LEMON GROVE BIKEWAY MASTER PLAN UPDATE

GENERAL PLAN AMENDMENT GPA06-001

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Prepared for: City of Lemon Grove

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1. INTRODUCTION

The Lemon Grove Bikeway Master Plan provides a blueprint for making bicycling an integral part of daily life in Lemon Grove. After nearly a decade of bicycle facility development guided by the Bicycle Facilities Sub-Element of the General Plan, Lemon Grove now has a solid network of primary bikeways that provide connections to destinations throughout the city as well as links to the regional bikeway system. This Bikeway Master Plan seeks to build upon this foundation– to enhance and expand the existing bikeway network, connect gaps, address constrained areas, provide for greater local and regional connectivity, and encourage even more residents to bicycle.

The Bikeway Plan provides for an updated system of bike lanes, bike routes and bike paths, identifies necessary support facilities such as bicycle parking, and recommends a variety of programs to allow for safe, efficient and convenient bicycle travel within Lemon Grove and connecting to regional destinations. The Plan covers the "4 E's" of planning for bicyclists – Engineering, Education, Encouragement, and Enforcement – recognizing that an approach that draws from all 4 E's will be the most successful in improving safety and increasing the number of Lemon Grove residents bicycling for work, shopping, school, and recreation.

1.1. WHY BICYCLING?

The bicycle is a low-cost and effective means of transportation that is quiet, non-polluting, extremely energy-efficient, versatile, healthy, and fun. Bicycles also offer low-cost mobility to the non-driving public. Bicycling as a means of transportation has been growing in popularity as many communities work to create more balanced transportation systems by giving bicyclists a greater share in use of the roadway networks. In addition, recent national surveys find that more people are willing to cycle more frequently if better bicycle facilities are provided.

1.2. PURPOSE OF THE BIKEWAY PLAN

This updated Bikeway Master Plan provides a broad vision, strategies and actions for the improvement of bicycling in Lemon Grove. It is important to note that the City of Lemon Grove is by no means starting from scratch in terms of accommodating and encouraging its residents to bicycle. This Bikeway Plan serves as an update to the Lemon Grove Bikeway Plan adopted as part of the Lemon Grove General Plan. The existing Bikeway Plan was adopted in 1996 as a Sub-Element of the General Plan, and all except a few segments of the identified Phase I regional bikeway routes have been implemented since that time.

This updated Bikeway Master Plan focuses on Phase II of the bicycle network development, provides recommendations for spot improvements to the existing network, and identifies programs to educate motorists and bicyclists on the rules of the road, and encourage even more residents to bicycle. Updating the Bikeway Plan by the City is important for the following reasons:

Maximize Funding Sources for Implementation. A key reason for updating the Bikeway Plan is to satisfy requirements of the California Bicycle Transportation Account (BTA) and other state and federal funding programs for bicycle transportation projects for which Caltrans plays an oversight and review role. In order to qualify for available funding, the State of California requires that applicants have a master plan adopted or updated within the past five years that includes a number of specific elements related to bicycle commuting, land uses, multi-modal connections, funding, and public input. The complete list of required BTA elements and their locations in this document is provided in **Table 1-1** below.

Table 1-1
Caltrans BTA Requirements

Required Element		Page(s)
1.	Existing and Future Bicycle Commuters	4-1 to 4-5, Appendix C
2.	Land Use Map/Population Density	3-15
3.	Existing and Proposed Bikeways	3-3 to 3-7, 5-3
4.	Existing and Proposed Bicycle Parking Facilities	3-8 to 3-9
5.	Existing and Proposed Multi-Modal Connections	3-13 to 3-14, 5-8
6.	Existing and Proposed Changing and Storage Facilities	3-7 to 3-11 5-2 to 5-4
7.	Bicycle Safety and Education Programs	3-12, 5-9 to 5-10
8.	Citizen Participation	4-12
9.	Consistency with Transportation, Air Quality, and Energy Plans	3-14 to 3-18
10.	Project Descriptions/Priority Listings	5-13 to 5-33
11.	Past Expenditures and Future Financial Needs	3-12, 6-2 to 6-4

Improve Safety. Reduce the accident rate for bicyclists in Lemon Grove by providing a complete network of bicycle facilities that meets Caltrans design standards and guidelines, through educational programs, and with regular enforcement activities.

Provide needed facilities and services. Lemon Grove has existing bikeways on several major roadways including Broadway, Massachusetts Avenue, Lemon Grove Avenue; Grove Street, Palm Street, Troy Street, Kempf Street, and Skyline Drive. While these facilities provide direct routes for experienced cyclists comfortable with riding on streets with relatively high volumes of traffic, much of the success of encouraging new cyclists will depend on meeting the needs of less experienced riders who are less comfortable on such roadways. In addition to incorporating more alternative routes into the existing bikeway network, support facilities such as clear directional signage and secure bicycle parking at schools, employment centers and transit stops will encourage more people to ride bicycles and enhance the level of comfort for all.

Enhance the quality of life in Lemon Grove. The development of bicycle facilities provides for people-friendly streets, paths, trails, and activity centers available to everyone, and supports sustainable community development.

Bicycling can reduce traffic congestion, vehicle exhaust emissions, noise, and energy consumption by encouraging healthier and more active forms of travel.

1.3. MAJOR RECOMMENDATIONS OF THE PLAN

This Bikeway Plan recommends the enhancement of the existing network with the implementation of approximately 0.7 miles of new Class I Bike Paths, 2.4 miles of new Class II Bike Lanes, and 5.6 miles of new Class III Bike Routes. The total cost of the recommended projects is estimated to be about $877,000. The Recommended Bikeway Network is shown in Figure 5-1 in Chapter 5, and the proposed cost breakdown is provided in Table 6-1 in Chapter 6.

In addition to the planned bikeways and bicycle facilities, this plan outlines new educational and promotional programs aimed at bicyclists and motorists. These programs include bicycle parking improvements, multi-modal (transit) support facilities, bicycle safety and education programs for cyclists and motorists, Safe Routes to Schools (SR2S) programs, community and employer outreach programs, continued development of bikeway network maps, and bike-to-work and school day events, among others.

1.4. PLAN CONTENTS

The Lemon Grove Bikeway Plan is organized as follows:

Chapter 2, Goals and Policies, documents the goals and policies of the 1996 Bicycle Facilities Sub-Element as well as the goals and policies of this Bikeway Plan.

Chapter 3, Existing Conditions, provides a description of the existing bicycle conditions in Lemon Grove. The conditions presented include the existing bicycle network, support facilities, and programs, as well as existing network needs, opportunities and constraints.

Chapter 4, Needs Analysis, documents the need for bicycle transportation in Lemon Grove, including an overview of existing user groups, bicycle commute statistics, and bicycle accident data.

Chapter 5, Recommended Improvements, outlines the recommended Class I, II, and III bicycle network map, as well as support facilities and programs such as bicycle parking, Safe Routes to School, and educational efforts that will improve safety and convenience for bicyclist and complement the recommended network. Chapter 5 also includes individual Project Sheets that provide additional detail and highlight design and feasibility issues for each of the major projects identified in this plan.

Chapter 6, Implementation, provides a complete list of recommended project components with cost estimates, outlines the highest priority projects and provides a guide to system implementation and funding sources and strategies for getting the recommended bikeway network and facilities built.

Appendices:

- Appendix A: Caltrans Bikeway Planning and Design (Chapter 1000)
- Appendix B: Supplemental Design Guidelines
- Appendix C: Bicycle Commute and Air Quality Calculations

2. GOALS AND POLICIES

This section presents the recommended specific goals and policies for the Lemon Grove Bikeway Master Plan. Goals provide the context for the specific policies and actions discussed in the Master Plan. The goals provide the long-term vision and serve as the foundation of the plan, while the policies provide more specific descriptions of actions to undertake to implement the plan.

2.1. BICYCLE FACILITIES SUB-ELEMENT OBJECTIVES AND POLICIES

The following Objective and Policies pertaining to bicycle use are identified in the existing Bicycle Facilities Sub-Element of the Lemon Grove General Plan:

Objective 1.0. Routine use of the bicycle for transportation.

Policy 1.1. Provide bicycle facilities that link with local activity centers (downtown, schools, parks) and the regional bikeway system.

Policy 1.2. Encourage residents to use bicycles as an alternative mode of travel for both local and commuter trips by publicizing routes and providing routine maintenance of bicycle facilities.

Policy 1.3. Provide secure bicycle storage facilities and racks in activity centers and at major bus and trolley stops.

Policy 1.4. Aggressively implement a Bicycle Safety Awareness Program to promote bicycle safety habits.

2.2. GENERAL PLAN IMPLEMENTATION MANUAL

The following action items pertaining to bikeway facilities are identified in the existing Lemon Grove General Plan Implementation Manual:

Bikeway Implementation and Funding

Program: Strongly consider adoption of the Bicycle Facilities Sub-Element of the General Plan for the City of Lemon Grove. Coordinate with SANDAG and Caltrans and apply for funding in a timely manner.

Schedule: Phase I complete; Phase II is currently underway

Bikeway Storage Facilities

Program: Promote the provision of additional bicycle lockers at trolley stations and park-and-ride lots to provide additional opportunities for this alternative mode utilization for commercial trips. Strive to provide bike racks at local community facilities including the downtown, parks and recreation facilities. Consider the need to provide bicycle storage

facilities at all new and redeveloping commercial, office, industrial, high density residential and public places.

Schedule: Ongoing

Bicycle Safety Awareness Program

Program: Aggressively promote the Bicycle Safety Awareness Program as established in the Bikeway Plan. Attempt to hold these programs at the beginning of every school year, and as needed to reinforce safety habits. Outreach to drivers and adults could take the form of informational articles and updates in City newsletters and through dissemination of information by community groups and organizations.

Schedule: Ongoing

2.3. GOALS AND POLICIES OF BIKEWAY MASTER PLAN UPDATE

As part of this Bikeway Master Plan, the objectives and policies of the existing Bicycle Facilities Sub-Element have been expanded upon to provide an updated and comprehensive set of goals and policies covering all aspects of bicycle facility development, education and encouragement, system maintenance, and regional cooperation.

Goal 1: Complete Lemon Grove's Recommended Bikeway Network to encourage routine use of the bicycle for transportation

Policy 1.1. Implement a network of bike lanes, bike routes, and shared use paths that serve all bicycle user groups, including commuting, recreation, and utilitarian trips.

Policy 1.2. Provide safe and accessible bicycle facilities that link with local activity centers (downtown, schools, parks) and the San Diego regional bikeway system.

Policy 1.3. Complete the recommended bikeway network by closing existing gaps and considering innovative design solutions for constrained locations

Goal 2: Encourage Lemon Grove residents to use bicycles as an alternative mode of travel for both local and commuter trips by publicizing routes and proper maintenance.

Policy 2.1. Install signage along all local and regional bikeways to assist with wayfinding and to increase awareness of bicyclists through messages such as "Share the Road."

Policy 2.2. Coordinate with SANDAG to ensure that Lemon Grove's regional bikeways continue to be included on the San Diego Bikeways Map.

Policy 2.3. Develop a program to routinely repair and maintain roads and other bikeway network facilities, including regular sweeping of bikeways and shared use pathways.

Policy 2.4. Require that construction or repair activities, both on street and of adjacent buildings, minimize disruption to bicycle facilities, ensure bicyclist safety at all times, and provide alternate routes if necessary.

Goal 3: Provide for bicycle support facilities throughout Lemon Grove

Policy 3.1. Provide secure bicycle storage facilities and racks in activity centers and at major bus and trolley stops.

Policy 3.2. Provide projects that improve multi-modal connections and enhance bicycle-transit trip linking.

Policy 3.3. Develop a program to ensure that bicycle loop detectors are installed at signalized intersections and are tested regularly to ensure they remain functional.

Goal 4. Promote bicycle safety and increased bicycling through education, encouragement and enforcement activities.

Policy 4.1. Continue existing and pursue new adult and youth bicycle education and safety programs, such as the San Diego County Sheriff's Department Youth Bicycle Traffic School.

Policy 4.2. Continue San Diego County Sheriff's Department enforcement of bicycle-related violations by both motorists and bicyclists, and emphasize positive enforcement for safe bicycling behavior by children.

Policy 4.3. Support Safe Routes to School efforts and cooperation with the that include educational and incentive programs to encourage more students to bicycle or walk to school.

Policy 4.4. Encourage major Lemon Grove employers to provide incentives and support facilities for existing and potential employees that commute by bicycle.

Goal 5: Implement the Lemon Grove Bikeway Plan

Policy 5.1. Seek funding for bicycle transportation through current regional, state, and federal funding programs.

Policy 5.2. Update the Bicycle Plan periodically as required by Caltrans to reflect new policies and/or requirements for bicycle funding.

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3. EXISTING CONDITIONS

This chapter provides a description of existing conditions within the City of Lemon Grove relevant to this Bikeway Master Plan. Information is based on field visits, existing planning documents, maps, and conversations with City and other agency staff.

3.1. SETTING

3.1.1. Location

The City of Lemon Grove is located in the southwestern portion of San Diego County. Encompassing 3.75 square miles, the City boundaries are generally defined by the SR-94 freeway to the north, Sweetwater Road to the east, 69th Street and MacArthur Drive on the west, and various residential streets on the south. The City of La Mesa lies just north of Lemon Grove, across SR-94. East of the City is the unincorporated community of Spring Valley. Several communities in the City of San Diego (Encanto, Oak Park and Rolando) wrap around the western portion of the City. Topographically, the city is dominated by coastal mesas and drainages, with elevations ranging from about 280 feet above sea level in the northwestern part of the city to 528 feet near the northeastern boundary.

A cyclist riding in one of Lemon Grove's many striped bicycle lanes, this one along Massachusetts Avenue

3.1.2. Land Uses

Lemon Grove is characterized by an established urban land use pattern. The commercial and industrial areas primarily occur in the northern part of the city, near SR-94. The traditional downtown, located on Broadway east of Lemon Grove Avenue, provides additional shopping opportunities. Commercial activity continues to extend south on Lemon Grove Avenue and west on Broadway. Well-established neighborhoods occupy most of the area south of Broadway. Single-family homes dominate the neighborhoods, mixed with some condominiums and apartment buildings. Most multi-family residential development has been focused along major transportation routes, and within one or two blocks of Broadway. Small municipal parks provide recreational opportunities, and schools and churches are scattered throughout the neighborhoods.

3.1.2.1. Schools

Table 3-1 provides an inventory of Elementary and Middle Schools in Lemon Grove. No high schools are located within the Lemon Grove city limits. High school students residing in Lemon Grove attend one of two high schools in nearby La Mesa and Spring Valley, in the Grossmont Union High School District. It should be noted that the Lemon Grove School District policy requires that students who bicycle to school have gone through a bicycle education course led by the San Diego County Sheriff's Department.

Table 3-1
Elementary and Middle Schools in Lemon Grove

School Name	Grades	Address
Golden Avenue Elementary	K-5	7855 Golden Avenue
Monterey Heights Elementary	K-5	7550 Canton Drive
Mount Vernon Elementary	K-5	8350 Mount Vernon Street
San Altos Elementary	K-5	1750 Madera Street
San Miguel Elementary	K-5	7059 San Miguel Avenue
Lemon Grove Middle School	6-8	7866 Lincoln Street
Palm Middle School	6-8	8425 Palm Street

3.1.2.2. Park and Recreation Facilities

The City of Lemon Grove has a number of parks and recreational facilities available for use of residents. These range from developed park sites with playgrounds, picnic areas, and sport courts, to community rooms and other facilities available for rental for parties, banquets or other events. **Table 3-2** lists major park and recreation facilities in Lemon Grove.

Table 3-2
Park and Recreation Facilities in Lemon Grove

Park/Facility Name	Address
Annex Courtyard	3225 Olive Street
Berry Street Park	7071 Mt. Vernon
Civic Center Park	3200 Main Street
Community Center	3146 School Lane
Dan Kunkel Memorial Park	8105 Lemon Grove Way
Firefighters Park	Central Avenue
Lemon Grove Park	2259 Washington Street
Recreation Center	3131 School Lane
Senior Center	8235 Mt. Vernon Street

3.1.2.3. Shopping

The City of Lemon Grove provides a wide-range of shopping opportunities for its residents and the surrounding region. Filled with hundreds of stores, the central commercial district ranges from large-scale regional retailers down to small and personalized craftsmen. Major retail shopping centers are listed below in **Table 3-3.**

Table 3-3
Major Retail Shopping Locations in Lemon Grove

Shopping Center Name	Address
Lemon Grove Gateway	6902 – 6998 Federal Blvd
Gateway Plaza	6929 – 6943 Federal Blvd
94 Country Plaza	6955 – 6971 Broadway
Lemon Grove Plaza	7012 – 7162 Broadway
Lemon Grove Square	7117 – 7143 Broadway
El Dorado Properties	7431 – 7451 Broadway
La Mancha Plaza	7582 – 7586 Broadway
Lemon Grove Center	7801 – 7825 Broadway
Golden Professional Center	7855 – 7867 Broadway; 7850 – 7860 Golden Ave
Washington Square	8055 – 8099 Broadway
Broadway Plaza	8249 – 8257 Broadway
Palm Center	7733 – 7747 Palm St
Lemon Grove Commercial Center	2605 – 2627 Lemon Grove Avenue

3.2. EXISTING BICYCLE FACILITIES

3.2.1. Definition of Bikeways

The three types of bikeways identified by Caltrans in Chapter 1000 of the Highway Design Manual are as follows. Detailed design guidelines for all three types of bikeways are provided in Appendix A.

Class I Bikeway Typically called a "bike path," a Class I bikeway provides bicycle travel on a paved right-of-way completely separated from any street or highway.

Class II Bikeway. Often referred to as a "bike lane," a Class II bikeway provides a striped and stenciled lane for one-way travel on a street or highway.

Class III Bikeway. Generally referred to as a "bike route," a Class III bikeway provides for shared use with motor vehicle traffic and is identified only by signing.

It is important to note that bicycles are permitted on *all* roads in the State of California and in Lemon Grove (with the exception of access-controlled freeways such as SR-94). As such, Lemon Grove's entire street network is effectively the city's bicycle network, regardless of whether or not a bikeway stripe, stencil, or sign is present on a given street. The designation of certain roads as Class II or III bicycle facilities is not intended to imply that these are the only roadways intended for bicycle use, or that bicyclists should not be riding on other streets. Rather, the designation of a network of Class II and III on-street bikeways recognizes that certain roadways are optimal bicycle routes, for reasons such as

directness or access to significant destinations, and allows the City of Lemon Grove to then focus resources on building out this primary network.

Bicycle lane along Federal Avenue, adjacent to on-street parking lane

One of the greatest divergences of opinion lies between those who feel paved Class I bike paths, separated from roadways, should be constructed wherever physically possible, versus those who feel more comfortable riding on streets on lanes or routes. This preference is usually based on personal feeling regarding comfort and safety.

In general, Class I bike paths are desirable for slower-speed recreational cycling, particularly by families and children. Although referred to as "bike paths," Class I facilities are multi-use facilities that will likely see use by a wide mix of non-motorized, including pedestrians, joggers, roller bladers and dog walkers. Given this mix of uses, there is potential for conflicts on heavily-used Class I facilities, necessitating lower bicycle speeds on these paths. Class I bike paths are preferred for corridors where there are few intersections or crossings, to reduce the potential for conflicts with motor vehicles. Class I facilities located immediately adjacent to roadways, often referred to as "sidepaths," are less desirable due to the numerous potential conflicts with motor vehicles turning on or off of side streets and driveways. Due to their linear off-street nature, opportunities for developing Class I facilities in an urban setting are typically much more limited, often occurring along waterways, rail corridors, or utility corridors. As such, Class I bike paths will normally comprise a much smaller fraction of the total designated bikeway network than on-street bike lanes and routes.

Most commuter bicyclists would argue that on-street facilities are the safest and most functional facilities for bicycle transportation. Bicyclists have stated their preference for marked on-street bicycle lanes in numerous surveys. The fact is that many bicyclists – particularly less experienced riders – are far more comfortable riding on a busy street if it has a striped and signed bike lane. Part of the goal of this Plan is to encourage new riders, and providing marked facilities such as bike lanes is one way of helping to persuade residents to give bicycling a try. This Bicycle Plan takes the approach that if properly designed, Class II bike lanes can increase safety and promote proper riding, and are therefore highly desirable for bicycle commute routes along major roadways. Bike lanes help to define the road space for bicyclists and motorists, reduce the chance that motorists will stray into the cyclists' path, discourage bicyclists from riding on the sidewalk, and remind motorists that cyclists have a right to the road. One key consideration in designing bike lanes in an urban setting is to ensure that bike lane and adjacent parking lane are wide enough so that cyclists have enough room to avoid a suddenly opened vehicle door.

On streets with low traffic volumes and speeds (under 5,000 vehicles per day, 30 mph), striped bike lanes may not be needed at all. This is based on the potential for serious conflicts being so low that the cost of installing bike lanes may not be warranted. On these types of low-traffic neighborhood streets, designated and signed Class III bike routes can serve as important connectors to schools and recreational areas such as parks. Class III bike routes may also be desirable on certain commute routes where installing bike lanes is not possible, provided that appropriate signage is installed to alert motorists to the presence of bicycles on the roadway. Class III bike route signing should also include "Share the Road"

signs at regular intervals along the route, such as found on Massachusetts Avenue south of Madera Street.

Lemon Grove's existing network of designated bikeways is shown in **Figure 3-1**. Specific facility segments are discussed in more detail below.

3.2.2. Existing Off-Street Bike Paths

Currently there are no off-street Class I bike paths within Lemon Grove.

3.2.3. Existing On-Street Bike Lanes and Routes

As shown in Figure 3-1, Lemon Grove's existing bikeway network is comprised of a mix of on-street bike lanes and routes. **Tables 3-4** and **3-5** show the limits and lengths of existing Class II and III bikeway segments in the city, respectively.

This unimproved ROW along the Trolley Line north of Massachusetts Avenue shows use as an informal trail

Since adoption of the Bikeway Plan in 1996 as part of the Mobility Element of the Lemon Grove General Plan, the city has focused on implementing a network of Class II bike lanes that provide regional bikeway connectivity. Key existing Class II Bike Lane segments have been installed on Federal Boulevard/Broadway, Lemon Grove Avenue, Massachusetts Avenue, Grove Street, Buena Vista Avenue/Waite Drive, Kempf Street/ Skyline Drive, and Palm Street/Troy Street. Lemon Grove now has a solid primary Class II network in place system that serves the city's major activity centers and provides links to the regional system.

However, several of these existing Class II facilities are not continuous the length of the roadway segment, with gaps in a number of places where the Class II Bike Lanes drop and turn into signed Class III routes. These include segments of Broadway/Federal Boulevard, Massachusetts Avenue, and Lemon Grove Avenue where the Class II facility drops in constrained locations and cyclists must share the vehicle travel lane. While experienced cyclists typically have the skills and confidence to ride through these gaps in the network without any problems, such gaps may discourage casual cyclists from bicycling on these facilities. For this reason, addressing these gaps or discontinuous segments is a high priority of this update to the Bikeway Plan.

Furthermore, there are a number of local Class II segments identified in the 1996 Sub-Element that remain to be implemented; completion of the local network will be also be a priority for the next phase of bikeways implementation for the City. The 1996 General Plan Implementation Manual divides implementation of the bike plan into two phases: Phase I, construction of the Regional Bikeway system, which, with few exceptions, is complete, and Phase II, the local bikeway system, on which construction has just started.

Striped Class II bike lane along Skyline Drive

Table 3-4
Index of Existing City of Lemon Grove Class II Bike Lanes

Street	From	To	Class	Length (Miles)
Federal Boulevard	Central Avenue	College Ave	2	0.4
Broadway	Massachusetts Ave	Olive Street	2	0.6
Broadway	Kempf Street	East City Limit	2	0.9
Massachusetts	Madera Street	Lemon Grove Ave	2	1.1
Kempf/Skyline	Golden Avenue	South City Limit	2	1.6
Buena Vista	Broadway	High Street	2	0.3
Palm/Troy	Lemon Grove Ave	Sweetwater Road	2	1.1
Lemon Grove Ave	South City Limit	Arcadia	2	1.1
Lemon Grove Ave	Montana St	Golden Ave	2	0.4
Grove	Broadway	Lemon Grove Ave	2	0.2
TOTAL MILES				7.7

Source: Alta Planning + Design field inventory, April 2005

Table 3-5
Index of Existing City of Lemon Grove Class III Bike Routes

Street	From	To	Class	Length (Miles)
Broadway	Olive Street	Kempf Street	3	0.3
Massachusetts	Madera Street	Lemon Grove Ave	3	0.4
Kempf	Golden Ave	Broadway	3	0.1
Lemon Grove Ave	Golden Ave	Broadway	3	0.1
Lemon Grove Ave	Arcadia	Montana St	3	0.2
TOTAL MILES				1.1

Source: Alta Planning + Design field inventory, April 2005

A Class III Bike Route is present on Massachusetts Avenue south of Madera Street

3.2.4. Bikeway Signage

Implementing a well-designed, attractive, and functional system of network signage greatly enhances bikeway facilities by promoting their presence to both potential and existing users. Currently, Lemon Grove uses standard Caltrans bikeway signage for its Class II bike lanes and Class III bike routes. On Massachusetts Avenue, the city has also installed fluorescent yellow green "Share the Road" signs along the length of the Class II and III facility.

In terms of wayfinding, there is currently no directional or destination signage provided along bikeways in Lemon Grove. For the regional connections, some directional signage maybe be helpful in complicated intersections such as Broadway/Federal (where a merge to the left turn lane is required for through cyclists), or locations such as College Avenue north of Federal and Massachusetts Avenue north of Broadway which connect into facilities in San Diego and La Mesa, respectively.

INSERT FIGURE 3-1, EXISTING BICYCLE NETWORK

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3.2.5. Bicycle Detector Loops

Bicycle detector loops (BDLs) are sensors that activate traffic signals when a bicyclist positions him/herself where a loop detector is installed, in bicycle or auto travel lanes at signalized intersections. The City of Lemon Grove generally does not need BDLs along the bikeway network, because most of these facilities are along major arterials where the signals are timed. Specifications for all bicycle facilities installed in the city calls for installation of BDLs if necessary, such as in left turn pockets. The city may install BDLs in the future, and video detection is an alternative that may be studied for some locations. The city currently has two video monitoring cameras: one for northbound Massachusetts at Broadway, and the other for eastbound Massachusetts at Lemon Grove Avenue. Both these video cameras have zones for bike lane detection.

Regular maintenance of these devices is important to ensure the intended benefits of BDLs for bicycle travel. In addition, all BDL locations should be marked by a pavement stencil. The stencils wear off and should be repainted when street striping is repainted. Chapter 5 provides recommendations on the structure of a BDL program.

3.2.6. Bicycle Parking

Bicycle parking is an important component in planning bicycle facilities and encouraging people to use their bicycles for everyday transportation. Bicycles are one of the top stolen items in most communities, with components often being stolen even when the bicycle frame is securely locked to a rack. Because today's bicycles are often high-cost and valuable items, many people will not use a bicycle unless they are sure that there is secure parking available at their destinations. In California, bicycle parking facilities are classified as either Class I or Class II facilities. Bear in mind that many cyclists may use (and even prefer) less "formal" bicycle parking methods, such as simply bringing their bicycle inside their building and storing it in their office. Cyclists with higher-end bicycles (perhaps costing several thousand dollars) are often reluctant to let a bicycle out of their sight at all, and for them the ability to bring a bicycle inside a building is a paramount concern if they are considering whether or not to bicycle to work or to a store.

Bicycle racks and lockers at Massachusetts Avenue Trolley Station

<u>Bike Lockers – Long Term (Class I Parking)</u>

Long-term (Class I) bicycle parking facilities accommodate bicycles of employees, students, residents, and others expected to park more than two hours. This parking is provided in a secure, weather-protected manner and location, such as a bicycle locker or a secure area like a 'bike corral' that may be accessed only by bicyclists. The "day locker" (bike lid, eLocker, etc.) is a new bicycle locker concept that has gained recent popularity because it requires minimal program administration. These lockers allow for multiple users in the same day, therefore allowing these lockers to function similar to racks.

<u>Bike Racks – Short-Term (Class II Parking)</u>

Short-term (Class II) bicycle parking facilities are best used to accommodate bicycles of visitors, customers, messengers, and others expected to depart within two hours. This parking is provided by bicycle racks, which provide support for the

These "wheelbender" type of bike racks at a local shopping center are considered an undesirable rack design

bicycle but do not have locking mechanisms. Racks are relatively low-cost devices that typically hold between two and eight bicycles, allow bicyclists to securely lock their frames and wheels, are secured to the ground, and are located in highly visible areas. Racks should not be designed to damage the wheels by causing them to bend. Bike racks should be located at schools, commercial locations, and activity centers such as parks, libraries, retail locations, post offices, churches, and civic centers, or anywhere personal or professional business takes place

3.2.6.1. *Lemon Grove Bicycle Parking Ordinance*

The Lemon Grove Municipal Code requires 1 bicycle parking space per 10 vehicle parking spaces.

> *17.24.010 OFF-STREET PARKING*
>
> *F. Bicycle Parking Facilities*
>
> *In all projects with ten (10) or more required parking spaces, a rack or other secure device for the purpose of storing and protecting bicycles from theft shall be installed. Such devices shall be provided with a minimum capacity of one (1) bicycle per ten (10) required parking spaces. Such devices shall be located so as not to interfere with pedestrian or vehicular traffic.*

Dimensions for bicycle parking spaces are as follows, as noted in Section G.

Width (open)	*2'*
Width (enclosed)	*3'3"*
Length	*6'*

3.2.6.2. *Lemon Grove Existing Bicycle Parking Facilities*

Currently there are 6 bike lockers and a wave rack at the Massachusetts Avenue Station. The Lemon Grove Depot Station has 10 bike lockers and a wave rack.

No bike racks were visible in front of the downtown commercial businesses along Broadway east of Lemon Grove Avenue.

Several of the commercial shopping centers located along Broadway provide bicycle racks. These include undesirable "wheelbender" type racks as well as the preferred U-racks.

The City has typically been recommending "wave" style racks, such as those at the Lemon Grove trolley stations. However, many cyclists do not understand how to properly lock their bike to a wave rack, placing their bike parallel to the rack and blocking use of the rack for other cyclists. For this reason, the City is considering recommending the standard "Inverted-U" rack for future installations, given the simplicity and versatility of this style.

3.2.7. Bicycle Support Facilities

For the purposes of this Bikeway Plan, bicycle support facilities refer to end-of-trip facilities that would encourage bicyclists to commute to work or other activities that require one to "clean up" after a ride. Typically, these amenities include showers and clothing locker facilities and can be located at places of employment. Such facilities are most often provided by building owners or tenants for use by those who work in the building. Although health clubs provide showers and clothing lockers, they are only available to their members.

Bicycle shops are important for bicyclists making trips between urban areas in the event they suffer an equipment failure and need repair parts or service. Lemon Grove has one bicycle shop, Quality Bicycle Shop, located at 7388 Broadway, where residents can purchase bicycles, cycling accessories and clothing, have repairs done, and obtain maps and get advice about bicycle routes in the area.

Parks and rest stops offer cyclists water, a place to sit or rest, and restroom facilities. Park and recreational facilities in Lemon Grove are discussed in Section 3.1 above. Transit stations extend the range cyclists can commute. Multi-modal connections are discussed later in this chapter.

3.3. BICYCLE FACILITY MAINTENANCE

Currently, the maintenance of Lemon Grove's bikeway facilities consists of restriping, replacement of missing or damaged signs, trimming of plants, pavement repair, traffic signal repair of bicycle and pedestrian devices. Other maintenance activities are conducted on an as-needed basis by the City.

Street sweeping services in Lemon Grove are provided by a sweeping contractor. Major arterials are swept twice monthly, and the city's residential streets are swept once a month. There is no explicit policy regarding bike lanes, they are swept as any other street would be swept. Currently, the city's sweeping contractor does not have a specific mechanism in place to take reports on bicycle facility maintenance needs, such as reporting on glass or debris in bike lanes, although the firm indicated that they will respond to calls if there is a particular problem area where debris is occupying a bike lane.

