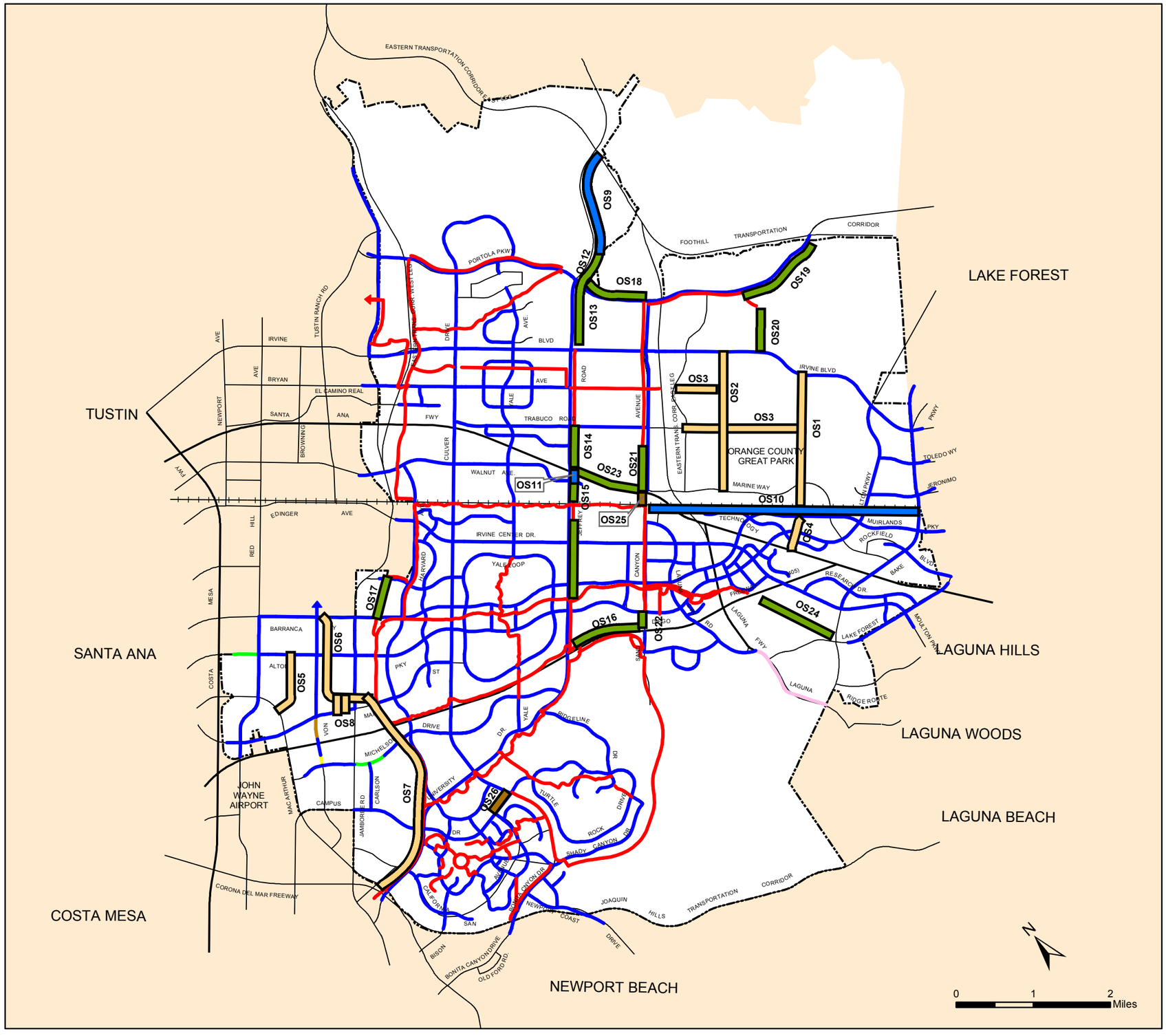
- A new grade separated crossing over the I-5 Freeway adjacent to Jeffrey Road
- A new grade separated crossing over Walnut Avenue adjacent to Jeffrey Road
- A new grade separated crossing over Jeffrey Road parallel to the I-405 freeway; north/east of side of I-405 freeway
- A new grade separated crossing over Culver Drive parallel to the I-405 freeway; north/east of I-405 freeway

The following are the results of the survey:

Segment	**Rating Average**
A new grade separated crossing over the I-5 freeway adjacent to Jeffrey Road	4.25
A new grade separated crossing over Walnut Avenue adjacent to Jeffrey Road	4.00
A new grade separated crossing over Jeffrey Road parallel to the I-405 freeway; north/east of side of I-405 freeway	4.19
A new grade separated crossing over Culver Drive parallel to the I-405 freeway; north/east of I-405 freeway	4.28

Taking the results of the community survey into consideration, the near term projects are prioritized in *Table 6-C Grade Separation Projects.* Priority for implementation could be based on several factors, including competitiveness for a grant funding and cost-benefit. Long-term projects are future projects to be implemented and have not been ranked. Developer obligated and City funded projects have funding identified and are therefore not ranked.

Figure 6-1,Prioritized Off-Street Projects



Legend

- Proposed Unfunded Near Term Off-Street Bikeway
- Proposed Unfunded Long Term Off-Street Bikeway
- Proposed Developer Obligated Bikeway
- Proposed City Funded Bikeway
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Raidroad
- Irvine City Boundary
- Irvine Sphere of Influence

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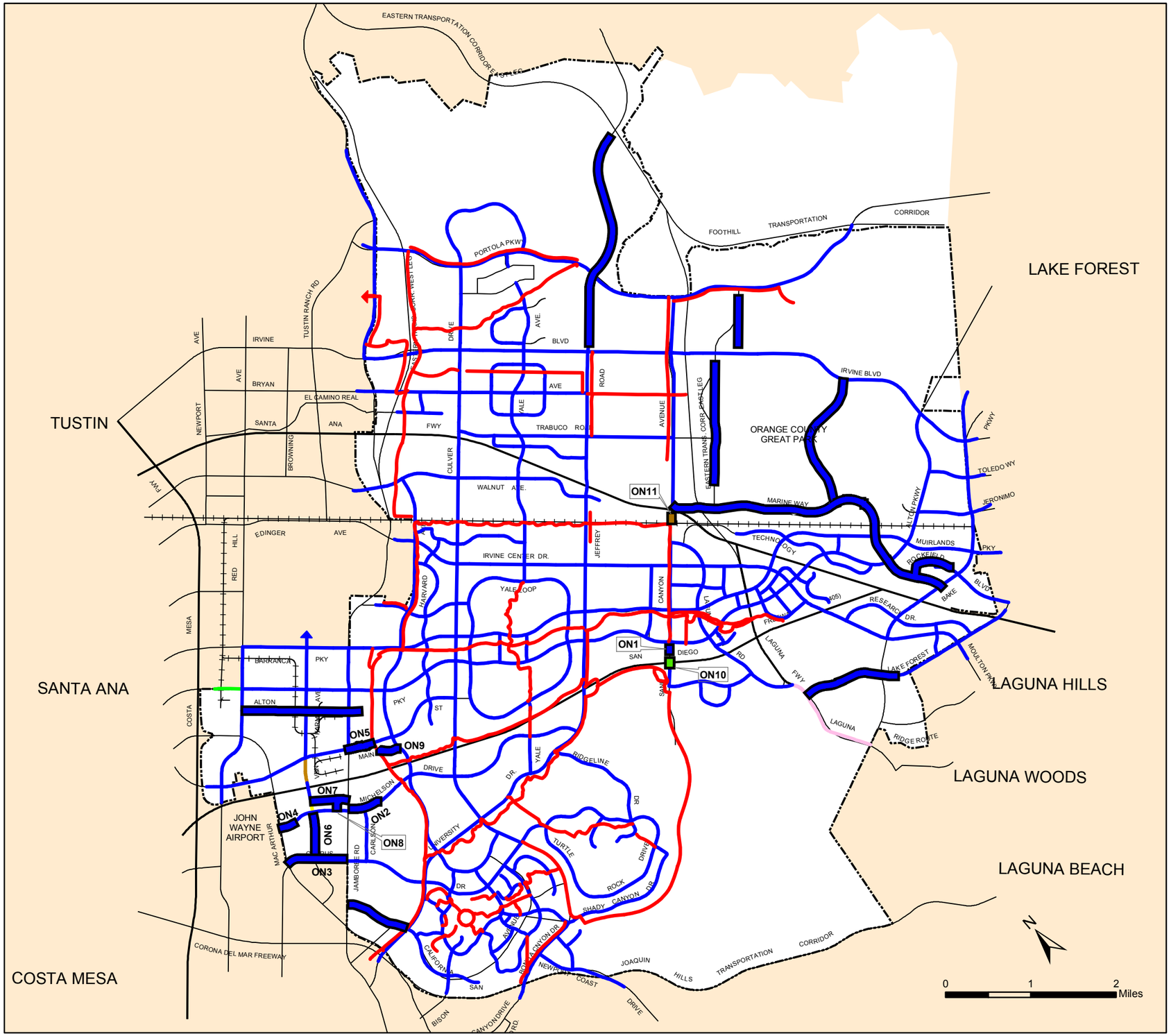
Figure 6-2, Proposed On-Street Projects



Legend

- Proposed Unfunded On-Street Bikeway
- Proposed Developer Obligated On-Street Bikeway
- Proposed City Funded On-Street Bikeway
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

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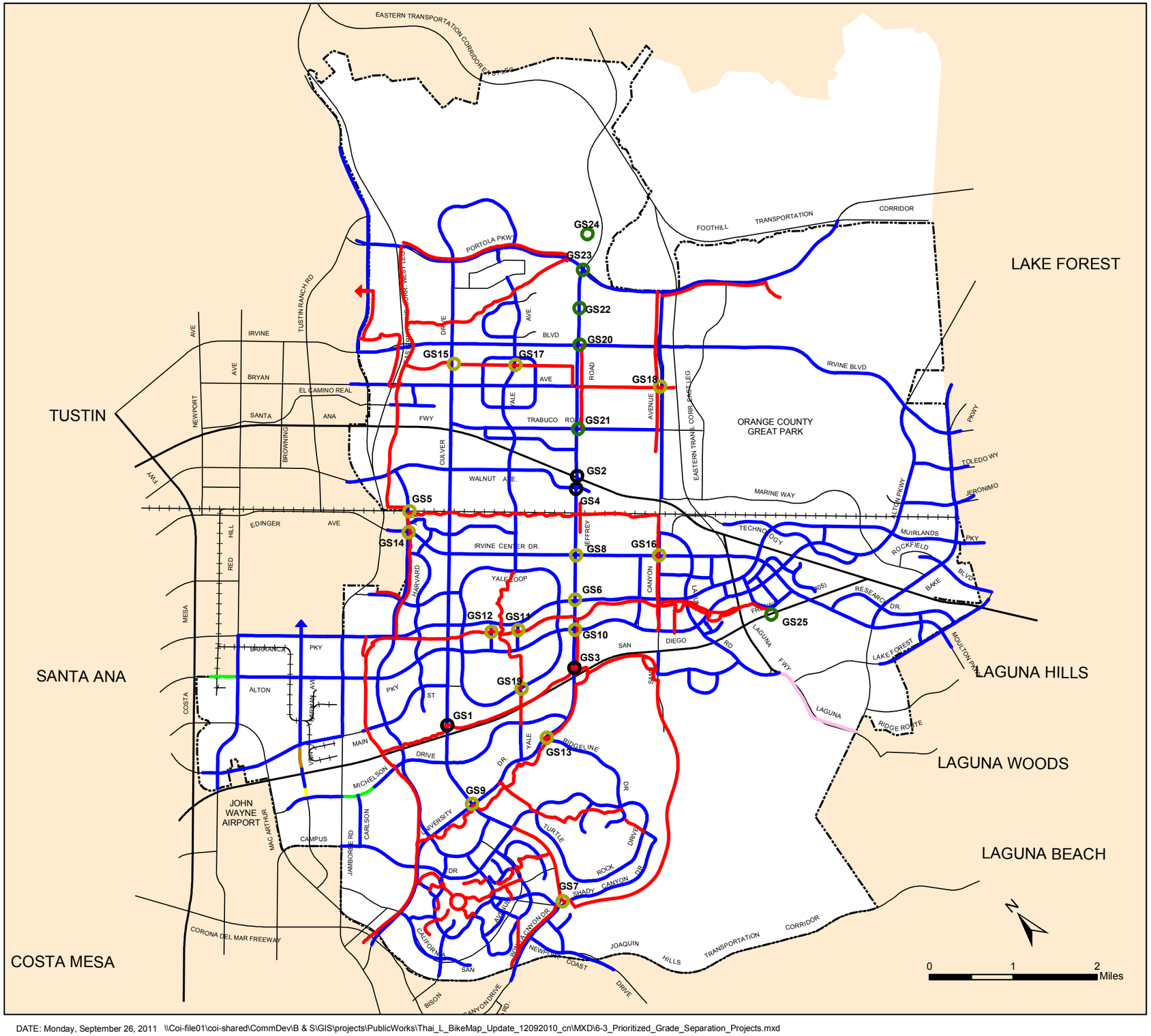
TABLE 6-C – *Grade Separation Projects*

MAP #	RANKING	GRADE SEPARATION CROSSING OVER/UNDER	AT THE INTERSECTION OF
Near-Term Projects – Unfunded			
GS 1	1	Culver Drive	I-405 freeway; parallel to I-405 freeway; north/east of I-405 freeway
GS 2	2	I-5 Freeway	Adjacent to Jeffrey Road
GS 3	3	Jeffrey Road	I-405 freeway; parallel to I-405 freeway, north/east of I-405 freeway
GS 4	4	Walnut Avenue	Adjacent to Jeffrey Road; Walnut and the Jeffrey Open Space Trail
Long-Term Projects – Unfunded			
GS 5	N/A	Harvard Avenue	Harvard Avenue and the Walnut Trail
GS 6	N/A	Barranca Parkway	Barranca Parkway and the Jeffrey Open Space Trail
GS 7	N/A	Shady Canyon/Bonita Canyon Drive	Shady Canyon/Bonita Canyon Drive and the Shady Canyon Trail
GS 8	N/A	Irvine Center Drive	Irvine Center Drive and the Jeffrey Open Space Trail
GS 9	N/A	Culver Drive	Culver Drive and the Mason Regional Park Trail
GS 10	N/A	Alton Parkway	Alton Parkway and Jeffrey Open Space Trail (Jeffrey Road)
GS 11	N/A	Creek Road	Creek Road and the San Diego Creek Trail
GS 12	N/A	Lake Road	Lake Road and the San Diego Creek Trail
GS 13	N/A	Ridgeline Drive	Ridgeline Drive and the Mason Regional Park Trail
GS 14	N/A	Irvine Center Drive	Irvine Center Drive and the Harvard Trail
GS 15	N/A	Culver Drive	Culver Drive and the Venta Spur Trail
GS 16	N/A	Irvine Center Drive	Irvine Center Drive and the Sand Canyon Trail
GS 17	N/A	Yale Avenue	Yale Avenue and the Venta Spur Trail
GS 18	N/A	Sand Canyon Avenue	Sand Canyon Avenue and the Venta Spur Trail
GS 19	N/A	Yale Loop	Yale Loop and the Woodbridge Trail
N/A	N/A	Irvine Boulevard	Irvine Boulevard at its intersection with a potential Great Park Trail (western entry point)
N/A	N/A	Irvine Boulevard	Irvine Boulevard at its intersection with a potential Great Park

MAP #	RANKING	GRADE SEPARATION CROSSING OVER/UNDER	AT THE INTERSECTION OF
			Trail (eastern entry point)
N/A	N/A	Railway easement	Railway right-of way and potential Great Park Trail (between I-5 Freeway and Irvine Station)
N/A	N/A	SR-133 Toll road	SR-133 Toll road and a potential Great Park Trail
Developer Obligated			
GS 20	N/A	Irvine Boulevard	Jeffrey Open Space Trail and Irvine Boulevard
GS 21	N/A	Trabuco Road	Jeffrey Open Space Trail and Trabuco Road
GS 22	N/A	Potential Village Entry	Jeffrey Open Space Trail and potential village entry
GS 23	N/A	Portola Parkway	Jeffrey Open Space Trail and Portola Parkway
GS 24	N/A	Jeffrey Road	Jeffrey Road and Hicks Canyon Trail
GS 25	N/A	I-405 freeway	San Diego Creek Trail and I-405 freeway

Concurrent with future development, the unfunded projects may become conditions of approval on new development, moving them to the list of developer obligated projects.

Figure 6-3, Prioritized Grade Separation Projects



Legend

- Proposed Unfunded Near Term Grade Separation
- Proposed Unfunded Long Term Grade Separation
- Developer Obligated Grade Separation
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Railroad
- Irvine City Boundary
- Irvine Sphere of Influence

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6.4 Project Feasibility

Many of the proposed projects identified in this chapter are constrained by a variety of factors that may inhibit the projects' feasibility. These constraints may include the following:

- Right-of-way constraints, which would require the City to acquire additional right-of-way in order to construct the project.
- Utility and/or other easement constraints, which would require the City to possibly acquire or relocate easements, or negotiate agreements to use easements for bikeway purposes.
- Environmental or community sensitivity in which project construction may adversely impact the environment or may face neighborhood opposition.
- Engineering or other technical constraints, in which complicated and possible cost-prohibitive engineering would be required to construct the project.

The constraints associated with the proposed projects will be identified and addressed during the preliminary engineering stages of the projects.

6.5 Funding Needs

The projects identified as near-term projects need feasibility studies and project reports prepared. The costs of these studies are roughly estimated at $100,000 per project and vary depending on the complexity of the bikeway project. According to the most recent Orange County Transportation Authority Bikeways Strategic Plan, the estimated cost of bikeway project is $1,500,000 per mile for off-street bikeway and $280,000 per mile for on-street bikeway. The near-term off-street bikeways identified in this Plan are roughly estimated at $15M; approximately 10 miles of new off-street bikeways.

Chapter 7 – Funding Opportunities and Expenditures

The City received funding from a variety of sources since 2006 to plan, design, construct, and implement projects to further the completion of a comprehensive bicycle network. As the interest in and use of bicycle and pedestrian facilities has grown over the years, funding resources for bicycle related programs also have increased. A variety of federal, state, and local programs can provide financial assistance for bicycle transportation projects within the City.

7.1 City of Irvine Funding Policies

The following are policies and requirements that the City has adopted for funding bikeway improvements through the years:

1. The City shall seek funding administered by the Orange County Transportation Authority (OCTA) for routes and amenities identified in the 2009 OCTA Commuter Bikeways Strategic Plan, adopted on May 22, 2009.
2. Class II bikeways shall be built and paid for as part of required road improvements.
3. Developers shall pay for bikeway systems and links to the City system in conjunction with required improvements for subdivision processing.
4. The City and/or developers shall pay for links within the existing areas of the City to connect with undeveloped areas, or interim bikeways through undeveloped planning areas.
5. The City shall apply for federal, state, and local bikeway funds where available and appropriate.

This chapter identifies the successfully funded bicycle projects previously awarded to the City, the current projects within the City's Capital Improvement Program, and a listing of funding programs available to the City from federal, state and local appropriations.

7.2 Past Expenditures on Bicycle Projects within the City

The City has secured a total of approximately $3.4 million in federal, state, and local funds for bicycle related projects since fiscal year 2005-2006. Table 7-A, Past Expenditures History, presents the history of citywide bicycle projects that have been awarded funding through a variety of sources. The majority of the City's bicycle funding is derived from competitive grant programs.

The Federal Transportation Enhancement Activities program has provided funding for the Campus Drive Off-Street Bikeway, and the Federal Highway Safety Improvement Program has provided funding to upgrade sidewalk ramps at intersections along Class II On-Street Bikeways. The Statewide Bicycle Transportation Account has continued to provide a consistent means for funding City projects to include new wayfinding signage within the City's bikeway network and additional bicycle lockers at Irvine Station. The Federal and State Safe Routes to School Programs have allowed the City to complete a bicycle and walking safety education program serving elementary and middle schools, and retrofit fifty traffic signals with pedestrian countdown signal heads at intersections serving neighboring schools. Local funds sourced from Orange County's Measure M, a 20-year program for transportation improvements funded by a half-cent sales tax, has provided funding assistance in recent years for the Jeffrey Off-Street Bikeway and the Walnut Trail Extension projects.

TABLE 7-A
Past Expenditures History

Year	Funding Program	Project	Award Amount
2011-12	Bicycle Transportation Account	San Diego Creek Class I Bikeway Pavement Rehabilitation	$ 353,475
2011-12	Bicycle Transportation Account	UCI Los Trancos Bikeway Extension	$ 269,411
2010-11	Transportation Enhancement (TE) Activities Program	Campus Drive Class I Off-Street Bikeway (California to Culver Drive)	$ 354,719

Year	Funding Program	Project	Award Amount
2010-11	Bicycle Transportation Account	Citywide Bikeway Wayfinding Signage	$ 45,000
2009-10	Bicycle Transportation Account	Irvine Station Bicycle Lockers	$ 27,000
2009-10	Highway Safety Improvement Program	Citywide ADA Ramp Upgrades	$ 900,000
2009-10	State Safe Routes to School Program	50 Pedestrian Countdown Signal Heads and Walking School Bus	$ 118,800
2008-09	Measure M - Combined Transportation Funding Program & Transportation Demand Management	Jeffrey Off-Street Bikeway (Venta Spur to Bryan)	$ 500,000
2008-09	Federal Safe Routes to School Program	Comprehensive Bicycle / Walking Safety Education and Sustainable Walking Program	$ 500,000
2005-06	Measure M - Combined Transportation Funding Program, Transportation Demand Management, Growth Management Area	Walnut Trail Extension (Sand Canyon Avenue to Technology Drive)	$ 294,753
		Total	**$ 3,363,158**

7.3 Future Funding Opportunities

Table 7-B presents a matrix of the federal, state and local funding programs available to the City. There are a variety of potential funding sources including federal, state, regional, and local funding programs that can be used to construct the proposed bicycle improvements. Most of the programs are competitive and involve the completion of applications with clear documentation of the project need, costs, and benefits.

TABLE 7-B
Bicycle Transportation Funding Programs

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
FEDERAL PROGRAMS									
Congestion Mitigation and Air Quality (CMAQ) Program	Varies by RPTA	OCTA	$360 m Statewide, and formula based by MPO	Established by OCTA	MPOs, RTPAs, Cities, Counties, Transit Operators.	X	X	X	Counties re-designated to attainment status for ozone may lose this source. Provision for bicycle and pedestrian facilities and programs (paths, racks, support facilities, non-construction outreach to safe bicycle use). Contact Ben Ku, OCTA at (714) 560-5473.
Federal Safe Routes to School (SRTS)	July	Caltrans	$23 m	Not Required	County, City, School Districts, Non-Profits, Public Health Departments	X	X	X	Infrastructure and non-infrastructure projects that encourage students in grades K-8 to walk and bike to school. Projects must be in close proximity to schools. Contact Ghazal Afrasiabi, Caltrans (949) 724-2124.
Highway Safety Improvement Program (HSIP)	December	Caltrans	$75 m Statewide	10% Match	County, City	X	X	---	Projects that improve safety for any public road, publicly owned bicycle, pedestrian pathway, or trail. Contact Raouf Fam, Caltrans at (949) 724-2229
Land & Water Conservation Fund	November	California Deptartment of Parks and Recreation	$1.7 m	50% Match	Counties, Cities, and Disricts	---	X	---	Federally-funded. Projects that acquire and develop outdoor recreation areas and facilities. Contact (916) 653-7423
Regional Surface Transportation Program	Varies by RPTA	Caltrans OCTA	$320 m Annually Statewide	Established by OCTA	County, City, Transit Operators, Caltrans, and MPOs	X	X		Projects for bicycle facilities. RSTP funds may be exchanged for local funds for non-federally certified local agencies; no match may be required if project improves safety. Contact Ben Ku, OCTA, (714) 560-5473.

TABLE 7-B
Bicycle Transportation Funding Programs (continued)

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
FEDERAL PROGRAMS (continued)									
Rivers, Trails, and Conservation Assistance Program	August 1 for the following FFY (Oct 1 thru Sept 30)	US National Park Service	No Direct Funds, Technical Assistance	N/A	State, Counties, Cities, Tribal, Non-Profits	X	X	---	Technical assistance for community-led natural resource conservation and outdoor recreation initiatives. Provide guidance to develop trails and greenways. Pacific West Office contact Barbara Rice, US National Park Service at (510) 817-1449
Transportation Enhancement (TE) Activities	Varies by RPTA	Caltrans OCTA	$12.4 m, $500 k max per project	25% Local Match	County and City Agencies in Orange County	X	X	X	Transportation-related projects that enhance quality of life, in or around transportation facilities, landscape and aesthetic enhancements, and bicycle and pedestrian facilities. Bicycle and pedestrian examples may be gap closures, bike lockers, bikeways, bike racks, walkways at multi-use recreational trails, etc. Contact Ben Ku, OCTA at (714) 560-5473.
STATE PROGRAMS									
Bicycle Transportation Account (BTA)	December	Caltrans	$7.2 m	10% Local	County, City	X	---	X	State-funded. Projects that improve safety and convenience of bicycle commuters. Contact Ann Mahaney, Caltrans at (916) 653-0036.
California River Parkways and Urban Streams Restoration Grant Program (Prop 84)	Fall	California Resources Agency & Strategic Growth Council	$28.4 m remaining in program, $700 k Average Project Award	Not Required, but Encouraged	County, City, and California Non-Profits	X	X	--	River Parkway - Recreation Category will fund projects that provide compatible recreational opportunities including trails for strolling, hiking, bicycling, and equestrian uses along rivers and streams. Contact (916) 653-2812.
Coastal Conservancy	Ongoing	California Coastal Conservancy	No Minimum or Maximum	Not Required, but Encouraged	Federal, State, Local, Special Districts, and Certain Non-Profits	X	X	---	Fund projects that help people get to coast and by shores by building trails and stairways and by acquiring land and easements. Contact Joan Cardellino, South Coast Region at (510) 286-4093

TABLE 7-B
Bicycle Transportation Funding Programs (continued)

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
STATE PROGRAMS (continued)									
Community Based Transportation Planning (CBTP) Grants	March	Caltrans	$3 m per year, $300k max per project	10% Local	MPO, RPTA, County, City	X	X	---	Projects (studies or plans) that promotes public engagement, livable community concepts, and sustainable transportation system, which includes mobility, access, and safety. Contact Damon Davis, Caltrans at (949) 440-3487.
Environmental Enhancement and Mitigation (EEM) Program	October	California Natural Resources Agency, Caltrans	$10m statewide, $350k max per project	Not Required	State, County, City, Federal Govt. Non-Profits	X	X	---	Roadside Recreation - Projects that enhance or mitigate future transportation projects; can include acquisition or development of roadside recreational facilities. Contact coordinator at CA Natural Resources Agency at (916) 651-7593 or Brenda Herron, Caltrans at (916) 653-6930.
Environmental Justice and Community-Based Transportation Planning	April	Caltrans	$3 m Statewide, $250 Max per Project	10% Non-Federal	MPOs, RTPs, Counties, Cities, Transit Agencies, Tribal	X	X	X	Projects that promote community involvement in planning to improve mobility, access, and safety while promoting economic opportunity, equity, environmental protection, and affordable housing for low-income, minority, and Native American communities. Contact Damon Davis, Caltrans at (949) 440-3487.
Habitat Conservation Fund - Trails Category	October	California Department of Parks and Recreation	$2 m	50% Federal or Local Match (Non-State Funds)	Counties, Cities, and Disricts	X	X	---	Funding for land acquisition or trail development which brings people to a park and/or wildlife environment. Project examples are: Create / install interpretive elements, seating, lighting, new trails, and/or rehabilitate existing trails. Trail projects is one of seven categories. Grants for trails are typically under $200,000. Contact Deborah Viney at (916) 509-3019.
Office of Traffic Safety (OTS) Grants	February	California Office of Traffic Safety	--	Not Required	State, County, City	---	---	X	Bicycle and pedestrian projects have been funded through this program. Promotes safety programs, education, enforcement, traffic safety and bicycle rodeos, safety and helmet distribution. Contact OTS Coordinator for Orange County at (916) 509-3019.

TABLE 7-B
Bicycle Transportation Funding Programs (continued)

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
STATE PROGRAMS (continued)									
Recreational Trails Program (RTP) for Non-Motorized Trails	October	CA Dept of Parks and Recreation	$2.1 m Statewide	12% Match	Federal Agencies, State Agencies, Counties, Cities, Districts, Non-Profits	X	X	---	For recreational bikeways to benefit bicyclists, pedestrians, and other users; contact CA Department of Parks and Recreation, Statewide Trails Coordinator Luan Aubin at (916) 651-8573
Rubberized Asphalt Concrete (RAC) Grant	February	California Department of Resources Recycling and Recovery	$250 k max per program, $500 k per FY	10% Match	Cities, Counties, Qualifiying Indian Tripbes	X	X	---	Funding for on-street bikeway and roadway projects that use 100% California waste tires. Program has two categories: 1) Targeted Rubberized Asphalt Concrete Incentive Grant for first-time or limited users; and 2) Rubberized Asphalt Concrete Chip Seal Grant Program for road repair and maintenance. Contact: (916) 341-5062.
State Safe Routes to School (SR2S)	July	Caltrans	$24.25 m Statewide, $450 k project max	10% Local	County, City	X	X	X	Infrastructure projects that encourage students in grades K-12 to walk and bike to school. Projects must be in close proximity to schools. Contact Ghazal Afrasiabi, Caltrans at (949) 724-2124.
Strategic Growth Council - Sustainable Communities Planning Grants & Incentives	July	California Resources Agency & Strategic Growth Council	Min. 100 k, Max $1 m, $37.15 m remains for award	Not Required	Cities, Counties, JPAs, Council of Governments, MPOs, Transportation Planning Authorities	X	X	---	Funds planning grants and incentives to encourage the development of regional and local land use plans to promote water conservation, reduce automobile use and fuel consumption, encourage greater infill and compact development, protect natural resources and agriculturanl lands, and revitalize urban and community centers. Contact: (916) 322-3439.
Transportation Development Act (TDA) Article 3 Funds	Varies by RPTA	OCTA	Per Capita	Not Required	County, Cities	X	X	---	Funds for planning and construction of bicycle and pedestrian facilities (engineering, ROW-A, construction, retrofit, route improvements, ADA improvements, bicycle facilities). Contact Ben Ku, OCTA at (714) 560-5473.

TABLE 7-B
Bicycle Transportation Funding Programs (continued)

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
STATE PROGRAMS (continued)									
Urban Greening Program (Prop 84)	July	California Resources Agency & Strategic Growth Council	$20 m statewide, $250 k max for Planning, no max for Project	Not Required, but Encouraged	County, MPO, Local Agency, Non-Profit, Special District, Joint Powers Authority	X	X	---	Funding for project (design, ROW, construction) that utilize green objectives in urbanized areas that promote public health, increase access to safe areas for physical activity, improve access to health, local food sources, reduce effects of climate change. Contact (916) 653-2812.
LOCAL FUNDING									
Developer Fees or Exactions	Ongoing	City of Irvine	Varies	---	---	X	X	---	Funds sourced from developer fees may be required for development of bikeways.
Renewed Measure M (M2) Comprehensive Transportation Funding Program	Varies	OCTA	Varies	Varies	Cities within Orange County	X	X	---	Arterial Capacity Enhancement program category will provide funds for planning, design, ROW, construction of on-street bikeways as part of arterial / right-of-way widening project. Contact Roger Lopez, OCTA at (714) 560-5438.
Renewed Measure M (M2) Fairshare	Annually	OCTA	Varies	---	Cities within Orange County	X	X	---	
State Gas Tax (Local Share)	Ongoing	State Auditor Controller	---	---	---	X	X	---	Allocated by State Auditor Controller
Systems Development Charge (SDC) - Non-Circulation	Ongoing	City of Irvine	Varies	---	---	X	X	---	Funds received through the City's Building Permit Process for design and construction of Capital Improvement Projects including bikeways.

TABLE 7-B
Bicycle Transportation Funding Programs (continued)

Acronyms:	Jurisdictions for City of Irvine
Caltrans - California Department of Transportation	Caltrans - Caltrans District 12
CTC - California Transportation Commission	County Supervisorial District 3
FHWA - Federal Highway Administration	OCCOG - Orange County Council of Governments
MPO - Metropolitan Planning Organization	SCAG - Southern California Association of Governments
OCCOG – Orange County Council of Governments	State Assembly District 70
OCTA – Orange County Transportation Authority	State Senate District 35
RPTA - Regional Transportation Planning Agency	US Congressional District 48

7.4 Federal Funding Sources

Federal funding for bikeway related projects may be sourced from legislative acts, fuel taxes, appropriations, allocations, and competitive grant programs. The City continually monitors and pursues funding opportunities as they arise. Below are federal grant programs that provide funds for bikeway-related projects.

Congestion Mitigation and Air Quality Improvement Program

Congestion Mitigation and Air Quality Improvement funds are programmed by the Federal transportation bill for projects that are likely to contribute to the attainment of a national ambient air quality standard, and congestion mitigation. These funds can be used for a broad variety of bicycle and pedestrian projects, particularly those that are developed primarily for transportation purposes. The funds can be used either for construction of bicycle transportation facilities and pedestrian walkways or for non-construction projects related to safe bicycle and pedestrian use (maps, brochures, etc.).

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) targets funds for the most critical safety needs with the intent to significantly reduce public roadway fatalities and serious injuries. Projects must be on a public road, publicly owned bicycle and/or pedestrian pathway, or trail. Projects must identify a specific safety problem, using safety data, that can be corrected or improved substantially and formula to determine the Benefit Cost Ratio. There is a 10% local match requirement.

Federal Safe Routes to School (FSRTS) Program

The Federal Safe Routes to School (FSRTS) program, administered by Caltrans, will enable and encourage primary and secondary school children to walk and bike to school. Both infrastructure-related and behavioral projects will be geared toward providing a safe, appealing environment for walking and biking that will improve the quality of children's lives and support national objectives by reducing traffic, fuel

consumption, and air pollution in the vicinity of schools. Matching funds are not required.

Land and Water Conservation Fund (LWCF)

The Land and Water Conservation Fund, a program administered by the National Parks Service, allocates money to state and local governments to acquire new land for recreational purposes, including bicycle paths and support facilities such as bicycle racks. Funding allocated to California is administered by the State Department of Parks and Recreation. Eligible applicants include cities, counties and districts authorized to acquire, develop, operate and maintain park and recreation areas. For local agencies, funds are provided through a competitive selection process. There is a 50% local match requirement.

Regional Surface Transportation Program (RSTP)

Regional Surface Transportation Program (RSTP) funding is distributed based on population among the urbanized and non-urbanized areas of the State through Metropolitan Planning Organizations (MPOs) and Regional Transportation Planning Agencies (RTPAs). Eligible projects are varied transportation related projects, including bicycle and pedestrian facilities. These funds are distributed in Orange County by OCTA.

Transportation Enhancement (TE) Activities

The Transportation Enhancement (TE) Activities program, administered by Caltrans and OCTA, provides federal funds for community-based projects that expand travel choices and enhance transportation by improving the cultural, historic, aesthetic and environmental aspects of the transportation infrastructure. Projects must qualify under twelve categories, wherein eligible projects include funding for bicycle and pedestrian facilities, provision of safety and educational activities for bicyclists and pedestrians, as well as preservation of abandoned railway corridors for conversion and use for bicycle trails and pedestrians. There is a 25% local match requirement.

7.5 State Funding Sources

Similar to federal funding sources, state and local funding may also be sourced from legislative acts, fuel taxes, appropriations, allocations, and competitive grant programs. Below are competitive grant programs administrated at the state level that provides funding for bikeway-related projects.

Bicycle Transportation Account (BTA)

The Bicycle Transportation Account (BTA) program is administered by Caltrans Bicycle Facilities Unit. Cities and counties must prepare and adopt a Bicycle Transportation Plan that complies with the Streets and Highways Code Section 291.2. The BTA has programmed $7.2 million each year for projects that improve safety and convenience for bicycle commuters, including but not limited to, bikeways, bicycle parking at transportation and transit centers, bicycle carrying facilities on public transit vehicles, installation of traffic control devices to improve the safety and efficiency of bicycle travel, bicycle safety improvements, planning, as well as improvement and maintenance of bikeways. There is a 10% local match requirement.

Environmental Enhancement and Mitigation (EEM) Program

Environmental Enhancement and Mitigation (EEM) Program funds are allocated to projects that offset environmental impacts of modified or new public transportation facilities. The EEM program categorized for roadside recreational projects provides funds for roadside recreational opportunities, including bikeways, trails, and trailheads.

Recreational Trails Program (RTP) for Non-Motorized Trails

The Recreational Trails Program provides funds for developing and maintaining recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Recreational Trails Program funds may be used for the following:

- Maintenance and restoration of existing trails (including bicycle paths);

- Development and rehabilitation of trailside and trailhead facilities and trail linkages;
- Purchase and lease of trail construction and maintenance equipment;
- Construction of new trails (with restrictions for new trails on federal lands);
- Acquisition of easements or property for trails;
- State administrative costs related to this program (limited to seven percent of a State's funds); and
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds).

State Safe Routes to School (SR2S) Program

The State Safe Routes to School (SR2S) program is administered by Caltrans for cities and counties to fund bicycle and pedestrian infrastructure improvements for children in elementary, middle, and high school. Infrastructure projects are aimed to improve school commute routes by eliminating barriers to bicycle and pedestrian travel through rehabilitation, new projects, and traffic calming. Bicycle facilities may include new or upgraded bikeways, trails, paths, geometric improvements, should widening, and bicycle parking facilities, racks, and lockers. Approximately $24.25 million is available each cycle, with a $450,000 maximum reimbursement ($500,000 project total), requiring 10% local match per project.

7.6 Local Funding Sources

Local funding sources is varied and can originate from the City’s general fund, special funds, fees from developer obligations, the City’s local share of state gas tax, and local sales tax such as Renewed Measure M (M2) Program. The M2 Program is administered by the OCTA providing funding for streets and roads, wherein on-street bikeway projects would be eligible.

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Chapter 8 – Planning and Design Guidelines for Bicycle Facilities

This chapter identifies City guidelines for planning, designing, and constructing bikeways in the City of Irvine. City standards defer to those mandated by Caltrans in the Caltrans Highway Design Manual (HDM), Chapter 1000 - Bikeway Planning and Design, except where noted that City standards should take precedence. City standards for traffic control facilities for bicycles, including signage, markings, and striping follow the HDM. Where City standards take precedence, City standards exceed those of the HDM. In the event the HDM is updated while this Plan is in effect, the HDM shall take precedence only where its standards exceed those described in this chapter of the Plan. Chapter 1000 of the HDM is included in Section 8.3.

