City of Oakland
Bicycle Master Plan

part of the ***Land Use & Transportation Element***
of the Oakland General Plan
December 2007 ▪ Oakland, California

CITY OF OAKLAND

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Contents

List of Figures

Acknowledgements

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Mayor Ron Dellums	
Jane Brunner	District 1
Patricia Kernighan	District 2
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Maya Carson	Cycles of Change
Robert Raburn	East Bay Bicycle Coalition
Sanjiv Handa	East Bay News Service
Phil Olmstead	Urban Ecology

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Project Staff

Natalie Fay	Planning and Zoning Division
Philip Ho	Transportation Services Division
Kathryn Hughes	Transportation Services Division
Jason Patton	Transportation Services Division (Project Manager)
Kerry Jo Ricketts-Ferris	Planning and Zoning Division
Jennifer Stanley	Transportation Services Division
Elois Thornton	Planning and Zoning Division
Mark Wald	City Attorney's Office

Consultants

Carol Levine	Wilbur Smith Associates
Nate Chanchareon	Wilbur Smith Associates
Michelle DeRobertis	Professional Engineer
Crescentia Brown	Environmental Science Associates
Lesley Lowe	Environmental Science Associates
Jack Hutchinson	Environmental Science Associates
Louis Hexter	Moore Iacofano Goltsman

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Technical Advisory Committee

Jim Allison	Capitol Corridor
Anthony Banks	Oakland Police Department
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Brooke Kuhn	Alameda County Public Health Department
Nathan Landau	Alameda-Contra Costa Transit District (AC Transit)
Robin Little	Alameda-Contra Costa Transit District (AC Transit)
Heath Maddox	City of Berkeley
Martin Matarrese	City of Oakland, Park and Building Services Division
Mona Mena	Alameda County Public Health Department
Val Menotti	Bay Area Rapid Transit District (BART)
Jamie Perkins	East Bay Regional Park District
Stacey Perry	Oakland Police Department
Cesar Pujol	Alameda-Contra Costa Transit District (AC Transit)
Peter Schultze-Allen	City of Emeryville
Wendy Silvani	Emery Go Round (Emeryville TMA)
Diane Stark	Alameda County Congestion Management Agency
Diane Tannenwald	City of Oakland, Project Delivery Division
Laura Timothy	Bay Area Rapid Transit District (BART)
Jim Townsend	East Bay Regional Park District
Beth Walukas	Alameda County Congestion Management Agency
Kenya Wheeler	Bay Area Rapid Transit District (BART)
Rochelle Wheeler	Alameda County Transportation Improvement Authority

1. Introduction and Executive Summary

Vision Statement: *Oakland will be a city where bicycling is fully integrated into daily life, providing transportation and recreation that are both safe and convenient.*

To realize this vision of a bicycle-friendly community, the City of Oakland will promote the routine accommodation of bicyclists in its projects and programs. The ongoing development of the City's bikeway network, including Safe Routes to Transit and the associated support facilities, will provide the infrastructure for making Oakland more accessible by bicycle. Programs will educate cyclists and drivers on road safety while encouraging people to bicycle for both physical activity and utilitarian trips. The benefits of bicycling will help the city meet its policy goals regarding transportation, sustainability, public health, equity, and quality of life.

The *Bicycle Master Plan* is the citywide, long-range policy document for promoting bicycling in Oakland over the next twenty years. Policy T4.5 of *Envision Oakland* (1998), the Land Use and Transportation Element of the Oakland General Plan, recommended the creation of a *Bicycle Master Plan* to promote alternatives to the private automobile. To be eligible for funding from the State's Bicycle Transportation Account, local jurisdictions must complete bicycle transportation plans and then update or reaffirm those plans every five years (Streets and Highways Code 890-894.2). Oakland's original plan was completed in 1999 and reaffirmed by City Council in 2005. This document is the first update to Oakland's *Bicycle Master Plan* and it is adopted as part of the General Plan. Appendix A provides a summary of how this plan meets the requirements of the California Bicycle Transportation Act.

1.1 Goals and Objectives

To develop Oakland as a bicycle-friendly community, the *Bicycle Master Plan* identifies the following goals:

Goal 1 – Infrastructure: Develop the physical accommodations, including a network of bikeways and support facilities, to provide for safe and convenient access by bicycle.

Goal 2 – Education: Improve the safety of bicyclists and promote bicycling skills through education, encouragement, and community outreach.

Goal 3 – Coordination: Provide a policy framework and implementation plan for the routine accommodation of bicyclists in Oakland's projects and programs.

To measure progress towards these goals, the *Bicycle Master Plan* specifies the following overarching objective: *Publicly strive to become a Bicycle Friendly Community by 2012, as recognized by the League of American Bicyclists.*

The Bicycle Friendly Community Campaign is a national program to evaluate and award municipalities for actively promoting bicycling.[1] The evaluation is based on a holistic consideration of a city's accomplishments to date as well as outstanding needs. It follows a five E's approach that considers the coordinated efforts of engineering, education, encouragement, evaluation and planning, and enforcement. Applications are reviewed by an independent committee that makes awards decisions and provides constructive feedback on how municipalities can better achieve their bicycle-friendly goals. To measure progress towards these goals, the City of Oakland will publicly strive to become a Bicycle Friendly Community by 2012 when this plan will again be updated or reaffirmed.

Accomplishments to Date

The City of Oakland has taken significant steps towards becoming a bicycle-friendly community and most of these steps have been accomplished in the past ten years. This Plan provides additional detail and focus for building upon the following accomplishments.

- *Bikeways*: Major bikeways include the Bancroft Bikeway (Melrose to San Leandro), the San Francisco Bay Trail (on-street component between Emeryville and Fruitvale), Grand Ave Bikeway (West Oakland to Grand Lake), Webster/Shafter Bikeway (downtown to Rockridge), Market St Bikeway (Jack London Square to Berkeley), and the bicycle routes in the Oakland Hills. In total, Oakland now has over eighty-five miles of designated bikeways.

- *Bicycle parking*: Since 1999, the City has installed 900 bike racks throughout Oakland accommodating over 2,000 bicycles. Electronic bicycle lockers are available at the downtown BART stations and the Fruitvale Bike Station at Fruitvale BART provides secure parking for over two hundred bicycles.

- *Bicycling information*: The web site for the City of Oakland's Bicycle and Pedestrian Program includes extensive information on bicycle facilities and related resources.[2]

[1] `www.bicyclefriendlycommunity.org`
[2] `www.oaklandbikes.info`

The *Walk Oakland! Map & Guide* includes detailed information on bikeways, street grades, bicyclist safety, and transit connections. Over the course of three editions, there are now 43,000 copies of the map in print and it is available at bookstores and bike shops throughout Oakland.

- *Lake Merritt and the waterfront*: With the passage of Measure DD, the City of Oakland is embarking on major capital improvements that will dramatically improve bicycling conditions along Lake Merritt, the Lake Merritt Channel, and the Oakland Estuary.

- *Measure B*: In November 2000, Alameda County voters passed this half-cent transportation sales tax that over its twenty-year lifetime will deliver $80 million in bicycle and pedestrian improvements throughout the county.

In addition to bicycle facilities, there is a growing group of programs and organizations promoting bicyclist safety and skills.

- The City's Parks and Recreation Department offers a Bicycle Safety Helmet Program and an Earn Your Bike Program for children and youth, respectively.

- The Oakland Police Department has a highly successful Bicycle Patrol that provides community policing in the downtown and neighborhood commercial districts.

- In 2007, Oakland celebrated its fourteenth annual Bike to Work Day with over 450 bicyclists participating in the traditional pancake breakfast at City Hall.

- Community-based organizations including Cycles of Change and The Crucible provide bicycle programs and repair shops to engage and educate youth in disadvantaged neighborhoods.

- Bicycle clubs like the Oakland Yellowjackets and the Royal Ground Velo Raptors offer regular recreational rides and support for cyclists of all abilities.

- Advocacy organizations including the East Bay Bicycle Coalition and Walk Oakland Bike Oakland speak on behalf of their membership in promoting the interests of cyclists.

- Oakland's nine neighborhood-based bicycle shops provide sales and service while creating jobs and sales tax revenue.

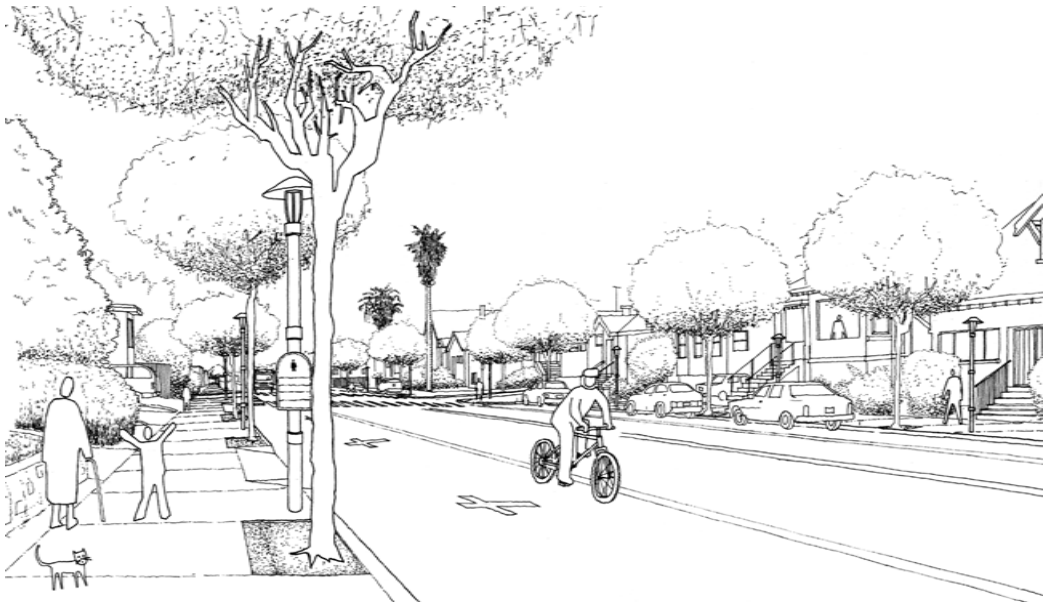

Figure 1.1: *Improving Neighborhood Quality of Life.* Bicycle improvements are mutually reinforcing with traffic calming efforts on residential streets. Bicycling helps connect residents with their communities by exposing them to sights, sounds, and social interactions that are otherwise muted by traffic. Through bicycling, children gain independence, stay active, and develop an enriched understanding of their neighborhoods. (Illustration by Amit Price Patel.)

- The City of Oakland's Bicycle and Pedestrian Advisory Committee has been meeting monthly since 1995 to ensure participation and open communication between city government, residents, and community-based organizations.

This *Bicycle Master Plan* provides the vision, goals, policies, and priorities for additional facilities and programs that will build upon these accomplishments to help Oakland become a city where bicycling is fully integrated into daily life.

1.2 Benefits of Bicycling

Bicycling is a healthy, non-polluting, low-cost, and quiet form of transportation that is ideal for many trips, including commuting and shopping. Improving safety and access for cyclists supports the City's efforts to become more environmentally, economically, and socially sustainable (Figures 1.1 to 1.3).

Transportation: Bicycles are ideal transportation for shorter trips within urban areas. In Oakland, in-fill projects and residential development in the downtown are creating land uses that are well-served by bicycle. In the San Francisco Bay Area, 43% of all trips are two miles in length or less (Federal Highway Administration 1999). In Oakland, 85% of residents live within two miles of downtown or a major transit station. This two-mile

distance equates to an easy 12-minute bicycle ride. Forty percent of American adults identified that they would sometimes commute or commute more often by bicycle if there were safe bikeways serving their trips (Parkwood Research Associates 1995). As the population of Oakland and the Bay Area continues to grow, the transportation system faces increasing demands on its crowded infrastructure. Compared to automobiles, bicycles are a very efficient use of roadway capacity and parking space.

Sustainability: Bicycling is the most energy efficient form of transportation and it has no emissions. Motor vehicles are responsible for 47% of Oakland's greenhouse gas emissions (ICLEI 2006, p. 7). Smarter land uses that foster nonmotorized transportation is a key strategy for slowing human-created climate change as well as for preserving open space throughout the region. The use of bicycles for short trips reduces the number of short trips by automobile. These are high-polluting trips because of the car's cold start and the associated inefficient operation of the engine's catalytic converter. In fact, up to 70% of the pollution from a ten-mile car trip is generated in the first mile because of the cold start.[3] By extending human-powered travel beyond walking distance, bicycles are especially effective for linking neighborhoods to major transit stations and thereby eliminating short, high-polluting car trips.

Public Health: Bicycling is healthy transportation. Physical inactivity and poor nutrition are the root causes of the obesity epidemic in the United States. In the Oakland Unified School District, 20% of students are physically unfit and 36% of students are overweight or obese (California Department of Education 2005). Over 40% of the leading causes of death in Oakland including heart disease, cancer, stroke, and type 2 diabetes are related to physical inactivity. These deaths contribute to a lifespan that is 2.5 years shorter than that of Alameda County residents as a whole. Oakland's African Americans have a lifespan that is five years shorter than the citywide average (Alameda County Public Health Department 2004). Thirty minutes of moderate physical activity per day is an effective prevention measure against these leading causes of death (US Department of Health and Human Services 2005). Building physical activity into people's daily lives is one of the most sustainable interventions to promote healthy lifestyles. Bicycling for recreation is an aerobic and low-impact form of exercise. Bicycling for transportation is an ideal means for integrating physical activity into daily life.

Equity: Bicycling is an inexpensive and broadly accessible form of transportation. The average annual cost of operating a car is $5,000 to $12,000 versus $120 per year for operating a bicycle (American Automobile Association 2006).[4] Bicycling is affordable transportation for the urban poor who—because of the correlation between wealth and race in the United

[3] `http://www.baaqmd.gov/pio/triplinking.htm`

[4] `http://www.bicyclinginfo.org/pp/benefits/econoben/index.htm`

Figure 1.2: *Providing Sustainable Transportation.* Bicycles are ideal transportation for urban areas. In the San Francisco Bay Area, 43% of trips are two miles in length or less. In Oakland, 85% of residents live within two miles of the downtown or a major transit station. This two-mile distance amounts to a casual 12-minute bicycle ride. Bicycling is the most energy efficient form of transportation and it has no associated emissions. Bicycling helps Oakland reduce the 47% of its total greenhouse gas emissions that are caused by motor vehicles. (Illustration by Amit Price Patel.)

States—are disproportionately people of color. Bicycles provide added freedom and independence for youth and parents (who are otherwise shuttling their children) as well as for some people who cannot drive and those who have chosen not to drive.

Quality of Life: Bicycling is a means for improving the livability of Oakland's neighborhoods. Bicycle improvements are mutually reinforcing with traffic calming efforts on residential streets. Bicycling helps connect residents with their community by exposing them to sights, sounds, and social interactions that are otherwise muted by traffic. The lives of parents are simplified when their children can ride safely and confidently to school and their activities. Through bicycling, children gain independence, stay active, and develop an enriched understanding of their communities.

1.3 Executive Summary

In the following chapters, the *Bicycle Master Plan* describes existing conditions, policy recommendations, proposed bikeways, support facilities, and an implementation program. The policies were developed from the existing conditions and they in turn guide the recommendations for "Bikeways" and "Parking and Support Facilities." Taken as a whole,

the Plan provides a framework for achieving the vision, goals, and objectives by improving bicyclist safety and access. The specific recommendations reflect consensus amongst stakeholders on how best to achieve this overarching vision.

Chapter 2: Existing Conditions

Chapter 2 provides a comprehensive description of bicycling in Oakland based on available data, fieldwork, and an extensive community process. It identifies the opportunities for and constraints to bicycling, and characterizes the user groups that are common in Oakland. The chapter reviews the available data on bicyclist mode share (with an emphasis on bicycling to transit) and bicyclist-involved collisions. It also summarizes bicycle-related programs in Oakland and provides an overview of the community process through which the *Bicycle Master Plan* was developed. In assessing the existing conditions, these quantitative data were complemented by a community outreach process that included meetings with neighborhood groups and merchants associations throughout Oakland.

Oakland's mild climate and varied topography are highly suited for both commuter and recreational cycling. In fact, Oakland has the third highest cycling rate of all California cities with populations over 150,000 (US Census 2000). However, busy streets and high motor vehicle speeds create real and perceived barriers to more people cycling. On average, a bicyclist-involved collision occurs every other day in Oakland. Ninety-seven percent of these collisions involve motor vehicles and youth cyclists are disproportionately represented in these collisions (based on their share of the population). However, considering both the number of cyclists and number of collisions, Oakland is a comparatively safe place for bicycling: the fourth safest city in California with a population over 60,000 (Jacobsen 2003).

Chapter 3: Policy Recommendations

Based on the existing conditions, Chapter 3 provides policy recommendations for each of the Plan's three goals: Infrastructure, Education, and Coordination. These policies address the Bikeway Network, Routine Accommodation, Safe Routes to Transit, Parking and Support Facilities, Education, Enforcement, Resources, Project Development, and Public Review. In particular, the policy on routine accommodation states that bicycle safety and access be addressed, as a matter of course, in the design and maintenance of all streets. The chapter contextualizes these recommendations with related policies at the federal, state, regional, and municipal levels. An inventory of all related Oakland General Plan policies and actions are compiled in Appendix D.

The United States Department of Transportation's Policy Statement on Walking and Bicycling specifies that "bicycling and walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist." Similarly, the California Department of Transportation's Deputy Directive 64 requires that Caltrans fully consider the needs of bicyclists in all of its activities. California Assembly Concurrent Resolution No. 211 encourages all cities to implement these USDOT and Caltrans policies. The Metropolitan Transportation Commission's policy on routine accommodation requires that all projects using regional funds consider bicyclist access. Oakland's *Bicycle Master Plan* follows this guidance through the policy on Routine Accommodation: that bicycle safety and access be addressed in the design and maintenance of all streets. Another key policy direction, Safe Routes to Transit, promotes bicycle facilities serving major transit hubs, thereby extending the reach of bicyclists while simultaneously increasing transit ridership. These policy recommendations are applied in Chapter 4, "Bikeways," and Chapter 5, "Parking and Support Facilities."

Chapter 4: Bikeways

Chapter 4 describes the various bikeway types and explains the rationales for the proposed bikeway network. It also applies the Safe Routes to Transit policy to the bikeway network by specifying bikeways to each of the major transit stations. The chapter concludes with bikeway design guidelines to help project managers, consultants, and the public understand the basic design issues for accommodating bicyclists.

Oakland's proposed bikeway network consists of bicycle paths (Class 1), bicycle lanes (Class 2), bicycle routes (Class 3), arterial bicycle routes (Class 3A), and bicycle boulevards (Class 3B). The network reflects incremental modifications and improvements to the network identified in the 1999 *Bicycle Master Plan.* All proposals were evaluated through a citywide feasibility analysis that considered street grades, available right-of-way, street capacity, and bicycle/bus interactions. The network emphasizes Safe Routes to Transit by including bikeways from four directions to each transit station. The bikeway design guidelines summarize the basic parameters required by the Caltrans Highway Design Manual and the Manual on Uniform Traffic Control Devices. This section also explains additional treatments that address issues commonly found in Oakland.

Chapter 5: Parking and Support Facilities

The bicycle is a viable means of transportation when physical accommodations ensure that people's trips are safe and convenient and that their property is secure. These facilities in-

clude various types of bicycle parking as well as restrooms, showers, and lockers. Chapter 5 explains the basic types of bicycle parking and identifies the existing and proposed facilities for each type. The chapter describes Oakland's bicycle parking ordinance and provides design guidelines for selecting and locating bicycle parking facilities. The provision of high-quality bicycle parking is critical because people's decisions to bicycle are affected by security concerns over their property.

Chapter 6: Implementation

Chapter 6 prioritizes projects and programs for implementing the Plan's recommendations. In particular, priority bikeways were identified based on evaluation criteria to determine and rank their relative benefit. The chapter discusses the process for project implementation, including the need for further study. It then describes the relationship between proposed bikeways and other roadway and development projects that may affect the network. Most bikeway projects are implemented with some form of grant funding and the chapter provides a brief summary of the most common grant sources. Lastly, the chapter addresses staffing and public participation, with an emphasis on Oakland's Bicycle and Pedestrian Advisory Committee.

Appendices

The following appendices provide greater detail and additional documentation to augment the preceding chapters. Appendix A, "Caltrans BTA Requirements," is a quick reference guide on how this document meets the state requirements for a bicycle transportation plan. Appendix B, "Building on the 1999 Bicycle Master Plan," provides a policy-level discussion of how bicycle planning and engineering in Oakland have developed over the past eight years. Appendix C, "Local and Regional Coordination," documents the community outreach process for this Plan and summarizes other plans at the local, county, and regional levels that intersect with Oakland's *Bicycle Master Plan.* Appendix D, "Oakland General Plan Policies," inventories the bicycle-related policies and actions in all elements of Oakland's General Plan. Similarly, Appendix E, "Oakland Municipal Code," documents all references to bicycles in this code. Appendix F, "Bikeway Descriptions," provides descriptions of priority projects, bicycle paths and bridges, major on-street projects, bridges and freeway crossings, at-grade railroad crossings, and proposed changes to existing bikeways. Appendix G, "Requirements for Bikeway Feasibility Studies," specifies the additional analysis that will be necessary prior to implementing proposed bikeways. Lastly, Appendix H, "Supplementary Documentation" includes the data and evaluation for the approximately

Figure 1.3: *Promoting Equity and Public Health.* Bicycling is an inexpensive and broadly accessible form of transportation and recreation. Bicycle improvements are one aspect of improving Oakland's streets and open spaces to make them accessible and inclusive. Building physical activity into people's daily lives is a sustainable intervention for promoting healthy lifestyles. Bicycling for transportation and recreation is an ideal means for integrating physical activity into daily life. (Illustration by Amit Price Patel.)

700 bikeway segments that were evaluated in the development of the proposed bikeway network. Key maps are included as 11"x17" color pages and collected at the end of this document.

2. Existing Conditions

The San Francisco Bay Area's mild climate is exceptionally well-suited for cycling. Oakland's flatlands provide many possibilities for bicycling to work, school, shops, and transit whereas improvements along the waterfront and Lake Merritt are creating new recreational opportunities. Similarly, the Oakland Hills are known throughout the region for their challenging and rewarding cycling routes. However, busy streets with many cars are widely recognized as barriers to more people bicycling in Oakland. This chapter explores these opportunities and constraints through the available data on bicyclist mode share and bicyclist-involved collisions. Both of these analyses are contextualized by data from other California cities, including other cities in the East Bay plus cities of comparable size throughout the state. The chapter also summarizes past and current educational programs along with the community outreach effort associated with this Plan.

2.1 Opportunities and Constraints

Oakland has many of the basic characteristics of a bicycle-friendly community, more so than many major metropolitan areas in the United States. However, there are significant barriers to bicycling becoming a viable and everyday form of transportation. Many of these constraints can be constructively addressed through policy, planning, design, education, encouragement, and enforcement.

Opportunities

- Oakland's climate allows for year-round bicycling.
- The downtown and many mixed-use neighborhoods put homes, jobs, shops, and services in close proximity to each other.
- BART, AC Transit, Capitol Corridor, Alameda/Oakland Ferry, and the Caltrans Bay Bridge Bike Shuttle provide bicycle-accessible public transportation throughout the region.
- The vast majority of Oakland residents live within bicycling distance of a major transit station.