3.4. PAST BICYCLE PROGRAM EXPENDITURES

Table 3-6 lists past bicycle program funds and expenditures in Lemon Grove.

Table 3-6
Past Bicycle Program Expenditures

Year	Cost
2001	$2,049
2002	$89,808
2003	$67,550
2004	$10,264
2005	$176,683
Total	$346,354

Source: City of Lemon Grove, 2005.

3.5. ENFORCEMENT AND EDUCATION PROGRAMS

3.5.1. Enforcement

The San Diego County Sheriff's Department has been providing contract law enforcement services to the City of Lemon Grove since it became incorporated in 1977. In the role of the city's "Police Department," the men and women of the Lemon Grove Station provide all aspects of law enforcement services including patrol, traffic, crime prevention and investigations. The City of Lemon Grove enforces bicycle and motorist traffic violations through its Traffic Division. The Lemon Grove Station's Traffic Division consist of one Traffic Sergeant, one motorcycle unit, three sedan units, and three Community Service Officers.

3.5.2. Educational Programs

The Sheriff's Department currently operates a Bicycle Traffic School for juveniles (under the age of 18) issued a citation for a bicycle traffic violation. Common bicycle citations include riding without a helmet, riding on the wrong side of the road, or riding at night without a headlight. Children issued a bicycle citation have the option of attending Bicycle Traffic School in lieu of paying the citation.

The Bicycle Traffic School consists of a two-hour course. The first part is devoted to classroom instruction, where instructors teach basic bicycle operation and maintenance, discuss proper helmet wearing, and teach about basic traffic laws and traffic controls. In the second part of the program, children are taken outside for an obstacle course to practice bike handling skills such as maneuvering and quick braking. Finally, the Department's bicycle patrol deputies take the students on a ride on the road to illustrate and practice the principles discussed in the classroom and skills course in a real on-street situation. Students who have successfully completed the course are given a sticker to place on their helmet indicating that they have gone through the Bicycle Traffic School instruction. Children who do not have a helmet when they attend the course are given a free helmet; free helmets are also available through the school PTAs.

The Lemon Grove School District requires that students who bicycle to school have attended this course; however this policy does not currently appear to be strictly enforced. Bicycle traffic school is currently offered a total of three times per year, at the beginning of the Fall and Spring school semesters, and during summer. Funding for the program is from TransNet funds obtained by the City of Lemon Grove.

3.6. MULTI-MODAL CONNECTIONS

Multi-modal refers to the use of two or more modes of transportation in a single trip (i.e., bicycling and riding the bus or train). Improving the bicycle-transit link is an important part of making bicycling a part of daily life in Lemon Grove. Linking bicycles with mass transit, San Diego Trolley, buses, and shuttle services, overcomes such barriers as lengthy trips, personal security concerns, and riding at night or in poor weather.

The Lemon Grove Depot Trolley Station provides a multi-modal connection for cyclists, and has bike racks and lockers

Making the multi-modal connection consists of two key elements: providing bicycle parking facilities at bus stops and bike racks on trains and buses. Two other components include improving bikeways and roadways that link with transit facilities and stops, and encouraging the use of multi-modal programs. Bicycling to transit, in lieu of driving, provides health benefits to the cyclist and benefits the community by reducing air pollution, reducing the demand for parking, reducing energy consumption, and reducing traffic congestion with relatively low investment costs.

3.6.1. San Diego Trolley

Two San Diego Trolley light rail stops are located in Lemon Grove, both along Lemon Grove Avenue: the Lemon Grove Depot Station at Broadway/Lemon Grove Avenue; and the Massachusetts Avenue Station at Massachusetts Avenue/Lemon Grove Avenue. As noted above, both of these Trolley stations provide bike lockers and a bike rack.

3.6.2. MTS Buses

The city of Lemon Grove is served by the following fixed route bus lines operated by the San Diego Metropolitan Transit System:

- Route 856 – College Grove to Rancho San Diego
- Route 876 – La Mesa Westside Shuttle
- Route 916 – Euclid Trolley to College Grove
- Route 936 – 69th and El Cajon to Spring Valley

According to the *Lemon Grove Public Opinion Survey* conducted in April 1998 by SANDAG, 10% of respondents worked in downtown San Diego and 10% worked in the East County area (La Mesa, El Cajon, Santee, Spring Valley, etc.). Over half of all respondents (56%) used the trolley at least once in the prior year, and 18% of all respondents used the trolley regularly during the month. About 23%

used the bus at least once in the past year, and 13% used it regularly. These survey responses indicate that existing multi-modal connections in Lemon Grove are especially important when considering these regional trip opportunities. Ensuring adequate bicycle access on these connections will extend the travel range of individuals at both ends of the trip.

3.6.3. Park-and-Ride Lots

Two park-and-ride locations are present in Lemon Grove. The VFW Post 2082 lot is located at Lemon Grove Ave and Lincoln Street. The second park-and-ride lot is located at Lemon Grove Avenue and High Street, just north of SR-94 on the border between Lemon Grove and La Mesa. Bike lockers are not present at either park-and-ride location.

3.7. RELEVANT PLANS AND POLICIES

3.7.1. Lemon Grove General Plan

3.7.1.1. Land Uses

The Lemon Grove General Plan represents a comprehensive plan for the City, and establishes strategies to achieve community goals pertaining to development, circulation patterns, aesthetics, public safety, open space, and other civic matters. The General Plan contains maps showing existing and proposed land uses within the City planning limits. **Figure 3-2** shows the Lemon Grove General Plan Land Use Plan. While there are no significant proposed changes of land use in Lemon Grove, major planned projects include the following listed in **Table 3-5**.

Table 3-7
Index of Currently Planned Projects in Lemon Grove

Project Name	Location	Type of Use
Citrus Heights Subdivision	Massachusetts at San Altos	Residential
Downtown Redevelopment	Downtown	Mixed Use

Source: City of Lemon Grove

3.7.1.2. Bicycle Facilities Sub-Element

Adopted as part of the 1996 Lemon Grove General Plan, the Bicycle Facilities Sub-Element of the Lemon Grove Mobility Element provided the City of Lemon Grove with its first Bicycle Facilities Plan. The Plan was intended to accommodate both commuter and recreational bicyclists and addressed regional connectivity, transfer points and activity centers, route descriptions, implementation requirements, funding sources and a safety awareness program. The Bicycle Sub-Element serves as part of the foundation for this updated Bikeway Master Plan. The Goals and Objectives identified by the 1996 Sub Element are discussed in Chapter 2 of this Plan: Goals and Policies. This plan carries forward and builds upon the projects and recommendations of the existing Sub Element, and is therefore consistent with that plan.

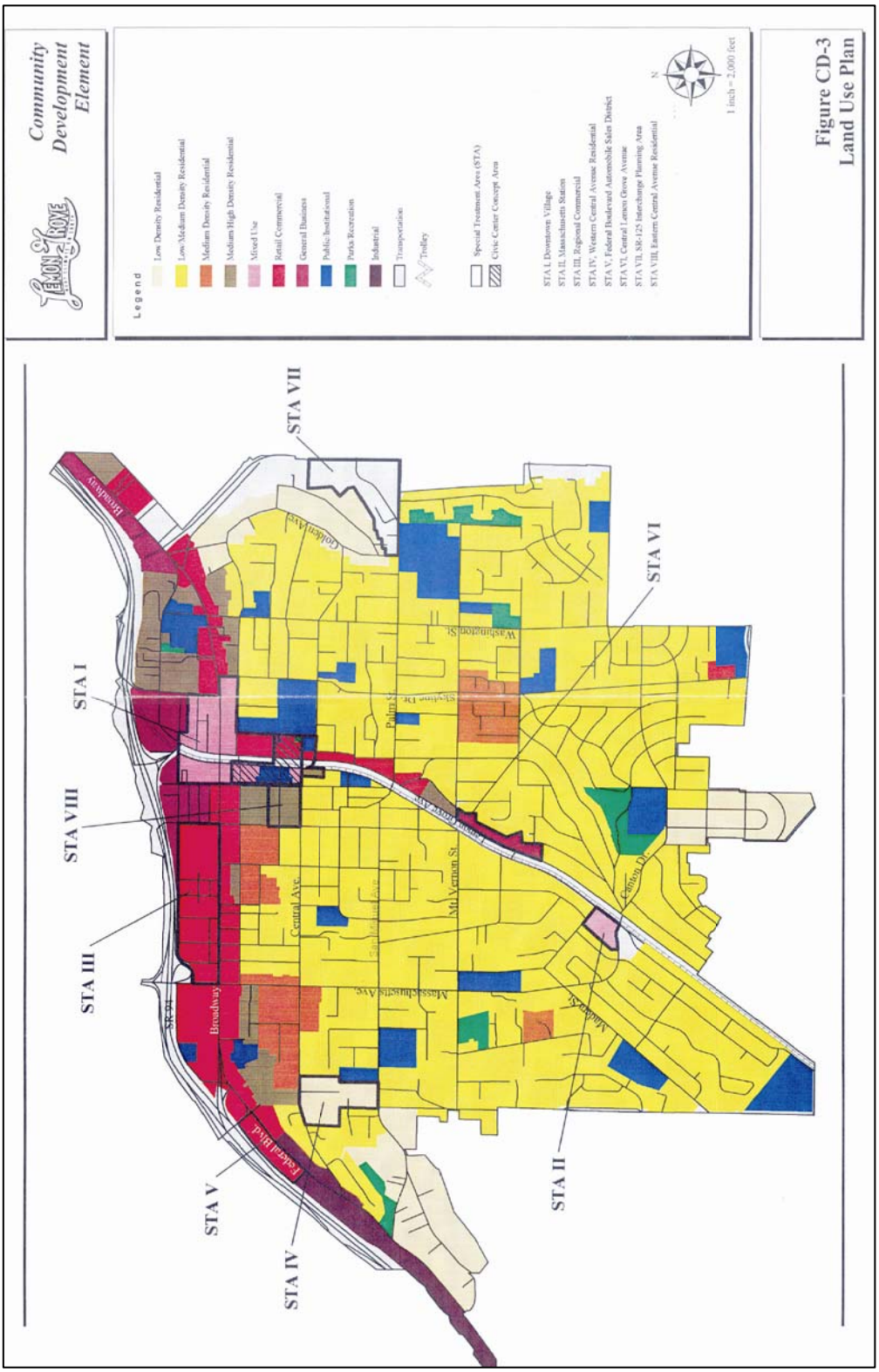


Figure 3-2: Lemon Grove General Plan Land Use Map

The Bicycle Facilities Sub-Element developed a list of recommended bicycle facilities, to be implemented in two phases. Phase I would implement those bikeways that provided for regional connectivity, and include:

- Federal Boulevard/Broadway Class II (Class III on south side from College to Massachusetts)
- Federal Boulevard Class II (Broadway to west city limit)
- Lemon Grove Avenue Class II (Broadway to south city limit)
- Massachusetts Avenue Class II (north city limit to Lemon Grove Avenue)
- Buena Vista Avenue Class II (north of Broadway to north city limit)
- Grove Street Class II (north of Broadway to north city limit)
- Palm/Troy Street Class II (Lemon Grove Ave to east city limit)
- Kempf Street/Skyline Drive Class II

To date, nearly all of the Phase I bikeway facilities have been implemented (see Figure 3-1), with the exception of Broadway and Federal Boulevard between Massachusetts Avenue and College Avenue.

For Phase II, the Bicycle Facilities Sub-Element recommended a number of facilities to complete the local bicycle network. These include:

- Kempf/Skyline Class II
- Canton Drive Class II
- Madera Street Class II
- San Miguel Avenue Class III
- Buena Vista Avenue Class III (south of Broadway)
- Washington Street Class III (Palm to Alton)
- Alton Street Class III (Washington to Skyline)
- Cypress Avenue Class III (Lemon Grove Avenue to Alton)

To date, the city has been focusing on completing the Phase I network, and implementation of the Phase II bikeway network has only just begun. As a result very few Phase II facilities are in place (see Figure 3-1). A major focus of this updated Bikeway Master Plan is to reevaluate the overall network for completeness, and assist the city in prioritizing and moving forward with the Phase II project list.

In addition to the recommended network of bicycle lanes and routes, the Bicycle Facilities Sub-Element contains a variety of recommendations on bicycle support facilities such as bicycle parking, transit connections, bicycle safety and awareness, and potential funding sources.

3.7.2. 2030 Regional Transportation Plan

The San Diego Regional Transportation Plan (RTP), MOBILITY 2030, is a $42 billion plan which serves as a blueprint to address the mobility challenges created by the region's growing population and employment. It contains an integrated set of public policies, strategies, and investments to maintain, manage, and improve

the transportation system in the San Diego region. A main focus of the RTP is to reduce motor vehicle trips in the region by providing additional mobility choices through modes such as transit and bicycling. Included in the Plan is a discussion of Regional Bikeways corridors that could convert intercommunity trips from motor vehicles to bicycles. The SR-94 corridor through Lemon Grove is considered a Regional Bikeway corridor.

The primary implementation effort of Lemon Grove's existing bikeways planning (through the Bicycle Sub-Element) was implementing the regional bikeway corridors. This Bikeway Master Plan serves to enhance some of those corridors and provide gap improvements, as well as complete the Phase II local bikeway network. This plan also furthers the overall goal of converting motor vehicle trips to bicycle trips, thereby reducing motor vehicle trips in the region. This Bikeway Master Plan is therefore consistent with the goals of the 2030 Regional Transportation Plan.

3.7.3. San Diego Basin Air Quality Consistency

The 2030 RTP was determined to be in conformance with the region's State Implementation Plan (SIP), which is the plan for reaching attainment with federal air quality standards. This conformity determination means that future transportation projects identified of the RTP will not jeopardize air quality standards. It also means that federal funding and approval will go to transportation projects that help to meet air quality goals. A major goal of this Bikeway Master Plan is to reduce the number of motor vehicle trips within and regional through Lemon Grove, by converting these trips to bicycle trips. This plan is therefore consistent with the air quality goals of the San Diego basin.

3.8. REGIONAL BICYCLE NETWORK

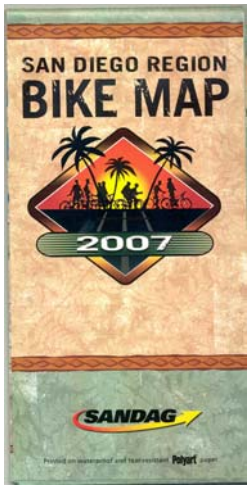
3.8.1. Regional Bikeway Corridors

As part of their long range transportation planning effort, SANDAG designated a network of Regional Bikeway Corridors in their Regional Transportation Plan, *Mobility 2030*. As outlined in *Mobility 2030* the designated Regional Bikeway Corridors in Lemon Grove are Broadway/Federal (SR-94 corridor) and Sweetwater Road (SR-125 corridor). These regional bikeways provide both north-south and east-west links through Lemon Grove, connecting to the adjoining cities of San Diego, La Mesa, and the unincorporated community of Spring Valley.

The Mobility 2030 RTP does not designate the Regional "Feeder" Bikeways that are identified in the existing Bicycle Facilities Sub-Element of the Lemon Grove General Plan. These Regional Feeder Bikeways were identified in the previous 1994 RTP, and included Massachusetts Avenue and a segment of Lemon Grove Avenue, as well as Jamacha Road just outside the southern city limits.

The Regional Bikeway network is significant in that designated Regional Bikeway facilities can receive higher priority for competitive funding sources for project implementation. The Regional Bikeway network was used as a primary basis for prioritizing the bikeways implemented under the Bicycle Facilities Sub-Element. Under that plan, projects recommended for Phase I implementation were those

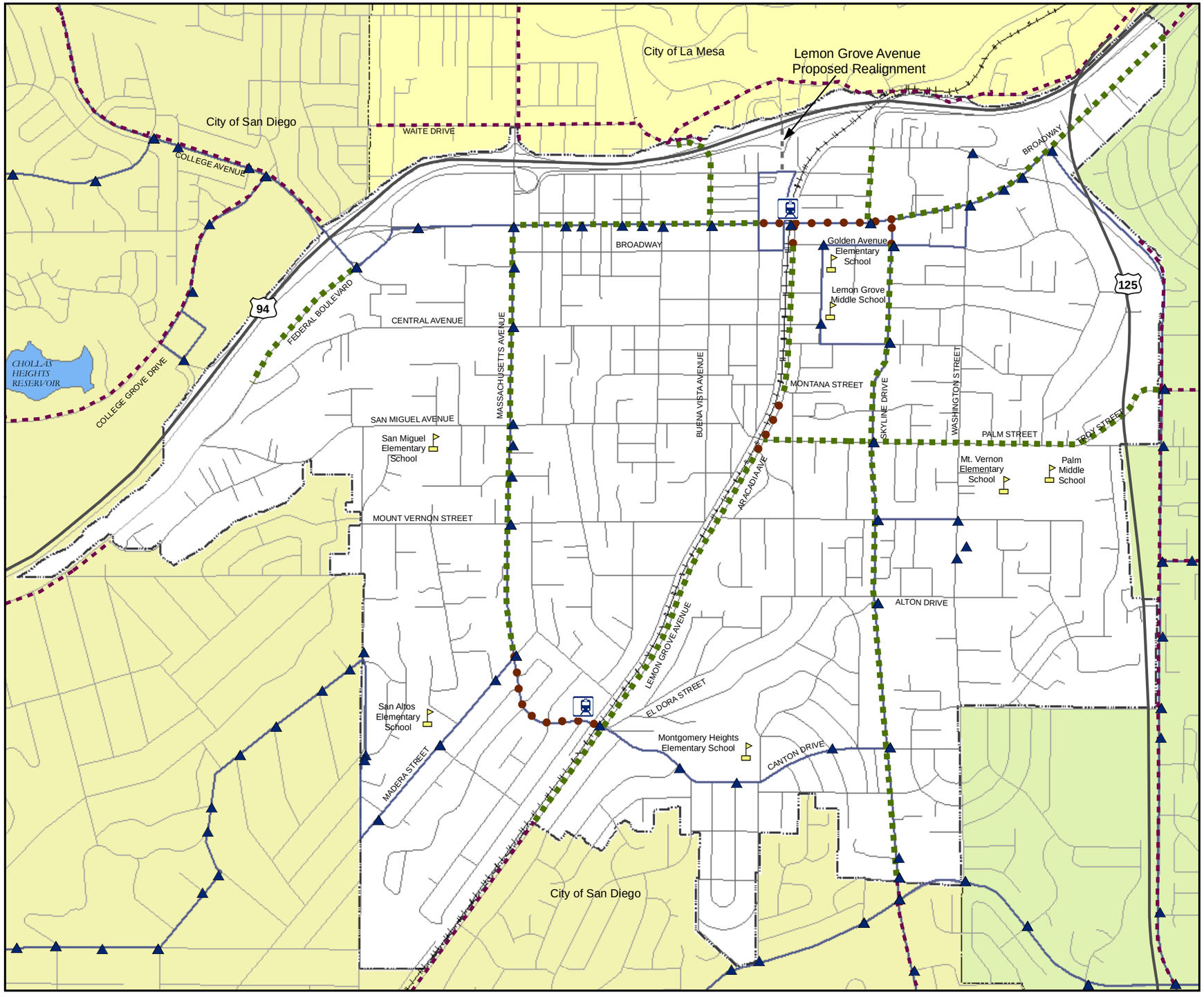
that provided regional connectivity and linked to bicycle facilities surrounding Lemon Grove, and these included the Regional facilities of Broadway/Federal, Massachusetts, and Lemon Grove Avenue. One exception was the Regional facility identified on Sweetwater Road, which was not included as a recommended facility in the General Plan Bicycle Facilities Sub-Element.



3.8.2. San Diego Region Bike Map

Produced by SANDAG, the San Diego Region Bike Map (most recently updated in 2007) is intended to provide information on bicycle facilities to bicyclists. The map shows existing Class I, II and III facilities across San Diego County, as well as "Other Suggested Routes" that are not designated facilities, but are recommended routes for bicycling. In the City of Lemon Grove, the bike lanes shown on the San Diego Region Bike Map are segments along Broadway, Buena Vista Avenue, Kempf Street/Skyline Drive, Lemon Grove Avenue, and Palm Street/Troy Street. The bike routes shown in Lemon Grove include segments of Broadway and Lemon Grove Avenue. In addition to these Class II facilities, the Map shows Canton Drive, Massachusetts Avenue and San Miguel Drive as other suggested routes. There are currently no Class I facilities in Lemon Grove.

FIGURE 3-1 LEMON GROVE EXISTING BIKEWAY NETWORK



Legend

Existing Bikeways

- Bike Lane (Class II)
- Bike Route (Class III)
- Bikeway in Adjacent Municipality
- Bus Route
- Trolley - Orange Line
- Trolley Stop
- Bus Stop
- School
- Lemon Grove City Limits

0 0.25 0.5 Miles

4. NEEDS ANALYSIS

This chapter reviews the relationship between bicycle use, commute patterns, demographics, and land use in the City of Lemon Grove. It identifies major activity centers and public facilities where bicyclists may be destined, along with the needs of recreational and commuter bicyclists. A review of the needs of each bicycle user group will help guide the type and routing of the bikeway system.

One of the primary reasons for producing this updated Bikeway Master Plan is to maximize the number of bicycle commuters in order to help achieve transportation goals such as minimizing traffic congestion and air pollution. In order to set the framework for these benefits, local and national statistics are used as a basis for determining the benefits of an improved and expanded bikeway network for Lemon Grove. The national and local statistics are based on the 2000 U.S. Census.

4.1. LAND USE AND DEMAND

The concept of "demand" for bicycle facilities can be difficult to comprehend. Unlike automobile use, where historical trip generation studies and traffic counts for different types of land uses permits an estimate of future "demand" for travel, bicycle trip generation methods are less advanced and standardized in the United States. Land use patterns can help predict demand and are important to bikeway planning because changes in land use (and particularly employment areas) will affect average commute distance, which in turn affects the attractiveness of bicycling as a commute mode. The Lemon Grove bikeway network will connect the neighborhoods where people live to the places they work, shop, recreate, or go to school. An emphasis will be placed on regional bikeway and transit connections centered around the major activity centers in Lemon Grove, including:

- Major employment centers
- Major retail and commercial centers
- Civic buildings such as libraries
- Schools
- Transit Stations
- Neighborhood parks and regional recreational areas

4.2. COMMUTE PATTERNS

A central focus of presenting commute information is to identify the current "mode split" of people that live and work in Lemon Grove. Mode split refers to the choice of transportation a person selects to move to destinations, be it walking, bicycling, taking a bus, or driving. One major objective of any bicycle facility

improvement is to increase the "split" or percentage of people who choose to bike rather than drive or be driven. Every saved vehicle trip or vehicle mile represents quantifiable reductions in air pollution and can help in lessening traffic congestion.

Journey to work and travel time to work data were obtained from the 2000 US Census for Lemon Grove, San Diego County, California, and the United States. Journey to work data are shown in **Table 4-1**.

Table 4-1
Journey to Work Data

Mode	United States	California	San Diego County	Lemon Grove
Bicycle	0.4%	0.8%	0.6%	0.1%
Drove Alone	75.7%	71.8%	73.9%	74.4%
Carpool	12.2%	14.6%	13.0%	14.4%
Public Transit	4.7%	5.1%	3.4%	6.2%
Walked	2.9%	2.9%	3.4%	1.4%
Other	4.1%	4.8%	1.0%	.3%

Source: U.S. Census 2000

As shown, about 0.1% of all employed Lemon Grove residents commute primarily by bicycle, which is less than the national average of 0.4%, the state average of .8% and the San Diego County average of 0.6%. This table indicates that Lemon Grove has a less than average mode split for commuting purposes. It should be noted that the Census data do not give an indication of the number of people who bicycle for recreation or for utilitarian purposes, such as shopping.

Travel time to work is shown in **Table 4-2**. Travel time is important because it can give an indication of the number of potential new bicycle commuters.

It has been suggested that a reasonable commute time, regardless of mode, is about 30 minutes. Assuming that travel occurs primarily on local roads during peak commute periods, a motor vehicle commute time of 15 minutes or less would be equivalent to about a 30 minute bicycle commute on flat terrain. In other words, converting an under-15 minute motor vehicle commute trip to a bicycle commute trips would still result in a reasonable 30 minute commute time. As shown in Table 4-2, about 16% of Lemon Grove residents have a commute time of 15 minutes or less (most of these trips are drive alone, based on the city's mode split data). While some of these people may be taking transit or walking, based on the fact that 74% of all Lemon Grove residents drive alone to work, it can be assumed that the majority of these short-distance commuters are driving alone to work. Given these data, there is a substantial opportunity to capture some of the short distance (less than 15 minute) motor vehicle commute trips and convert them to bicycle commute trips.

Table 4-2
Travel Time to Work Data

Time	United States	California	San Diego County	Lemon Grove
Less than 15 minutes	29.4%	25.3%	24.7%	15.8%
15 to 29 minutes	36.1%	35.4%	40.6%	45.4%
30 to 44 minutes	19.1%	20.9%	21.6%	24.6%
45 to 59 minutes	7.4%	8.2%	6.7%	6.9%
60 minutes or more	8.0%	10.1%	6.4%	7.3%

Source: Census 2000

4.3. TRIP REDUCTION AND POTENTIAL AIR QUALITY BENEFITS

Based on available census data on mode split, a rough projection of future bicycle ridership in Lemon Grove along with the trip reduction and air quality benefits can be made. While these projections are only ambitious estimates, they are important to building a case for investing in bicycle facilities and programs over time. For example, a traffic model is used to project future roadway improvements over time based on a straight-line assumption about auto use, fuel price, and other factors. The projection on bicycle use and benefits differs only in that it forecasts a minor change in modal choice – not travel behavior – based on a combination of empirical and theoretical data. Research conducted throughout the U.S. by the U.S. Department of Transportation shows a definitive link between bicycle use and (a) age and (b) the miles of bicycle facilities provided. It is possible to derive a causal relationship from this information.

Lemon Grove lies within the San Diego Air Basin which is regulated by the San Diego County Air Pollution Control District. The San Diego Air Basin is comprised of 4,225 square miles and covers all of San Diego County. The Basin is in attainment with all Federal standards, and is in non-attainment of only two of the more stringent State standards. Currently, the Basin is classified as non-attainment for the State one-hour ozone and fine particulate matter (PM 10)[1] standards.

According to the San Diego County Air Pollution Control District, motor vehicles are responsible for approximately 50 percent of the smog in San Diego County. Reducing vehicle miles traveled (VMTs)[2] by providing residents safe and functional ways to get to work, school, or shopping without using a motor vehicles will aid in reducing the amount of smog produced by motor vehicle pollution. The current number of daily bicycle commuters (including bike to work, bike to school/college, transit connections, and utilitarian trips) in Lemon Grove is estimated to be 760 riders, making a total of 1,520 daily trips and saving an estimated 3,000 VMTs per weekday. With implementation of the Bicycle Master Plan network and programs, it is estimated that bicycle commuting could increase

[1] PM 10 refers to fine airborne particles, less than 10 micrometers in diameter. Sources of PM 10 include motor vehicle emissions, construction or agricultural dust, wood burning stoves and fireplaces, or industrial activities.

[2] Vehicle Miles Traveled is a measurement of the extent of motor vehicle operation, a sum of all miles traveled by motor vehicles over a given period of time.

to 2,119 daily bicycle riders making 4,239 daily trips and saving an approximately 8,374 VMTs per weekday.

Table 4-3 quantifies the estimated reduction in VMTs in Lemon Grove following implementation of the bicycle network, and the estimated reduction in air pollutants based on the best available local and national data. Under these estimates, the proposed bikeway system in Lemon Grove would increase the bicycle mode share of trips from 0.1% in 2000 (U.S. Census) to 0.3% percent by 2020. While still a relatively low mode split percentage, this increase would represent more than a doubling of the current number of bicyclists in Lemon Grove. This would result in an estimated decrease of 60 tons/day of PM 10, 236 tons/day of reactive organic gases (ROG), and 162 tons/day of nitrogen oxides (NOX).[3]

4.4. BICYCLE SAFETY AND ACCIDENT ANALYSIS

4.4.1. Perceptions of Safety

Safety is a major concern of both existing and potential bicyclists. For those who ride, safety is typically an on-going concern or even a distraction. For those who don't ride, it is one of the most compelling reasons not to ride. In discussing bicycle safety, it is important to separate out perceived dangers versus actual safety hazards.

Bicycle riding on-street is commonly perceived as unsafe because of the exposure of a lightweight, two-wheeled vehicle to heavier and faster moving automobiles, trucks and buses. Actual collision statistics, however, show that bicyclists face only a marginally higher degree of sustaining an injury than a motorist based on numbers of users and miles traveled. Death rates are essentially the same with bicyclists as with motorists. Bicycle-vehicle collisions are much less likely to happen than bicycle-bicycle, bicycle-pedestrian, or collisions caused by physical conditions. The majority of reported bicycle collisions show the bicyclist to be at fault; (due to not obeying basic traffic laws; these often involve younger bicyclists riding on the wrong side of the road or being hit broadside by a vehicle at an intersection or driveway.)

[3] Reactive Organic Gases (ROG) and Nitrogen Oxides (NOX) are known as ozone precursors, because they react in the atmosphere to form smog. The main sources of ROG and NOX are combustion processes, with motor vehicle engines being the single largest source.

Table 4-3
Bicycle Commute and Air Quality Projections

Current Commuting Statistics		Source
Lemon Grove Population	24,918	*2000 US Census*
Number of Employed Persons	12,013	*2000 US Census*
Number of US Census Bicycle-to-Work Commuters	12	*2000 US Census*
Bicycle-to-Work Mode Share	0.1%	*Mode share percentage of Bicycle to Work Commuters*
School Children Grades K-8	5,409	*2000 US Census, population ages 6-14*
Estimated School Bicycle Commuters	270	*5% bicycle mode split for schoolchildren*
Number of College Students	1,928	*2000 US Census*
Estimated College Bicycle Commuters	96	*5% bicycle mode split for college students*
Average daily Lemon Grove Bus and Trolley Boardings	4,400	*MTS, total Lemon Grove boardings for bus lines and Trolley*
Number of daily bike boardings on bus/trolley in Lemon Grove	70	*Based on bike boardings as 1.6% of total boardings on Orange Trolley line*
Utilitarian Bicycle Trips	311	*Calculated from above based on existing estimates*
Existing Bicycle Commuters		
Total Number of Bicycle Commuters	760	*Total of bike-to-work, transit, school, college and utilitarian bicycle trips. Does not include recreation.*
Total Daily Bicycle Trips	1,520	*Total bicycle commuters x 2 (for round trips)*
Reduced Vehicle Trips per Weekday	1,002	*Assumes 73% of bicycle trips replace vehicle trips for adults/college students and 53% for school children*
Reduced Vehicle Miles per Weekday	3,005	*Assumes average round trip travel length of 8 miles for adults/college students and 1 mile for schoolchildren*
Future Bicycle Commuters		
Number of Future Daily Bicycle Commuters	2,119	*Estimated using 279% of baseline from 2000 Los Angeles County MTA study*
Future Bicycle-to-Work Mode Share	0.3%	*Calculated from above*
Future Total Daily Bicycle Trips	4,239	*Calculated from above*
Future Reduced Vehicle Trips per Weekday	2,793	*Calculated from above*
Future Reduced Vehicle Miles per Weekday	8,374	*Calculated from above*
Future Reduced Vehicle Miles per Year	2,115,635	*180 days for students, 256 weekdays for employed persons*
Future Air Quality Benefits		
Reduced PM10 (tons/weekday)	154	*(.0184 tons per reduced mile)*
Reduced NOX (tons/weekday)	418	*(.04988 tons per reduced mile)*
Reduced ROG (tons/weekday)	608	*(.0726 tons per reduced mile)*
Reduced PM10 (tons/year)	38,927	*(.0184 tons per reduced mile)*
Reduced NOX (tons/year)	105,528	*(.04988 tons per reduced mile)*
Reduced ROG (tons/year)	153,595	*(.0726 tons per reduced mile)*

Sources as noted in the table.
PM10 = fine particulate matter, NOX = nitrogen oxides, ROG = reactive organic gases.