8.1 Planning Criteria and Requirements

The following types of bikeways shall be used in the City of Irvine:

Class I Bikeway: Provides for bicycle travel on a paved right-of-way completely separated from streets or highways. Class I bikeways are also referred to as an off-street bikeway, bicycle path, or bicycle trail.

Class II Bicycle Lane: A striped on-street bicycle lane for one-way bicycle travel within the roadway.

Class III Bikeways: A bikeway is shared with pedestrian or motor traffic. Class III bikeways are identified by signs and allow for bicyclists to use streets or sidewalks jointly with motor vehicle traffic.

Class I Bikeways

Class I bikeways are physically separated from motorized vehicle traffic by barriers or open space. They can serve as direct high-speed commuter routes where motor vehicle cross traffic can be minimized or, in other cases, provide a recreational opportunity.

An off-street Class I bikeway system shall be used to link the major districts and activity areas of the City. The Class I bikeway system will be integrated into the major linear open spaces within the City and include:

- Barranca Trail
- Bonita Canyon Trail
- Freeway Trail
- Harvard Trail
- Hicks Canyon Trail
- Jeffrey Open Space Trail
- Peters Canyon Trail
- Portola Trail
- San Diego Creek Trail
- Sand Canyon Trail
- Shady Canyon Trail
- Turtle Rock Trail
- University Trail
- Venta Spur Trail
- Walnut Trail
- West Irvine Trail
- Woodbridge Trail

The development of off-street bikeways through and adjacent to eucalyptus windrows, utility easement areas, flood control channels, and greenbelts is encouraged in the City.

Whenever possible, off-street bikeways will be grade-separated at major intersections. All grade separations will meet accessibility guidelines. Exceptions to these criteria will be reviewed by the Director of Public Works.

Class I bikeways are categorized into the following three designations based on width:

Type A – Two-Way Primary Master Planned Facility

This type of bikeway has a paved section width of eleven (11) feet, with a level shoulder area of not less than two (2) feet on each side. The total right-of-way will be not less than fifteen (15) feet overall. The shoulder area may be combined with other permanent open spaces. Applications of this type of facility will be limited to primary off-street use as indicated in the City's adopted Trails Network (Figure 5-1A) and will provide regionally-oriented links between planning areas.

Type B – Two-Way Secondary Facility

This type of bikeway will have a paved section width of no less than eight (8) feet, with a level shoulder area of not less than two (2) feet on each side. The total right-of-way width shall be no less than twelve (12) feet overall.

This type of facility can be used to provide local linkages within commercial centers, parks, and communities and to serve as local collector/distributors in concert with primary Master Plan facilities. Typically, secondary facilities are not regional in nature, and are typically limited to serving one planning area.

A secondary facility should be increased in width to a paved section of eleven (11) feet where substantial joint use with pedestrians is expected. Bikeways which provide direct access to community parks, lakes, and planning area or district level shopping centers can be expected to have residential pedestrian use.

Type C – Two-Way Connector Facility

This type of bikeway will have a paved section width of no less than five (5) feet, with a level shoulder area of not less than two (2) feet on each side. Total right-of-way width should be no less than nine (9) feet overall.

Connector facilities are defined as short convenient connections which provide access to portions of the bikeway system, commercial facilities, community centers, schools, and parks from immediately adjacent development areas. Because the concept of this type of facility is to provide locally convenient access, Caltrans standards state that length should be less than one hundred (100) feet; however, the City of Irvine General Plan encourages these types of bicycle linkages throughout neighborhoods whenever possible.

Every effort should be taken to ensure that all types of Class I bikeways are constructed to the standard widths; however, this may not be possible in certain situations due to physical constraints (e.g., existing bridges, utilities, etc.). In these cases, widths less than standard may be allowed subject to approval of the Director of Public Works where it can be shown that the narrower widths can provide the desirable level of safety for bicyclists.

Class II Bicycle Lanes

Class II bicycle lanes are portions of the roadway designated for bicycle use through pavement striping. The on-street lane system generally provides convenient routes between points within the City.

Class II bicycle lanes will be one-way with eight (8) foot wide lanes located on both sides of the traveled roadway. Appropriate signage and striping is used in accordance with Chapter 1000 of the HDM provided in Section 8.3 of this Plan, to delineate right-of-way assigned to bicycles and motor vehicles. On-street parking is prohibited where Class II lanes are provided unless the parking is for emergency situations or permitted for special events by the Director of Public Works.

The City has adopted the following policies for developing an on-street bicycle lane system:

1. Unless noted on Figure B-4 of the General Plan (Figure 5-1A of this Plan), all major, primary, and secondary highways will include Class II bicycle lanes. The

standard on-street bicycle lanes will be eight (8) feet wide on both sides of the street. This width includes provisions for emergency parking. As required by the General Plan, parking is prohibited on all such streets.

2. Commuter highways will also be considered for Class II or Class III bikeways. Striped eight (8) foot bicycle lanes will be provided on individual commuter highways if the Director of Public Works determines that would be appropriate.

Spacing and Location of Bikeways

Bikeways will be planned and designed to provide the most direct route to attractions based upon desired lines of travel identified at the time of concept plan and subdivision map review.

The spacing and location of off-street bikeways will be based on the service areas of the attraction using an acceptable bicycling time/distance standard established for various attractions (i.e., schools, parks, transit stops, etc.). Pathways should be as direct as possible, following desired lines of travel, and be located to maximize their use for access to several attractions. The following identifies the criteria by which bikeways should be located:

Continuity – The City has policies restricting the number and frequency of local street accesses to arterial highways. When pathways following the local street system will not provide access to attractions along the most direct route, off-street bikeways will be provided accordingly (i.e., at the ends of cul-de-sacs, between residential lots, and through open spaces). Such connections should be highly visible to residents, to both increase the usage of such pathways as well as increase the level of safety for users and adjacent residents.

Transit Stops – When the design and layout of a local street system will not allow all residents of a development access to a transit stop within a maximum walking distance of 1/4 mile (five minutes), off-street bikeways for transit access will be provided.

Parks – Local street systems will be designed to provide bikeways following desired lines of travel to park facilities at the time of the concept plan and/or subdivision map review. Off-street bikeways will be provided to minimize street crossings.

Schools – Local streets will provide for convenient bikeways to school facilities based upon desired lines of travel identified at the time of concept plan review. In the service area where children are not transported to and from school by the Irvine Unified School District or Tustin Unified School District, off-street bikeways will be provided along the most direct route and will be provided to minimize street crossings.

Shopping Centers – On and off-street bikeways will be located and designed to provide direct and convenient access to planning areas and district shopping centers based upon desired lines of travel identified at the time of concept plan review. Local pathways will be located and designed to interface with the system of planning area and regional bikeways.

Other – The local street system will provide for convenient and direct access to other attractions in the development based upon desired lines of travel identified at the time of concept plan review. Off-street bikeways will be used when the local streets do not provide a direct route.

Whenever off-street bikeways are necessary, they will be located so that connections with pathways along arterial highways are located at controlled intersections in order to minimize bicycle and automobile conflicts.

Off-street bikeways connecting with arterial highways at mid-block will be joined with a bicycle facility, in conjunction with the roadway, and be re-routed to the nearest controlled intersection (note: on-street bikeways should never be two-way facilities). When it is necessary for bikeways to continue across an arterial highway mid-block, an overcrossing/undercrossing or traffic signal shall be provided as determined by the Director of Public Works.

Interim Bikeways

Interim bikeways are temporary Class I, Class II, or Class III facilities built to accommodate the travel desires of bicyclists until the ultimate or alternate bikeway can be constructed.

Due to varying conditions that may create the need for temporary bikeways, design standards should be established on an individual basis, keeping in mind that a width of eight (8) feet is the minimum standard. Temporary two-way sidewalk bikeways may be built in undeveloped areas with a limited number of roadway intersections upon review and approval by the Director of Public Works.

Dedication

The area provided for off-street bikeways will be indicated on the tentative tract map, and dedication by the developer to the City for public use is required.

Construction and Maintenance of Off-Street Bicycle Facilities

Developers will be responsible for the design and construction of off-street bicycle facilities located within and adjacent to a given proposed development, including the pathways, landscaping, lighting, etc. The bikeways will be constructed according to the latest revision of "City of Irvine, Street Design Manual and Standard Plans," and the planning and design criteria presented in these guidelines.

Where the City's Director of Public Works determines that it would be appropriate, homeowners associations shall be responsible for maintenance of bicycle paths. This would typically be required where paths pass through, or are immediately adjacent to, common areas maintained by a homeowners association.

Bicycle Amenities and Ancillary Facilities

Providing bicycle amenities and other ancillary facilities is an important component in the City's effort to promote bicycling as an alternative mode of transportation. The public

may be encouraged to use their bicycles to a greater degree when the facilities addressed in this section are provided and convenient for everyday use.

The following requirements and policies are provided as a guide in implementing these bicycle-related facilities:

Benches and Drinking Fountains

Amenities such as benches and drinking fountains should be placed at convenient intervals adjacent to Class I bikeway facilities. All benches and drinking fountains shall meet accessibility guidelines to the fullest extent.

Signage

The purpose of signage is to identify the presence of a bicycle facility. Signage may be used for way-finding, route signage, regulatory signage, and warning signage. Directional signage (including street and bikeway names) should be incorporated into bikeway facilities where Class I bikeways intersect each other and where Class I bikeways intersect with arterial highways. Signage should direct users to major destination points and bicycle routes. Additionally, bikeway markers, identifying the name of the bikeway, and the distance to the nearest cross street should be provided, to aid emergency and public safety response. Application, placement and design of bikeway-related signs should follow the HDM provided in Section 8.3.

Bicycle Parking and Requirements

The wide variety of bicycle parking devices fall into categories based on user needs: commuter or long-term parking and convenience or short-term parking. Long-term parking is necessary at locations such as employment centers, transit stations, residential complexes, schools or colleges, and certain business establishments such as theaters, etc. This type of development requires a storage area that can provide bicycle security and protection from inclement weather. The following are prime examples of long-term and short-term parking facilities:

Bicycle Lockers – A locker is a fully-enclosed space accessible only to the owner or operator of the bicycle. This type of facility is useful where the bicycle is left unattended for an extended period of time. In shopping areas, lockers can be used to store items collected on a (bicycling) shopping trip while the owner shops further or patronizes a restaurant or theater.

Bicycle Check-In – With a check-in parking system, the bicycle is delivered to and left with attendant(s). The stored bicycles are accessible only to the attendant(s), who have the ability to identify the owner of the bicycle.

Monitored Parking – Monitored parking provides bicycles within an area under constant surveillance. In some parking garages, racks are located within sight distance of an attendant, and at some locations security guards provide a surveillance function.

Short-term Parking – Short-term parking is suitable at highly frequented and visible locations such as retail shopping centers, libraries, post offices, recreation centers, schools, etc. These facilities should be very convenient and be near building entrances or other highly visible areas that are self-policing.

Bicycle (Rack) Parking Requirements - According to Section 4-3-7 of bicycle (rack) parking requirements of the City of Irvine's Zoning Ordinance, a Class I bicycle rack is a stationary bicycle storage rack designed to secure the frame and both wheels of the bicycle where the cyclists supplies only a padlock. A Class II bicycle rack is a stationary bicycle rack, typically a vertical loop or bar, where cyclist supplies a padlock and chain or cable. The number of bicycle parking spaces required and implementation of parking facilities shall conform to Section 4-3-7: Bicycle Parking Requirements, of the City of Irvine's Zoning Ordinance. Relevant excerpts from the Zoning Ordinance are provided in Appendix B.

Miscellaneous Planning Considerations for Class I Bikeways

Attractions – When off-street bikeways connect with routes along the local streets, and are used to provide direct access to attractions, the bikeways should be designated to be compatible with surrounding uses.

In situations where the projected intensity of the bikeway's use may result in a potential for conflicts between the bikeway and surrounding uses, special design treatments for adjoining property may be necessary. The developer should provide the City with a statement to be signed by each homebuyer, prior to the issuance of building permits, for each residential lot that is proposed to be constructed adjacent to or in close proximity to off-street bikeways. The statement should contain a comprehensive description of all improvements within the bikeway facility.

Residential Areas – Where off-street bikeways are provided in conjunction with low- and medium-density residential areas (single-family and duplex), the need for privacy of the residential units adjacent to the pathway should be balanced against the need for natural surveillance opportunities onto the bikeway.

Where off-street bikeways are provided in conjunction with medium-high and high-density residential areas (townhouse, stacked condominiums, apartments), location and design of the bikeway should be incorporated into the common open space provided within the development. Adequate access should be provided to allow common use of the two areas while maintaining the character of the residential properties.

School / Park Facilities – Where off-street bikeways connect with school facilities, or with park facilities, bikeways should be designed and located to link the various activity areas on the school grounds or park site systems. Under typical conditions these connectors will be designed to meet Type C - Two-way Connector Facility standards, as discussed in prior section of this chapter. If heavy use of the pathway is anticipated, the bikeway should be designed to Type A - Two-way Primary Master Plan standards, as discussed in prior section of this chapter, to accommodate both pedestrians and

bicyclists with a minimum of conflict. The landscaped area adjacent to the bikeway should be of a type that will allow overflow traffic without damage to the plant material.

8.2 Design Criteria and Standards

Chapter 1000 - "Bikeway Planning and Design," of the most recent edition of the Caltrans Highway Design Manual (HDM) Section 1003 Design Criteria provides guidance for design of bikeways in the City of Irvine. Mandatory criteria presented in the HDM and/or MUTCD shall apply in all cases not specifically modified or supplemented in the sections that follow.

Class I Off-Street Bikeways

Widths

The width of Class I off-street bicycle lane facilities follow the criteria shown below, where at minimum, meet standards of HDM Section 1003.1.

Class I Facility Type	Right-of-Way	Paved Width	(Shoulder)
Type A (Two-Way Primary Master Facility)	15'	11'	2' (each side)
Type B (Two-Way Secondary Facility)	12'	8'	2' (each side)
Type C (Two-Way Connector Facility, Maximum Length 100')	9'	5'	2' (each side)

Note: Maximum cross slope shall be two percent.

HDM 1003.1 (3) – Signing and Striping

Yellow center line striping (four inches wide, three foot stripe with a nine foot space) should be used on curves where the horizontal design speed cannot be met (see HDM 1003.1(7). Design Speed) and on all bridge undercrossings or at other locations where grades exceed five percent. White edge line stripes (four-inches wide) shall be installed immediately adjacent to the edge of a paved bikeway on all Type A - Primary Master Plan Facility.

HDM 1003.1 (4) – Intersections with Highways

Where off-street bikeways intersect with highways within the sole jurisdiction of the City of Irvine and a crossing cannot be redirected to an adjacent controlled intersection, crossing locations shall be subject to the review and approval of the Director of Public Works. Where off-street bikeways intersect with driveway intersection or roadways, design shall be in accordance with City of Irvine Standard Plan No. 410. Prevailing traffic conditions (sight-distance, vehicle speeds, etc.) will be considered in making such determinations. Bikeway signing and pavement delineation on the approach to an intersecting street shall at a minimum conform to Caltrans and MUTCD standards.

HDM 1003.1 (7) (12) – Design Speed

Off-street bikeways on level grades shall be designed for 25 miles per hour. Bikeways with downgrades between four and six percent and longer than 500 feet shall have a design speed of 30 miles per hour and shall be for short segments only. Grades steeper than six percent and longer than 500 feet, shall be designed for 40 miles per hour and signs indicating grade posted. Grades greater than five percent are undesirable.

When horizontal design speeds for curves cannot be met, it is recommended that the bikeway pavement be widened by four feet on the inside of the curve. Signs (conforming to the MUTCD) shall be provided to identify the actual design speed and direction of curvature. Centerline striping should also be used along with the signing (See MUTCD Chapter 9B and 9C Signing and Striping). A deceleration area (meeting the stopping sight distance criteria) shall be provided in advance of these curves.

HDM 1003.1 (9) – Stopping Sight Distance

A visibility triangle of 30 feet minimum shall be provided at all off-street bikeway intersections with streets and other pathways. Walls and/or landscaping within the visibility triangle shall be no higher than thirty (30) inches from the finish grade of the pathway. Where bikeways intersect with roadways at the intersection of two roadways,

site distance clearance shall be constructed in accordance with City of Irvine Standard Plan No. 403.

HDM 1003.1 (13) – Structural Section

All pavement sections shall conform to the requirements of the most recent edition of the City of Irvine Street Design Manual and Engineering Standard Plans. The minimum structural section for Class I bikeways shall be three inch asphalt over native soil compacted to 95 percent.

HDM 1003.1 (15) – Barrier Posts

In designing barrier posts in conformance with MUTCD Chapter 9C.101, flexible barrier posts that can be driven over by emergency and service vehicles may be required at selected locations by the City in lieu of a removable barrier post design. Where off-street bikeways intersect with driveway intersection or roadways, design for barrier posts shall be in accordance with City of Irvine Standard Plan No. 410.

Landscaping

a. A landscaping area equal to 50 percent of the bikeway width (with a minimum width of four feet inclusive of the shoulder) shall be provided on each side of the bikeway constrained by a wall or other continuous obstruction greater than *thirty inches* in height. The landscaped areas shall be improved per standards contained in the latest version of the City of Irvine *Landscape Manual and Landscape Standard Plans*.

b. Landscaping shall be kept a minimum of two (2) feet from the edge of the pavement except for low maintenance ground covers not exceeding six inches in height.

c. A vertical area beginning three (3) feet above the final grade and continuing up to eight (8) feet above the final grade shall be kept free and clear of dense landscaping. Plant materials shall be selected to provide the clear area with a minimum of maintenance.

d. When walls are used in the overall design of bikeways, landscaping shall be used to moderate the visual impact of the wall to the users of the bikeway.

e. Off-street bikeways, when intersecting streets, shall be landscaped in such a manner so as to be compatible with the approved streetscape plan and not affecting the stopping sight distance.

Sound Attenuation

When off-street bikeways cause a break in a sound attenuation wall or berm, offset walls, pathway curves through berms, or other appropriate means shall be used to maintain the attenuation capability of the wall or berm.

Walls

Where required to preserve the privacy of adjoining residential units, off-street bikeways shall be designed to include six (6) foot high walls or fences, as measured from the finished grade of the pathway, along the adjacent residential property lines. If the design of the residential unit precludes the need for the use of a wall or fence for purposes of preserving privacy, or if it is in conflict with other zoning requirements, the wall may be modified or eliminated.

Class II On-Street Bicycle Lanes

Widths

The width of Class II bicycle lanes for all facilities shall be eight feet which, at minimum, meet standards of HDM Section 1003.2 (1). Reductions to no less than five feet shall be approved by the Director of Public Works.

HDM 1003.2 (3) – Intersection Design

The preferred design treatment for Class II bicycle lanes on the approach to intersections with free right turn lanes is presented in Figure 1003.2C of the HDM. At intersections where there is a bike lane and traffic-actuated signal, installation of bicycle

video detection within the bike lane is required. Push button detectors are not as satisfactory as video detection because the cyclist must stop to actuate the push button. It is also necessary to be able to detect bicycles in the left turn lanes and through lanes.

Site Distance

Where bikeways intersect with roadways at the intersection of two roadways, site distance clearance shall be constructed in accordance with City of Irvine Standard Plan No. 403.

Miscellaneous Bikeway Criteria

HDM 1003.6 (1) – Bridges

The basic minimum width of a bridge for a Class I facility will be that of the approaching bikeway. If significant pedestrian traffic is to use the structure, an additional four feet may be required.

Compliance with this standard requires a clear surface width on the structure equal to the paved approach width of the bikeway. Where agencies are constructing a bikeway facility to a higher standard (wider than the mandatory minimum), the width of the structure need meet only the minimum mandatory paved width, even though a wider structure would be desirable.

Where bikeway bridges cross roadways, the vertical clearance shall conform to Section 1003.6 (4) of HDM.

Lighting

According to Section 5-9-520(B)(5), “Special Recreational Spaces Provisions,” of the Uniform Security Code, bikeways not incorporated in the roadway shall be illuminated with a minimum maintained twenty-five one-hundredths (0.25) foot-candles of light at ground level during the hours of darkness. Upon Public Safety review, greater foot-candles may be required.

A number of off-street bikeways within the City of Irvine were constructed prior to the implementation of the Uniform Security Code, and therefore were not constructed with lighting. Those existing Class I bikeways that meet the following criteria should be given the highest priority for the installation of lighting:

- Bikeways serving land uses that have regularly scheduled activities at night that would likely attract bicyclists. Examples would be near colleges, high schools, or recreational facilities with night activity.
- At highway intersections and through underpasses or tunnels.
- Where recurring joint use with pedestrians at night can be expected.
- Lighting may be required if the Director of Public Works determines that safety would be improved by the addition of such facilities.

When lighting is required, it shall be high pressure sodium. Vandal resistant lights shall be used along bikeways. In all conflict locations, lighting shall be provided per the standards for street lighting found in the latest version of the City of Irvine Street Design Manual and Engineering Standard Plans.

HDM 1003.6 (1) Undercrossing

The basic minimum width for an undercrossing shall be the same as for a bridge (See HDM 1003.6 (1) - Bridges). Minimum vertical clearance shall be 10 feet and skewed crossing should be avoided (See HDM 208.6). All undercrossings shall meet accessibility guidelines to the fullest extent.

Driveways

Where unpaved driveway crossings of bike paths and pedestrian walkways or driveway intersections with roadways or pedestrian paths, the driveway shall be paved a minimum of 15 feet or the length of the unpaved driveway, whichever is less, on each

side of the crossing or intersection, to minimize or eliminate the gravel being scattered on the path by motor vehicles (See HDM 205.4).

Curb Ramps

Where Class I bikeways intersect with roadways at the intersection of two roadways, curb ramps shall be constructed in accordance with City of Irvine Standard Plan No. 202. Where Class I bikeways intersect roadways mid-block, the proposed installation of curb ramps shall be constructed in accordance with City of Irvine Standard Plan No. 403. Where feasible, users may be directed to the nearest intersection to facilitate a safe crossing of the roadway.

In addition, curb ramps should meet requirements of the Americans with Disabilities Act of 1990 (ADA). Newly constructed or altered streets, roads, and highways must contain curb ramps or other sloped areas at any intersection having curbs or other barriers to entry from a street level pedestrian walkway. Newly constructed or altered street level pedestrian walkways must contain curb ramps or other sloped areas at intersections to streets, roads, or highways.[2]

Turning Lanes

An optional thru right-turn lanes shall not be used in combination with right-turn-only lanes on roads where bicycle travel is not prohibited when posted or actual speeds exceed 35 mph (See HDM 403.6).

Bikeway Signing and Delineation

HDM 1003.2 (2)– Bicycle Lane (Class II) Signing and Pavement Markings

Bicycle lanes shall be striped in accordance with HDM 1003.2 (2).

[2] U.S. Department of Justice. (September 15, 2010). Revised regulations for Title II of the Americans with Disabilities Act of 1990 (ADA), 2010 ADA Standards for Accessible Design, 28 CFR Part 35.151 (i) – New Construction and Alterations for curb ramps.

HDM 1003.3 – Class III Bikeways
Class III bikeways shall be designed in accordance with HDM 1003.3.

8.3 Highway Design Manual, Chapter 1000

The following pages include Chapter 1000 of the HDM. Except where noted previously in this chapter, the HDM standards apply to all bikeway development and construction within the City of Irvine. Where City standards take precedence, City standards exceed those of the HDM. In the event that the HDM is updated while this Plan is in effect, the HDM shall take precedence only where its standards exceed those described in this chapter of the Plan.

CHAPTER 1000 BIKEWAY PLANNING AND DESIGN

Topic 1001 - General Criteria

Index 1001.1 - Introduction

The needs of non-motorized transportation are an essential part of all highway projects. Topic 105 discusses Pedestrian Facilities with Index 105.3 addressing accessibility needs. This chapter discusses bicycle travel. All city, county, regional and other local agencies responsible for bikeways or roads where bicycle travel is permitted must follow the minimum bicycle planning and design criteria contained in this and other chapters of this manual (See Streets and Highways Code Section 891).

Bicycle travel can be enhanced by improved maintenance and by upgrading existing roads used regularly by bicyclists, regardless of whether or not bikeways are designated. This effort requires increased attention to the right-hand portion of roadways where bicyclists are expected to ride. On new construction, and major reconstruction projects, adequate width should be provided to permit shared use by motorists and bicyclists. On resurfacing projects, it is important to provide a uniform surface for bicyclists and pedestrians. See Index 625.1(1) and 635.1(1) for guidance in accommodating bicyclist and pedestrian needs on resurfacing projects. **When adding lanes or turn pockets, a minimum 4-foot shoulder shall be provided (see Topic 405 and Table 302.1).** When feasible, a wider shoulder should be considered. When placing a roadway edge line, sufficient room outside the line should be provided for bicyclists. When considering the restriping of roadways for more traffic lanes, the impact on bicycle travel should be assessed. Bicycle and pedestrian traffic through construction zones should be addressed in the project development process. These efforts, to preserve or improve an area for use by bicyclists, can enhance motorist and bicyclist safety and mobility.

1001.2 The Role of Bikeways

Bikeways are one element of an effort to improve bicycling safety and convenience - either to help accommodate motor vehicle and bicycle traffic on shared roadways, or to complement the road system to meet needs not adequately met by roads.

Off-street bikeways in exclusive corridors can be effective in providing new recreational opportunities, or in some instances, desirable commuter routes. They can also be used to close gaps where barriers exist to bicycle travel (e.g., river crossing). On-street bikeways can serve to enhance safety and convenience, especially if other commitments are made in conjunction with establishment of bikeways, such as: elimination of parking or increasing roadway width, elimination of surface irregularities and roadway obstacles, frequent street sweeping, establishing intersection priority on the bike route street as compared with the majority of cross streets, and installation of bicycle-sensitive loop detectors at signalized intersections.

1001.3 The Decision to Develop Bikeways

The decision to develop bikeways should be made with the knowledge that bikeways are not the solution to all bicycle-related problems. Many of the common problems are related to improper bicyclist and motorist behavior and can only be corrected through effective education and enforcement programs. The development of well conceived bikeways can have a positive effect on bicyclist and motorist behavior. Conversely, poorly conceived bikeways can be counterproductive to education and enforcement programs.

1001.4 Definitions

The Streets and Highway Code Section 890.4 defines a "Bikeway" as a facility that is provided primarily for bicycle travel.

(1) Class I Bikeway (Bike Path). Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with crossflow by motorists minimized.

(2) Class II Bikeway (Bike Lane). Provides a striped lane for one-way bike travel on a street or highway.

(3) Class III Bikeway (Bike Route). Provides for shared use with pedestrian or motor vehicle traffic.

1001.5 Streets and Highways Code References - Chapter 8 - Nonmotorized Transportation

(a) Section 887 -- Definition of nonmotorized facility.

(b) Section 887.6 -- Agreements with local agencies to construct and maintain nonmotorized facilities.

(c) Section 887.8 -- Payment for construction and maintenance of nonmotorized facilities approximately paralleling State highways.

(d) Section 888 -- Severance of existing major nonmotorized route by freeway construction.

(e) Section 888.2 -- Incorporation of non-motorized facilities in the design of freeways.

(f) Section 888.4 -- Requires Caltrans to budget not less than $360,000 annually for nonmotorized facilities used in conjunction with the State highway system.

(g) Section 890.4 -- Class I, II, and III bikeway definitions.

(h) Section 890.6 - 890.8 -- Caltrans and local agencies to develop design criteria and symbols for signs, markers, and traffic control devices for bikeways and roadways where bicycle travel is permitted.

(i) Section 891 -- Local agencies must comply with design criteria and uniform symbols.

(j) Section 892 -- Use of abandoned right-of-way as a nonmotorized facility.

1001.6 Vehicle Code References - Bicycle Operation

(a) Section 21200 -- Bicyclist's rights and responsibilities for traveling on highways.

(b) Section 21202 -- Bicyclist's position on roadways when traveling slower than the normal traffic speed.

(c) Section 21206 -- Allows local agencies to regulate operation of bicycles on pedestrian or bicycle facilities.

(d) Section 21207 -- Allows local agencies to establish bike lanes on non-state highways.

(e) Section 21207.5 -- Prohibits motorized bicycles on bike paths or bike lanes.

(f) Section 21208 -- Specifies permitted movements by bicyclists from bike lanes.

(g) Section 21209 -- Specifies permitted movements by motorists in bike lanes.

(h) Section 21210 -- Prohibits bicycle parking on sidewalks unless pedestrians have an adequate path.

(i) Section 21211 -- Prohibits impeding or obstruction of bicyclists on bike paths.

(j) Section 21717 -- Requires a motorist to drive in a bike lane prior to making a turn.

(k) Section 21960 -- Use of freeways by bicyclists.

Topic 1002 - Bikeway Facilities

1002.1 Selection of the Type of Facility

The type of facility to select in meeting the bicycle need is dependent on many factors, but the following applications are the most common for each type.

(1) Shared Roadway (No Bikeway Designation). Most bicycle travel in the State now occurs on streets and highways without bikeway designations. This probably will be true in the future as well. In some instances, entire street systems may be fully adequate for safe and efficient bicycle travel, and signing and pavement marking for bicycle use may be unnecessary. In other cases, prior to designation as a bikeway, routes may need improvements for bicycle travel.

Many rural highways are used by touring bicyclists for intercity and recreational travel. It might be inappropriate to designate the highways as bikeways because of the limited use and the lack of continuity with other bike routes. However, the development and

maintenance of 4-foot paved roadway shoulders with a standard 4 inch edge line can significantly improve the safety and convenience for bicyclists and motorists along such routes.

(2) Class I Bikeway (Bike Path). Generally, bike paths should be used to serve corridors not served by streets and highways or where wide right of way exists, permitting such facilities to be constructed away from the influence of parallel streets. Bike paths should offer opportunities not provided by the road system. They can either provide a recreational opportunity, or in some instances, can serve as direct high-speed commute routes if cross flow by motor vehicles and pedestrian conflicts can be minimized. The most common applications are along rivers, ocean fronts, canals, utility right of way, abandoned railroad right of way, within college campuses, or within and between parks. There may also be situations where such facilities can be provided as part of planned developments. Another common application of Class I facilities is to close gaps to bicycle travel caused by construction of freeways or because of the existence of natural barriers (rivers, mountains, etc.).

(3) Class II Bikeway (Bike Lane). Bike lanes are established along streets in corridors where there is significant bicycle demand, and where there are distinct needs that can be served by them. The purpose should be to improve conditions for bicyclists in the corridors. Bike lanes are intended to delineate the right of way assigned to bicyclists and motorists and to provide for more predictable movements by each. But a more important reason for constructing bike lanes is to better accommodate bicyclists through corridors where insufficient room exists for safe bicycling on existing streets. This can be accomplished by reducing the number of lanes, reducing lane width, or prohibiting parking on given streets in order to delineate bike lanes. In addition, other things can be done on bike lane streets to improve the situation for bicyclists, that might not be possible on all streets (e.g., improvements to the surface, augmented sweeping programs, special signal facilities, etc.). Generally, pavement markings alone will not measurably enhance bicycling.

If bicycle travel is to be controlled by delineation, special efforts should be made to assure that high levels of service are provided with these lanes.

In selecting appropriate streets for bike lanes, location criteria discussed in the next section should be considered.

(4) Class III Bikeway (Bike Route). Bike routes are shared facilities which serve either to:

(a) Provide continuity to other bicycle facilities (usually Class II bikeways); or

(b) Designate preferred routes through high demand corridors.

As with bike lanes, designation of bike routes should indicate to bicyclists that there are particular advantages to using these routes as compared with alternative routes. This means that responsible agencies have taken actions to assure that these routes are suitable as shared routes and will be maintained in a manner consistent with the needs of bicyclists. Normally, bike routes are shared with motor vehicles. The use of sidewalks as Class III bikeways is strongly discouraged.

It is emphasized that the designation of bikeways as Class I, II and III should not be construed as a hierarchy of bikeways; that one is better than the other. Each class of bikeway has its appropriate application.

In selecting the proper facility, an overriding concern is to assure that the proposed facility will not encourage or require bicyclists or motorists to operate in a manner that is inconsistent with the rules of the road.

An important consideration in selecting the type of facility is continuity. Alternating segments of Class I and Class II (or Class III) bikeways along a route are generally incompatible, as street crossings by bicyclists are required when the route changes character. Also, wrong-way bicycle travel will occur on the street beyond the ends of bike paths because of the inconvenience of having to cross the street.

Topic 1003 - Design Criteria

1003.1 Class I Bikeways

Class I bikeways (bike paths) are facilities with exclusive right of way, with cross flows by motorists minimized. Section 890.4 of the Streets and Highways Code describes Class I bikeways as serving "the exclusive use of bicycles and pedestrians". However, experience has shown that if significant pedestrian use is anticipated, separate facilities for pedestrians are necessary to minimize conflicts. Dual use by pedestrians and bicycles is undesirable, and the two should be separated wherever possible.

Sidewalk facilities are not considered Class I facilities because they are primarily intended to serve pedestrians, generally cannot meet the design standards for Class I bikeways, and do not minimize motorist cross flows. See Index 1003.3 for discussion relative to sidewalk bikeways.

By State law, motorized bicycles ("mopeds") are prohibited on bike paths unless authorized by ordinance or approval of the agency having jurisdiction over the path. Likewise, all motor vehicles are prohibited from bike paths. These prohibitions can be strengthened by signing.

(1) Widths. **The minimum paved width for a two-way bike path shall be 8 feet. The minimum paved width for a one-way bike path shall be 5 feet. A minimum 2-foot wide graded area shall be provided adjacent to the pavement (see Figure 1003.1A).** A 3-foot graded area is recommended to provide clearance from poles, trees, walls, fences, guardrails, or other lateral obstructions. A wider graded area can also serve as a jogging path. Where the paved width is wider than the minimum required, the graded area may be reduced accordingly; however, the graded area is a desirable feature regardless of the paved width. Development of a one-way bike path should be undertaken only after careful consideration due to the problems of enforcing one-way operation and the difficulties in maintaining a path of restricted width.

Where heavy bicycle volumes are anticipated and/or significant pedestrian traffic is expected, the paved width of a two-way path should be greater than 8-feet, preferably 12 feet or more. Another important factor to consider in determining the appropriate width is that bicyclists will tend to ride side by side on bike paths, necessitating more width for safe use.

Experience has shown that paved paths less than 12 feet wide sometimes break up along the edge as a result of loads from maintenance vehicles.

Where equestrians are expected, a separate facility should be provided.

(2) Clearance to Obstructions. **A minimum 2-foot horizontal clearance to obstructions shall be provided adjacent to the pavement (see Figure 1003.1A).** A 3-foot clearance is recommended. Where the paved width is wider than the minimum required, the clearance may be reduced accordingly; however, an adequate clearance is desirable regardless of the paved width. If a wide path is paved contiguous with a continuous fixed object (e.g., block wall), a 4-inch white edge line, 2 feet from the fixed object, is recommended to minimize the likelihood of a bicyclist hitting it**. The clear width on structures between railings shall be not less than 8 feet.** It is desirable that the clear width of structures be equal to the minimum clear width of the path (i.e., 12 feet).

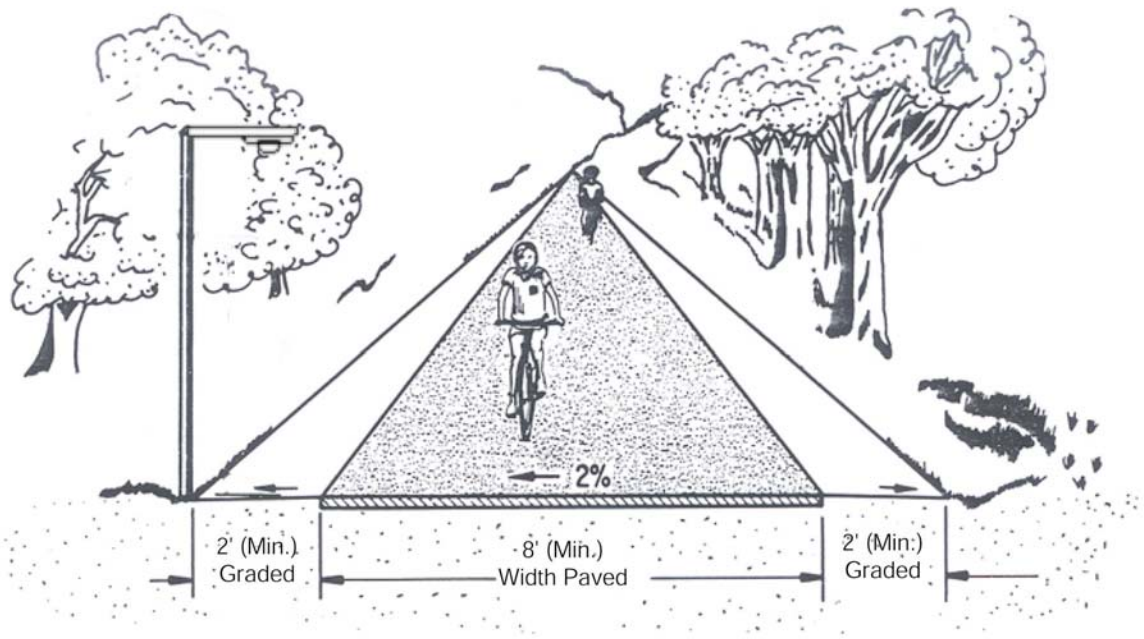
The vertical clearance to obstructions across the clear width of the path shall be a minimum of 8 feet. Where practical, a vertical clearance of 10 feet is desirable.

(3) Signing and Delineation. For application and placement of signs, see the California Manual on Uniform Traffic Control Devices (California MUTCD), Section 9B.01. For pavement marking guidance, see the California MUTCD, Section 9C.03.

(4) Intersections with Highways. Intersections are a prime consideration in bike path design. If alternate locations for a bike path are available, the one with the most favorable intersection conditions should be selected.

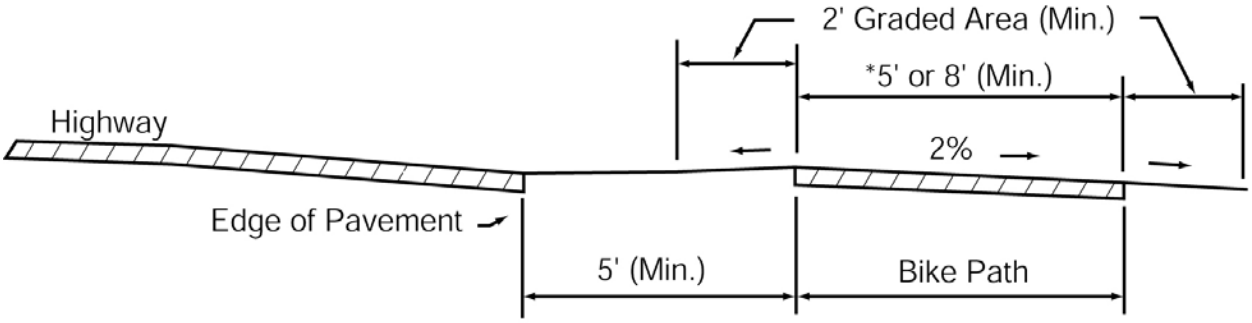
Figure 1003.1A

Two-Way Bike Path on Separate Right of Way



Note: For sign clearances, see MUTCD, Figure 9B-1.