- Transit village development at Oakland's BART stations is creating opportunities to improve bicycle access to the stations and bicycle parking at the stations.
- Many of Oakland's major streets were developed in the streetcar era, providing direct and level connections between neighborhoods and the downtown.
- Lake Merritt is a popular destination for recreational cyclists of all abilities who will benefit from the significant investments currently underway.
- The Oakland Hills provide premier routes for experienced recreational cyclists.
- The San Francisco Bay Trail is providing scenic and practical connections along Oakland's waterfront for both recreational and commuter bicyclists.
- The bicycling community in Oakland and the greater East Bay is an active constituency supporting improved bicycle facilities.
- Oakland has many bicycle shops—local businesses that provide services, create jobs, and generate tax revenue.

Constraints

- In some neighborhoods, Oakland's irregular street grid provides cross-town connections on a limited number of streets, creating conflicts between cars, buses, trucks, and bicycles.
- Many of Oakland's major streets lack bicycle facilities and have motor vehicle volumes and speeds that create undesirable conditions.
- Freeways, interchanges, and the Oakland Estuary are significant obstacles to bicycle travel.
- In neighborhoods like Montclair, Maxwell Park, and Peralta Heights, steep hills limit bicycle travel and options for designating bikeways.
- In some areas, current land uses and structures limit the ability to develop new bicycle paths.
- Uneven street surfaces caused by railroad tracks, utility covers, drainage grates, rough pavement, and debris are hazardous to bicyclists.
- Diagonal parking as well as double-parked cars and trucks can create difficult situations for bicyclists.

- Concerns over personal security deter some people from riding on residential streets in neighborhoods that are perceived as unsafe.
- Bicycle theft and a lack of secure parking deter people from leaving their bicycles unattended and from using high quality bikes for utilitarian trips.
- BART's commute-time bicycle restrictions limit bicycle commuting.
- Many drivers and bicyclists are unaware of the rights and responsibilities of cyclists on city streets.

2.2 Who Rides Bicycles?

The *Bicycle Master Plan* addresses commuters and recreationists as two basic categories of on-street bicyclists. Depending on their skill level, bicyclists may be further differentiated as either experienced or casual. The purpose of the *Bicycle Master Plan* is to improve conditions for experienced cyclists, encourage casual cyclists to ride more often and more skillfully, and attract new people to cycling for both transportation and recreation.

Commuters: Commuter bicycling includes all utilitarian trips—to work, school, stores, or restaurants—and is often linked with transit trips. Secure bicycle parking is a paramount concern for all commuters.

- *Experienced commuters* seek the quickest and most direct routes, making full use of arterial streets that require as few stops as possible. Experienced bicyclists negotiate streets like motor vehicles, for example, by merging across traffic to make left turns.
- *Casual commuters* generally ride shorter distances and may be unfamiliar with the rules of the road. They may believe—incorrectly—that riding on the sidewalk is safer than riding in the street. Casual cyclists may prefer local streets even if they are slower. Regardless of skill level, commuters may choose major streets over quiet streets because of personal safety concerns.

Recreationists: For recreationists, routes with low or no traffic and appealing scenery are generally more important than direct routes. In some cases, recreationists may drive to their starting point because of traffic barriers in bicycling to the staging area.

- *Experienced recreationists* seek physically challenging routes, riding at high speeds over long distances that may include significant hills. They will often avoid bicycle

paths because of uneven surfaces, conflicts with pedestrians, and limited visibility or maneuverability at high speeds. Recreational rides are typically loop routes that return to the ride's starting point. Regional transit allows cyclists to take one-way rides and reach rural areas without the use of a car.

- *Casual recreationists* include families with children who seek out quiet streets or bicycle paths in park-like settings (like the Bay Trail or the Lake Merritt Path). Because they travel at lower speeds, casual recreationists mix more easily with pedestrians on shared-use paths than do experienced recreationists riding at higher speeds.

The U.S. Department of Transportation provides thresholds for traffic volumes, vehicle speeds, and lane widths for cyclists of different experience levels. For example, on an arterial street with traffic moving between 30 and 40 miles per hour, less experienced bicyclists require bicycle lanes to separate themselves from motor vehicle traffic. In contrast, more experienced bicyclists may be comfortable sharing a wide curb lane with motor vehicles (Wilkinson III et al. 1994; Hunter et al. 1999).

2.3 Bicycling Rates in Oakland

Bicycling rates have been increasing in Oakland in conjunction with the growing interest in cycling at the regional and national levels as well as the construction of more bicycle facilities at the local level. This interest is related to a heightened awareness of climate change, oil dependence and gas prices, and the health-related impacts of physical inactivity. In this context, bicycling is receiving more attention as healthy, environmentally benign, and affordable transportation.

Three sources of data are available for characterizing these bicycling rates: bicycle counts conducted by the City of Oakland, US Census Journey to Work data, and the San Francisco Bay Area Travel Survey administered by the Metropolitan Transportation Commission. Figure 2.1 provides selected bicyclist counts collected in Oakland. The first three entries compare two sets of bicyclist counts taken at least a year apart for three different intersections without bicycle facilities. The lower half of the table then compares bicyclist counts taken before and after the installation of recent bicycle lane projects.

The US Census Journey to Work data provide the primary mode of travel that people take to work. According to the 2000 Census, 1.2% of Oaklanders bicycled to work versus 1.1% in the 1990 Census. At a finer level of detail, cycling rates vary significantly between census tracts in Oakland. Some neighborhoods have cycling rates over 5% while other areas report no residents cycling to work as their primary transportation mode. (See the map of "Bicycle Mode Share by Census Tract" on page 202.)

Intersections without Bikeways	Earlier Count (Date)	Later Count (Date)	Percent Change
Lakeshore Ave / Foothill Blvd	18 (Jul 2001)	29 (Oct 2002)	61%
Martin Luther King Jr Way / 14th St	15 (Aug 1999)	30 (Feb 2001)	100%
Telegraph Ave / 27th St	18 (May 1999)	52 (May 2002)	189%
TOTAL	51	111	118%

Streets with Bicycle Lane Projects	Pre-project Count (Date)	Post-project Count (Date)	Percent Change
3rd St (Mandela Pkwy to Brush St)	8 (Jun 2003)	17 (Apr 2006)	113%
73rd Ave (Bancroft Ave to International Blvd)	12 (Aug 2005)	7 (Apr 2006)	-42%
Embarcadero (Oak St to Kennedy St)	39 (May 2002)	60 (Apr 2006)	54%
Fruitvale Ave (E 12th St to Alameda Ave)	41 (Aug 2002)	93 (Apr 2006)	127%
Grand Ave (Market St to El Embarcadero)	58 (Jun 2000)	121 (Oct 2001)	109%
MacArthur Blvd (Lakeshore Ave to Park Blvd)	4 (Apr 2002)	20 (Apr 2006)	400%
Market St (Aileen St to MacArthur Blvd)	23 (Jul 2005)	23 (May 2006)	0%
TOTAL	185	341	84%

Figure 2.1: *Selected Bicyclist Counts.* Bicycling rates have been increasing in Oakland in conjunction with the growing interest in cycling at the regional and national levels as well as the construction of more bicycle facilities at the local level. (All counts were taken during the PM peak hour, Tuesday through Thursday).

Figure 2.2 compares the mode split for selected California cities as reported in the US Census Journey to Work data. Of the 24 California cities with populations over 150,000, Oakland had the third highest cycling rate (tied with Anaheim at 1.2%), following San Francisco (2.0%) and Sacramento (1.4%).

These census data are widely considered to undercount cycling rates for three reasons:

1. The Census does not capture people cycling to work one or two times per week.

2. The Census does not count cycling trips linked with transit (or carpooling) in that the transit trip is generally considered the primary mode and only one mode is counted.

3. Many cycling trips are not work-related and thus are not counted.

This under-reporting of bicycle trips is corroborated by the San Francisco Bay Area Travel Survey 2000 (BATS2000). This survey provides mode share data at the county level based on a sampling of households that completed activity diaries of all transportation trips. For work trips in Alameda County, the US Census 2000 reports a 1.3% bicycle mode share while BATS2000 reports the bicycle mode share at 2.2%. For all trips originating in Alameda County, bicycles accounted for 2.1% of weekday trips, 2.0% of Saturday trips, and 1.7% of Sunday trips (Metropolitan Transportation Commission 2004, pp. 197–180, E115, F115).

City	Total Workers	Bicycle	Walk	Transit	Carpool	Drive Alone	Other
Oakland	170,503	1.2%	3.7%	17.4%	16.6%	55.3%	5.6%
Anaheim	139,343	1.2%	2.3%	4.6%	17.5%	71.1%	3.4%
Berkeley	54,674	5.6%	14.9%	18.6%	9.6%	43.2%	8.1%
Fresno	156,569	0.8%	2.1%	2.5%	16.0%	74.7%	3.9%
Long Beach	184,479	0.7%	2.5%	6.6%	13.7%	72.6%	3.8%
Los Angeles	1,494,895	0.6%	3.6%	10.2%	14.7%	65.7%	5.1%
Sacramento	166,419	1.4%	2.8%	4.6%	16.3%	71.0%	4.0%
San Diego	580,318	0.7%	3.6%	4.2%	12.2%	74.0%	5.3%
San Francisco	418,553	2.0%	9.4%	31.1%	10.8%	40.5%	6.2%
San Jose	427,984	0.6%	1.4%	4.1%	14.1%	76.4%	3.4%
San Leandro	36,928	0.6%	1.9%	10.2%	13.1%	70.3%	3.9%
Santa Ana	124,289	1.1%	2.2%	8.5%	24.7%	60.1%	3.3%

Figure 2.2: *Mode Split for Oakland and Other California Cities.* Of the 24 California cities with populations over 150,000, Oakland had the third highest cycling rate (tied with Anaheim at 1.2%), following San Francisco (2.0%) and Sacramento (1.4%). (US Census 2000, Journey to Work)

Data on trip length are available from the 1995 Nationwide Personal Transportation Survey (NPTS) (Federal Highway Administration 1999). These data suggest the potential for bicycle trips replacing trips by other modes, most notably the private automobile. (Note that data on trip length are not included in the US Census or the Bay Area Travel Survey.) For the San Francisco-Oakland Consolidated Metropolitan Statistical Area, the NPTS includes data on 5,369 trips that were 50 miles or less in length. Of these trips, 43% were two miles or less and 67% were five miles or less.[1] At ten miles per hour, a bicyclist covers these distances in 12 minutes and 30 minutes, respectively. Ten miles per hour is a casual cycling speed whereas strong cyclists will travel at 15 to 20 miles per hour. These trips of five miles or less—and especially those of two miles or less—are trips where the bicycle is a viable and practical mode choice. These figures suggest the potential for increasing bicycle mode share by providing bikeways, bicycle parking, and programs that encourage and promote cycling skills.

Cycling rates are likely to increase with the implementation of Oakland's *Bicycle Master Plan.* In particular, research suggests that the number of bicycle commuters in a given city is positively correlated with the prevalence of bikeways in that area. Nelson and Allen (1997) found that each new mile of bicycle lane or bicycle path per 100,000 people correlates with a 0.069% increase in the bicycle mode share for work trips. Similarly, Dill and Carr (2003) found that each additional mile of bicycle lane per square mile correlates with a 1% increase in this mode share for cities over 250,000 people. Based on these models, Oakland's bicycle journey-to-work mode share may increase from 1.2% (US Census 2000) to between 4% and 5% upon completion of the bikeway network described in Chapter 4. Oakland may

[1] United States Department of Transportation, Bureau of Transportation Statistics (`www.transtats.bts.gov`)

be expected to have larger than average increases due to its mild climate, level terrain (in many neighborhoods), mixed land uses, and proximity to the University of California, Berkeley. By accounting for these contextual factors and the bicycle mode share data from BATS2000, Oakland may achieve a 10% bicycle mode share for all transportation trips with the development of the bikeway network and associated education and enforcement programs.[2]

2.4 Transit Connections

Allowing bicycles on transit vehicles provides significant benefits for both bicyclists and transit providers. For cyclists, it increases the range of destinations accessible by bicycle and can be used to overcome barriers including long distances, bad weather, hilly terrain, traveling at night, and riding through seemingly unsafe areas. For transit operators, providing on-board bicycle access is an incentive for people to use their service. This incentive increases the number of potential riders while decreasing the proportion of car parking required at transit stations. People who prefer to leave a bicycle at either end of their transit trip should be accommodated with secure parking that is conveniently located at the transit station.

As shown in Figures 2.3 and 2.4, a significant number of Oakland residents live within proximity of at least one major transit station. While 8% of Oakland residents live within one-half mile of a station, 85% of Oakland residents live within two miles of a station. In the case of MacArthur BART, for example, 18 times as many people live within two miles of the station compared to the number of people who live within one-half mile. While two miles is further than most people will walk, this distance is easily covered in a 12-minute bicycle ride. Because many of Oakland's transit stations are within two miles of each other, many residents live within two miles of more than one station.

The following policies govern on-board bicycle access for transit serving Oakland. Folding bicycles are allowed on all transit vehicles at all times.

[2]Note that these models are based on the limited data available and their results should be interpreted with a degree of caution. The models do not address education, encouragement, or enforcement and they are subject to the above qualifications regarding the US Census data on bicycling. The research establishes a correlation—not a causal relationship—between bikeways and mode share. The projections for Oakland are based on the following numbers for population (400,000), land area (55 square miles), existing bikeways in 2000 (10 miles), total bikeways upon completion of the network (218 miles). In addition to the differences between the two models, the range of 4% to 5% arises from different assumptions on how to classify arterial bicycle routes (Class 3A) and bicycle boulevards (Class 3B). See Section 4.5 for additional information on these bikeway types.

Major Transit Station	1/2 mile	1 mile	2 miles
Amtrak -- Jack London Square	501	9,307	57,850
Amtrak -- Oakland Coliseum	318	6,950	57,763
BART -- 12th St	6,006	21,487	87,884
BART -- 19th St	4,512	27,080	96,647
BART -- Coliseum	1,177	9,117	63,085
BART -- Fruitvale	4,712	22,101	111,576
BART -- Lake Merritt	4,405	19,431	78,584
BART -- MacArthur	5,234	22,688	96,575
BART -- Rockridge	4,472	18,134	84,472
BART -- West Oakland	2,953	9,093	28,445
Oakland/Alameda Ferry	9	6,067	41,553
TOTAL for Oakland	30,524	115,290	337,974

Figure 2.3: *Residential Population Near Major Transit Stations.* While 8% of Oakland residents live within one-half mile of a station, 85% of Oakland residents live within two miles of a station. (Data courtesy of the Metropolitan Transportation Commission using US Census 2000. Distances between home and station were computed using the road network, excluding freeways.)

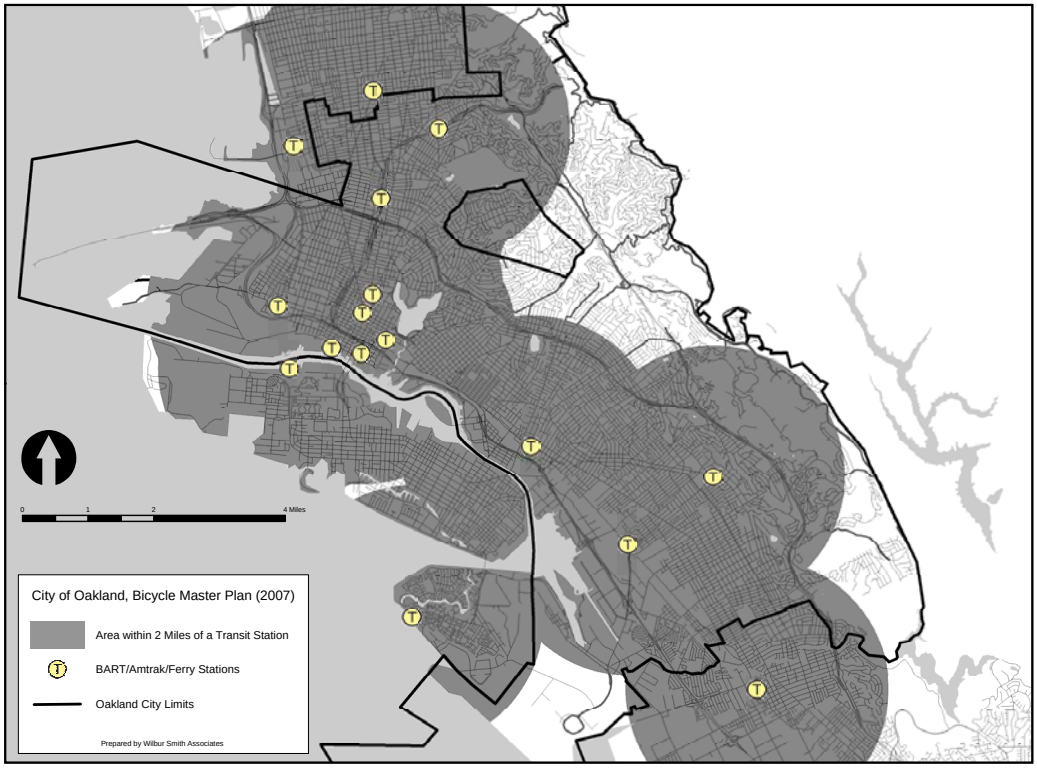

Figure 2.4: *Transit Coverage.* The majority of Oakland is within two miles of a major transit station and the downtown. While two miles is further than most people will walk, this distance is easily covered in a 12-minute bicycle ride.

- *AC Transit*: As of 2001, all AC Transit buses are equipped with front-mounted bicycle racks that hold two bikes. A limited number of transbay lines have under-carriage bicycle racks in the luggage bins that carry an additional two bicycles. Full-size bicycles are allowed on-board between 12:30am and 5:30am on weekdays and 12:30am and 9:00am on weekends and holidays if the rack is full and space is available inside.

- *Alameda/Oakland Ferry*: Bicycles are allowed on the ferry on a first come, first served basis. The Encinal, the service's flagship, has a bicycle rack on the first deck with significant storage space.

- *BART*: Bicycles are allowed on most BART trains except for those traveling at the peak time in the peak direction. During commute hours, bicycles are not allowed in the 12th and 19th Street stations. The particular train and station restrictions are highlighted in the "BART Fares and Schedules" brochure. Bikes are never allowed on the first car or on crowded cars.

- *Caltrans Bay Bridge Bike Shuttle*: This service runs between MacArthur BART, Treasure Island, and the Transbay Terminal using a van and trailer that accommodates 14 bicyclists. The shuttle runs on weekdays during commute hours with seven departures per day in each direction.

- *Capitol Corridor*: Bicycle racks are located on the lower level of most coach cars. Each rack accommodates three bicycles. If the racks are full, the conductor will identify a place to secure additional bikes. Capitol Corridor buses allow unboxed bicycles in the luggage compartments.

In the BART system, 3% of patrons travel from home to the station by bicycle. Of the top ten BART stations by bicycle mode share, four are located in Oakland: Lake Merritt, Fruitvale, MacArthur, and Rockridge. Additionally, the Ashby station serves Oakland residents and has the second highest bicycle mode split in the BART system (Bay Area Rapid Transit District 2002, p. 1-17). BART developed a "Bicycle Access Growth Potential" tool to rank stations by their likelihood of increasing bicycle mode share (Bay Area Rapid Transit District 2002, Table A-11). This analysis considered topography and major barriers, nearby population and car ownership levels, existing bicycle mode share, total station ridership, and the number of home-based passenger entries. These results were summarized on a scale of high, medium, or low and are included in Figure 2.5. A map with more recent access data for MacArthur BART is included as Figure 2.6.

In November 2000, AC Transit had a total of 1,312 weekday bicycle boardings. Of these trips, 88% were on local routes and the remaining 12% on transbay routes.

Station	Bicyclist Mode Share	Total Bicyclists	Growth Potential
12th Street	1%	40	Medium
19th Street	3%	62	Medium
Ashby	7%	193	High
Coliseum/Oakland Airport	2%	52	Low
Fruitvale	4%	208	High
Lake Merritt	5%	105	Medium
MacArthur	4%	147	High
Rockridge	3%	92	Medium
San Leandro	2%	64	Medium
West Oakland	1%	31	Low

Figure 2.5: *Bicyclist Mode Share at BART Stations*, based on 1999 data (Bay Area Rapid Transit District 2002, p. A-6). The "Growth Potential" was developed by BART to assess the likelihood of increasing bicycle mode share at stations throughout their system.

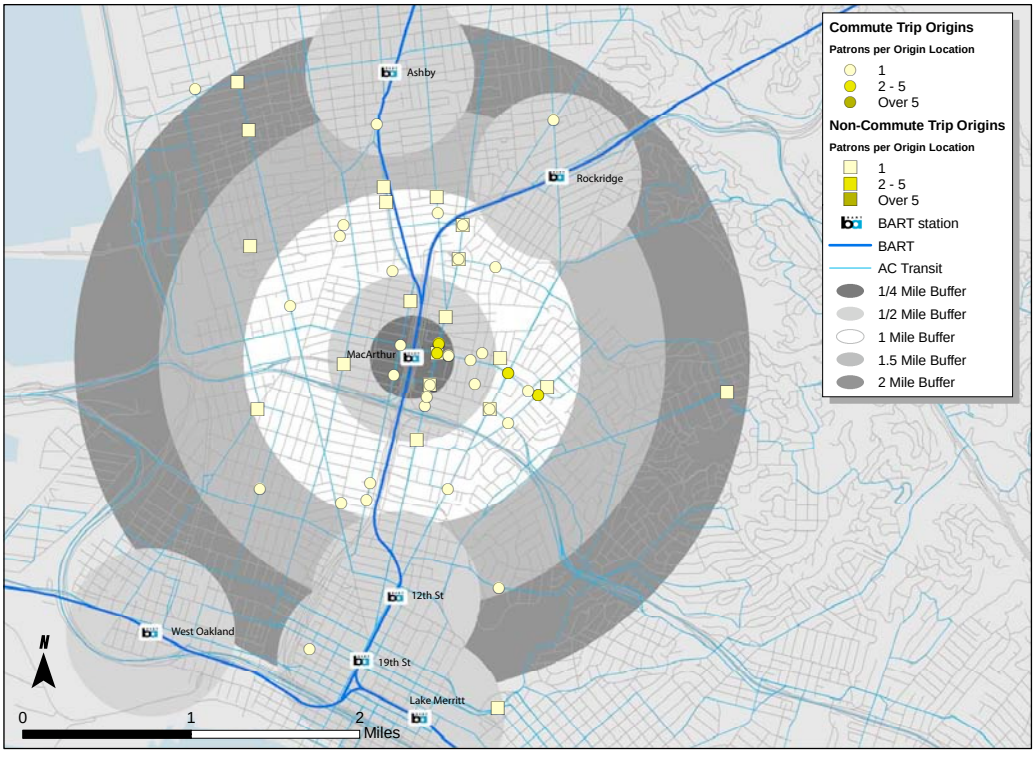

Figure 2.6: *Bicycle Trips to MacArthur BART*. The bicycle access mode share to MacArthur BART increased from 4% in 1999 to 7% in 2006, one of the highest in the BART system. At the time of these surveys, there was not a designated bikeway that provided a continuous connection to the station. (Map by Fehr and Peers and Nelson\Nygaard, 2006.)

In February 2006, the Capitol Corridor Satisfaction Study surveyed riders on how they got to and from the train stations along the Capitol Corridor line. For Jack London Square, 3.6% of patrons (5 out of 138) bicycled to the train and 10.1% of patrons (18 out of 179) bicycled from the train to their final destination. For Emeryville, 4.6% of patrons (14 out of 305) bicycled to the train and 5.1% of patrons (16 out of 316) bicycled from the train to their final destination. Complete data were not available for the recently opened Oakland Coliseum Station. System wide, the survey found that 7.3% of riders bicycled to the train and 9.3% bicycled from the train to their final destination.

2.5 Bicyclist Collisions

The following analysis identifies general patterns in bicyclist-involved collisions across the city over a multi-year period. In particular, the analysis shows trends with respect to geographical location of the collisions, demographics of the involved bicyclists, and the general reasons for these collisions. The insights from these collision data inform the policies, programs, and facilities that are described in the remainder of this plan.