4.4.2. Collision Data

Data for reported bicycle collisions were collected for the calendar years 2002 to 2004 in Lemon Grove, and are presented in **Table 4-4**.

Table 4-4
Summary of Reported Bicycle Collisions in Lemon Grove 2002-2004

Street 1	Street 2	Primary Collision Factor	Year
Madera Street	Massachusetts Avenue	Unknown	2002
Golden Avenue	Adams Avenue	Vehicle Code Violation	2002
Lemon Grove Avenue	Eldora Street	Vehicle Code Violation	2002
Massachusetts Avenue	San Miguel Avenue	Vehicle Code Violation	2003
Washington Street	Palm Street	Vehicle Code Violation	2003
Broadway	Buena Vista Avenue	Vehicle Code Violation	2003
Lemon Grove Way	Grove Street	Vehicle Code Violation	2003
New Jersey Avenue	Madison Avenue	Vehicle Code Violation	2003
Broadway	Massachusetts Avenue	Vehicle Code Violation	2003
Lincoln Street	School Lane	Vehicle Code Violation	2003
Massachusetts Avenue	Broadway	Vehicle Code Violation	2003
Buena Vista Avenue	Lemon Avenue	Vehicle Code Violation	2003
Broadway	Broadway	Vehicle Code Violation	2003
Broadway	Sweetwater Road	Vehicle Code Violation	2004

Source: California Highway Patrol, April 2005.

As shown, there were 14 bicycle-related collisions reported in Lemon Grove from 2002 to 2004. The collision locations are spread throughout Lemon Grove, although certain locations recorded higher than average accident rates. Of the motor vehicle versus pedestrian collisions in Lemon Grove between 2002 and 2004, thirty six percent (36%) occurred along Broadway. Accidents involving bicycles were also concentrated along Massachusetts at twenty nine percent (29%). The 2002-2004 accidents may have had varied causes, however ninety three percent (93%) are attributable to vehicles sideswiping or broadsiding bicyclists.

The San Diego County Sheriff's Department enforces all traffic laws in Lemon Grove for bicycles and motor vehicles as part of their regular duties. Violations may include bicyclists who break traffic laws, as well as motorists who disobey traffic laws and make the cycling environment more dangerous. The level of

enforcement depends on the availability of officers. The Sheriff's Department also responds to particular needs and problems as they arise. In addition, an important function of the sheriff's department is filing reports for accidents involving bicyclists. A record should be kept, accessible to other city departments including Engineering Services and Community Development, on where, when and how collisions between bicyclists and cars and bicyclists and pedestrians occur. For the City's bicycle planning effort, these departments should continue to review and monitor bicycle and pedestrian accident data to improve safety through the bicycle network.

4.5. BICYCLIST NEEDS

The purpose of reviewing the needs of bicyclists is twofold: (a) it is instrumental when planning a system that must serve both commuter and recreational user groups; and (b) it is useful when attempting to quantify future usage and benefits to justify expenditures of resources. According to a nationwide 1991 Lou Harris Poll, it was reported that "...nearly 3 million adults (about one in 60) already commute by bike, and projected the number could rise to 35 million if more bicycle friendly transportation systems existed." In short, there is a large reservoir of potential bicyclists who do not ride (or ride more often) simply because they do not feel comfortable using the existing street system and/or don't have appropriate bicycle facilities at their destination.

Key general observations about bicycling needs in Lemon Grove include:

- Bicyclists are typically categorized as experienced or casual riders. The U.S. Department of Transportation identifies thresholds of traffic volumes, speeds, and curb lanes where less experienced bicyclists begin to feel uncomfortable. For example, on an arterial with traffic moving between 30 and 40 miles per hour, less experienced bicyclists prefer bike lanes while more experienced bicyclists can comfortably use streets with wide curb lanes.
- Casual riders include those who feel less comfortable negotiating traffic. Others such as children and the elderly may have difficulty gauging traffic, responding to changing conditions, or moving rapidly enough to clear intersections.
- Casual riders may perceive riding on sidewalks as being a safer alternative than bicycling on-street on major roads, when in fact sidewalk riding is inherently more dangerous due to the fact that most motorists aren't expecting a bicyclist to emerge from the sidewalk at the many driveways and intersections along a sidewalk segment. Wrong-way sidewalk riding is of particular concern.
- Other attributes of the casual bicyclist include cycling shorter distances than the experienced rider and unfamiliarity with many of the rules of the road.
- The casual bicyclist will benefit from route markers, bike lanes, wider curb lanes, and educational programs. Casual bicyclists may also benefit from marked routes that lead to parks, schools, shopping areas, and other destinations.

- Experienced bicyclists include those who prefer the most direct, through route between origin and destination, and a preference for riding within or near the travel lanes. Experienced bicyclists negotiate streets in much the same manner as motor vehicles, merging across traffic to make left turns, and avoiding bike lanes and shoulders that contain gravel and glass. The experienced bicyclist will benefit from wider curb lanes and loop detectors at signals. The experienced bicyclist who is primarily interested in exercise will benefit from loop routes that lead back to the point of origin.
- Bicycles themselves range in cost from about $200 to over $2,000 for adult models. The most popular bicycle types today are the hybrid or mountain bike. These relatively lightweight bicycles feature wider tires that can handle both on-road and off-road conditions, from 10 to 27 gears, and upright handlebars. Advanced versions have features such as front and rear shocks to help steady the rider on rough terrain. The "10-speed" bicycles of years past have evolved into a sophisticated ultra-light "road bike" that is used primarily by the serious long distance adult bicyclists. These machines feature very narrow tires that are more susceptible to flats and blowouts from debris on the roadway.
- Who rides bicycles? While the majority of Americans own bicycles, most of these people are recreational riders who ride relatively infrequently. School children between the ages of about 6 and 14 typically make up a large percentage of the bicycle riders today, often riding to school, parks, or other local destinations on a daily basis, weather permitting. The serious adult road bicyclist who may compete in races, "centuries" (100 mile tours) and/or ride for exercise makes up a small, but important, segment of bikeway users, along with serious off-road mountain bicyclists, who enjoy riding on trails and dirt roads. Other bicyclists include lower-income people for whom the bicycle is their only transportation option, and are riding by necessity to work or for shopping. The single biggest adult group of bicyclists is the intermittent recreational rider who generally prefers to ride on pathways or quiet side streets.

4.5.1. Recreational Bicyclist Needs

The term "recreational" cyclist covers a broad range of skill and fitness levels. Recreational cyclists can range from a "roadie" who joins 50 mile group rides on weekends, to a family with young children who occasionally want to ride a couple miles down a quiet bike path, and all levels in between. A cyclist's level of skill, fitness, and comfort on the road will determine what type of facility they are looking for. The needs of recreational bicyclists must be understood prior to developing a system or set of improvements. While it is not possible to serve every neighborhood and every need, a good plan will integrate recreational needs to the extent possible. The following points summarize recreational needs:

- Recreational users cover all age groups from children to adults to senior citizens. Each group has its own abilities, interests, and needs.
- Directness of route is typically less important than routes with less traffic conflicts, visual interest, shade, and protection from wind, moderate gradients, or other features.

- People exercising or touring often (though not always) prefer a loop route rather than having to backtrack.

In order to characterize the differences in recreational cyclists, this study breaks this category into two subcategories: "Road Cyclists" and "Casual Cyclists," acknowledging that these are generalizations and that the average cyclist may have attributes of both user groups.

Road Cyclists

Road cyclists are those who will bike almost exclusively on street, because roadways are the type of facility that accommodates their desire for 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. In fact, special cycling clothing and shoes and the lack of a bicycle lock, tends to limit the ability of the road cyclist to park and walk around off the bike.

Due to the relatively narrow width and thin casing of standard road bike tires, road cyclists are often susceptible to flat tires. As such, road cyclists are very concerned about glass, rocks, and other debris on the road or in the shoulder. In addition, loose material on the road such as sand or gravel can cause skinny road tires to lose traction and wash out on curves. Since most road debris tends to end up in the shoulder, road cyclists will tend to merge into the travel lane if any debris is present in the shoulder that might cause a flat tire or other hazard. This can sometimes lead to conflicts with motor vehicles, as many motorists don't understand why a cyclist is riding in the lane if there is a seemingly good shoulder available. This points to the need for regular sweeping and maintenance of bicycle facilities; even if the facilities are in place, bicyclists will not use them if they are poorly maintained.

Although very dependent on the fitness level of the rider, topography is less of a limiting factor for road cyclists; in fact, many road cyclists seek out routes that involve challenging and scenic terrain, which is often hilly. Hilly topography is a dominant characteristic of Lemon Grove and opportunities for hill riding abound.

Casual Cyclists

Casual recreational cyclists are those who generally want to ride on off-street bike paths, are seeking a more relaxed cycling experience, and cover shorter trip distances at slower speeds. Casual cyclists will tend to do trips of less than 10 miles in length, and often ride more comfort-oriented bikes, hybrid or mountain bikes. Casual cyclists may ride as a family group, with children, and because they are more likely to ride with others of varying skill and fitness levels, flat topography is generally desired. Casual cyclists are typically not comfortable riding in traffic, and will avoid riding on busy streets when possible, riding on the sidewalk if necessary. Bike routes that extend through low-traffic residential

streets are generally acceptable for casual cyclists, even if they are not the most direct route between destinations. Casual cyclists may load their bikes in their cars and drive to a bike path, and are more likely in need of parking areas. Having recreational amenities and features along the route is more important to the casual cyclists, such as drinking fountains, shaded areas, picnic tables, interpretive signs, and scenic vistas. Recreational destinations are also important for casual cyclists, as they provide a place to stop and get off the bike and walk around. To this end, having secure bike parking at destinations is important.

4.5.2. Commuter Bicyclist Needs

As this plan for enhancing and developing bicycle facilities, and available state and federal bicycle funding is primarily focused on commuting cyclists – those riding to work or school, or for shopping, errands, and other utilitarian trips – it is important to understand the specific needs of bicycle commuters.

Commuter bicyclists in Lemon Grove include employees who ride to work, children who ride to school, and people riding to destinations such as downtown businesses or neighborhood parks. Millions of dollars have been spent throughout the United States attempting to increase the number of people who ride to work or school, with moderate success. Bicycling requires shorter commutes, which runs counter to many of our nation's past land use and transportation policies, which effectively encouraged people to live further, and further from where they work. Access to transit helps extend the commute range of cyclists, but transit systems also face an increasingly dispersed live-work pattern that is difficult to serve.

It should be noted that Lemon Grove recently adopted the Downtown Village Specific Plan, which proposes a mixed-use development that would place residents in close proximity to shopping and transit. This commitment to a more pedestrian and bicycle-friendly land use pattern means that Lemon Grove has the potential to increase the number of people who ride to work, school or shopping. Other factors that contribute to a potential for increased bicycle ridership in Lemon Grove include (a) a temperate climate, and (b) a significant percentage of work commute trips (16%) that are less than 15 minutes in length.

For example, bicycle commuters in the City of Davis have reduced peak hour traffic volumes by over 15 percent -- to the point that many downtown streets that would normally be four lanes of traffic (with no bike lanes) have only two traffic lanes and ample room for bicyclists. While Davis may be an anomaly, national surveys have indicated that about 20 percent of the adult population would use a bicycle to ride to work at least occasionally if there were a properly designed bikeway system.

Key commuter needs are summarized below.

- Commuter walking or bicycling typically falls into one of two categories: (1) adult employees, and (2) younger students.
- Adult employee commuters may be further broken down into "by choice" and "by necessity." "By Choice" commuters may own motor vehicles, but choose to bicycle to work for a variety of reasons such as avoiding traffic,

health and exercise, or environmental reasons. "By Necessity" commuters are typically lower income residents who may not own a motor vehicle at all (or even have a drivers license), and use the bicycle as their primary transportation mode.

- Commuter trips range from several blocks to one or more miles.
- Commuters typically seek the most direct and fastest route available. Many experienced "By Choice" adult commuters are comfortable riding on-street, often preferring to ride on arterials rather than side streets. "By Necessity" commuters are often less experienced cyclists who are not aware of the rules of the road and are more likely to ride on the sidewalk or ride in the wrong direction on-street.
- Unprotected intersection (no traffic control device such as a signal or stop sign) crossing locations are major concerns of all bicycle commuters.
- Commute periods typically coincide with peak traffic volumes and congestion, increasing the exposure to potential conflicts with vehicles.
- Places to securely store bicycles are of paramount importance to all bicycle commuters.
- Major commuter concerns include changes in weather (e.g. rain), riding in darkness, personal safety and security.
- Many younger students use sidewalks for riding to schools or parks, which is acceptable in areas where pedestrian volumes are low and driveway visibility is high, and the cyclists speed is relatively low. Where on street parking and/or landscaping obscures visibility, sidewalk riders may be exposed to a higher incidence of accidents. Older students who consistently ride at speeds over 10 mph should be directed to riding on street wherever possible.

Commuters and students follow similar paths, which is typically the most direct possible route from origin to destination. For grammar school students, this may consist of residential or collector streets, with few crossings of major arterials. For junior high and high school students, riders may have to cross up to five or six arterials to reach school. For college students and adult commuters, trips are most often under five miles but may be as long as 10 or 15 miles.

Unfortunately, commuters and students need to travel during periods of peak traffic activity, and to destinations that may have high levels of congestion and traffic volumes/speeds. For example, one of the most dangerous parts of a young student's commute is the drop-off zone in front of their school where dozens of vehicles jockey for position.

Once they have arrived at their destinations, bicycle commuters often find no (or poor) bicycle racks, and no showers or lockers. Rather than providing an incentive for bicyclists, most schools and employers inadvertently discourage bicyclists while continuing to subsidize parking for the automobile.

In terms of developing an overall bikeway network, improvements that benefit commuting bicyclists include bike lanes or wider curb lanes along arterials and

collectors, loop detectors at signalized intersections, new signals where school children need to cross busy arterials, adequate maintenance of the pavement, and adequate bicycle storage and showers at their destinations. Local or employer based incentive to encourage bicycling to work could also help to increase the bicycle mode split. Beyond the network development and "engineering" aspects of the plan, commuter bicyclists can benefit greatly from educational programs that emphasize bicycling street skills and safe traffic behavior.

Most commute bicycle trips are under five miles, except for those commuters linking to another mode such as bus transit or trolley. Allowing bicycles on other modes such as rail or bus, or providing bicycle lockers at multi-modal stations help extend the range of the bicycle commuter. Other bicycle commuters will depend on a well-devised local bikeway network produced by a city in its bikeway plan.

4.6. CITIZEN AND COMMUNITY INVOLVEMENT

Public involvement is an important component of the Lemon Grove Bikeway Master Plan Update process. The public outreach process for this project includes release of the Draft Master Plan for a public review period, as well as a public workshop to receive community input to be held in Spring 2006. The workshop will present an overview of the proposed bicycle projects and programs, allow the public a chance to provide comments and ask questions, and allow residents the opportunity give feedback on their top priority projects. Following the public review period and workshop, revisions to the document will be made, a project priority list will be developed, and a Final Bikeway Master Plan will be produced. A summary of comments received at the public workshop will be provided as appendix to the Final Bikeway Master Plan.

5. RECOMMENDED BICYCLE IMPROVEMENTS

The recommended improvements for the Lemon Grove Bicycle Master Plan consist of a bikeway network and bicycle-related support facilities and programs. The primary bikeway network consists of on-street Class II bike lanes and Class III bike routes linking residential neighborhoods, schools, parks, community centers, libraries, employment centers, commercial and retail areas, and providing regional connections. As part of this Bikeway Master Plan, a new Class I Bike Path segment has been recommended that would link to a low-traffic bike route along parallel to Lemon Grove Avenue. The recommended bicycle support facilities and programs include bike parking facilities, maintenance programs, and educational programs.

The bicycle network for this Bikeway Master Plan update was generally carried over from the existing Bicycle Network identified in the General Plan Bicycle Sub-Element. Most of the updated bicycle network recommendations pertain to additional design details for specific constrained areas along the network.

5.1. RECOMMENDED BIKEWAY NETWORK

A bikeway network is a system of bikeways that for a variety of reasons – safety, convenience, destinations served, attractiveness – provides a superior level of service for bicyclists. It is important to recognize that, by law, bicyclists are allowed on all streets and roads regardless of whether they are a part of the designated bikeway network. The bikeway network serves as a tool that allows the City to focus and prioritize bicycle facility implementation efforts where they will provide the greatest benefit to bicyclists and the community at large.

Since adoption of the existing Bicycle Sub-Element in 1996, the City of Lemon Grove has implemented nearly all of the Phase I Class II Regional Facilities identified in that plan. These include bike lanes along Massachusetts Avenue, Broadway, Palm Avenue/Troy Street, Lemon Grove Avenue, Kempf Street/ Skyline Drive, Grove Street and Buena Vista Avenue/Waite Drive. Along several of these facilities, discontinuous segments or gaps in the Class II facilities exist at constrained areas. This plan contains a number of specific design recommendations to enhance those existing gaps in the Class II network.

In addition, this plan recommends that the city continue with implementation of the identified Citywide network by moving toward implementing the Phase II projects. Phase II projects are facilities intended to provide additional local connectivity to activity centers such as schools, parks and residential areas. The Phase II network includes several Class III bike routes along residential streets.

The Recommended Bikeway Network for Lemon Grove is shown in **Figure 5-1**. The system of bikeways is classified into the standard Caltrans Class I, II, and III bikeway categories discussed in Chapter 2.

The full bikeway network project list for the Bicycle Master Plan is provided at the end of this chapter, starting on page 5-10. The project list also includes some of the specific support facility improvements discussed below. Following the project list, graphics are provided that illustrate the specific facility improvements and enhancements that are recommended.

5.2. RECOMMENDED SUPPORT FACILITIES AND PROGRAMS

Support facilities and programs are an important component of a bicycle transportation system. Support programs (such as bikeway management and maintenance, signing, and promotional/educational programs) and facilities (such as bicycle racks on buses, bicycle parking racks, and showers and lockers for employees) further improve safety and convenience for bicyclists.

5.2.1. Bicycle Parking and End-of-Trip Facilities

The City of Lemon Grove Municipal Code currently requires the provision of bicycle parking for all new projects (public or private property), at a ratio of 1 bicycle space for every 10 parking spaces. Bike racks currently exist at the Trolley stations, at local parks and schools, and at several shopping centers in Lemon Grove. Racks are not present at the downtown commercial area along Broadway. A lack of safe and secure bicycle parking is often noted as a concern of bicyclists who may wish to ride to work or to shop. Theft and vandalism of bicycles, especially now that bicycles are often worth hundreds of dollars, is a major impediment to bicycle riding. Other essential end-of-trip facilities include showers and lockers at places of employment, which provide comfort and greater security for commuters, and encourage more people to bicycle to work.

A systematic program to improve the quality and increase the quantity of bicycle end-of-trip facilities should be implemented in Lemon Grove. For example, the city could look for appropriate public locations to install new bicycle racks (such as sidewalks within the downtown commercial area, parks, of community centers). For existing private locations such as shopping centers, appropriate bicycle racks (e.g. inverted-U's) could be made available to property owners for free or low-cost to encourage the installation of additional bike racks or the replacement of poorly-designed wheelbender racks.

As a general rule, inverted-U type racks bolted into the sidewalk are preferred in shopping centers, to be located intermittently and/or at specific bicycle destinations (e.g. cafes, grocery stores). Some rack manufacturers may be able to provide custom racks that can serve not only as bike racks, but also public artwork or as advertising for a specific business. While these racks can add a creative and fun element to the shopping center, the rack function should not be overlooked: all racks should adhere to the basic functional requirement of supporting the bicycle by the frame (not the wheel) and accepting a U-lock.

[Insert figure 5-1 proposed bikeway network]

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Standard inverted-U racks also are preferred for downtown sidewalk areas, such as in Lemon Grove's planned Downtown Village. The inverted-U should be placed parallel to the street, and should be located within the sidewalk furnishing zone (in line with trees, benches, newspaper racks, etc.) so as not to block pedestrian traffic in the sidewalk through-zone. As an alternate to the standard inverted-U in areas such as the downtown, the City of Lemon Grove may wish to install a decorative bike rack style that serves to add an artistic element or ties to a theme of the streetscape. The "post and ring" style rack is an attractive alternative to the standard inverted-U, which requires only a single mounting point and can be customized to have the city name or emblem stamped into the rings. These racks can also be easily retrofitted onto existing street posts, such as parking meter posts.

Possible alternatives to the inverted-U bike rack include the simple post-and-ring style (top), or a custom artistic rack such as the heart shaped rack in the bottom photo. Both styles allow the bicycle to be secured by the frame with a U-lock. A simple sticker on the top of the rack can illustrate the correct way to park the bicycle. This is especially important in downtown areas where orienting the bicycle incorrectly against the rack (e.g. perpendicular to the rack) may result in the bicycle blocking the sidewalk.

Commuter locations such as major transit stops should provide secure indoor parking, covered bicycle corrals, or bicycle lockers. Installation of multiple capacity "wave" style racks is not recommended due to common misunderstanding of how to properly lock a bike to these racks (users commonly lock their bike parallel to the rack, effectively limiting their capacity to 1 or 2 bikes).

RECOMMENDATIONS

Strengthen the Bicycle Parking Ordinance with Design Requirements

The City of Lemon Grove has already taken an important first step in adopting a bicycle parking ordinance that requires developers to install 1 bicycle rack per 10 parking spaces (Section 17.24.010 (F) of the Zoning chapter of the Lemon Grove Municipal Code). However, a number of racks observed at shopping centers were the "wheelbender" style of rack that supports the bicycle only by a wheel and does not accept a U-lock.

It is recommended that the city amend the Municipal Code to include specific design requirements in the bicycle parking ordinance that require an inverted-U style rack, or other rack type that supports the bicycle frame in at least two points and can accept a U-lock. As noted above, "wave" style racks should generally not be recommended. The Association of Bicycle and Pedestrian Professionals (APBP) *Bicycle Parking Guidelines* document is a good source of information on appropriate bike rack styles and placement. Numerous bike rack vendors offer the inverted-U style rack; these racks are relatively inexpensive, simple to install, minimal and unobtrusive on sidewalks, and well-understood by users.

The City may also want to consider adding a requirement to the Municipal Code that new commercial buildings of a certain size include showers for employees. For example, the City of Palo Alto requires that employee showers be required in all new business, professional, and medical buildings over 10,000 square feet in size.

Amendment to the Municipal Code would be a future process outside of this Bikeway Master Plan process, and would require separate approval by the Lemon Grove City Council.

5.2.2. Safe Routes to School

Phase II of the Bicycle Network includes a number of Class III neighborhood bike routes that will benefit school children who bicycle to school. Identifying and improving routes for children to walk or bicycle to school is one of the most effective means of reducing AM traffic congestion and addressing existing safety problems. Most effective school commute programs are joint efforts of the school district and city, with parent organizations adding an important element.

RECOMMENDATION

Develop a Safe Routes to School Program

Each public and private school in Lemon Grove should conduct its own evaluation of school commute patterns and work with the city to identify corridor and crossing improvements. School commute routes are highly local in nature, requiring extensive and detailed examination of patterns and conditions and local input. School commute improvements were discussed in public and staff comments, due to concerns about current safety and impacts of school-related traffic, and partially because of new State funding opportunities.

School commute projects need to be developed in a traditional planning process that includes (a) school administrators and teachers, (b) local PTAs and other groups, (c) neighborhood groups and the public, (d) local law enforcement, and (e) City transportation engineers. The planning process can be accomplished by these groups using the step-by-step process outlined below, or by enlisting professional services.

5.2.3. Maintenance

The City of Lemon Grove's bikeways need regular maintenance. Typical tasks include repairing damaged and potholed roadway surfaces and clearing plant overgrowth. Bike lanes and bike routes should have regular sweeping to clear debris. Although these latter aspects are generally associated with routine roadway maintenance, special attention to bikeway safety and usability is important and can mean additional costs are incurred. The typical maintenance program for bicycle facilities is provided in Table 5-1.

RECOMMENDATION

Develop a Funding Source for the Bicycle Facility Maintenance Program

Bicycling is an integral part of Lemon Grove's transportation network, and maintenance of the bikeway network should be part of the ongoing maintenance program for all city transportation facilities. As such, bikeway network maintenance should receive an appropriate allocation of the City's transportation maintenance funds.

5.2.4. Bicycle Signal Detection

To enable safe bicycle travel through signalized intersections, bicycles should be detected at the waiting positions used by cyclists proceeding through and turning left. Detection of vehicles and bicycles is performed either with inductive loops

(in-pavement metal detectors carrying a radio-frequency signal, combined with change detection circuitry) or video (overhead cameras combined with image processing software).

RECOMMENDATON

At appropriate signalized intersections (at a minimum, all signalized intersections on the bikeway network), the City should install and mark traffic detection devices (loops or video) that are responsive to bicycles. Signal detectors and stencils identifying where bicyclists place their bicycles to trigger signals should be reviewed and approved by City staff prior to implementation. Specific implementation criteria may include sensitivity, impact of overlay projects, cost, and need. All signal detectors should be checked regularly to ensure that they are functioning correctly.

Details of sawcuts and winding patterns for inductive detector loop types appear on Caltrans Standard Detail ES5B and appear in this document as part of Appendix A. Loop types B (5' square diamond), C (quadruple), D (diagonal-slashed), Q (figure-8) and modified Type E (circle with slash per City of Palo Alto detail) can reliably detect bicycles across their full width. Types A (6' square) and E (unmodified circle) are not bike-sensitive in their center. The state standard bicycle detection marking appears on Caltrans Standard Plan A24C.

Once bicycle loops are installed, the City should ensure that they are tested annually and are calibrated and operable. Standard bicycle detection markings should be applied in the center of the appropriate lane for all loop locations to show cyclists the best place to wait. (For inductive detection this implies that the loop must sense bicycles in its center). As part of the loop detector testing program, the city should ensure that the markings are placed in the proper location above the detector.

For new installation it is recommended that the City use Type D for lead loops in all lanes except bike lanes, where a narrow Type C may be appropriate.

5.2.5. Construction Activities

RECOMMENDATON

Consider impacts on bicycles while performing construction, maintenance and repair work on roadways and trails.

- Provide suitable construction warning signs for any activities that involve work in a designated bikeway.
- Where necessary, provide detour routes around areas undergoing construction.

Detailed guidelines are provided in Appendix E for accommodating bicycles in construction zones.

5.2.6. Bicycle Enforcement

RECOMMENDATION

The San Diego County Sheriff's Department should continue to perform enforcement of vehicle statutes relating to bicycle operation. A particular focus should be on individuals riding the wrong direction, or riding on the sidewalk, as these behaviors increase the chance that a cyclist will be involved in a collision. Enforcement of vehicle laws related to bicycling can serve as an educational tool, as some individuals may simply not understand that they are breaking the law and putting themselves at risk.

5.2.7. Signage and Striping

All bikeway signage on public roadways in Lemon Grove should conform to the signage identified in the 2003 Manual on Uniform Traffic Control Devices (MUTCD) and California Supplement. These documents give specific information on the type and location of signing for bicycle facilities in the Lemon Grove bicycle network. Samples of suggested signage and striping are outlined in Appendix A.

RECOMMENDATION

"SHARE THE ROAD" Signage

For all Class III Bike Route implementation, the City should install "SHARE THE ROAD" signs (MUTCD W16-1) along with the standard "BIKE ROUTE" signage (MUTCD D11-1).

Designated Bikeway Signs

The installation of bikeway signs on all designated bicycle facilities is important to heighten motorist awareness and help cyclists find their way. Installing signage is something that can be implemented easily compared to major striping revisions or bike path construction and should be implemented as a priority. An example of where this applies is on Existing Class III Bike Routes where installation of several signs will complete a designated route.

5.2.8. Multi-Modal Connections

RECOMMENDATION

Transit operators in Lemon Grove – San Diego Trolley and MTS buses – should continue to allow bicycle access on all buses and trains. Bicycle travel to transit stops and stations should be enhanced in order to make the transfer between bicycle and transit travel as convenient as possible. MTS should continue to ensure

that sufficient secure bicycle parking is provided at transit stops in order to facilitate multi-modal connections.

5.2.9. Education Programs

This section covers future efforts to educate bicyclists and motorists, and efforts to increase the use of bicycles as a transportation alternative. Most education and encouragement programs and activities will likely be cooperative efforts between the San Diego County Sheriff's Department, City of Lemon Grove, Lemon Grove School District, SANDAG, and local bicycle groups such as the San Diego County Bicycle Coalition.

The Sheriff's Department and Lemon Grove School District currently work in a variety of ways to educate children and adults on bicycle safety as described in Chapter 2. Unfortunately, statewide trends show that the lack of education for bicyclists, especially younger students, continues to be a leading cause of accidents. For example, the most common type of bicycle accident reported in California involves a younger person (between 8 and 16 years of age) riding on the wrong side of the road in the evening hours. Studies of accident locations around California consistently show the greatest concentration of accidents is directly adjacent to elementary, middle, and high schools.

RECOMMENDATIONS

Continue and Expand Existing Education Programs

Existing school education programs conducted by the Sheriff's Department and School District should be continued and supported by a secure, regular funding source.

For adult education, support the development of local adult bicycle education and safety programs, such as the League of American Bicyclists courses. The city could make small grants available to local non-profit groups (such as the San Diego County Bicycle Coalition) to offset time and materials costs for a certified bicycle education instructor to conduct a class, and to offer the course free to participants. The city could also assist by making meeting space available, such as at a community center or library. Consider partnering with other local jurisdictions to support adult bicycle education efforts.

For bicycle infractions (such as running stop signs) by minors, the Sheriff's Department should continue utilizing "bicycle traffic school" in lieu of fines.

Provide Safety Handbook

A standard safety handbook, such as the *From A to Z By Bike* handbook currently used by the Sheriff's Department, should be made available to each school. Schools should develop a circulation map of the campus and immediate neighborhood showing the preferred circulation and parking patterns and explaining in text the reason behind the recommendations. This circulation map should also be a permanent feature in all school newsletters. Bicycle helmet subsidy programs are available in California and should be used to provide low-cost approved helmets for all school children bicyclists.

Educate Motorists and Bicyclists

Motorist education on the rights of bicyclists and pedestrians is virtually non-existent. Many motorists mistakenly believe, for example, that bicyclists do not have a right to ride in travel lanes and that they should be riding on sidewalks. Many motorists do not understand that they must only pass bicyclists when it is safe to do so and with adequate passing distance. Many motorists do not understand why a bicyclist may need to ride in a travel lane if there is no shoulder or it is full of gravel, glass, or potholes. The term "Share the Road" is a common message that is intended to educate both motorists and bicyclists about their legal rights and responsibilities on the road, and the need to increase courtesy and cooperation to improve safety. Motorists and bicyclists should be educated about the rights and characteristics of bicyclists through a variety of means including:

- Enforce existing traffic laws for both motorists and bicycles (Sheriff's Department responsibility).
- Work with towing companies and emergency clean up crews so they better understand the needs of cyclists.
- Work with contractors, subcontractors and city maintenance and utility crews to ensure they understand the needs of bicyclists and follow standard procedures when working on or adjacent to roadways.
- Produce a brochure on bicycle safety and laws for public distribution (could be produced by variety of government agencies or non-profit groups, with support from the city).

5.2.10. Encouragement Programs

Encouragement programs are vital to the success of the Lemon Grove Bikeway Plan. Encouragement programs work to get more people out of their cars and on bicycles which will help to reduce traffic congestion and air pollution, as well as improve the quality of life in Lemon Grove. However, without community support, the City lacks the resources that are needed to ensure the success of encouragement programs over time. While Lemon Grove's Engineering Department may be responsible for designing and constructing physical improvements, strategies for community involvement will be important to ensure broad-based support – which translates into political support – to help secure financial resources. Involvement by the private sector in raising awareness of the benefits of bicycling can range from small incremental activities by non-profit groups, to efforts by the largest employers in the City. Specific programs are described below.