Figure 1003.1B
Typical Cross Section of Bike Path Along Highway



NOTE: See Index 1003.1(5)

*One - Way: 5' Minimum Width
Two - Way: 8' Minimum Width

Where motor vehicle cross traffic and bicycle traffic is heavy, grade separations are desirable to eliminate intersection conflicts. Where grade separations are not feasible, assignment of right of way by traffic signals should be considered. Where traffic is not heavy, stop or yield signs for bicyclists may suffice.

Bicycle path intersections and approaches should be on relatively flat grades. Stopping sight distances at intersections should be checked and adequate warning should be given to permit bicyclists to stop before reaching the intersection, especially on downgrades.

When crossing an arterial street, the crossing should either occur at the pedestrian crossing, where motorists can be expected to stop, or at a location completely out of the influence of any intersection to permit adequate opportunity for bicyclists to see turning vehicles. When crossing at midblock locations, right of way should be assigned by devices such as yield signs, stop signs, or traffic signals which can be activated by bicyclists. Even when crossing within or adjacent to the pedestrian crossing, stop or yield signs for bicyclists should be placed to minimize potential for conflict resulting from turning autos. Where bike path stop or yield signs are visible to approaching motor vehicle traffic, they should be shielded to avoid confusion. In some cases, Bike Xing signs may be placed in advance of the crossing to alert motorists. Ramps should be installed in the curbs, to preserve the utility of the bike path. Ramps should be the same width as the bicycle paths. Curb cuts and ramps should provide a smooth transition between the bicycle paths and the roadway.

(5) Separation Between Bike Paths and Highways. A wide separation is recommended between bike paths and adjacent highways (see Figure 1003.1B). **Bike paths closer than 5 feet from the edge of the shoulder shall include a physical barrier to prevent bicyclists from encroaching onto the highway. Bike paths within the clear recovery zone of freeways shall include a physical barrier separation.** Suitable barriers could include chain link fences or dense shrubs. Low barriers (e.g., dikes, raised traffic bars) next to a highway are not recommended because bicyclists could fall over them and into oncoming automobile traffic. In instances where there is danger of motorists encroaching into the bike path, a positive barrier (e.g., concrete barrier, steel guardrailing) should be provided. See Index 1003.6 for criteria relative to bike paths carried over highway bridges.

Bike paths immediately adjacent to streets and highways are not recommended. They should not be considered a substitute for the street, because many bicyclists will find it less convenient to ride on these types of facilities as compared with the streets, particularly for utility trips.

(6) Bike Paths in the Median of Highways. As a general rule, bike paths in the median of highways are not recommended because they require movements contrary to normal rules of the road. Specific problems with such facilities include:

(a) Bicyclist right turns from the center of roadways are unnatural for bicyclists and confusing to motorists.

(b) Proper bicyclist movements through intersections with signals are unclear.

(c) Left-turning motorists must cross one direction of motor vehicle traffic and two directions of bicycle traffic, which increases conflicts.

(d) Where intersections are infrequent, bicyclists will enter or exit bike paths at midblock.

(e) Where medians are landscaped, visual relationships between bicyclists and motorists at intersections are impaired.

For the above reasons, bike paths in the median of highways should be considered only when the above problems can be avoided. **Bike paths shall not be designed in the medians of freeways or expressways.**

(7) Design Speed. The proper design speed for a bike path is dependent on the expected type of use and on the terrain. **The minimum design speed for bike paths shall be 25 miles per hour except as noted in Table 1003.1.**

Table 1003.1

Bike Path Design Speeds

Type of Facility	Design Speed (mph)
Bike Paths with Mopeds Prohibited	25
Bike Paths with Mopeds Permitted	30
Bike Paths on Long Downgrades (steeper than 4%, and longer than 500')	30

Installation of "speed bumps" or other similar surface obstructions, intended to cause bicyclists to slow down in advance of intersections or other geometric constraints, shall not be used. These devices cannot compensate for improper design.

(8) Horizontal Alignment and Superelevation. The minimum radius of curvature negotiable by a bicycle is a function of the superelevation rate of the bicycle path surface, the coefficient of friction between the bicycle tires and the bicycle path surface, and the speed of the bicycle.

For most bicycle path applications the superelevation rate will vary from a minimum of 2 percent (the minimum necessary to encourage adequate drainage) to a maximum of approximately 5 percent (beyond which maneuvering difficulties by slow bicyclists and adult tricyclists might be expected). A straight 2 percent cross slope is recommended on tangent sections. The minimum superelevation rate of 2 percent will be adequate for most conditions and will simplify construction. Superelevation rates steeper than 5 percent should be avoided on bike paths expected to have adult tricycle traffic.

The coefficient of friction depends upon speed; surface type, roughness, and condition; tire type and condition; and whether the surface is wet or dry. Friction factors used for design should be selected based upon the point at which centrifugal force causes the bicyclist to recognize a feeling of discomfort and instinctively act to avoid higher speed. Extrapolating from values used in highway design, design friction factors for paved bicycle paths can be assumed to vary from 0.31 at 12 miles per hour to 0.21 at 30 miles per hour. Although there is no data available for unpaved surfaces, it is suggested that friction factors be reduced by 50 percent to allow a sufficient margin of safety.

The minimum radius of curvature can be selected from Figure 1003.1C. When curve radii smaller than those shown in Figure 1003.1C must be used on bicycle paths because of right of way, topographical or other considerations, standard curve warning signs and supplemental pavement markings should be installed. The negative effects of nonstandard curves can also be partially offset by widening the pavement through the curves.

(9) Stopping Sight Distance. To provide bicyclists with an opportunity to see and react to the unexpected, a bicycle path should be designed with adequate stopping sight distances. The distance required to bring a bicycle to a full controlled stop is a function of the bicyclist's perception and brake reaction time, the initial speed of the bicycle, the coefficient of friction between the tires and the pavement, and the braking ability of the bicycle.

Figures 1003.1D and 1003.1E indicate the minimum stopping sight distances for various design speeds and grades. For two-way bike paths, the descending direction, that is, where "G" is negative, will control the design.

(10) Length of Crest Vertical Curves. Figure 1003.1F indicates the minimum lengths of crest vertical curves for varying design speeds.

(11) Lateral Clearance on Horizontal Curves. Figure 1003.1G indicates the minimum clearances to line of sight obstructions for horizontal curves. The required lateral clearance is obtained by entering Figure 1003.1G with the stopping sight distance from Figures 1003.1D and 1003.1E, the proposed horizontal curve radius.

Figure 1003.1C

Curve Radii & Superelevations

$$R = \frac{V^2}{15(0.01e + f)}$$

where,

R = Minimum radius of curvature (ft)

V = Design Speed (mph)

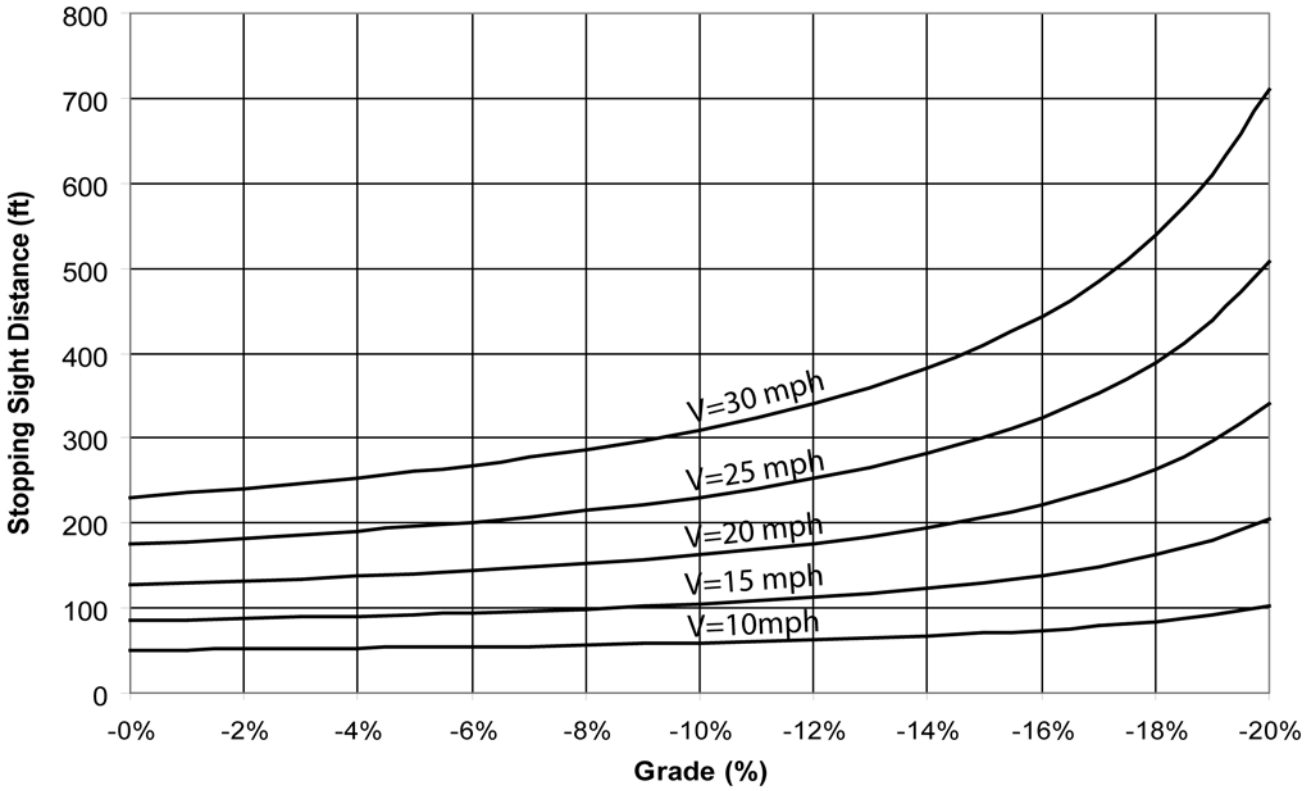
e = Rate of bikeway superelevation, percent

f = Coefficient of friction

Design Speed-V (mph)	Friction Factor-f	Superelevation-e (%)	Minimum Radius-R (ft)
15	0.31	2	46
20	0.28	2	89
25	0.25	2	155
30	0.21	2	261
15	0.31	3	45
20	0.28	3	86
25	0.25	3	149
30	0.21	3	250
15	0.31	4	43
20	0.28	4	84
25	0.25	4	144
30	0.21	4	240
15	0.31	5	42
20	0.28	5	81
25	0.25	5	139
30	0.21	5	231

Figure 1003.1D

Stopping Sight Distance – Descending Grade



$$S = \frac{V^2}{30(f - G)} + 3.67V$$

Where : S = Stopping sight distance (ft)

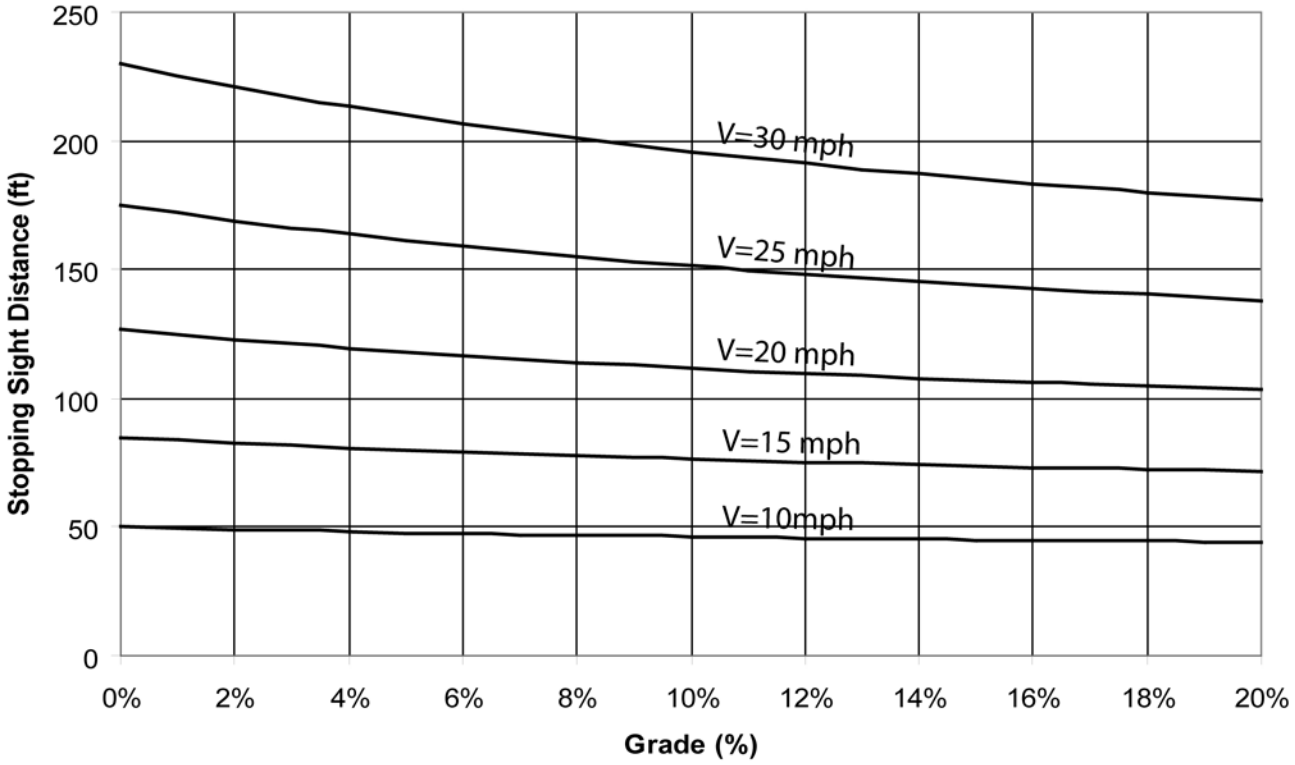
V = Velocity (mph)

f = Coefficient of friction (use 0.25)

G = Grade (ft/ft) rise/run

Figure 1003.1E

Stopping Sight Distance – Ascending Grade



$$S = \frac{V^2}{30(f + G)} + 3.67V$$

Where : S = Stopping sight distance (ft)

V = Velocity (mph)

f = Coefficient of friction (use 0.25)

G = Grade (ft/ft) rise/run

Bicyclists frequently ride abreast of each other on bicycle paths, and on narrow bicycle paths, bicyclists have a tendency to ride near the middle of the path. For these reasons, and because of the serious consequences of a head on bicycle accident, lateral clearances on horizontal curves should be calculated based on the sum of the stopping sight distances for bicyclists traveling in opposite directions around the curve. Where this is not possible or feasible, consideration should be given to widening the path through the curve, installing a yellow center line, installing a curve warning sign, or some combination of these alternatives.

(12) Grades. Bike paths generally attract less skilled bicyclists, so it is important to avoid steep grades in their design. Bicyclists not physically conditioned will be unable to negotiate long, steep uphill grades. Since novice bicyclists often ride poorly maintained bicycles, long downgrades can cause problems. For these reasons, bike paths with long, steep grades will generally receive very little use. The maximum grade rate recommended for bike paths is 5 percent. It is desirable that sustained grades be limited to 2 percent if a wide range of riders is to be accommodated. Steeper grades can be tolerated for short segments (e.g., up to about 500 feet). Where steeper grades are necessitated, the design speed should be increased and additional width should be provided for maneuverability.

(13) Pavement Structure. The pavement structure of a bike path should be designed in the same manner as a highway, with consideration given to the quality of the basement soil and the anticipated loads the bikeway will experience. It is important to construct and maintain a smooth riding surface with skid resistant qualities. Principal loads will normally be from maintenance and emergency vehicles. Expansive soil should be given special consideration and will probably require a special pavement structure. A minimum pavement thickness of 2 inches of Hot Mix Asphalt (HMA) is recommended. HMA (as described in Department of Transportation Standard Specifications), with ½ inch maximum aggregate and medium grading is recommended. Consideration should be given to increasing the asphalt content to provide increased pavement life. Consideration should also be given to sterilization of basement soil to preclude possible weed growth through the pavement.

At unpaved highway or driveway crossings of bicycle paths, the highway or driveway should be paved a minimum of 10 feet on each side of the crossing to reduce the amount of gravel being scattered along the path by motor vehicles. The pavement structure at the crossing should be adequate to sustain the expected loading at that location.

(14) Drainage. For proper drainage, the surface of a bike path should have a cross slope of 2 percent. Sloping in one direction usually simplifies longitudinal drainage design and surface construction, and accordingly is the preferred practice. Ordinarily, surface drainage from the path will be adequately dissipated as it flows down the gently sloping shoulder. However, when a bike path is constructed on the side of a hill, a drainage ditch of suitable dimensions may be necessary on the uphill side to intercept the hillside drainage. Where necessary, catch basins with drains should be provided to carry intercepted water across the path. Such ditches should be designed in such a way that no undue obstacle is presented to bicyclists.

Culverts or bridges are necessary where a bike path crosses a drainage channel.

(15) Barrier Posts. It may be necessary to install barrier posts at entrances to bike paths to prevent motor vehicles from entering. For barrier post placement, visibility marking, and pavement markings, see the California MUTCD, Section 9C.101(CA).

Generally, barrier configurations that preclude entry by motorcycles present safety and convenience problems for bicyclists. Such devices should be used only where extreme problems are encountered.

Figure 1003.1F

Minimum Length of Crest Vertical Curve (L) Based on Stopping Sight Distance (S)

$L = 2S - \frac{1456}{A}$ when S > L

$L = \frac{AS^2}{1456}$ when S < L

Double line represents S = L

L = Minimum length of vertical curve – feet

A = Algebraic grade difference - %

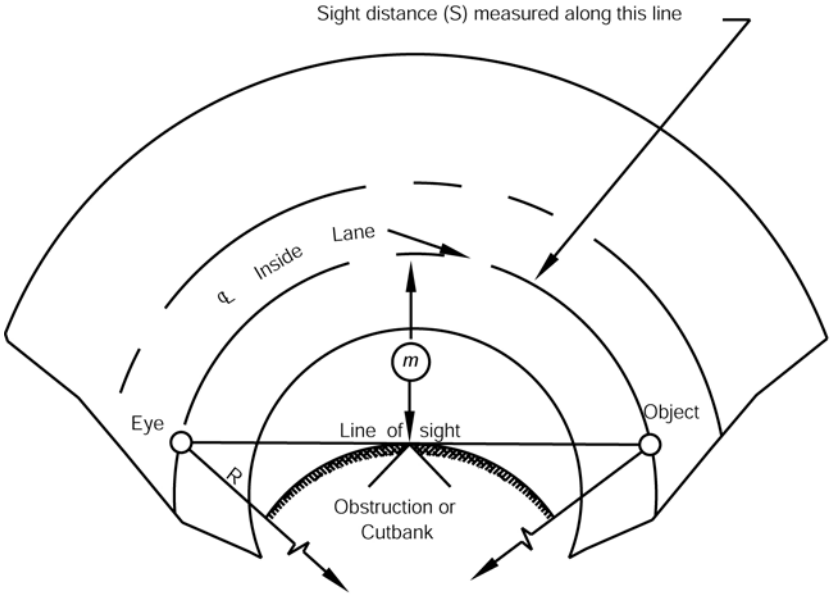
S = Stopping sight distance – feet

Refer to Figure 1003.1D to determine "S", for a given design speed "V"

Height of cyclist eye = 4½ feet Height of object = 4 inches

A	S = Stopping Sight Distance (ft)														
(%)	30	50	70	90	110	130	150	170	190	210	230	250	270	290	
3												15	55	95	
4									16	56	96	136	176	216	
5							9	49	89	129	169	209	249	289	
6		**S > L**				17	57	97	137	177	217	258	300	347	
7					12	52	92	132	172	212	254	300	350	404	
8					38	78	118	158	198	242	291	343	401	462	
9				18	58	98	138	179	223	273	327	386	451	520	
10				34	74	114	155	198	248	303	363	429	501	578	
11			8	48	88	128	170	218	273	333	400	472	551	635	
12			19	59	99	139	185	238	298	363	436	515	601	693	
13			28	68	108	151	201	258	322	394	472	558	651	751	
14			36	76	116	163	216	278	347	424	509	601	701	809	
15		3	43	83	125	174	232	298	372	454	545	644	751	866	
16		9	49	89	133	186	247	318	397	485	581	687	801	924	
17		14	54	95	141	197	263	337	421	515	618	730	851	982	
18		19	59	100	150	209	278	357	446	545	654	773	901	1040	
19		23	63	106	158	221	294	377	471	575	690	816	951	1097	**S < L**
20		27	67	111	166	232	309	397	496	606	727	859	1001	1155	
21		31	71	117	175	244	325	417	521	636	763	901	1051	1213	
22		34	74	122	183	255	340	437	545	666	799	944	1102	1271	
23		37	77	128	191	267	355	457	570	697	836	987	1152	1329	
24		39	81	134	199	279	371	476	595	727	872	1030	1202	1386	
25	2	42	84	139	208	290	386	496	620	757	908	1073	1252	1444	

Figure 1003.1G
Minimum Lateral Clearance (*m*) on Horizontal Curves



S = Sight distance in feet.
R = Radius of ℄ of lane in feet.
m = Distance from ℄ of lane in feet.

See Figure 1003.1D to determine "S" for a given design speed "V".

Angle is expressed in degrees

$$m = R\left[1-\cos\left(\frac{28.65S}{R}\right)\right]$$

$$S = \frac{R}{28.65}\left[\cos^{-1}\left(\frac{R-m}{R}\right)\right]$$

Formula applies only when S is equal to or less than length of curve.

Line of sight is 28" above ℄ inside lane at point of obstruction.

R (ft)	S = Stopping Sight Distance (ft)														
	20	**40**	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**
25	2.0	7.6	15.9												
50	1.0	3.9	8.7	15.2	23.0	31.9	41.5								
75	0.7	2.7	5.9	10.4	16.1	22.8	30.4	38.8	47.8	57.4	67.2				
95	0.5	2.1	4.7	8.3	12.9	18.3	24.7	31.8	39.5	48.0	56.9	66.3	75.9	85.8	
125	0.4	1.6	3.6	6.3	9.9	14.1	19.1	24.7	31.0	37.9	45.4	53.3	61.7	70.6	79.7
155	0.3	1.3	2.9	5.1	8.0	11.5	15.5	20.2	25.4	31.2	37.4	44.2	51.4	59.1	67.1
175	0.3	1.1	2.6	4.6	7.1	10.2	13.8	18.0	22.6	27.8	33.5	39.6	46.1	53.1	60.5
200	0.3	1.0	2.2	4.0	6.2	8.9	12.1	15.8	19.9	24.5	29.5	34.9	40.8	47.0	53.7
225	0.2	0.9	2.0	3.5	5.5	8.0	10.8	14.1	17.8	21.9	26.4	31.3	36.5	42.2	48.2
250	0.2	0.8	1.8	3.2	5.0	7.2	9.7	12.7	16.0	19.7	23.8	28.3	33.1	38.2	43.7
275	0.2	0.7	1.6	2.9	4.5	6.5	8.9	11.6	14.6	18.0	21.7	25.8	30.2	34.9	39.9
300	0.2	0.7	1.5	2.7	4.2	6.0	8.1	10.6	13.4	16.5	19.9	23.7	27.7	32.1	36.7
350	0.1	0.6	1.3	2.3	3.6	5.1	7.0	9.1	11.5	14.2	17.1	20.4	23.9	27.6	31.7
390	0.1	0.5	1.2	2.1	3.2	4.6	6.3	8.2	10.3	12.8	15.4	18.3	21.5	24.9	28.5
500	0.1	0.4	0.9	1.6	2.5	3.6	4.9	6.4	8.1	10.0	12.1	14.3	16.8	19.5	22.3
565		0.4	0.8	1.4	2.2	3.2	4.3	5.7	7.2	8.8	10.7	12.7	14.9	17.3	19.8
600		0.3	0.8	1.3	2.1	3.0	4.1	5.3	6.7	8.3	10.1	12.0	14.0	16.3	18.7
700		0.3	0.6	1.1	1.8	2.6	3.5	4.6	5.8	7.1	8.6	10.3	12.0	14.0	16.0
800		0.3	0.6	1.0	1.6	2.2	3.1	4.0	5.1	6.2	7.6	9.0	10.5	12.2	14.4
900		0.2	0.5	0.9	1.4	2.0	2.7	3.6	4.5	5.6	6.7	8.0	9.4	10.9	12.5
1000		0.2	0.5	0.8	1.3	1.8	2.4	3.2	4.0	5.0	6.0	7.2	8.4	9.8	11.2

(16) Lighting. Fixed-source lighting reduces conflicts along paths and at intersections. In addition, lighting allows the bicyclist to see the bicycle path direction, surface conditions, and obstacles. Lighting for bicycle paths is important and should be considered where riding at night is expected, such as bicycle paths serving college students or commuters, and at highway intersections. Lighting should also be considered through underpasses or tunnels, and when nighttime security could be a problem.

Depending on the location, average maintained horizontal illumination levels of 5 lux to 22 lux should be considered. Where special security problems exist, higher illumination levels may be considered. Light standards (poles) should meet the recommended horizontal and vertical clearances. Luminaires and standards should be at a scale appropriate for a pedestrian or bicycle path.

1003.2 Class II Bikeways

Class II bikeways (bike lanes) for preferential use by bicycles are established within the paved area of highways. Bike lane pavement markings are intended to promote an orderly flow of traffic, by establishing specific lines of demarcation between areas reserved for bicycles and lanes to be occupied by motor vehicles. This effect is supported by bike lane signs and pavement markings. Bike lane pavement markings can increase bicyclists' confidence that motorists will not stray into their path of travel if they remain within the bike lane. Likewise, with more certainty as to where bicyclists will be, passing motorists are less apt to swerve toward opposing traffic in making certain they will not hit bicyclists.

Class II bike lanes shall be one-way facilities. Two-way bike lanes (or bike paths that are contiguous to the roadway) are not permitted, as such facilities have proved unsatisfactory and promote riding against the flow of motor vehicle traffic.

(1) Widths. Typical Class II bikeway configurations are illustrated in Figure 1003.2A and are described below:

(a) Figure 1003.2A-(1) depicts bike lanes on an urban type curbed street where parking stalls (or continuous parking stripes) are marked. Bike lanes are located between the parking area and the traffic lanes. **As indicated, 5 feet shall be the minimum width of bike lane where parking stalls are marked.** If parking volume is substantial or turnover high, an additional 1 foot to 2-foot of width is desirable.

Bike lanes shall not be placed between the parking area and the curb. Such facilities increase the conflict between bicyclists and opening car doors and reduce visibility at intersections. Also, they prevent bicyclists from leaving the bike lane to turn left and cannot be effectively maintained.

(b) Figure 1003.2A-(2) depicts bike lanes on an urban-type curbed street, where parking is permitted, but without parking stripe or stall marking. Bike lanes are established in conjunction with the parking areas**. As indicated, 11 feet or 12 feet (depending on the type of curb) shall be the minimum width of the bike lane where parking is permitted.** This type of lane is satisfacory where parking is not extensive and where turnover of parked cars is infrequent. However, if parking is substantial, turnover of parked cars is high, truck traffic is substantial, or if vehicle speeds exceed 35 miles per hour, additional width is recommended.

(c) Figure 1003.2A-(3) depicts bike lanes along the outer portions of an urban type curbed street, where parking is prohibited. This is generally the most desirable configuration for bike lanes, as it eliminates potential conflicts resulting from auto parking (e.g., opening car doors). **As indicated, if no gutter exists, the minimum bike lane width shall be 4 feet. With a normal 2-foot gutter, the minimum bike lane width shall be 5 feet.** The intent is to provide a minimum 4 feet wide bike lane, but with at least 3 feet between the traffic lane and the longitudinal joint at the concrete gutter, since the gutter reduces the effective width of the bike lane for two reasons. First, the longitudinal joint may not always be smooth, and may be difficult

to ride along. Secondly, the gutter does not provide a suitable surface for bicycle travel. Where gutters are wide (say, 4 feet), an additional 3 feet must be provided because bicyclists should not be expected to ride in the gutter. Wherever possible, the width of bike lanes should be increased 6 feet to 8 feet to provide for greater safety. Eight-foot bike lanes can also serve as emergency parking areas for disabled vehicles.

Striping bike lanes next to curbs where parking is prohibited only during certain hours shall be done only in conjunction with special signing to designate the hours bike lanes are to be effective. Since the Vehicle Code requires bicyclists to ride in bike lanes where provided (except under certain conditions), proper signing is necessary to inform bicyclists that they are required to ride in bike lanes only during the course of the parking prohibition. This type of bike lane should be considered only if the vast majority of bicycle travel would occur during the hours of the parking prohibition, and only if there is a firm commitment to enforce the parking prohibition. Because of the obvious complications, this type of bike lane is not encouraged for general application.

Figure 1003.2A-(4) depicts bike lanes on a highway without curbs and gutters. This location is in an undeveloped area where infrequent parking is handled off the pavement. This can be accomplished by supplementing the bike lane signing with R25 (park off pavement) signs, or R26 (no parking) signs. **Minimum widths shall be as shown.** Additional width is desirable, particularly where motor vehicle speeds exceed 35 miles per hour

Per Topic 301, the minimum lane width standard is 12 feet. There are situations where it may be desirable to reduce the width of the traffic lanes in order to add or widen bicycle lanes or shoulders. In determining the appropriateness of narrower traffic lanes, consideration should be given to factors such as motor vehicle speeds, truck volumes, alignment, bicycle lane width, sight distance, and the presence of on-street vehicle parking. When vehicle parking is permitted adjacent to a bicycle lane, or on a shoulder where bicycling is not prohibited, reducing the width of the adjacent traffic lane may allow for wider bicycle lanes or shoulders, to provide greater clearance between bicyclists and driver-side doors when opened. Where favorable conditions exist, traffic lanes of 11 feet may be feasible but must be approved per Topic 301.

Bike lanes are not advisable on long, steep downgrades, where bicycle speeds greater than 30 miles per hour are expected. As grades increase, downhill bicycle speeds will increase, which increases the problem of riding near the edge of the roadway. In such situations, bicycle speeds can approach those of motor vehicles, and experienced bicyclists will generally move into the motor vehicle lanes to increase sight distance and maneuverability. If bike lanes are to be marked, additional width should be provided to accommodate higher bicycle speeds.

If the bike lanes are to be located on one-way streets, they should be placed on the right side of the street. Bike lanes on the left side would cause bicyclists and motorists to undertake crossing maneuvers in making left turns onto a two-way street.

(2) Signing and Pavement Markings. Details for signing and pavement marking of Class II bikeways are found in the California MUTCD, Section 9C.04.

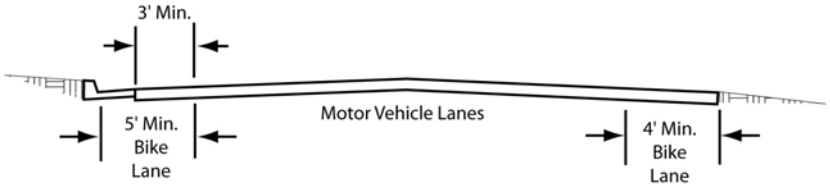
(3) At-grade Intersection Design. Most auto/bicycle accidents occur at intersections. For this reason, bikeway design at intersections should be accomplished in a manner that will minimize confusion by motorists and bicyclists, and will permit both to operate in accordance with the normal rules of the road.

Figure 1003.2A
Typical Bike Lane Cross Sections
(On 2-lane or Multilane Highways)

(1) MARKED PARKING

* 13' is recommended where there is substantial parking or turnover of parked cars is high (e.g. commerical areas).

(2) PARKING PERMITTED WITHOUT MARKED PARKING OR STALL



(With Gutter) **(3) PARKING PROHIBITED** (Without Gutter)

(4) TYPICAL ROADWAY IN OUTLYING AREAS PARKING RESTRICTED

Note: For pavement marking guidance, see the California MUTCD, Section 9C.04

Figure 1003.2B illustrates a typical at-grade intersection of multilane streets, with bike lanes on all approaches. Some common movements of motor vehicles and bicycles are shown. A prevalent type of accident involves straight-through bicycle traffic and right-turning motorists. Left-turning bicyclists also have problems, as the bike lane is on the right side of the street, and bicyclists have to cross the path of cars traveling in both directions. Some bicyclists are proficient enough to merge across one or more lanes of traffic, to use the inside lane or left-turn lane. However, there are many who do not feel comfortable making this maneuver. They have the option of making a two-legged left turn by riding along a course similar to that followed by pedestrians, as shown in the diagram. Young children will often prefer to dismount and change directions by walking their bike in the crosswalk.

(4) Interchange Design. As with bikeway design through at-grade intersections, bikeway design through interchanges should be accomplished in a manner that will minimize confusion by motorists and bicyclists. Designers should work closely with the local agency in designing bicycle facilities through interchanges. Local Agencies should carefully select interchange locations which are most suitable for bikeway designations and where the crossing meets applicable design standards. The local agency may have special needs and desires for continuity through interchanges which should be considered in the design process.

For Class II bikeway signing and lane markings, see the California MUTCD, Section 9C.04.

The shoulder width shall not be reduced through the interchange area. The minimum shoulder width shall match the approach roadway shoulder width, but not less than 4 feet or 5 feet if a gutter exists. If the shoulder width is not available, the designated bike lane shall end at the previous local road intersection.

Depending on the intersection angles, either Figure 1003.2C or 1003.2D should also be used for multilane ramp intersections. Additionally, the outside through lane should be widened to 14 feet when feasible. This allows extra room for bicycles to share the through lane with vehicles. The outside shoulder width should not be reduced through the interchange area to accommodate this additional width.

1003.3 Class III Bikeways

Class III bikeways (bike routes) are intended to provide continuity to the bikeway system. Bike routes are established along through routes not served by Class I or II bikeways, or to connect discontinuous segments of bikeway (normally bike lanes). Class III facilities are shared facilities, either with motor vehicles on the street, or with pedestrians on sidewalks, and in either case bicycle usage is secondary. Class III facilities are established by placing Bike Route signs along roadways.

Minimum widths for Class III bikeways are not presented, as the acceptable width is dependent on many factors, including the volume and character of vehicular traffic on the road, typical speeds, vertical and horizontal alignment, sight distance, and parking conditions.

Since bicyclists are permitted on all highways (except prohibited freeways), the decision to designate the route as a bikeway should be based on the advisability of encouraging bicycle travel on the route and other factors listed below.

(1) On-street Bike Route Criteria. To be of benefit to bicyclists, bike routes should offer a higher degree of service than alternative streets. Routes should be signed only if some of the following apply:

(a) They provide for through and direct travel in bicycle-demand corridors.

(b) Connect discontinuous segments of bike lanes.

(c) An effort has been made to adjust traffic control devices (stop signs, signals) to give greater priority to bicyclists, as compared with alternative streets. This could include placement of bicycle-sensitive detectors on the right-hand portion of the road, where bicyclists are expected to ride.