This collision analysis is based on data from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS). The data set includes non-injury, injury, and fatality collision reports taken by the Oakland Police Department and filed with the California Highway Patrol. These data are widely regarded as an undercount of actual collisions in that they include only the reported collisions that are field investigated. Non-injury collisions, especially those involving a bicyclist and a stationary object or poor pavement conditions, are the least likely to be reported. Unless noted otherwise, all analyses are based on data from 2000 to 2004.

Oakland in State Perspective

Oakland is a relatively safe city for bicycling in comparison to other cities throughout California. The absolute number of injury and fatality collisions per population is amongst the lowest of the cities listed in Figure 2.7. Yet this comparison is of limited value because it does not account for the number of collisions relative to the number of bicyclists. Fewer cyclists on a city's streets will generally result in a lower number of collisions. Thus collision numbers by themselves provide an incomplete understanding of safety.

Jacobsen (2003) addressed this issue by analyzing the number of collisions relative to the number of bicyclists for 68 cities throughout California with a population over 60,000. He developed a "relative risk index" of collision rates based on the total number of injury and fatality collisions divided by the bicyclist mode share. The analysis is based on US Census

City	Population	Injury+Fatality Collisions	Collisions per 100,000	Bicyclist Mode Share	Risk Index
Oakland	399,484	123	31	1.2%	2.50
Anaheim	328,014	135	41	1.2%	3.40
Berkeley	102,743	125	122	5.6%	2.17
Fresno	427,652	109	25	0.8%	3.24
Long Beach	461,522	245	53	0.7%	7.27
Los Angeles	3,694,820	1,372	37	0.6%	6.15
Sacramento	407,018	230	57	1.4%	4.18
San Diego	1,223,400	469	38	0.7%	5.29
San Francisco	776,733	360	46	2.0%	2.34
San Jose	894,943	319	36	0.6%	5.79
San Leandro	79,452	21	26	0.6%	4.22
Santa Ana	332,353	133	40	1.1%	3.53

Figure 2.7: *Bicyclist Collisions in Oakland and Other California Cities.* Based on bicyclist collisions with respect to bicyclist mode share, Oakland is the fourth safest city in California with a population over 60,000. (Population and Bicyclist Mode Share: US Census 2000; Collisions: SWITRS 2000; Risk Index: Jacobsen (2003).)

Journey to Work and SWITRS data, both for the year 2000. (The index also includes a normalization factor such that the resulting numbers are greater than one.) By measuring the number of collisions relative to the number of cyclists, a lower risk index indicates greater bicyclist safety. By this measure, Oakland ranked as the fourth safest city in California with a population over 60,000. Oakland's risk index of 2.50 follows Berkeley (2.17), Huntington Park (2.33), and San Francisco (2.34).

Overall, Jacobsen's analysis indicates that more people bicycling (and walking) correlates with a lower rate of collisions. For example, increasing the number of people bicycling by 100% will only increase the number of collisions by 32% (p. 208). Jacobsen suggests the following explanation: "[M]otorists in communities or time periods with greater walking and bicycling are themselves more likely to occasionally walk or bicycle and hence may give greater consideration to people walking and bicycling. Accordingly, the most plausible explanation for the improving safety of people walking and bicycling as their numbers increase is behavior modification by motorists when they expect or experience people walking and bicycling" (p. 208). A key policy implication is that increasing bicycle use will increase the relative safety of all bicyclists. The following subsections provide additional detail on bicyclist-involved collisions in Oakland.

Year	Non-injury	Injury	Fatality	Total
1995	80	139	1	220
1996	71	132	2	205
1997	87	133	1	221
1998	88	135	0	223
1999	91	145	0	236
2000	58	120	3	181
2001	6	130	1	137
2002	34	129	1	164
2003	59	131	1	191
2004	61	118	0	179
Total	635	1312	10	1957
% Total	32.5%	67.0%	0.5%	100%

Figure 2.8: *Bicyclist Collisions by Year.* There was a significant decrease in the total number of bicyclist collisions between 1995 to 1999 and 2000 to 2004 (SWITRS, 1995–2004).

Parties	Collisions	% Collisions
Bicyclist and Driver	791	92.8%
Bicyclist and Parked Car	28	3.3%
Bicyclist Only	16	1.9%
Bicyclist, Parked Car, and Driver	10	1.2%
Bicyclist and Pedestrian	5	0.6%
Bicyclist, Driver, and Pedestrian	1	0.1%
Bicyclist and Bicyclist	1	0.1%
Total	852	100.0%

Figure 2.9: *Bicyclist Collisions by Involved Parties.* Ninety-seven percent of collisions involved a bicyclist and a motor vehicle, 4% of which involved parked cars (SWITRS, 2000–2004).

Rates of Bicyclist Collisions

On average, a bicyclist-involved collision occurs every other day in Oakland. However, there was a significant decrease in the total number of collisions between 1995 to 1999 and 2000 to 2004 (Figure 2.8). In the earlier period, there was an average of 221 collisions/year versus 170 collisions/year in the latter period. This decrease in collisions per year occurred in spite of a growing number of cyclists as described in Section 2.3. While the necessary bicycle volume data are not available for detailed calculations, the general trend is that the absolute number of bicyclists is increasing while, simultaneously, the absolute number of collisions is decreasing.

Note that total bicyclist collisions for 2000 and 2001 may be artificially low because the Oakland Police Department did not file reports on non-injury collisions from October 2000 to October 2001. Additionally, the total collisions for 2002 may be artificially deflated if police officers did not immediately begin taking non-injury collision reports following this reporting change in October 2001. Excluding these data for 2000 to 2002, the 2003 to 2004

Rank	Roadway	Collisions
1	Grand Ave	44
2	Telegraph Ave	43
3	International Blvd	42
4	MacArthur Blvd	26
5	College Ave	23
5	Foothill Blvd	23
6	San Pablo Ave	22
7	Broadway	20
8	Market St	19
8	Martin Luther King Jr Wy	19
9	Fruitvale Ave	16
10	73rd Ave	13
10	98th Ave	13
10	Shattuck Ave	13
11	Bancroft Ave	12
11	Lakeshore Ave	12
12	High St	11

Figure 2.10: *Top Bicyclist Collision Streets by Total Number of Collisions* (SWITRS, 2000–2004).

period had an average of 185 collisions/year versus the 221 collisions/year for the 1995 to 1999 period.

Ninety-seven percent of collisions involved a bicyclist and a motor vehicle, 4% of which involved parked cars (Figure 2.9). Pedestrians were involved in a total of five reported collisions, or approximately one bicyclist/pedestrian collision per year. (While bicyclist/-pedestrian collisions are certainly underreported, the more serious collisions are likely to result in a police report.) Of the 643 injuries associated with these collisions, 97% were sustained by bicyclists while 2% were sustained by drivers (or their passengers). All six fatalities associated with these collisions were sustained by bicyclists.

Location of Bicyclist Collisions

Bicyclist-involved collisions occurred throughout Oakland, although the concentration was significantly higher in the flatlands. (See the map of "Citywide Bicyclist Collisions, 2000–2004" on page 203). Comparatively few collisions occurred in the area bounded by Highway 13, Interstate 580, and Broadway, while fewer still occurred in the Oakland Hills above Highway 13. The greatest concentrations of collisions were in North Oakland, West Oakland, downtown, and the area surrounding Lake Merritt. Of the ten roadways with the most collisions, seven were located in these areas (Figure 2.10). When normalized by roadway length, eight of the ten top collision streets were in these areas (Figure 2.11). College Avenue, a comparatively short street, had the highest rate of collisions per road mile.

Rank	Roadway	Collisions per Road Mile	Collisions	Length (miles)
1	College Ave	23.0	23	1.0
2	Telegraph Ave	13.0	43	3.3
3	Grand Ave	11.6	44	3.8
4	Shattuck Ave	10.0	13	1.3
5	73rd Ave	9.3	13	1.4
6	San Pablo Ave	8.8	22	2.5
7	International Blvd	6.2	42	6.8
8	Lakeshore Ave	5.5	12	2.2
9	Market St	5.3	19	3.6
10	Martin Luther King Jr Wy	5.1	19	3.7
11	Fruitvale Ave	4.8	16	3.3
12	High St	4.1	11	2.7
13	98th Ave	3.8	13	3.4
14	Foothill Blvd	3.7	23	6.2
15	Broadway	3.4	20	5.8
16	Bancroft Ave	2.7	12	4.5
17	MacArthur Blvd	2.5	26	10.4

Figure 2.11: *Top Bicyclist Collision Streets by Collisions per Road Mile* (SWITRS, 2000–2004).

Rank	Intersection	Collisions
1	Fruitvale Ave / Foothill Blvd	6
1	Telegraph Ave / Grand Ave	6
2	Telegraph Ave / MacArthur Blvd	5
3	73rd Ave / Weld St	4
3	Broadway / 27th St	4
3	Edes Ave / 98th Ave	4
3	Grand Ave / Perkins St	4
3	International Blvd / 73rd Ave	4
3	International Blvd / 81st Ave	4
3	Market St / 36th St	4
3	Shattuck Ave / 52nd St	4
3	Telegraph Ave / 40th St	4

Figure 2.12: *Top Intersections by Number of Bicyclist Collisions* (SWITRS, 2000–2004).

Thirteen intersections had four or more bicyclist-involved collisions over the five years from 2000 to 2004 (Figure 2.12). Ten of those intersections are on the top ten streets with the greatest number of collisions. Overall, 85% of collisions over this five-year period occurred within 100 feet of an intersection. While some collisions occurred on local streets, the majority occurred on the city's arterials. This situation is likely explained by the arterials having (a) the greatest number of motor vehicles; and (b) higher bicyclist volumes since these streets serve the major destinations for work, shopping, and other services.

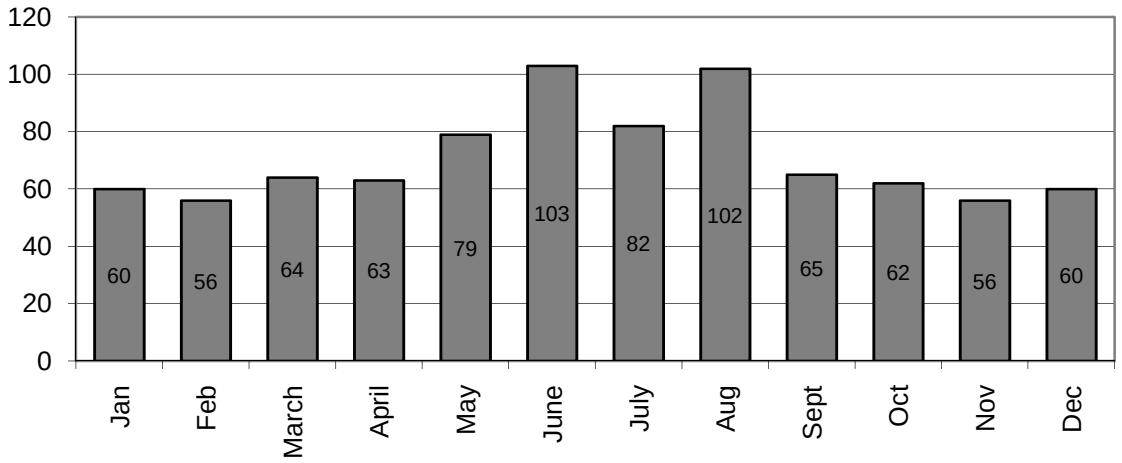

Figure 2.13: *Bicyclist Collisions by Month* (SWITRS, 2000-2004).

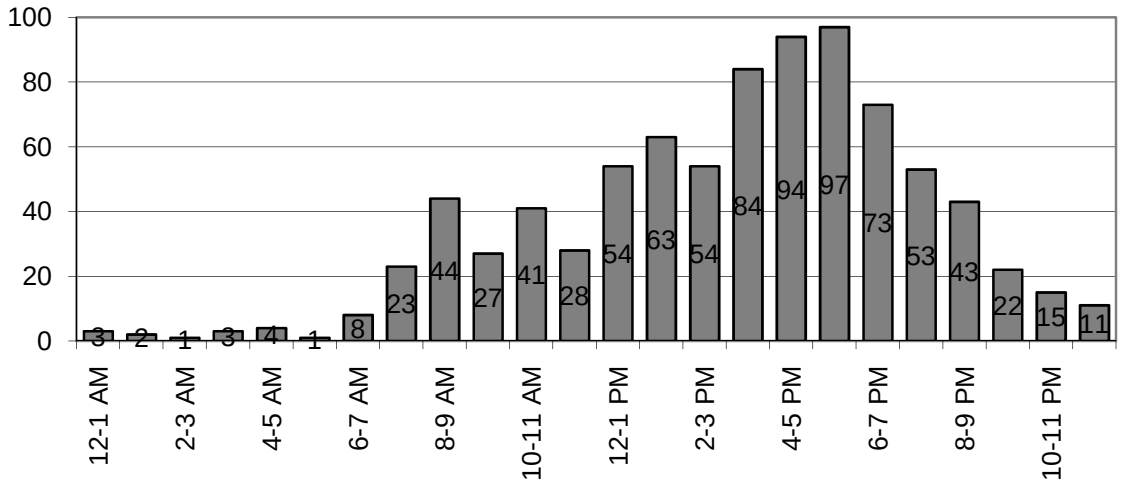

Figure 2.14: *Bicyclist Collisions by Time of Day* (SWITRS, 2000–2004).

Time of Bicyclist Collisions

The greatest number of bicyclist collisions occurred during the summer months, particularly June and August (Figure 2.13). One-third of all collisions occurred within this quarter of the year. These higher numbers likely correspond to more bicyclists during the summer months because of good weather and more daylight hours.

Similarly, the greatest proportion of collisions occurred between the hours of 3:00pm to 7:00pm (Figure 2.14). These four hours, comprising 17% of the day, account for 41% of all collisions. This concentration suggests the importance of safety improvements and educational efforts directed at commute hour conditions, particularly in the evening period.

Bicyclist Age	Collisions	% of Collisions	% of Population
0 - 9	71	8.8%	14.6%
10 - 17	170	21.0%	10.3%
18 - 24	118	14.6%	9.6%
25 - 34	151	18.7%	18.1%
35 - 45	108	13.4%	15.8%
46 - 54	106	13.1%	13.5%
55 - 64	64	7.9%	7.4%
65+	20	2.5%	10.5%

Figure 2.15: *Collisions by Bicyclist Age.* People ages 10 to 24 are overrepresented as bicyclists in collisions relative to their share of the population (SWITRS, 2000–2004).

Rank	Intersection	Collisions
1	98th Ave / Edes Ave	4
1	International Blvd / 81st Ave	4
2	73rd Ave / Weld St	3
2	Adeline St / 8th St	3
2	Fruitvale Ave / Foothill Blvd	3
2	MacArthur Blvd / West St	3
2	Shattuck Ave / 52nd St	3
2	Telegraph Ave / MacArthur Blvd	3
3	(19 intersections)	2

Figure 2.16: *Top Intersections by Number of Child Bicyclist Collisions (<18)* (SWITRS, 2000–2004).

Demographics of Bicyclists Involved in Collisions

By age group, the greatest number of collisions involved children ages 10 to 17 (Figure 2.15). This finding is especially significant because people of this age group account for 10.3% of Oakland's population but 21.0% of all bicyclist-involved collisions. People ages 18 to 24 are also overrepresented in collisions based on their share of the population. In contrast, children 9 years and under as well as senior citizens 65 and over are significantly underrepresented in collisions based on their respective share of the overall population. Eight intersections had three or more collisions involving bicyclists under eighteen years of age (Figure 2.16).

Younger children and older adults are less likely to ride bicycles than people of other ages, resulting in a lower exposure rate and a smaller number of collisions for these age groups. While cycling rates by age are not available, youth of ages 10 to 17 are more likely to ride bicycles than most other age groups and thus have a higher exposure rate. However, it is unclear if youth are overrepresented in collisions based on their share of trips, vehicle miles traveled, or their more limited understanding of the rules of road.

By race and ethnicity, the trends are less distinct because the data are unavailable for over 40% of the bicyclist-involved collisions (Figure 2.17). The available information suggests

Race/Ethnicity	Bicyclists	% Collisions	% Population
Black	256	29.8%	35.1%
White	146	17.0%	23.5%
Hispanic	71	8.3%	21.9%
Asian	23	2.7%	15.6%
Other	9	1.0%	3.9%
Not Stated	355	41.3%	NA
Total*	860	100%	100%

Figure 2.17: *Bicyclist Collisions by Race/Ethnicity.* By race and ethnicity, the trends are less distinct because the data are unavailable for over 40% of the bicyclist-involved collisions (SWITRS, 2000–2004).

that "Blacks" and "Whites" may be over-represented as bicyclists in collisions. Similarly, "Hispanics" and "Asians" appear to be under-represented in these collisions based on their respective share of Oakland's population. As with the collisions by age group, it is not known if particular racial or ethnic groups are overrepresented based on their share of trips or vehicle miles traveled.

Reasons for Bicyclist Collisions

Bicyclists were named as the party at fault in approximately 60% of all collisions while drivers were named in approximately 40% of the cases (Figure 2.18). Of the 60% of collisions where the bicyclist was at fault, 22% were attributed to youth cyclists (17 years and under) and 33% to adult cyclists (18 years and over). For bicyclists, the most common primary collision factors were riding on the wrong side of the road and failure to obey traffic signals and signs. For drivers, the most common factors were right of way violation, improper turning, unsafe speed, and failure to obey traffic signals and signs. For bicyclists, the movement preceding collision was "proceeding straight" in 76% of all collisions (Figure 2.19). For drivers, "proceeding straight" accounts for 49% of all collisions, while "making right turn" and "making left turn" account for 18% and 14%, respectively (Figure 2.20). For collisions in which a vehicle code violation was specified, 8% were caused by "dooring"—a person opening a vehicle's door into the path of an oncoming cyclist. Given that bicyclists sustained 97% of the injuries associated with these collisions, bicyclists in general bear the consequences of their own illegal behaviors as well as the illegal behaviors of drivers.

Primary Collision Factor	Collisions	Party at Fault			
		Bicyclist			Driver
		Youth	Adult	Unstated	
Wrong side of road	173	61	98	6	8
Auto right of way	117	15	21	2	79
Other hazardous violation	109	23	34	5	47
Traffic signals and signs	105	33	33	7	32
Improper turning	94	13	22	6	53
Unsafe speed	48	2	12	1	33
Unsafe starting or backing	15	2	0	1	12
Not stated	14	3	2	2	7
Driving/Bicycling under the influence	13	1	6	0	6
Pedestrian violation	10	7	3	0	0
Pedestrian right of way	10	0	0	0	10
Improper passing	10	0	4	0	6
Total	**718 (100%)**	**160 (22.3%)**	**235 (32.7%)**	**30 (4.2%)**	**293 (40.8%)**

Figure 2.18: *Primary Collision Factor by Party at Fault.* Youth $\leq$ 17 years of age; Adult $\geq$ 18 years of age (SWITRS, 2000–2004).

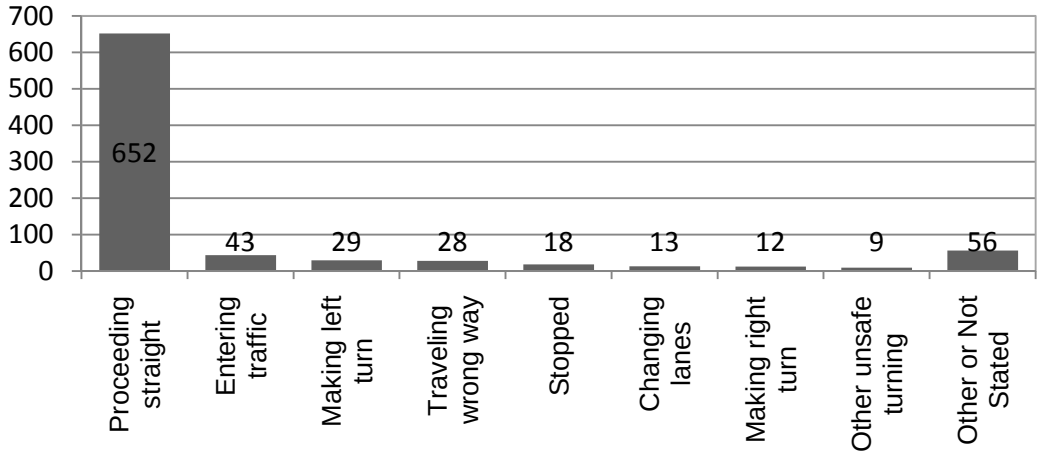

Figure 2.19: *Bicyclist Movement Preceding Collision* (SWITRS, 2000-2004).

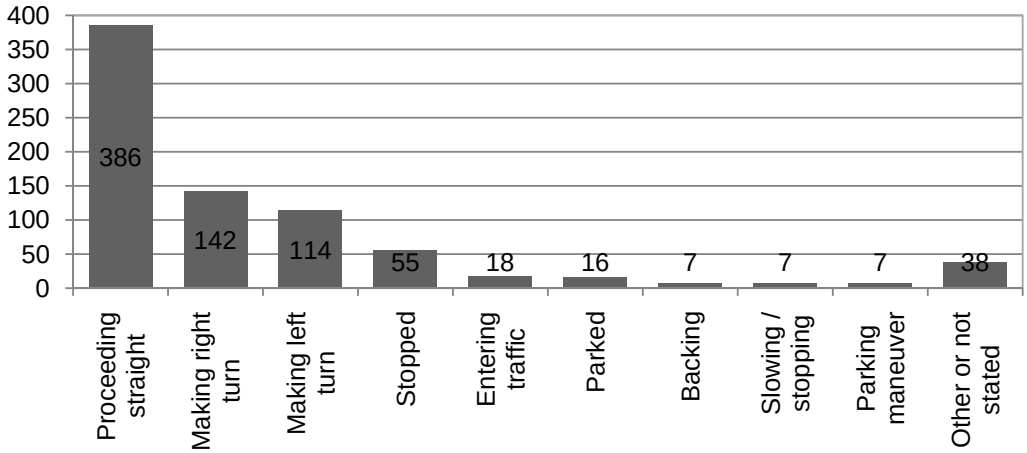

Figure 2.20: *Driver Movement Preceding Collision* (SWITRS, 2000–2004).

2.6 Education, Encouragement, and Enforcement

Education, encouragement, and enforcement are important elements for promoting bicycling while simultaneously improving safety. The need for enhanced bicycle safety education is demonstrated by surveys that consistently identify safety concerns as being the top reason that more people do not ride bicycles. Both motorists and cyclists are often unaware of the basic rules of the road. Programs can target youth cyclists, the parents of youth cyclists, adult cyclists, and motorists. The following resources and programs have been active or developed since the adoption of Oakland's first *Bicycle Master Plan* in 1999.

Bicycle Shops

Bay Area Bikes: 2424 Webster St (downtown)

Bent Spoke: 6124 Telegraph Ave (North Oakland)

Cycle Sports: 3530 Grand Ave (Grand Lake)

Fruitvale Bike Station: 3301 E 12th St, Suite 141 (Fruitvale)

Hank & Frank Bicycles: 6030 College Ave (Rockridge)

Montano Velo: 4266 Piedmont Ave (Piedmont Ave)

Pioneer Bike Shop: 11 Rio Vista Ave (Piedmont Ave)

Tip Top Bike Shop: 4800A Telegraph Ave (Temescal)

Wheels of Justice Cyclery: 2024 Mountain Blvd (Montclair)

Brochures

Bicycle Safety Quiz: The East Bay Bicycle Coalition developed this brochure to promote bicyclist safety by describing basic rules of the road that are often unknown or disobeyed by cyclists and motorists. The brochure is distributed in English, Spanish, and Chinese and is also available on-line at `www.ebbc.org/safety.html`.