RECOMMENDATIONS

Facilitate the Development of Employer Incentive Programs

Facilitate the development of employer incentive programs to encourage employees to try bicycling to work include providing bicycle lockers and shower facilities, and offering incentives to employees who commute by bicycle by allowing for more flexible arrival and departure times, and possibly paying for transit or taxis during inclement weather. The City may offer incentives to

employers to institute these improvements through air quality credits, lowered parking requirements, reduced traffic mitigation fees, or other means. Other efforts should include:

- Developing, promoting and publicizing bicycle commuter services, such as bike shops selling commute gear and bike-on-transit policies.
- Creating an annual commuter challenge for area businesses.

Utilitarian and Recreational Trip Incentive Programs

Develop and implement encouragement programs for utilitarian and recreational purposes. Local businesses such as cafes should be involved to encourage customers to use bicycle for their trips. Such efforts may include:

- Implementing a "Bicycle Friendly Businesses" program (City recognizes local businesses that encourage employees or clients to bicycle, through end-of-trip facilities like bike parking, or incentives such as discounts or stipends, or other programs).
- Holding an annual community event to encourage residents to replace one car trip a week with a bicycle trip.
- Supporting the planning and implementation of an annual mass bicycling ride in Lemon Grove to attract new riders, showcase the city, and demonstrate the benefits of bicycling.
- Develop and implement a public education campaign to encourage bicycling, such as advertising on city benches, bicycle lockers, billboards and cable access television.

Bicycle Clunker and Parts Program, Bicycle Repair Program

This program involves obtaining broken, stolen, or other bicycles and restoring them to working condition. The program's dual mission is also to train young people (ages 12 to 18) how to repair bicycles as part of a summer jobs training effort. Bicycles are an excellent medium to teach young people the fundamentals of mechanics, safety, and operation. Young people can use these skills to maintain their own bicycles, or to build on related interests. The program is often staffed by volunteers from local cycling organizations and bicycle shops, who can help build an interest in bicycling as an alternative to driving. The seed money to begin this program often comes from a local private funding source. The proposal submitted to this source should clearly outline the project objectives, operating details, costs, effectiveness evaluation, and other details. The bicycles themselves could be derived from unclaimed stolen bicycles from the Sheriff's department, or from donated bicycles. The program will need to qualify as a Section 501c(3) non-profit organization to offer tax deductions.

Community Bikeway Adoption

Community Bikeway Adoption programs are similar to the widely-instituted Adopt-a-Highway programs throughout the country. These programs identify local individuals, organizations, or businesses that would be interested in "adopting" a bikeway. Adopting a bikeway would mean that person or group would be responsible for maintenance of the bikeway either through direct action or as the source of funding for the City's maintenance of that bikeway. For example, members of a local recreation group may volunteer every other weekend to sweep a bikeway and identify and address larger maintenance needs. Or, a local bike shop may adopt a bikeway by providing funding for the maintenance costs. The managers of an adopted bikeway may be allowed to post their name on bikeway signs throughout the bikeway in order to display their commitment to bicycling in Lemon Grove.

Bike Fairs and Races

Hosting bike fairs and races in Lemon Grove can raise the profile of bicycling in the area and provide entertainment for all ages at the same time. Bike fairs and races, similar to bike-to-work day events and bike rodeos currently hosted by the City, provide an opportunity to educate and encourage current and potential bicyclists. These events can also bring visitors to Lemon Grove who may also contribute to the local economy.

Local Bikeways Map

Producing a local bikeways user map can serve as an important tool for showing bicyclists the designated bikeways in Lemon Grove. Given the relatively small land area of Lemon Grove, a small pocket map of the local bikeways could be produced inexpensively and distributed widely to schools, at city offices, and at major employers. The map could show significant destinations, the location of bicycle parking facilities, connections to bicycle facilities in the neighboring communities. Local businesses, such as the local bike shop may, wish to advertise or sponsor the map, helping to offset printing costs, and the map could be produced in cooperation with the Lemon Grove Chamber of Commerce. The map should be distributed as widely as possible at locations such as city offices, libraries, schools, and bike shops. The Bicycle Map should clearly show the type of facility (path, lane, or route) as well as include basic safety information.

Lemon Grove should also continue to coordinate with SANDAG to ensure that its bikeways are included on future updates to the San Diego Region Bike Map.

Bike-to-Work and Bike-to-School Days

The City of Lemon Grove could participate in the annual Bike-to-Work day in May, in conjunction with the California bike-to-work week activities. City staff could be present at "energizer" stations along key local commuter routes. Local Bike-to-School days should be held annually in conjunction with the Sheriff's Department bicycle education programs. These should include International Walk and Bike to School Day, held in early October each year. The City should consider hosting, sponsoring, or supporting other bicycle events unique to the Lemon Grove community that will encourage more and safer riding.

Marketing the Bicycle Master Plan

The success of the Lemon Grove Bikeway Master Plan depends largely on the community's acceptance and promotion of the Plan's contents. In addition, city departments and commissions should incorporate the policies, objectives and spirit of the Plan into their respective projects and responsibilities. The following steps will help ensure the plan becomes a living document, helping shape Lemon Grove's future.

- Distribute copies of the Bikeway Plan to members of the City Council, Planning Commission, and Traffic Advisory Committee.
- Distribute copies of the Plan to City of Lemon Grove's Community Development, Recreation Services and Engineering Services Departments, the Redevelopment Agency, and the San Diego County Sheriff's Department.
- Provide copies of the Lemon Grove bicycle network map to local schools, bicycle and recreational groups, MTS and San Diego Trolley, SANDAG, the local bicycle shop, and major employers.

5.3. RECOMMENDED NETWORK PROJECTS

The recommended Lemon Grove bikeway network shown in Figure 5-1 focuses on implementing the Phase II local bikeways to complete the city's comprehensive bikeway network.

The following facilities were identified in the Bicycle Facilities Sub-Element of the Lemon Grove General Plan, but have not yet been implemented. They are carried over as recommended facilities for this plan:

- Canton Drive Class II Bike Lanes
- Madera Street Class II Bike Lanes
- San Miguel Avenue Class III Bike Route
- Buena Vista Avenue (south of Broadway) Class III Bike Route
- Washington Street (Palm to Alton) Class III Bike Route
- Alton Drive (Washington to Skyline) Class III Bike Route
- Cypress Avenue (Lemon Grove Avenue to Alton) Class III Bike Route

Cross sections and associated improvements for the proposed Class II bike lane facilities on Canton Drive and Madera Street are described in the following section. The proposed Class III bike routes would involve shared travel lanes and would not require altering the existing roadway lanes. For Class III facilities, standard Caltrans "BIKE ROUTE" signage, along with "SHARE THE ROAD" would be the recommended treatment.

In addition to the recommended Phase II facilities, several new bicycle network projects are recommended as part of this plan. These projects are primarily

intended to enhance gaps or problem areas in the existing network, and include the following:

- College Avenue (at SR-94 Undercrossing) Class III Enhancements
- Massachusetts Avenue (at SR-94 Undercrossing) Class II Bike Lanes
- Broadway (Massachusetts to Federal) Class III Enhancements
- Federal (College to Broadway) Class III Bike Route Enhancements
- Federal (Central to West City Limit) Class II Bike Lanes
- Palm Street Class II Bike Lane Enhancements
- Washington Street (Palm to Broadway) Class III Bike Route
- San Altos Place / Main Street Bike Path and Route
- Broadway (Olive to Kempf) Class II Upgrade

Cross sections and associated improvements for these new recommended projects are also described in the following section.

A complete street-by-street listing for all recommended bikeway facilities, with segment lengths and cost estimates, is provided in Chapter 6, Implementation.

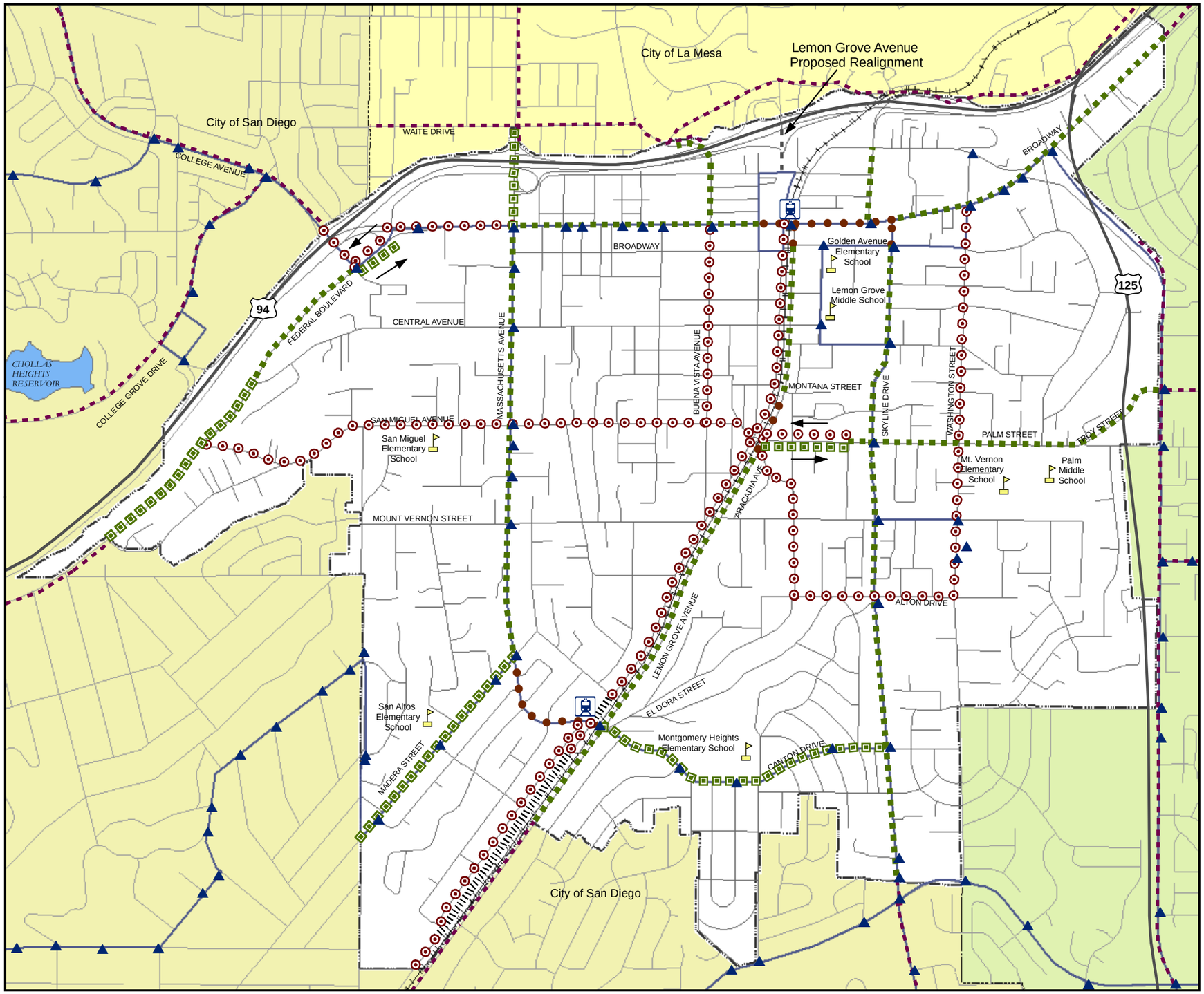


FIGURE 5-1 LEMON GROVE EXISTING AND PROPOSED BIKEWAY NETWORK

Legend

Proposed Bikeways

- Class I
- Class II
- Class III

Existing Bikeways

- Bike Lane (Class II)
- Bike Route (Class III)
- Bikeway in Adjacent Municipality
- Bus Route
- Trolley - Orange Line
- Trolley Stop
- Bus Stop
- School
- Lemon Grove City Limits

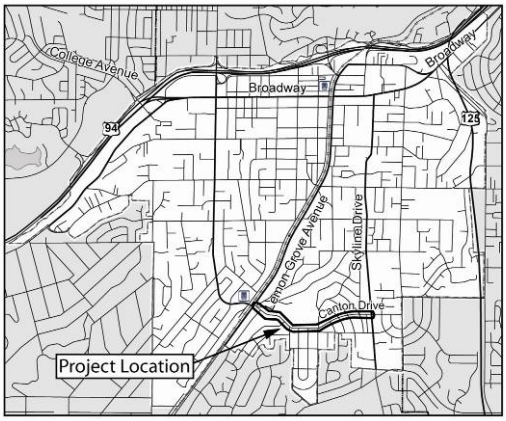
0 0.25 0.5 Miles

PHASE II BIKE LANE IMPLEMENTATION PROJECT

CANTON DRIVE BIKE LANES (LEMON GROVE AVE. TO SKYLINE DR.)

Project Description and Location

The existing Bicycle Facilities Sub-Element recommends that Class II bike lanes be implemented on Canton Drive between Lemon Grove Avenue and Skyline Drive. Right-of-way is constrained along Canton Drive; the roadway is 40' wide with one travel lane and on-street parking on each side. In order to implement a Class II option, parking would need to be removed on one side of the street as shown below in Option A. (This design recommendation has been carried forward from the existing Bicycle Facilities plan.) In order to maintain parking on both sides, bikeway implementation would be limited to a Class III as shown in Option B. City staff should work with residents to determine the preferred option for this segment to be implemented as part of Phase II bikeway network development.



Design Issues

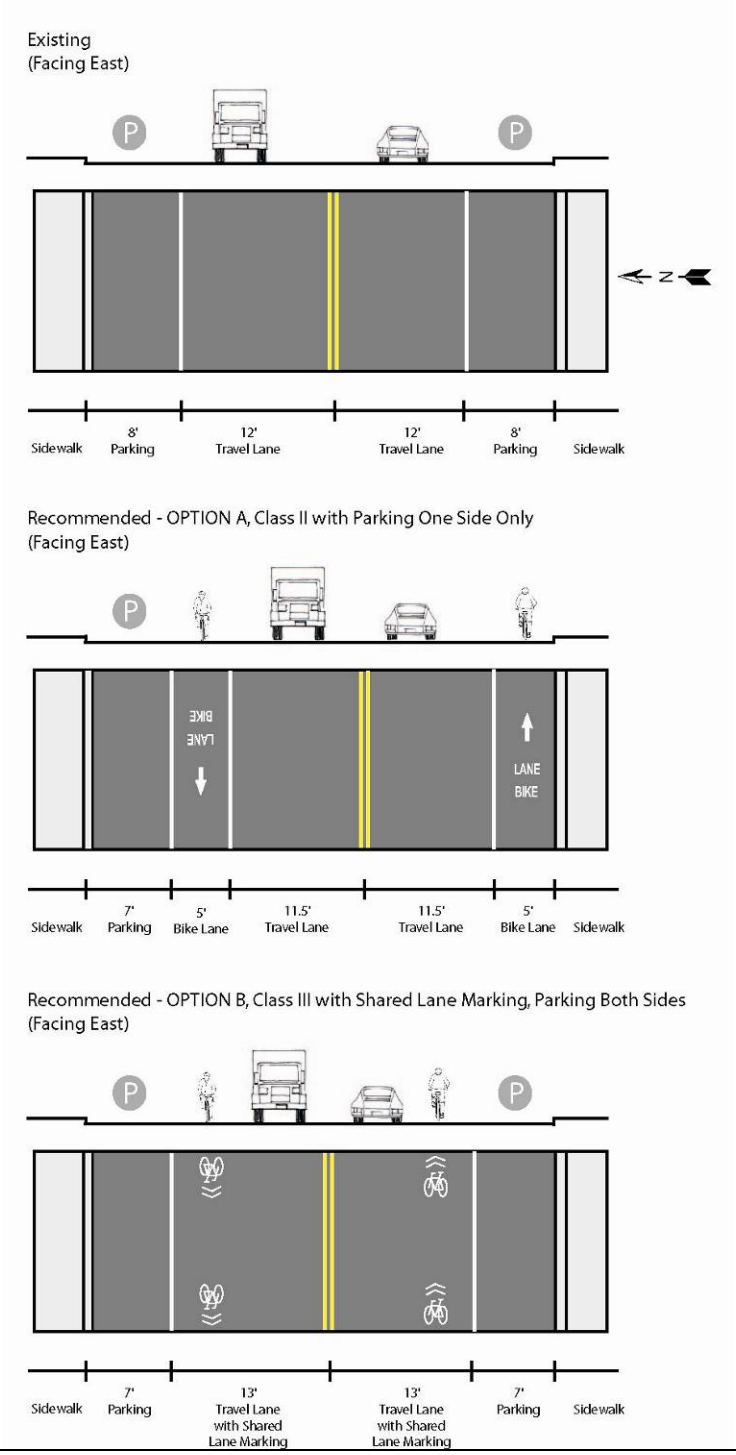
Constraints:

- Limited right-of-way
- On-street parking

Improvement Options:

- Option A: Retain parking on one side of street only; south (eastbound) side appears to have least number of residential frontages that would be disturbed by loss of parking. Further study/outreach necessary.
    - 5' bike lane adjacent to 7' parking lane in one direction; 5' bike lane adjacent to curb in other direction
    - Travel lane width 11.5' in each direction
- Option B: Restripe roadway to 7' parking lanes on both sides, and 13' wide shared travel lanes. Sign as a Class III route with SHARE THE ROAD signs. Consider installing the Shared Lane Marking.

Graphic:



Cost Estimate

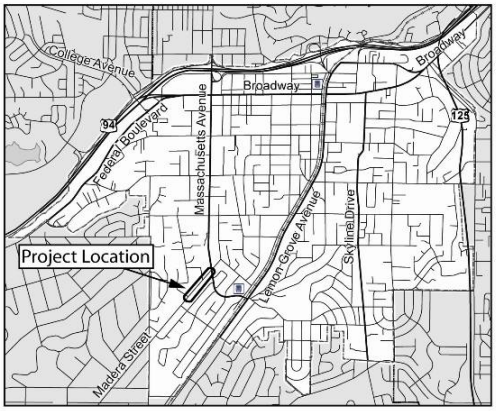
Total estimated cost Option A: $71,700
Total estimated cost Option B: $48,000

PHASE II BIKE LANE IMPLEMENTATION PROJECT

MADERA STREET BIKE LANES (MASSACHUSETTS AVE. TO SONOMA LN.)

Project Description and Location

The existing Bicycle Facilities Sub-Element recommends Class II Bike Lanes for Madera Street from Massachusetts Avenue to the City Limit. Between Massachusetts and Sonoma, parking would be maintained on one side of the road only. This design recommendation has been carried forward from the existing Bicycle Facilities plan, and should be implemented as part of the Phase II bikeway network development.



Design Issues

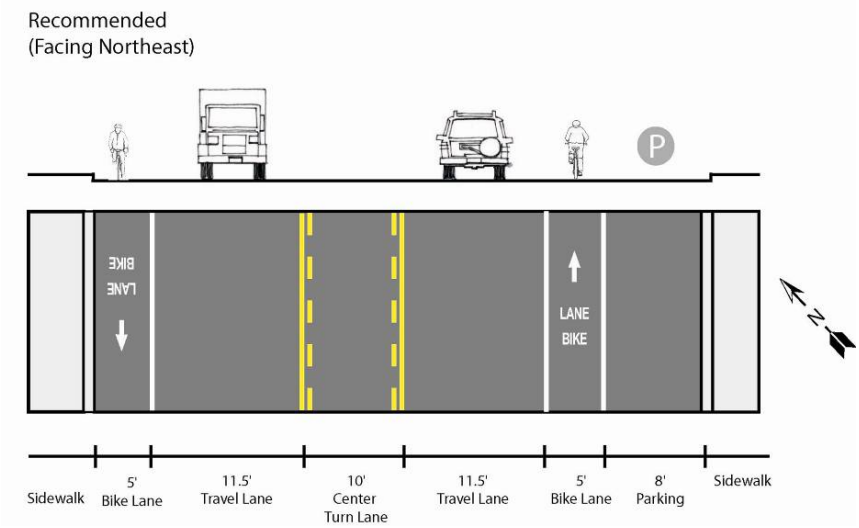
Constraints:

- Limited right-of-way width
- On-street parking

Improvement Options:

- Retain parking on one side of street only; north (westbound) side appears to have least number of residential frontages that would be disturbed by loss of parking. Further study/outreach necessary.
- 5' bike lane adjacent to 8' parking lane in one direction; 5' bike lane adjacent to curb in other direction
- Travel lane width 11.5' in each direction
- 10' center turn lane

Graphic:



Cost Estimate

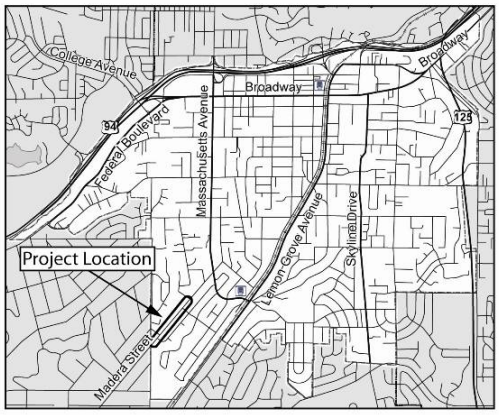
Total estimated cost: $26,100

PHASE II BIKE LANE IMPLEMENTATION PROJECT

MADERA STREET BIKE LANES (SONOMA LANE TO WEST CITY LIMITS)

Project Description and Location

The existing Bicycle Facilities Sub-Element recommends Class II Bike Lanes for Madera Street from Massachusetts Avenue to the City Limits. Between Sonoma Lane and the City Limits, pavement width is sufficient to maintain parking on both sides of the road in addition to bike lanes. This design recommendation has been carried forward from the existing Bicycle Facilities plan, and should be implemented as part of the Phase II bikeway network development.



Design Issues

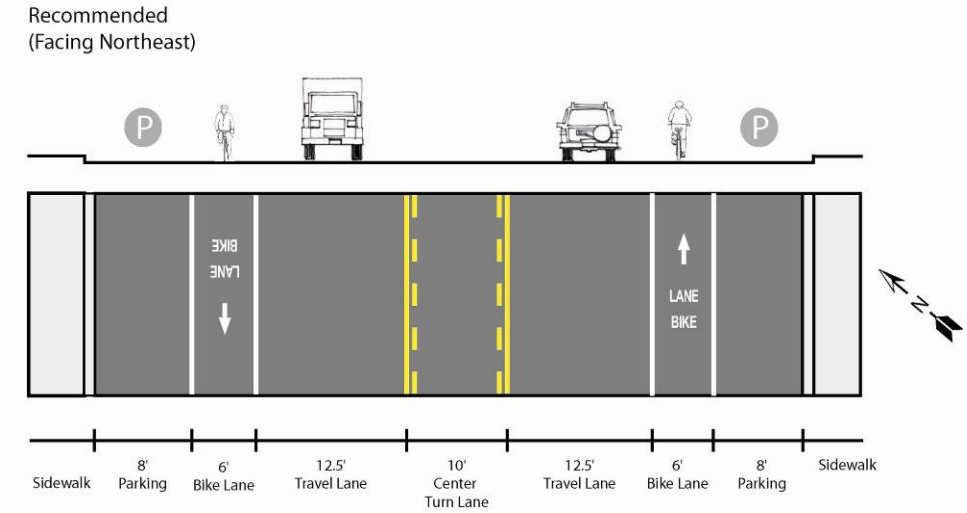
Constraints:

- No existing bicycle facilities
- On-street parking

Improvement Options:

- 6' bike lanes in each direction
- Maintain 8' parking lanes on both sides
- Travel lanes reduced to 12.5' each direction
- 10' center turn lane

Graphic:



Cost Estimate

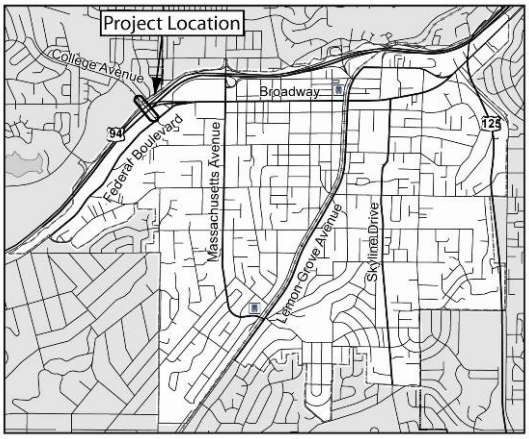
Total estimated cost: $29,400

BIKEWAY NETWORK GAP ENHANCEMENT PROJECT

COLLEGE AVENUE AT SR-94 (FEDERAL BLVD. TO NORTH CITY LIMITS)

Project Description and Location

The segment of College Avenue at the SR-94 undercrossing currently has 13' outside lanes in each direction, with no striped shoulders. This is a challenging segment for cyclists to navigate, particularly in the northbound direction where the speed difference is greater between uphill cyclists and vehicles. It is recommended that the lane striping be narrowed to provide a separate shoulder for bicyclists through this segment. Narrowing the inside travel lanes to 12' and the outside travel lanes to 11' would provide width for a 3' shoulder adjacent to the curb. While not sufficient to meet Caltrans Class II bikeway standards, the 3' shoulder would still provide an additional measure of width between cyclists and motorists by helping to position motorists farther away from the curb.



Design Issues:

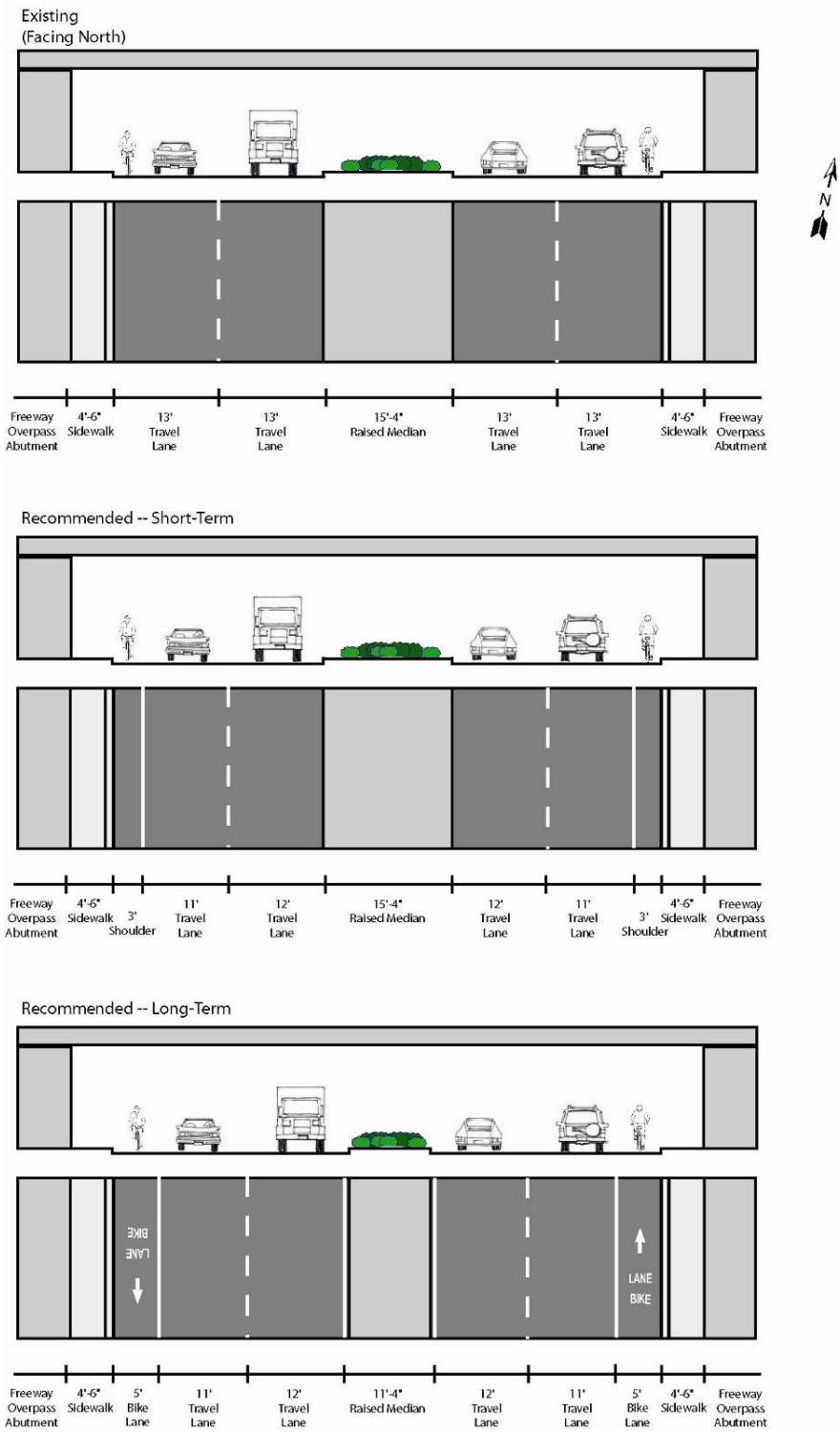
Constraints:

- Relatively narrow 13' outside travel lanes shared by bicyclists and motor vehicles
- In northbound (uphill) direction, speed difference between bicycles and vehicles makes navigating this segment challenging

Improvement Options:

- 3' shoulder striping through undercrossing area
- Narrow inside travel lanes to 12', outside travel lanes to 11'
- Install SHARE THE ROAD signage in both directions through segment
- Long-term reduction of raised median width could provide additional width for standard 12' travel lane widths and full 5' wide Class II bike lanes in each direction
- Consider installing "BEGIN RIGHT TURN LANE, YIELD TO BIKES" signage (MUTCD R4-4) at all right-turn only locations along this segment
- Install the bicycle warning sign (MUTCD W11-1) at all off-ramps of SR-94 along this segment.

Graphic:



Cost Estimate

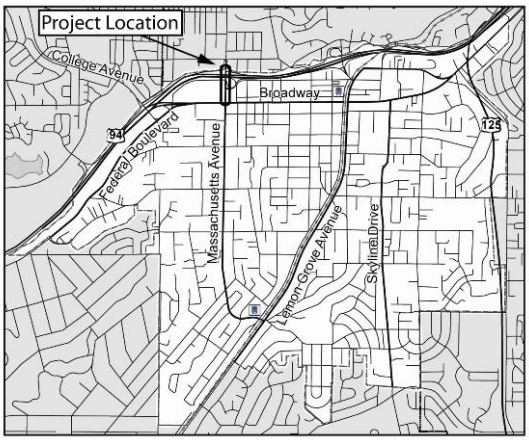
Total estimated short term cost: $11,000 (does not include median reduction)
Total estimated long-term cost: $64,900 (includes median reduction)

BIKEWAY NETWORK GAP ENHANCEMENT PROJECT

MASSACHUSETTS AVE. AT SR-94 (BROADWAY TO NORTH CITY LIMITS)

Project Description and Location

The segment of Massachusetts Avenue from Broadway to the North City Limits currently has wide travel lanes in both directions, but no striped shoulders or designated bicycle facilities. This is a challenging segment for cyclists to navigate, particularly in the northbound direction where the speed difference is greater between uphill cyclists and vehicles. It is recommended that the lane striping be narrowed to provide a 5' striped Class II bike lane in each direction. Narrowing the inside travel lanes to 12' and the outside travel lanes to 11' (southbound) and 12' (northbound) would provide width for a full 5' Class II bike lane adjacent to the curb. This bike lane would provide a definitive separation between motor vehicles and bicyclists through this segment. This facility would connect to existing Class II bike lanes on Massachusetts Avenue heading north into the City of La Mesa bicycle network.