Figure 1003.2B

Typical Bicycle/Auto Movements at Intersections of Multilane Streets

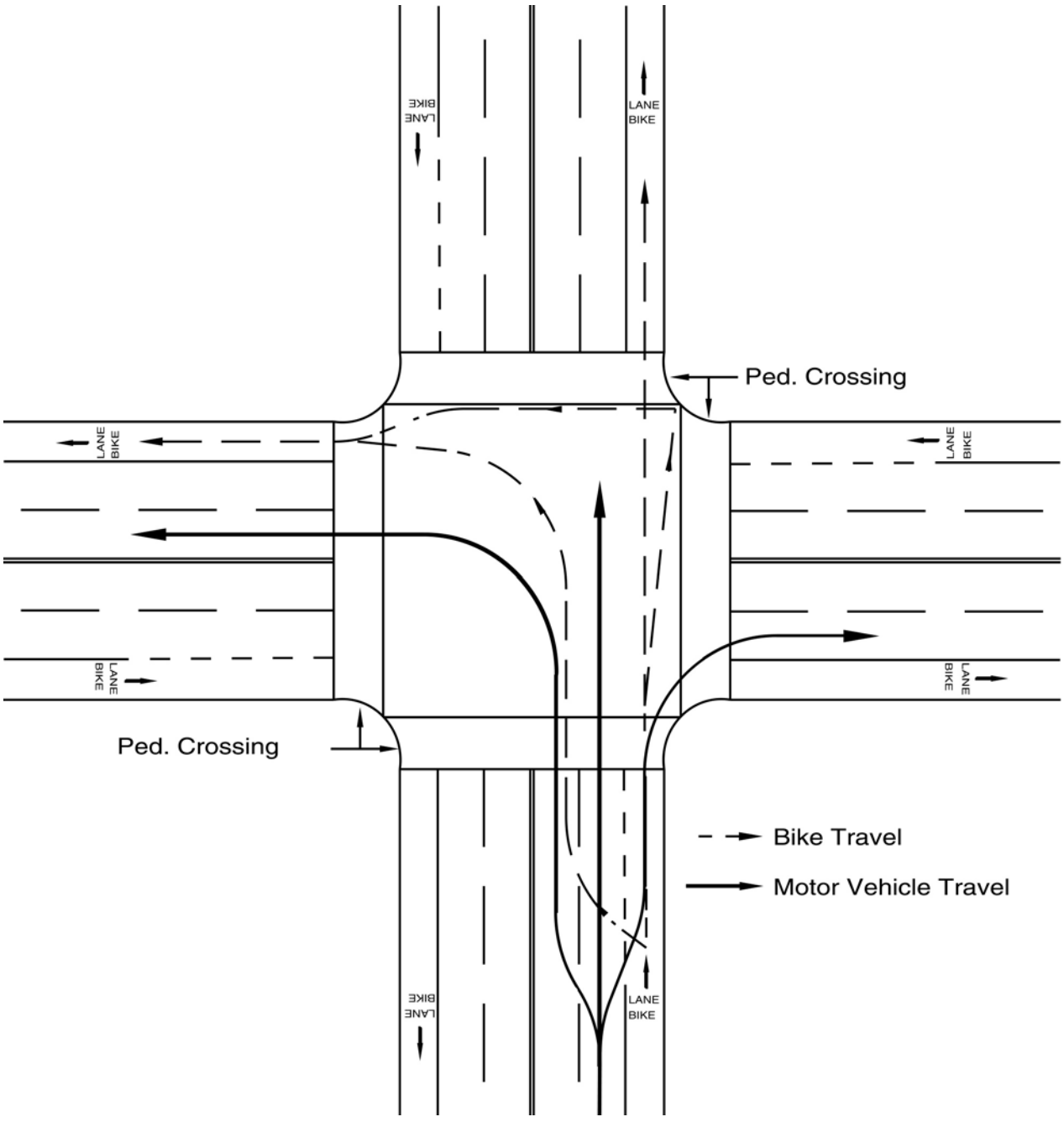
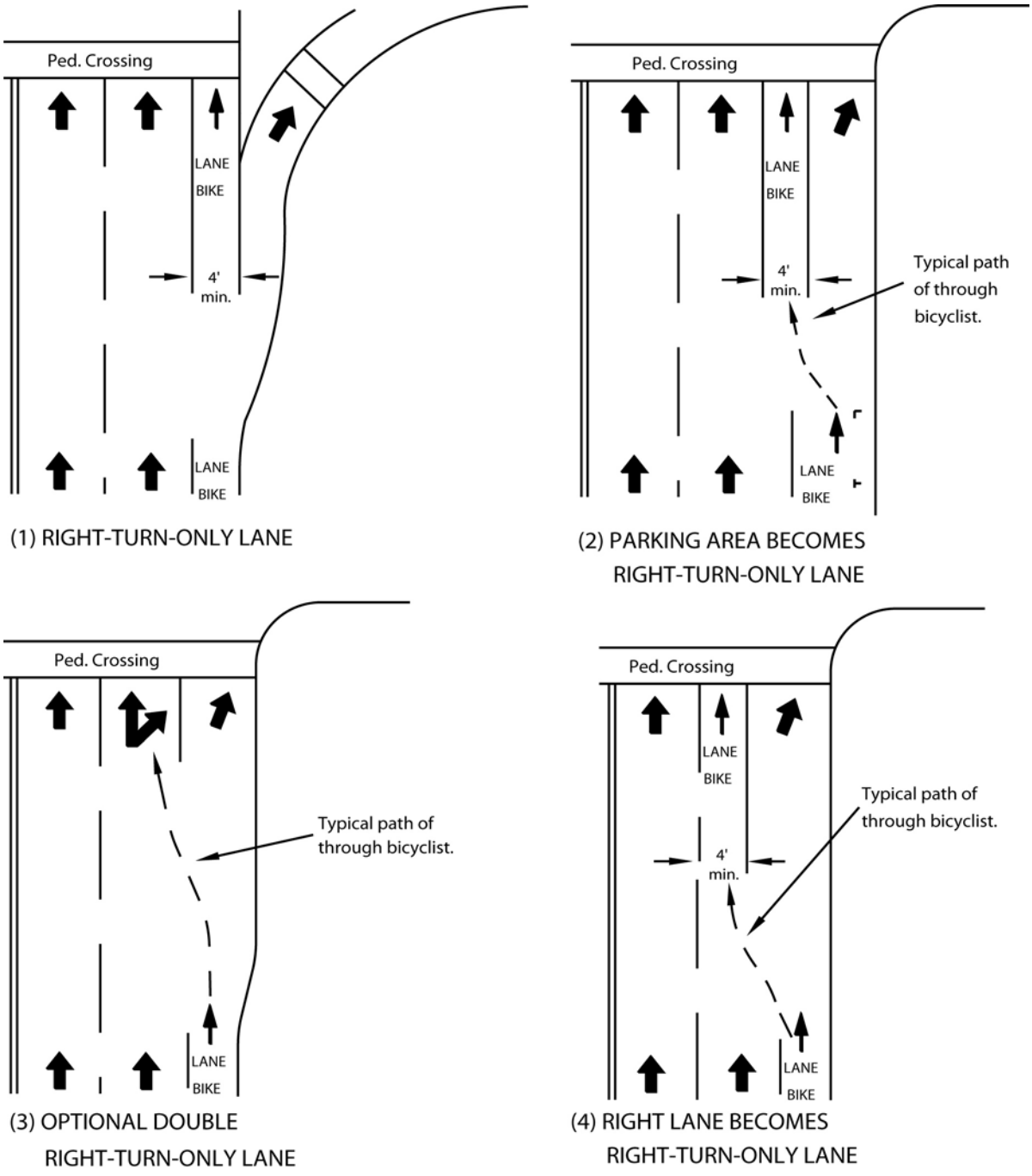
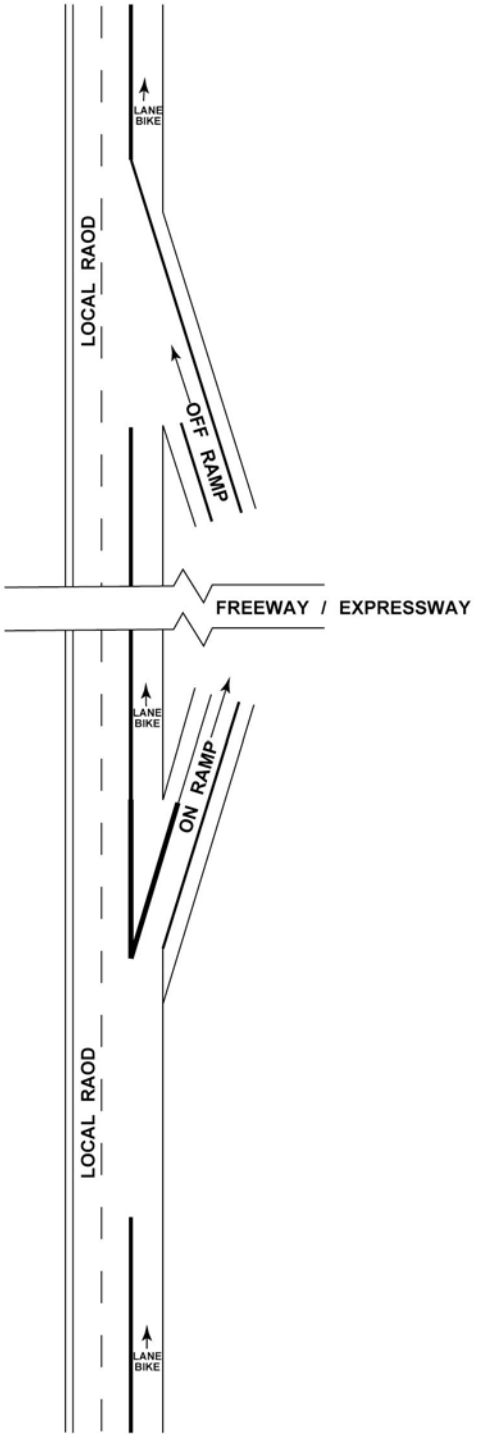


Figure 1003.2C
Bike Lanes Approaching Motorist
Right-turn-only Lane



Note: For bicycle lane markings, see the California MUTCD, Section 9C.04.

Figure 1003.2D
Bike Lanes Through Interchanges



Notes:

1.) See Index 1003.2(4) for additional information.

2.) The shoulder width shall not be reduced through the interchange area. The minimum shoulder width shall match the approach roadway shoulder width, but not less than 4 feet or 5 feet if a gutter exists. If the shoulder width is not available, the designated bike lane shall end at the previous local raod intersection.

3.) See Index 1003.3(4) for information on Bike Routes Through Interchanges.

(d) Street parking has been removed or restricted in areas of critical width to provide improved safety.

(e) Surface imperfections or irregularities have been corrected (e.g., utility covers adjusted to grade, potholes filled, etc.).

(f) Maintenance of the route will be at a higher standard than that of other comparable streets (e.g., more frequent street sweeping).

(2) Sidewalk Bikeway Criteria. In general, the designated use of sidewalks (as a Class III bikeway) for bicycle travel is unsatisfactory.

It is important to recognize that the development of extremely wide sidewalks does not necessarily add to the safety of sidewalk bicycle travel, as wide sidewalks will encourage higher speed bicycle use and can increase potential for conflicts with motor vehicles at intersections, as well as with pedestrians and fixed objects.

Sidewalk bikeways should be considered only under special circumstances, such as:

(a) To provide bikeway continuity along high speed or heavily traveled roadways having inadequate space for bicyclists, and uninterrupted by driveways and intersections for long distances.

(b) On long, narrow bridges. In such cases, ramps should be installed at the sidewalk approaches. If approach bikeways are two-way, sidewalk facilities should also be two-way.

Whenever sidewalk bikeways are established, a special effort should be made to remove unnecessary obstacles. Whenever bicyclists are directed from bike lanes to sidewalks, curb cuts should be flush with the street to assure that bicyclists are not subjected to problems associated with crossing a vertical lip at a flat angle. Also curb cuts at each intersection are necessary. Curb cuts should be wide enough to accommodate adult tricycles and two-wheel bicycle trailers.

In residential areas, sidewalk riding by young children too inexperienced to ride in the street is common. With lower bicycle speeds and lower auto speeds, potential conflicts are somewhat lessened, but still exist. Nevertheless, this type of sidewalk bicycle use is accepted. But it is inappropriate to sign these facilities as bikeways. Bicyclists should not be encouraged (through signing) to ride facilities that are not designed to accommodate bicycle travel.

(3) Destination Signing of Bike Routes. For Bike Route signs to be more functional, supplemental plates may be placed beneath them when located along routes leading to high demand destinations (e.g., "To Downtown"; "To State College"; etc. For typical signing, see the California MUTCD, Figures 9B-5 and 9B-6.

There are instances where it is necessary to sign a route to direct bicyclists to a logical destination, but where the route does not offer any of the above listed bike route features. In such cases, the route should not be signed as a bike route; however, destination signing may be advisable. A typical application of destination signing would be where bicyclists are directed off a highway to bypass a section of freeway. Special signs would be placed to guide bicyclists to the next logical destination. The intent is to direct bicyclists in the same way as motorists would be directed if a highway detour was necessitated.

(4) Interchange Design As with bikeway design through at-grade intersections, bikeway design through interchanges should be accomplished in a manner that will minimize confusion by motorists and bicyclists. Designers should work closely with the local agency in designing bicycle facilities through interchanges. Local Agencies should carefully select interchange locations which are most suitable for bikeway designations and where the crossing meets applicable design standards. The local agency may have special needs and desires for continuity through interchanges which should be considered in the design process.

Within the Interchange area the bike route shall require either an outside lane width of 16-foot or a 12-foot lane and a 4-foot shoulder. If the above width is not available,

the designated bike route shall end at the previous local road intersection.

1003.4 Bicycles on Freeways

In some instances, bicyclists are permitted on freeways. Seldom would a freeway be designated as a bikeway, but it can be opened for use if it meets certain criteria. Essentially, the criteria involve assessing the safety and convenience of the freeway as compared with available alternate routes. However, a freeway should not be opened to bicycle use if it is determined to be incompatible. The Headquarters Traffic Liaisons and the Design Coordinator must approve any proposals to open freeways to bicyclists.

If a suitable alternate route exists, it would normally be unnecessary to open the freeway. However, if the alternate route is unsuitable for bicycle travel the freeway may be a better alternative for bicyclists. In determining the suitability of an alternate route, safety should be the paramount consideration. The following factors should be considered:

- Number of intersections
- Shoulder widths
- Traffic volumes
- Vehicle speeds
- Bus, truck and recreational vehicle volumes
- Grades
- Travel time

When a suitable alternate route does not exist, a freeway shoulder may be considered for bicycle travel. Normally, freeways in urban areas will have characteristics that make it unfeasible to permit bicycle use. In determining if the freeway shoulder is suitable for bicycle travel, the following factors should be considered;

- Shoulder widths
- Bicycle hazards on shoulders (drainage grates, expansion joints, etc.)
- Number and location of entrance/exit ramps
- Traffic volumes on entrance/exit ramps
- Bridge Railing height

When bicyclists are permitted on segments of freeway, it will be necessary to modify and supplement freeway regulatory signs, particularly those at freeway ramp entrances and exits, see the California MUTCD, Section 9B.101(CA).

Where no reasonable alternate route exists within a freeway corridor, the Department should coordinate with local agencies to develop or improve existing routes or provide parallel bikeways within or adjacent to the freeway right of way.

The long term goal is to provide a safe and convenient non-freeway route for bicycle travel.

1003.5 Multipurpose Trails

In some instances, it may be appropriate for agencies to develop multipurpose trails - for hikers, joggers, equestrians, bicyclists, etc. Many of these trails will not be paved and will not meet the standards for Class I bikeways. As such, these facilities should not be signed as bikeways. Rather, they should be designated as multipurpose trails (or similar designation), along with regulatory signing to restrict motor vehicles, as appropriate.

If multipurpose trails are primarily to serve bicycle travel, they should be developed in accordance with standards for Class I bikeways. In general, multipurpose trails are not recommended as high speed transportation facilities for bicyclists because of conflicts between bicyclists and pedestrians. Wherever possible, separate bicycle and pedestrian paths should be provided. If this is not feasible, additional width, signing and pavement markings should be used to minimize conflicts.

It is undesirable to mix mopeds and bicycles on the same facility. In general, mopeds should not be allowed on multipurpose trails because of conflicts with slower moving bicyclists and pedestrians. In some cases where an alternate route for mopeds does not exist, additional width, signing, and pavement markings should be used to minimize conflicts. Increased patrolling by law enforcement personnel is also recommended to enforce speed limits and other rules of the road.

It is usually not desirable to mix horses and bicycle traffic on the same multipurpose trail. Bicyclists are often not aware of the need for slower speeds and additional operating space near horses. Horses

can be startled easily and may be unpredictable if they perceive approaching bicyclists as a danger. In addition, pavement requirements for safe bicycle travel are not suitable for horses. For these reasons, a bridle trail separate from the multipurpose trail is recommended wherever possible.

1003.6 Miscellaneous Bikeway Criteria

The following are miscellaneous bikeway criteria which should be followed to the extent pertinent to Class I, II and III bikeways. Some, by their very nature, will not apply to all classes of bikeway. Many of the criteria are important to consider on any highway where bicycle travel is expected, without regard to whether or not bikeways are established.

(1) Bridges. Bikeways on highway bridges must be carefully coordinated with approach bikeways to make sure that all elements are compatible. For example, bicycle traffic bound in opposite directions is best accommodated by bike lanes on each side of a highway. In such cases, a two-way bike path on one side of a bridge would normally be inappropriate, as one direction of bicycle traffic would be required to cross the highway at grade twice to get to and from the bridge bike path. Because of the inconvenience, many bicyclists will be encouraged to ride on the wrong side of the highway beyond the bridge termini.

The following criteria apply to a two-way bike path on one side of a highway bridge:

(a) The bikeway approach to the bridge should be by way of a separate two-way facility for the reason explained above.

(b) **A physical separation, such as a chain link fence or railing, shall be provided to offset the adverse effects of having bicycles traveling against motor vehicle traffic.** The physical separation should be designed to minimize fixed end hazards to motor vehicles and if the bridge is an interchange structure, to minimize sight distance restrictions at ramp intersections.

It is recommended that bikeway bridge railings or fences placed between traffic lanes and bikeways be at least 54 inches high to minimize the likelihood of bicyclists falling over the railings. Standard bridge railings which are lower than 46 inches can be retrofitted with lightweight upper railings or chain link fence suitable to restrain bicyclists. See Index 208.10(6) for guidance regarding bicycle railing on bridges.

Separate highway overcrossing structures for bikeway traffic shall conform to Department standard pedestrian overcrossing design loading. The minimum clear width shall be the paved width of the approach bikeway but not less than 8 feet. If pedestrians are to use the structure, additional width is recommended.

(2) Surface Quality. The surface to be used by bicyclists should be smooth, free of potholes, and the pavement edge uniform. For rideability on new construction, the finished surface of bikeways should not vary more than ¼ inch from the lower edge of an 8-foot long straight edge when laid on the surface in any direction.

Table 1003.6 indicates the recommended bikeway surface tolerances for Class II and III bikeways developed on existing streets to minimize the potential for causing bicyclists to lose control of their bicycle (Note: Stricter tolerances should be achieved on new bikeway construction.) Shoulder rumble strips are not suitable as a riding surface for bicycles. See the California MUTCD, Chapter 3B for additional information regarding rumble strip design considerations for bicycles.

(3) Drainage Grates, Manhole Covers, and Driveways. Drainage inlet grates, manhole covers, etc., on bikeways should be designed and installed in a manner that provides an adequate surface for bicyclists. They should be maintained flush with the surface when resurfacing.

Table 1003.6
Bikeway Surface Tolerances

Direction of Travel	Grooves (1)	Steps (2)
Parallel to travel	No more than ½" wide	No more than ⅜" high
Perpendicular to travel	---	No more than ¾" high

Notes:

(1) Groove--A narrow slot in the surface that could catch a bicycle wheel, such as a gap between two concrete slabs.

(2) Step--A ridge in the pavement, such as that which might exist between the pavement and a concrete gutter or manhole cover; or that might exist between two pavement blankets when the top level does not extend to the edge of the roadway.

Drainage inlet grates on bikeways shall have openings narrow enough and short enough to assure bicycle tires will not drop into the grates (e.g., reticuline type), regardless of the direction of bicycle travel. Where it is not immediately feasible to replace existing grates with standard grates designed for bicycles, 1" x ¼" steel cross straps should be welded to the grates at a spacing of 6 inches to 8 inches on centers to reduce the size of the openings adequately.

Corrective actions described above are recommended on all highways where bicycle travel is permitted, whether or not bikeways are designated.

Future driveway construction should avoid construction of a vertical lip from the driveway to the gutter, as the lip may create a problem for bicyclists when entering from the edge of the roadway at a flat angle. If a lip is deemed necessary, the height should be limited to ½ inch.

(4) At-grade Railroad Crossings and Cattle Guards. Whenever it is necessary to cross railroad tracks with a bikeway, special care must be taken to assure that the safety of bicyclists is protected. The bikeway crossing should be at least as wide as the approaches of the bikeway. Wherever possible, the crossing should be straight and at right angles to the rails. For on-street bikeways where a skew is unavoidable, the shoulder (or bike lane) should be widened, if possible, to permit bicyclists to cross at right angles (see Figure 1003.6A). If this is not possible, special construction and materials should be considered to keep the flangeway depth and width to a minimum.

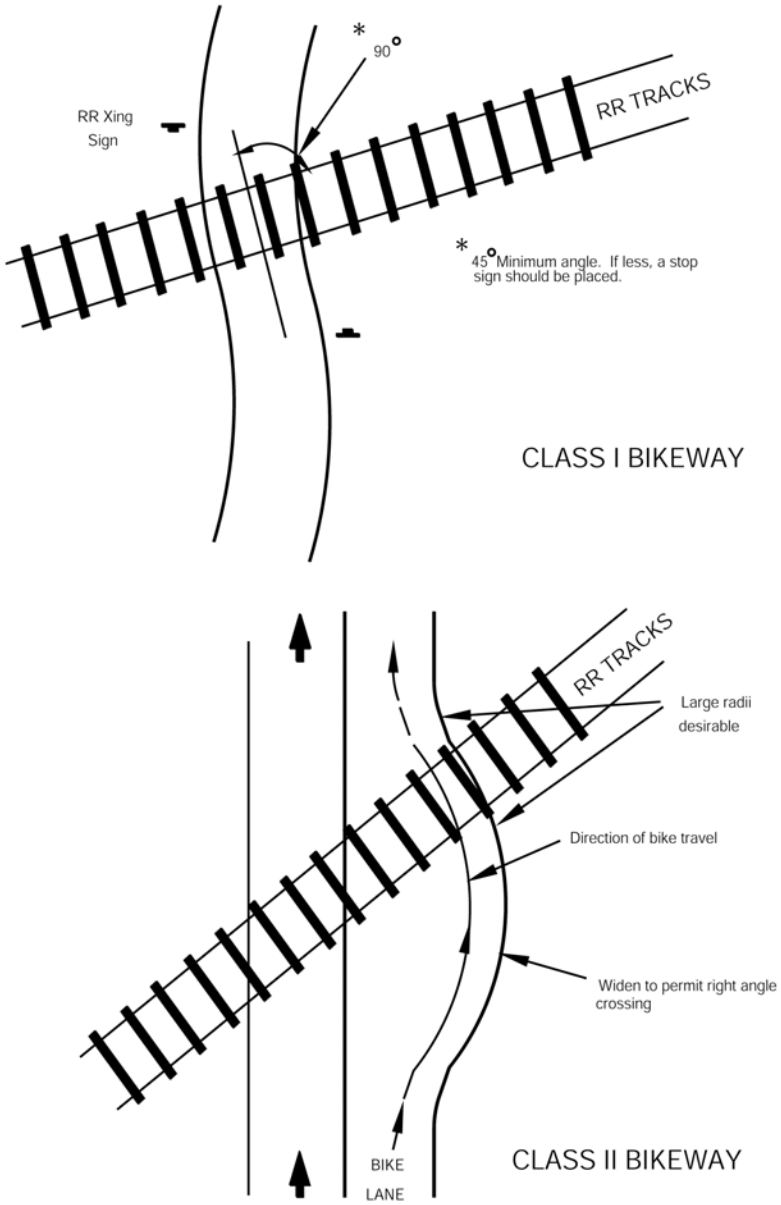
Pavement should be maintained so ridge buildup does not occur next to the rails. In some cases, timber plank crossings can be justified and can provide for a smoother crossing. Where hazards to bicyclist cannot be avoided, appropriate signs should be installed to warn bicyclists of the danger.

All railroad crossings are regulated by the California Public Utilities Commission (CPUC). All new bike path railroad crossings must be approved by the CPUC. Necessary railroad protection will be determined based on a joint field review involving the applicant, the railroad company, and the CPUC.

The presence of cattle guards along any roadway where bicyclists are expected should be clearly marked with adequate advance warning.

(5) Obstruction Markings. Vertical barriers and obstructions, such as abutments, piers, and other features causing bikeway constriction, should be clearly marked to gain the attention of approaching bicyclists. This treatment should be used only where unavoidable, and is by no means a substitute for good bikeway design. See the California MUTCD, Section 9C.06.

Figure 1003.6A
Railroad Crossings



California
Manual on Uniform
Traffic Control Devices
for Streets and Highways
**(FHWA's MUTCD 2003 Edition
including Revisions 1 and 2,
as amended for use in California)**

PART 9
Traffic Controls
for Bicycle Facilities

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION

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PART 9. TRAFFIC CONTROLS FOR BICYCLE FACILITIES

TABLE OF CONTENTS

TABLES

CHAPTER 9B. SIGNS

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CHAPTER 9A. GENERAL

Section 9A.01 Requirements for Bicyclist Traffic Control Devices

Support:

General information and definitions concerning traffic control devices are found in Part 1.

Section 9A.02 Scope

Support:

Part 9 covers signs, pavement markings, and highway traffic signals specifically related to bicycle operation on both roadways and shared-use paths.

Guidance:

Parts 1, 2, 3, and 4 should be reviewed for general provisions, signs, pavement markings, and signals.

Standard:

None of the bikeway designations in this Manual shall be construed to preclude permitted bicycle travel on roadways or portions of roadways that do not have bikeway designations.

Section 9A.03 Definitions Relating to Bicycles

Standard:

The following terms shall be defined as follows when used in Part 9:

1. **Bicycle Facilities—a general term denoting improvements and provisions that accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically defined for bicycle use.**
2. **Bicycle Lane—a portion of a roadway that has been designated by signs and pavement markings for preferential or exclusive use by bicyclists.**
3. **Bikeway—a generic term for any road, street, path, or way that in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.**
4. **Designated Bicycle Route—a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route signs, with or without specific bicycle route numbers. Bicycle routes, which might be a combination of various types of bikeways, should establish a continuous routing.**
5. **Shared-Use Path—a bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users.**
6. **Bikeway – All facilities that provide primarily for bicycle travel. Refer California Streets and Highways Code Section 890.4.**
7. **Bike Lane – See Class II Bikeway.**
8. **Bike Path – See Class I Bikeway.**
9. **Bike Route – See Class III Bikeway.**
10. **Class I Bikeway (Bike Path) – Provides a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with crossflows by motorists minimized. Refer California Streets and Highways Code Section 890.4.**
11. **Class II Bikeway (Bike Lane) – Provides a restricted right-of-way designated for the exclusive or semiexclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited, but with vehicle parking and crossflows by pedestrians and motorists permitted. For example, a marked lane for one-way bike travel on a street or highway. Refer California Streets and Highways Code Section 890.4.**
12. **Class III Bikeway (Bike Route) – provide a right-of-way designated by signs or permanent markings and shared with pedestrians or motorists. Refer California Streets and Highways Code Section 890.4.**
13. **Nonmotorized Traffic – Bicycle and pedestrian component of traffic.**

14. Shared Roadway (No Bikeway Designation) – A roadway that permits bicycle use but is not officially designated as a bikeway.

Section 9A.04 Maintenance

Guidance:

All signs, signals, and markings, including those on bicycle facilities, should be properly maintained to command respect from both the motorist and the bicyclist. When installing signs and markings on bicycle facilities, an agency should be designated to maintain these devices.

Section 9A.05 Relation to Other Documents

Support:

"The Uniform Vehicle Code and Model Traffic Ordinance" published by the National Committee on Uniform Traffic Laws and Ordinances (see Section 1A.11) has provisions for bicycles and is the basis for the traffic control devices included herein.

Informational documents used during the development of the signing and marking recommendations in Part 9 include the following:

A. "Guide for Development of Bicycle Facilities," which is available from the American Association of State Highway and Transportation Officials (see Page i for the address);

B. State and local government design guides; and

C. "Selecting Roadway Design Treatments to Accommodate Bicycles," FHWA Publication No. FHWA-RD- 92-073, which is available from the FHWA Research and Technology Report Center, 9701 Philadelphia Court, Unit Q, Lanham, MD 20106.

D. "Highway Design Manual", 2001 Edition (Department of Transportation)

Other publications that relate to the application of traffic control devices in general are listed in Section 1A.11.

Section 9A.06 Placement Authority

Support:

Section 1A.08 contains information regarding placement authority for traffic control devices.

The following references from the California Streets and Highways Code relate to bicycles:

1. Section 887 – Definition of nonmotorized transportation facility.
2. Section 887.6 – Agreements with local agencies to construct and maintain nonmotorized transportation facilities.
3. Section 888 – Severance of existing major nonmotorized route by freeway construction.
4. Section 888.2 – Incorporation of nonmotorized transportation facilities in the design of freeways.
5. Section 890.2 – Definition of bicycle.
6. Section 890.4 – Definitions of Class I, II, and III bikeways.
7. Section 890.6 – The Department of Transportation, in cooperation with county and city governments, to establish minimum safety design criteria for the planning and construction of bikeways and roadways where bicycle travel is permitted.
8. Section 890.8 - The Department of Transportation to establish uniform specifications and symbols for signs, markers, and traffic control devices for bikeways and roadways where bicycle travel is permitted.
9. Section 891 – Local agencies must comply with design criteria and uniform specifications and symbols for signs, markers, and traffic control devices established by the Department of Transportation.
10. Section 891.2 – Local agencies bicycle transportation plan.
11. Section 892 – Use of abandoned right of way as a nonmotorized transportation facility.

The following references from the California Vehicle Code relate to bicycles:

1. Section 231 – Definition of bicycle.
2. Section 21100 – Local rules and regulations of bicycles on public sidewalks.
3. Section 21113 – Use of bicycles on public grounds.
4. Section 21200 – Laws applicable to bicycle use and peace officer exemption.
5. Section 21202 – Operation on roadway.

6. Section 21206 – Local Regulation.
7. Section 21207 – Bicycle lanes.
8. Section 21207.5 – Prohibited operation of motorized bicycles.
9. Section 21208 – Permitted movements from bicycle lanes.
10. Section 21209 – Motor vehicles and motorized bicycles in bicycle lanes.
11. Section 21210 – Bicycle parking.
12. Section 21211 – Obstruction of bikeways or bicycle paths or trails.
13. Section 21229 – Operation of motorized scooters in bicycle lanes.
14. Section 21230 – Operation of motorized scooters on bicycle paths, trails or bikeways.
15. Section 21450 – Official traffic control signals.
16. Section 21456.2 – Bicycles and traffic signals.
17. Section 21456.3 – Bicycle signals.
18. Section 21650.1 – Bicycle operated on roadway or highway shoulder.
19. Section 21717 – Turning across bicycle lane.
20. Section 21750 – Overtake and pass to left.
21. Section 21960 – Use of freeway shoulder by bicyclists.
22. Section 21966 – Pedestrians in bicycle lanes.

Section 9A.07 Meaning of Standard, Guidance, Option, and Support

Support:

The introduction to this Manual contains information regarding the meaning of the headings Standard, Guidance, Option, and Support, and the use of the words shall, should, and may.

Section 9A.08 Colors

Support:

Section 1A.12 contains information regarding the color codes.

Section 9A.101(CA) Traffic Controls for Bicycle Facilities at Rail Crossings

Standard:

Any bicycle facility traversing an at-grade railroad crossing shall conform to Parts 8 and 10.

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CHAPTER 9B. SIGNS

Section 9B.01 Application and Placement of Signs

Standard:

Bicycle signs shall be standard in shape, legend, and color.

All signs shall be retroreflectorized for use on bikeways, including shared-use paths and bicycle lane facilities.

Where signs serve both bicyclists and other road users, vertical mounting height and lateral placement shall be as specified in Part 2.

On shared-use paths, lateral sign clearance shall be a minimum of 0.9 m (3 ft) and a maximum of 1.8 m (6 ft) from the near edge of the sign to the near edge of the path (see Figure 9B-1).

Mounting height for ground-mounted signs on shared-use paths shall be a minimum of 1.2 m (4 ft) and a maximum of 1.5 m (5 ft), measured from the bottom edge of the sign to the near edge of the path surface (see Figure 9B-1).

When overhead signs are used on shared-use paths, the clearance from the bottom edge of the sign to the path surface directly under the sign shall be a minimum of 2.4 m (8 ft).

Guidance:

Signs for the exclusive use of bicyclists should be located so that other road users are not confused by them.

The clearance for overhead signs on shared-use paths should be adjusted when appropriate to accommodate typical maintenance vehicles.

Support:

California signs for bicycle facilities are shown in Figures 9B-2(CA) and 9B-4(CA).

Section 9B.02 Design of Bicycle Signs

Standard:

If the sign applies to motorists and bicyclists, then the size shall be as shown for conventional roads in Table 2B-1.

The minimum sign sizes for shared-use paths shall be those shown in Table 9B-1, and shall be used only for signs installed specifically for bicycle traffic applications. The minimum sign sizes for bicycle facilities shall not be used for signs that are placed in a location that would have any application to other vehicles.

Option:

Larger size signs may be used on bicycle facilities when appropriate.

Guidance:

Except for size, the design of signs for bicycle facilities should be identical to that specified in this Manual for vehicular travel.

Support:

Uniformity in design includes shape, color, symbols, wording, lettering, and illumination or retroreflectorization.

Section 9B.03 STOP and YIELD Signs (R1-1, R1-2)

Standard:

STOP (R1-1) signs (see Figure 9B-2) shall be installed on shared-use paths at points where bicyclists are required to stop.

YIELD (R1-2) signs (see Figure 9B-2) shall be installed on shared-use paths at points where bicyclists have an adequate view of conflicting traffic as they approach the sign, and where bicyclists are required to yield the right-of-way to that conflicting traffic.

Option:

A 750 x 750 mm (30 x 30 in) STOP sign or a 900 x 900 x 900 mm (36 x 36 x 36 in) YIELD sign may be used on shared-use paths for added emphasis.

Guidance:

Where conditions require path users, but not roadway users, to stop or yield, the STOP sign or YIELD sign should be placed or shielded so that it is not readily visible to road users.

When placement of STOP or YIELD signs is considered, priority at a shared-use path/roadway intersection should be assigned with consideration of the following:

A. Relative speeds of shared-use path and roadway users;

B. Relative volumes of shared-use path and roadway traffic; and

C. Relative importance of shared-use path and roadway.

Speed should not be the sole factor used to determine priority, as it is sometimes appropriate to give priority to a high-volume shared-use path crossing a low-volume street, or to a regional shared-use path crossing a minor collector street.

When priority is assigned, the least restrictive control that is appropriate should be placed on the lower priority approaches. STOP signs should not be used where YIELD signs would be acceptable.

Section 9B.04 Bicycle Lane Signs (R3-17, R3-17a, R3-17b)

~~**Standard:**~~

~~**The BIKE LANE (R3-17) sign (see Figure 9B-2) shall be used only in conjunction with marked bicycle lanes as described in Section 9C.04, and shall be placed at periodic intervals along the bicycle lanes.**~~

~~Guidance:~~

~~The BIKE LANE (R3-17) sign spacing should be determined by engineering judgment based on prevailing speed of bicycle and other traffic, block length, distances from adjacent intersections, and other considerations.~~

~~The AHEAD (R3-17a) sign (see Figure 9B-2) should be mounted directly below a R3-17 sign in advance of the beginning of a marked bicycle lane.~~

~~The ENDS (R3-17b) sign (see Figure 9B-2) should be mounted directly below a R3-17 sign at the end of a marked bicycle lane.~~

Standard:

The Bike Lane (R81(CA)) sign shall be placed at the beginning of each designated Bike Lane and along each Bike Lane at all major changes in direction. The R81(CA) sign shall be used to regulate bicycle and motor vehicle traffic, in accordance with CVC Sections 21207, 21207.5, 21208, 21209 and 21717.

Guidance:

The Bike Lane (R81(CA)) sign should be placed at every arterial street and at 800 m (1/2 mi) intervals of each designated Bike lane.

Option:

The BEGIN (R81A(CA)) and END (R81B(CA)) signs may be used below the R81(CA) sign to mark the beginning or end of a bike lane.

Support:

The R81(CA), R81A(CA) and R81B(CA) signs are shown in Figure 9B-2(CA).

Section 9B.05 BEGIN RIGHT TURN LANE YIELD TO BIKES Sign (R4-4)

Option:

Where motor vehicles entering an exclusive right-turn lane must weave across bicycle traffic in bicycle lanes, the BEGIN RIGHT TURN LANE YIELD TO BIKES (R4-4) sign (see Figure 9B-2) may be used to inform both the motorist and the bicyclist of this weaving maneuver.

Guidance:

The R4-4 sign should not be used when bicyclists need to move left because of a right-turn lane drop situation.

Section 9B.06 Bicycle WRONG WAY Sign and RIDE WITH TRAFFIC Plaque (R5-1b, R9-3c)

Option:

The Bicycle WRONG WAY (R5-1b) sign and RIDE WITH TRAFFIC (R9-3c) plaque (see Figure 9B-2) may be placed facing wrong-way bicycle traffic, such as on the left side of a roadway.

This sign and plaque may be mounted back-to-back with other signs to minimize visibility to other traffic.

Guidance:

The RIDE WITH TRAFFIC plaque should be used only in conjunction with the Bicycle WRONG WAY sign, and should be mounted directly below the Bicycle WRONG WAY sign.

Section 9B.07 NO MOTOR VEHICLES Sign (R5-3)

Option:

The NO MOTOR VEHICLES (R5-3) sign (see Figure 9B-2) may be installed at the entrance to a shared-use path.

The Bike Path Exclusion (R44A(CA)) sign may be used to identify a bike path and prohibit motor vehicles and motorized bicycles from entering the bike path. If motorized bicycles are permitted, the "Motorized Bicycles" portion may be replaced with "Motorized Bicycles Permitted".

Support:

The R44A(CA) sign is shown in Figure 9B-2(CA).

Section 9B.08 No Bicycles Sign (R5-6)

~~Guidance:~~

Option:

Where bicyclists are prohibited, the No Bicycles (R5-6) sign (see Figure 9B-2) ~~should~~ may be installed at the entrance to the facility.

Option:

Where pedestrians and motor-driven cycles are also prohibited, it may be more desirable to use the R5-10a word message sign that is described in Section 2B.36.

Section 9B.09 No Parking Bike Lane Signs (R7-9, R7-9a)

Standard:

If the installation of signs is necessary to restrict parking, standing, or stopping in a bicycle lane, appropriate signs as described in Sections 2B.39 through 2B.41, or the No Parking Bike Lane (R7-9 or R7-9a) signs (see Figure 9B-2) shall be installed.

Section 9B.10 Bicycle Regulatory Signs (R9-5, R9-6, R10-3)

Option:

The R9-5 sign (see Figure 9B-2) may be used where the crossing of a street by bicyclists is controlled by pedestrian signal indications.

Where it is not intended for bicyclists to be controlled by pedestrian signal indications, the Bike/Push Button for Green Light (R62C(CA)) sign may be used.

Where it is not intended for bicyclists to be controlled by pedestrian signal indications, the R10-3 sign (see Figure 9B-2 and Section 2B.45) may be used.

The R9-6 sign (see Figure 9B-2) may be used where a bicyclist is required to cross or share a facility used by pedestrians and is required to yield to the pedestrians.

Guidance:

If used, the R9-5, R62C(CA) or R10-3 signs should be installed near the edge of the sidewalk in the vicinity of where bicyclists will be crossing the street.

Support:

The R62C(CA) sign is shown in Figure 9B-2(CA).

Section 9B.11 Shared-Use Path Restriction Sign (R9-7)

Option:

The Shared-Use Path Restriction (R9-7) sign (see Figure 9B-2) may be installed on facilities that are to be shared by pedestrians and bicyclists. The symbols may be switched as appropriate.

A designated pavement area may be provided for each mode of travel (see Section 9C.03).

Section 9B.12 Bicycle Signal Actuation Sign (R10-22)

Option:

The Bicycle Signal Actuation (R10-22) sign (see Figure 9B-2) may be installed at signalized intersections where markings are used to indicate the location where a bicyclist is to be positioned to actuate the signal (see Section 9C.05).

Guidance:

If the Bicycle Signal Actuation sign is installed, it should be placed at the roadside adjacent to the marking to emphasize the connection between the marking and the sign.

Section 9B.13 Other Regulatory Signs

Option:

Other regulatory signs described in Chapter 2B may be installed on bicycle facilities as appropriate.

Section 9B.14 Turn or Curve Warning Signs (W1 Series)

Guidance:

To warn bicyclists of unexpected changes in shared-use path direction, appropriate turn or curve (W1-1through W1-7) signs (see Figure 9B-3) should be used.

The W1-1 through W1-5 signs should be installed no less than 15 m (50 ft) in advance of the beginning of the change of alignment.

Section 9B.15 Intersection Warning Signs (W2 Series)

Option:

Intersection Warning (W2-1 through W2-5) signs (see Figure 9B-3) may be used on a roadway, street, or shared-use path in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic.

Guidance:

When engineering judgment determines that the visibility of the intersection is limited on the shared-use path approach, Intersection Warning signs should be used.

Intersection Warning signs should not be used where the shared-use path approach to the intersection is controlled by a STOP sign, YIELD sign, or a traffic control signal.