Shared Lane Markings ("Sharrow"): Oakland's Public Works Agency prepared this flyer with answers to frequently asked questions for educating Oakland's bicyclists and drivers on this traffic control device that was approved in September 2005 for use in California.

Courses

Bicycle Safety Helmet Program (Oakland Parks and Recreation Department): This program provides children (ages 5-10 years) an opportunity to earn a bicycle helmet, T-shirt, certificate of completion, and promotional materials by completing a five-hour course on bicycle safety.

Bicycle Traffic School: The East Bay Bicycle Coalition organized a workshop in 2002 to educate city and county officials on the need for traffic school for bicyclists. The one-day workshop featured speakers from the City of Walnut Creek, Los Angeles Unified School District, and UC Berkeley. This program would be analogous to traffic school for drivers whereby bicyclists who receive moving violations could choose to take a class on bicyclist safety and thereby reduce the financial penalty of their violation. As of this writing, Oakland does not have a bicycle traffic school program.

Earn Your Bike Program (Oakland Parks and Recreation Department): This program provides youth (ages 10-18 years) an opportunity to earn a bicycle, helmet, and other safety materials by completing 32 hours of training in bicycle safety, bicycle repair, and community service in Oakland's parks, playgrounds, and recreation centers.

Road I Course: The League of American Bicyclists offers this nine-hour course curriculum as a basic bicycle safety primer for adults and children 14 years and older. It is taught locally by League Certified Instructors (LCIs). The East Bay Bicycle Coalition has offered this course to the public as funding allows.

Events

Bicycle Club Rides: The Oakland Yellowjackets and the VeloRaptors are local bicycle clubs that offer regular recreational rides for cyclists of all ability levels. For additional information, see the descriptions under "Organizations" below.

Bike to Work Day: This annual event encourages people to try bicycling to work, school, or errands and provides positive reinforcement for those who already do so. The City of Oakland, in collaboration with the East Bay Bicycle Coalition, initiated Oakland's Bike to Work Day in 1994. The event's activities have included a pancake breakfast, a transportation fair, and all-day valet parking at City Hall, energizer stations around town, noontime activities at Frank Ogawa Plaza, and raffles with prizes donated by local businesses.

Oakland Bike Trippers: The Oakland Museum of California organizes bicycle tours of local historic sites. These two-hour tours are offered monthly from May through October and cover five miles at a leisurely pace.

Valet Bicycle Parking: The East Bay Bicycle Coalition provides valet bicycle parking for major events including street fairs, festivals, and sports games. Additional information on valet bicycle parking is provided in Chapter 5 on "Parking and Support Facilities."

Maps

511 BikeMapper: This on-line mapping tool is part of `www.511.org` and includes the nine-county San Francisco Bay Area. It provides dynamically generated maps of existing bicycle paths, lanes, and routes based on an origin and destination specified by the user.

Bicycle Transportation Map of the East Bay, Map 1: West of the Hills (1996) is published by the East Bay Bicycle Coalition and provides recommended bikeways throughout Oakland and adjoining cities.

San Francisco Bay Trail: East Bay, Richmond to Hayward (2007) shows the existing and proposed alignment of the Bay Trail through West Oakland and Jack London Square, along the Estuary, and around Arrowhead Marsh. The "San Francisco Bay Shoreline webGuide" provides an on-line, interactive reference for the Bay Trail and waterfront access. (`http://gis.abag.ca.gov/website/ShorelineAccess/index.htm`)

Walk Oakland! Map & Guide, Third Edition (2007) includes existing bicycle paths, lanes, and routes within Oakland as well as information on street grades, neighborhoods, historic landmarks, parks, and civic destinations. As of the third edition, 43,000 copies of the map are in print.

Organizations

Bicycle Trails Council of the East Bay (BTCEB) is a membership-based, non-profit advocacy organization whose mission is to educate cyclists in responsible mountain biking, to advocate for appropriate access and to promote community among trail users so all may fully enjoy and preserve the natural spaces of the East Bay (`www.btceb.org`).

The Crucible's Youth Program offers earn-a-bike classes and bicycle fix-a-thons for West Oakland youth. Participants in the earn-a-bike classes work with volunteer mechanics to fix donated bicycles. Each participant repairs two bicycles: one for he or she to keep and the other to be sold, raising money for the program. For the bicycle fix-a-thons, mechanics work with youth to fix their bicycles while deepening their understanding of repair and maintenance (`www.thecrucible.org`).

Cycles of Change is a community-based organization that teaches middle school students bicycle safety and mechanics in conjunction with environmental education through after

school programs. The organization began in 1998 at Roosevelt Middle School and is now operating programs at schools throughout the East Bay (www.cyclesofchange.org).

East Bay Bicycle Coalition (EBBC) is dedicated to promoting bicycling as an everyday means of transportation and recreation. The EBBC safeguards the interest of bicyclists in Alameda and Contra Costa Counties. The EBBC works with cities, counties, Caltrans, and other government agencies to improve conditions for cyclists (www.ebbc.org).

NorCal High School Mountain Bike League is an Oakland-based organization that works to establish and maintain safe, quality high school mountain bike programs. The League is committed to teaching safe riding practices and believes that forming high school teams is the best way for students to learn how to ride safely (www.norcalmtb.org).

Oakland Yellowjackets Bicycle Club (OYJ) is a social, multicultural bicycling group for men and women of all ages and skill levels. The OYJ regular ride season starts in mid-April and concludes in late-September or early October. Weekly rides in the off-season are weather dependent (www.oaklandyellowjackets.org).

VeloRaptors Bike Club is an Oakland-based bicycle club that promotes the fitness and health of its members through bicycling for recreation, exercise, touring, and transportation. The club's activities include weekly rides leaving from Montclair and cyclists of all levels are welcome to participate (www.veloraptors.com).

Walk Oakland Bike Oakland (WOBO) is a community-based organization that works to improve neighborhood quality of life in Oakland by making walking and bicycling safe, accessible, easy, and fun (www.walkoaklandbikeoakland.org).

Programs

Hazard Reports (East Bay Bicycle Coalition): The East Bay Bicycle Coalition (EBBC) maintains an on-line reporting system and database of hazards submitted by the public. EBBC then forwards reports to the responsible agencies.

Hazardous Grate Replacement Project (City of Oakland): The City of Oakland received a $340,000 grant from the Hazard Elimination and Safety Program (Caltrans) to replace drainage grates that could catch bicycle wheels. Between 2004 and 2006, the City replaced approximately 900 such grates throughout Oakland.

Maintenance Reports (City of Oakland): People may report bicycle-related maintenance issues like debris, potholes, damaged signs, and faded striping to the Public Works Agency Customer Call Center (510-615-5566).

Police Bicycle Patrol (City of Oakland): The Oakland Police Department (OPD) has 15 officers who patrol by bicycle in the downtown and neighborhood commercial districts (including Rockridge, Piedmont Ave, and Montclair). These officers are also used in areas that are inaccessible to patrol cars. As part of a community policing approach, the bicycle patrols provide a highly visible presence in a small geographical area to address quality of life issues. OPD seeks to grow the program based on positive responses from merchants and residents who appreciate the opportunities for personal interaction with the bicycle patrol officers. The Bicycle Patrol could also be developed as an ambassador program, serving as a model of good bicycling skills and equipment for Oakland residents.

Traffic Reports (City of Oakland): People may report bicycle-related issues with traffic signals, signage, and striping to the Transportation Services Division (510-238-3466) for evaluation by a transportation engineer. Requests for basic maintenance to existing facilities should be submitted to the Public Works Customer Call Center (510-615-5566) as described under "Maintenance Reports" above.

Traffic Safety Mini-grant Program (City of Oakland): From 2001 to 2004, the Oakland Pedestrian Safety Project administered a program that awarded mini-grants to community-based organizations for traffic safety projects. Funded by the California Office of Traffic Safety, the bicycle-related projects included bicycle safety training, helmet distribution, educational brochures, and public service announcements.

Public Service Announcements

Love Life Foundation: As part of the Traffic Safety Mini-grant Program the Love Life Foundation produced a public service announcement (PSA) about safe bicycling to work as one in a series of five PSAs on traffic safety themes. These PSAs aired on KTOP and KMTP (Channel 32).

The City of Oakland produced public service announcements on the "CityRacks Bicycle Parking Program," "Oakland's Bike Lanes," and "Bike to Work Day." These PSAs are aired on KTOP and the parking and bike lanes PSAs are also available on the web page of the Bicycle and Pedestrian Facilities Program.

Web Resources

`www.oaklandbikes.info` is the home page for the City of Oakland's Bicycle and Pedestrian Facilities Program. It provides information on existing facilities, current projects,

Bike to Work Day, the *Bicycle Master Plan*, and other city programs that affect bicyclists and pedestrians.

`www.511.org`: The Metropolitan Transportation Commission provides bicycling information as part of its comprehensive web site on transportation for the San Francisco Bay Area. Bicycle-specific information includes maps, transit, parking, local bridges, organizations, and promotional materials. The site also includes the interactive BikeMapper described under "Maps."

California Vehicle Code

The California Vehicle Code (CVC) specifies the legal requirements for riding a bicycle in the public right-of-way. The operation of bicycles is addressed in Sections 21200-21212 while the registration and licensing of bicycles is addressed in Sections 39000-39011. Opening a vehicle's door in the path of an oncoming bicyclist is prohibited by Section 22517. In general, Section 21200(a) states, "Every person riding a bicycle upon a highway has all the rights and is subject to all the provisions applicable to the driver of a vehicle..."

The CVC is available on-line at `www.dmv.ca.gov/pubs/vctop/vc/vc.htm`.

The California Vehicle Code does not regulate bicycle riding on sidewalks. However, the Oakland Municipal Code (OMC) does prohibit sidewalk riding in OMC 10.16.150 (Appendix E).

2.7 Community Outreach

This update of Oakland's *Bicycle Master Plan* included outreach to and coordination with neighborhood groups and merchant associations, local transit operators, adjoining jurisdictions, and countywide and regional agencies. The following bullets list the key components of this outreach process:

- *Citizens Advisory Committee (CAC)*: This committee was composed of residents from each council district, representatives of community-based organizations, and interested individuals. It met monthly to provide public input and oversight for each stage of the process.
- *Meetings with community-based organizations*: The project manager and members of the CAC gave presentations to neighborhood groups and merchants associations as part of those groups' regularly scheduled meetings. The process included 52 meetings that reached over 850 people.

- *Public meetings*: Three large format, open invite public meetings were held over the course of the project. The first two meetings were held at the beginning of the project and the third meeting was held after the release of the Draft Plan.
- *Technical Advisory Committee (TAC)*: This committee facilitated cooperation with outside agencies and had a primary focus on AC Transit and the adjoining jurisdictions of Alameda, Berkeley, Emeryville, Piedmont, and San Leandro. A full listing of TAC participants is included in the Acknowledgements.
- *EIR and General Plan Amendment*: The preparation of the associated Environmental Impact Report (EIR) and the adoption of this document through a General Plan amendment included public hearings and actions by the Planning Commission, Community and Economic Development Committee, and City Council.

This public outreach noted the following issues that were subsequently addressed through the planning process and integrated into this document. Many Oakland residents would like to bicycle (or bicycle more often) but they do not feel safe given the current traffic conditions on many of Oakland's streets. Merchants in the neighborhood commercial districts are concerned that bikeways on their streets could cause localized congestion that would negatively affect their businesses. Some bicyclists are seeking the most direct routes (regardless of traffic conditions) while others (including parents with children) are seeking residential streets and bicycle paths. Bicyclists are very interested in ensuring that Oakland's bikeways provide seamless connections to the bikeways in adjoining jurisdictions. Bus and shuttle operators are concerned that some bikeways may cause localized congestion that would adversely affect their transit operations. Especially at night, many cyclists ride on busier streets because of their concerns for personal security on the quieter side streets. People's priorities for improvements include developing bikeway connections to transit stations, the downtown, Oakland's waterfront, and connecting Lake Merritt to the surrounding neighborhoods.

Additional details on the outreach process are included in Section C.1. The ongoing role of community outreach and public participation for implementation of the *Bicycle Master Plan* is described in Section 6.6.

3. Policy Recommendations

Numerous policies at the federal, state, and regional levels promote the routine accommodation of bicyclists in transportation projects. After summarizing these policies, this chapter develops the city policies and actions for achieving the goals of the *Bicycle Master Plan*. These policies emphasize the physical accommodation of bicyclists through the development of the bikeway network and accompanying support facilities. In particular, Safe Routes to Transit is a policy priority for linking cycling trips to transit trips and thereby promoting the viability of both cycling and transit-riding. The policy on routine accommodation specifies how the needs of bicyclists should be considered in all transportation projects. These policies also address key education and enforcement programs and provide a framework for implementation. This chapter concludes with a section on bikeway guide signage and mountain biking as issues where further discussion is necessary for establishing specific policy positions.

3.1 Related Federal, State, and Local Policies

U.S. Department of Transportation

US DOT Policy Statement on Integrating Bicycling and Walking into Transportation Infrastructure: Design Guidance (2001): In response to Section 1202(b) of the Transportation Equity Act for the 21st Century (TEA-21), this document is "a policy statement that bicycling and walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist."

United States Code, Title 23, §109(m), Protection of Nonmotorized Transportation Traffic. – The Secretary shall not approve any project or take any regulatory action under this title that will result in the severance of an existing major route or have significant adverse impact on the safety for nonmotorized transportation traffic and light motorcycles, unless such project or regulatory action provides for a reasonable alternate route or such a route exists.

United States Code, Title 23, §130(j), Railway-Highway Crossings, Bicycle Safety. – In carrying out projects under this section, a State shall take into account bicycle safety.

United States Code, Title 23, §217, Bicycle Transportation and Pedestrian Walkways: (e) Bridges. – In any case where a highway bridge deck being replaced or rehabilitated with

Federal financial participation is located on a highway on which bicycles are permitted to operate at each end of such bridge, and the Secretary determines that the safe accommodation of bicycles can be provided at reasonable cost as part of such replacement or rehabilitation, then such bridge shall be so replaced or rehabilitated as to provide such safe accommodations.

United States Code, Title 23, §217, Bicycle Transportation and Pedestrian Walkways: (g) Planning and Design. – In General. – Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use are not permitted.

State of California

California Department of Transportation (Caltrans), Deputy Directive 64, Accommodating Non-Motorized Travel (2001): "The Department fully considers the needs of non-motorized travelers (including pedestrians, bicyclists, and persons with disabilities) in all programming, planning, maintenance, construction, operations and project development activities and products."

Assembly Concurrent Resolution No. 211 (2002): "That in order to improve the ability of all Californians who choose to walk or bicycle to do so safely and efficiently, the Legislature of the State of California hereby encourages all cities and counties to implement the policies of the California Department of Transportation Deputy Directive 64 and the United States Department of Transportation's design guidance document on integrating bicycling and walking when building their transportation infrastructure."

California Bicycle Transportation Act, Streets and Highways Code 890-894.2: "It is the intent of the Legislature, in enacting this article, to establish a bicycle transportation system. It is the further intent of the Legislature that this transportation system shall be designed and developed to achieve the functional commuting needs of the employee, student, business person, and shopper as the foremost consideration in route selection, to have the physical safety of the bicyclist and bicyclist's property as a major planning component, and to have the capacity to accommodate bicyclists of all ages and skills."

Congestion Management Programs, Government Code 65089(b)(1)(B)(5): "It is the intent of the Legislature that, when roadway projects are identified in the program, consideration be given for maintaining bicycle access and safety at a level comparable to that which existed prior to the improvement or alteration."

San Francisco Bay Conservation and Development Commission, Government Code 66602 (McAteer-Petris Act): "[E]xisting public access to the shoreline and waters of the San Francisco Bay is inadequate and that maximum feasible public access, consistent with a proposed project, should be provided."

Metropolitan Transportation Commission

Regional Transportation Plan (RTP), Transportation 2030 Plan for the San Francisco Bay Area (2005): Calls to Action, "Address Nonmotorized Transportation Needs" (p. 58) – "Bicyclists, pedestrians, and wheelchair users must be full partners in the planning process, and bicycle facilities and walkways must be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities. Project sponsors must also consider safety and contiguous routes for bicyclists and pedestrians. These actions greatly reduce the future cost of retrofitting facilities for nonmotorized travelers, and encourage safe and convenient bicycling and walking. MTC will monitor routine accommodation of nonmotorized transportation needs in its programming processes."

Transit-oriented Development Policy for Regional Transit Expansion Projects (Resolution 3434, 2005): "Clearly identify any barriers for pedestrian, bicycle and wheelchair access to the station from surrounding neighborhoods, and propose strategies that will remove these barriers and maximize the number of residents and employees that can access the station by these means."

Regional Policies for Accommodation of Bicycle and Pedestrian Facilities in Transportation Project Planning, Design, Funding and Construction (Resolution 3765, 2006): "Projects funded all or in part with regional funds (e.g. federal, STIP, bridge tolls) shall consider the accommodation of bicycle and pedestrian facilities, as described in Caltrans Deputy Directive 64."

City of Oakland

Resolution Declaring the City of Oakland's Support for Public Transit and Other Alternatives to Single-Occupant Vehicles (Resolution 73036, 1996): "It shall be the official policy of the City of Oakland to encourage and promote bicycle and pedestrian travel by providing a bicycle circulation system which includes Class I, II, and III facilities, safe and secure bicycle parking, pedestrian/bicycle bridges, pedestrian plazas, bicycle loop detectors, traffic calming devices, crosswalks and sidewalk bulbs, median 'safety zones,' and repair of damaged sidewalks."

Oakland's *General Plan* contains numerous statements on bicyclist safety and access in the *Land Use and Transportation Element* (1998), *Open Space, Conservation, and Recreation Element* (1996), and the *Estuary Policy Plan* (1999). These policies and actions are collected in Appendix D. Oakland's *Pedestrian Master Plan* (2002), part of the Land Use and Transportation Element, is a companion document to the *Bicycle Master Plan* with mutually reinforcing goals, policies, and projects.

3.2 Bicycle Master Plan Policies

The following policy recommendations provide direction for the City of Oakland's decision-makers and staff in realizing the goals of the *Bicycle Master Plan.* The recommendations include specific policies for each of the plan's goals on infrastructure, education, and coordination. In turn, each policy has an associated list of actions—the detailed steps for acting on those policies to achieve the overarching goals. These actions apply to the areas, both geographic and programmatic, over which the City of Oakland has legal authority. The implementation of any particular action will depend upon its feasibility with respect to physical, economic, legal, and other constraints. When acting on these policies, the Planning Commission and the City Council will ensure that decisions and projects are consistent with the General Plan by balancing various policies that may be in competition with each other.

Goal 1 – Infrastructure: Develop the physical accommodations, including a network of bikeways and support facilities, which provide for safe and convenient access by bicycle.

BMP Policy 1A – Bikeway Network: Develop and improve Oakland's bikeway network.

Action 1A.1 – Bicycle Lanes (Class 2): Install bicycle lanes where feasible as the preferred bikeway type for all streets on the proposed bikeway network (except for the bicycle boulevards proposed for local streets with low traffic volumes and speeds).

Action 1A.2 – Arterial Bicycle Routes (Class 3A): Install arterial bicycle routes on collector and arterial streets only when bicycle lanes are infeasible. These shared lane facilities shall include best practices for lane widths, signage, and striping.

Action 1A.3 – Bicycle Boulevards (Class 3B): Enhance bicycle routes on local streets by developing bicycle boulevards with signage, striping, and intersection modifications to prioritize bicycle travel.

Action 1A.4 – Route Signage: Develop an informative and visible signage system for the bikeway network, building on existing bikeway signage, that includes directional and distance information to major destinations.

Action 1A.5 – Neighborhood Connectors: Develop maps to identify additional cycling streets within neighborhoods that would provide community benefit but not require the capital improvements typically associated with designated bikeways.

Action 1A.6 – Dedicated Right Turn Lanes and "Slip Turns": Where feasible, avoid the use of dedicated right turn lanes on streets included in the bikeway network. Where infeasible, consider a bicycle through lane to the left of the turn lane or a combined bicycle lane/right turn lane.

Action 1A.7 – Diagonal Parking: Discourage the installation of "head-in/back-out" diagonal parking on streets included on the bikeway network. Where feasible, relocate existing diagonal parking on the bikeway network to other streets.

Action 1A.8 – Rails-to-Trails Conversions: Where rail lines, sidings, and spurs are unused, evaluate the feasibility of acquiring those alignments for mixed use paths.

Action 1A.9 – Bicycle Path Security: Where appropriate, consider security and monitoring mechanisms such as lighting, video cameras, call boxes, emergency access, and bicycle patrols along paths in isolated areas.

Action 1A.10 – Maintenance: Continue and improve the PWA Customer Call Center as the system for reporting and responding to maintenance issues on bikeways.

Action 1A.11 – Street Cleaning: Strive to keep bikeways free of debris through regularly scheduled street sweeping. In industrial areas, work with businesses to ensure their compliance with related use permits for keeping adjacent roadways and bikeways clear of sand, gravel, and other debris.

Action 1A.12 – Regional and Inter-regional Bikeways: Work with partner agencies to support the development of regional and inter-regional bikeways.

Action 1A.13 – Striping Materials: Where feasible, specify thermoplastic or tape for bikeway pavement markings for increased longevity and reduced maintenance.

BMP Policy 1B – Routine Accommodation: Address bicycle safety and access in the design and maintenance of all streets.

Action 1B.1 – Roadway Improvements: Include bicycle safety and access improvements in roadway resurfacing, realignment, and reconstruction projects.

Action 1B.2 – Traffic Signals: Include bicycle-sensitive detectors, bicycle detector pavement markings, and adequate yellow time for cyclists with all new traffic signals and in the modernization of all existing signals.

Action 1B.3 – Freeway Ramps: Work with Caltrans to reduce conflicts created by ramps, dedicated turn lanes, and high-speed merges at freeway interchanges.

Action 1B.4 – Bridges: Include two-way bicycle access in projects that would rebuild or create new bridges over the Oakland Estuary, Lake Merritt Channel, railroad tracks, or freeways.

Action 1B.5 – Railroad Crossings: Strive to enhance bicyclist safety at railroad crossings by improving pavement quality, reducing the flangeway gap, removing abandoned tracks, and installing warning signs to indicate rough surfaces or skewed tracks where needed.

Action 1B.6 – Medians: Discourage the installation of medians where those medians would preclude a proposed bikeway or otherwise compromise bicyclist safety and access.

Action 1B.7 – Automobile Diagonal Parking: Consider the negative impacts on cyclists in proposals to convert parallel parking to diagonal parking.

Action 1B.8 – Pavement Quality and Drainage Grates: Strive to ensure smooth paving surfaces and bicycle-safe drainage grates on city streets and paths.

Action 1B.9 – Bicycle Performance Measure: Work to identify and integrate a quantitative performance measure for bicycles into the City's process for environmental review and transportation impact analysis.

BMP Policy 1C – Safe Routes to Transit: Improve bicycle access to transit, bicycle parking at transit facilities, and bicycle access on transit vehicles.

Action 1C.1 – Bikeways to Transit Stations: Prioritize bicycle access to major transit facilities from four directions, integrating bicycle access into the station design and connecting the station to the surrounding neighborhoods.

Action 1C.2 – Bicycle Parking at Transportation Hubs: Work with partner agencies to provide secure bicycle parking at transportation hubs that accommodates demand with bicycle racks, bicycle lockers, bicycle cages, and/or bicycle stations.

Action 1C.3 – Bicycles on BART: Encourage BART to expand bicycle access during commute hours to trains and the 12th and 19th Street stations. Encourage the research and development of train car interiors specifically designed to accommodate bicycles.

Action 1C.4 – Bicycle Racks on Buses: Support AC Transit's efforts to maintain and expand the carrying capacity of bicycles on buses using front-mounted racks as well as the luggage compartments on transbay buses.