Design Issues

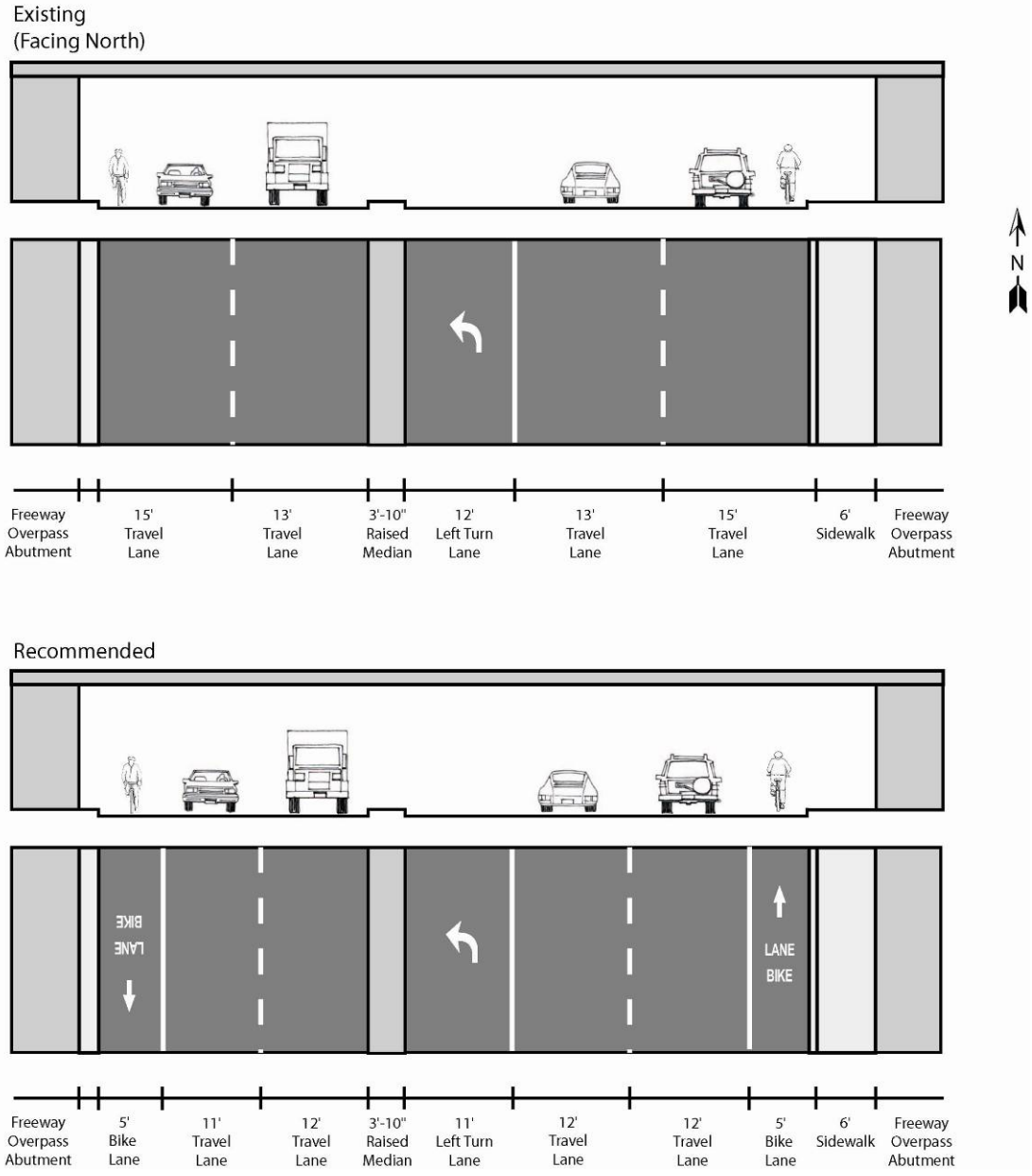
Constraints:

- Although outside travel lanes are relatively wide, there is a lack of shoulder stripe or bike lanes
- In northbound (uphill) direction, speed difference between bicycles and vehicles makes navigating this segment challenging

Improvement Options:

- 5' Class II Bike Lane from Broadway to North City Limit, including undercrossing area
- Narrow inside travel lanes to 12', outside travel lanes to 11' (southbound) and 12' (northbound)
- Install SHARE THE ROAD signs in northbound direction at approach to SR-94 eastbound on-ramp
- Consider Shared Lane Marking in southbound direction approaching SR-94 westbound on-ramp, where bicyclists must merge to avoid right-turning traffic. Also consider installing "BEGIN RIGHT TURN LANE, YIELD TO BIKES" signage (MUTCD R4-4).
- Install the bicycle warning sign (MUTCD W11-1) at all off-ramps of SR-94 along this segment.

Graphic:



Cost Estimate

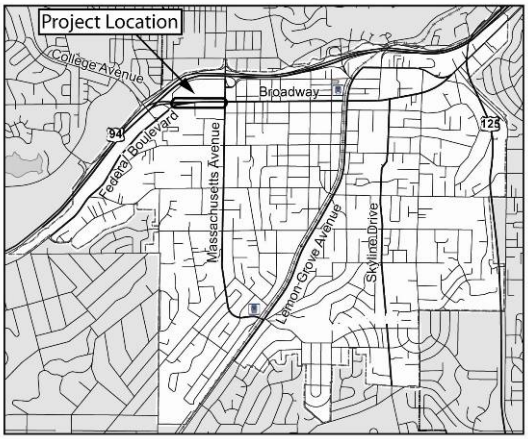
Total estimated cost: $30,200

BIKEWAY NETWORK GAP ENHANCEMENT PROJECT

BROADWAY BETWEEN MASSACHUSETTS AVE. AND FEDERAL BLVD.

Project Description and Location

The segment of Broadway between Massachusetts Avenue and Federal Boulevard is currently a gap in the Broadway-Federal Boulevard east-west bikeway. Westbound cyclists in particular have a difficult movement as they turn left from Broadway onto Federal, then must merge right across the lane of traffic exiting SR-94. Eastbound cyclists must share a narrow (11') outside travel lane with vehicles that are often queued along this segment during peak periods.



Design Issues

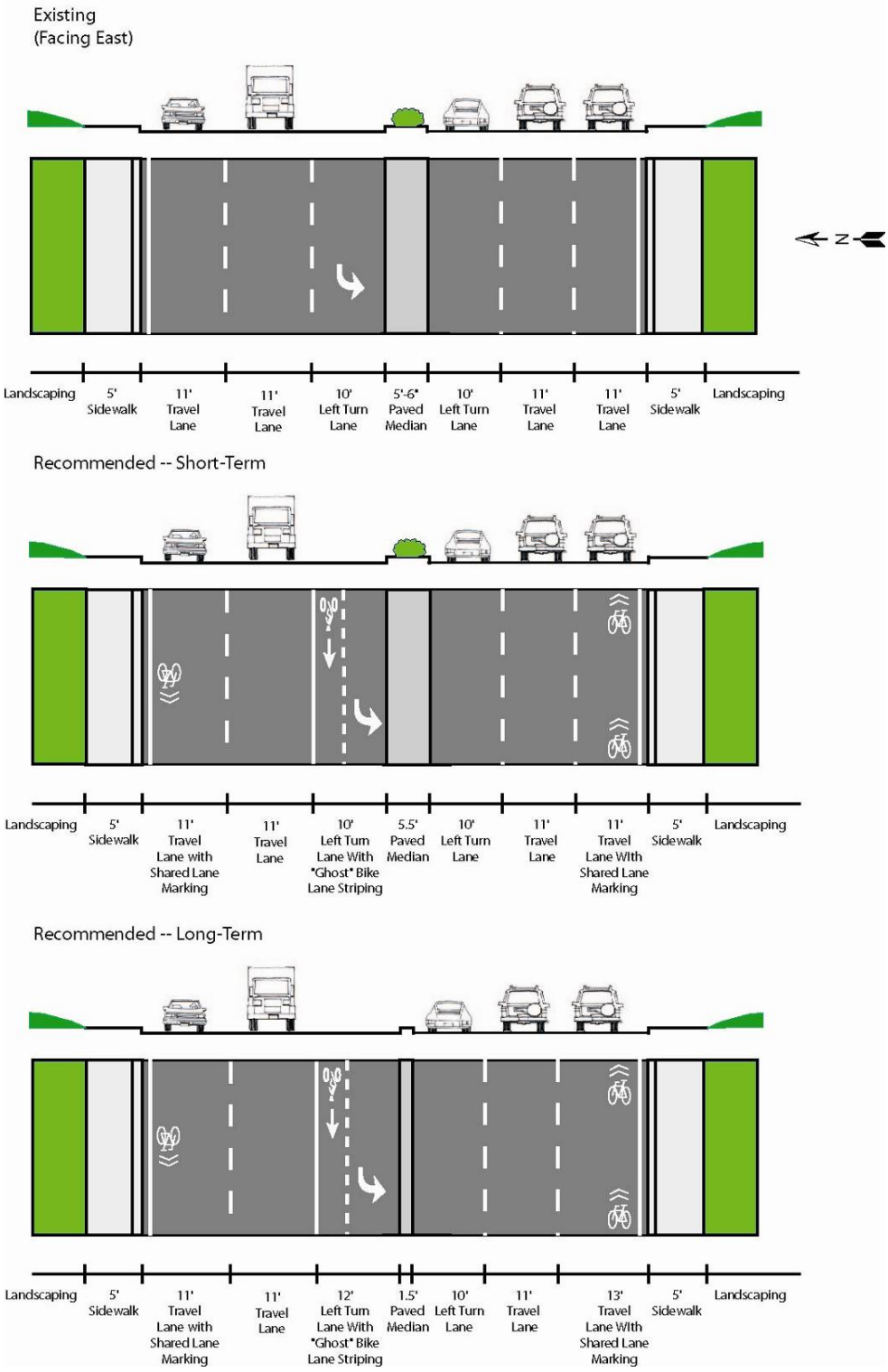
Constraints:

- Narrow travel lanes, gap in existing bikeway network along Broadway
- Traffic often queues along this segment during peak periods, resulting in some bicyclists riding on the sidewalk or riding along narrow gaps along the line of cars.
- Constrained right-of-way, traffic volumes do not permit eliminating a travel lane

Improvement Options:

- Shared lane markings along outside lane in eastbound and westbound directions on Broadway from Federal Boulevard to Massachusetts Avenue.
- "Ghost" bike lane striping along right side of left turn lane in westbound direction, for transition for through-cyclists from Broadway to Federal. In long term, raised median could be narrowed to provide additional width in the eastbound outside travel lane (13') and in the westbound left turn lane (12'). Shared lane markings could also be considered for the left turn lane area.
- Long-term reduction of raised median would provide additional width for left turn lane for shared use by bicyclists
- Install SHARE THE ROAD signage in both directions along this segment
- In westbound direction install directional signage indicating the need for through cyclists to make the left turn movement. Signage should be installed well in advance of merge area.
- Install bicycle loop detectors in westbound left turn lane

Graphic:



Cost Estimate

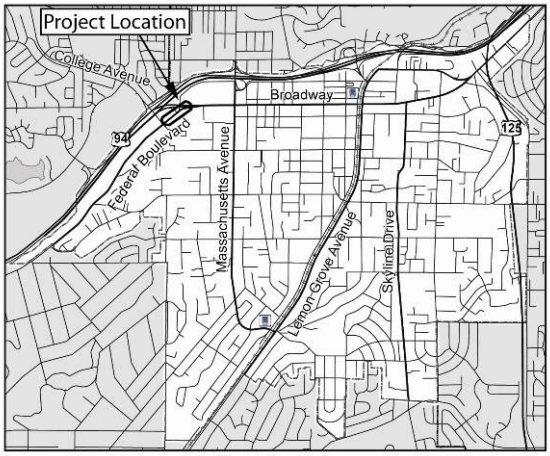
Total estimated short term cost: $8,100
Total estimated long term cost: $129,300 (includes narrowing median)

BIKEWAY NETWORK GAP ENHANCEMENT PROJECT

FEDERAL BOULEVARD BETWEEN COLLEGE AVENUE AND BROADWAY

Project Description and Location

The segment of Federal between College and Broadway is currently a gap in the Broadway-Federal east-west bikeway. Westbound cyclists in particular have a difficult movement as they turn left from Broadway onto Federal, then must merge right across the lane of traffic exiting SR-94. Once onto Federal, cyclists in both directions must share narrow (12') travel lanes with no striped shoulders.



Design Issues

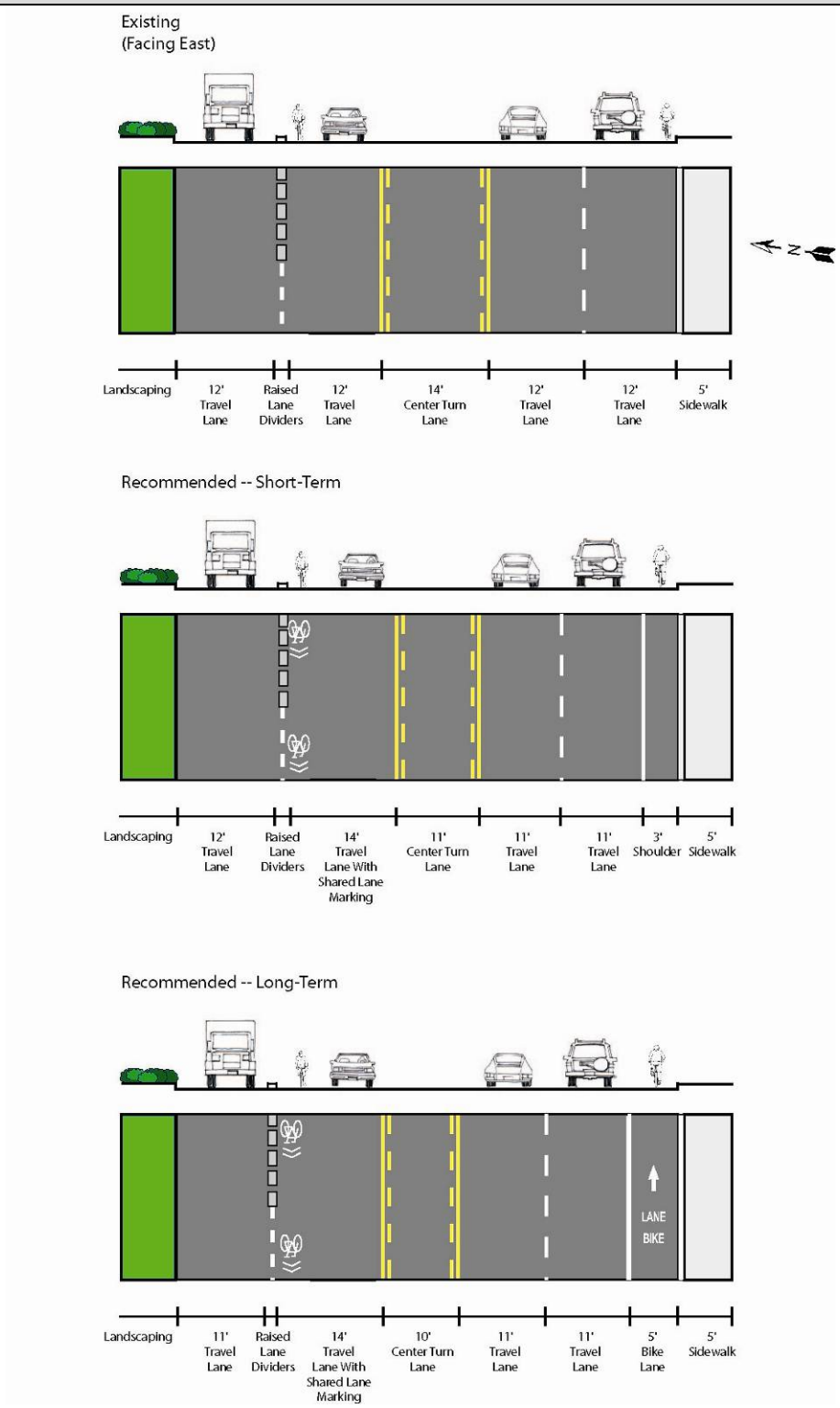
Constraints:

- In westbound direction, cyclists ride along raised lane dividers in shared 12' travel lane, then merge across traffic exiting from SR-94
- In eastbound direction, cyclists must share a 12' travel lane with no striped shoulder

Improvement Options:

- Narrow painted center turn median to provide additional width In westbound direction, restripe to 14' inside travel lane, with Shared Lane Markings
- In eastbound direction, restripe to 11' travel lanes with 3' outside shoulder
- In long-term, consider shifting raised lane dividers to narrow outside westbound lane to 11' and narrowing center turn lane to 10' to provide additional width for full Class II Bike Lane in eastbound direction.
- Install SHARE THE ROAD signage in both directions along this segment

Graphic:



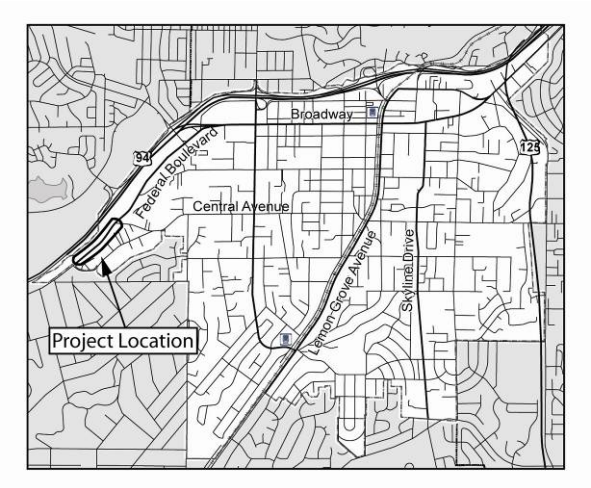
Cost Estimate

Total estimated short-term cost: $16,700
Total estimated long-term cost: $21,600

BIKEWAY NETWORK FACILITY ENHANCEMENT PROJECT

FEDERAL BOULEVARD BETWEEN CENTRAL AVE. AND WEST CITY LIMIT

Project Description and Location



The segment of Federal Boulevard between Central Ave. and the west city limit is an important link in the regional bikeway network heading west into San Diego parallel to SR-94. Currently this segment contains 16' travel lanes, but no designated bicycle facilities. The Class II bike lanes on Federal Ave. terminate at Central Avenue, as Federal narrows and enters an area of industrial businesses. The businesses front the north side of the road, and there is heavy employee parking in driveway areas in front of the business (and at-grade with the Federal road lanes). On the south side of the road, a narrow paved shoulder and an adjacent unpaved shoulder area abut a steep hillside; this side of the road also experiences heavy employee parking, with vehicles parking partially on the unpaved area and partially on the paved shoulder. There is subtantial truck traffic through this area, and the roadway surface is in poor condition. It is recommended that the entire road profile be improved through this area, to provide Class II bike lanes in both directions, an on-street parking lane on the south side, and curb and gutter for drainage.

Design Issues

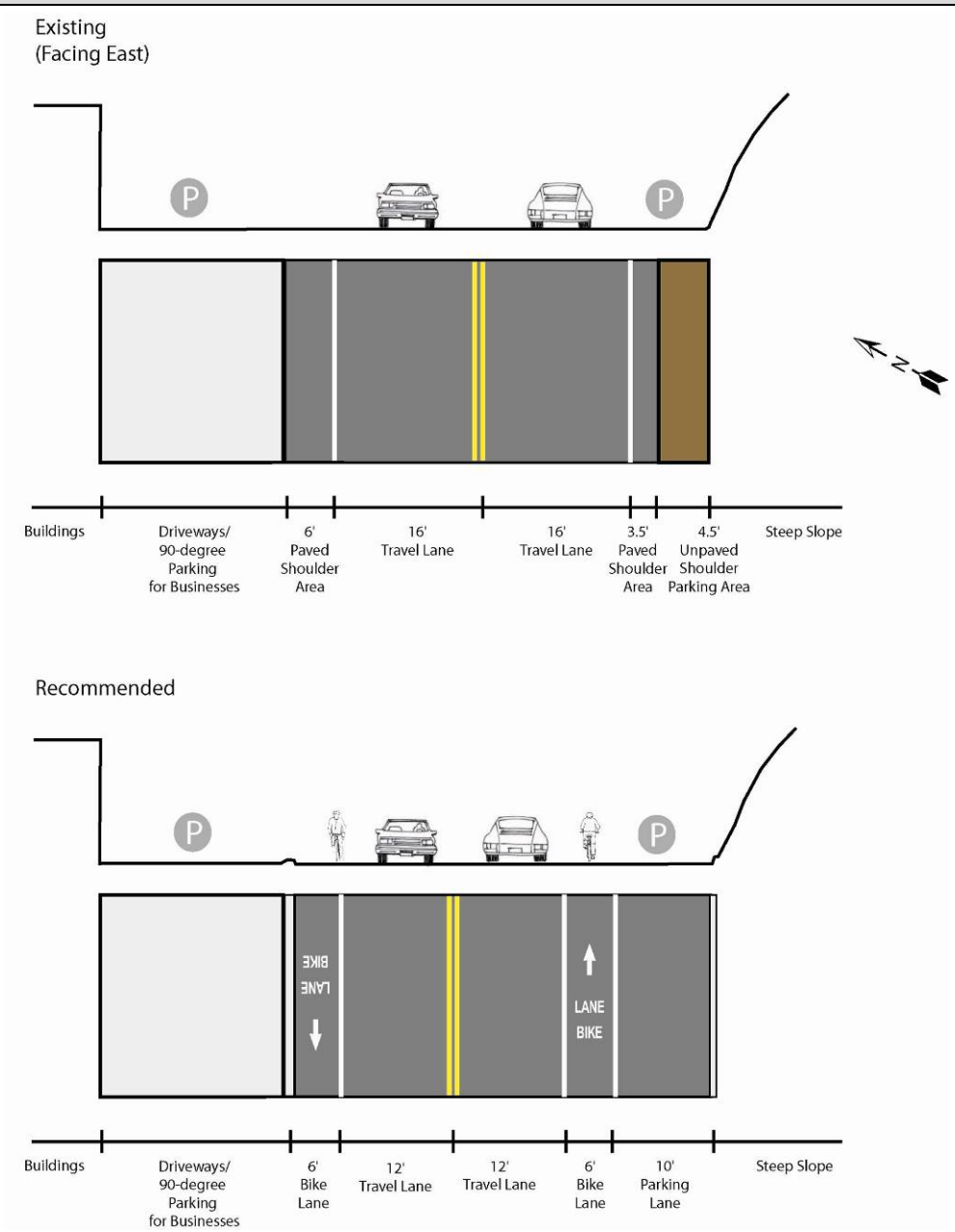
Constraints:

- Industrial uses fronting the north side of the roadway. Heavy parking demand for employees of these businesses. On north side vehicles park in large paved driveway areas in front of businesses. Along the south side of the roadway, vehicles park in the paved/unpaved shoulder area, adjacent to a steep hillside.
- Steep hillside along south side limits ability to widen road/shoulder area without significant engineering

Improvement Options:

- Narrow travel lanes to 12' to provide additional width for bicycle lanes
- Provide on-street parking lane on south side of road, widen pavement to toe of hillside
- Install curb and gutter for drainage
- Resurface roadway to improve pavement conditions for cyclists

Graphic:



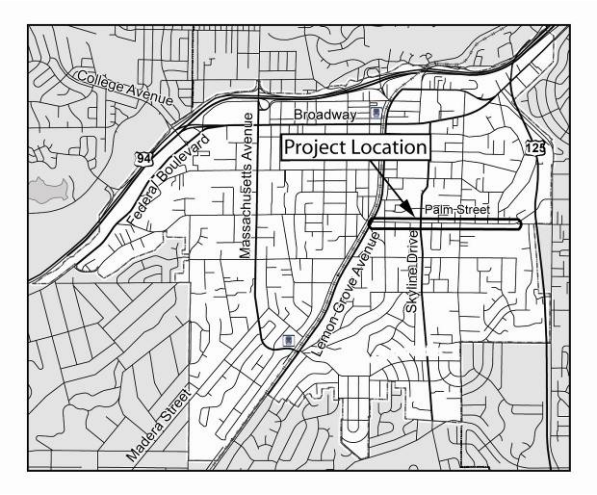
Cost Estimate

Total estimated cost: $277,700

BIKEWAY NETWORK FACILITY ENHANCEMENT PROJECT

PALM STREET EAST OF LEMON GROVE AVENUE

Project Description and Location



The segment of Palm Street east of Lemon Grove Avenue has a striped Class II bike lane in the westbound direction between Citronella and Hardy, and a 12' shared travel lane in the eastbound direction along this segment. On-street parallel parking is present on both sides of the road. This segment of Palm Street descends downhill toward Lemon Grove Avenue, in the westbound direction. It is recommended that the current bike lane configuration be reversed for this short segment – that the Class II bike lane be striped in the eastbound (uphill) direction, and that the shared travel lane exist in the downhill direction. Due to the speed difference between bicyclists and motor vehicles, providing the separation in the uphill direction will reduce the chance that motorists get caught behind a very slow moving cyclist. In the downhill direction, the striped lane is not critical: because cyclists are moving at similar rate of speed to cars, they can move out in the travel lane, away from the adjacent parked car doors. It is recommended that the westbound (downhill) travel lane be widened to 13', and Shared Lane Markings installed, in order to provide additional width and higher visibility for cyclists sharing the lane through this segment. In addition to this improvement, the City should consider extending the Class II Bike Lane from Citronella an additional block to Lemon Grove Avenue to connect to the existing bicycle facilities along that roadway.

Design Issues

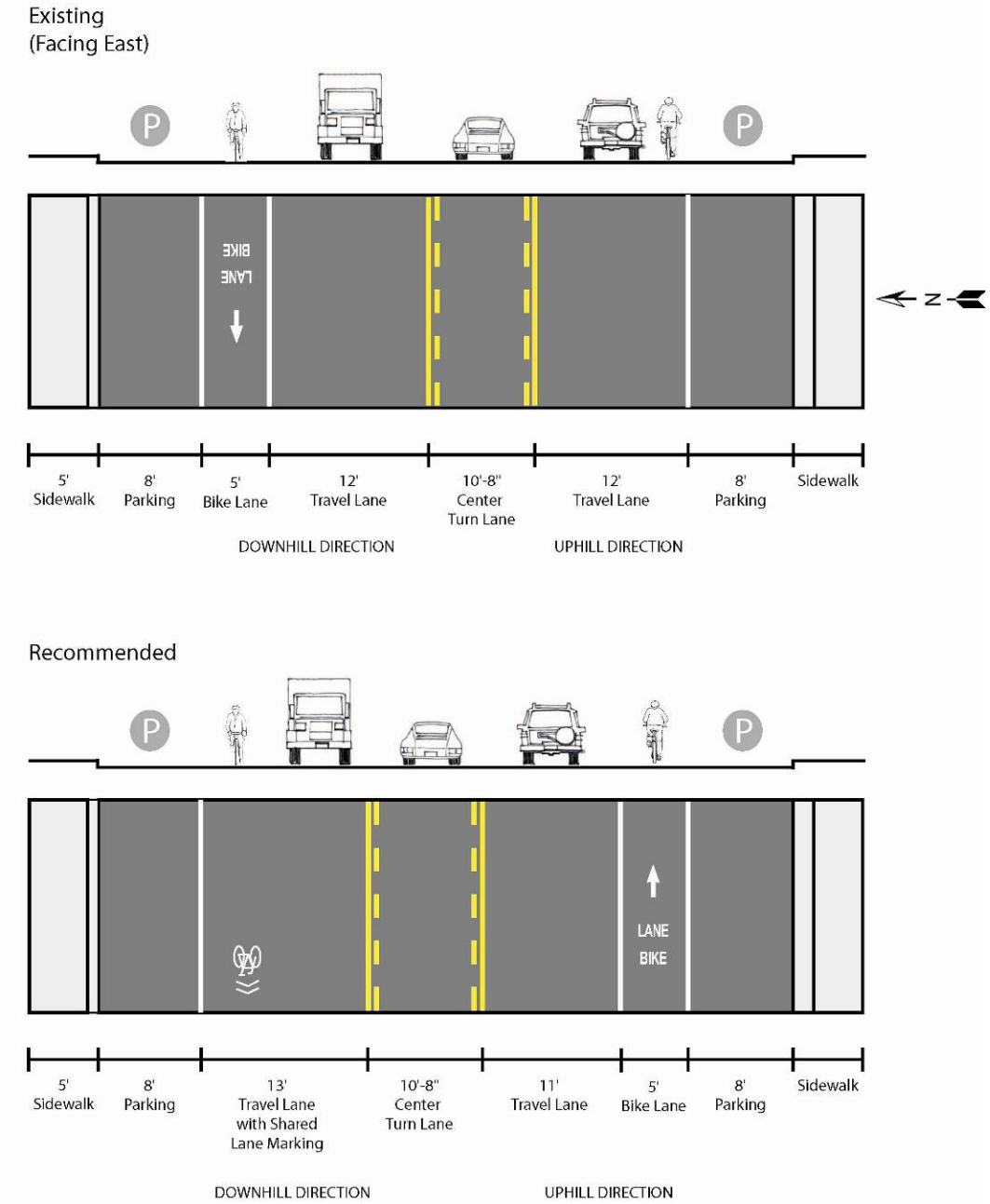
Constraints:

- Eastbound cyclists share 12' travel lane, but slower uphill speeds of cyclists makes it more difficult for motorists to share the lane
- Westbound cyclists have dedicated Bike Lane, but this lane is located immediately adjacent to parallel parking. In the downhill direction, cyclists' speeds will be similar to motor vehicles, so the need for a dedicated bike lane is not as critical.

Improvement Options:

- Reverse bike lane striping: put Class II bike lane in eastbound (uphill) direction, and shared travel lane in westbound (downhill) direction.
- Extend bike lane all the way to Lemon Grove Avenue.
- Widen westbound travel lane to 13' and install Shared Lane Marking
- Install SHARE THE ROAD signs in westbound direction

Graphic:



Cost Estimate

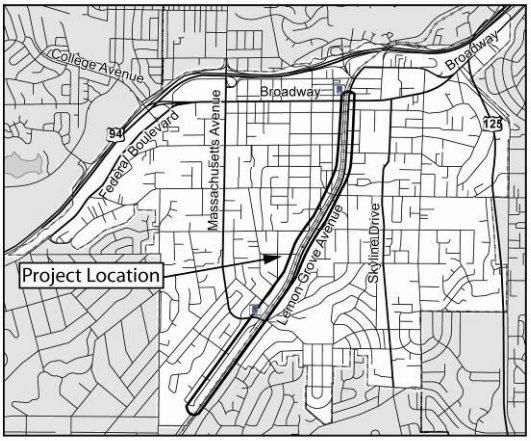
Total estimated cost: $33,400

BIKE PATH/NEIGHBORHOOD BIKE ROUTE PROJECT

SAN ALTOS PLACE / MAIN STREET BIKE PATH AND ROUTE

Project Description and Location

The proposed San Altos / Main Street bike path and route would involve a combination of Class I bike path and Class III bike route facilities on or adjacent to San Altos Place and Main Street, parallel to the northwest side of the MTS railroad right-of-way, from the south City Limit north to downtown. San Altos Place extends from the south city limit parallel to the MTS line; a seasonal drainage runs in an area of unimproved right-of-way between the MTS tracks and the backs of the residences along San Altos Place. Along the north side of this drainage an unimproved foot path exists. San Altos Place intersects Massachusetts Avenue just north of the MTS station, and a short segment of Main Street extends east from Massachusetts Avenue to San Pasqual Street. Northeast of San Pasqual, there is a discontinuous segment of Main Street that exists as an unimproved dirt corridor, with an informal use trail that is utilized by bicyclists and pedestrians. The Main Street roadway picks up again south of Beryl Street and continues toward downtown.



South of Massachusetts Avenue, the recommended facility would consist of either a new Class I facility within the unimproved right-of-way along the drainage (on the back side of the San Altos residences), or a Class III bike route along San Altos Place if the Class I facility is not feasible. North of Massachusetts Avenue, the facility would consist of a new Class I connector path between San Pasqual and the Main Street south terminus, connecting the discontinuous segments of Main Street. Once connected to Main Street, the facility would shift to an on-street Class III route all the way to the downtown village. Traffic volumes and speeds on these segments of Main Street and San Altos Place are relatively low, and even less-experienced bicyclists can share the travel lane with little difficulty. It is suggested that restoration and bank improvements to the adjacent drainage be made as part of the project to enhance the corridor.