Section 9B.16 Bicycle Surface Condition Warning Sign (W8-10)

Option:

The Bicycle Surface Condition Warning (W8-10) sign (see Figure 9B-3) may be installed where roadway or shared-use path conditions could cause a bicyclist to lose control of the bicycle.

Signs warning of other conditions that might be of concern to bicyclists, including BUMP (W8-1), DIP (W8-2), PAVEMENT ENDS (W8-3), and any other word message that describes conditions that are of concern to bicyclists, may also be used.

A supplemental plaque may be used to clarify the specific type of surface condition.

Section 9B.17 Bicycle Warning Sign (W11-1)

Support:

The Bicycle Warning (W11-1) sign (see Figure 9B-3) alerts the road user to unexpected entries into the roadway by bicyclists, and other crossing activities that might cause conflicts. These conflicts might be relatively confined, or might occur randomly over a segment of roadway.

Option:

A supplemental plaque with the legend AHEAD or ~~XXX METERS~~ (XXX FEET) may be used with the Bicycle Warning sign.

Guidance:

If used in advance of a specific crossing point, the Bicycle Warning sign should be placed at a distance in advance of the crossing location that conforms with the guidance given in Table 2C-4.

Standard:

Bicycle Warning signs, when used at the location of the crossing, shall be supplemented with a diagonal downward pointing arrow (W16-7p) plaque (see Figure 9B-3) to show the location of the crossing.

Option:

A fluorescent yellow-green background color with a black legend and border may be used for Bicycle Warning signs and supplemental plaques.

Guidance:

When the fluorescent yellow-green background color is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a zone or area should be avoided.

Section 9B.18 Other Bicycle Warning Signs

Option:

Other bicycle warning signs (see Figure 9B-3) such as BIKEWAY NARROWS (W5-4a) and Hill (W7-5) may be installed on bicycle facilities to warn bicyclists of conditions not readily apparent.

In situations where there is a need to warn motorists to watch for bicyclists traveling along the highway, the SHARE THE ROAD (W16-1) plaque (see Figure 9B-3) may be used in conjunction with the W11-1 sign.

Guidance:

If used, other advance bicycle warning signs should be installed no less than 15 m (50 ft) in advance of the beginning of the condition.

Where temporary traffic control zones are present on bikeways, appropriate signs from Part 6 should be used.

Option:

Other warning signs described in Chapter 2C may be installed on bicycle facilities as appropriate.

Support:

Refer to Section 8B.19 for Skewed Crossing (W10-12) Sign.

Section 9B.19 Bicycle Route Guide Signs (D11-1)

Guidance:

If used, Bicycle Route Guide (D11-1) signs (see Figure 9B-4) should be provided at decision points along designated bicycle routes, including signs to inform bicyclists of bicycle route direction changes and confirmation signs for route direction, distance, and destination.

If used, Bicycle Route Guide signs should be repeated at regular intervals so that bicyclists entering from side streets will have an opportunity to know that they are on a bicycle route. Similar guide signing should be used for shared roadways with intermediate signs placed for bicyclist guidance.

Support:

Figure 9B-5 shows an example of the signing for the beginning and end of a designated bicycle route on a shared-use path. Figure 9B-6 shows an example of signing for an on-roadway bicycle route. Figure 9B-7 shows examples of signing and markings for shared-use paths.

Section 9B.20 Bicycle Route Signs (M1-8, M1-9)

Option:

To establish a unique identification (route designation) for a State or local bicycle route, the Bicycle Route (M1-8) sign (see Figure 9B-4) may be used.

Standard:

The Bicycle Route sign shall contain a route designation and shall have a green background with a retroreflectorized white legend and border.

Option:

Where a designated bicycle route extends for long distances through two or more States, a coordinated submittal by the affected States for an assignment of an Interstate Bicycle Route number designation may be sent to the American Association of State Highway and Transportation Officials (see Page i for the address).

Standard:

The Interstate Bicycle Route (M1-9) sign (see Figure 9B-4) shall contain the assigned route number designation and have a black legend and border with a retroreflectorized white background.

Guidance:

If used, the Bicycle Route or Interstate Bicycle Route signs should be placed at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

Option:

Bicycle Route or Interstate Bicycle Route signs may be installed on shared roadways or on shared-use paths to provide guidance for bicyclists.

The Bicycle Route Guide (D11-1) sign (see Figure 9B-4) may be installed where no unique designation of routes is desired.

Option:

The Bicycle Route Number Marker (SG45(CA)) sign may be used on public highways/bikeways where a numerical designation for bike routes is desired. The local agency that requests the SG45(CA) sign on State highways is responsible for furnishing, installing and maintaining the signs.

Guidance:

For numbered bike routes initiated by the State, the Bike Route (D11-1) sign should be used on State highways. The District Traffic Engineer is responsible for approving the use of SG45(CA) signs on State highways.

Option:

The Bicycle Route Name Marker (S17(CA)) sign may be installed above the Bike Route (D11-1) sign for those bicycle routes where a community or the responsible agency has given a designated name to selected routes.

Support:

The SG45(CA) and S17(CA) signs are shown in Figure 9B-4(CA).

Section 9B.21 Destination Arrow and Supplemental Plaque Signs for Bicycle Route Signs

Option:

Destination (D1-1b and D1-1c) signs (see Figure 9B-4) may be mounted below Bicycle Route Guide signs, Bicycle Route signs, or Interstate Bicycle Route signs to furnish additional information, such as directional changes in the route, or intermittent distance and destination information.

The M4-11 through M4-13 supplemental plaques (see Figure 9B-4) may be mounted above the appropriate Bicycle Route Guide signs, Bicycle Route signs, or Interstate Bicycle Route signs.

Guidance:

If used, the appropriate arrow (M7-1 through M7-7) sign (see Figure 9B-4) should be placed below the Bicycle Route Guide sign, Bicycle Route sign, or Interstate Bicycle Route sign.

Standard:

The arrow signs and supplemental plaques used with the D11-1 or M1-8 signs shall have a white legend and border on a green background.

The arrow signs and supplemental plaques used with the M1-9 sign shall have a white legend and border on a black background.

Section 9B.22 Bicycle Parking Area Sign (D4-3)

Option:

The Bicycle Parking Area (D4-3) sign (see Figure 9B-4) or Bicycle Parking (G93C(CA)) sign (see Figure 9B-4(CA)) may be installed where it is desirable to show the direction to a designated bicycle parking area. The arrow may be reversed as appropriate.

Standard:

The legend and border of the Bicycle Parking Area sign shall be green on a retroreflectorized white background.

Section 9B.101(CA) Freeway Bicycle Signs

Support:

Refer Section 2B.36 and CVC 21960 for restrictions on use of freeways.

Refer Section 2B.36 for PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES PROHIBITED (R5-10a) sign.

Standard:

The BICYCLES MOTOR-DRIVEN CYCLES MUST EXIT (R44B(CA)) sign shall be used on freeways in advance of an exit ramp where bicycles and motor-driven cycles must exit.

Guidance:

The PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES PROHIBITED (R5-10a) sign should be placed beyond the exit ramp gore as a follow-up message to the R44B(CA) sign.

Standard:

The BICYCLES MUST EXIT (R44C(CA)) sign shall be used on freeways where bicycles are required to exit.

Support:

The R44B(CA) and R44C(CA) signs are shown in Figure 9B-2(CA).

Figure 9B-1. Sign Placement on Shared-Use Paths

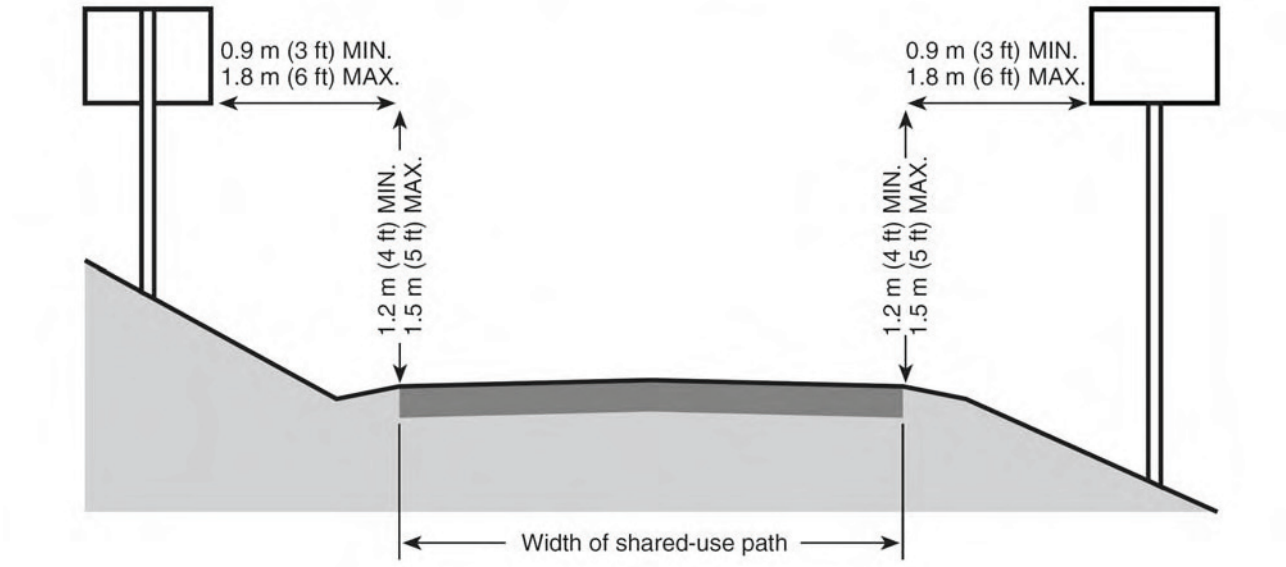

Figure 9B-2. Regulatory Signs for Bicycle Facilities

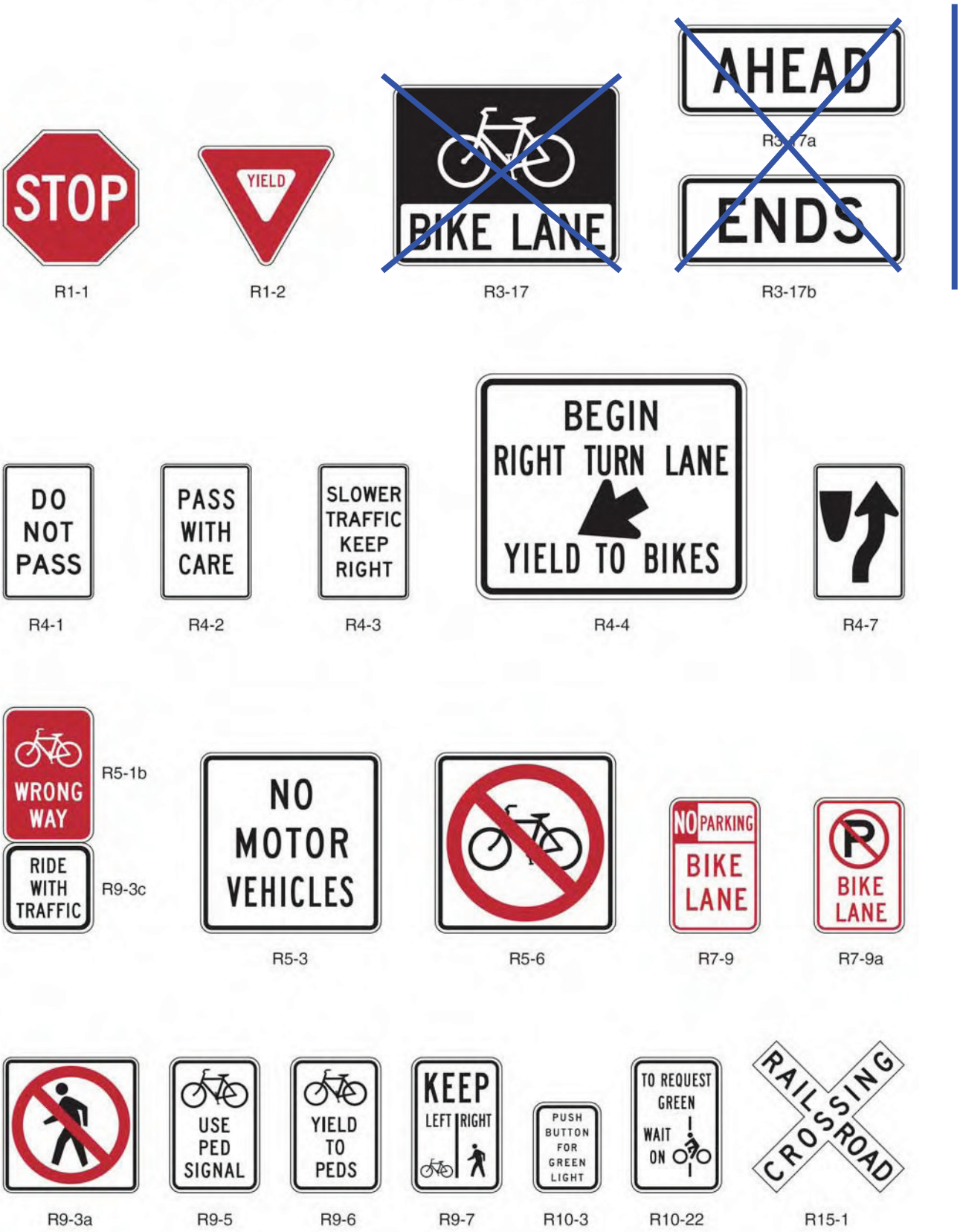

Figure 9B-2 (CA). California Regulatory Signs for Bicycle Facilities

R44A (CA)

R44B (CA)

R44C (CA)

R62C (CA)

R81 (CA)

R81A (CA)

R81B (CA)

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Figure 9B-3. Warning Signs for Bicycle Facilities *(Sheet 1 of 2)*

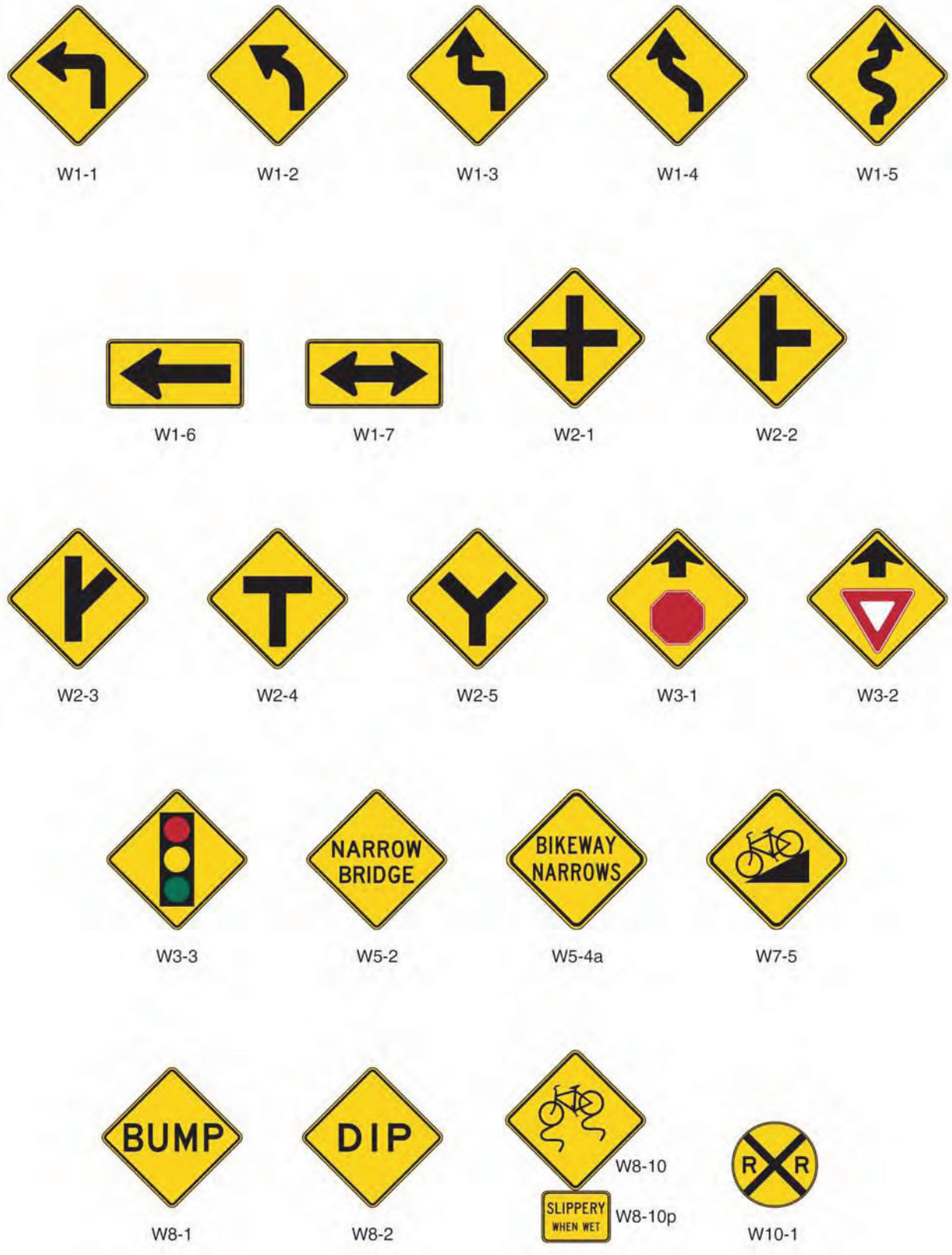

Figure 9B-3. Warning Signs for Bicycle Facilities (Sheet 2 of 2)

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Figure 9B-4. Guide Signs for Bicycle Facilities

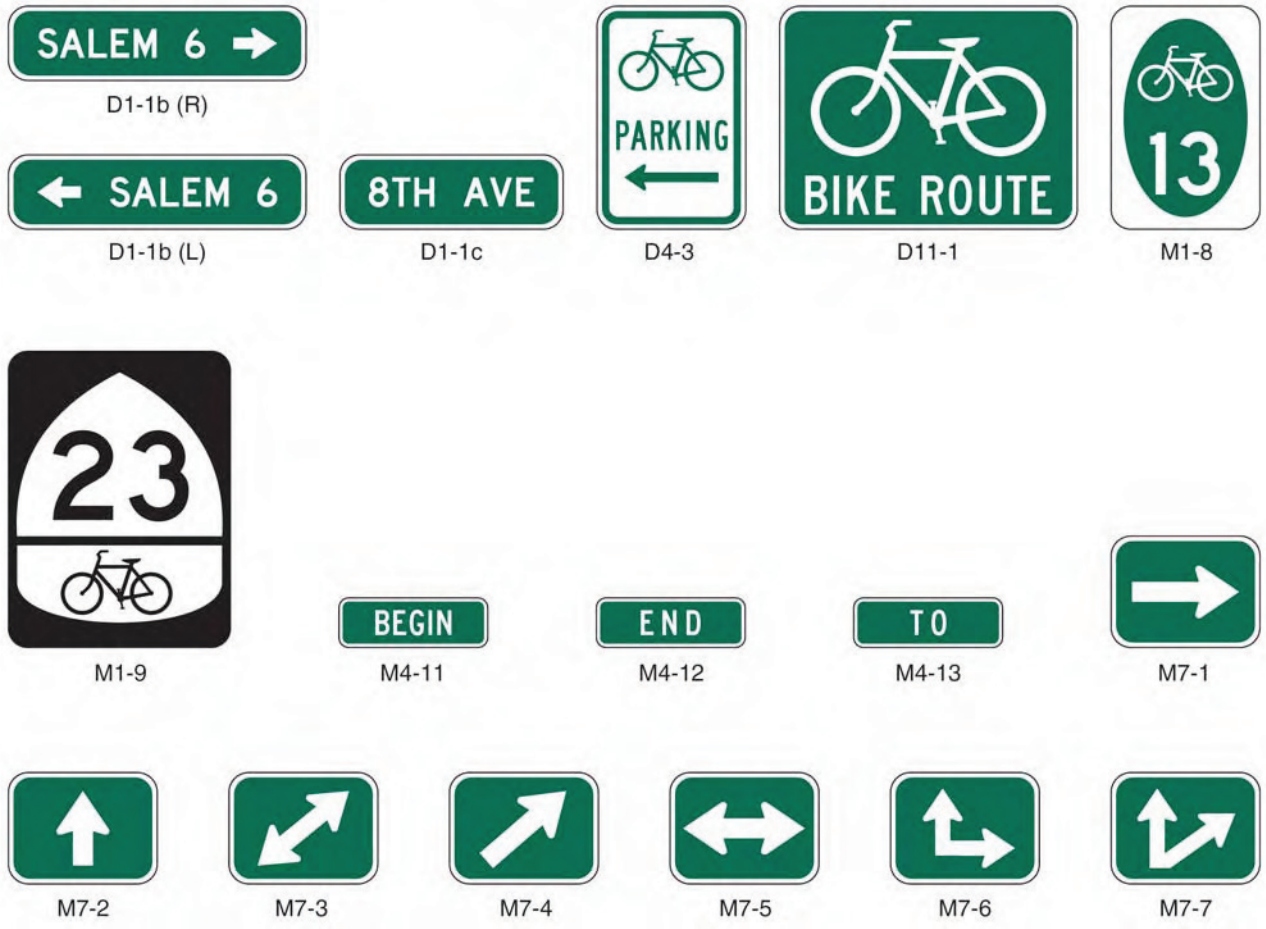

Figure 9B-4 (CA). California Guide Signs for Bicycle Facilities

Figure 9B-5. Example of Signing for the Beginning and End of a Designated Bicycle Route on a Shared-Use Path

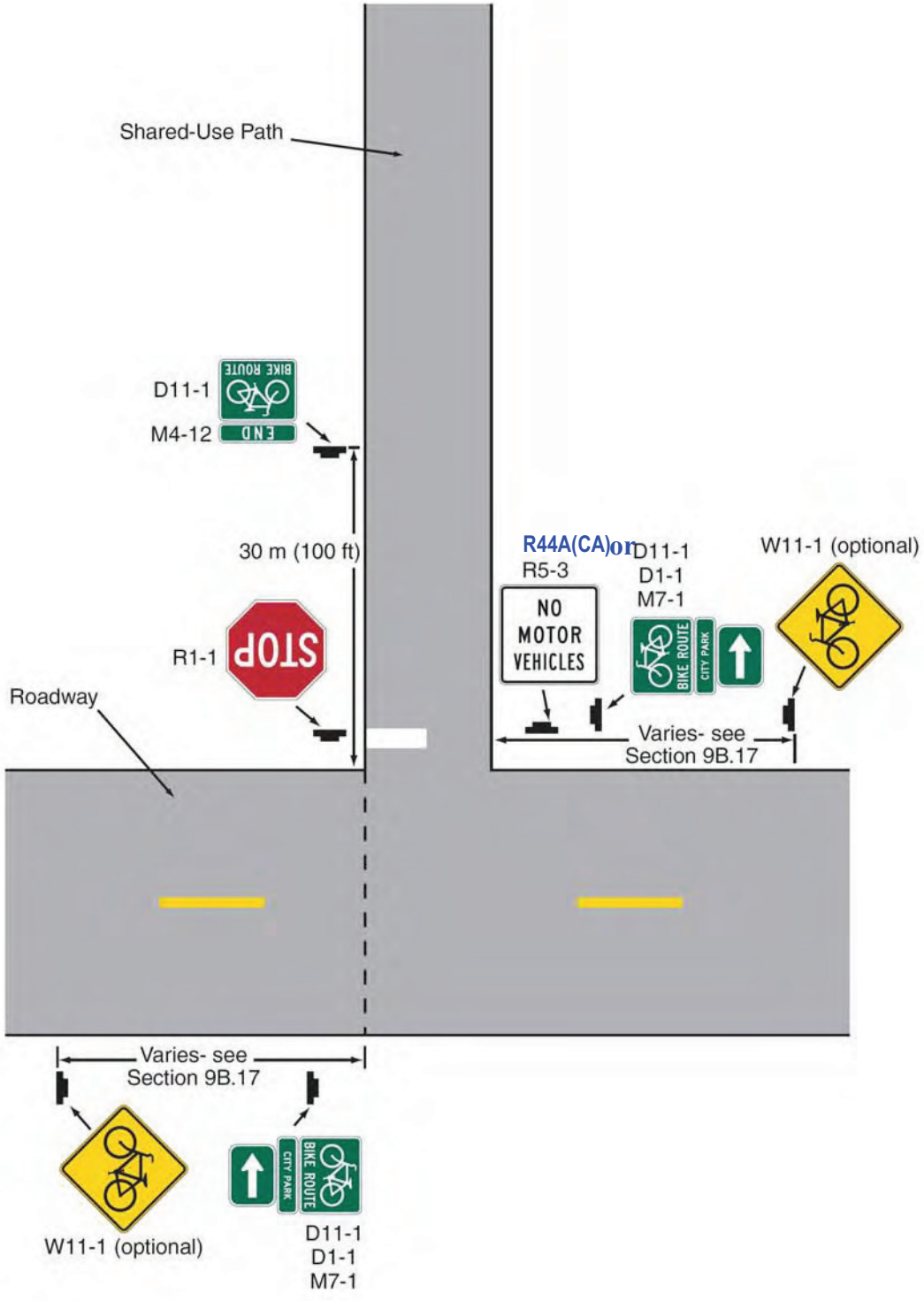

Figure 9B-6. Example of Signing for an On-Roadway Bicycle Route

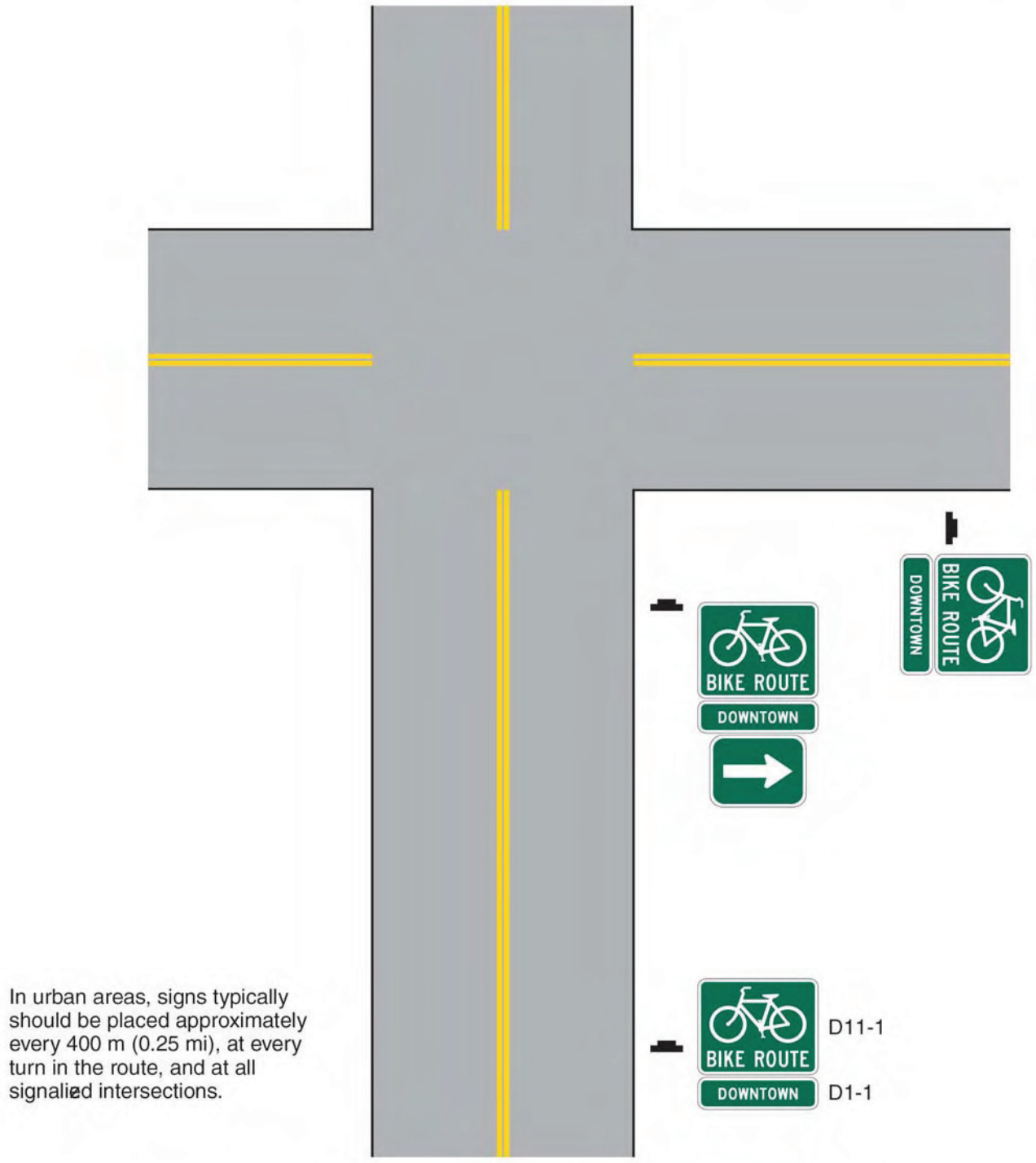

Figure 9B-7. Examples of Signing and Markings for Shared-Use Paths

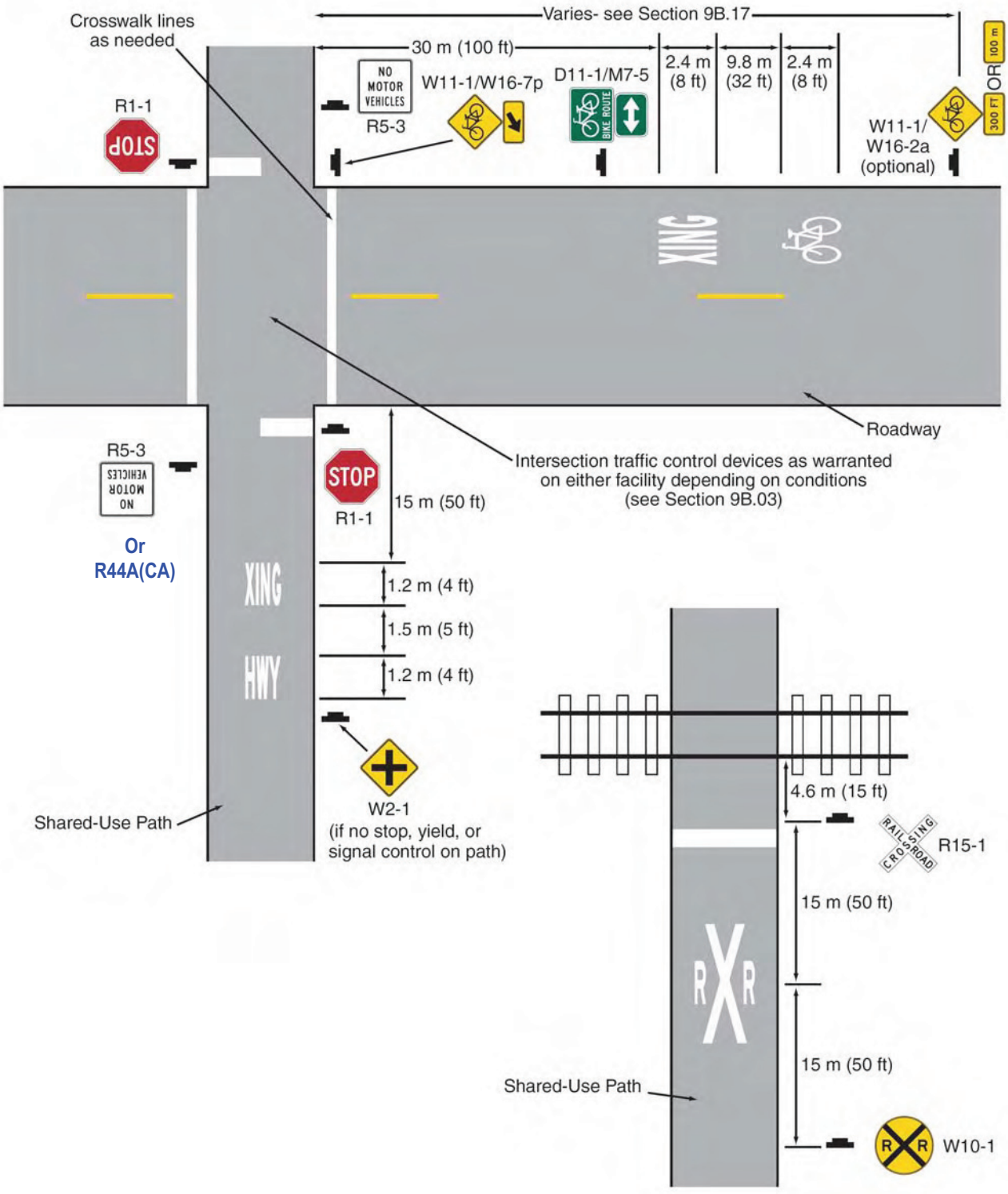

Table 9B-1. Minimum Sign Sizes for Bicycle Facilities (Sheet 1 of 2)

Sign	MUTCD Code	Minimum Sign Size - mm (in)	
		Shared-Use Path	Roadway
Stop	R1-1	450 x 450 (18 x 18)	750 x 750 (30 x 30)
Yield	R1-2	450 x 450 x 450 (18 x 18 x 18)	750 x 750 x 750 (30 x 30 x 30)
Bike ~~Lane~~	~~R3-17~~	—	~~750 x 600 (30 x 24)~~
~~Bicycle Lane Supplemental Plaques~~	~~R3-17a,b~~	—	~~750 x 300 (30 x 12)~~
Movement Restriction	R4-1,2,3,7	300 x 450 (12 x 18)	450 x 600 (18 x 24)
Begin Right Turn Lane Yield to Bikes	R4-4	—	900 x 750 (36 x 30)
Bicycle Wrong Way	R5-1b	300 x 450 (12 x 18)	300 x 450 (12 x 18)
No Motor Vehicles	R5-3	600 x 600 (24 x 24)	600 x 600 (24 x 24)
No Bicycles	R5-6	600 x 600 (24 x 24)	600 x 600 (24 x 24)
No Parking Bike Lane	R7-9,9a	—	300 x 450 (12 x 18)
Pedestrians Prohibited	R9-3a	450 x 450 (18 x 18)	450 x 450 (18 x 18)
Ride With Traffic Plaque	R9-3c	300 x 300 (12 x 12)	300 x 300 (12 x 12)
Bicycle Regulatory	R9-5,6	300 x 450 (12 x 18)	300 x 450 (12 x 18)
Shared-Use Path Restriction	R9-7	300 x 450 (12 x 18)	—
Push Button for Green Light	R10-3	225 x 300 (9 x 12)	225 x 300 (9 x 12)
To Request Green Wait on Symbol	R10-22	300 x 450 (12 x 18)	300 x 450 (12 x 18)
Railroad Crossbuck	R15-1	600 x 112 (24 x 4.5)	1200 x 225 (48 x 9)
Turn and Curve Warning	W1-1,2,3,4,5	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Arrow Warning	W1-6,7	600 x 300 (24 x 12)	900 x 450 (36 x 18)
Intersection Warning	W2-1,2,3,4,5	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Stop,Yield,Signal Ahead	W3-1,2,3	450 x 450 (18 x 18)	750 x 750 (30 x 30)
Narrow Bridge	W5-2	450 x 450 (18 x 18)	750 x 750 (30 x 30)
Bikeway Narrows	W5-4a	450 x 450 (18 x 18)	750 x 750 (30 x 30)

Table 9B-1. Minimum Sign Sizes for Bicycle Facilities (Sheet 2 of 2)

Sign	MUTCD Code	Minimum Sign Size - mm (in)	
		Shared-Use Path	Roadway
Hill	W7-5	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Bump or Dip	W8-1,2	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Bicycle Surface Condition	W8-10	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Bicycle Surface Condition Plaque	W8-10p	300 x 225 (12 x 9)	300 x 225 (12 x 9)
Advance Grade Crossing	W10-1	375 Dia. (15 Dia.)	375 Dia. (15 Dia.)
Bicycle Warning	W11-1	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Pedestrian Crossing	W11-2	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Low Clearance	W12-2	450 x 450 (18 x 18)	750 x 750 (30 x 30)
Playground	W15-1	450 x 450 (18 x 18)	600 x 600 (24 x 24)
Share the Road Plaque	W16-1	—	450 x 600 (18 x 24)
Diagonal Arrow Plaque	W16-7p	—	600 x 300 (24 x 12)
Bicycle Guide	D1-1b	600 x 150 (24 x 6)	600 x 150 (24 x 6)
Street Name	D1-1c	450 x 150 (18 x 6)	450 x 150 (18 x 6)
Bicycle Parking	D4-3	300 x 450 (12 x 18)	300 x 450 (12 x 18)
Bike Route	D11-1	600 x 450 (24 x 18)	600 x 450 (24 x 18)
Bicycle Route Sign	M1-8	300 x 450 (12 x 18)	300 x 450 (12 x 18)
Interstate Bicycle Route Sign	M1-9	450 x 600 (18 x 24)	450 x 600 (18 x 24)
Bicycle Route Supplemental Plaques	M4-11,12,13	300 x 100 (12 x 4)	300 x 100 (12 x 4)
Route Sign Supplemental Plaques	M7-1,2,3,4,5,6,7	300 x 225 (12 x 9)	300 x 225 (12 x 9)

Table 9B-1(CA). California Minimum Sign Sizes for Bicycle Facilities

Sign	California Code	Minimum Sign Size (in)	
		Shared-Use Path	Roadway
Bike Path Exclusion	R44A(CA)	---	(12 x 24)
BICYCLES MOTOR-DRIVEN CYCLES MUST EXIT	R44B(CA)	---	(30 x 36)
BICYCLES MUST EXIT	R44C(CA)	---	(30 x 30)
Bike/Push Button for Green Light	R62C(CA)	---	(5 x 7.5)
Bike Lane	R81(CA)	---	(12 x 8)
BEGIN	R81A(CA)	---	(12 x 5)
END	R81B(CA)	---	(8 x 5)
Bicycle Route Number Marker	SG45(CA)	---	(12 x 18)
Bicycle Route Name Marker	S17(CA)	---	(24 x 6)

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CHAPTER 9C. MARKINGS

Section 9C.01 Functions of Markings

Support:

Markings indicate the separation of the lanes for road users, assist the bicyclist by indicating assigned travel paths, indicate correct position for traffic control signal actuation, and provide advance information for turning and crossing maneuvers.

Section 9C.02 General Principles

Guidance:

Bikeway design guides should be used when designing markings for bicycle facilities (see Section 9A.05).

Standard:

Markings used on bikeways shall be retroreflectorized.

On State highways, markings material shall conform to Sections 84-2.02 and 84-3.02 of the Standard Specifications published by the Department of Transportation.

Guidance:

Pavement marking symbols and/or word messages should be used in bikeways where appropriate. Consideration should be given to selecting pavement marking materials that will minimize loss of traction for bicycles under wet conditions.