Action 1C.5 – Bicycles on Amtrak/Capitol Corridor: Support Amtrak and the Capitol Corridor in continuing to provide adequate capacity for bicyclists on trains serving Oakland.

Action 1C.6 – Bicycles on Ferries: Encourage partner agencies to ensure that ferry service to San Francisco and Alameda continues to provide adequate on-board bicycle storage.

Action 1C.7 – Estuary Crossing: Encourage the Port of Oakland, City of Alameda, and the Alameda County Congestion Management Agency to provide reliable water taxi service—and study potential alternatives—for bicycle access across the Oakland Estuary.

Action 1C.8 – Bicycle-Transit Information: Encourage transit agencies and the Metropolitan Transportation Commission to provide accurate and complete bicycle-transit information through their publications and the 511 program.

BMP Policy 1D – Parking and Support Facilities: Promote secure and conveniently located bicycle parking at destinations throughout Oakland.

Action 1D.1 – CityRacks Program: Continue Oakland's program of installing bicycle racks in the public right-of-way based on requests by residents and merchants.

Action 1D.2 – Parking Meter Removal: Develop a program to replace parking meters with bicycle racks when parking meters are removed or consolidated into central pay stations.

Action 1D.3 – Valet Bicycle Parking: Work with partner organizations to provide valet bicycle parking at festivals and street fairs including all large city-sponsored events.

Action 1D.4 – Support Facilities: Encourage the inclusion of public restrooms, drinking fountains, and telephones at major transit stations and along the San Francisco Bay Trail.

Action 1D.5 – Security: Identify security and monitoring mechanisms for bicycle parking including lighting, video cameras, call boxes, and security patrols.

Action 1D.6 – Bicycle Parking Ordinance: Adopt an ordinance as part of the City's Planning Code that would require new development to include short and long-term bicycle parking.

Action 1D.7 – Development Incentives: Consider reduced automobile parking requirements in exchange for bicycle facilities as part of transportation demand management strategies in new development.

Action 1D.8 – Abandoned Bicycle Removal: Develop a process, as part of Oakland's Abandoned Vehicle program, for noticing and removing abandoned bicycles from the public right-of-way.

Goal 2 – Education: Improve the safety of bicyclists and promote bicycling skills through education, encouragement, and community outreach.

BMP Policy 2A – Education: Work with public agencies and the private sector to improve bicycle education, enforcement, and promotional programs.

Action 2A.1 – Child Education: Work with the Oakland Unified School District and community-based organizations to develop education programs and parking facilities that promote youth cycling.

Action 2A.2 – Adult Education: Work with bicycling organizations and partner agencies to provide street skills bicycle safety courses for adult cyclists.

Action 2A.3 – Driver Education: Work with stakeholder organizations and the media to educate drivers on the rights and responsibilities of cyclists and drivers through brochures and public service announcements.

Action 2A.4 – Commute Incentives: Develop a bicycle commute incentive program for city employees that would serve as a model for major employers in Oakland.

Action 2A.5 – Bicycle/Bus Education: Work with AC Transit to develop a joint educational campaign for bicyclists and bus drivers on sharing the road safely and courteously.

Action 2A.6 – Public Awareness: Publicize the benefits of bicycling, existing facilities, and available programs through Bike to Work Day, the City of Oakland's web site, and other outreach opportunities.

Action 2A.7 – Maps: Support the creation, maintenance, and distribution of bicycling maps including the *Walk Oakland! Map & Guide*, the on-line BikeMapper at `www.511.org`, and the East Bay Bicycle Coalition's *West of the Hills* map.

BMP Policy 2B – Enforcement: Prioritize the enforcement of traffic laws that protect bicyclists.

Action 2B.1 – Bicycle Diversion Program: Consider developing a fine structure tailored to bicycle violations in conjunction with a bicycle traffic school program.

Action 2B.2 – Officer Training: Educate police officers on the importance of and methods for citing bicycle offenders.

Action 2B.3 – Bicycle Patrols: Continue and extend the use of bicycle patrol officers in downtown, neighborhood commercial districts, parks, and along the Bay Trail.

Action 2B.4 – Oakland Municipal Code: Review and update the sections of the Oakland Municipal Code that relate to bicycles.

Goal 3 – Coordination: Provide a policy framework and implementation plan for the routine accommodation of bicyclists in Oakland's projects and programs.

BMP Policy 3A – Resources: Seek the necessary staff and funding to implement the *Bicycle Master Plan.*

Action 3A.1 – Staffing: Dedicate the necessary staff in all agencies, divisions, and departments to implement the *Bicycle Master Plan.*

Action 3A.2 – Funding: Use local resources to leverage grant funding for implementing the bikeway network and accompanying support facilities.

Action 3A.3 – Routine Accommodation: Integrate bicycle facilities and their associated costs into the implementation of streetscape and resurfacing projects.

BMP Policy 3B – Project Development: Prioritize and design bicycle projects in cooperation with key stakeholders.

Action 3B.1 – Prioritization: Work with the Bicycle and Pedestrian Advisory Committee to identify and prioritize projects based on the recommendations of this Plan.

Action 3B.2 – Resurfacing: Integrate proposed bikeways into resurfacing projects. In developing resurfacing schedules, prioritize streets with existing or proposed bikeways when choosing between streets of otherwise equal priority.

Action 3B.3 – Feasibility and Design: Complete feasibility studies and the design of proposed bikeways in close cooperation with key stakeholders including AC Transit, adjacent jurisdictions, and the Bicycle and Pedestrian Advisory Committee.

Action 3B.4 – Maintenance: In project development and design, identify the cost, funding source, and responsible agency for the maintenance and operation of the proposed facilities.

Action 3B.5 – Data Collection: Work with the Alameda County Transportation Improvement Authority, Alameda County Congestion Management Agency, and Metropolitan Transportation Commission to improve data collection on bicycle trips.

BMP Policy 3C – Public Review: Prior to the implementation of bikeway projects, affected residents, merchants, and property owners shall be notified of the project's costs and benefits.

Action 3C.1 – Information Sharing: Maintain and expand the web pages on bicycling in Oakland to provide current and complete information on facilities, programs, and proposed projects.

Action 3C.2 – Contact List: Maintain a contact list of interested individuals and organizations and notify them of projects related to bicycling in Oakland.

Action 3C.3 – Community Input: Seek community input through mailers and/or meetings for the implementation of new bikeways.

Action 3C.4 – City Council Approval: If the design of a bikeway will reduce the number of motor vehicle lanes or on-street parking spaces (by 10% or more in the project area), there shall be a vote of the City Council before implementation of the bikeway project.

3.3 Issues for Further Discussion

This chapter concludes with this section on bikeway guide signage and mountain biking as issues for further discussion. These issues require ongoing dialog because they lack consensus for establishing policy positions in the *Bicycle Master Plan.* The differing viewpoints on these issues are presented here to facilitate further discussion on how best to promote bicyclist safety and access in the City of Oakland while being sensitive to the competing demands of multiple stakeholders.

Bikeway Guide Signage

Oakland uses a combination of "Bike Route" signs (D11-1) and "Bicycle Route Number Marker" signs (SG45) to designate bikeways and provide wayfinding information. The numbered routes are based on a system specified by the Alameda Countywide Bicycle Plan whereby north-south bikeways end in "5" (5, 15, 25, ...) and east-west bikeways end in "0" (10, 20, 30, ...). Analogous to the interstate highway system, the north-south bikeways are numbered west to east (5 is the westernmost) and the east-west bikeways

Figure 3.1: *Bicycle Wayfinding Signage.* Wayfinding signs for bicyclists include the "Bicycle Route Number Marker" sign (left) and and the "Bike Route" sign (right), shown here with supplementary placards for the bikeway name and a destination along the route. The relative size of the signs in this illustration reflects that of typical installations in Oakland.

are numbered north to south (10 is the northernmost). Oakland applied this framework to locally designated bikeways with north-south bikeways ending in odd numbers (other than 5) and east-west bikeways ending in even numbers (other than 0).

There are various strengths and weaknesses to this approach regarding maintenance, general visibility, and the information provided by the signs. In particular, the SG45 signs have the following benefits. The signs are manufactured in-house and have a highly reflective surface material. The Caltrans standard provides a uniform look across jurisdictions while allowing for customization at the local level. Other jurisdictions, including San Francisco and Marin County, are also using the SG45 sign. In Oakland's case, the distinctive design integrates the City's oak tree logo and is a source of pride for the staff involved in its development. The City of Oakland has already made a commitment to the SG45 with a signage project completed in 2004. The smaller sign size (12"x18") is also less likely to be damaged by trucks or vandalism. Overall, the design of the sign is very attractive while minimizing the associated maintenance needs.

However, the following concerns have arisen with this signage scheme. Oakland's street grid does not follow the cardinal directions and thus the overall framework for the numbering system is not intuitive. The numbering for the countywide bikeways was developed as a planning tool and was not necessarily intended to be used as a wayfinding system (Alameda County Congestion Management Agency 2001, p. 4-3). At the local level, this

approach requires many numbers for all of the bikeways—more numbers than people are likely to learn. It is unclear how the numbering for local bikeways would be coordinated across jurisdictional boundaries. The SG45 signs are not large enough to be readily visible to bicyclists and to drivers. In particular, the destination and directional information is difficult to read due to the necessary font size given the sign's limited width. Neither the SG45 nor the D11-1 signs include distances to key destinations. Overall, the signs do not provide sufficient information in an intuitive format.

Given these strengths and weaknesses, the following points offer suggestions on how to continue the discussion regarding bikeway guide signage:

- Consider using the SG45 signs only for countywide bikeways to limit the extent of numbered bikeways and simplify the overall numbering system. This limited use of numbers could make the numbered bikeways more readily understandable.
- When using the SG45 signs, consider the Caltrans standard 18"x24" sign rather than the 12"x18" size currently in use. The larger format would improve the signs' visibility and provide more space for wayfinding information. These potential benefits should be weighed against the cost and maintenance implications of larger signs.
- Consider using D11-1 signs on locally designated bikeways. Include the "Bicycle Route Name Marker" supplementary sign (S17) on bikeways that are readily identified by name (e.g. "Webster-Shafter").
- Consider the use of the D1 and D11 Series Bicycle Guide Signs developed by the City of Chicago and recommended by the National Committee on Uniform Traffic Control Devices (NCUTCD) in 2006 for inclusion in the Manual of Uniform Traffic Control Devices (MUTCD). These signs build on the common bicycle route sign (D11-1) to include route name, destination, direction, and distance information.[1]

Additionally, the City of Oakland's bikeway guide signage needs to be coordinated with other agencies that are interested in providing bicycle wayfinding systems. The Alameda County Congestion Management Agency has expressed an interest in signing countywide bikeways. BART is developing wayfinding signs for bicyclists to connect each BART station to its surrounding neighborhoods. The San Francisco Bay Trail Project has its own signage to mark paths and on-street bikeways that are part of the Bay Trail. In some of areas of Oakland including West Oakland BART, for example, all four signage systems would overlap: local bikeways intersecting countywide bikeways that are also part of the Bay Trail

[1] http://members.cox.net/ncutcdbtc/fall05/bike02-bikeguidesign.pdf

and provide access to BART. To ensure that this signage is consistent and understandable, all stakeholders must work together to ensure that the various signage schemes build upon each other. The City of Oakland encourages other agencies to develop their wayfinding systems as supplementary signs to the bikeway guide signage established by the MUTCD and the California MUTCD.

Mountain Biking

Mountain biking is a popular activity in the East Bay Hills, especially in the East Bay Regional Parks as well as the City of Oakland's Joaquin Miller Park. The Oakland Municipal Code 12.60.070 describes the legal requirements for using bicycles on trails under the jurisdiction of the City of Oakland. In particular, it states, "Within city parks, bicyclists can ride on named trails only and are prohibited from operating bicycles off-trail... The City Manager, or his or her designees, shall determine trail accessibility for bicyclists." There are currently a number of named trails in Joaquin Miller Park that are accessible to mountain bikers. The mountain biking community seeks to improve and expand that trail access while other park users have concerns over the use of the park by mountain bikers.

The Joaquin Miller Park Working Group and the Joaquin Miller Park Bike Patrol are actively addressing these issues. Under the auspices of Councilmember Jean Quan, the Joaquin Miller Park Working Group has been meeting on a regular basis since May 2005 as part of a community-based planning effort to improve the Park. The Working Group includes representatives of park user groups (hikers, bicyclists, equestrians, dog owners), the Woodminster Theater (Producers Associates), and the Joaquin Miller Community Center Advisory Board as well as staff from city agencies and the East Bay Regional Park District. The group has focused on improvements to signage, education, and trails to enhance visibility, reduce erosion, and address conflicts between different park users. The Joaquin Miller Park Bike Patrol is a volunteer program of the Bicycle Trails Council of the East Bay (BTCEB) in partnership with the Oakland Police Department Rangers. The Bike Patrol is composed of BTCEB members who volunteer their time in the park to assist and educate park visitors and trail users regarding park rules.

There are three primary concerns over the use of bicycles on off-road, unpaved trails: (1) the environmental effects of mountain biking (namely erosion) may be incompatible with some trails and park areas; (2) some feel that hikers should be able to use trails for the park experience without the disruption caused by mountain bikers; and (3) some multi-use trails in their current form do not adequately accommodate hikers, mountain bikers, dog walkers, and equestrians. These concerns are addressed in various ways in the *Open Space, Conservation, and Recreation Element* (OSCAR, 1996) of the City of Oakland's

General Plan. On one hand, OSCAR Policy OS-1.1 addresses wildland parks and resource conservation areas in which park uses are generally limited to passive recreation. There are concerns that mountain biking is not (or should not be) a form of passive recreation. On the other hand, Policy OS-5.3 on trail design specifies that trails be planned and designed by considering the needs of multiple users (including pedestrians, bicyclists, and persons with disabilities). This policy suggests that, to the extent feasible, trails should be made accessible to diverse groups.

In 2000, the City's Office of Parks and Recreation commissioned "An Assessment of Trails, Watercourses, Soils, and Redwood Forest Health in Joaquin Miller Park, Oakland, California, with Recommendations for Management" (Koehler et al. 2000). The report was motivated by concerns that increased recreational use in the park was causing negative impacts, namely erosion and sedimentation. With respect to the park's maintained trails, the report explains, "Many of these trails were constructed with adequate grade, alignment, and width characteristics. Because of tight compaction and good construction techniques, trails that have gentle gradients and/or bedrock tread material were observed to be relatively resistant to erosion and have few erosion problems. Some trails, however, were constructed with poor grade and alignment characteristics on areas with soft soils" (Koehler et al. 2000, pp. 5–6). These problematic trails include the Cinderella Trail, Upper Palos Colorados Trail, and the Fern Trail (Koehler et al. 2000, p. 26). The report recommends that, in the long term, these trails should be rebuilt with switchbacks and gentler grades to rectify these erosion issues. The report also notes that recreational use is a major source of erosion on "bootleg" trails (trails created by users that are not maintained by the park) and that the use of such informal trails should be actively discouraged through signage and fencing.

This background and policy context suggest an approach to determining bicycle access based on the environmental effects of that access and the ability of particular trails to be designed and built in a manner that safely accommodates multiple user groups. Specifically, the process would need to address bicycle access on existing trails that do not meet current design guidelines. OSCAR Action OS-5.3.2 calls for the preparation of a Bicycle Trail Plan that has not yet been developed (as of the completion of this *Bicycle Master Plan*). Such a planning process could involve key stakeholders for the various user groups as well as representatives of the environmental issues. The process would develop a trail plan and design guidelines that meet stakeholder needs and are consistent with the General Plan direction provided by the OSCAR policies. Such a plan could be incorporated into a future update of Oakland's *Bicycle Master Plan*, providing more comprehensive policy guidance for accommodating on- and off-street bicyclists in Oakland.

4. Bikeways

The proposed bikeway network includes streets throughout Oakland for bicycle access improvements. It links neighborhoods, commercial districts, downtown, and the major transit stations across the city. The network focuses and prioritizes the implementation of bikeways where they will provide the best connectivity and greatest community benefit. Designated bikeways also improve safety by concentrating cyclists and thereby building awareness amongst drivers to expect cyclists on those streets. The overall goal of the network is to provide safe and convenient bikeways such that the majority of any bicycle trip could be made on a designated facility.

4.1 Bikeway Types

Bikeways are streets or corridors that include either bicycle paths, bicycle lanes, or bicycle routes. These three bikeway types are defined by the California Department of Transportation (Caltrans) in Chapter 1000 of the Highway Design Manual. The California Streets and Highways Code Section 891 states that all local agencies must comply with the minimum design criteria and uniform symbols specified in Chapter 1000. Bikeway design guidelines are provided in Section 4.5 of this chapter.

Bicycle Paths (Class 1) provide for bicycle travel on a paved right-of-way that is completely separated from the street. Bicycle paths are often located along waterfronts, creeks, railroad rights-of-way (active or abandoned), or freeways where there are a limited number of cross streets and driveways that create conflict points. They are typically shared with pedestrians and often called mixed-use paths.

Bicycle Lanes (Class 2) are striped lanes on streets, designated with specific signage and stencils, for the use of bicyclists. Bicycle lanes are the preferred treatment for all arterial and collector streets on the bikeway network. Bicycle lanes should not be installed on low-volume, low-speed residential streets where, because of driveways, bicyclists are safer riding in the middle of the travel lane.

Bicycle Routes (Class 3) designate preferred streets for bicycle travel using lanes shared with motor vehicles. While the only required treatment is signage, bicycle routes are designated because they are suitable for sharing with motor vehicles and provide better connectivity than other streets. The following three bikeway types are variations on the standard bicycle route (Cupertino 1998, pp. 2-4 to 2-5). These variations

provide tools for addressing the following issues that are commonly found in Oakland: (1) limited right-of-way width may preclude adding bicycle lanes; (2) parallel streets may not provide an alternative bikeway alignment; (3) bicycle lanes may not be feasible due to diagonal parking; and (4) neighborhood streets may provide good bicycle connections and could be marked as bikeways.

- *Arterial Bicycle Routes (Class 3A)*: Bicycle routes may be used on some arterial streets where bicycle lanes are not feasible and parallel streets do not provide adequate connectivity. These streets should promote shared use with lower posted speed limits (preferably 25mph), shared lane bicycle stencils, wide curb lanes, and signage.

- *Bicycle Boulevards (Class 3B)*: Bicycle boulevards are bicycle routes on residential streets that prioritize through trips for bicyclists. The route should appeal to cyclists of varied skill levels by providing direct connections on streets with low traffic volumes. The route should reduce delay to bicyclists by assigning right-of-way to travel on the route. Traffic calming should be introduced as needed to discourage drivers from using the boulevard as a through route. Intersections with major streets should be controlled by traffic signals with bicycle actuation.

- *Neighborhood Connectors*: While most of the designated bikeways provide connections *between* neighborhoods, there are numerous streets that currently provide good connections *within* neighborhoods. These streets could be mapped to improve their public visibility without installing the standard bicycle route signage. This map-only designation would provide community benefit through identified routes while allowing the City to focus physical improvements on the other bikeway types that provide the key links in the bikeway network.

4.2 Proposed Bikeway Network

The proposed bikeway network reflects incremental modifications and improvements to the network presented in the 1999 *Bicycle Master Plan*. The 1999 network was evaluated and revised based on the following criteria:

1. *Connectivity*: Connect major transit stations, downtown, commercial districts, neighborhoods, and adjoining jurisdictions with a citywide network of bikeways.

2. *Coverage*: Identify bikeways spaced at one-half mile intervals (on average) to ensure coverage throughout Oakland.

	Bike Path (Class 1)	Bike Lane (Class 2)	Bike Route (Class 3)	Arterial Bike Route (Class 3A)	Bike Boulevard (Class 3B)	Totals
Existing	15.4	21.1	50.1	0.7	0.0	87.2
Proposed	19.0	73.4	4.0	35.3	32.5	164.3
When Completed	34.4	93.1	22.0	36.0	32.5	218.0

Figure 4.1: *Bikeway Network Summary* (mileage). Note that "Existing" plus "Proposed" does not equal "When Completed" due to proposed modifications to existing bikeways.

3. *Safety*: Designate arterial and collector streets as bikeways where bicycle lanes, wide curb lanes, or shared lane treatments are feasible.

4. *Convenience*: Select direct connections using the most level streets available.

5. *Ability*: Include a mixture of bicycle paths, lanes, and routes as part of the overall network to support cyclists of differing experience levels.

6. *Feasibility*: Propose bikeways that meet the evaluation criteria in the plan's citywide feasibility analysis.

The resulting network is shown on the map of the "Proposed Bikeway Network" on page 204. Figure 4.1 provides a summary of the total miles by bikeway type included in this network. The following subsection explains the citywide feasibility analysis while narrative descriptions of key bikeways are included in Appendix F.

On average, bikeways spaced at one-half mile intervals result in four miles of bikeway per square mile of land area, or approximately 220 miles of bikeway throughout Oakland's 55 square miles. Note that the bikeway selection criteria could not be met in all cases. In particular, very few streets in the Oakland Hills meet both the requirements for coverage and convenience. Conversely, the network has more bikeways serving major activity centers including downtown, Lake Merritt, the waterfront, and major transit stations.

Bikeways proposed for implementation may deviate from the alignments specified by the proposed bikeway network in two cases. First, a feasibility study may show that a quality bikeway is infeasible on a particular street included in the bikeway network. In such cases, an alternate alignment in the same corridor may be developed if that alternative would provide a superior bicycle accommodation. Second, bicycle lanes may be included in neighborhood traffic calming projects that narrow or reconfigure travel lanes in order to reduce motor vehicle speeds and improve pedestrian safety. An example of such a project is the bicycle lanes on Santa Clara Ave between Vernon St and Lake Park Ave. This project

Zone	Area	Average Slope	Maximum Slope	Difficulty
1	Flatlands (below MacArthur Blvd, Broadway, College Ave)	≤ 6%	≤ 8%	≤ 5
2	Lower Hills (below Mountain Blvd, above Flatlands)	≤ 8%	≤ 10%	≤ 15
3	Upper Hills (above Mountain Blvd)	≤ 10%	≤ 12%	≤ 25

Figure 4.2: *Street Grade Analysis.* These guidelines specify the steepness of hills that are appropriate for the bikeway network in different zones of the city. In general, a hill was excluded from the network if it exceeded two or three of these criteria.

was not included in the 1999 *Bicycle Master Plan.* It was implemented in 2001 as a traffic calming project and subsequently integrated into the bikeway network as part of the MacArthur Blvd bikeway.

Citywide Feasibility Analysis

The citywide feasibility analysis applied criteria to all streets on the recommended bikeway network from the 1999 *Bicycle Master Plan* plus a number of additional streets that were evaluated as potential alternatives. Overall, approximately 700 segments of potential bikeway were analyzed. Segments were defined by uniform characteristics including street width, lane configuration, and parking configuration. The segments are commonly one-third mile in length although some are as short as one block. The criteria included street grade, curb-to-curb street width, existing motor vehicle volumes, and bicycle/bus interactions to propose bikeway alignments and recommended cross-sections for all arterial and collector streets. The results of the following analyses are included in Appendix H.

- *Street Grade Analysis*: Figure 4.2 provides the guidelines for hills that are appropriate on the bikeway network. For particular streets, the average slope and maximum slope were computed using overlapping GIS layers of the street grid and contour lines. The difficulty factor relates the steepness and length of a given hill through the following expression: (total elevation gain) * slope * slope * 10. This factor accounts for the relationship between steepness and length that shapes overall difficulty. The factor is normalized such that most hills in Oakland have a difficulty between 0 and 40, where the higher numbers indicate more difficult hills. All significant hills on the network were screened by these three criteria: average slope, maximum slope, and overall difficulty. In general, a hill was excluded from the network if it exceeded two or three of the criteria.