Design Issues

Constraints:

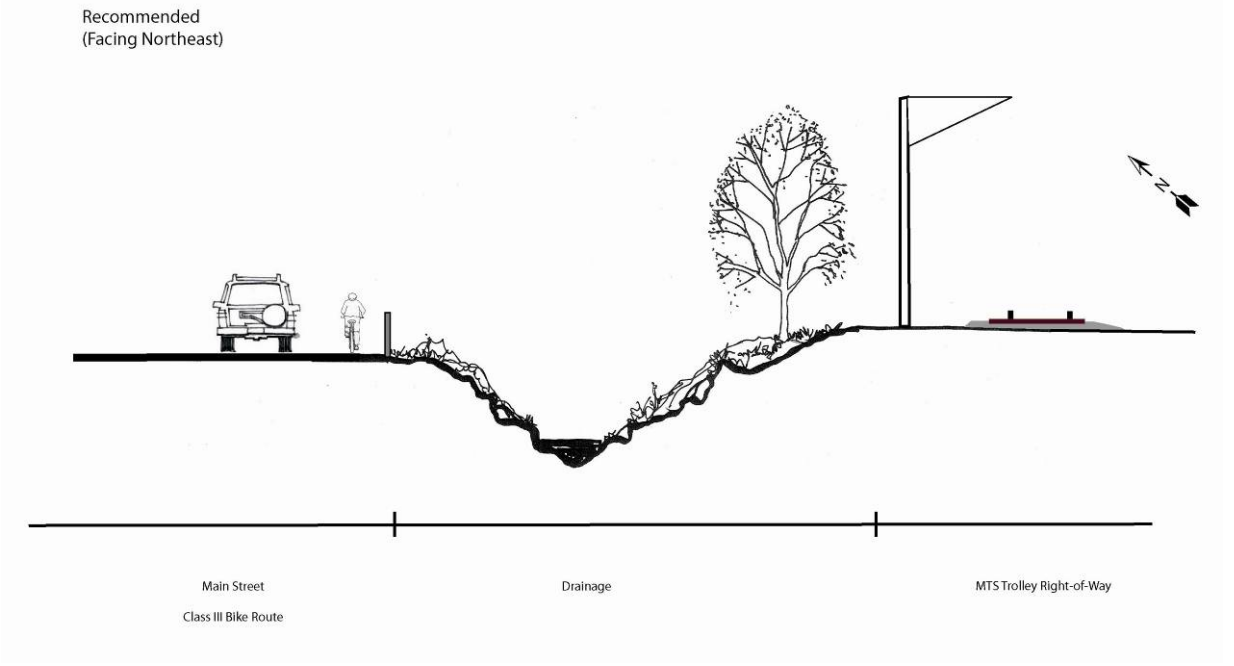
- Provide Class I path along back side of San Altos Place residences within unimproved ROW along drainage channel
- Provide connector along unimproved ROW between Massachusetts Avenue and southern terminus of Main Street
- Utilize Main Street ROW for shared Class III Bike Route to downtown

Improvement Options:

- Class I path along back side of San Altos Place residences from southern city limit to the MTS trolley station; if this improvement is not feasible, implement a Class III bike route on-street on San Altos Place from the southern terminus to Massachusetts Avenue
- Class I connector path along Main Street corridor between San Pasqual Street and southern terminus of Main Street (south of Beryl Street)Class III bike route facility along Main Street from southern terminus northeast to downtown
- Crossing enhancements at major crossings along route – Massachusetts Avenue, San Miguel Avenue and Central Avenue
- Utilize Crime Prevention Through Environmental Design (CPTED) principles for all off-street trail design features (e.g. lighting, landscaping, visual access).
- Fence/barrier separating edge of drainage from new Class I or Class III facilities
- Revegetation and other enhancements to drainage to improve habitat quality and aesthetics

- Install SHARE THE ROAD signs in both directions along Main Street and San Altos Place

Graphic:



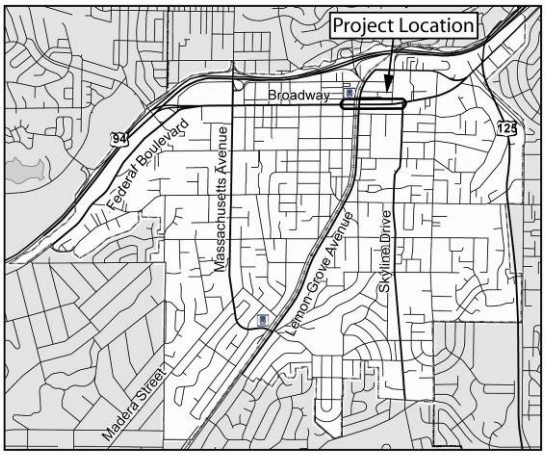
Cost Estimate

Total estimated cost: $588,300

BIKEWAY NETWORK FACILITY ENHANCEMENT PROJECT

BROADWAY (OLIVE TO KEMPF) FUTURE CLASS II UPGRADE

Project Description and Location



This segment of Broadway between Olive and Kempf through the Downtown Village is currently designated as a Class III bike route. Between Lemon Grove Avenue and Kempf, the roadway is configured with two travel lanes in each direction (separated by a raised median), and diagonal parking bays separated from the from the travel lanes by a raised median. Under the current configuration there in not sufficient width in the travel lane area to provide for Class II bike lanes. Installation of Class II bike lane would require modifying the diagonal parking lane configuration and removing the median separator.

This area of Lemon Grove is proposed for substantial future redevelopment as part of the Downtown Village Specific Plan. Plans call for transit oriented development and higher densities, along with a grade separation of the Trolley crossing of Broadway. If any future development of the Downtown Village area would result in changes to the diagonal parking configuration along Broadway, the city should at that time consider upgrading this segment to full Class II bike lanes to provide a continuous Class II facility along Broadway east of Massachusetts.

Given that this project exists only at a very conceptual level at this stage, no design or cost details are provided. However the city should consider this to be a potential future improvement to be coordinated with ongoing development in the Downtown Village area.

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6. IMPLEMENTATION

This chapter identifies steps towards implementation of the proposed facilities and programs of this plan, the estimated costs for the proposed improvements and maintenance, and strategies on funding and financing.

6.1. IMPLEMENTATION PROCESS

The steps between the network improvements and concepts identified in this Plan and the final completion of the improvements will vary from project to project, but typically include:

1. Conceptual design (with consideration of possible alternatives and environmental issues) and cost estimate for individual projects as needed.
2. Secure, as necessary, outside funding and any applicable environmental approvals.
3. Approval of the project by the Planning Commission and the City Council, including the commitment by the latter to provide for any unfunded portions of project costs.
4. Completion of final plans, specifications and estimates, advertising for bids, receipt of bids and award of contract(s).
5. Construction of Project.

6.2. HIGH PRIORITY PROJECTS

Once a bikeway system has been identified, the greatest challenge is to identify the top priority projects that will offer the greatest benefit to bicyclists if implemented. Prioritization involves a number of factors, including: (a) cost and construction feasibility given existing traffic, safety, and environmental constraints; (b) need, benefit, and public support; (c) funding cycles and opportunities, and strength of the project as measured by specific funding criteria. The City of Lemon Grove has already implemented all of the Phase I (Regional) projects identified in the existing Bicycle Facility Sub-Element. This plan focuses on Phase II project implementation, as well as enhancement of some constrained areas of the Phase I network.

Prioritization of the projects proposed in this Updated Bikeway Master Plan will occur during the Draft Plan review phase, based on discussions with city staff, input received from public during the Draft Plan review and public meeting, and opportunities such as planned roadway improvement projects. It is important to remember that the lists of bikeway projects and programs are flexible concepts that serve as guidelines to those responsible for implementation. The bikeway network project list may change over time as a result of changing bicycling patterns and implementation constraints and opportunities. Lemon Grove city staff should review the project list on an periodic basis to ensure that it reflects the most current priorities, needs, and opportunities for implementing the bikeway network in a logical and efficient manner, and that in particular the list takes

advantage of all available funding opportunities and grant cycles. As projects get implemented and taken off the list, new projects should be moved up on the list.

6.3. COST BREAKDOWN

A breakdown of cost estimates for the recommended bicycle network provided by this plan is presented in Table 6-1 below. The cost of the long-term recommended projects is estimated to be about $588,300 for the San Altos Class I Bike Path project, $555,000 for Class II Bike Lane projects, and $168,700 for Class III/Shared Use Bike Route projects, combined for a total system buildout cost of about $1.3 million. It is important to note the two following assumptions about the cost estimates. First, all cost estimates are highly conceptual, since there is no feasibility or preliminary design completed, and second, the costs do not include feasibility, environmental or engineering study costs.

All the projects are recommended to be implemented over the next two to twenty years, or as funding is available. The more expensive projects may take longer to implement. In addition, many funding sources are highly competitive, and therefore it is impossible to determine exactly which projects will be funded by which funding sources. Timing of projects is also difficult to predict, due to the dependence on competitive funding sources, timing of roadway and development, and the overall economy.

The projects listed may be funded through various sources. The funding section in this chapter outlines some of the local, regional, state and federal funding methods and resources for non-motorized transportation projects.

The total annual maintenance cost of the primary bike path system is estimated to be about $16,800 per year when it is fully implemented. Bicycle facility maintenance costs are based on per mile estimate, which covers labor, supplies, and amortized equipment costs for weekly trash removal, monthly sweeping, and bi-annual resurfacing and repair patrols. Other maintenance costs include restriping bike lane lines, sweeping debris, and tuning signals for bicycle sensitivity.

Maintenance costs for the bikeway network will be relatively low due to the limited number of long Class I path facilities. The existing and recommended bikeway network is predominately made up of on-street bike lanes and routes that will be treated as part of the normal roadway maintenance program. As part of the normal roadway maintenance program, extra emphasis should be put on keeping the bike lanes and roadway shoulders clear of debris and keeping vegetation overgrowth from blocking visibility or creeping into the roadway. The other typical maintenance costs for the bikeway network, as shown below in Table 6-2, include the maintenance of signage, striping and stencils.

Table 6-1
Construction Cost of Long-Term Recommended Bikeway Projects

Segment Name	Start	End	Class	Length (miles)	Cost ($)
Recommended Class I Bike Paths					
San Altos Bike Path (NP)	South City Limit	Main Street south terminus	I	0.7	$588,300
Total Class I Cost				*0.7*	*$588,300*
Recommended Class II Bike Lanes					
Canton Drive (EP)	Lemon Grove Avenue	Skyline Drive	II	0.8	$71,700
College Avenue (NP)	Federal	North City Limits	II	0.1	$64,900
Federal Boulevard (EP)	Central	West City Limits	II	0.5	$277,700
Federal Boulevard (NP)	College Avenue	Broadway	III	0.1	$21,600
Madera Street (EP)	City Limit	Sonoma	II	0.4	$29,400
Madera Street (EP)	Sonoma	Massachusetts	II	0.2	$26,100
Massachusetts Avenue (NP)	Broadway	North City Limits	II	0.3	$30,200
Palm Street (NP)	Lemon Grove Avenue	Citronella Avenue	II	0.2	$33,400
Total Class II Cost				2.6	*$555,000*
Recommended Class III Bike Routes					
Buena Vista Avenue (EP)	Broadway	Palm Street	III	0.5	$3,800
San Miguel Avenue (EP)	Lemon Grove Avenue	Broadway	III	1.5	$11,300
Washington Street (EP)	Palm Street	Alton Drive	III	1.0	$7,500
Alton Drive (EP)	Washington Street	Cypress Avenue	III	0.4	$3,000
Cypress Avenue (EP)	Lemon Grove Avenue	Alton Drive	III	0.4	$3,000
Broadway (NP)	Massachusetts Avenue	Federal	III	0.3	$129,300
Main Street Bike Route (NP)	Main Street south terminus	Downtown	III	1.5	$10,800
Total Class III Cost				5.6	*$168,700*
TOTAL SYSTEM COST					**$1,312,000**

EP = Existing Project, carried over from Existing Bicycle Facilities Sub-Element
NP= New Project, recommended as part of this Updated Bikeway Master Plan

Detailed Cost Breakdowns for each project are provided in the Appendix.

Table 6-2
Annual Operations and Maintenance Cost Estimates for Recommended Bikeway Network

Facility/Program	Unit Cost ($)	Description	Miles	Cost	Notes
Class I Maintenance	8,500	Annual Cost per Mile	0.7	$6,000	Lighting and debris and vegetation overgrowth removal.
Class II Maintenance	2,000	Annual Cost per Mile	2.6	$5,200	Repainting lane stripes and stencils, sign replacement as needed
Class III Maintenance	1,000	Annual Cost per Mile	5.6	$5,600	Sign and shared use stencil replacement as needed
		Avg. Cost/Year		**$16,800**	
		Est. 10-Year Cost		**$168,000**	

6.4. FUNDING

There are a variety of potential funding sources including local, state, regional, and federal funding programs that can be used to construct the proposed bicycle improvements. Most of the Federal, state, and regional programs are competitive and involve the completion of extensive applications with clear documentation of the project need, costs, and benefits. Regional funding for bicycle projects typically comes from Transportation Development Act (TDA) funding, which is prorated to each County based on the return of gasoline taxes. Many of the projects and programs would need to be funded either with TDA, general fund (for staff time), and regional, State and Federal sources. The primary funding sources are described below.

6.4.1. Federal Funding Sources

6.4.1.1. The Safe, Accountable, Flexible, Efficient Transportation Equity Ac: A Legacy for Users (SAFETEA-LU)

SAFETEA-LU is the third iteration of the transportation vision established by Congress in 1991 with the Intermodal Surface Transportation Efficiency Act (ISTEA) and renewed in 1998 through the Transportation Equity Act for the 21st Century (TEA-21). Also known as the Federal Transportation bill, the $286.5 million SAFETEA bill was passed in 2005.

SAFETEA-LU funding will be administered through the state (Caltrans or Resources Agency) and regional planning agencies (SANDAG). Most, but not all, of the funding programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Funding criteria often includes completion and adoption of a pedestrian master plan, quantification of the costs and benefits of the system (such as saved vehicle trips and reduced air pollution), proof of public involvement and support, CEQA compliance, and commitment of some local resources. In most cases, SAFETEA-LU provides matching grants of 80 to 90 percent--but prefers to leverage other

monies at a lower rate. SAFETEA-LU continues to support many of the non-motorized programs that were contained in TEA-21, with the following new and existing non-motorized programs (dollar amounts listed are totals for the entire federal transportation bill).

- Recreational Trails Program – $110 million over five years, to be dedicated to non-motorized trail projects ($1.5 million to California in FY 2006 for non-motorized projects)
- Safe Routes to School Program – A new program with $612 million over five years ($11 million to California in FY 2006)
- Transportation, Community and System Preservation Program - $270 million over five years reserved for bicycle and pedestrian projects
- Alternative Transportation in Parks and Public Lands - $96 million over the next four years reserved for promoting non-motorized transportation in national parks and other public lands.

6.4.1.2. 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.). The projects must be tied to a plan adopted by the State and SANDAG. California was allocated $374 in CMAQ funds in FY 2006.

6.4.1.3. 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 bike 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.

6.4.2. STATE FUNDING SOURCES

6.4.2.1. Bicycle Transportation Account

The State Bicycle Transportation Account (BTA) is an annual statewide discretionary program that is available through the Caltrans Bicycle Facilities Unit for funding bicycle projects. Available as grants to local jurisdictions, the emphasis is on projects that benefit bicycling for commuting purposes. Due to the passage of AB1772 in the year 2000, the BTA has $7.2 million available each year until 2005. Following the year 2005, the fund will drop to $5

million per year unless new legislation is authored. The local match must be a minimum of 10% of the total project cost.

6.4.2.2. *National Recreational Trails Fund*

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. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized as well as motorized uses.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails (including bike 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).

6.4.2.3. *Environmental Enhancement and Mitigation Program*

Environmental Enhancement and Mitigation Program Funds are allocated to projects that offset environmental impacts of modified or new public transportation facilities. Bike paths, bike lanes, and other facilities that encourage alternative transportation are eligible. State gasoline tax monies fund the EEMP.

6.4.2.4. *Safe Routes to School (AB 1475/SB 1087)*

The Safe Routes to School program is a recently created state program using funds from the Hazard Elimination Safety program. This program is meant to improve school commute routes by eliminating barriers to bicycle and pedestrian travel through rehabilitation, new projects, and traffic calming. In September of 2004, the passage of SB 1087 extended the Safe Routes to School program for 3 additional years.

6.4.3. REGIONAL FUNDING SOURCES

6.4.3.1. *TransNet*

TransNet, San Diego County's program generated to raise funds for transportation improvements in the urbanized portion of the county, allocates $1 million dollars for bicycle paths and facilities. A one-half cent amount is attached to all sales tax transactions and placed into a fund for improvements throughout the county. The program, begun in 1988 and extends into 2008, has generated $3 billion dollars, of which one million is secured annually for bicycle paths and

facilities. The program is guaranteed secured funding for an additional forty years, as it was successfully renewed under Proposition A in 2004. Local jurisdictions are awarded TransNet funds through a competitive grant process through SANDAG.

6.4.4. LOCAL FUNDING SOURCES

6.4.4.1. TDA Article III (SB 821)

Transportation Development Act (TDA) Article III funds are state block grants awarded annually to local jurisdictions for bicycle projects in California. These funds originate from the state gasoline tax and are distributed to local jurisdictions based on population. These funds should be used as leveraging monies for competitive state and federal sources. Similar to TransNet funds, these funds are distributed to local jurisdictions through a competitive grant process through SANDAG.

6.4.4.2. Mello-Roos Community Facilities Act

Bike paths and bike lanes can be funded as part of a local assessment or benefit district. Defining the boundaries of the benefit district may be difficult unless the facility is part of a larger parks and recreation or public infrastructure program with broad community benefits and support.

6.4.4.3. Impact Fees

Another potential local source of funding is developer impact fees, typically tied to trip generation rates and traffic impacts produced by a proposed project. A developer may reduce the number of trips (and hence impacts and cost) by paying for on- and off-site bikeway improvements that will encourage residents to bicycle rather than drive. Establishing a clear nexus or connection between the impact fee and the project's impacts is critical in avoiding a potential lawsuit.

Other opportunities for implementation will appear over time that may be used to implement the project.

Table 6-3
Funding Sources

Acronyms:	Jurisdictions for Lemon Grove, California:
AQMD - Air Quality Management District Caltrans - California Department of Transportation CMAQ - Congestion Mitigation and Air Quality CTC - California Transportation Commission FHWA - Federal Highway Administration SANDAG – San Diego Association of Governments RTPA - Regional Transportation Planning Agency State DPR - California Department of Parks and Recreation (under the State Resources Agency) SAFETEA – Safe Accountable Flexible, Efficient Transportation Equity Act: A Legacy for Users	Caltrans - Caltrans District 11 SANDAG—San Diego Association of Governments Congressional District 53 Assembly District 78 Senate District 39 County District 2 Resources: Caltrans TEA-21 website - http://www.dot.ca.gov/hq/TransEnhAct/ FHWA – SAFETEA-LU – website - http://www.fhwa.dot.gov/reauthorization/

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
Federal Funding									
Regional Surface Transportation Program (RSTP)	varies by RPTA	RTPAs, Caltrans	$634 m for California in FY 2006	11.47% non-federal match	cities, counties, transit operators, Caltrans, and MPOs	X	X		RSTP funds may be exchanged for local funds for non-federally certified local agencies; no match may be required if project improves safety. Contact Cathy Gomes, Caltrans, (916) 654-3271
Congestion Mitigation and Air Quality Program (CMAQ)	Dec. 1 yearly	RTPAs, Caltrans	$374 m for California in FY 2006	11.47% non-federal match	federally certified jurisdictions	X			Counties redesignated to attainment status for ozone may lose this source. Contact Cathy Gomes, Caltrans, (916) 654-3271
Transportation Enhancement Activities (TE)	varies by RTPA	RTPAs, Caltrans	$74 m to California in FY 2005	11.47% non-federal match	federally certified jurisdictions	X	X		Funds are dispersed through the four shares listed below.
Regional Share	varies by RTPA	RTPAs, Caltrans	$45 m	"	federal, state, or local, depending on category	X	X		Funding share to RTPAs.
Caltrans Share	varies by RTPA	Caltrans	$6.6 m	"	Caltrans	X	X		Funding share to Caltrans. Available only if regional TEA funds are not used
Statewide Transportation Enhancement Share	varies by RTPA	Caltrans, State Resources Agency	$20-30 m	"	federal, state (except Caltrans), regional and local agencies with a state partner	X	X		Funding share for all 12 TEA categories except conservation lands.

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
Conservation Lands Share	varies by RTPA	Caltrans, State Resources Agency	$11 m	"	RTPAs, counties, cities and non-profits.	X	X		Funding share for conservations lands category - acquisitions of scenic lands with high habitat conservation value.
Safe Routes to School (FHWA)	Not yet determined	Caltrans	$11 m to California in FY 2006	None permitted	State, local and regional agencies, including non-profits	X		X	Includes both infrastructure and non-infrastructure projects that improve safety for children walking and bicycling to school; Contact California SR2S DOT Program Coordinator Joyce Parks, Caltrans, (916) 653-6920
Recreational Trails Program (RTP)	Oct. 1	State DPR	$1.5 m for non-motorized in California FY 2006	20% match	jurisdictions, special districts, non profits with management responsibilities over the land		X		For recreational trails to benefit bicyclists, pedestrians, and other users; contact State Dept. of Parks & Rec. , Statewide Trails Coordinator, (916) 653-8803
Transportation and Community and System Preservation Pilot Program	pending	FHWA	$25 m nationwide	--	state, local, MPOs	--	--	--	Projects that improve system efficiency, reduce environmental impacts of transportation, etc. Contact K. Sue Kiser, Regional FHWA office, (916) 498-5009
Land & Water Conservation Fund (LWCF)	May 1st	State DPR	$7.7 m statewide	50%, including in-kind	Federal, state, city, county, eligible districts		X		Federally-funded. Projects that acquire and develop outdoor recreation areas and facilities. Contact Odel King, State DPR, (916) 653-8758
State Funding									
Environmental Enhancement and Mitigation Program (EEMP)	Nov.	State Resources Agency, Caltrans	$10 m statewide	not required but favored	local, state and federal government non-profit agencies	X	X	X	Projects that enhance or mitigate future transportation projects; can include acquisition or development of roadside recreational facilities. Contact Carolyn Dudley, State Resources Agency, (916) 653-5656
Safe Routes to School (Caltrans, SB 10)	May 31	Caltrans	$18 m, although amount unclear due to Federal SR2S	11.5% min.	city, county	X	X	X	Primarily construction program to enhance safety of pedestrian and bicycle facilities. Contact. Caltrans District 4, (510) 286-5598
Bicycle Transportation Account	December	Caltrans	$7.2 m	min. 10% local match on construction	city, county	X		X	State-funded. Projects that improve safety and convenience of bicycle commuters. Contact Ken McGuire, Caltrans, (916) 653-2750

Grant Source	Due Date	Agency	Annual Total	Matching Requirement	Eligible Applicants	Eligible Bikeway Projects			Comments
						Commute	Recreation	Safety/Ed	
Regional Transportation Improvement Program (RTIP)	December 15, odd years	RTPA	--	--	city, county, transit operators, Caltrans	X		X	Part of State Transportation Improvement Program (STIP), the main state program for transportation project funding. For "improving transportation within the region." RTPA must program funds.
Petroleum Violation Escrow Account (PVEA)	On-going	State Legislature	$5 m	--	city, county, transit operators, Caltrans	--	--	--	Bicycle and trail facilities have been funded with this program. Contact Caltrans Federal Resource Office, (916) 654-7287
Community Based Transportation Planning Demonstration Grant Program	Nov.	Caltrans	$3 m	20% local	MPO, RPTA, city, county	X			Projects that exemplify livable community concepts. Contact Leigh Levine, Caltrans, (916) 651-6012
Office of Traffic Safety Grants	Jan. 31	Office of Traffic Safety	--	--	state, city, county			X	Bicycle and pedestrian projects have been funded through this program. Contact OTS, (916) 262-0990
Local Funding									
Transportation Development Act (TDA) Article 3 (2% of total TDA)	Jan.	RPTA	--	--	--	--	--	--	
State Gas Tax (local share)	--	State Auditor Controller	--	--	--	X		X	Allocated by State Auditor Controller
Developer Fees or Exactions (developer fee for street improvements - DFSI)	--	Cities or County	--	--	--	--	--	--	Mitigation required during land use approval process
TransNet Sales Tax		SANDAG	$1 m		City, county				Contact Craig Scott, Project Manager, (619) 699-1926

APPENDIX A: CALTRANS BIKEWAY PLANNING AND DESIGN (CHAPTER 1000, HIGHWAY DESIGN MANUAL)

This appendix contains Chapter 1000 of the Caltrans Highway Design Manual, which provides minimum design standards and other guidelines for developing bicycle facilities in California.

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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).

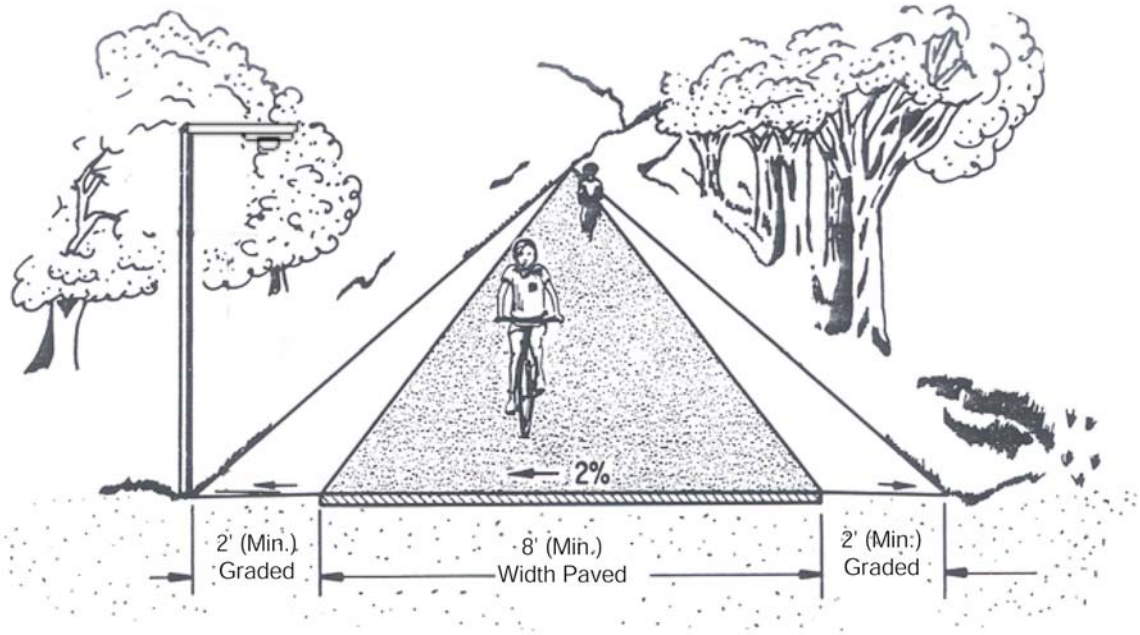
The vertical clearance to obstructions across the clear width of the path shall be a minimum of 8 feet. Where practical, a vertical clearance of 10 feet is desirable.

(3) *Signing and Delineation*. For application and placement of signs, see the Manual on Uniform Traffic Control Devices (MUTCD), Section 9B.01 and the MUTCD and California Supplement Section 9B.01 and Figure 9B-101. For pavement marking guidance, see the 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.

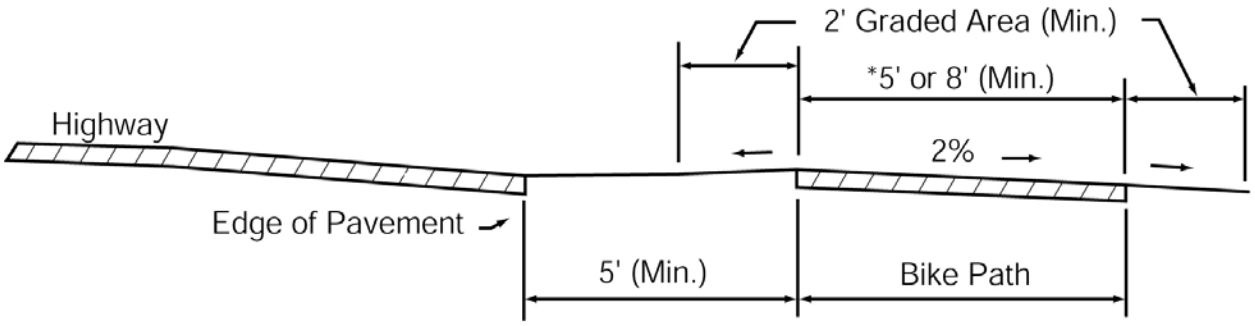
Figure 1003.1A

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)

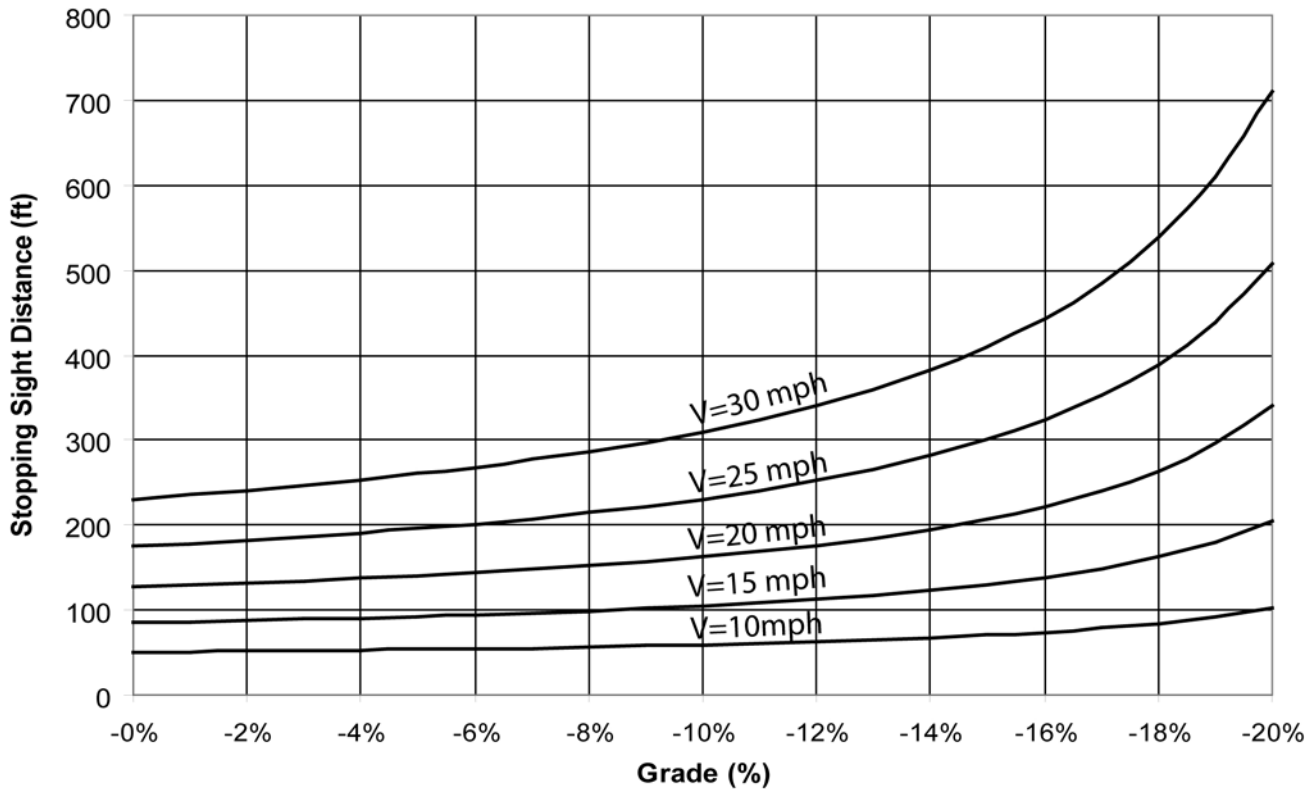
e = Rate of bikeway superelevation, percent

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)

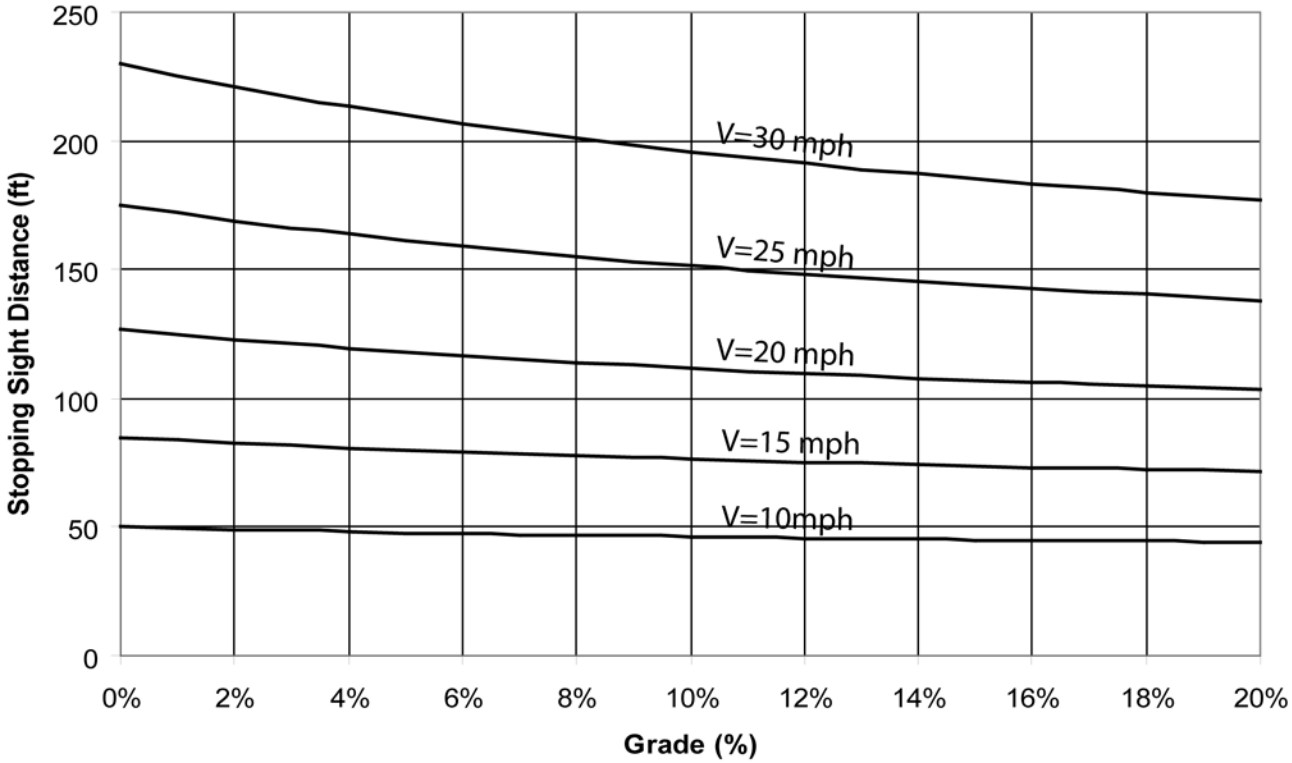
V = Velocity (mph)

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 MUTCD and California Supplement, Section 9C.101.