Standard:

The colors, width of lines, patterns of lines, and symbols used for marking bicycle facilities shall be as defined in Sections 3A.04, 3A.05, and 3B.22.

Support:

Figures 9B-7 and 9C-1 through 9C-8 show examples of the application of lines, word messages, and symbols on designated bikeways.

Option:

A dotted line may be used to define a specific path for a bicyclist crossing an intersection (see Figure 9C-1) as described in Sections 3A.05 and 3B.08.

Section 9C.03 Marking Patterns and Colors on Shared-Use Paths

Option:

Where shared-use paths are of sufficient width to designate two minimum width lanes, a solid yellow line may be used to separate the two directions of travel where passing is not permitted, and a broken yellow line may be used where passing is permitted (see Figure 9C-2).

Guidance:

Broken lines used on shared-use paths should have the usual 1-to-3 segment-to-gap ratio. A nominal 0.9 m (3 ft) segment with a 2.7 m (9 ft) gap should be used.

If conditions make it desirable to separate two directions of travel on shared-use paths at particular locations, a solid yellow line should be used to indicate no passing and no traveling to the left of the line.

Markings as shown in Figure 9C-2 should be used at the location of obstructions in the center of the path, including vertical elements intended to physically prevent unauthorized motor vehicles from entering the path.

Support:

A centerline marking is particularly beneficial in the following circumstances:

A. Where there is heavy use;
B. On curves with restricted sight distance; and,
C. Where the path is unlighted and nighttime riding is expected.

Option:

A solid white line may be used on shared-use paths to separate different types of users. The R9-7 sign (see Figure 9B-2) may be used to supplement the solid white line.

Smaller size letters and symbols may be used on shared-use paths. Where arrows are needed on shared-use paths, half-size layouts of the arrows may be used (see Section 3B.19).

Fixed objects adjacent to shared-use paths may be marked with object markers (Type 1, 2, or 3).

Standard:

All object markers shall be retroreflective.

Markers such as those described in Section 3C.01 shall also be used on shared-use paths, if needed.

Obstructions in the traveled way of a shared-use path shall be marked with retroreflectorized material or appropriate object markers.

On Type 3 markers, the alternating black and retroreflective yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction.

Section 9C.04 Markings For Bicycle Lanes

Guidance:

Longitudinal pavement markings should be used to define bicycle lanes.

Support:

Pavement markings designate that portion of the roadway for preferential use by bicyclists. Markings inform all road users of the restricted nature of the bicycle lane.

Examples of bicycle lane markings at right-turn lanes are shown in Figures 9C-1, 9C-3, and 9C-4. Examples of pavement markings for bicycle lanes on a two-way street are shown in Figure 9C-5. Pavement symbols and markings for bicycle lanes are shown in Figure 9C-6.

Standard:

If used, the bicycle lane symbol marking (see Figure 9C-6) shall be placed immediately after an intersection and at other locations as needed. The bicycle lane symbol marking shall be white. If the bicycle lane symbol marking is used in conjunction with other word or symbol messages, it shall precede them.

If the word or symbol pavement markings shown in Figure 9C-6 are used, Bicycle Lane signs (see Section 9B.04) shall also be used, but the signs need not be adjacent to every symbol to avoid overuse of the signs.

A through bicycle lane shall not be positioned to the right of a right turn only lane.

Support:

A bicyclist continuing straight through an intersection from the right of a right turn lane would be inconsistent with normal traffic behavior and would violate the expectations of right-turning motorists.

Guidance:

When the right through lane is dropped to become a right turn only lane, the bicycle lane markings should stop at least 100 feet before the beginning of the right turn lane. Through bicycle lane markings should resume to the left of the right turn only lane.

An optional through-right turn lane next to a right turn only lane should not be used where there is a through bicycle lane. If a capacity analysis indicates the need for an optional through-right turn lane, the bicycle lane should be discontinued at the intersection approach.

Posts or raised pavement markers should not be used to separate bicycle lanes from adjacent travel lanes.

Support:

Using raised devises creates a collision potential for bicyclists by placing fixed objects immediately adjacent to the travel path of the bicyclist. In addition, raised devices can prevent vehicles turning right from merging with the bicycle lane, which is the preferred method for making the right turn. Raised devices used to define a bicycle lane can also cause problems in cleaning and maintaining the bicycle lane.

Standard:

Bicycle lanes shall not be provided on the circular roadway of a roundabout intersection.

Support:

Class III Bikeways (Bike Route) are shared routes and do not require pavement markings. In some instances, a 100 mm (4 in) white edge stripe separating the traffic lanes from the shoulder can be helpful in providing for safer shared use. This practice is particularly applicable on rural highways and on major arterials in urban areas where there is no vehicle parking.

Option:

The Bike Lane Intersection (Detail 39A) line as shown in Figure 9C-101(CA) may be used to extend the bike lane to or through an intersection.

Bicycle Lane Markings on Class II Bikeways (Bike Lane)

Guidance:

Bicycle lane markings on Class II Bikeways (Bike Lane) should be placed a constant distance from the outside motor vehicle lane. Bike lanes with parking permitted (3.3 m (11 ft) to 3.9 m (13 ft) between the bike lane line and the curb) should not be directed toward the curb at intersections or localized areas where parking is prohibited. Such a practice prevents bicyclists from following a straight course. Where transitions from one type of bike lane to another are necessary, smooth tapers should be provided.

Support:

Class II Bikeways (Bike Lane) require standard signing and pavement markings as shown in Figure 9C-102(CA). This figure also depicts the proper method of striping bike lanes through intersections. Bike lane lines are not typically extended through intersections.

Guidance:

Where motor vehicle right turns are not permitted, the solid bike lane stripe should extend to the edge of the intersection, and begin again on the far side. Where there is no right turn only lane and right turns are permitted, the solid stripe should terminate 30 m (100 ft) to 60 m (200 ft) prior to the intersection.

Option:

A dashed line, as shown in Figure 9C-102(CA), may be carried to, or near, the intersection. Where city blocks are short (less than 120 m (400 ft)), the length of dashed stripe may be 30 m (100 ft).

Guidance:

Where blocks are longer or vehicle speeds are high (greater than 60 km/h (35 mph)), the length of dashed stripe should be increased to 60 m (200 ft).

Standard:

Raised barriers (e.g., raised traffic bars and asphalt concrete dikes) or raised pavement markers shall not be used to delineate bike lanes on Class II Bikeways (Bike Lane).

Support:

Raised barriers prevent motorists from merging into bike lanes before making right turns, as required by the CVC, and restrict the movement of bicyclists desiring to enter or exit bike lanes.

They also impede routine maintenance. Raised pavement markers increase the difficulty for bicyclists when entering or exiting bike lanes, and discourage motorists from merging into bike lanes before making right turns.

Option:

Physical barriers may be used to convert a Class II Bikeway (Bike Lane) to Class I Bikeway (Bike Path).

Bicycle Lane Treatment at Right Turn Only Lanes

Guidance:

A dashed line across the right-turn-only lane should not be used on extremely long lanes, or where there are double right-turn-only lanes. For these types of intersections, all striping should be dropped to permit judgment by the bicyclists to prevail.

Option:

A Bicycle Crossing (W11-1) sign may be used to warn motorists of the potential for bicyclists crossing their path. See Section 9B.17.

When a bike lane approaches a ramp intersection that intersects the local facility at or close to 90° (typical of a compact or spread diamond configuration), then Figures 9C-3, 9C-3(CA) and 9C-4 may be the appropriate method of getting bike lanes through the interchange.

Guidance:

However, when a bike lane approaches one or more ramp intersections that intersect the local facility at various angles other than 90° (typically high-speed, skewed ramps), Figure 9C-103(CA) should be used.

Bicycle Lane Treatment through Interchanges

Support:

Markings for a bike lane through a typical interchange are shown in Figure 9C-103(CA).

Guidance:
The 150 mm (6 in) bike lane stripe should be dropped 30 m (100 ft) prior to the ramp intersection as shown in Figure 9C-103(CA) to allow for adequate weaving distance.
Option:
Figure 9C-103(CA) may also be used where the preferred designation is a Class III Bikeway (Bike Route), with the Bike Lane (R81(CA)) signs being replaced with Bike Route (D11-1) signs and the bike lane delineation eliminated. A 100 mm (4 in) stripe may be used to delineate the shoulder through out the bike route designation.
Standard:
Signing and striping as shown in Figure 9C-103(CA) shall be repeated at additional onramps within the interchange.
Guidance:
Where the onramps intersect at the local road at or near 90º, the striping should be per Figure 9C-3(CA).
Standard:
The shoulder width shall not be reduced through the interchange area. The minimum shoulder width shall match the approach roadway shoulder width, but not less than 1.2 m (4 ft), or 1.5 m (5 ft) if a gutter exists. If the shoulder width is not available, the designated bike lane shall end at the previous local road intersection.

Bicycle Lane Treatment Where Vehicle Parking is Prohibited/Permitted

Support:
Markings for a bike lane where vehicle parking is prohibited or permitted are shown in Figure 9C-102(CA).
Standard:
Where motorist right turns are permitted, the solid bike lane shall either be dropped entirely, or dashed (Refer Bike Intersection lane, Detail 39A, shown in Figure 9C-101(CA)) beginning at a point between 30 m (100 ft) and 60 m (200 ft) in advance of the intersection.
Option:
In areas where parking stalls are not necessary (because parking is light), a 100 mm (4 in) solid white stripe may be painted to fully delineate the bike lane. This may be advisable where there is concern that motorists may misconstrue the bike lane to be a traffic lane.

BIKE LANE Pavement Markings

Standard:
The BIKE LANE pavement markings shall be placed on the far side of each intersection.
Option:
The BIKE LANE pavement markings may also be placed at other locations as desired.
Support:
Examples of BIKE LANE pavement markings are shown in various figures in this chapter.
Option:
Optional word, arrow and symbol markings with details as shown in Figure 9C-6(CA) may be used.

Section 9C.05 Bicycle Detector Symbol

Option:
A symbol (see Figure ~~9C-7~~ 9C-7(CA)) may be placed on the pavement indicating the optimum position for a bicyclist to actuate the signal.
An R10-22 sign (see Section 9B.12 and Figure 9B-2) may be installed to supplement the pavement marking.
Support:
Section 4D.105(CA) and Figure 4D-111(CA) contain information on bicycle detectors and their locations.

Section 9C.06 Pavement Markings for Obstructions

Guidance:
In roadway situations where it is not practical to eliminate a drain grate or other roadway obstruction that is inappropriate for bicycle travel, white markings applied as shown in Figure 9C-8 should be used.

Section 9C.101(CA) Barrier Posts on Class I Bikeways

Support:

Before a decision is made to install barrier posts, consideration needs to be given to the implementation of other remedial measures, such as Bike Path Exclusion (R44A(CA)) signs (see Section 9B.07) and/or redesigning the path entry so that motorists do not confuse it with vehicle access.

It could be necessary to install barrier posts at entrances to bike paths to prevent motor vehicles from entering. When locating such installations, care needs to be taken to assure that barriers are well marked and visible to bicyclists, day or night (i.e., install reflectors or reflectorized tape).

Guidance:

An envelope around the barriers should be striped as shown in Figure 9C-2. If sight distance is limited, special advance warning signs or painted pavement warnings should be provided. Where more than one post is necessary, 1.5 m (5 ft) spacing should be used to permit passage of bicycle-towed trailers, adult tricycles, and to assure adequate room for safe bicycle passage without dismounting. Barrier post installations should be designed so they are removable to permit entrance by emergency and service vehicles.

Support:

Generally, barrier configurations that preclude entry by motorcycles present safety and convenience problems for bicyclists.

Guidance:

Such devices should be used only where extreme problems are encountered.

Section 9C.102(CA) Rumble Strips

Support:

Shoulder rumble strips are not suitable as a riding surface for bicycles. Refer to Section 3B.106(CA) for more information on rumble strips and bicyclists.

Section 9C.103(CA) Shared Roadway Bicycle Marking

Option:

The shared roadway bicycle marking shown in Figure 9C-104(CA) may be used to assist bicyclists with positioning on a shared roadway with on-street parallel parking and to alert road users of the location a bicyclist may occupy within the traveled way.

Standard:

The shared roadway bicycle marking shall only be used on a roadway (Class III Bikeway (Bike Route) or Shared Roadway (No Bikeway Designation) which has on-street parallel parking. If used, shared roadway bicycle markings shall be placed so that the centers of the markings are a minimum of 3.3 m (11 ft) from the curb face or edge of paved shoulder. On State highways, the shared roadway bicycle marking shall be used only in urban areas.

Option:

For rural areas, the SHARE THE ROAD (W16-1) plaque may be used in conjunction with the Bicycle Warning (W11-1) sign (see Sections 2C.51 and 9B.18).

Support:

Information regarding classification of rural versus urban roadways can be found at the California Department of Transportation website: http://www.dot.ca.gov/hq/tsip/hpms/Page1.php

Guidance:

If used, the shared roadway bicycle marking should be placed immediately after an intersection and spaced at intervals of 75 m (250 ft) thereafter.

If used, the shared roadway bicycle marking should not be placed on roadways with a speed limit at or above 60 km/h (40 mph).

Option:

Where a shared roadway bicycle marking is used, the distance from the curb or edge of paved shoulder may be increased beyond 3.3 m (11 ft). The longitudinal spacing of the markings may be increased or reduced as needed for roadway and traffic conditions. Where used, bicycle guide or warning signs may supplement the shared roadway bicycle marking.

Support:

The shared roadway bicycle marking is intended to:

- Reduce the chance of bicyclists impacting open doors of parked vehicles on a shared roadway with on-street parallel parking.
- Alert road users within a narrow traveled way of the lateral location where bicyclists ride.
- Be used only on roadways without marked bicycle lanes or shoulders.

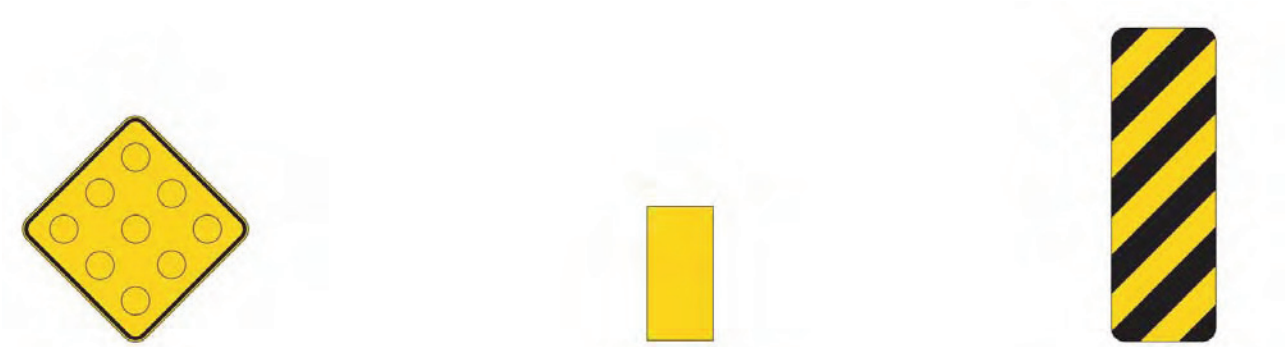

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Figure 9C-1. Example of Intersection Pavement Markings—Designated Bicycle Lane with Left-Turn Area, Heavy Turn Volumes, Parking, One-Way Traffic, or Divided Highway

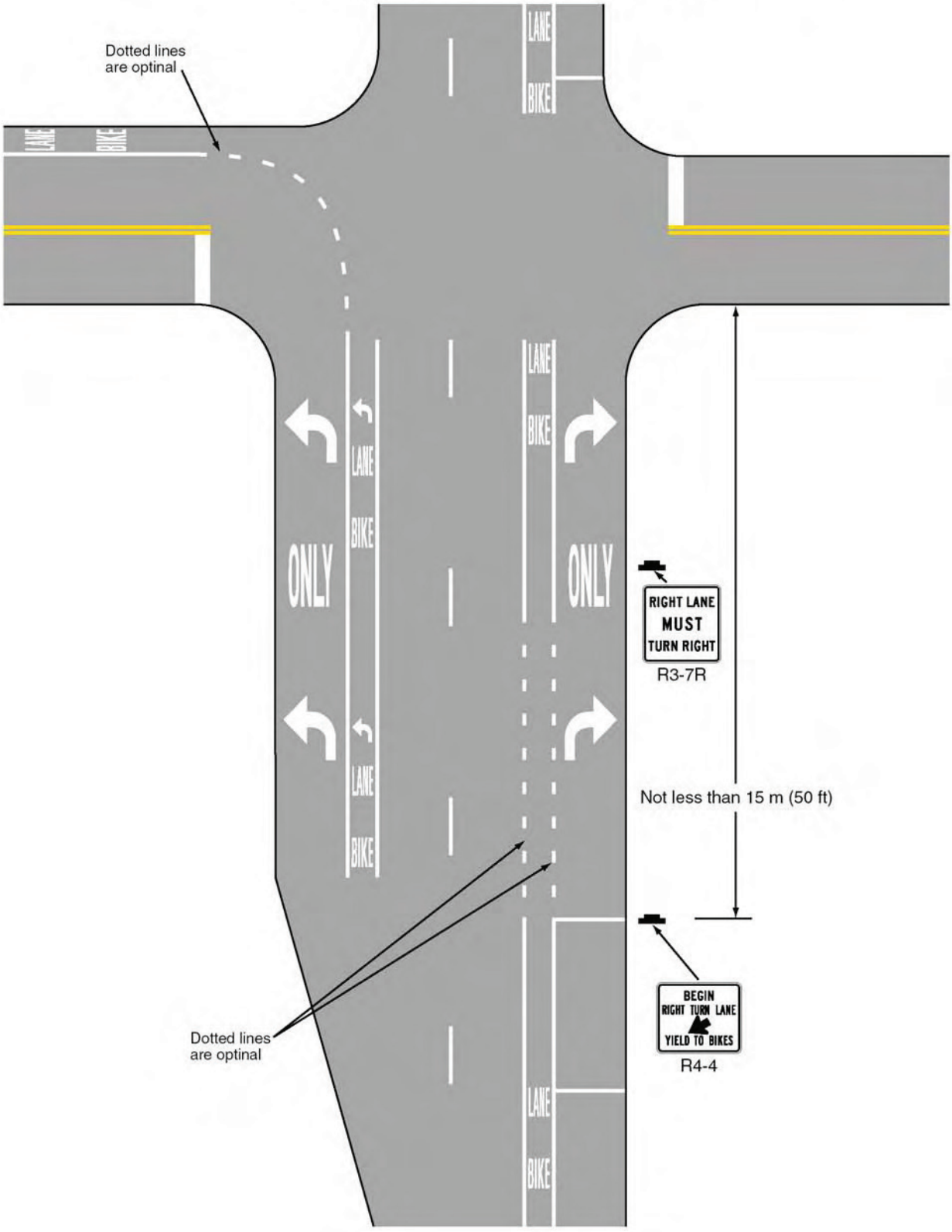

Figure 9C-2. Examples of Centerline Markings for Shared-Use Paths

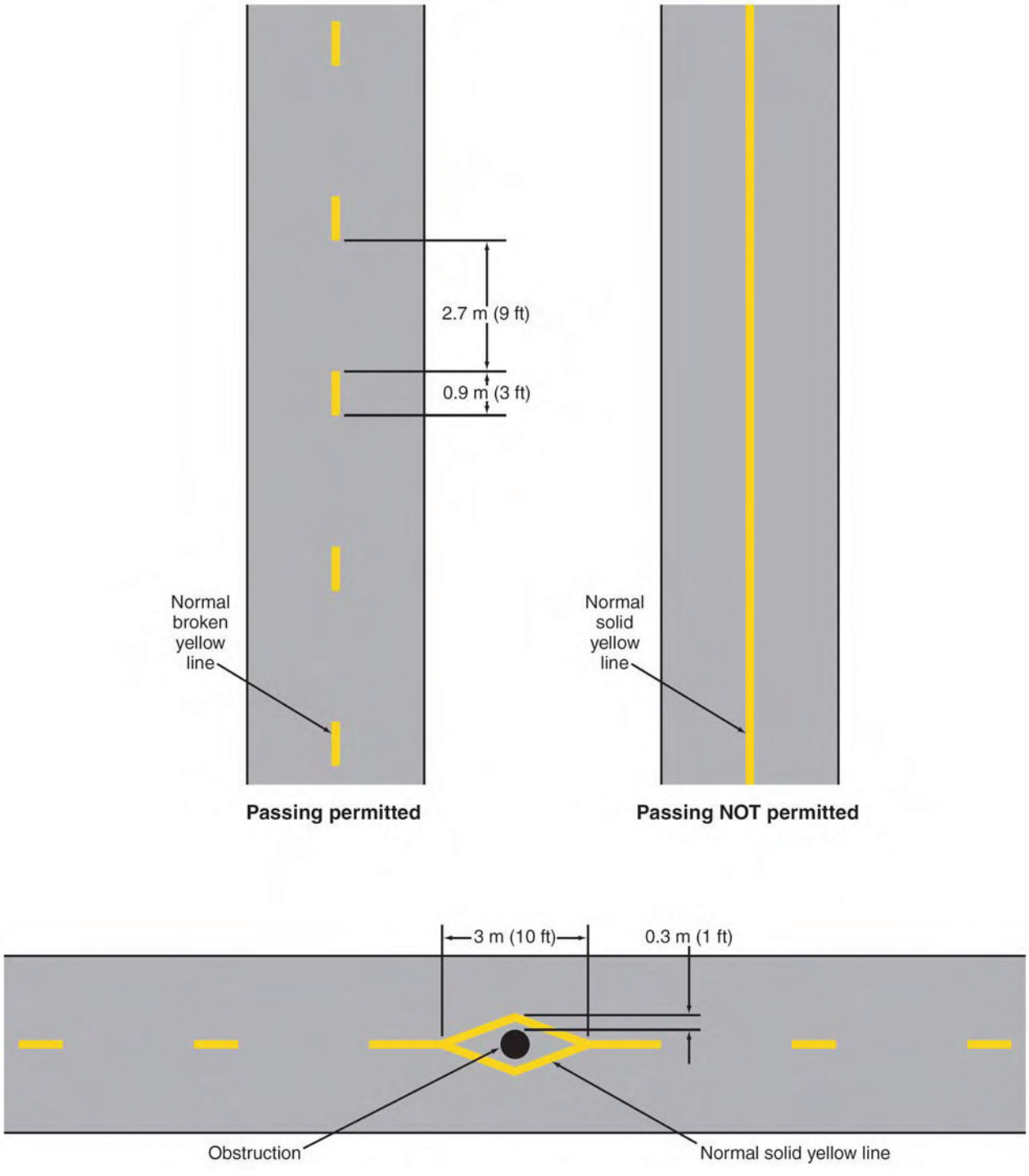

Figure 9C-3. Example of Bicycle Lane Treatment at a Right Turn Only Lane

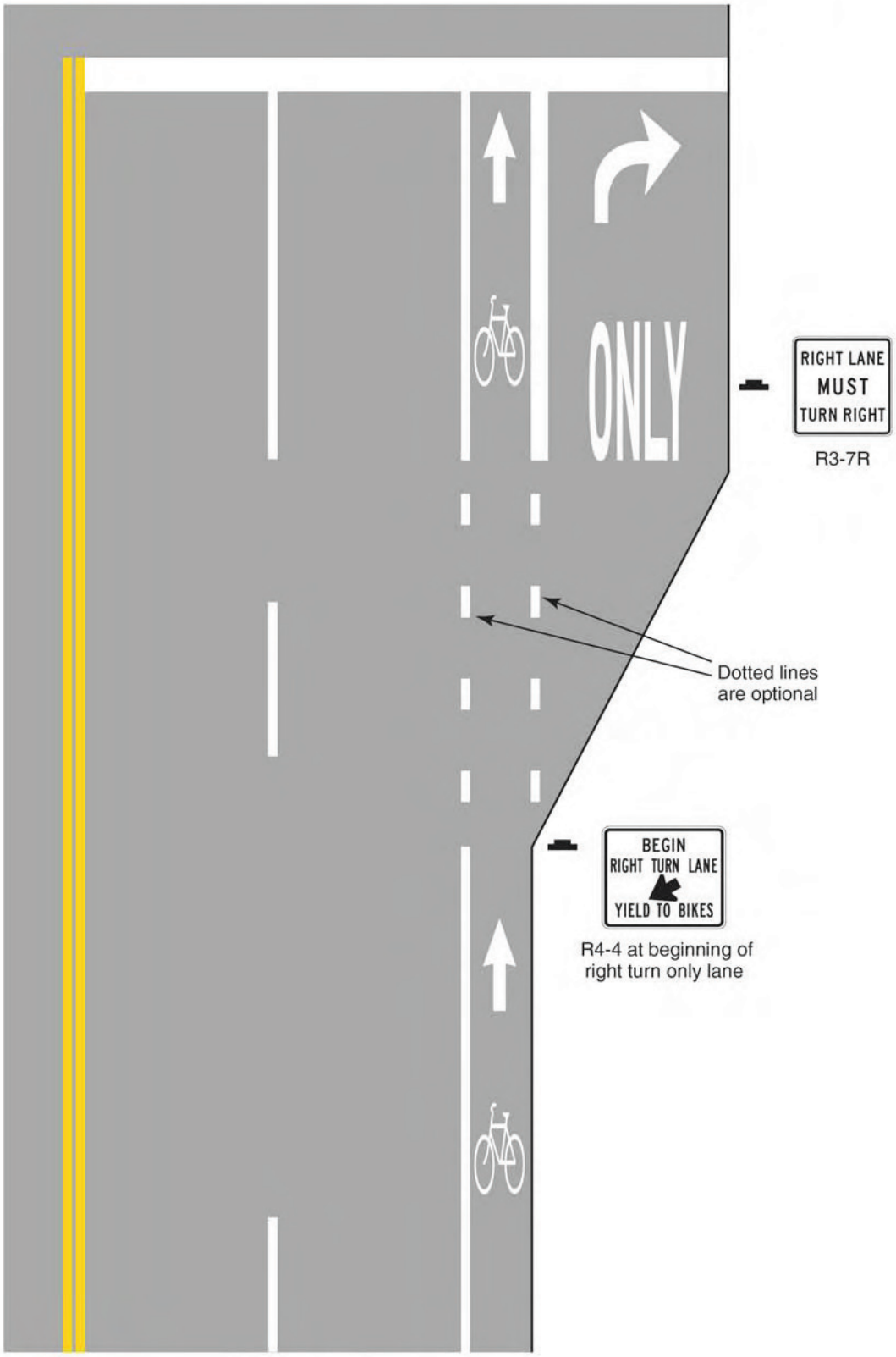

Figure 9C-3 (CA). Examples of Bicycle Lane Treatments at Right Turn Only Lanes

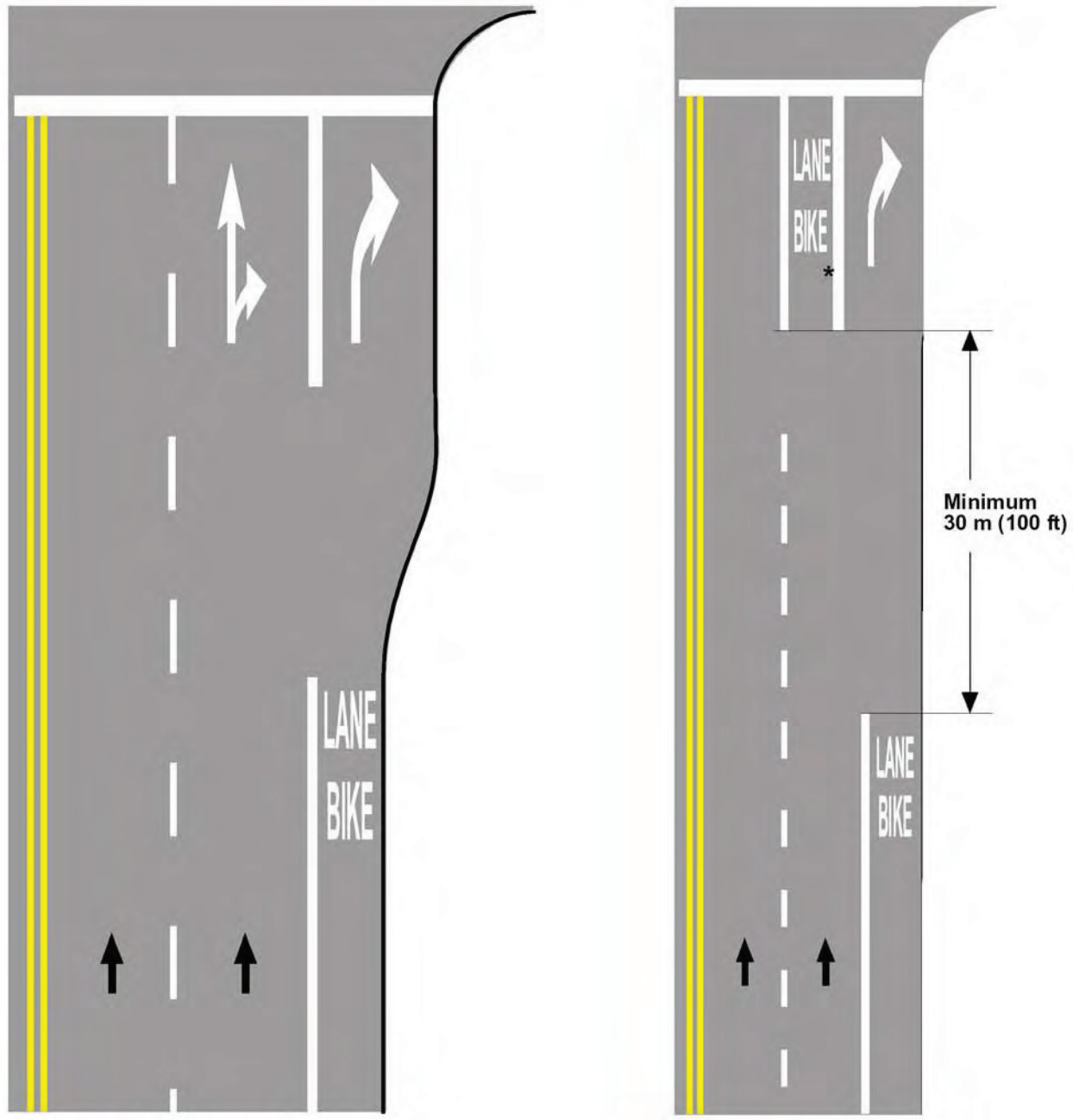

Figure 9C-4. Example of Bicycle Lane Treatment at Parking Lane into a Right Turn Only Lane

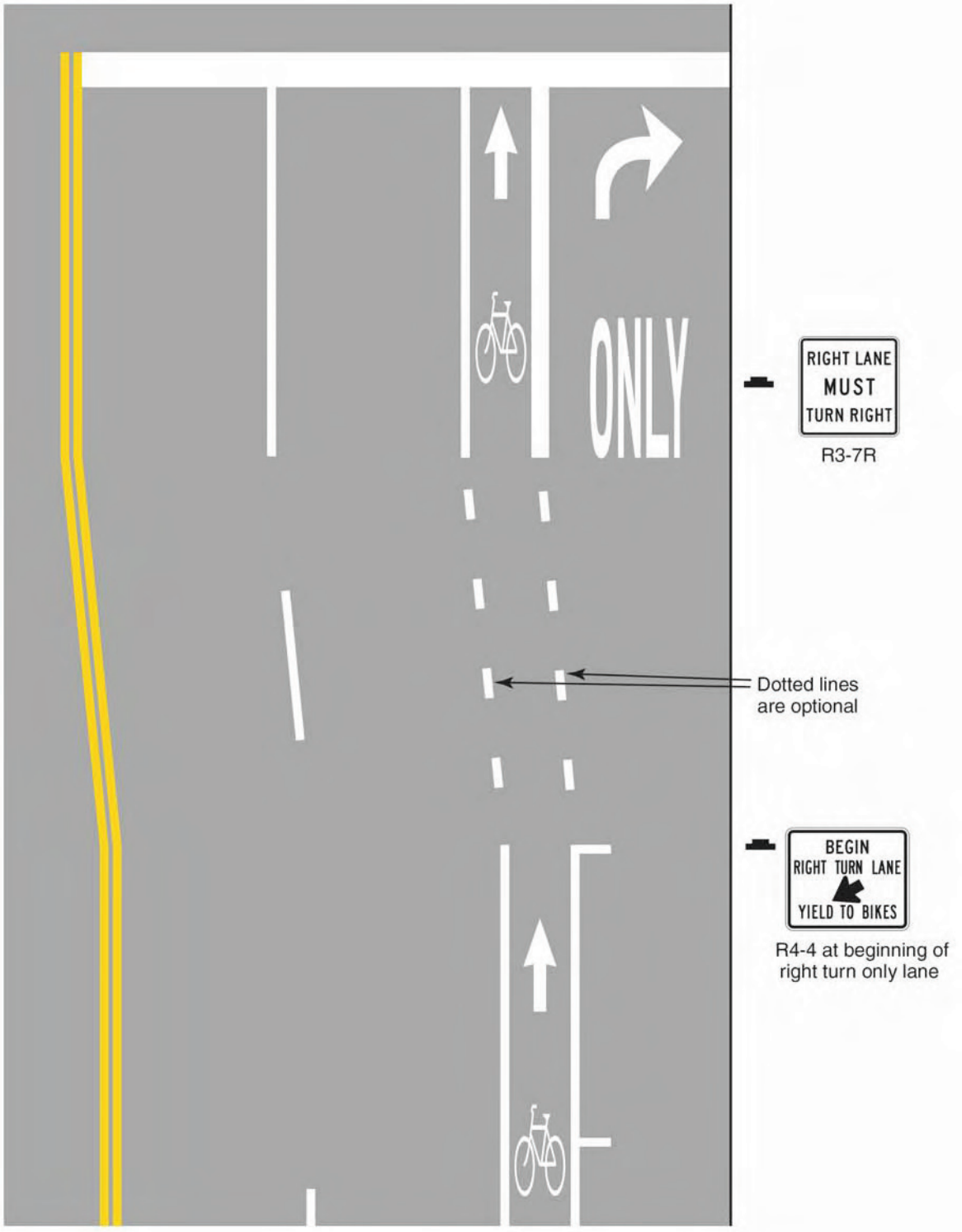

Figure 9C-5. Example of Pavement Markings for Bicycle Lanes on a Two-Way Street

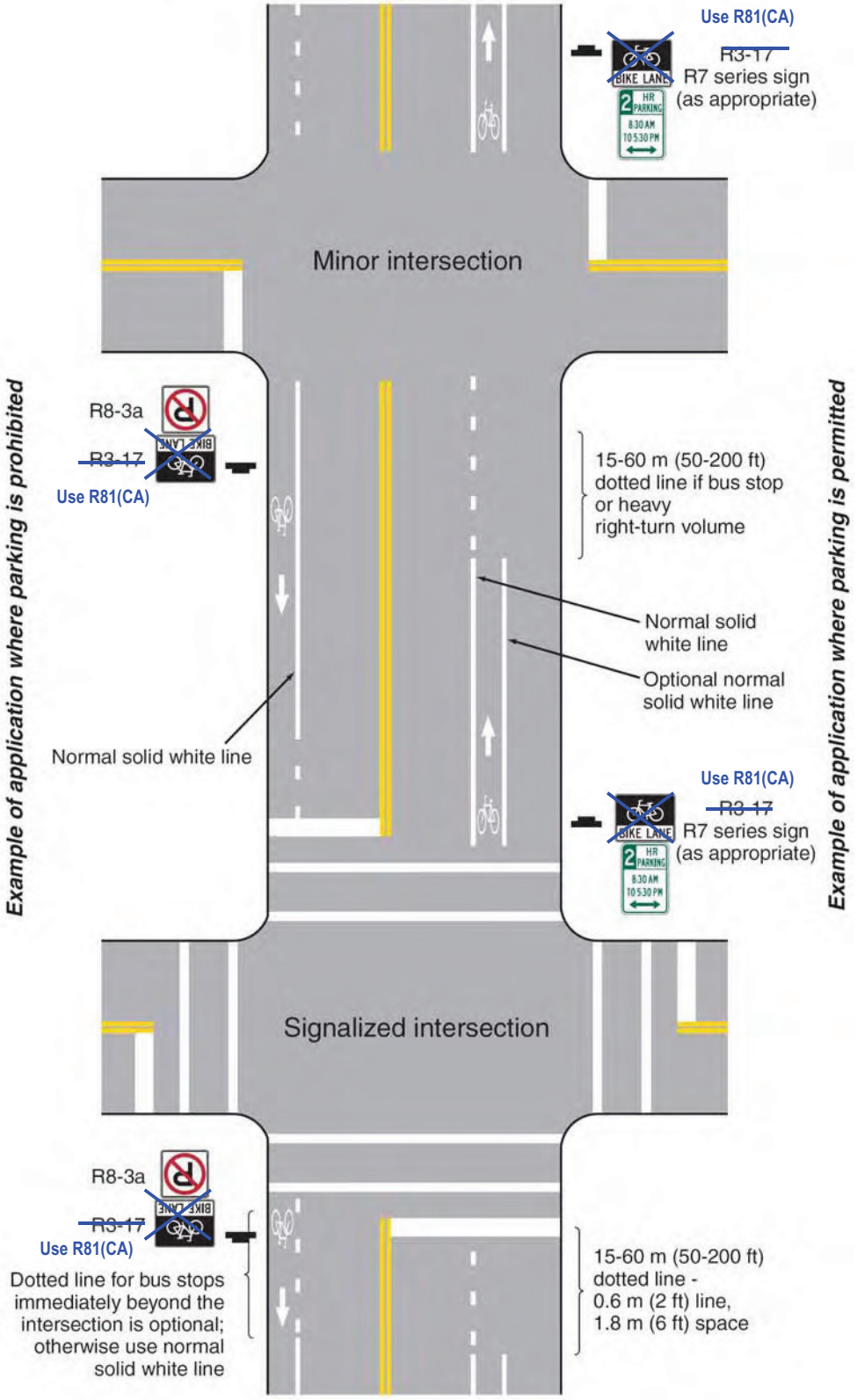

Figure 9C-6. Example of Optional Word and Symbol Pavement Markings for Bicycle Lanes