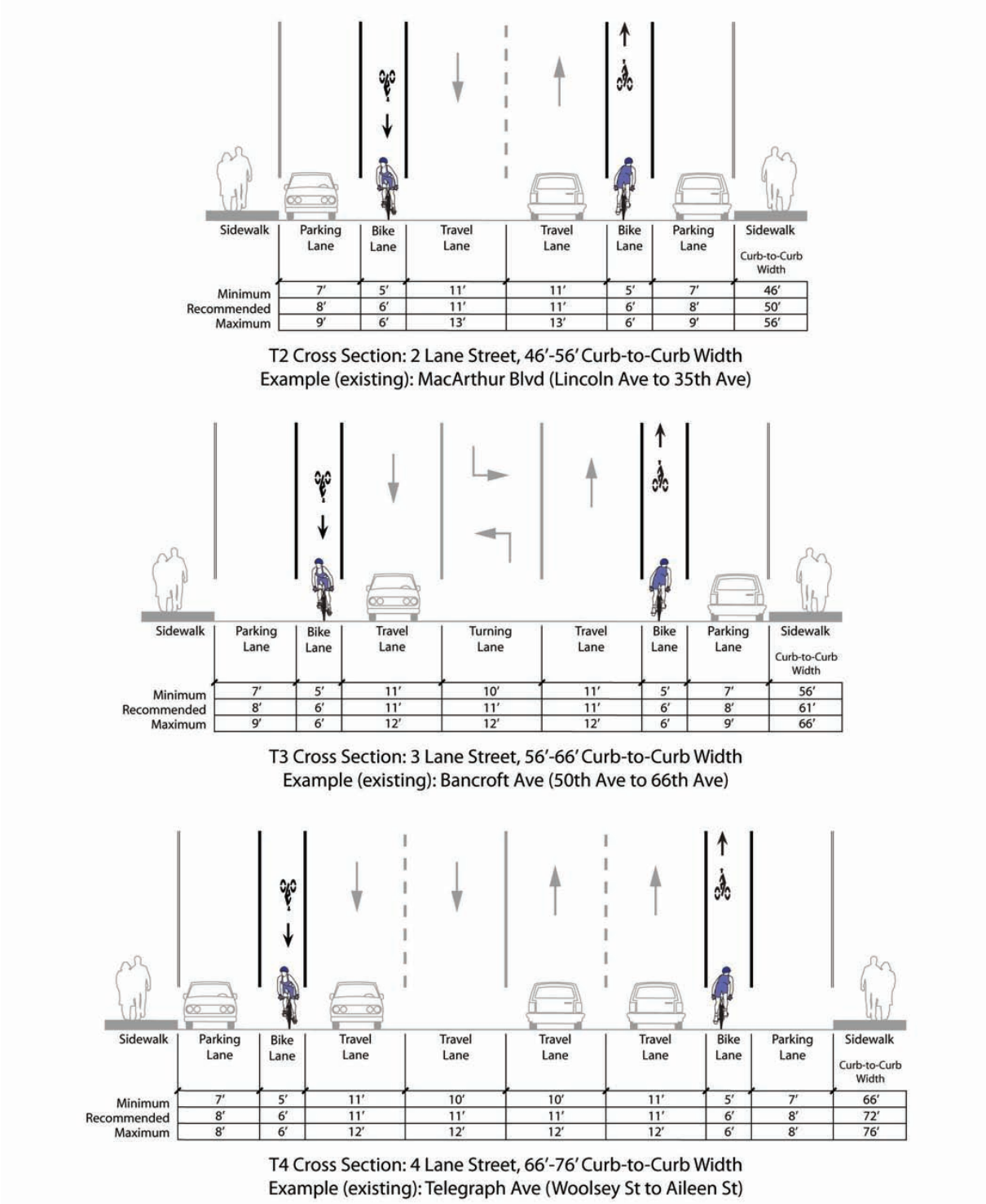

Figure 4.3: *Bikeway Cross-Sections (1 of 4).* (Illustration by Wilbur Smith Associates.)

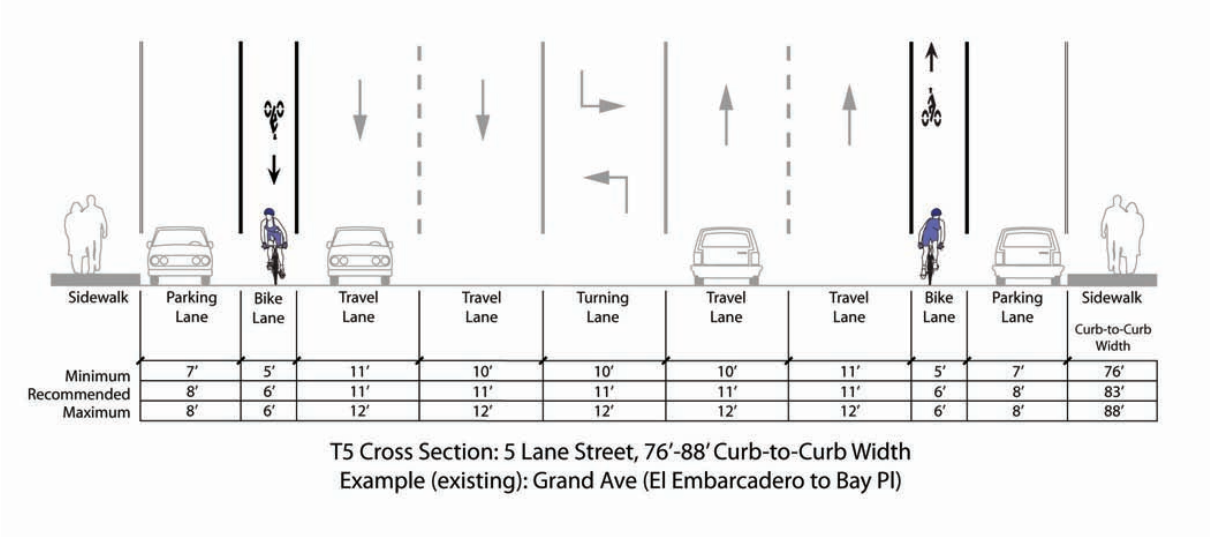

Figure 4.4: *Bikeway Cross-Sections (2 of 4).* (Illustration by Wilbur Smith Associates.)

- *Street Width Analysis*: The curb-to-curb street width was inventoried for all bikeway segments on collector and arterial streets.[1] The analysis then applied proposed cross-sections based on the following "minimum" lane widths: 7' parking lanes, 5' bicycle lanes, 11' outer travel lanes, 10' inner travel lanes, and 10' two-way center turn lanes (American Association of State Highway and Transportation Officials 2004, pp. 311–312). On streets with rapid bus lines, a minimum 11' inner travel lane is necessary. A minimum of 11' is also required for turn lanes used by fixed route bus service. (See Figures 4.3 to 4.6.) In general, the "recommended" lane widths include 11' travel lanes and 8' parking lanes when adjacent to bicycle lanes. The "maximum" lane widths specify a possible right-of-way allocation for which the next widest cross-section would also be feasible (using the "minimum" lane widths associated with that cross-section). For arterial and collector streets, proposed bikeways without adequate width to accommodate bicycle lanes were either rerouted to parallel streets or identified as Class 3A (shared lane treatment with wide outer lanes).

- *Capacity Analysis*: This analysis was completed for all segments in which the proposed cross-section would require the conversion of travel lanes to accommodate bicycle lanes or wide outer curb lanes. (A number of the streets on the bikeway network are wide enough to accommodate the proposed cross-section without converting travel lanes.) Peak hour volumes were compared to a threshold based on the service volumes for urban streets specified by the Highway Capacity Manual (Transportation Research Board 2000, p. 10-10). Under the most urbanized conditions

[1]The bulk of these data were from high-resolution aerial photographs (four pixels per foot). Additional data were gathered from fieldwork, feasibility studies, and the final design for new and pending projects.

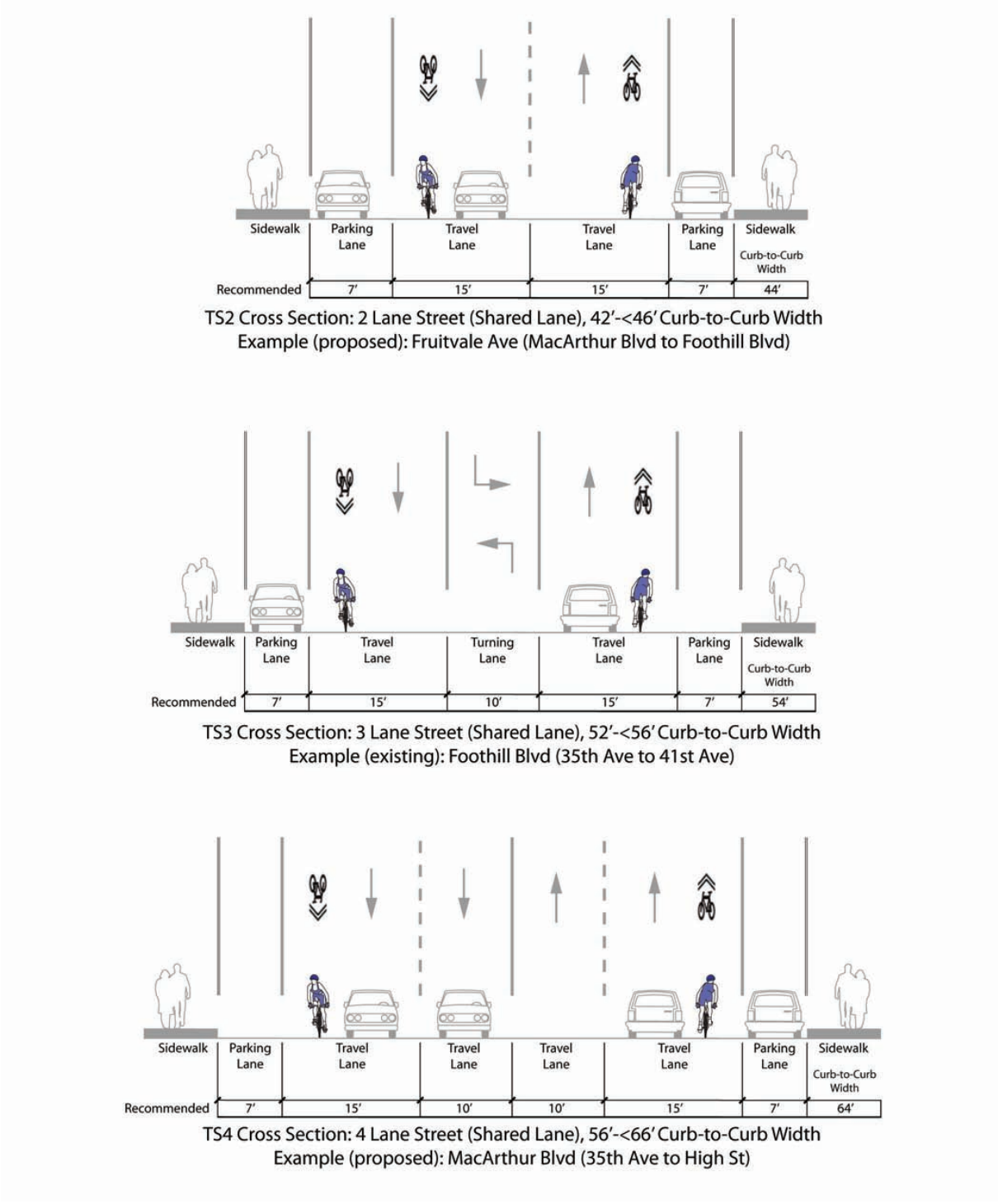

Figure 4.5: *Bikeway Cross-Sections (3 of 4).* (Illustration by Wilbur Smith Associates.)

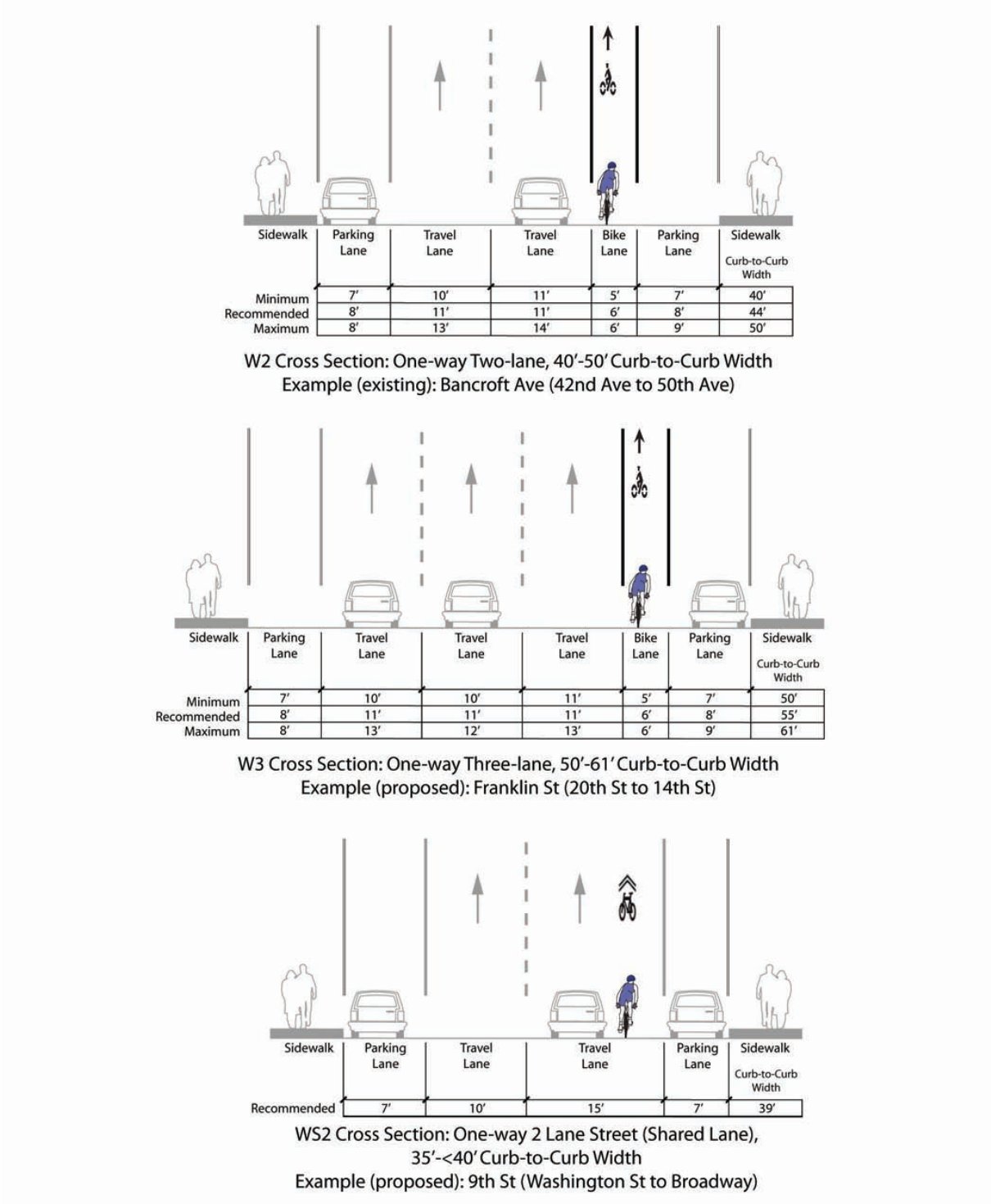

Figure 4.6: *Bikeway Cross-Sections (4 of 4).* (Illustration by Wilbur Smith Associates.)

(Class IV) operating at a level of service E, each travel lane can be expected to accommodate roughly 800 motor vehicles per hour. This analysis used 1,080 motor vehicles per lane per hour as the capacity threshold, or 135% of the 800 vehicles specified by the Highway Capacity Manual. This threshold is deliberately conservative (i.e., greater than 100%) so that potentially feasible bikeway projects are not eliminated unnecessarily by this citywide analysis. The viability of these borderline cases will be determined through engineering analysis. Thus, the capacity analysis does not determine the ultimate feasibility of such lane conversion projects. Rather, it provides planning-level guidance as to which segments merit an engineering analysis to determine their operational viability. The segments that failed the capacity analysis were either rerouted to a different street or the proposed cross-sections were changed to accommodate the existing motor vehicle volumes.

- *Bicycle/Bus Interactions*: This analysis compared potential bikeways to existing bus routes (AC Transit, Emery-Go-Round, and AirBART) to minimize the complications in both design and operations of having designated bikeways on heavily used transit streets. Based on their headways and ridership, bus lines were categorized by overall importance into a hierarchy of four groups (Figure 4.7). The most important transit streets—those with "rapid/trunk lines" and "major lines"—were avoided where possible and bikeways were designated on parallel streets. Where this solution was not possible due to Oakland's irregular street grid, the proposed cross-sections were chosen to minimize potential effects on bus operations. In particular, an effort was made to avoid lane conversions to only one travel lane per direction on rapid/trunk and major lines.

A small number of streets failed the citywide feasibility analysis but were retained as part of the bikeway network because they provide key links for which there are not alternatives. These proposals are retained as long-term projects in that they would likely require major roadway reconstruction. Section F.3 identifies these streets and provides an accompanying explanation of the key issues for each.

4.3 Safe Routes to Transit

The bikeway network serves as a feeder system to Oakland's major transit stations including BART, the Capitol Corridor, Eastmont Transit Center, and the Alameda/Oakland Ferry. People are generally willing to walk up to one-half mile to a transit station. In comparison, a bicycle ride covering two miles (about 12 minutes) greatly increases the number of destinations that are conveniently accessible by transit. Such a two-mile ride can reach

Priority	Service Type	Bus Line	Primary Streets
1	Rapid/Trunk	1/1R	Telegraph Ave, 11th/12th St, International Blvd
		18	Shattuck Ave, MLK Jr Wy, Park Blvd
		40	Foothill Blvd, Bancroft Ave, 11th/12th St
		51	College Ave, Broadway
		57	40th St, MacArthur Blvd
		72R/72/72M	San Pablo Ave
		NL	Grand Ave, MacArthur Blvd, 20th St
2	Major	14	Adeline St, 14th St, High St
		15	MLK Jr Wy
		19	Peralta St
		50	Hegenberger Rd, 73rd Ave, MacArthur Blvd
		53	Fruitvale Ave
		54	35th Ave, Redwood Rd, Campus Dr
		62	7th St, 8th St, 23rd Ave
		88	Market St
		F	Market St
		EM*	40th St
		AB*	66th Ave, Hegenberger Rd
3	Transbay	B, C, CB, E, NX, NX1, NX2, NX3, O, OX, P, V, W, 800	
	Other	7, 11, 12, 13, 45, 46, 47, 56, 59/59A, 63, 98, 801, 802, 805, 840, 851	

Figure 4.7: *Bus Service Types.* To compare potential bikeways to existing bus routes, bus lines were categorized based on their headways and ridership into a hierarchy of four groups. (*EM = Emery-Go-Round; AB = AirBART.)

destinations within an area that is 16 times larger than the area reached by a one-half mile walk. As described in Section 2.4, 31,000 Oakland residents live within one-half mile of a major transit station while 338,000 Oakland residents live within two miles of a major transit station. In fact, many residents live within two miles of multiple transit stations. Bikeways serving these transit stations are thus a priority because of the large number of people that are within easy bicycling distance of high quality transit service. Because of the number of transit stations in the downtown, these bikeways will also serve cyclists commuting to the central business district regardless of whether or not they are using transit to reach their final destination.

For each major transit station, the proposed bikeway network includes a bikeway connecting from each of the four directions surrounding the station. These segments are prioritized for implementation because of their ability to increase transit ridership while connecting cyclists to destinations throughout the region. As of this writing, BART is developing a system of bicycle wayfinding signage that would direct cyclists from the surrounding neighborhoods to each BART station. Such signage should be coordinated with local and countywide bicycle wayfinding such that the multiple signage systems are consistent and mutually reinforcing (Section 3.3). In many cases, the bikeway segments serving transit stations will require careful coordination with AC Transit and shuttle operators because of the heavy bus volumes and localized congestion at these stations. This coordination

Major Transit Station	North	South	East	West
Amtrak -- Emeryville	(Emeryville)	Mandela Pkwy, Hollis St, 32nd St	53rd St, 55th St	(Emeryville)
Amtrak -- Jack London Square	Madison St / Oak St	Estuary Crossing	2nd St, Embarcadero	2nd St
BART -- 12th St	Franklin St / Webster St	Clay St, Washington St	14th St	14th St
BART -- 19th St	Telegraph Ave	Franklin St / Webster St	20th St	20th St
BART -- Ashby	(Berkeley)	Genoa St	(Berkeley)	(Berkeley)
BART -- Coliseum / Amtrak	66th Ave, Hegenberger Rd	BART to Bay Trail Connector	San Leandro St	San Leandro St
BART -- Fruitvale	38th Ave, Fruitvale Ave	Fruitvale Ave	E 12th St	E 12th St
BART -- Lake Merritt	Madison St / Oak St	Madison St / Oak St	10th St	8th St / 9th St
BART -- MacArthur	Telegraph Ave	Telegraph Ave	MacArthur Blvd, 41st St	40th St
BART -- Rockridge	College Ave, Webster-Shafter	College Ave, Webster-Shafter	Chabot Rd, Lawton Ave	Shafter Ave, Cavour St, 55th St
BART -- San Leandro	(San Leandro)	(San Leandro)	(San Leandro)	San Leandro St
BART -- West Oakland	Mandela Pkwy	Mandela Pkwy	7th St	8th St
Eastmont Transit Center	(none)	73rd Ave	MacArthur Blvd	MacArthur Blvd
Oakland/Alameda Ferry	Washington St / Clay St	Estuary Crossing	2nd St	2nd St, 3rd St

Figure 4.8: *Safe Routes to Transit – Priority Bikeways.* For each major transit station, the proposed bikeway network includes a bikeway connection from each of the four directions surrounding the station.

should be a part of comprehensive station area access planning to ensure that the streets surrounding the major transit stations provide superior multimodal accommodations.

4.4 Existing Bikeways

As shown in Figure 4.1 and the map of "Existing Bikeways" (on page 205), Oakland has 87 miles of existing bikeways. Major accomplishments to date include the Grand Ave bikeway, Bancroft Ave bikeway, and on-street portions of the San Francisco Bay Trail (including Mandela Pkwy, 3rd St, and Embarcadero). The majority of the existing bikeways are bicycle routes (Class 3), especially in the Oakland Hills and in downtown. In general, existing bicycle routes below Mountain Blvd are proposed to be upgraded—as feasible—to bicycle lanes (Class 2), arterial bicycle routes (Class 3A), or bicycle boulevards (Class 3B) to improve those bikeways. In a small number of cases, existing bikeways are proposed for relocation to different streets for improved connectivity or better facilities. These proposed modifications to existing bikeways are described in detail in Section F.6. Figures 4.9 to 4.11 list the bicycle facilities completed to date.