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)

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

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

Double line represents S = L

L = Minimum length of vertical curve – feet

A = Algebraic grade difference - %

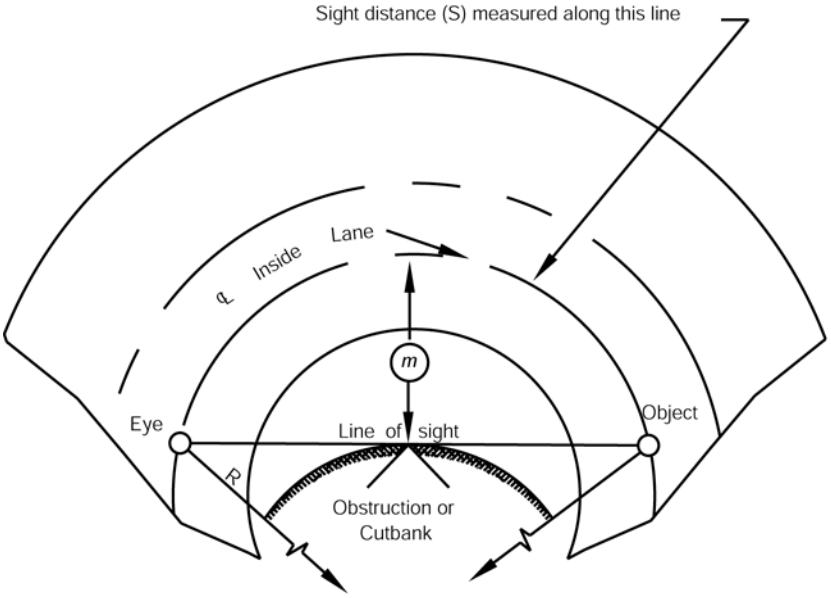
S = Stopping sight distance – feet

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

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

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

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.

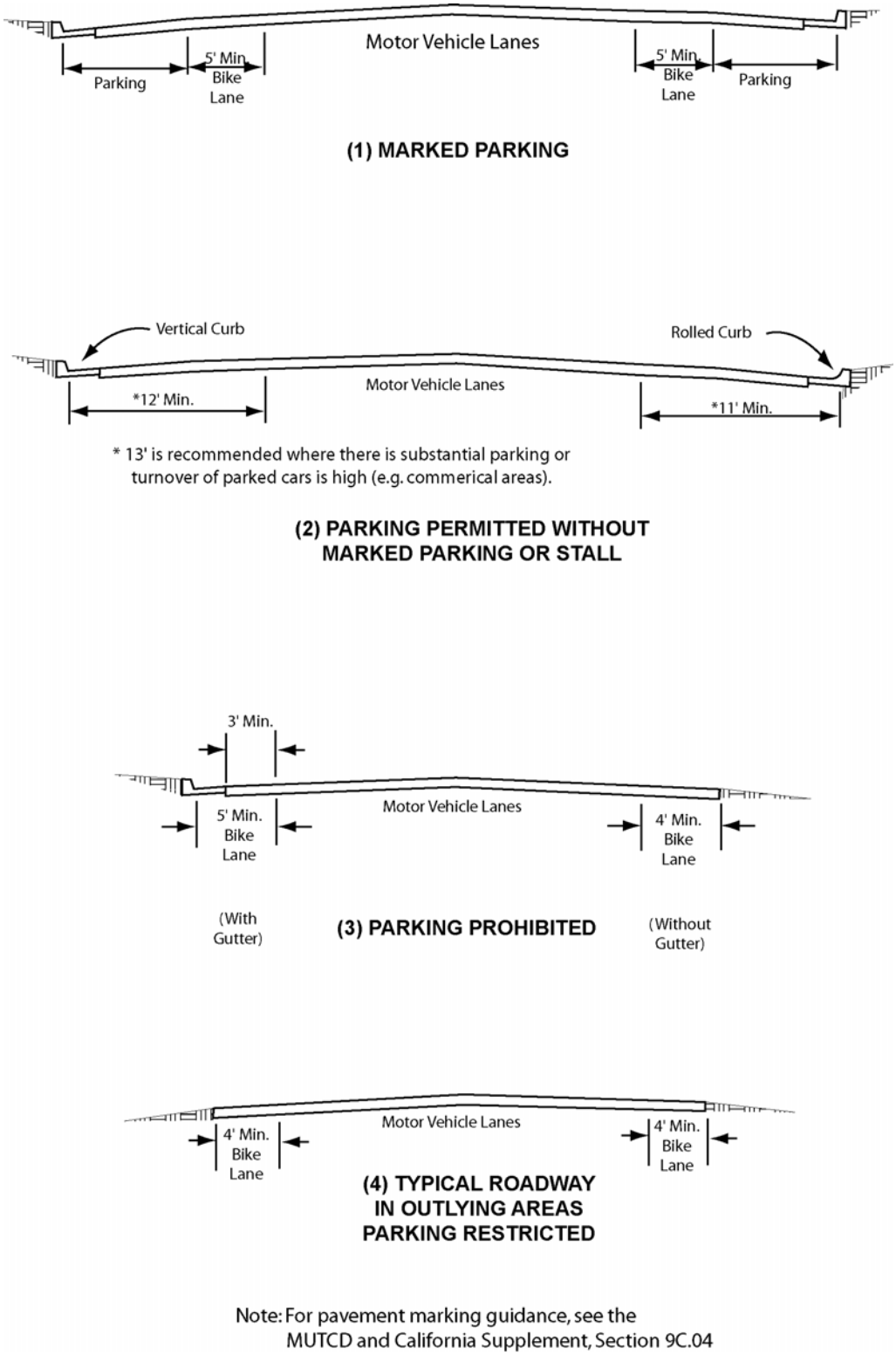
Bike lanes are not advisable on long, steep downgrades, where bicycle speeds greater than 30 miles per hour are expected. As grades increase, downhill bicycle speeds will increase, which increases the problem of riding near the edge of the roadway. In such situations, bicycle speeds can approach those 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 MUTCD and California Supplement, 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)



Note: For pavement marking guidance, see the MUTCD and California Supplement, 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 MUTCD and California Supplement, 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

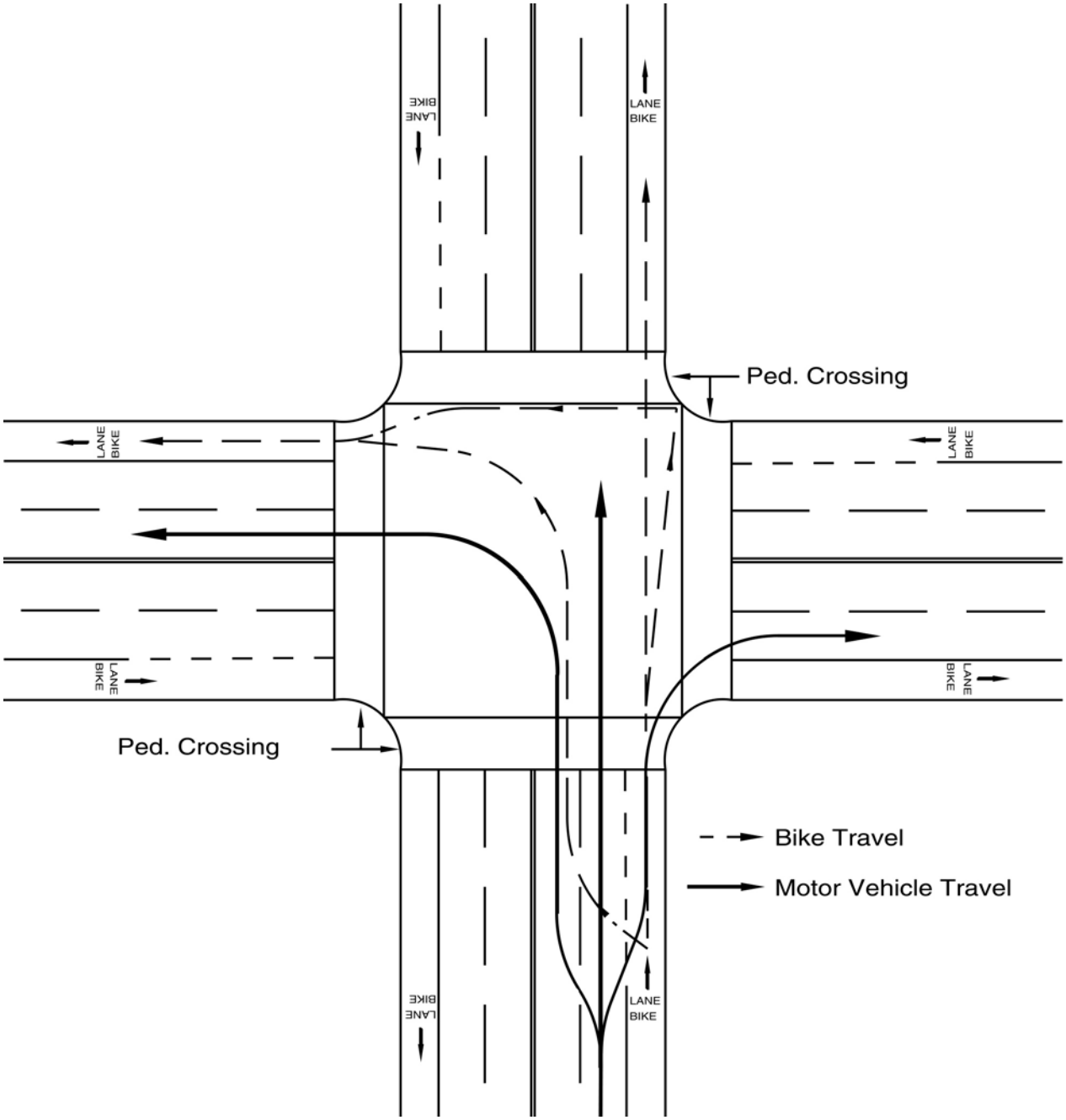
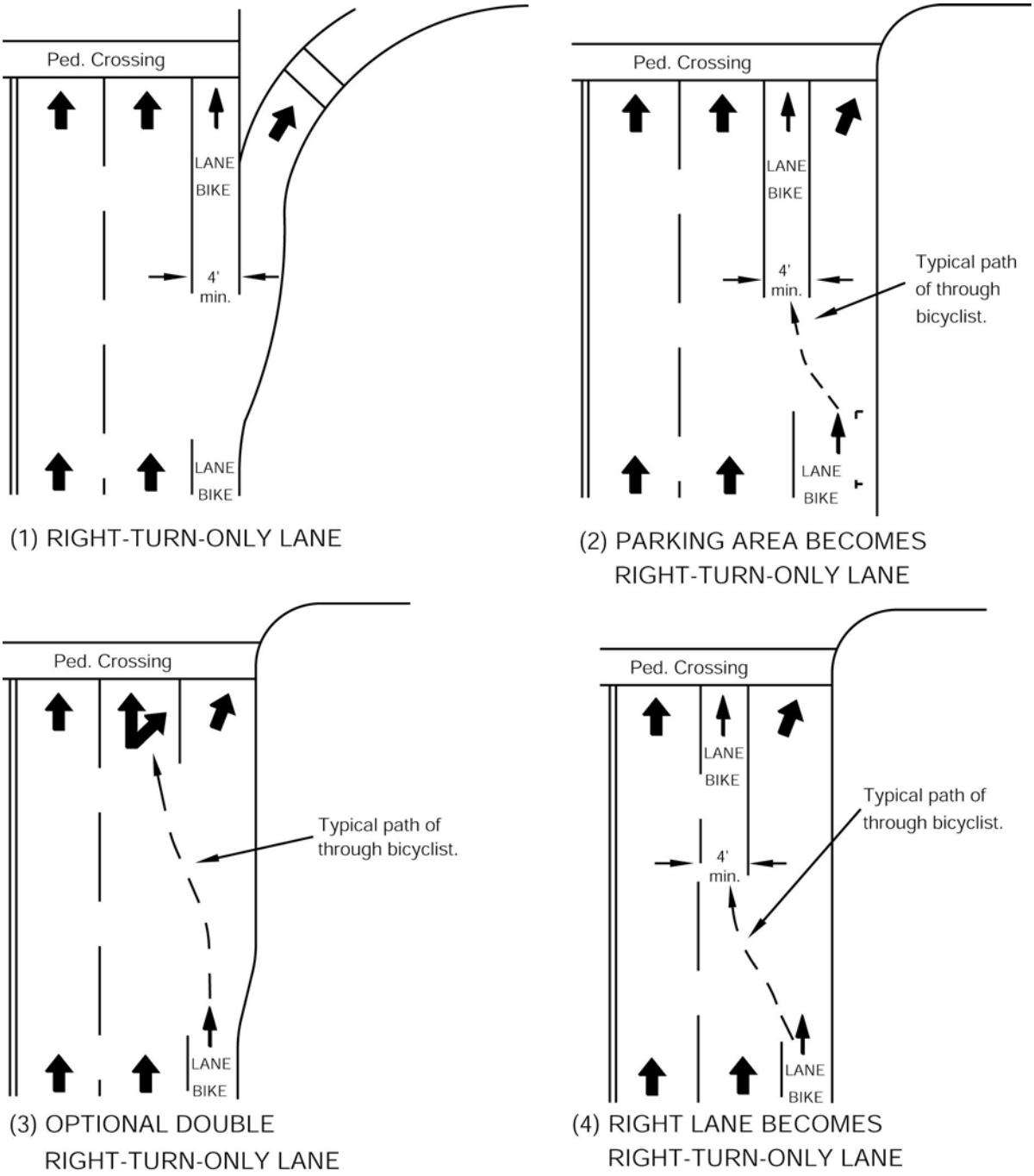
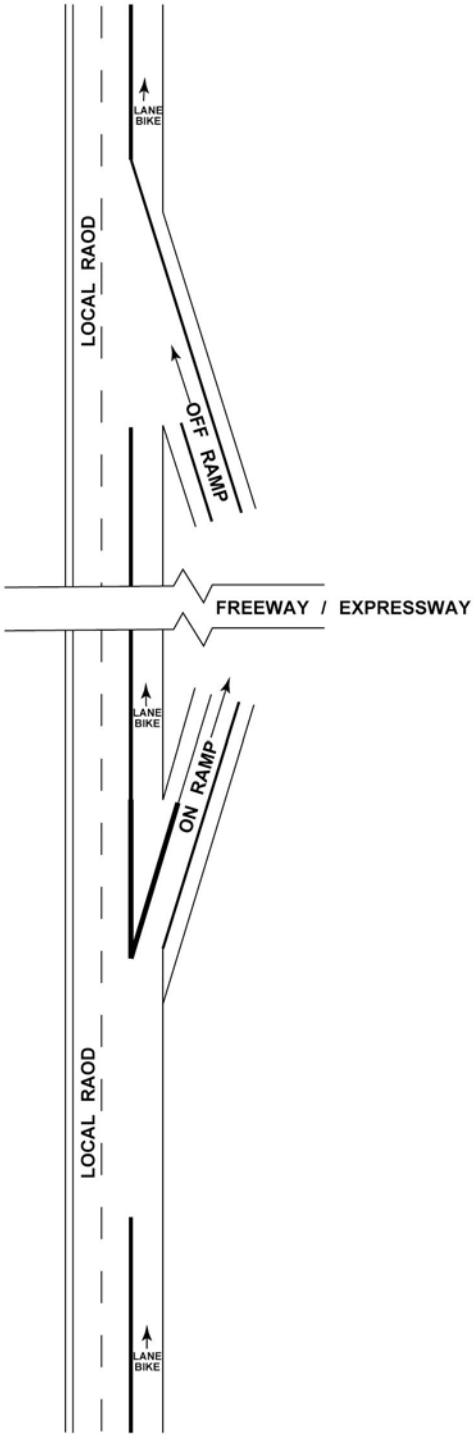


Figure 1003.2C
Bike Lanes Approaching Motorist
Right-turn-only Lane



Note: For bicycle lane markings, see the MUTCD and California Supplement, 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 MUTCD and California Supplement, 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 MUTCD and California Supplement, Section 9B.101.

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 MUTCD and California Supplement, 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.

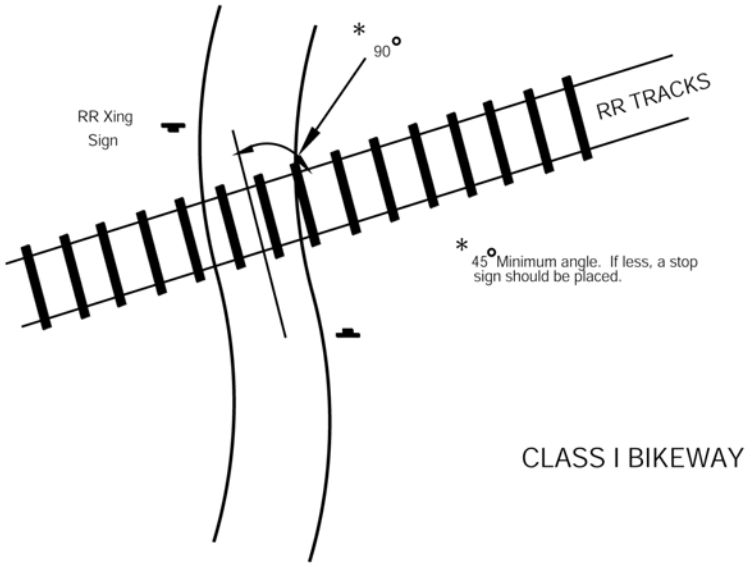
Pavement should be maintained so ridge buildup does not occur next to the rails. In some cases, timber plank crossings can be justified and can provide for a smoother crossing. Where hazards to bicyclist cannot be avoided, appropriate signs should be installed to warn bicyclists of the danger.

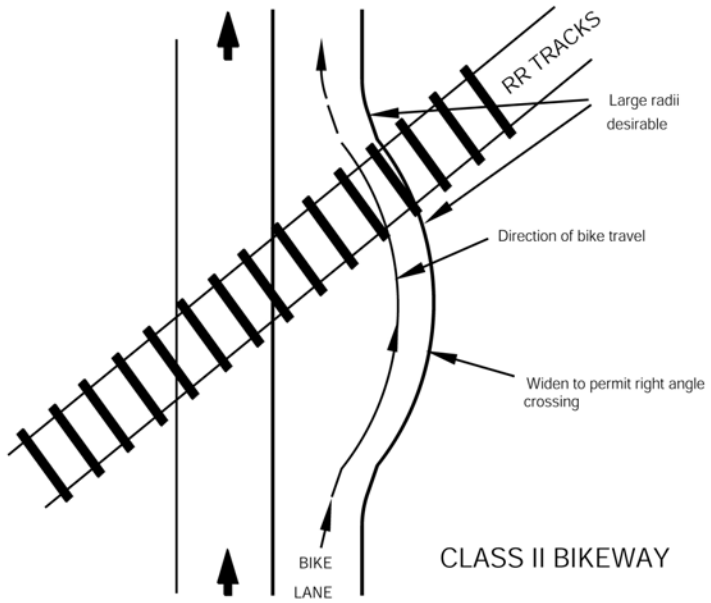
All railroad crossings are regulated by the California Public Utilities Commission (CPUC). All new bike path railroad crossings must be approved by the CPUC. Necessary railroad protection will be determined based on a joint field review involving the applicant, the railroad company, and the CPUC.

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 MUTCD, Section 9C.06.

Figure 1003.6A
Railroad Crossings





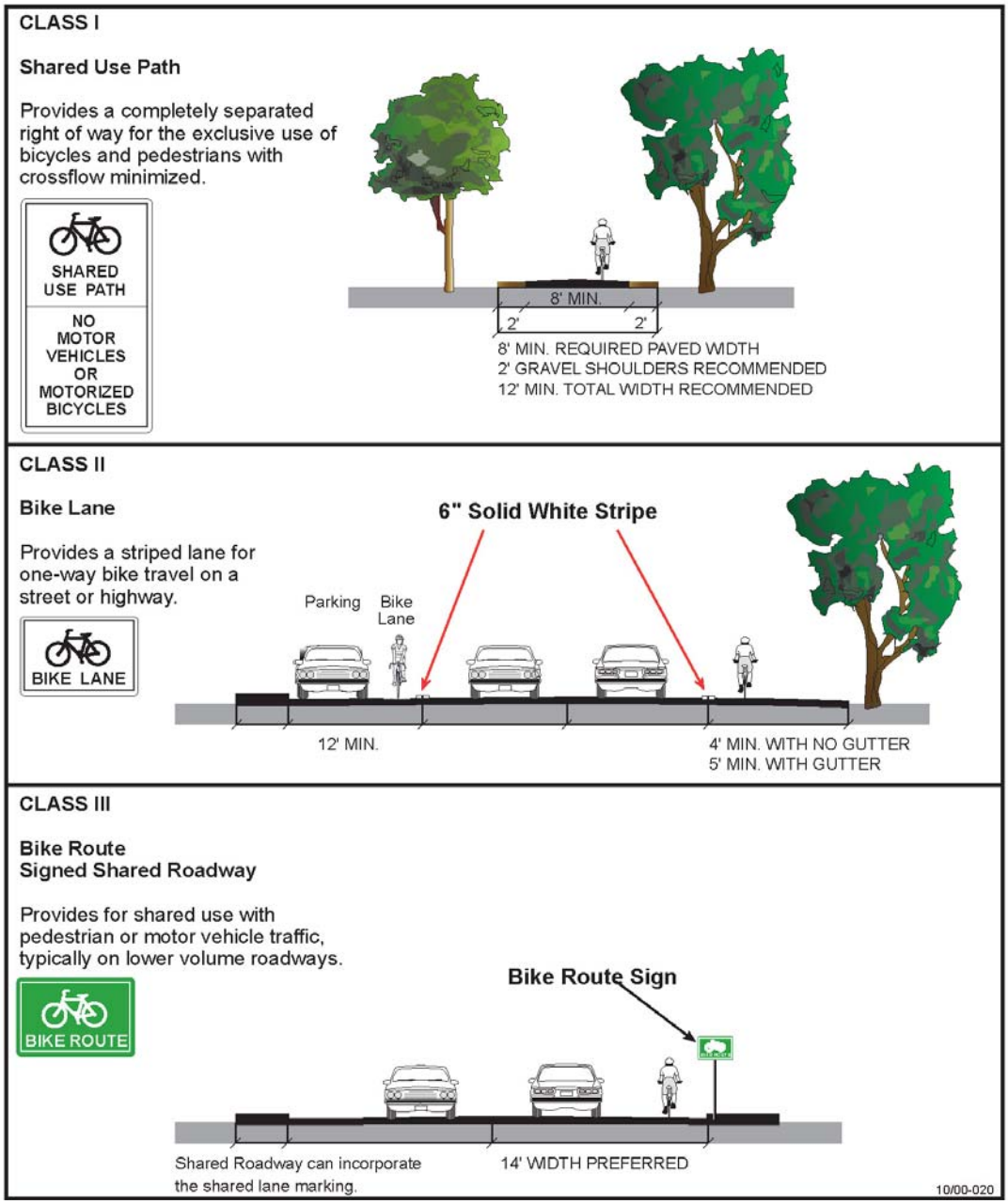
APPENDIX B: SUPPLEMENTAL DESIGN GUIDELINES

The design guidelines presented in this chapter are a combination of minimum standards outlined by the California Highway Design Manual's Chapter 1000 (Chapter 1000) and the California Manual on Uniform Traffic Control Devices (MUTCD), as well as supplemental design solutions tailored to the needs of the Lemon Grove. The minimum standards and guidelines presented by Chapter 1000 and the MUTCD provide basic information about the design of bicycle and pedestrian facilties, such as minimum standards for Class I paths and associated signage. The supplemental guidance in this chapter provides additional design recommendations for the the Lemon Grove bikeway network, such as recommended wayfinding signage.

B.1. CALTRANS BIKEWAY CLASSIFICATION OVERVIEW

Description
Caltrans has defined three types of bikeways in Chapter 1000 of the Highway Design Manual: Class I, Class II, and Class III. Minimum and recommended standards for each of these bikeway classifications is shown below. The existing Lemon Grove Bikeway Network includes segments of all three types of bikeways described below.

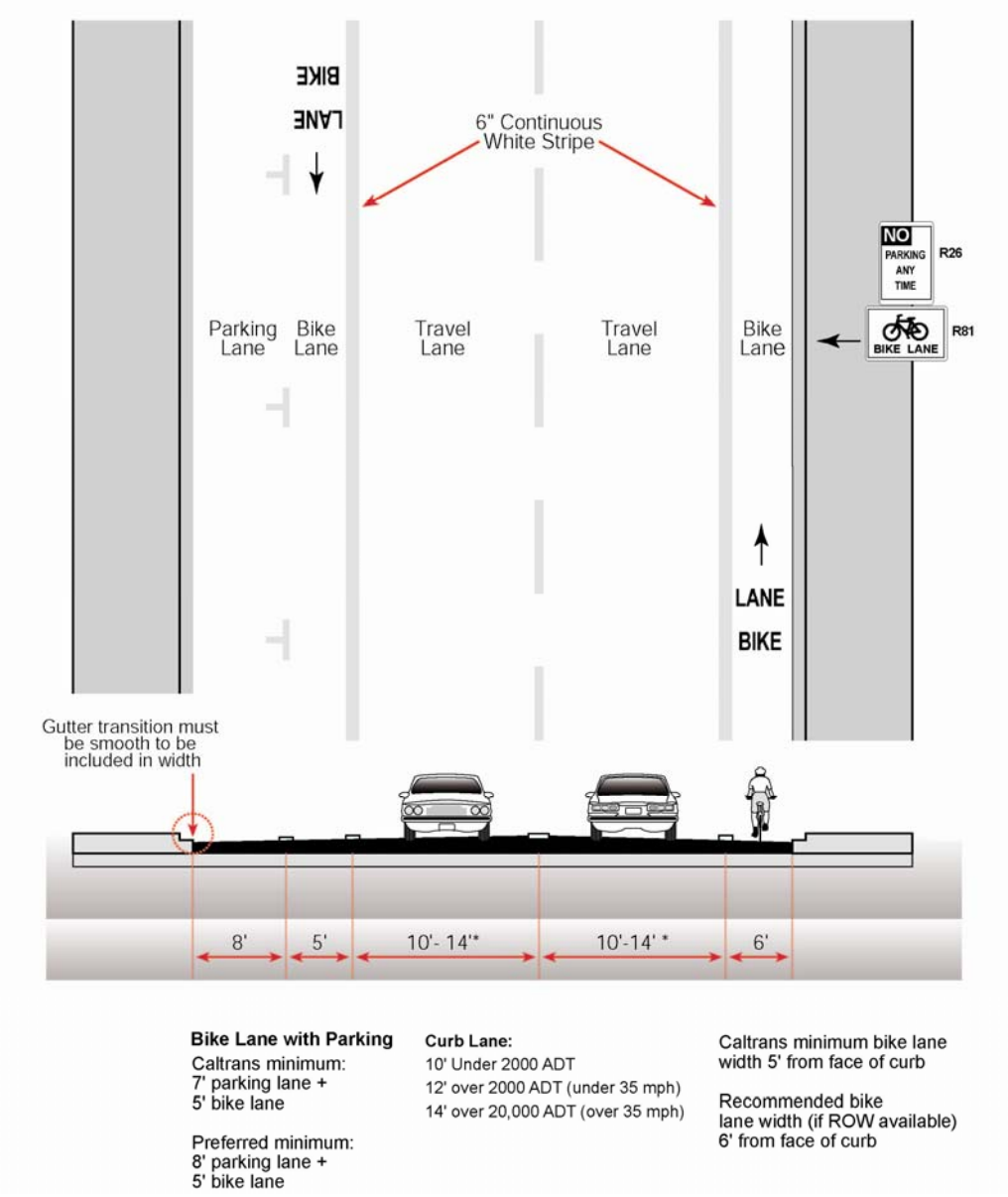
Graphic



B.2. CLASS II BIKE LANE MINIMUM STANDARDS

Description
Chapter 1000 of the Caltrans Highway Design Manual provides standards for bicycle facilities planning and design. These standards outline minimum dimensions, proper pavement markings, signage and other design treatments for bicycle facilities. Refer to Caltrans website: www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm.