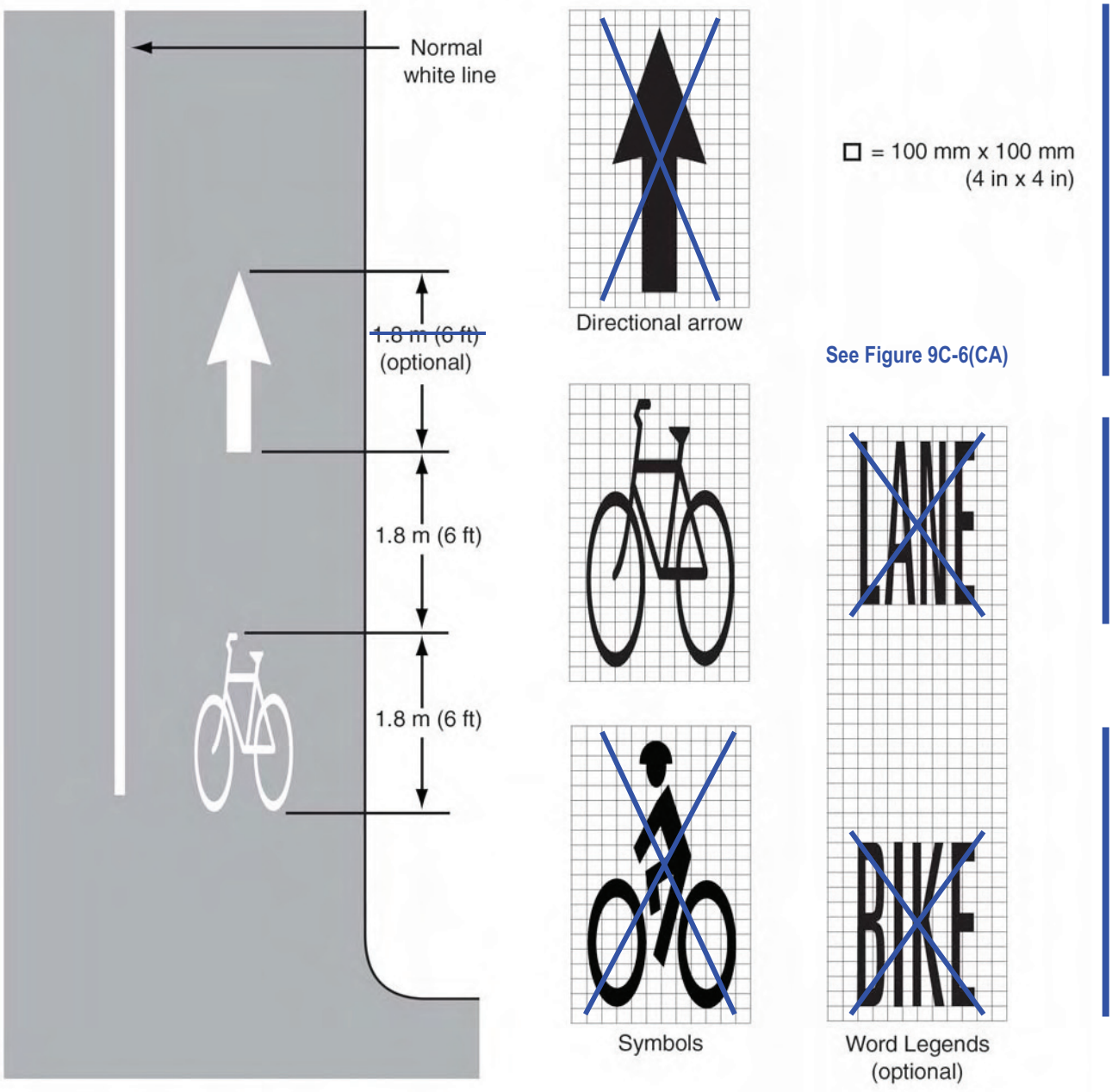

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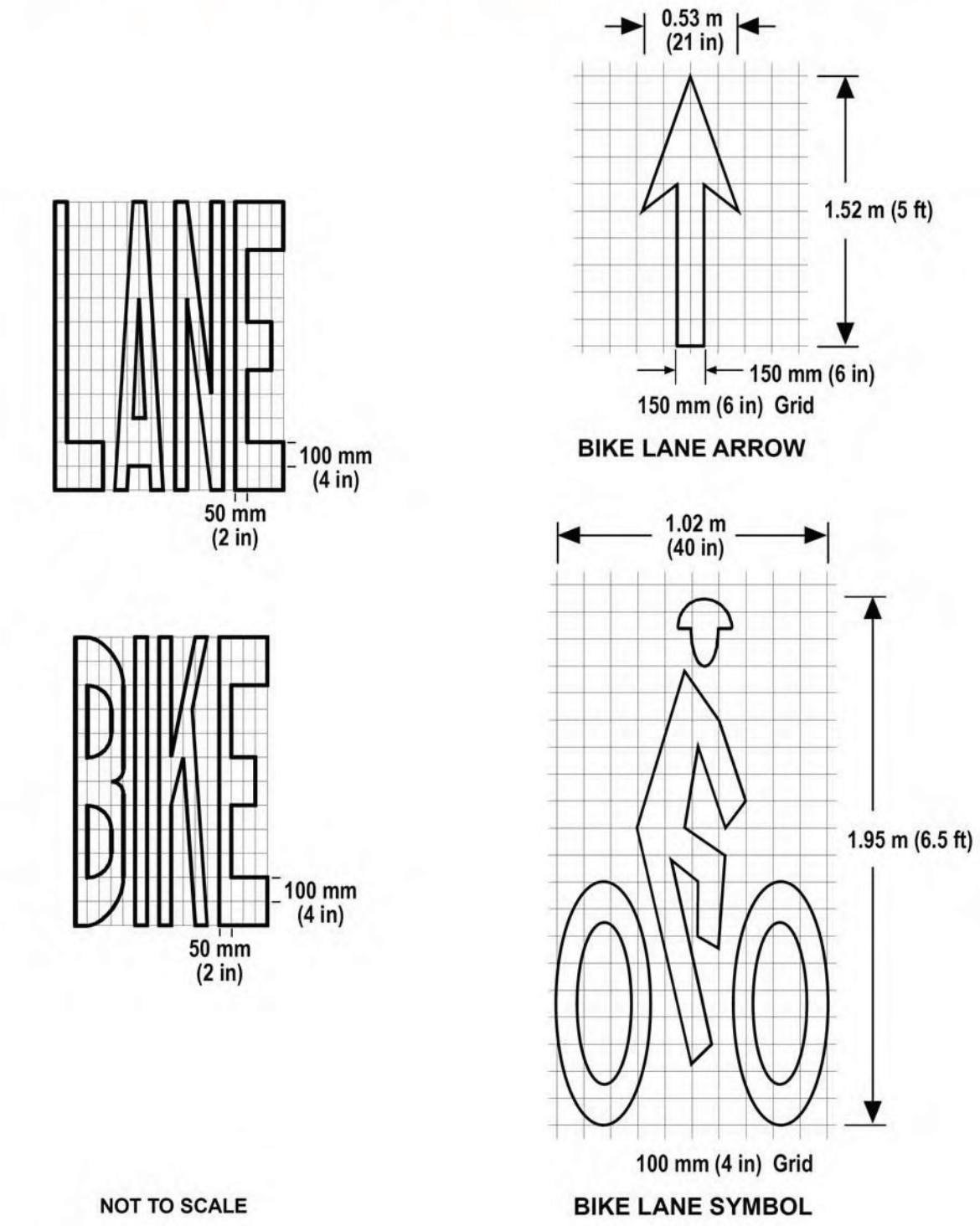
Figure 9C-6 (CA). Example of Optional Word and Symbol Pavement Markings for Bicycle Lanes



NOTE: The design details for various arrows and symbols are also shown in the Standard Plans published by the Department of Transportation.

Figure 9C-7. Example of Bicycle Detector Pavement Marking

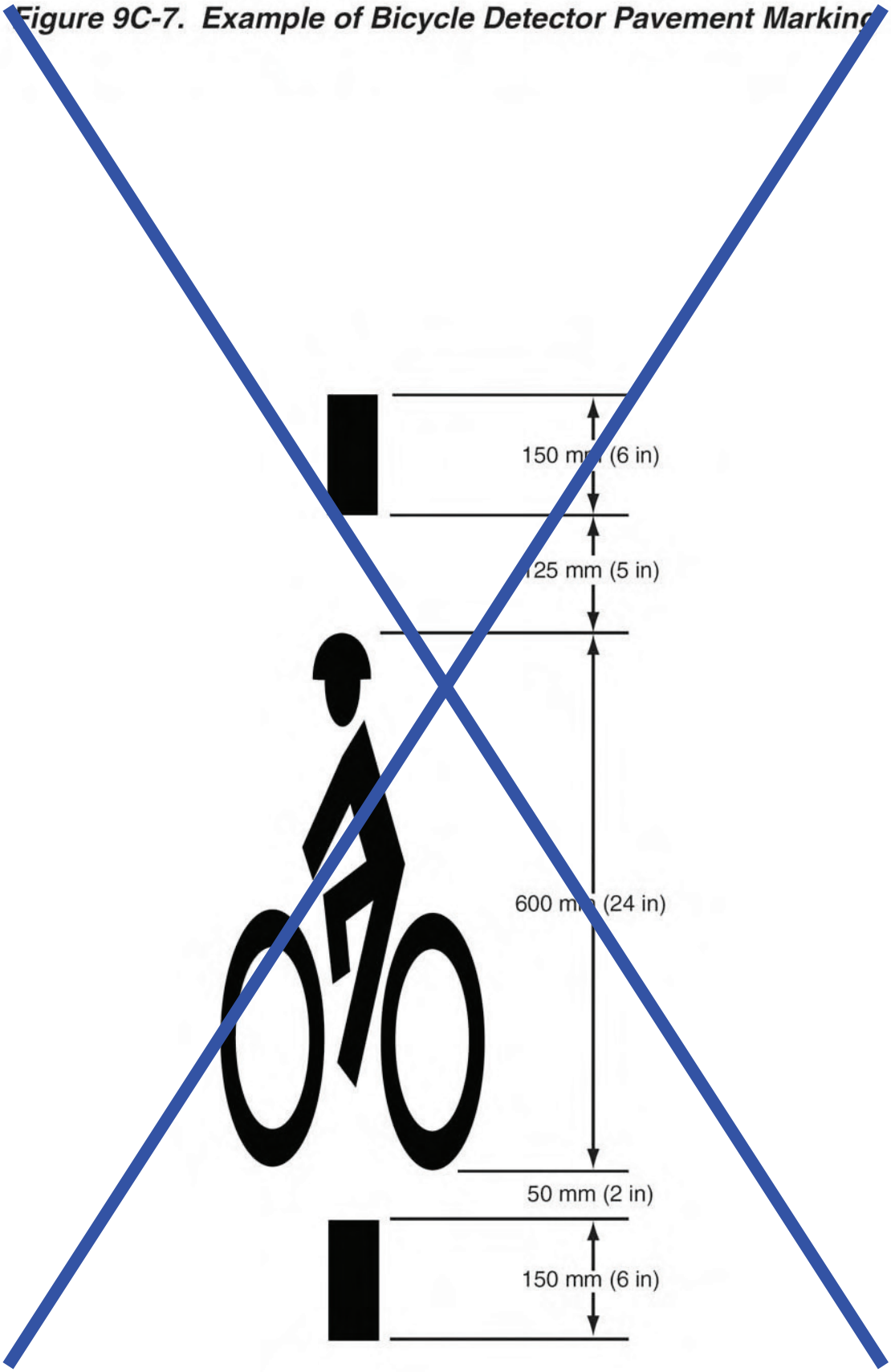
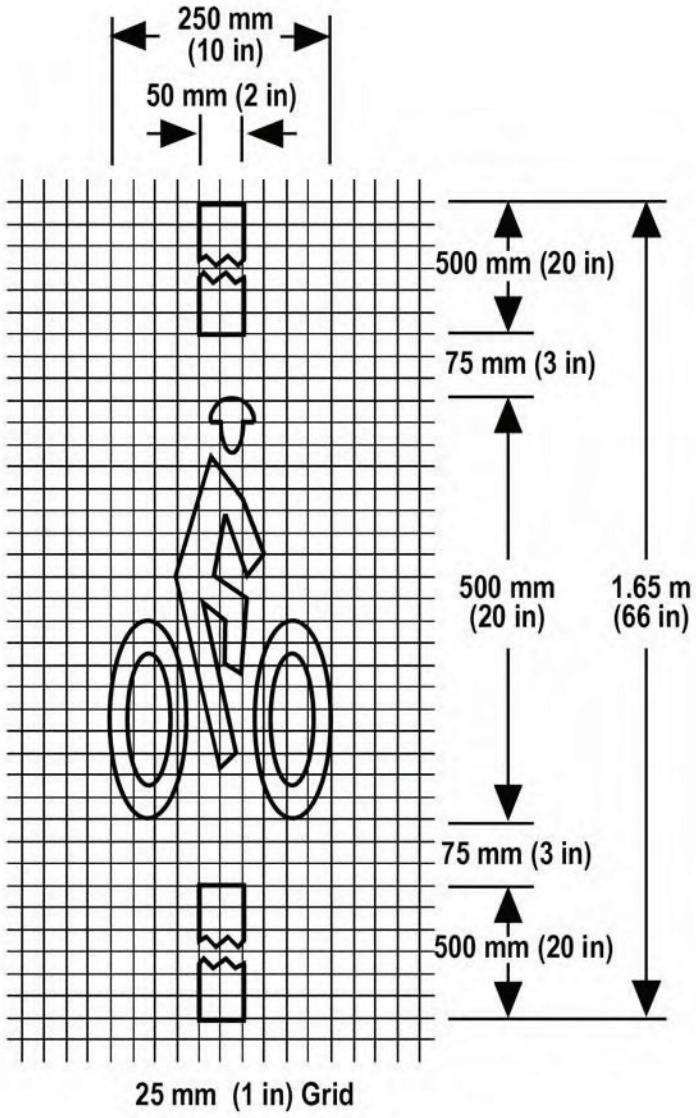


Figure 9C-7 (CA). Example of Bicycle Detector Pavement Marking

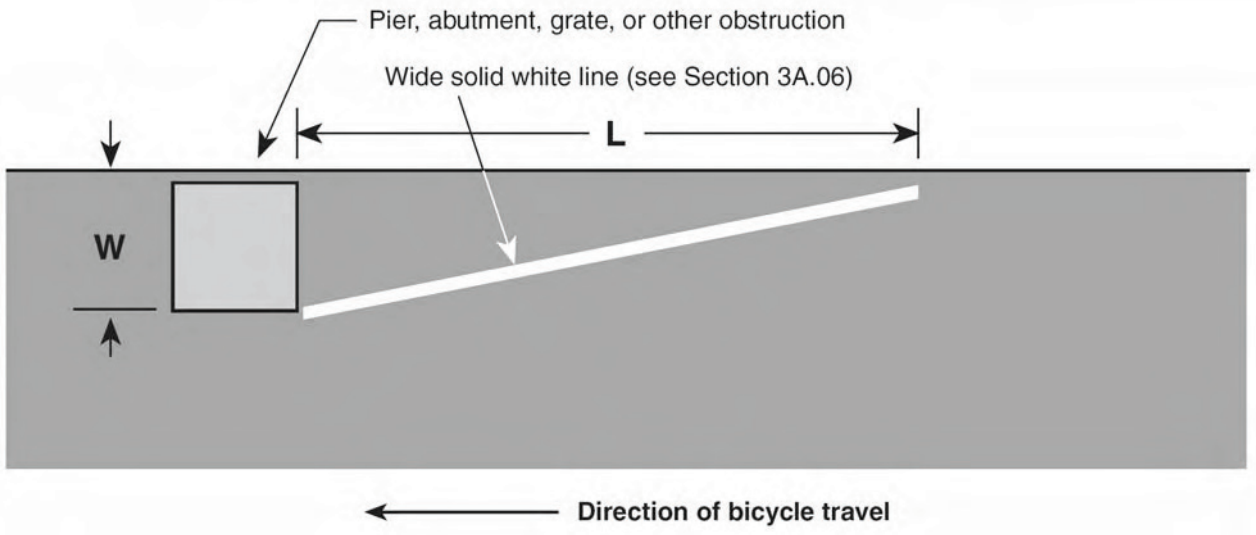


BICYCLE
DETECTOR SYMBOL

NOT TO SCALE

NOTE: The design details for various arrows and symbols are also shown in the Standard Plans published by the Department of Transportation.

Figure 9C-8. Example of Obstruction Pavement Marking



For metric units:
L = 0.6 WS , where S is bicycle approach speed in kilometers per hour

For English units:
L = WS , where S is bicycle approach speed in miles per hour

Figure 9C-101 (CA). Marking Details for Bicycle Lanes

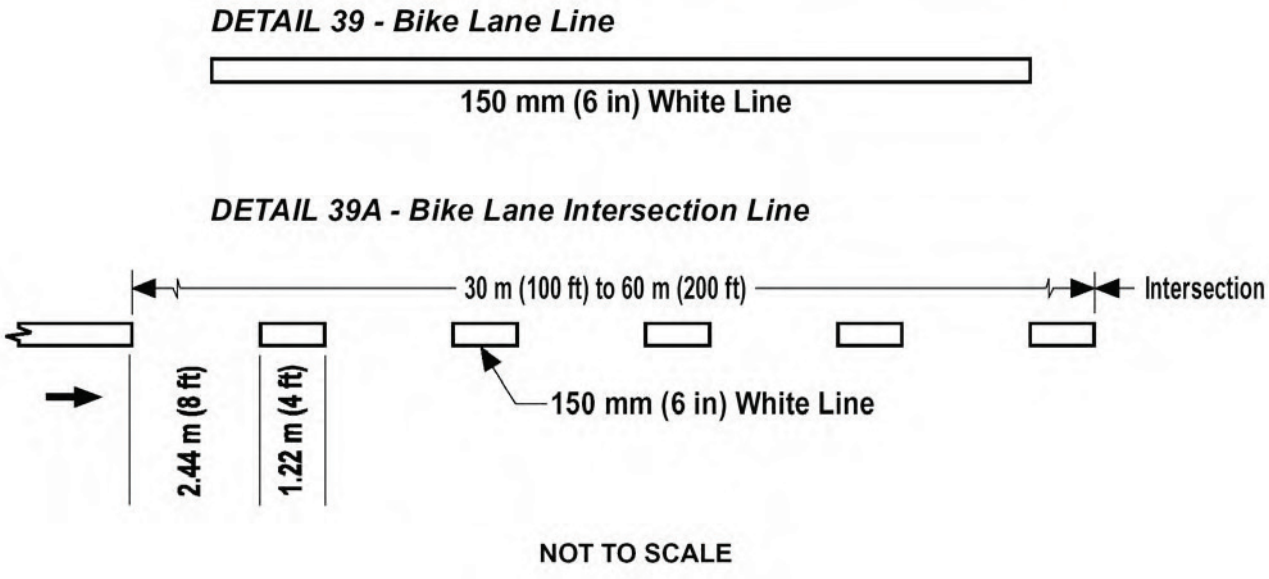


Figure 9C-102 (CA). Examples of Bicycle Lane Treatment Where Vehicle Parking is Prohibited/Permitted

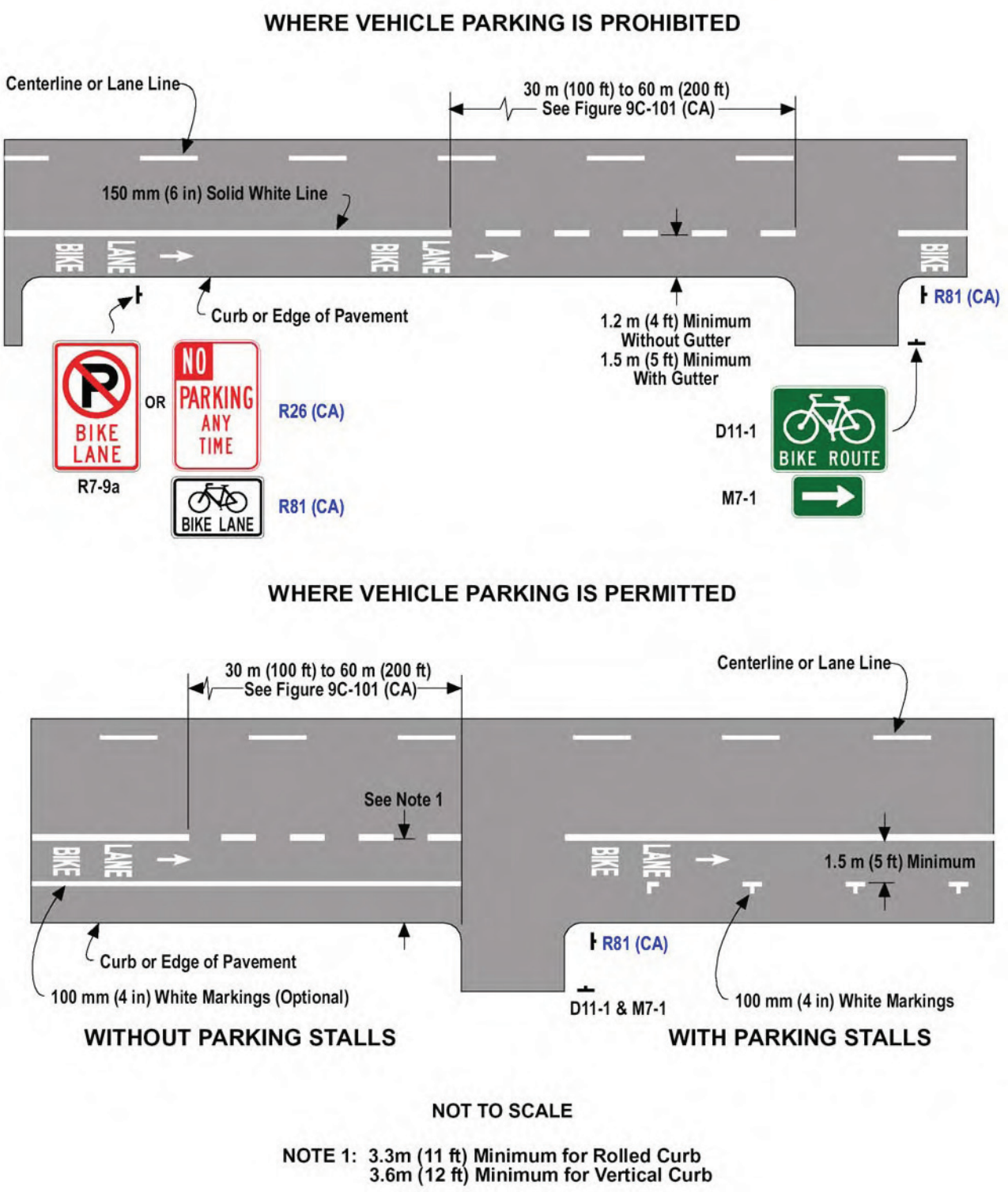


Figure 9C-103 (CA). Example of Bicycle Lane Treatment Through an Interchange

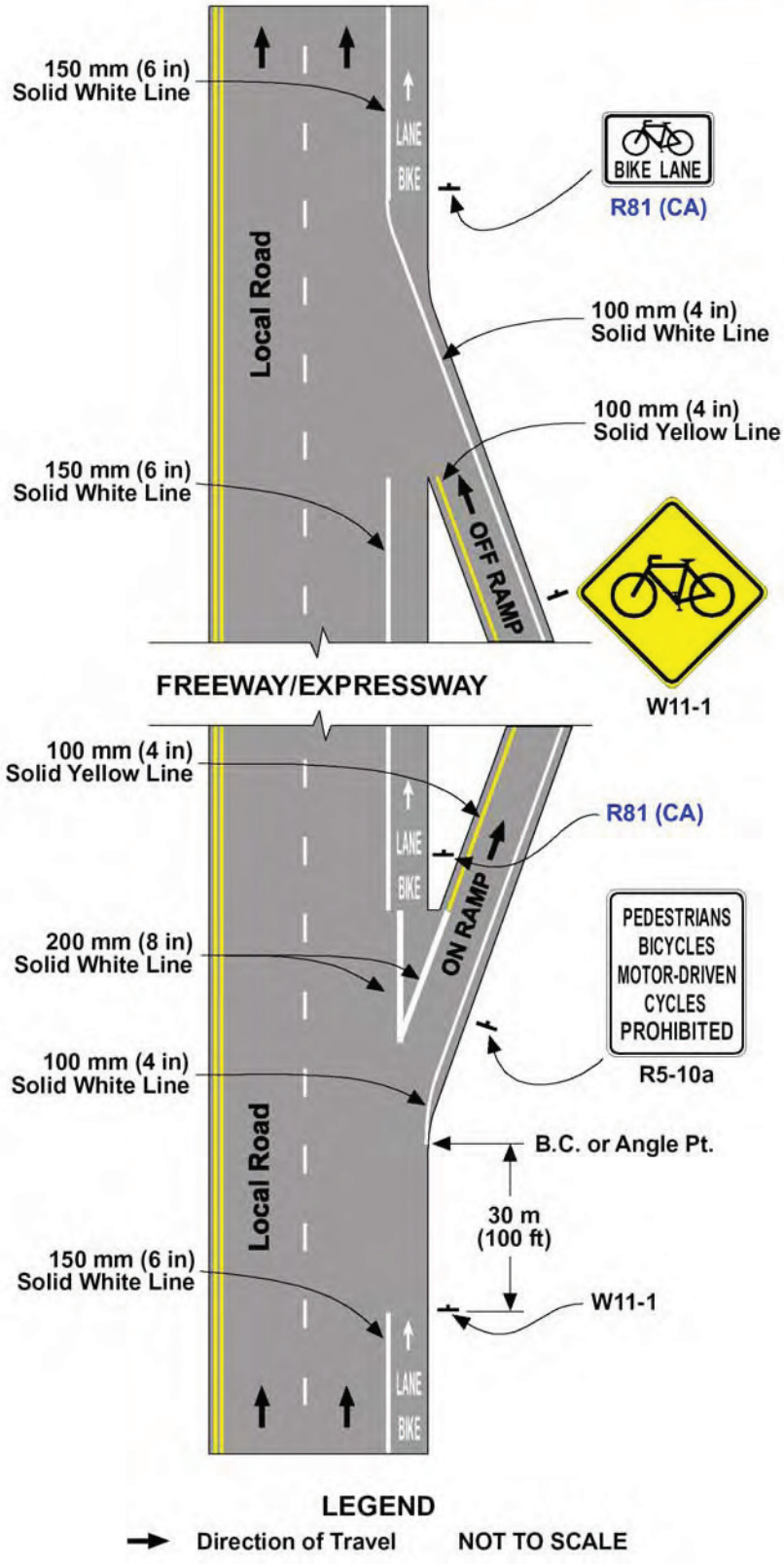
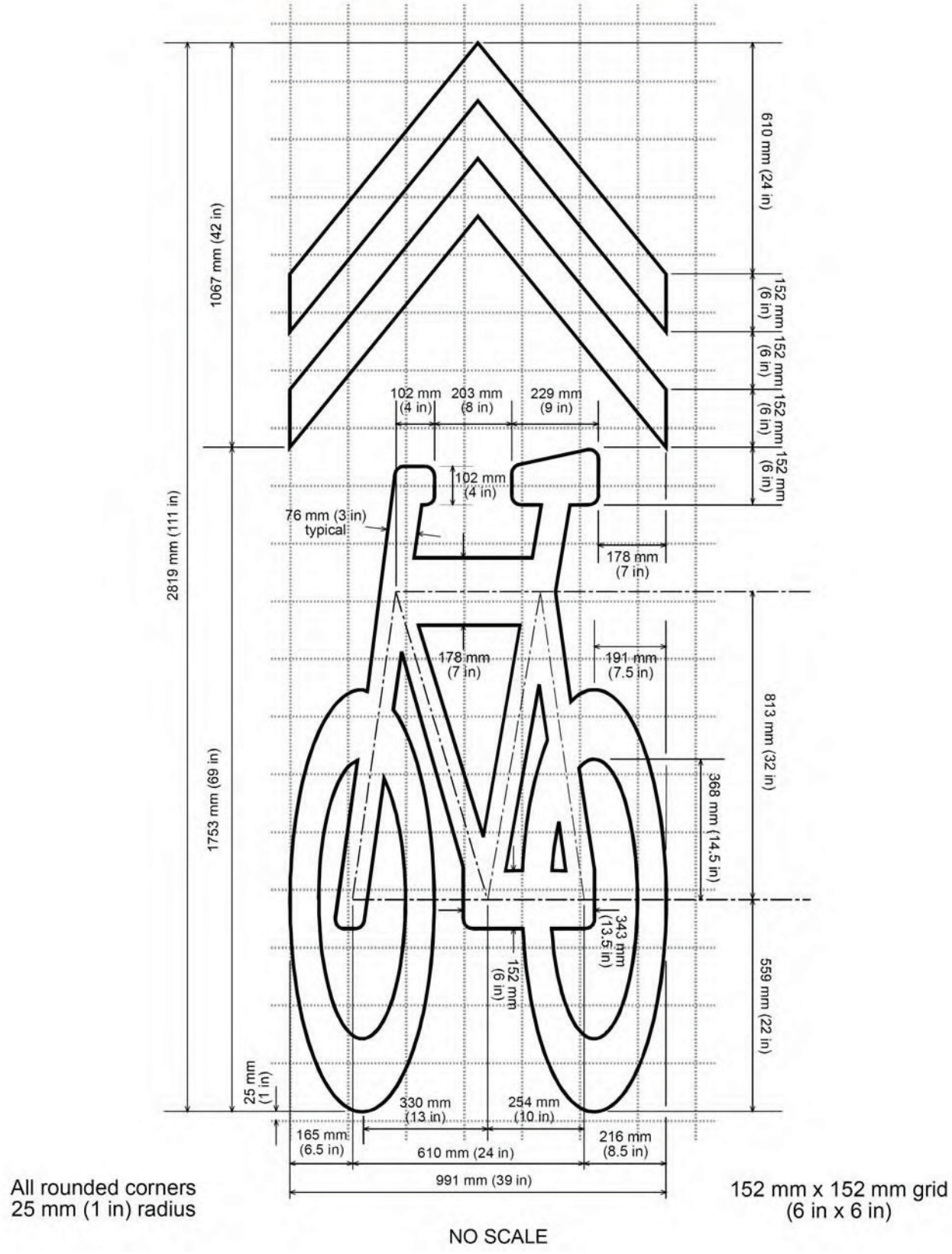


Figure 9C-104 (CA). Shared Roadway Bicycle Marking



CHAPTER 9D. SIGNALS

Section 9D.01 Application

Support:

Part 4 contains information regarding signal warrants and other requirements relating to signal installations.

Option:

For purposes of signal warrant evaluation, bicyclists may be counted as either vehicles or pedestrians.

Support:

Also refer Part 4 of this Manual for highway traffic signals, in particular:

- Section 4C.102(CA) – Bicycle signal warrants.
- Section 4D.104(CA) – Bicycle Signals.
- Section 4D.105(CA) – Bicycle Detectors.

Section 9D.02 Signal Operations for Bicycles

Standard:

At installations where visibility-limited signal faces are used, signal faces shall be adjusted so bicyclists for whom the indications are intended can see the signal indications. If the visibility-limited signal faces cannot be aimed to serve the bicyclist, then separate signal faces shall be provided for the bicyclist.

On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists.

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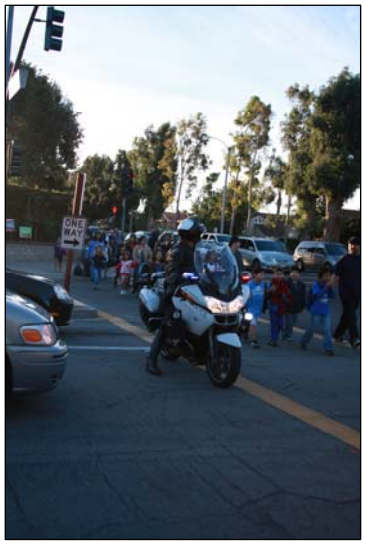
Chapter 9 – Bicycle Safety and Education Programs

Bicycle safety enforcement and education are critical components in the promotion of bicycling and the safety of Irvine's bikeway network users. According to the National Highway Traffic Safety Administration's annual statistics analysis, bicyclists accounted for 2 percent of all traffic fatalities during 2009. In addition, approximately 17 percent of bicyclists who were injured were age 14 and younger.

Accident reduction efforts should include educational programs to increase awareness of improper driver actions as well as to educate the bicycling community on proper bicycle operation, especially among children. The City has experienced an increase in the number of bicyclists due to the growth in development, and an expanded bikeway network.

9.1 City of Irvine Bicycle Related Collisions

As Irvine continues to grow, the increase in both motor vehicles and bicycles on arterial highways will also increase the potential for bicycle related collisions throughout the City. Figure 9-1, *Bicycle Related Collisions*, illustrates the locations of bicycle related collisions within the City reported to the Irvine Public Safety Department within the last six years (July 15, 2005 to August 30, 2011), 309 reported collisions involving bicyclists. These collisions involved 283 reported injuries (including injuries to both motor vehicle and bicycle users) and three fatalities.



As Figure 9-1 shows, collisions are concentrated along the City's busiest arterials, specifically Alton Parkway, Barranca Parkway, Campus Drive, Culver Drive, University Drive, Yale Avenue, and Yale Loops. Figure 9-1 also shows a correlation between bicycle-related collisions and proximity

to specific land uses, including retail uses, residential areas, and schools. Eight City intersections have had more than three bicycle related accidents in the past six years. Intersections along Culver Drive, Barranca Parkway, Jeffrey Road, and University Drive have incurred multiple, or more than four reported collisions.

A review of the City's Public Safety Department collision data shows that bicycle collisions typically involve improper actions on the part of bicyclists, motorists, or both. Many of the collisions shown in Figure 9-1 include right-of-way violations on the part of motorists or bicyclists riding on the wrong side of the road. Education programs for both bicyclists and motorists may aid in the prevention of many of these types of accidents.

9.2 Bicycle Education Programs

The City of Irvine has taken a diverse approach to providing bicycle education programs for City residents, including both adults and children, on bicycle safety and bicycle law. The following is an overview of the City's bicycle and pedestrian education programs in cooperation with the school districts, and parent teacher organizations, community leaders, and organizations.

Neighborhood Traffic Officer Support

The City's Public Safety Traffic Officers address neighborhood traffic complaints, utilizing creative, proactive approaches. Concerns can be relayed to designated traffic officers regarding speeding vehicles, parking violators, abandoned vehicles, or other traffic related issues. These officers are selected for their strong community relations and problem solving skills and work with City departments and the community to implement long-term strategies that aim to permanently address a wide-range of traffic related issues which increase the safety of all residents.

Student Workshops / Assemblies / Rodeos

The City's Public Safety Department in conjunction with the traffic officers, DARE and Crime Prevention, provide elementary and middle schools with student workshops and assemblies. Officers emphasize ten smart routes to bicycle safety, the do's and don'ts, measures to protect against theft, and participate in riding them to school acting as a chaperone.

Elementary Schools: Workshops, assemblies and rodeos involve role playing exercises consisting of bicyclists, pedestrians and drivers to simulate "real-life" traffic conditions and hazards. The lessons are designed to accommodate the abilities and cognitive learning skills of each grade level and are relevant to the diverse school communities. As a result, students build confidence and improve decision-making ability when walking and biking.

Middle Schools: Workshops, assemblies and rodeos are conducted for middle school and high school students in physical education classes and consist of discussions on their role as part of the solution and not the problem in traffic related collisions. This will be accompanied by engaging students in traffic environment assessment and discovering the causes of traffic related collisions by examining bicycle and pedestrian crashes. Safety education will emphasize how walking and bicycle is a valid exercise program. Workshops and assemblies include education covering the same topics, as described above in the elementary program; however, will be more in-depth and focused toward the middle school and high school age level. Rodeos involve bicycle skills courses as an interactive exercise that allows students to learn the bicycling skills by bicycling through the mock city.

Community and Parent Workshops

Community and parent workshops are provided by the City's Public Safety and Neighborhood Traffic Engineering Division to engage the community in the importance and the benefits of bicycle and pedestrian safety. Workshops address concerns of traffic speed and traffic volume around schools, identify the benefits of bicycling, and encourage parents to allow their children to bike and / or walk to school. A secondary issue communicated to parents is the need for their children's activity level to increase.

Drug Abuse Resistance Education (DARE) Program

The City's Public Safety Department coordinates the Drug Abuse Resistance Education (DARE) Program. DARE's primary mission is to provide children with the information and skills they need to live drug-and-violence-free lives. DARE seeks to equip kids with the tools that will enable them to avoid negative influences and instead, allow them to focus on their strengths and potential. DARE officers talk about bicycle safety and the bicycle helmet law in their 5th grade curriculum. Also, students are given bicycle license applications and DARE officers make themselves available on a specified school day to register bicycles and talk to students at the bicycle rack. Overall, the DARE program establishes positive relationships between students and law enforcement, teachers, parents, and other community leaders.

Bicycle Helmet Program

The City's Public Safety officers and staff educate the community on the proper use and fit of bicycle helmets. Public Safety staff provides inspections at community events, child safety programs, bicycle safety diversion programs to ensure that helmets fit properly. Studies of children and adolescents aged 4 to 18 years, found that 96% were be incorrectly fitted. Also, this program supports distribution of helmets to students and community members participating in bicycle rodeos.

Bicycle / Pedestrian Safety Diversion Program

The City's Public Safety Department administers the City's Bicycle / Pedestrian Safety Diversion Program to enforce and educate those who are issued administrative citations for bicycle and pedestrian traffic laws. Administrative citations will be issued to the violators that will require them to attend a bicycle education class provided free of charge. This program will be available for violators under the age of 15, and the other for adults.

City's Bikeways Map

The City's Bikeways Maps supports and complements the City's bicycle education programs and lists bicycle safety laws and tips. The City's Bikeways Map are provided to the public online on the City's website.

Suggested Routes to School Maps

The City's Neighborhood Traffic Engineering Division has prepared Suggested Routes to School Maps for each school throughout the City. The Suggested Routes to School Maps show the boundary of each school's enrollment boundary and identifies the suggested route to bike and walk to school.