Project	Completion Date	Funding Source(s)	Cost Estimate	Notes
BIKEWAYS				
12th Street Dam-Interim Bicycle Path	2005	TDA Article 3, Measure B	$100,000	includes staff costs
16th Ave Bikeway Lighting Improvements (E 12th St to Embarcadero)	1998 (Apr)	City	$40,000	includes staff costs
3rd St Bicycle Lanes (Mandela Pkwy to Brush St)	2005 (Dec)	TDA Article 3	$100,000	
73rd Ave Bicycle Lanes (MacArthur Blvd to International Blvd)	2001	TEA-21, TFCA-Regional	$250,000	includes staff costs
7th St Bicycle Path (Portview Park to Wood St)	2005	Port of Oakland	N/A	Port of Oakland
8th Street Bicycle Lanes/Bicycle Route (Wood St to Mandela Pkwy)	2005 (Feb)	TLC, TFCA-Local, CMAQ	$32,000	
8th St Bicycle Lanes (Mandela Pkwy to Union St)	2005 (Jun)	CMAQ	$750,000	Entire project cost including streetscape improvements
8th St Bicycle Lanes (Union St to Market St)	2001 (Sep)	Caltrans, MTC	$20,000	
8th St Bicycle Lanes (Jefferson St to Broadway)	2005 (Feb)	Urban Development Action Grant	$15,000	
Alameda Ave Bicycle Lanes (Fruitvale Ave to Howard St) and Waterfront Trail (Segment #29)	2007 (Aug)	TDA Article 3, Bay Trail, RTP	$525,000	
Airport Dr Path (Doolittle Dr to Ron Cowan Pkwy)	2001	Port of Oakland	N/A	Port of Oakland
Bancroft Ave Bicycle Lanes (42nd Ave to 66th Ave, 82nd Ave to 98th Ave)	2003	TEA-21, Measure B	$300,000	includes staff costs
Bancroft Ave Bicycle Lanes (98th Ave to Durant Ave)	2003 (Sep)	TDA Article 3	$92,483	
Broadway Bicycle Lanes (25th St to I-580)	1998 (Nov)	ISTEA	$10,000	
City Center/Ferry Bicycle Route Signs	1999 (Feb)	TDA Article 3	$10,000	includes staff costs
Citywide Bicycle Route Signage Project	2004 (Dec)	TFCA-Local	$91,514	
Doolittle Dr Bicycle Lanes (Hegenberger Rd to Airport Access Rd)	2007 (Nov)	Port of Oakland	N/A	Port of Oakland
Doolittle Dr Bicycle Lanes (Swan Wy to Eden Rd)	2001	Port of Oakland	N/A	Port of Oakland
Embarcadero Bicycle Lanes (Oak St to Kennedy St), Kennedy St Bicycle Lanes (Embarcadero St to 23rd Ave), 23rd Ave Bicycle Route (Kennedy St to 29th Ave)	2004 (Feb)	TEA-21, TDA Article 3, TFCA, Bay Trail RDP	$1,550,000	entire project cost including sidewalk work and repaving
Foothill Blvd Arterial Bicycle Route (36th Ave to 41st Ave)	2005 (Nov)	Measure B	$4,286	
Fruitvale Ave Bicycle Lanes (E 12th St to Alameda Ave)	2000	City of Alameda	$20,000	

Figure 4.9: Bicycle Facility Expenditures (1 of 3). “N/A” denotes the information is not available.

Project	Completion Date	Funding Source(s)	Cost Estimate	Notes
Grand Ave Bicycle Lanes (Market St to El Embarcadero) and Harrison St Bicycle Lanes (Grand Ave to 20th St)	2001	TFCA-Local	$400,000	
John Glenn Rd Bicycle Lanes (Ron Cowan Pkwy to Alan Shephard Wy)	2006 (Jun)	Port of Oakland	N/A	Port of Oakland
Lake Merritt Bicycle Path	N/A	N/A	N/A	
Lake Merritt Channel Bicycle Path (Lake Merritt Bicycle Path to 4th St Path); 4th St Bicycle Path (4th St to Lake Merritt Channel Path)	early 1980s	N/A	N/A	
Lake Temescal Bicycle Path	2000	Caltrans (mitigation)	$300,000	
Lakeshore Ave Bicycle Lanes (Winsor Ave to Mandana Blvd)	2007 (Mar)	Sewer Fund (local)	$22,000	cost included in slurry seal project
MacArthur Blvd Bicycle Lanes (Lakeshore Ave to Park Blvd)	2004 (Jun)	TDA Article 3, TFCA-Regional, Measure B	$176,253	
MacArthur Blvd Bicycle Lanes (Lincoln Ave to 35th Ave)	2001	Measure B	$100,000	includes staff costs
Mandela Pkwy Bicycle Lanes (Horton St to 8th St); Horton St Bicycle Lanes (40th St to Mandela Pkwy)	2005 (Jun)	Caltrans SHOPP	$750,000	
Mandela Pkwy Bicycle Lanes (7th St to 3rd St)	2005 (Apr)	Federal, AMTRAK	$1,150,000	entire project cost including sidewalk work and repaving
Market St Bicycle Lanes (57th St to MacArthur Blvd)	2005 (Jan)	TFCA-Regional, Measure B	$35,000	
Market St Bicycle Lanes (18th St to 3rd St)	2007 (Jun)	TDA Article 3	$80,000	
Middle Harbor Park Bicycle Path (7th St Bicycle Path through Middle Harbor Shoreline Park)	2004	Port of Oakland	N/A	Port of Oakland
Oyster Bay Bicycle Path (Airport Dr Bicycle Path to Oyster Bay Slough Bridge)	2002	Port of Oakland	N/A	Port of Oakland
Ron Cowan Pkwy Bicycle Lanes and Path (Harbor Bay Pkwy to Airport Dr)	2001	Port of Oakland	N/A	Port of Oakland
Santa Clara Ave Bicycle Lanes (Grand Ave to Vernon St)	2001	Measure B	$100,000	includes staff costs
Shepherd Canyon Bicycle Path (Saroni Dr to La Salle Ave)	N/A	N/A	N/A	
Telegraph Ave Bicycle Lanes (Woolsey St to Aileen St)	2001	TFCA-Regional & Local	$141,830	
Waterfront Trail Bicycle Path (Jack London Square to 66th Ave)	In progress	Measure DD		
West Street Bicycle Lanes (MacArthur Blvd to W Grand Ave)	1997	General Fund	$20,000	
BICYCLE PARKING				
City Administration Building Bicycle Parking Cage	1998 (Dec)	TFCA-Regional	$108,490	includes staff costs
CityRacks I (bicycle racks)	1999 (Nov)	TFCA-Regional, TFCA-Local	$36,650	includes staff costs

Figure 4.10: Bicycle Facility Expenditures (2 of 3). “N/A” denotes the information is not available.

Project	Completion Date	Funding Source(s)	Cost Estimate	Notes
CityRacks II (bicycle racks)	2001 (Sep)	TFCA-Regional	$21,393	includes staff costs
CityRacks III (bicycle racks)	2002 (Dec)	TFCA-Regional, TFCA-Local	$23,429	includes staff costs
CityRacks IV (bicycle racks and lockers)	2006 (Sep)	TFCA-Regional, Measure B	$80,000	includes staff costs
Downtown Bicycle Parking Bike Racks	1994	TFCA-Local	$25,000	includes staff costs
Frank H. Ogawa Plaza Bike Racks	1999 (Aug)	TFCA-Local	$7,000	
Fruitvale BART Bikestation	2004 (Nov)	BTA, TFCA-Regional	$1,200,000	joint BART, Unity Council, and City project; includes staff costs
Parks and Recreation Centers Bike Racks	1998 (Nov)	TFCA-Local	$5,000	
EDUCATION AND OUTREACH				
Bike to Work Day, 1994-2006	annual event	General Fund	$1,000	annual cost
CarFree Day, 2004-2006	annual event	General Fund	$500	annual cost
Commuter Kiosk	1998	TFCA-Local	$37,500	includes staff costs
Downtown Oakland Bicycle Parking Map	1998 (Nov)	General Fund	$500	
Earn-A-Bike Program	ongoing	OTS, General Fund	$60,000	FY04-06
GIS Bicycle Mapping Project	ongoing	Measure B	$1,000	staff costs only

Figure 4.11: Bicycle Facility Expenditures (3 of 3). "N/A" denotes the information is not available.

4.5 Bikeway Design Guidelines

The following guidelines reflect the minimum requirements established by:

- California Department of Transportation (Caltrans). *Highway Design Manual, Chapter 1000: Bikeway Planning and Design.*
- Federal Highway Administration (FHWA). *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD).
- California Department of Transportation (Caltrans). *California Manual of Uniform Traffic Control Devices for Streets and Highways.*

In particular, Section 891 of the California Streets and Highways Code specifies that local agencies must comply with the minimum design criteria provided by Chapter 1000 in the current Highway Design Manual. The following descriptions include the basic parameters that city staff and consultants should address when developing projects with designated bikeways. The design guidelines described herein may change over time as standards are

revised by the respective authorities. Definitive documentation is provided by the current versions of the manuals listed above. Other useful references include:

- American Association of State Highway and Transportation Officials (AASHTO). 1999. *Guide for the Development of Bicycle Facilities.*
- California Department of Transportation (Caltrans). 2005. *Pedestrian and Bicycle Facilities in California.*
- Institute of Transportation Engineers (ITE). 2002. *Innovative Bicycle Treatments.*
- San Francisco, City of. 2003. *Bicycle Plan Update: Supplemental Design Guidelines.*
- San Francisco Bay Trail Project. *Bay Trail Design Guidelines.*[2]
- Santa Clara Valley Transportation Authority (VTA). 1999. *VTA Bicycle Technical Guidelines.*

All traffic modifications in the public right-of-way are subject to review by the Transportation Services Division. Where feasible, all bikeway pavement markings should be constructed using thermoplastic paint or thermoplastic tape to maximize visibility and minimize long-term maintenance costs.

Bicycle Paths (Class 1) provide for bicycle travel on a paved right-of-way that is completely separated from the street.

- *Width*: Paths shall be at least 8' in width and include 2' graded shoulders on either side. A wider path may be substituted for the graded shoulders. All obstructions (including poles, benches, and architectural elements) should be at least 2' from the edge of pavement. *Oakland Practice*: Develop paved paths of at least 12' in width to reduce bicyclist/pedestrian conflicts and to avoid the maintenance associated with graded shoulders.
- *Alignment*: The bicycle paths included in the proposed bikeway network illustrate the proposed linkages that these paths would contribute to the overall network. The alignment of any particular path would be determined by project development and analysis that would consider site-specific circumstances including right-of-way and topography. All bicycle paths shall be designed, to the extent feasible, to avoid adverse environmental effects associated with water resources, biological resources, hazardous materials, and cultural resources.

[2] `www.baytrail.org/baytrailplan.html`

- *Lateral Separation*: When a path parallels a roadway, there must be at least 5' of lateral separation between the edge of the paved path and the edge of the roadway (typically the face of curb). A path's graded shoulder may be counted as part of this lateral separation. A vertical barrier may be used in lieu of the lateral separation.

- *Design Speed and Curve Radius*: Class 1 Bicycle Paths require a minimum design speed of 25mph and a minimum curve radius of 155'. *Oakland Practice*: In areas with significant pedestrian activity—and where it is not possible to separate pedestrians and bicyclists—develop multi-purpose trails with a minimum design speed of 12mph and a minimum curve radius of 36'. In such locations, accommodate faster moving cyclists with a parallel on-street bikeway where feasible.

- *Striping*: Bicycle paths may include yellow center lines to separate directions of travel or white lines to separate different types of users. White edge lines may also be used if the path's paving is contiguous with a fixed object of extended length (like a retaining wall). *Oakland Practice*: Include striping to delineate the two directions of bicycle travel only when a separate pedestrian path is provided. In other cases, limit the use of striping to tight turns, blind corners, intersection approaches, and other spot locations where conflicts may occur.

- *Cross Streets and Driveways*: Paths should cross as few streets and driveways as possible to reduce conflicts between cyclists and drivers. Where such street crossings are necessary, significant attention should be given to maximizing sight lines for both drivers and cyclists. Driveways should be designed to maximize sight lines and minimize driver speeds.

- *Bollards*: Minimize the use of bollards to avoid creating obstacles for bicyclists. The California MUTCD explains, "Such devices should be used only where extreme problems are encountered" (Section 9C.101-CA). Instead, design the path entry and use signage to alert drivers that motor vehicles are prohibited. Where a bollard is deemed essential for restricting motor vehicle access, it should be located in the center of the path such that bicycle traffic in either direction stays to the right of the bollard. The bollard should be marked with reflectors or reflective tape and include a diamond-shaped envelope striped around its base. Where removable bollards are used, the mount point should be flush with the path's surface so as not to create a hazard when the bollard is not in place.

Bicycle Lanes (Class 2) are on-street, striped lanes for specific use by bicyclists. They are the recommended bikeway type, where feasible, for arterial and collector streets

on Oakland's bikeway network. Bicycle lanes are recommended over wide curb lanes because they discourage sidewalk and wrong-way riding while reducing bicyclist/pedestrian conflicts. Compared to wide curb lanes, bicycle lanes also decrease the frequency of drivers encroaching into the adjoining travel lane when passing bicyclists (Hunter et al. 1999).

- *Width*: With parallel parking, the bicycle lane must be at least 5' wide and the parking lane at least 7' wide. Without parallel parking, a minimum 4' bicycle lane is allowed if at least 3' is clear of the gutter pan. On roadways without curb and gutter, a minimum 4' bicycle lane is allowed. *Oakland Practice*: Where feasible, use 8-9' parking lanes adjacent to 6' bicycle lanes to reduce the risk associated with the door zone. The design of bicycle lanes should follow current research and best practices for addressing the door zone.

- *Hills*: Bicycle lanes should be avoided if the steepness and length of a downhill grade will allow a typical cyclist to travel at the prevailing traffic speed. In such cases, the shared roadway bicycle marking (sharrow) should be provided to encourage cyclists to use the full travel lane, thereby reducing conflicts with vehicles entering traffic from cross streets, driveways, and parking spaces. See the design guidelines for arterial bicycle routes (Class 3A).

- *Signage*: Bicycle lanes require the following regulatory signage. R81 (Bike Lane) signs shall be placed at the beginning of each bicycle lane and at all major directional changes. The signs should be placed at every arterial street and at one-half mile intervals along each bike lane. The R81A (Begin) and R81B (End) supplemental signs are recommended, respectively, in conjunction with the R81 at the beginning and end of the bicycle lane. See also the explanation of guide signage below. *Oakland Practice*: Always use the R81B to alert road users where bicycle lanes end.

- *Stencils*: The bicycle symbol and arrow stencil shall be placed in the bicycle lane on the far side of each intersection. *Oakland Practice*: Oakland uses the bicycle symbol rather than the "bike lane" stencil because the symbol is more intuitive and does not require familiarity with the English words. *Oakland Practice*: Encourage cyclists to ride outside of the door zone by locating the bicycle symbol to the left side of the bicycle lane (leaving 4" from the symbol edge to bicycle lane stripe). *Oakland Practice*: To minimize maintenance, locate the bicycle symbol and arrow stencil approximately 15' beyond the curb return of the intersection and thereby outside the path of turning vehicles.

- *Intersection Approaches*: Bicycle lanes should be continuous from one intersection to the next. In some cases, it is necessary to drop the bicycle lane at an intersection approach in order to accommodate additional travel lanes for motor vehicle queuing. To the extent feasible, this design should be avoided in favor of continuous bikeways.

Bicycle Routes (Class 3) are preferred streets for bicycle travel using lanes shared with motor vehicles. The only requirement for bicycle routes is that they be marked with guide signs. However, the Highway Design Manual (1000-24) specifies that "bike routes should offer a higher degree of service than alternative streets" and that service may be achieved through traffic control devices that prioritize bicyclists, higher maintenance standards, and the like. *Oakland Practice*: Maintain a strong presumption in favor of bicycle routes with additional improvements following the guidelines for arterial bicycle routes (Class 3A) and bicycle boulevards (Class 3B). In general, limit the use of signage-only bicycle routes (Class 3) to recreational routes in the Oakland Hills above Mountain Blvd. For these recreational routes, include shoulder improvements where feasible.

Bicycle Routes – Arterials (Class 3A): Arterial bicycle routes are a compromise treatment for arterial and collector streets where the available street width does not allow for bicycle lanes and parallel streets do not provide viable alternatives. This bikeway type should only be used in cases where bicycle lanes are infeasible for the foreseeable future. While this bikeway type is not specifically identified by the Highway Design Manual, the following design guidelines meet Caltrans standards.

- *Width*: On multi-lane roadways, the lane striping should maximize the width of the outside lane that will be shared by bicyclists and drivers. A 14' travel lane adjoining a 7' parking lane is acceptable while a 15' lane is desirable. Narrower shared lane facilities are acceptable only if no other alternative exists. A bicycle lane should be used where the outside lane (with parking prohibited) is 15' or more. If parallel parking is permitted, a bicycle lane should be used where the outside lane is 16' or more (plus a minimum of 7' for the parking lane).

- *Stencils*: The shared roadway bicycle marking (sharrow) consists of a bicycle symbol and two chevrons. It should be used on designated bikeways with parallel parking and without bicycle lanes. The stencil guides bicyclists to ride outside of the door zone and alerts drivers to share the lane with bicyclists. *Oakland Practice*: For each direction of travel, place a minimum of two sharrows on a 250-foot block with additional sharrows used on longer blocks. Locate the sharrow at a minimum distance

of 11.5' from the curb. A travel lane plus parallel parking of less than 21' in width is too narrow for a bicyclist to share side-by-side with a driver and stay clear of the door zone. In such situations, the sharrow should be placed at the center of the travel lane to indicate that bicyclists should take the lane.

- *Signage*: Travel lanes of less than 14' (with parallel parking) and 13' (without parallel parking) do not provide adequate width for a bicyclist to ride clear of the door zone or standard gutter and safely share the lane with passenger cars. In such cases, bicyclists should ride in the center of the travel lane such that drivers pass in the adjoining lane or wait for the cyclist to clear the bottleneck. To facilitate these interactions, such roadway conditions may be accompanied with a regulatory sign that reads "Bicyclists May Use Full Lane." This sign is explained below under "Nonstandard Treatments."

- *Speed Limits*: To safely accommodate bicyclists, the recommended speed limit on arterial bicycle routes is 25mph. Section 627 of the California Vehicle Code allows bicyclist safety to be used as a factor in establishing speed limits. *Oakland Practice*: Consider the safety of bicyclists when setting speed limits on arterial bicycle routes.

Bicycle Routes – Boulevards (Class 3B): Bicycle boulevards are bicycle routes on local streets that prioritize through trips for bicyclists. Proposals for bicycle boulevards should strive to meet the following routing criteria (Berkeley 2000). First, the bicycle boulevard should be within one-quarter mile of an arterial if it is intended to provide an alternative to that arterial. Second, it should provide a continuous routing that connects multiple neighborhoods. And third, it should include as few jogs as possible with main segments of at least one-half mile in length. While this bikeway type is not specifically identified by the Highway Design Manual, the following design guidelines meet Caltrans standards.

- *Stencils*: Like the arterial bicycle routes, use the shared roadway bicycle marking (sharrow) to identify designated bikeways. In addition to promoting lane sharing, the sharrows also provide a significant wayfinding benefit for bicycle routes in neighborhoods with irregular street grids.

- *Intersection Control*: Where feasible, modify stop signs and traffic signals to prioritize bicycle travel and improve bicycle safety along the bicycle boulevard. In particular, minimize the number of intersections where cross traffic does not stop. Such modifications to intersection control shall be contingent on an engineering analysis of operations and safety.

- *Traffic Calming*: Consider bicycle-friendly speed humps, traffic circles, and partial street closures on bicycle boulevards with speeds and/or volumes of motor vehicle traffic that are incompatible with the bicycle route and the character of the residential street.

Additional Guidelines

Bicycle Signals: This traffic control device is used in conjunction with standard traffic signals to provide a separate phase for bicyclists. It uses green, yellow, and red lighted bicycle symbols to direct bicycle traffic. The California MUTCD provides a warrant for these signals based on traffic volumes, collision history, and geometric factors (Section 4C.103). For example, candidate locations may include intersections where a legal bicycle movement is not allowed for motor vehicles (like where a bicycle path crosses a street). In general, a bicycle signal should be considered only if other solutions involving signing, striping, and geometrics do not adequately address the issue (Section 4D.104).

Construction Zones: Bicyclist safety and access shall be considered in the staging of construction zones that encroach on the public right-of-way or require detours. Special consideration should be given to construction zones that affect designated bikeways. Detour plans should avoid directing cyclists onto arterial or collector streets with narrow travel lanes (less than 14') when no other accommodation is provided. For bicycle paths, consider a temporary path or an on-street detour. For on-street bikeways, temporary bicycle lanes may be delineated by cones so long as the clear width is at least 5'. If a bicycle lane is closed, additional signage should be considered including the "Bicycles May Use Full Lane" sign described below.

Curbside Parking – Diagonal Parking: The common form of diagonal parking (head-in/back-out) is incompatible with bicycle lanes and a general source of conflict with bicyclists. When backing out, drivers have limited views of oncoming traffic and bicyclists riding on the right side of the travel lane have little time to react. *Oakland Practice*: Avoid head-in/back-out diagonal parking adjacent to bicycle lanes and minimize its use on designated bikeways. See also "Diagonal Parking" under "Other Treatments."

Curbside Parking – Parallel Parking: Parking space markings (often called parking T's) are typically used to delineate curbside parallel parking spaces in areas with parking meters or consolidated pay stations. *Oakland Practice*: Oakland's standard parking T is 2' (parallel to the curb) by 3' (perpendicular to the curb). On designated bikeways with metered parking, use elongated parking T's such that the perpendicular line extends 2' into the travel lane.

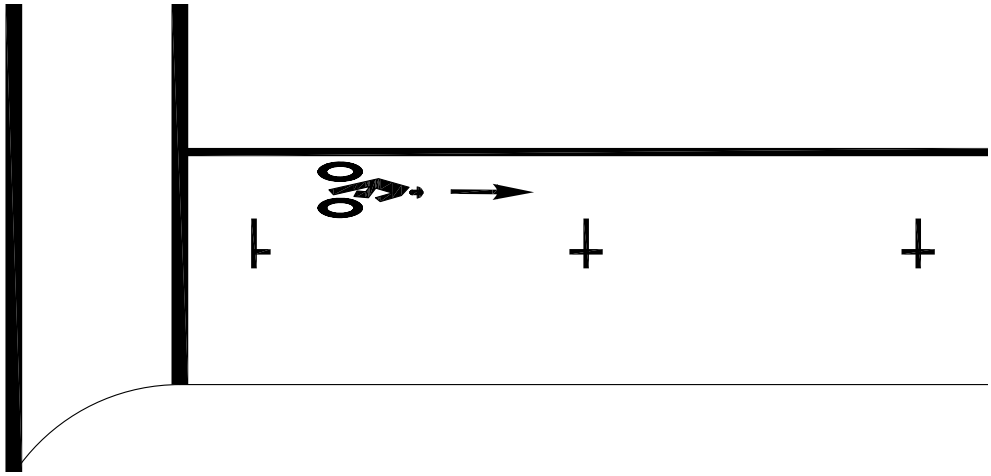

Figure 4.12: *Extended Parking T's.* Parking T's that extend two or more feet into the bicycle lane help mark the door zone. The bicycle symbol and arrow should be placed along the left side of the bicycle lane to encourage good bicyclist positioning. By placing the bicycle symbol away from the curb return, the symbol will require less maintenance because it is out of the path of turning vehicles.

These design considerations help cyclists identify and ride clear of the door zone (Figure 4.12).

Guide Signage: To date, Oakland has used a combination of "Bike Route" signs (D11-1) and "Bicycle Route Number Marker" signs (SG45) to designate bikeways and provide wayfinding information. There are various strengths and weaknesses to this approach regarding maintenance, general visibility, and the information provided by the signs. Because of these outstanding issues, there was a lack of agreement at the time of this planning process on how best to provide guide signage with future projects. Thus the plan does not include new recommendations regarding guide signage. This topic is discussed in detail in Section 3.3. In general, all guide signage should comply with MUTCD standards regarding placement, size, symbols, colors, and fonts.