Graphic

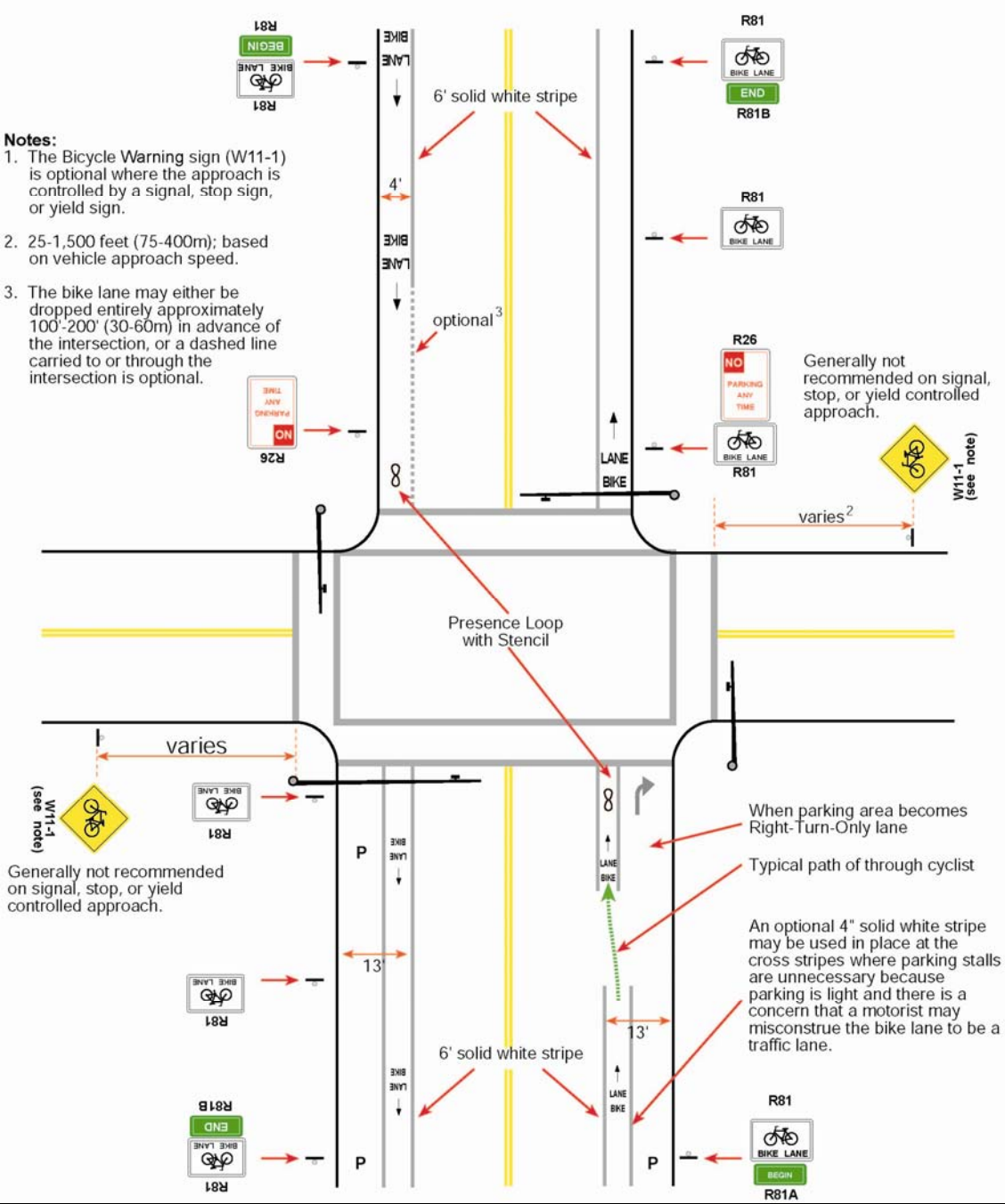


Summary of Standards
▪ Bicycle lanes shall be one way facilities, running with the direction of traffic. ▪ Where on-street parking is allowed, bicycle lanes must be striped between the parking area and the travel lanes. ▪ Width of bicycle lane: 1. Without an existing gutter, bicycle lanes must be a minimum of 4 feet wide. 2. With an existing gutter, bicycle lanes must be a minimum of 5 feet wide. 3. Where on-street parking stalls are marked and bicycle lanes are striped adjacent to on-street parking, bicycle lanes must be a minimum of 5 feet wide. 4. Where on-street parking is allowed but stalls are not striped, bicycle lanes must be a minimum of 10 feet wide, with 12 feet preferred. Depending on the type and frequency of traffic, wider bicycle lanes may be recommended. ▪ Bicycle lane striping standards: 1. Bicycle lanes shall be comprised of a 6 inch solid white stripe on the outside of the lane, and a 4 inch solid white stripe on the inside of the lane. 2. Bicycle lanes must never be delineated with raised barriers. 3. The inside 4 inch stripe of the bicycle lane should be dropped 90-180 feet prior to any intersection where right turns are permitted, and the outside 6 inch stripe should be dashed in this location. Bicycle lanes are generally not marked through intersections. 4. Bicycle lanes shall never be striped to the right of a right-hand turn lane ▪ Bicycle lane signage standards: 1. The R81 bicycle lane sign shall be placed at the beginning of all bicycle lanes, on the far side of arterial street intersections, at all changes in direction and at a maximum of .6 mile intervals. 2. Standard signage is shown in Chapter 9 of the California MUTCD.

B.3. TYPICAL CLASS II BIKE LANE SIGNING AT A SIGNALIZED INTERSECTION

Description
This treatment provides a design for where a roadway with Class II bike lanes intersects with a road at a signalized intersection.

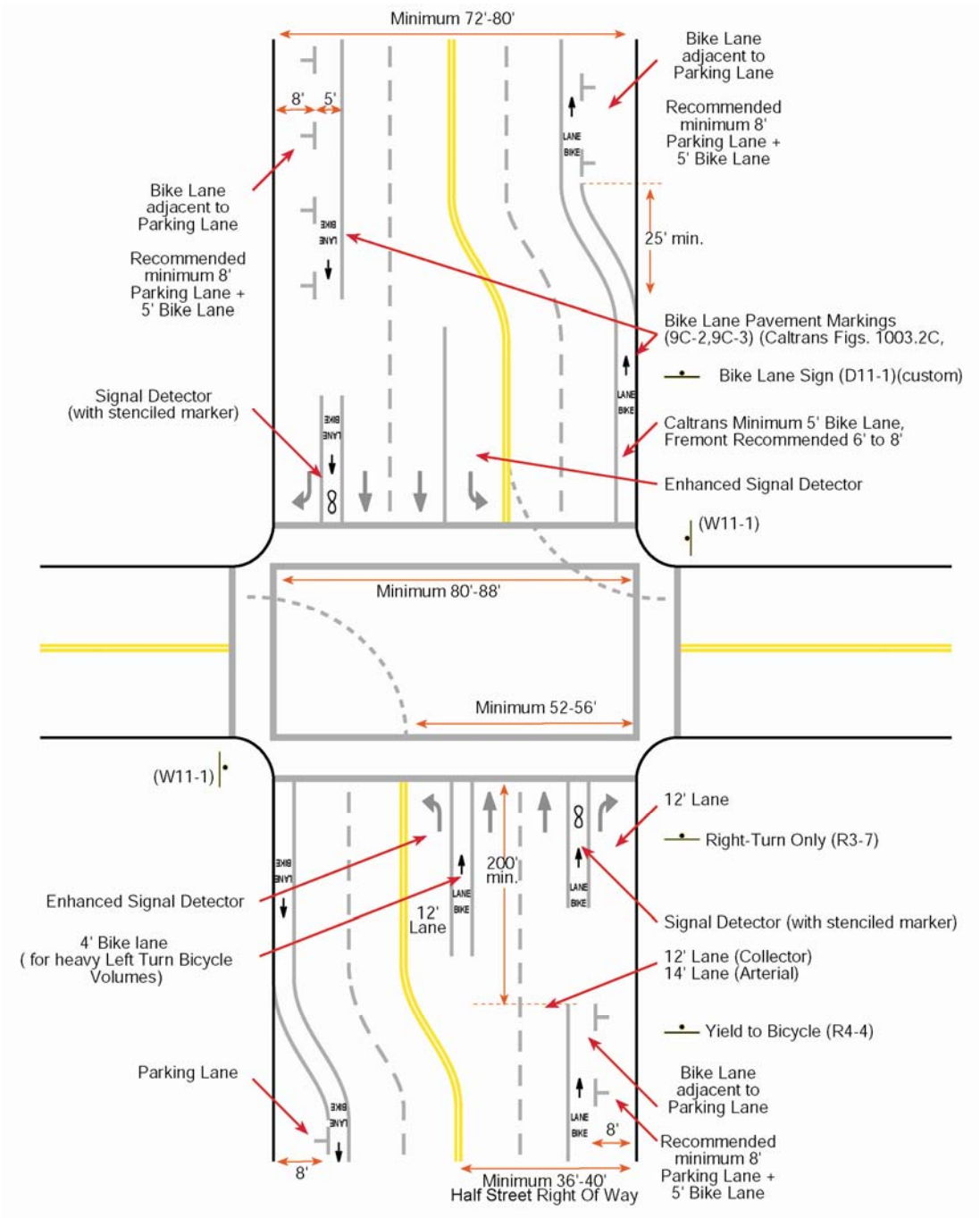
Graphic



B.4. DEDICATED BIKE TURN LANES AT AN INTERSECTION

Description
This treatment provides a design for where a roadway with Class II bike lanes intersects with a road at a signalized intersection.

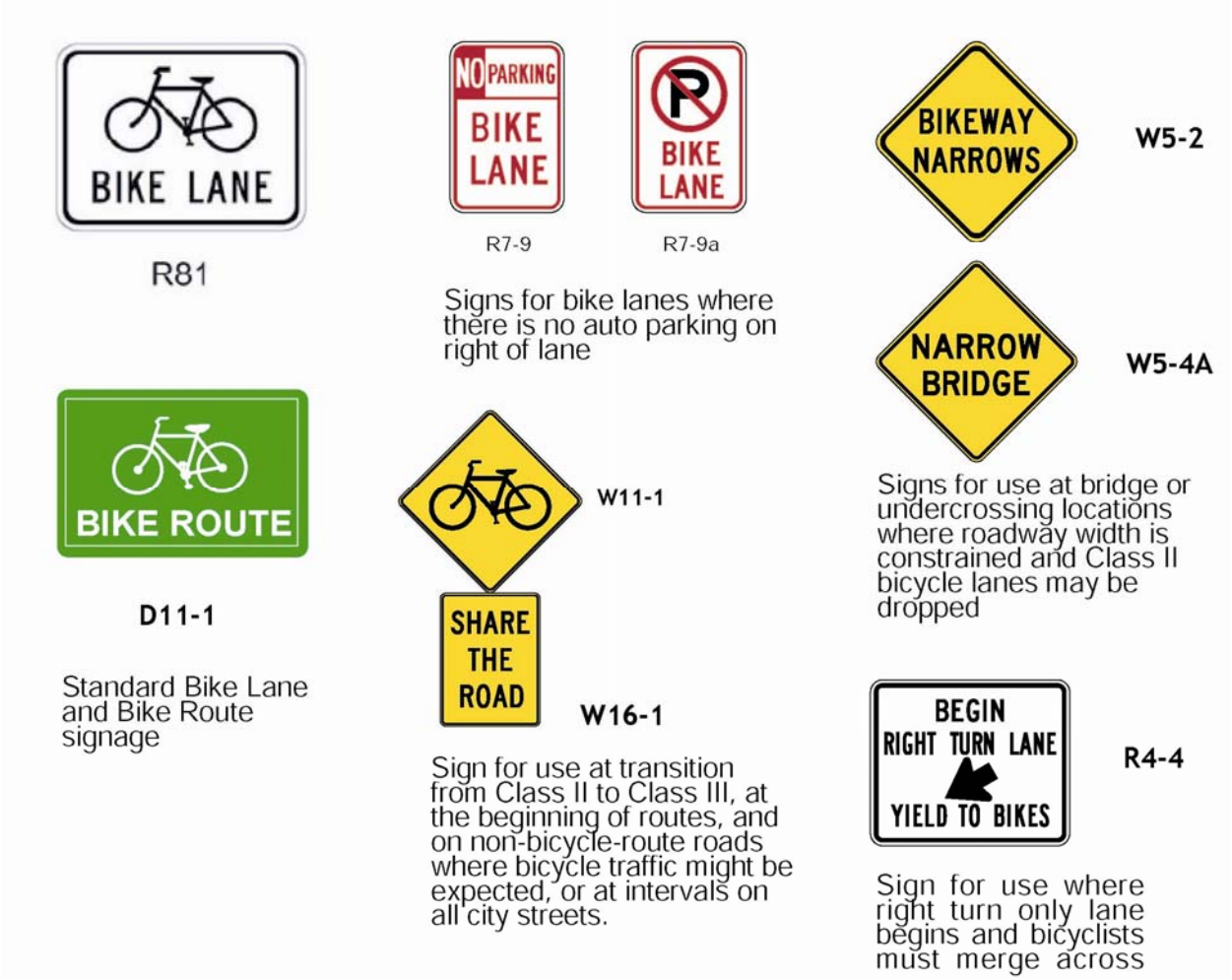
Graphic



B.5. ON-STREET BIKEWAY REGULATORY & WARNING SIGNAGE

Description
Signage for on-street bikeways includes standard BIKE LANE and BIKE ROUTE signage, as well as supplemental signage such as SHARE THE ROAD and warning signage for constrained bike lane conditions.

Graphic



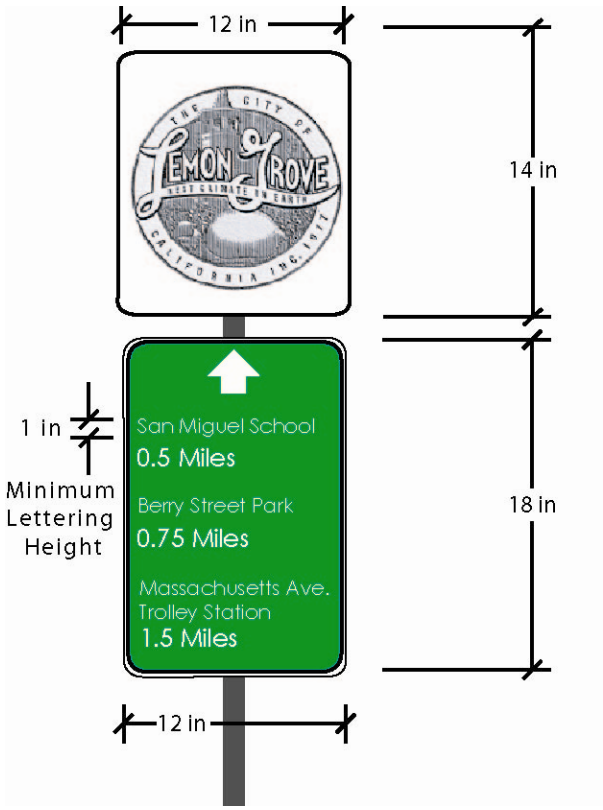
Figures are from Chapter 9 of the California MUTCD.

Potential Applications
Various situations, specific to each site. The City should install SHARE THE ROAD signs along all Class III Bike Routes in addition to standard BIKE ROUTE signage.

Guidelines
Signage should be installed on existing signposts if possible, reducing visual clutter along the path or roadway.

B.6. LEMON GROVE BIKEWAY NETWORK WAYFINDING SIGNAGE

Description
Destination signage acts as a "map on the street" for cyclists. Destination signage can not only direct cyclists to locations, but provide mileage and draw attention to local destinations. The destination signage shown below indicates destinations along the route, and may include mileage.

Graphic


Potential Applications
Along bicycle network streets throughout Lemon Grove Bikeway Network.

Guidelines
1. Destination signage should be easy to read. 2. Destination signage should be installed with enough frequency to effectively guide cyclists throughout the Lemon Grove Bikeway Network. Installation of signage every ¼ to ½ mile, depending on the route, is recommended. Placement of signage at key decision points is recommended. Many communities are developing customized signage along bikeways to accommodate both commuter and recreational users. The proposed Chollas Creek bike path project would be a good corridor to consider implementing this type of signage.

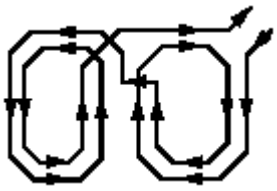
B.7. BICYCLE LOOP DETECTORS

Description

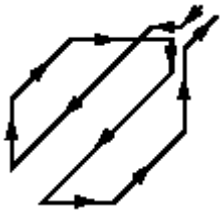
Bicycle loop detectors activate traffic signals at intersections, similar to standard loop detectors used for auto traffic. Where bicycle loop detectors are not present, bicyclists are forced to wait for a motor vehicle to trigger a signal; where motor vehicle traffic is infrequent, they may cross against a red signal. Bicycle loop detectors should be identified with pavement markings that show cyclists where to position themselves to trigger the traffic signal.

Graphic

Bicycle-Sensitive Loop Detector Examples



Quadrupole Loop – Type "C"
Detects most strongly in center
Sharp cut-off sensitivity
Used in bike lanes



Diagonal Quadrupole Loop – Type "D"
Sensitive over whole area
Sharp cut-off sensitivity
Used in shared lanes

Potential Applications

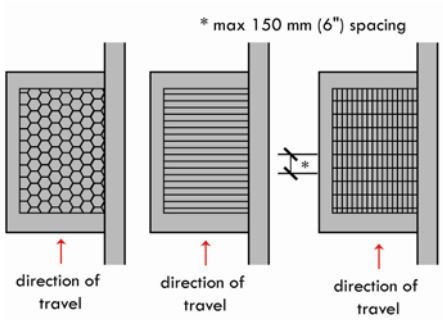
At signalized intersections along on-street segments of the Lemon Grove Bikeway Network.

Guidelines

1. Pavement markings should identify proper cyclist position above the loop detector.
2. Loop detectors should provide adequate time for cyclists to cross the intersection, keeping in mind the slower travel speed (10-15 mph) of bicyclists.

B.8. DRAINAGE GRATES AND UTILITY COVERS

Description
Improper drainage grates and utility covers can catch bicycle tires and cause bicyclists to lose control. Because of this, cyclists may veer into traffic lanes to avoid grates and utility covers. Properly designed grates and utility covers allow cyclists to maintain their direction of travel without catching tires or being forced into travel lanes.

Graphic
 Example of bicycle friendly drainage grates.

Potential Applications
Wherever drainage grates or utility covers are located along on-street segments of the Lemon Grove Bikeway Network route.

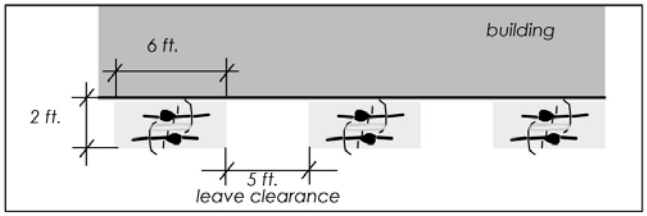
Guidelines
1. Grates must feature crossbars or a grid which prevents bicycle tires from catching or slipping through, as shown above. 2. Metal covers used in construction zones must have a non-slip coating.

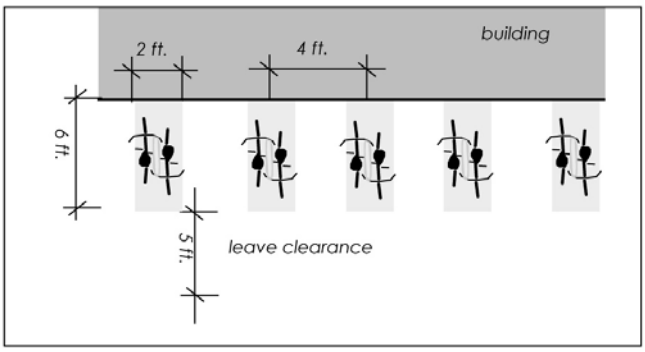
B.9. BICYCLE RACKS

Description

Secure bicycle parking is an essential element of a functional bicycle network. Bicycle racks are a common form of short-term secure bicycle parking and should be installed and maintained in various locations in Lemon Grove such as shopping centers.

Graphic





Potential Applications

Throughout the Lemon Grove Bikeway Network, with priority given to significant destinations such as parks, schools, shopping centers, transit hubs and job centers.

Guidelines

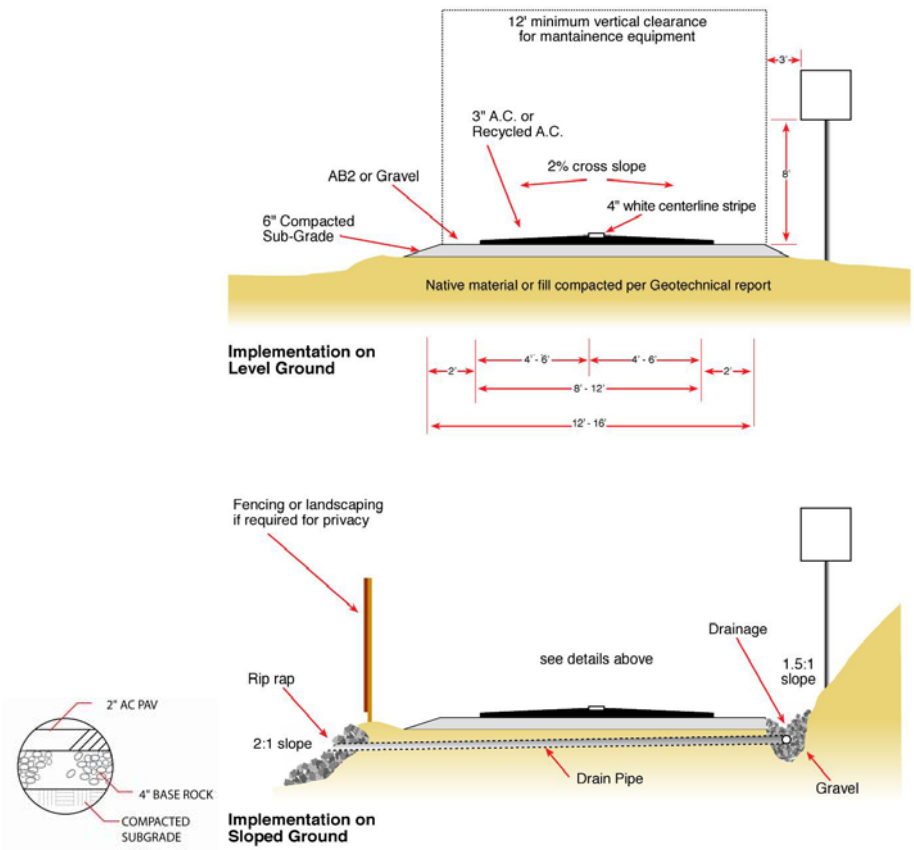
1. The rack element (part of the rack that supports the bicycle) should keep the bicycle upright by supporting the frame in two places without the bicycle frame touching the rack. The rack should allow one or both wheels to be secured.
2. A standard inverted-U style rack (shown above) is a simple and functional design that takes up minimal space on the sidewalk and is easily understood buy users. Most rack vendors offer the inverted-U design
3. In general, avoid use of multiple-capacity "wave" style racks. Users commonly misunderstand how to correctly park at wave racks, placing their bikes parallel to the rack and effectively limiting capacity to 1 or 2 bikes.
4. Position racks so there is enough room between adjacent parked bicycles. If it becomes too difficult for a bicyclist to easily lock their bicycle, they may park it elsewhere and the bicycle capacity is lowered. A row of inverted "U" racks should be situated on 30" minimum centers.
5. Empty racks should not pose a tripping hazard for visually impaired pedestrians. Position racks out of the walkway's clear zone.
6. When possible, racks should be in a lighted, high visibility, covered area protected from the elements. Long-term parking should always be protected.

B.10. TYPICAL CLASS I PATH DESIGN DETAILS

Description

In order to accommodate both bicyclists and pedestrians, Class I paths should be designed to the minimum standards shown below. In locations with high use, or on curves with limited sight distance, a yellow centerline should be used to separate travel in opposite directions. High use areas of the trail should also provide additional width up to 12 feet -16 feet as recommended below. Lighting should be provided in locations where evening use is anticipated or where paths cross below freeways or other structures.

Graphic



Potential Applications

All Class I Paths.

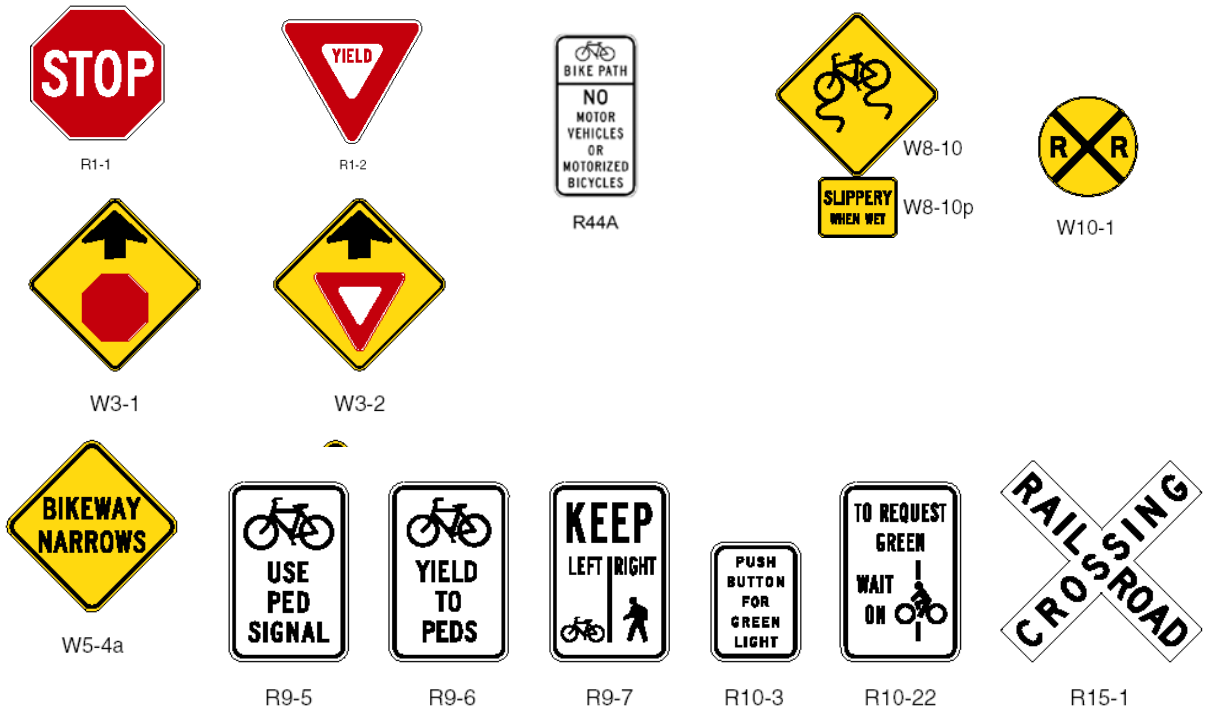
Guidelines

1. Paths should be constructed with adequate sub grade compaction to minimize cracking and sinking, and should be designed to accommodate appropriate loadings, including emergency vehicles.
2. A 2% cross slope shall be provided to ensure proper drainage.

B.11. CLASS I PATH REGULATORY AND WARNING SIGNAGE

Description
Signage for Class I paths includes warning signage for path-roadway crossings, destination and way finding signage for path users, signage to assist path users in crossing roadways, and signage to encourage proper use of path facilities. Striping along paths can help separate different types of path users, can separate opposing flows of pathway traffic, and can provide information to path users about upcoming roadway crossings or obstacles.

Graphic



Figures are from Chapter 9 of the California MUTCD.

Potential Applications
Various situations, specific to each site.

Guidelines
Signage should be installed on existing signposts if possible, reducing visual clutter along the path or roadway.

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APPENDIX C: BICYCLE COMMUTE AND AIR QUALITY CALCUATIONS

Table 1

Estimate of Existing Bicycle Transportation Usage

2000

Employed Adults, 16 Years and Older		*Input*	*Calculated Totals*	*Source(s)*
a. 2000 Population /1		24,918		U.S. Census or other source
b. 2000 Employed Persons /1		12,013		U.S. Census or other source
c. 2000 Bicycle Commute Share /1		0.10%		U.S. Census or other source
d. Travel Time Less Than 9 Minutes /1		634		U.S. Census or other source
e. 2000 est. Bicycle Commuters /1			12	U.S. Census or other source
School Children				
f. 2000 Population, Ages 6-14 /1 (K-8)		5,409		U.S. Census or other source
g. 1990 Bicycle Commute Share /2		5%		Default or local surveys
h. 2000 est. Bicycle School Commuters /3			270	
College				
i. 2000 College Population /1		1,928		U.S. Census or other source
j. 1990 Bicycle Commute Share /4		5%		local surveys
k. 2000 est. Bicycle College Commuters /5			96	
Bike-Transit Users				
l. average daily transit/rail boardings /6		4,400		MTS
m. average bike-transit boarding percentage /7		1.6%		MTS
n. bike-transit boardings in Lemon Grove /8			70	Based on above
Utilitarian (non work or school) Trips				
m. percent of work/school bicycle trips /9		174%		Local surveys or default
n. estimated bicycle utility riders /10			311	
l. Total Estimated Daily Bicycle Ridership (excl. recreation)			760	
m. Average Two-Way Travel Length (Miles)				
r1. Adults/College Students /11		8		Local surveys or default
r2. School Children /12		1		Local surveys or default
n. Replaced Vehicle Trips	n1. Adults /13	73%		Local surveys or default
	n2. Students /	53%		Local surveys or default
o. Reduced Vehicle Trips /15			1,002	
p. Reduced Vehicle Miles /16			3,005	
Reduced Annual Vehicle Miles			758,292	

Notes and Sources:

/1 2000 U.S. Census and estimates utilizing 1990 percentages.

/2 Lamorinda School Commute Study (Fehr & Peers Associates, 1995) and San Diego County School Commute Study (1990).

/3 Estimated school children who commute by bicycle, as of 1990.

/4 National Bicycling & Walking Study, FHWA, Case Study No. 1, 1995. Review of bicycle commute share in seven unversity communities (5%) – Reduced based on Community College

/5 Estimated college students who commute by bicycle, as of 1990.

/6 MTS - Total boardings FY 04 route 876, 936, 856, 926, Mass Ave and Broadway Trolley

/7 MTS -- Bike boarding on Orange Line as percent of total boardings, FY 2004

/8 ibid

/9 National Bicycling & Walking Study, Case Study No. 1, p. 16.

/10 total work, college, and transit bicycle users times 174 percent.

/11 Based on survey results from 10 California cities conducted by Alta between 1990 and 1999, L.A. Countywide Policy Document survey (1995), and National Bicycling & Walking Study, FHWA, 1995.

/12 Ibid.

/13 Ibid.

/14 Ibid.

/15 Calculated reduced vehicle trips based on assumptions and sources stated above.

/16 Calculated reduced vehicle miles based on assumptions and sources stated above.

Table 2

Estimate of System Completion and User Increases

(No Input Required)

Studies of Other Cities:

Study Cities:	v. Corridor Increases	x. System Completion	y. Adjusted Increase
City of Portland /17	137%	50%	274%
City of San Francisco /18	61%	20%	305%
City of Seattle /19	90%	35%	257%
Average			279%

Projected Increases in Your Community

	Current (2000)	*Buildout*	*Increment*	
q. Bicycle Commute Mode Share /20	0.10%	0.28%	0.18%	
r. Total Daily Bicycle Commuters /21	760	2,119	1,359	Calculation
s. Total Daily Bicycle Trips /22	1,521	4,239	2,718	
t. Reduced Daily Vehicle Trips /23	1,002	2,793	1,791	(1/x) x v
u. Reduced Daily Vehicle Miles /24	3,005	8,374	5,370	(1/x) x v

Notes and Sources:

/17 Before and after bicycle counts conducted by the City of Portland.

/18 Before and after bicycle counts conducted by the City of San Francisco.

/19 Based on preference survey study conducted by Stuart Goldsmith for the City of Seattle.

/17-19 Corridor increases refers to the average increase in bicycling in the corridors in each city, before and after bikeways were installed. System completion refers to the percent completion of the bikeway network in each city. Adjusted increase reflects the projected amount of bicycling that will occur when the system is completed, based on studies of communities with completed or nearly completed bikeway systems (National Bicycling & Walking Study, Study No. 1, 1995). This translates into an average 279% increase upon system completion.

/20 Current bicycle commute mode share from U.S. census for LA County (.63%), adjusted to potential mode share when system is 100% complete (1.76%), and the increment (1.13%).

/21 Same as above except that it shows total bicycle commuters (school and college students).

/22 Total commuters from previous line times 2 (each commuter makes 2 trips)

/23 Total reduced trips by category (adult employed, students), times 279% increase (see notes10-14).

/24 Total reduced vehicle miles by category (adult employed, students), times 279% increase (see notes 10-14)

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