Bicycle Safety Video

The City has developed a Bicycle Safety Video which is available on the City's website and for use at educational and community forums. The Bicycle Safety Video provides an overview of the following topics:

- Types of Bicycles
- Safety Equipment and Helmet
- Potential Road Hazards
- California and Municipal Vehicle Code
- Share the Bikeway and Road with Other Vehicles, Bicyclists, and Pedestrians
- City's Bikeways Map

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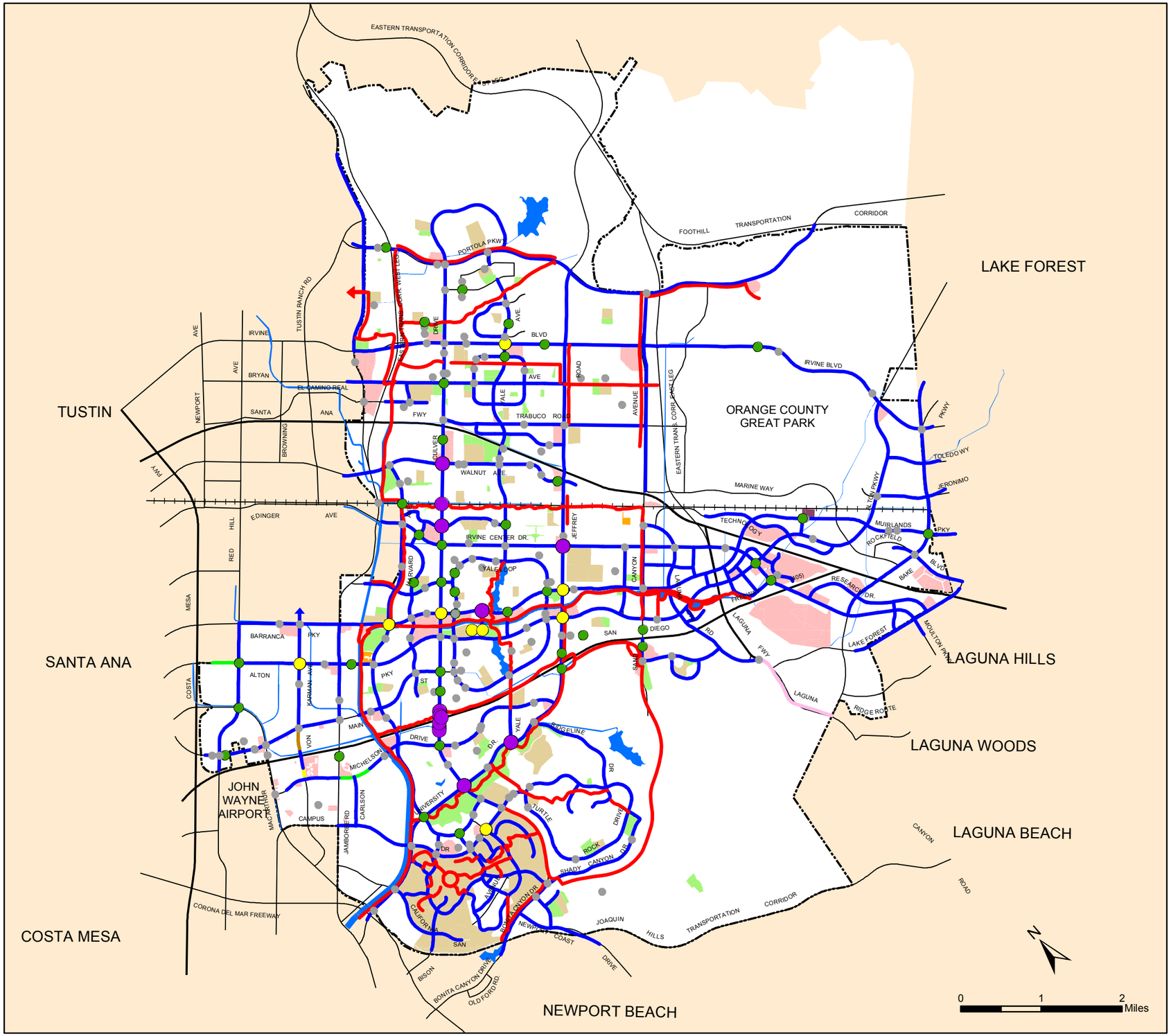
Figure 9-1, Bicycle Related Collisions



Legend

- 1 Collision
- 2 Collisions
- 3 Collisions
- 4+ Collisions
- Off-Street Bikeway
- On-Street Bikeway
- On-Street Signed Bike Route
- On-Street Bikeway on South Side of Road
- On-Street Bikeway on East Side of Road
- On-Street Bikeway on West Side of Road
- Schools, Universities
- Parks
- Waterways, Water Bodies
- Irvine Station
- City Hall, City Yard
- Retail Center/Entertainment Center
- Railroad
- Irvine City Boundary
- Irvine City Sphere

2011 Bicycle Transportation Plan

DATE: Monday, September 26, 2011 \\Coi-file01\coi-shared\CommDev\B & S\GIS\projects\PublicWorks\Thai_L_BikeMap_Update_12092010_cn\MXD\9-1_Bicycle_Related_Collisions.mxd

Chapter 10 – Consistency with Regional Planning

This chapter describes its consistency with City and regional policy documents. Policy documents represent the long range visions of the City of Irvine, neighboring cities, and the Orange County Region.

10.1 Consistency with City of Irvine Policy Documents

General Plan

The City General Plan is a state-mandated document representing the long-range vision of the City. The Circulation Element of the General Plan expects that bikeways and pedestrian trails will continue to be developed concurrent with adjacent development and includes objectives and policies related to the bikeways network. This Plan implements and is consistent with the following objectives and policies of the City General Plan Circulation Element:

Objective B-3: Establish a pedestrian circulation system to support and encourage walking as a mode of transportation.

Policy (a) of B-3: Link residences with schools, shopping centers, and other public facilities, both within a planning area and to adjacent planning areas, through an internal system of trails.

Policy (b) of B-3: Require development to provide safe, convenient, and direct pedestrian access to surrounding land uses and transit stops. Issues such as anticipated interaction between pedestrians and vehicles, proposed infrastructure improved and design standards shall be considered.

Policy (c) of B-3: Design and locate land uses to encourage access to them by nonautomotive means.

Objective B-4: Bicycle Circulation: Plan, provide and maintain a comprehensive bicycle trail network that together with the regional trail system, encourages increased use of bicycle trails for commuters and recreational purposes.

Policy (a) of B-4: Use the General Plan Trails Network diagram as a basis for detailed planning of the bicycle trail system. Detailed planning shall occur through the development processes outlined in the City's Zoning and Subdivision Ordinances. The General Plan Trails Network is available in Chapter 5, Figure 5 1-A of this Plan.

Policy (b) of B-4: Require a system of bicycle trails, both on- and off-street, in each planning area. Such trail shall be linked to the system shown in the General Plan Trails Network diagram. The on-street trails shall be designed for the safety of the cyclist.

Policy (c) of B-4: The trail system shall be designed to accommodate cyclists of all levels of experience and shall provide for both recreation and transportation.

Policy (d) of B-4: Require bicycle trail linkages between residential areas, employment areas, schools, parks, community facilities, commercial centers, and transit facilities.

Policy (e) of B-4: Require pedestrian and bicycle circulation plans detailing access to subject property and adjacent properties in conjunction with new development.

Policy (f) of B-4: Require that bicycle trip destinations, including community facilities, commercial centers, and transit facilities be equipped with appropriate bicycle facilities including, but not limited to, the provision of showers and bike racks.

Policy (g) of B-4: Require traffic control devices and traffic signal phasing for bicycle crossing, turning and through movements.

Policy (h) of B-4: Require grade-separated crossings for Class I bikeways at major intersections, wherever feasible, to increase safety and efficiency.

Policy (i) of B-4: Provide off-street bicycle trails in areas with minimal cross traffic, such as open space spine, flood control and utility easements, where possible.

Policy (j) of B-4: Support programs to increase public awareness of bicycle safety and bicycling as an alternative mode of transportation.

Policy (k): Incorporate, where appropriate, school and park locations within the design of the bikeway system.

These objectives are the fundamental purpose of the Plan.

Municipal Code and Zoning Ordinance

The City Municipal Code addresses bicycle issues in both the Zoning Ordinance and the Public Safety Ordinance.

Title IV, *Public Safety*, Division 7, *Bicycles*, of the City Municipal Code applies to the use, licensing, registration and control of bicycles within the City, and applies to any bicycle operated on any sidewalk or public path set aside for the use of bicycles. The Code describes City law in regards to obedience of traffic-control devices, the method of riding and number of riders, speed, parking, and other issues. This Plan is found to be consistent with City's Public Safety Code in that it encourages the responsible and lawful use of bicycles within the City. Additionally, excerpts from Title IV Division 7 are included on the back of the City Bikeways Map, for public and reference.

This Plan is also consistent with policy set by Section 6-3-603 of Municipal Code which promotes and encourages the "use of alternative transportation modes such as ridesharing, carpools, vanpools, public bus and rail transit, bicycles and walking, as well as those facilities that support such modes".

This Plan is also consistent with the City Zoning Ordinance, which regulates the provision of bicycle facilities including paths, trails and parking facilities. Excerpts of the Zoning Ordinance that are relevant to this Plan are included in Appendix B.

10.2 Adjacent City Policy Documents

The General Plans, and Bicycle Master Plans of adjacent cities including, Santa Ana, Costa Mesa, Tustin, Orange, Newport Beach, Lake Forest, Laguna Beach, and Laguna Hills were evaluated to identify existing and proposed trails in the adjacent jurisdictions. The purpose of this effort was to ensure connectivity with the bikeways across city boundaries and, as a result, to ensure consistency with the adjacent cities' General Plans.

A number of bicycle lanes and trails within the City of Irvine provide connectivity to trails within adjacent cities. Like the City, adjacent cities continue to develop bikeways and set policies for bikeway development through their General Plans, Bicycle Transportation Plans and Municipal Code. This Plan is found to be consistent with adjacent city bicycle facilities and bikeway-related policy.

10.3 Consistency with Regional Plans

The Orange County Transportation Authority (OCTA) is the regional transportation planning agency in Orange County. OCTA provides information to the public on regional bicycle facilities throughout the County. The 2009 OCTA Commuter Bikeways Strategic Plan and Orange County Bikeways Map includes those lanes and trails within the City of Irvine and discussed within this Plan. This Plan is consistent with the 2009 OCTA Commuter Bikeways Strategic Plan and Orange County Bikeways Map by providing lanes and trails that connect with various other trails throughout Orange County enabling bicycle commuting and recreation on a regional scale.

Non-motorized transportation, generally defined as walking and bicycling, is an important aspect of Southern California's overall strategy for meeting the region's mobility, air quality, and energy goals. While non-motorized transportation is

considered an element of the vehicle substitution strategy of Transportation Demand Management (TDM), bicycling and walking are distinct modes that not only share facilities with other modes, but also require unique facilities. The 2008 Regional Transportation Plan adopted by the Southern California Association of Governments, outlines policies and strategies for non-motorized transportation, including bicyclists and pedestrians. The policies and outcomes of this plan include the following:

- Decrease bicyclist and pedestrian fatalities and injuries
- Increase accommodation and planning for bicyclists and pedestrians
- Increase bicycle and pedestrian use in the region as an alternative to vehicle trips
- Encourage development of local-non-motorized plans
- Produce a comprehensive regional non-motorized plan
- Funding

This Plan will implement these strategies throughout the community. The regional goals of reducing vehicle trips and increasing air quality and energy conservation are shared by the City and can be met with implementation of the this Plan.

APPENDIX A

Community Survey Materials

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Community Bicycling Survey

Now through May 2, 2011

Tell Us What You Think!

The City of Irvine wants to know about our bikeways and bicycling needs in Irvine.

Take the survey at
cityofirvine.org/bikeways

Bikeway Survey

Exit this survey

1.

1. What are the reasons you choose to bike? (check all that apply)

- [ ] Recreation/fitness
- [ ] Commuting to work
- [ ] Commuting to school
- [ ] Shopping/errands
- [ ] Parking cost/availability
- [ ] Cost of gas
- [ ] Congestion
- [ ] Environment
- [ ] Health

Other (please specify)

2. How long are your most frequest bicycle trips (one-way)?

3. How often do you ride your bike?

4. What is your age?

5. To which of the following destinations do you currently ride your bike. (check all that apply)

- [ ] Irvine Business Complex
- [ ] Irvine Spectrum Employment Center
- [ ] Irvine Spectrum Entertainment Center
- [ ] Irvine Station
- [ ] The Market Place
- [ ] Tustin Metrolink Station
- [ ] University of California, Irvine

Other (please fill in name of destination(s))

6. To which of the following destinations would you ride your bike if routes were improved/established. (check all that apply)

- [ ] Irvine Business Complex
- [ ] Irvine Spectrum Employment Center
- [ ] Irvine Spectrum Entertainment Center
- [ ] Irvine Station
- [ ] The Market Place
- [ ] Tustin Metrolink Station
- [ ] University of California, Irvine

Other (please fill in name of destination(s))

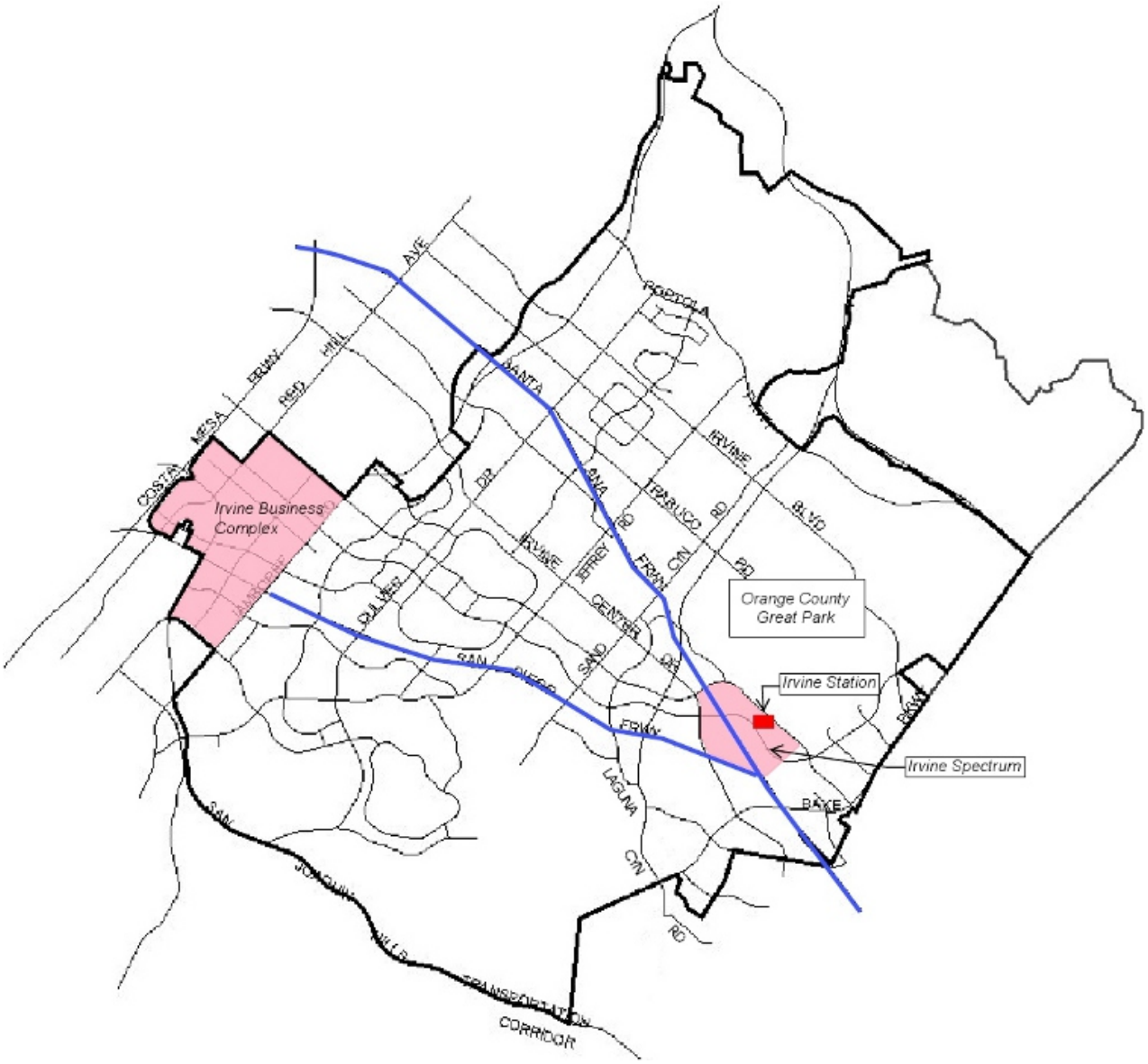
7. Please rate the following proposed segments of Off-Street bikeway(a bikeway that crosses over or under a street) using a scale from 1 to 5 where 1 = Don't like it and 5 = Really like it.

See map below for location

	1	2	3	4	5
New off-street bikeway connecting Irvine Station to the employment and retail centers in the Irvine Spectrum located north/east of I-5 freeway.	○	○	○	○	○
New off-street bikeways connecting to and through the Orange County Great Park	○	○	○	○	○
New off-street bikeways through the Irvine Business Complex	○	○	○	○	○

Other (please identify segment(s))

Please refer to the map below for Question 7.



8. Please rate your preference on the following type of bikeway facilities.

	Least Preferred	Somewhat Preferred	Most Preferred
Off-Street Bikeway (separated from street)	○	○	○
On-Street Bikeway (striped lane on a street)	○	○	○
Grade Separated Crossing (a bikeway that crosses over or under a street)	○	○	○

9. Please rate the following proposed Grade Separated Crossings (bikeways that cross over or under a street) using a scale from 1 to 5 where 1 = Don't like it and 5 = Really like it.

See map below for reference.

1	2	3	4	5

A. A new grade separated crossing over the I-5 freeway adjacent to Jeffrey Road	○	○	○	○	○
B. A new grade separated crossing over Walnut Avenue adjacent to Jeffrey Road	○	○	○	○	○
C. A new grade separated crossing over Jeffrey Road parallel to the I-405 freeway; north/east side of I-405 freeway	○	○	○	○	○
D. A new grade separated crossing over Culver Drive parallel to the I-405 freeway; north/east of I-405 freeway	○	○	○	○	○

Other (please identify location of grade separated crossing(s))

Please refer to the map below for Question 9.

10. Please rate the importance of the following bicyce amenities:

	Unimportant	Somewhat Important	Extremely Important
Rest stop at parks (designated meeting areas with benches, drinking fountains and bike racks)	○	○	○
Benches along trails	○	○	○
Bicycle parking at retail centers	○	○	○
Bicycle parking at work place	○	○	○
Bicycle parking at parks	○	○	○
Wayfinding signs (signs to destinations)	○	○	○

Done

Bikeway Survey Edit

Default Report + Add Report

Response Summary

Total Started Survey: 420
Total Completed Survey: 420 (100%)

PAGE: 1

1. What are the reasons you choose to bike? (check all that apply)

Create Chart Download

	Response Percent	Response Count
Recreation/fitness	95.5%	401
Commuting to work	48.8%	205
Commuting to school	10.5%	44
Shopping/errands	32.4%	136
Parking cost/availability	10.5%	44
Cost of gas	34.0%	143
Congestion	18.3%	77
Environment	43.1%	181
Health	66.0%	277
	Other (please specify) Show Responses	18
	answered question	420
	skipped question	0

2. How long are your most frequest bicycle trips (one-way)?

Create Chart Download

	Response Percent	Response Count
0-10 minutes	5.0%	21
11-20 minutes	17.5%	73
21-45 minutes	31.6%	132
45+ minutes	45.9%	192
	answered question	418
	skipped question	2

3. How often do you ride your bike?

Create Chart Download

	Response Percent	Response Count
Daily	15.3%	64
1-2 days/week	25.5%	107

3-5 days/week	**49.2%**	**206**
2-3 times/month	5.5%	23
Once a month or less	4.5%	19
Never	0.0%	0
	answered question	**419**
	skipped question	**1**

4. What is your age? Create Chart Download

	Response Percent	Response Count
17 year or younger	0.5%	2
18-24	7.5%	31
25-34	19.0%	79
35-44	21.2%	88
45-54	**28.0%**	**116**
55+	23.9%	99
	answered question	**415**
	skipped question	**5**

5. To which of the following destinations do you currently ride your bike. (check all that apply) Create Chart Download

	Response Percent	Response Count
Irvine Station	28.1%	80
Tustin Metrolink Station	12.3%	35
The Market Place	35.1%	100
Irvine Business Complex	26.0%	74
Irvine Spectrum Employment Center	16.8%	48
Irvine Spectrum Entertainment Center	25.6%	73
University of California, Irvine	**56.1%**	**160**
	Other (please fill in name of destination(s)) Show Responses	190
	answered question	**285**
	skipped question	**135**

6. To which of the following destinations would you ride your bike if routes were improved/established. (check all that apply) Create Chart Download

	Response Percent	Response Count
Irvine Station	38.9%	111
Tustin Metrolink Station	30.2%	86
The Market Place	48.4%	138

Irvine Business Complex	28.8%	82
Irvine Spectrum Employment Center	23.2%	66
Irvine Spectrum Entertainment Center	**60.4%**	**172**
University of California, Irvine	31.6%	90
Other (please fill in name of destination(s)) Show Responses		76
	answered question	**285**
	skipped question	**135**

7. Please rate the following proposed segments of Off-Street bikeway(a bikeway that crosses over or under a street) using a scale from 1 to 5 where 1 = Don't like it and 5 = Really like it. See map below for location Create Chart Download

	1	2	3	4	5	Rating Average	Response Count
New off-street bikeway connecting Irvine Station to the employment and retail centers in the Irvine Spectrum located north/east of I-5 freeway.	4.7% (18)	4.4% (17)	21.8% (84)	21.6% (83)	**47.5% (183)**	4.03	385
New off-street bikeways connecting to and through the Orange County Great Park	2.8% (11)	1.8% (7)	10.3% (40)	15.9% (62)	**69.2% (270)**	4.47	390
New off-street bikeways through the Irvine Business Complex	4.0% (15)	6.1% (23)	27.2% (103)	19.0% (72)	**43.7% (165)**	3.92	378
Other (please identify segment(s)) Show Responses							76
						answered question	**396**
						skipped question	**24**

8. Please rate your preference on the following type of bikeway facilities. Create Chart Download

	Least Preferred	Somewhat Preferred	Most Preferred	Rating Average	Response Count
Off-Street Bikeway (separated from street)	3.2% (13)	18.8% (77)	**78.0% (320)**	2.75	410
On-Street Bikeway (striped lane on a street)	34.3% (140)	**41.9% (171)**	23.8% (97)	1.89	408
Grade Separated Crossing (a bikeway that crosses over or under a street)	6.9% (28)	34.0% (138)	**59.1% (240)**	2.52	406
			answered question		**414**
			skipped question		**6**

9. Please rate the following proposed Grade Separated Crossings (bikeways that cross over or under a street) using a scale from 1 to 5 where 1 = Don't like it and 5 = Really like it. See map below for reference. Create Chart Download

	1	2	3	4	5	Rating Average	Response Count
A. A new grade separated crossing over the I-5 freeway adjacent to Jeffrey Road	3.0% (12)	3.0% (12)	16.9% (67)	20.2% (80)	**56.8% (225)**	4.25	396
B. A new grade separated crossing over Walnut Avenue adjacent to Jeffrey Road	3.8% (15)	4.9% (19)	23.0% (90)	24.3% (95)	**44.0% (172)**	4.00	391
C. A new grade separated crossing over Jeffrey Road parallel to the I-405 freeway; north/east side of I-405 freeway	3.3% (13)	3.3% (13)	17.8% (70)	21.9% (86)	**53.7% (211)**	4.19	393

D. A new grade separated crossing over Culver Drive parallel to the I-405 freeway; north/east of I-405 freeway	1.8% (7)	4.8% (19)	14.7% (58)	21.3% (84)	**57.5% (227)**	4.28	395
	Other (please identify location of grade separated crossing(s)) Show Responses						48
					answered question		**402**
					skipped question		**18**

10. Please rate the importance of the following bicyce amenities: Create Chart Download

	Unimportant	Somewhat Important	Extremely Important	Rating Average	Response Count
Rest stop at parks (designated meeting areas with benches, drinking fountains and bike racks)	18.1% (75)	**55.3% (229)**	26.6% (110)	2.08	414
Benches along trails	**55.8% (227)**	38.3% (156)	5.9% (24)	1.50	407
Bicycle parking at retail centers	7.2% (30)	28.3% (117)	**64.5% (267)**	2.57	414
Bicycle parking at work place	12.5% (51)	29.4% (120)	**58.1% (237)**	2.46	408
Bicycle parking at parks	12.3% (51)	41.8% (173)	**45.9% (190)**	2.34	414
Wayfinding signs (signs to destinations)	11.9% (49)	37.0% (152)	**51.1% (210)**	2.39	411
			answered question		**417**
			skipped question		**3**

APPENDIX B

City of Irvine Municipal Code
Section 4-7-101 thru 4-7-103
Section 6-3-601 thru 6-3-603

City of Irvine Zoning Ordinance
Bicycle Parking Requirements
Section 4-3-7

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CITY OF IRVINE
MUNICIPAL CODE SEC. 4-7-101 thru 4-7-103

Sec. 4-7-101. - Scope.

This division shall apply to the use, licensing, registration and control of bicycles in conformity with State law, and shall apply to any bicycle operated upon any street or sidewalk, or upon any public path set aside for the use of bicycles. The provisions contained herein are enacted pursuant to Vehicle code div. 16.7 (Vehicle Code § 39000 et seq.), and any rules and regulations adopted thereunder, pertaining to the licensing of bicycles, and California Vehicle Code § 21206 pertaining to the regulation of the operation, use and equipment of bicycles, and are not intended to conflict in any way with the provisions thereof.

(Code 1976, § IV.F-101; Ord. No. 192, 5-10-77)

Sec. 4-7-102. - Definitions.

The following words, terms and phrases when used in this division shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Bicycle: Any device upon which a person may ride which is propelled by human power through a system of belts, chains or gears, having one or more wheels. "Bike" shall mean the same as "bicycle."

Bicycle dealer: Any person who sells, gives away, buys or takes in trade for the purpose of resale, more than five bicycles in any one calendar year, whether or not such bicycles are owned by such person or entity. The term also includes agents or employees of such person or entity.

Bicycle lane: That portion of the roadway which has been separated from any vehicular lanes by a solid white line or other marking on the pavement, or defined for bike riders by appropriate signs.

Bicycle path: A path adjacent to and/or completely separated from the roadway, and defined for bike riders by appropriate signs or markings.

Bicycle plate: The license tag or decal designated by the State in accordance with California Vehicle Code § 39001 to be permanently affixed to the bicycle and which bears a unique number permanently assigned to that bicycle by the State.

Bicycle route or bicycle trail: A suggested route of travel for bicycle riders. A "bicycle route" may offer no physical protection to the bike rider and is normally defined for the bicycle rider only by a sign indicating "bike route," which defines a suggested route element of a bicycle system and provides a certain awareness for the motorist that bicycle riders are sharing the roadway.

Motorized bicycle: Any two-wheeled or three-wheeled device having fully operative pedals for propulsion by human power, or having no pedals if powered solely by electrical energy, and an automatic transmission and a motor which produces less than two gross brake horsepower and is capable of propelling the device at a maximum speed of not more than 30 miles per hour on level ground. A motorized bicycle is also a device that has fully operative pedals for propulsion by human power and has an electric motor that meets all the following requirements: (1) has a power output of not more than 1,000 watts, (2) is incapable of propelling the device at a speed of more than 20 miles per hour on ground level, and (3) is incapable of further increasing the

speed of the device when human power is used to propel the motorized bicycle faster than 20 miles per hour.

(Code 1976, § IV.F-102; Ord. No. 192, 5-10-77)

Sec. 4-7-103. - Enforcement.

A. *Responsibility of parent.* The parent of any child, and the guardian of any ward, shall not authorize or knowingly permit any minor child or ward to violate any of the provisions of this division.

B. *Reports upon retail sale.* Each bicycle dealer shall supply to each purchaser a preregistration form provided by the licensing agency and shall include on the sales check or receipt given to the purchaser, a record of the following information:

1. Name and address of dealer;
2. Year, make, type and model of bicycle;
3. Serial number of the bicycle if delivered to the purchaser in an assembled state;
4. General description of the bicycle;
5. Name and address of purchaser.

A copy of the preregistration form shall be filled out and forwarded by the purchaser to the Director of Public Safety/Chief of Police or his or her duly authorized representative within ten days from the date of sale.

C. *Penalty for violations.* Every person violating any provisions of sections, of this division, shall be deemed guilty of a misdemeanor unless specifically provided otherwise in this division or by State law. In no case shall the fine or violation of this division exceed $5. In addition to the penalty set forth in title 4, division 13, of this Code, the Director of Public Safety/Chief of Police, or any officers of the Police Department whose duty it is to enforce the provisions of this division, may impound and retain possession of any bicycle operated in violation of any of the provisions of this division and retain possession thereof until the provisions of this division have been complied with. Bicycles impounded and retained by the Police Department hereunder shall be considered abandoned after a period in excess of three months shall be disposed of under the provisions of Penal Code §§ 1407—1411 and further restricted by Civil Code §§ 2080.1, 2080.2, 2080.3, 2080.4 and 2080.5.

D. Where this division has been violated the Director of Public Safety/Chief of Police, or his or her duly authorized representatives, may require that the violator:

1. Attend bicycle traffic school;
2. Have the bicycle equipment inspected at the Police Department within five days of any equipment violations;
3. Obtain a bicycle license immediately.

(Code 1976, § IV.F-103; Ord. No. 192, 5-10-77)

CITY OF IRVINE
MUNICIPAL CODE SEC. 6-3-601 thru 6-3-603

Sec. 6-3-601. - Definitions.

The following words, terms and phrases when used in this chapter shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Alternative transportation modes means any mode of travel that serves as an alternative to the single occupant vehicle. This can include all forms of ridesharing such as carpooling or vanpooling, as well as public transit, bicycling or walking.

Developer means any person or entity which engages in development.

Development means any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations.

Facility(s) means the total of all buildings, structures and grounds that encompass a worksite, at either single or multiple locations, that comprises or is associated with a subject development project.

Level of services or*LOS* means a measure of the operational quality of a road or intersection ranging from LOS A (best) to LOS F (worst). As required by CMP legislation, the LOS standard for the CMP Highway System must be at "E" or at the existing LOS, whichever is further from LOS "A," for any intersection or roadway segment.

Mixed-use development means a subject development project that contains mixed use as that term is defined in the zoning code of the City.

Peak period means those hours of the business day between 6:00 a.m. and 10:00 a.m. inclusive, Monday through Friday.

Site development plan means a precise plan of development that may be subject to public hearing before the Planning Commission and as more fully described in section 7-9-150.1 of the 1989 Orange County Zoning Code.

Subject development project means any nonresidential development project being processed where some level of discretionary or ministerial action by a governmental entity is required and where such action has not occurred before the effective date of this chapter or within 90 days thereafter.

Transportation demand management or *TDM* means the implementation of programs, plans or policies designed to encourage changes in individual travel behavior. TDM can include an emphasis on alternative travel modes to the single occupant vehicle (SOV) such as carpools, vanpools and transit; reduction or elimination of the number of vehicle trips, or shifts in the time of vehicle commutes to other than the peak-period.

Transportation information center means the provision by developers through an information (bulletin board, kiosk, etc.) in a building of notices and other advertising which will aid persons working in such buildings to gain information respecting commuting alternatives and, thus, more effectively participate in alternative transportation modes or ridesharing or transit programs. Such information locations shall be situated in a conspicuous and easily accessible place.

Trip reduction means a reduction of the number of work-related trips taken between 6:00 a.m. and 10:00 a.m. inclusive Monday through Friday in single-occupancy vehicles.

Vehicle means a motor vehicle powered by conventional means and not by a "clean fuel" approved by the South Coast Air Quality Management District. "Vehicle" shall not include transit vehicles nor buses serving multiple work places.

(Ord. No. 96-3, § 2, 1-23-96)

Sec. 6-3-602. - Intent of chapter.

This chapter is intended to meet the requirements of Government Code § 65089.3(b)(3) which requires development of a trip reduction and travel demand element to the CMP, and Government Code § 65089.3(b) which requires adoption and implementation of a trip reduction and travel demand ordinance.

(Ord. No. 96-3, § 3, 1-23-96)

Sec. 6-3-603. - Policy.

New commercial, industrial, and mixed-use development may adversely impact existing transportation and parking facilities, resulting in increased motor vehicle emissions, deteriorating levels of service, and possibly significant additional capital expenditures to augment and improve the existing transportation system. In order to more efficiently utilize the existing and planned transportation system and to reduce vehicle emissions, it is the policy of the City to:

A. Reduce the number of peak-period vehicle trips generated in association with additional development;

B. Promote and encourage the use of alternative transportation modes such as ridesharing, carpools, vanpools, public bus and rail transit, bicycles and walking, as well as those facilities that support such modes;

C. Achieve related reductions in vehicle trips, traffic congestion, and public expenditure and achieve air quality improvements through utilization of existing local mechanisms and procedures for project review and permit processing;

D. Promote coordinated implementation of strategies on a County wide basis to reduce transportation demand;

E. Achieve the most efficient use of local resources through coordinated and consistent regional and/or local TDM programs.

(Ord. No. 96-3, § 4, 1-23-96)

CITY OF IRVINE
ZONING ORDINANCE SEC. 4-3-7

BICYCLE PARKING REQUIREMENTS

	Use	Bicycle Parking Requirement	Notes If a project is anticipated to generate visitor traffic, permanently anchored bicycle racks within 200 feet of the visitor's entrance shall be provided and readily visible to passers-by, at a rate of 5 percent of the total number of required visitor motorized vehicle parking spaces, with a minimum of one two-bike capacity racks.
1.	Regional Shopping Center	5 space at mall entrance	
2.	Shopping Center with more than 50,000 square feet of gross floor area	1 space/33 automobile parking spaces required	
3.	Restaurants		
	Fast Food, Coffee Shop	5 spaces	
	Dinner House	2 spaces	
	Pizza Parlor	5 spaces	
4.	Commercial Recreation		
	Arcade, game or video	1 space / 2 games up to 20 games plus 1 space / 5 games for over 20 games[1,2]	[1] This space requirement also applies to uses other than arcades that contain video games. [2] Nearest space shall be located no less than 5 feet from the building entrance.
	Bowling alleys, miniature golf, skating rinks, movie theaters, health clubs and similar commercial recreation activities as determined by the Director of Community Development	1 space/33 automobile parking spaces required	
5.	Community Facilities		
	Swim clubs, Racquet and Tennis Clubs, Community	1 space / 33 automobile parking	

	Use	Bicycle Parking Requirement	Notes If a project is anticipated to generate visitor traffic, permanently anchored bicycle racks within 200 feet of the visitor's entrance shall be provided and readily visible to passers-by, at a rate of 5 percent of the total number of required visitor motorized vehicle parking spaces, with a minimum of one two-bike capacity racks.
	Centers and similar uses as determined by the Director of Community Development	spaces required	
	Libraries	1 space / 10 automobile parking spaces required	
	Government Offices (civic center)	5 spaces	
6	Office Developments over 100,000 square feet of floor area:	5 spaces	
7.	Banks, Savings and Loans:	2 spaces	
8.	Hospitals:	4 spaces	
9.	Medical, Dental Office:	2 spaces	

(Ord. No. 00-04, § 4, 4-25-00; Ord. No. 01-02, § 4, 2-27-01)

ZONING ORDINANCE SEC. 4-4-2

DIMENSIONS OF PARKING BAYS AND AISLES

B. Bicycle. A minimum aisles width of 42 inches shall be provided between rows of bicycle spaces.

ZONING ORDINANCE SEC. 4-4-5

LOCATIONS OF PARKING SPACES

G. All bicycle spaces shall be located as close as is practical to the entrance(s) to the use they are intended to serve, but situated so that they do not obstruct the flow of pedestrians using the building entrance(s) or using sidewalks.

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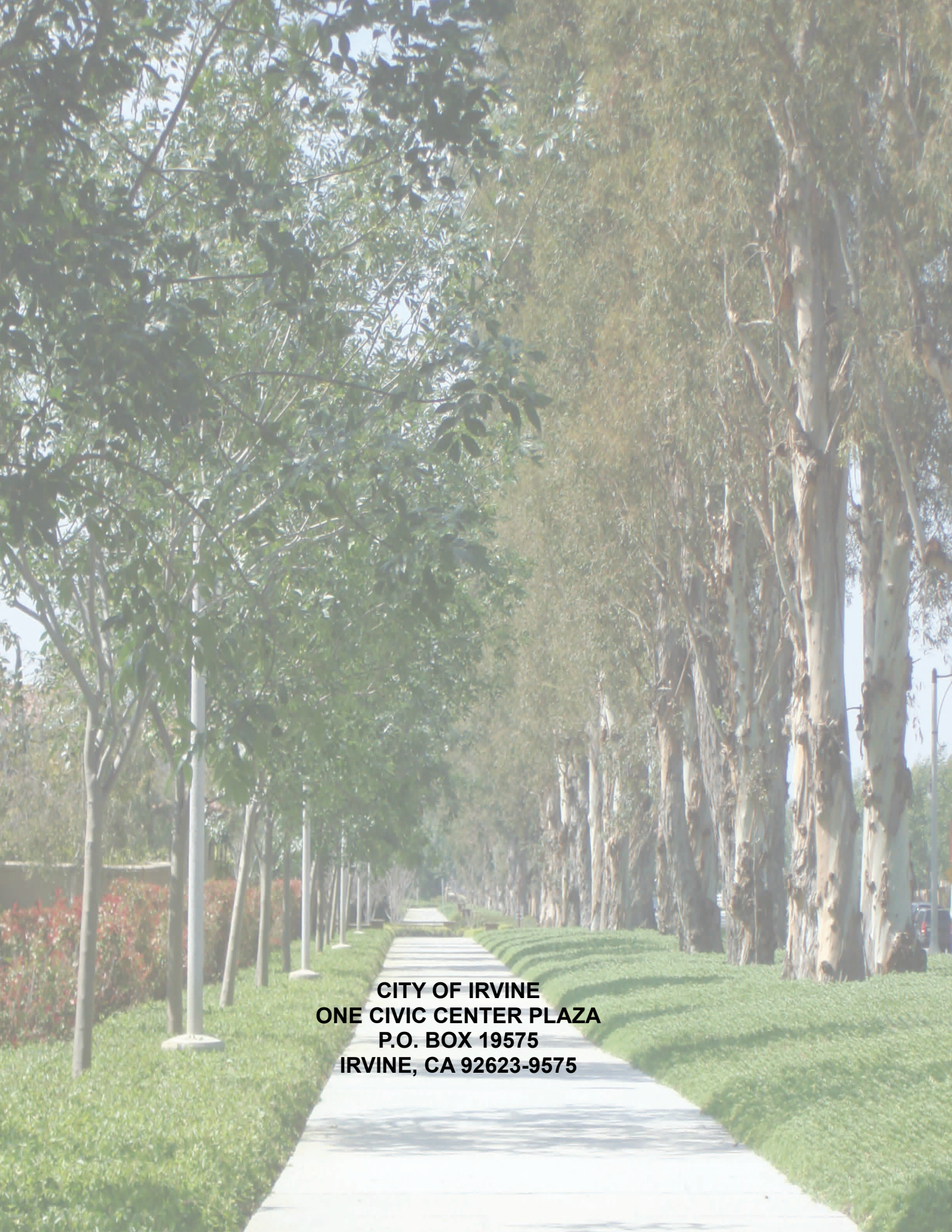

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