Railroad Crossings: Bicyclist safety at railroad crossings involves the pavement surface, flangeway gap, and crossing angle. The pavement should be level with the top of the rails and concrete pads are the preferred crossing material because of their longevity. The gap between the flangeway and the roadway should be as narrow as possible to provide a smooth travel surface and to reduce instances where a bicycle wheel gets caught by the gap. Where railroad tracks cross bikeways at skewed angles, the bikeway should be designed to allow and encourage bicyclists to cross at a right angle to the rails. (See Figure 1003.6A in the Caltrans Highway Design Manual.) For Oakland examples, see the Embarcadero Bikeway between 5th Ave and 16th Ave that has multiple sets of railroad crossings where the bicycle lane striping encourages right angle crossings. Where bicycle paths parallel

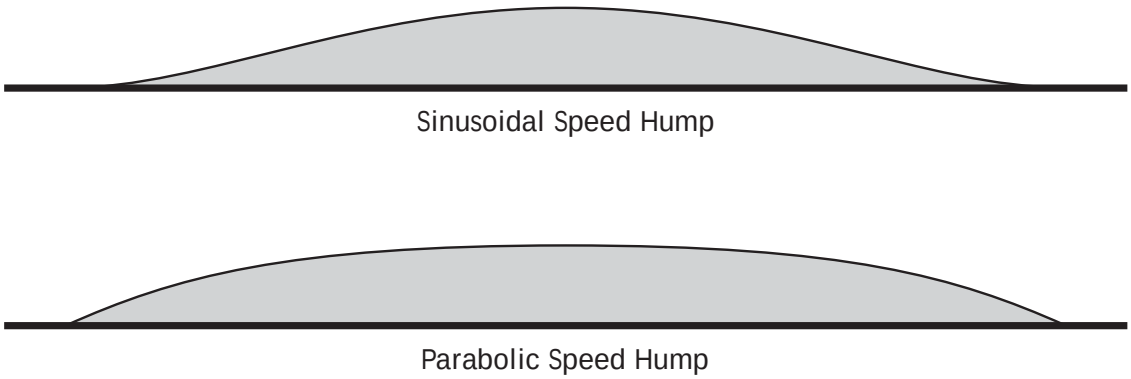

Figure 4.13: *Speed Hump Profiles.* Sinusoidal speed humps provide a smoother ride for bicyclists by eliminating the abrupt lip associated with parabolic speed humps. Both profiles are effective for reducing motor vehicle speeds. (Illustration by Wilbur Smith Associates.)

active railroad lines, fencing and buffering should be included between the path and the rails to improve the safety and comfort of path users.

Speed Humps: Speed humps on bikeways should be designed to slow motor vehicles while minimizing the disruption to bicyclists. Bicyclists feel the lip of the hump—the edge of the paving where the hump meets the street—as an abrupt jolt. The height of the hump has comparatively little impact because of the typical speed of bicyclists on residential streets. While drivers feel the height of the hump, they do not feel the abrupt lip because of the cars' greater shock absorbency. Bicycle-friendly speed humps eliminate this lip by providing a smooth transition from street to hump and thus provide a smooth ride. Such humps still have the intended effect of slowing motor vehicles because the height of the hump remains the same. More specifically, bicycle-friendly speed humps have a sinusoidal profile whereas the abrupt lip is created by speed humps with parabolic profiles (Figure 4.13). While sinusoidal speed humps are more difficult to install, the installation of speed humps on bikeways should seek to minimize this lip by providing a smooth pavement transition (Transport Research Laboratory nd).

Traffic Signals: Where feasible, traffic signals should accommodate bicyclists by providing (a) bicycle actuation (with loop detectors or video detection); and (b) an adequate clearance interval for cyclists to clear intersections. The MUTCD explains, "On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists" (Federal Highway Administration 2004, 9D.02). Signals on existing bikeways should be prioritized for these modifications. In Oakland, video detection is used with all new signals and to replace failed loop detectors. The installation of video detection may require other signal modifications to meet industry and City of Oakland standards. Where bicycle-sensitive loop detectors remain in use, they should be accompanied by the bicycle detector

pavement marking for each intersection approach as illustrated in the California MUTCD (Figure 9C-7). For multi-lane approaches like double left turn lanes, the right-most lane should be marked to encourage proper bicyclist positioning. The following sources provide methods for calculating adequate clearance intervals for bicyclists:

- American Association of State Highway and Transportation Officials. 1999. *Guide for the Development of Bicycle Facilities*, pp. 64-65.
- Wachtel, Alan, John Forester, and David Pelz. 1995 (March). Signal Clearance Timing for Bicyclists. *ITE Journal*, pp. 38-45.

The implementation of all traffic signal modifications is contingent on need, priority, feasibility, and funding as determined by the Transportation Services Division.

Transit Streets: Coordinate the installation of bikeways on transit streets with signage and striping modifications that would improve bus operations. In particular, work with AC Transit to identify bus stops that would benefit from additional red zone length or stop relocation (especially the conversion of near-side to far-side stops). Integrate these changes with the design of the bikeways to develop more holistic projects for improving bicycle/bus corridors.

Other Treatments

The following treatments have not been specifically approved as traffic control devices. Some of these treatments are currently under consideration for approval and others may be appropriate in particular circumstances based on engineering judgment. All of the treatments are being used successfully in other US cities. In particular, the MUTCD explains, "Regulatory word message signs other than those classified and specified in this Manual and the 'Standard Highways Sign' book may be developed to aid the enforcement of other laws or regulations. Except for symbols on regulatory signs, minor modifications in the design may be permitted provided that the essential appearance characteristics are met" (Federal Highway Administration 2004, 2B.54). As with all proposed roadway modifications, implementation of the following treatments is subject to the evaluation and determination of the Transportation Services Division on a case-by-case basis.

"Bicycles May Use Full Lane" Signs: The California Vehicle Code 21202 allows bicyclists to ride in the center of a travel lane when that lane is too narrow to safely share with passing motor vehicles. The proposed "Bicycles May Use Full Lane" Sign (R4-11) is intended to alert road users to this law and encourage bicyclists to ride outside of the door zone on

Figure 4.14: *"Bicycles May Use Full Lane" Sign.*

streets with narrow lanes (Figure 4.14). As of this writing, the sign is under consideration by the National Committee on Uniform Traffic Control Devices.[3] Consider using this sign at regular intervals on arterial bicycle routes (Class 3A) where the curb lane plus parking is less than 21' in width. This signage should only be used on bikeway segments where the curb-to-curb right-of-way cannot accommodate a bicycle lane or an outer travel lane of at least 14' in width. Narrow travel lanes generally provide poor bicyclist accommodation and the proposed bikeway network was developed to minimize the instances of narrow lanes to be shared by bicyclists and drivers. On the proposed network, the segments of arterial bicycle routes with narrow lanes provide key connections and could include this sign, in conjunction with the shared roadway bicycle marking (sharrow), to improve bicyclist safety.

Bike Boxes (Advance Stop Lines): This treatment may be used to improve the visibility and positioning of bicyclists at signalized intersections with heavy turning movements. It uses an advance stop line to create a "box" between the crosswalk and where motor vehicles stop at a red traffic signal. During the red phase, bicyclists are allowed to proceed to the head of the queue and position themselves in the bike box for their desired movement through the intersection. During the green phase, bicyclists use the standard lanes that correspond to their respective movements. Bike boxes may be marked with bicycle stencils, color pavement, and/or regulatory signage indicating that drivers must stop behind the advance stop line while bicyclists may stop in the bike box (Ridgeway and Nabti 2002; San Francisco 2003).

Blue Bike Lanes: This treatment marks the conflict area created by turning vehicles merging across a bicycle lane (typically associated with slip turns, on-ramps, and off-ramps).

[3] `http://members.cox.net/ncutcdbtc/fall05/bike01-bmufl.pdf`

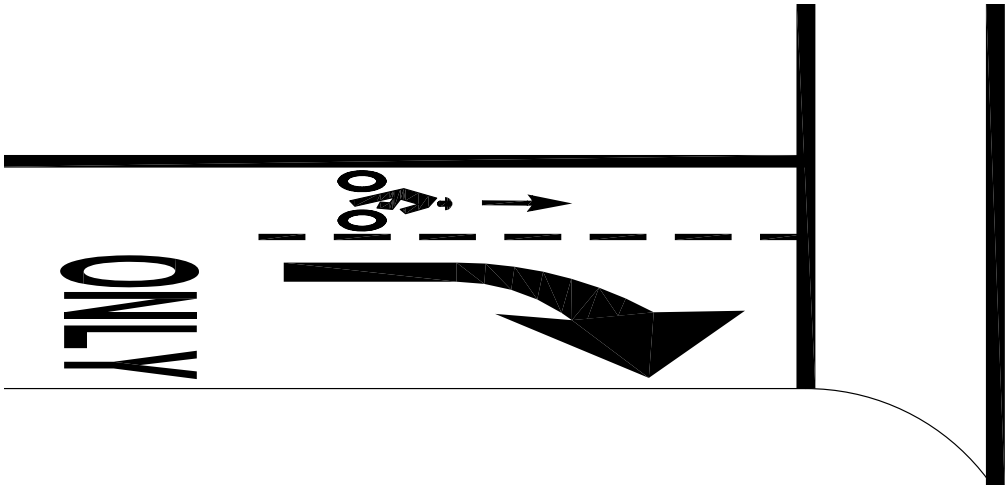

Figure 4.15: *Combined Bicycle Lane/Right-Turn Lane.* This design applies to intersection approaches where a dedicated right turn lane is deemed necessary and there is not adequate right-of-way to continue the bicycle lane along the left side of the right turn lane.

Such turning movements create difficult situations for bicyclists because of the high vehicle speeds and poor visibility associated with these merges. By making the bicycle lane blue in such locations, bicyclists and drivers are alerted to the specific conflict area. This treatment is used successfully in Portland, OR based on its more extensive use in European cities (Hunter 2000b; Portland 1999).

Combined Bicycle Lane/Right-Turn Lanes: This design applies to intersection approaches where a dedicated right turn lane is deemed necessary and there is not adequate right-of-way to continue the bicycle lane along the left side of the right turn lane (Figure 4.15). In such cases, the bicycle lane often ends before the intersection to accommodate the turn lane. This approach creates difficult situations for cyclists who must either merge left into the adjoining travel lane or proceed straight through the turn lane and thus violate the law. In contrast, the combined bicycle lane/right-turn lane allows bicyclists to legally proceed straight by delineating these overlapping movements with specific striping and signage (Hunter 2000a; San Francisco 2003).

Diagonal Parking (back-in/head-out): As described under "Additional Guidelines" above, the common form of diagonal parking (head-in/back-out) is incompatible with bicycle lanes and a general source of conflict on bikeways. A number of cities have installed back-in/head-out diagonal parking to eliminate these conflicts (Nelson Nygaard Consulting Associates 2005). Drivers pulling out of such parking spaces can readily see oncoming traffic and make eye contact with approaching bicyclists. The installation of back-in/head-out diagonal parking in Oakland may require a modification to the Oakland Municipal Code 10.28.060 which restricts back-in parking for loading and unloading.

5. Parking and Support Facilities

The bicycle is a viable means of transportation when physical accommodations ensure that people's trips are safe and convenient and that their property is secure (Figure 5.1). Every bicycle trip includes the route of travel and the facilities at the destination. These facilities include various types of bicycle parking as well as restrooms, showers, and lockers. Bicycle parking is critical because many people's decision to bicycle is affected by security concerns for their property. Shower and locker facilities are a key incentive for people with longer commutes who can turn their ride into a daily workout and still dress for the office.

Figure 5.1: *Fruitvale Bike Station* at the Fruitvale Transit Village.

5.1 Facility Types

There are three main types of bicycle parking and support facilities that serve a variety of cyclists and trip types.

Long-term Bicycle Parking (Class 1 Parking) serves people who frequently leave their bicycles at the same location for the day or overnight. Examples include commuters parking their bicycles at work, school, or transit and residents parking their bicycles at home. These facilities should provide superior security and protection from the weather. Long-term bicycle parking includes the following (Figure 5.2):

- *Bicycle lockers* are enclosed storage units that each store one bicycle. Traditionally, these lockers have been assigned to individual users who have a personal locker with a dedicated key. Recently, lockers are being designed for electronic access cards (or access via cell phone) such that multiple users—one after the next—can each access an available locker.

- *Bicycle cages* are secure rooms of bicycle racks where access is limited to authorized individuals. Bicycle cages are commonly located in parking garages or on school grounds.

Figure 5.2: *Long-term Bicycle Parking* includes bicycle lockers (left) and bicycle cages (right). These bicycle lockers are at 14th St and Broadway and the bicycle cage is in the parking garage of 250 Frank Ogawa Plaza.

- *Bicycle stations* provide attendants who check in bicycles and store them in secure facilities. Stations are often integrated with retail concessions offering bicycle supplies and repair services. Some bike stations are open outside of the attendants' work hours to registered members with electronic access cards.

Short-term Bicycle Parking (Class 2 Parking) serves people who leave their bicycles for relatively short periods of time, typically for shopping, recreation, eating, or errands. The parking must be conveniently located at the destination to effectively serve these short trips. Short-term bicycle parking includes the following (Figure 5.3):

- *Bicycle racks* allow cyclists to securely lock their frames and wheels to a fixed object. The racks are secured to the ground and should be located in visible areas with significant foot traffic. Racks are most often found in commercial districts and at particular destinations like civic buildings, parks, and transit facilities.

- *Valet bicycle parking* works like a temporary bike station to provide added parking capacity at major events like street fairs, festivals, and sports games. People check their bicycles with an attendant who then stores the bicycles in a temporary corral.

Support Facilities include showers, lockers, and restrooms for changing clothes and storing belongings. Showers are important for those who must dress in more formal attire or who have a more rigorous commute. Lockers provide a place for cyclists to store clothing and accessories during the workday.

5.2 Existing and Proposed Facilities

The installation of new bicycle parking by the City of Oakland should be prioritized: (1) at transit stations and major activity centers; and (2) in response to public requests. Figure

Figure 5.3: *Short-term Bicycle Parking* includes bicycle racks (left) and valet bicycle parking (right). This valet parking was at Oakland's Bike to Work Day on Frank Ogawa Plaza.

5.4 summarizes existing bicycle parking at transportation hubs. Bicycle parking should also be included in all public infrastructure improvements including streetscape projects and new buildings. In particular, secure bicycle parking at transit stations is a key strategy for promoting both cycling and transit use. Because bicycle parking is space efficient and cost effective, it is integral to Oakland's emphasis on transit-oriented development.

Long-term Bicycle Parking (Class 1 Parking)

Bicycle lockers are currently located at Oakland BART Stations and the Caltrans Fruitvale/Champion Park & Ride Lot. The City of Oakland installed electronic lockers on Broadway at 14th St and 20th St to serve the 12th and 19th St BART stations. As of this writing, BART has a pending project to install electronic lockers at Lake Merritt BART (32 lockers), MacArthur BART (32 lockers), Rockridge BART (32 lockers), and West Oakland (6 lockers).

Bicycle cages are available to employees in some of the larger office buildings in downtown. Examples include 250 Frank Ogawa Plaza (City of Oakland), 300 Lakeside Dr (BART), and 1111 Franklin St (University of California). A bicycle cage is also planned for Roosevelt Middle School (Oakland Unified School District). Bicycle cages are the primary means for new development to meet the long-term parking requirements described in the following section. A publicly accessible bicycle cage may be needed to meet growing demand for bicycle parking at the 19th St BART Station.

Bicycle stations are currently in operation in the Bay Area at Fruitvale BART, Berkeley BART, Embarcadero BART, and the Palo Alto Caltrain Station. The most likely locations in Oakland for additional bicycle stations are MacArthur BART and 19th St BART. Such a facility could be coordinated with a major development project. A publicly accessible

bicycle cage may be a cost-effective alternative for increasing long-term bicycle parking at these stations.

Short-term Bicycle Parking (Class 2 Parking)

Bicycle racks (public): Since 1999, the City of Oakland has installed 900 racks through the CityRacks bicycle parking program. These racks—accommodating over 2,000 bicycles—are located on sidewalks as well as at parks, libraries, and other public facilities. Racks are installed based on citizen and merchant requests and, in most cases, have the approval of the adjacent property owner. The racks are installed free of charge and have been funded by the Transportation Fund for Clean Air, Measure B, and Transportation Development Act Article 3.

Bicycle racks (private): The City of Oakland encourages property owners to install bicycle racks in accordance with the design guidelines provided in Section 5.4. Bicycle racks on private property are especially needed at supermarkets and other stores where parking lots are located between building entrances and the sidewalk. Businesses may also install bicycle racks in the public right-of-way subject to a minor encroachment fee ($35) and City approval of the rack specifications and location.

Valet bicycle parking: The East Bay Bicycle Coalition regularly provides valet bicycle parking at Oakland events including PortFest, Bike to Work Day, and Dia de Los Muertos. The service is free to event attendees. The parking should be located in a visible and convenient location with sufficient space for the anticipated demand. All marketing materials should promote the service and also indicate its location at the event.

Additional information on bicycling parking at BART stations is available from the BART planning documents that are listed in Section C.4. As of this writing, AC Transit is preparing a bicycle parking plan to prioritize locations and facility types for the installation of bicycle parking at transit centers and along major bus lines.

Support Facilities

Map H.5 on page 206 shows the location of bicycle parking and support facilities. Existing shower facilities are located in City Center Plaza, Elihu Harris State Building, and the Dalziel Building.

Transportation Hub	Rack Spaces	Locker Spaces	Bike Station Spaces
Amtrak -- Jack London Square	10	0	0
Amtrak -- Coliseum	6	0	0
BART -- 12th St (1)	26	8	0
BART -- 19th St (1)	24	8	0
BART -- Coliseum	63	2	0
BART -- Fruitvale	56	40	236
BART -- Lake Merritt	21	52	0
BART -- MacArthur	84	30	0
BART -- Rockridge	133	56	0
BART -- West Oakland	91	8	0
Caltrans Park & Ride -- Fruitvale/Champion	4	10	0
Caltrans Park & Ride -- 7th/Linden	0	0	0
Eastmont Transit Center	0	0	0
Oakland/Alameda Ferry	4	0	0

Figure 5.4: *Existing Bicycle Parking at Transportation Hubs.* (1) The bicycle parking at the 12th and 19th St BART stations is located at street level in the City of Oakland's right-of-way.

5.3 Bicycle Parking Ordinance

As part of the City of Oakland's plan review process conducted by the Planning & Zoning Division, developers are required to provide an adequate amount of automobile parking to accommodate proposed development projects. Many cities have also incorporated requirements into their planning codes to ensure that adequate bicycle parking is provided. The 1999 *Bicycle Master Plan* included a draft ordinance that was never adopted. This draft is being revised based on a comparison with the parking requirements of similar cities. The draft ordinance is considering requirements that, based on a development's size and use, may include short-term bicycle parking, long-term bicycle parking, and shower/locker facilities. The adoption of a bicycle parking ordinance would require action by the Planning Commission and the City Council.

5.4 Parking Design Guidelines

The following guidelines summarize the City of Oakland's "Bicycle Parking Placement Guidelines" (October 2004), the recommendations of the Association of Pedestrian and Bicycle Professionals' "Bicycle Parking Guidelines" (2002), and the City of Oakland's "Event Bike Parking Requirements, Guidelines, and Resources."

Bicycle Racks (Class 2 Parking) should be located within 50 feet (and no more than 120 feet) of the destination they serve. They should be placed in a visible area with significant foot traffic and, if possible, under an awning to provide protection from the weather. Such an awning is generally not possible with sidewalk installations.

Measurements
Footprint: 6' long x 2.5' wide (the area occupied by a bicycle when parked at the rack)
Rack: 36" tall x 21" wide

Location Details
- Commercial District
- On public property
- On a flat concrete sidewalk
- Sidewalk must be free from cracks or other damage

Clearance
There should be a minimum of 5.5' clear for pedestrian right-of-way outside of the footprint; 7' in areas of heavy pedestrian traffic. Rack should be located a minimum of:

5' from:	Fire Hydrant		
4' from:	AC Transit Red Zone	Blue Zone (disabled parking)	Crosswalk
	Loading Zone	Curb Ramps	BART Entrance
3' from:	Newspaper Racks	Bus Shelter	Standpipes
	US Mailbox	Driveway	Bus Benches
	Light Pole	Surface Hardware (utilities)	Trash Cans
	Sign Pole	Street Furniture	Other sidewalk obsructions
18" from:	The Curb		

Figure 5.5: *Placement Standards for Bicycle Racks.* (Based on City of Oakland, Public Works Agency, Bicycle Parking Guidelines, October 2004.)

- *Rack Type*: Inverted "U" racks are strongly recommended because they provide two points of contact with the bicycle and allow the frame and both wheels to be locked to the rack. Inverted "U" racks may include multiple loops fastened to a single "footer." This design is required for racks mounted on a surface other than concrete (including asphalt, brick, and pavers). Racks that only support one wheel (including comb, toast, and school-yard types) are not acceptable. Wave racks are strongly discouraged because they do not provide two points of contact and the middle spaces can be difficult to access. Any non-standard rack or installation shall be approved by the City of Oakland's Bicycle and Pedestrian Coordinator prior to installation.

- *Rack Clearance*: Racks should be located with at least 30" of clearance in all directions from all vertical obstructions, including other racks and landscaping. Additional spacing requirements mandating 3' to 5' of clearance are specified in the "Bicycle Parking Placement Guidelines" (Figure 5.5).

- *Pedestrian Right-of-way*: When parked at a rack, a bicycle occupies a footprint that is 6' long and 2.5' wide. Rack installations on sidewalks should maintain a minimum of 5.5' of unobstructed pedestrian right-of-way outside of this footprint. For sidewalks with heavy pedestrian traffic, at least 7' of unobstructed right-of-way is required.

Bicycle Lockers (Class 1 Parking) should also be located in convenient and visible locations. Compared to racks, lockers provide superior security but require additional space.

- *Locker Type*: All bicycle lockers located in the public right-of-way shall be multi-user electronic lockers. Lockers in the public right-of-way shall not be leased to individuals for their exclusive use.

- *Locker Clearance*: A single wedge-shaped locker is approximately 6.5' long and 3' wide. Lockers may be stacked against each other to form rectangular blocks, semi-circles, or full circles. For example, two lockers may be stacked to form a rectangle of 6.5' in length and 3' in width. Additional clearance is needed to accommodate the doors (of approximately 2.5' in width) that are hinged to swing outwards.

- *Pedestrian Right-of-way*: Locker locations should be selected on a case-by-case basis because of the multiple possible configurations, the necessary clearance for their doors, and potential sight line issues created by the lockers' massing. As a rule of thumb, sidewalk installations should maintain a minimum 7.5' of unobstructed pedestrian right-of-way from the face of locker doors. When the 2.5' door is entirely open, this spacing would allow 5' of clearance for pedestrian circulation and room to maneuver a bicycle into the locker.

Bicycle Cages (Class 1 Parking) are most appropriate in parking garages and on school grounds. They should be located near entrances in visible locations, especially when included in parking garages.

- *Cage Size*: For security purposes, small cages are preferred to limit the number of people with access to any single cage. Multiple small cages should be considered for high-demand locations. For example, a single cage of 18' x 20' occupies the same footprint as two standard parking stalls (of 9' x 20' each) (American Association of State Highway and Transportation Officials 2004, p. 371). Such a cage can accommodate a center aisle between two rows of seven "U" racks each. Assuming two bicycles per rack, such a cage can accommodate up to 28 bicycles in the same footprint at two cars.

- *Rack Clearance*: Within a cage, "U" racks should be spaced 2.5' from each other and the walls of the cage. The center aisle should allow a minimum 4' of unobstructed space between the facing rows of parked bicycles while a 5' aisle is recommended. These specifications are consistent with the 18' x 20' cage described above that includes 14 "U" racks.

Valet Bicycle Parking (Class 2 Parking) shall be provided at all special events held in Oakland between April 1 and October 31 with an expected attendance of 5,000 or

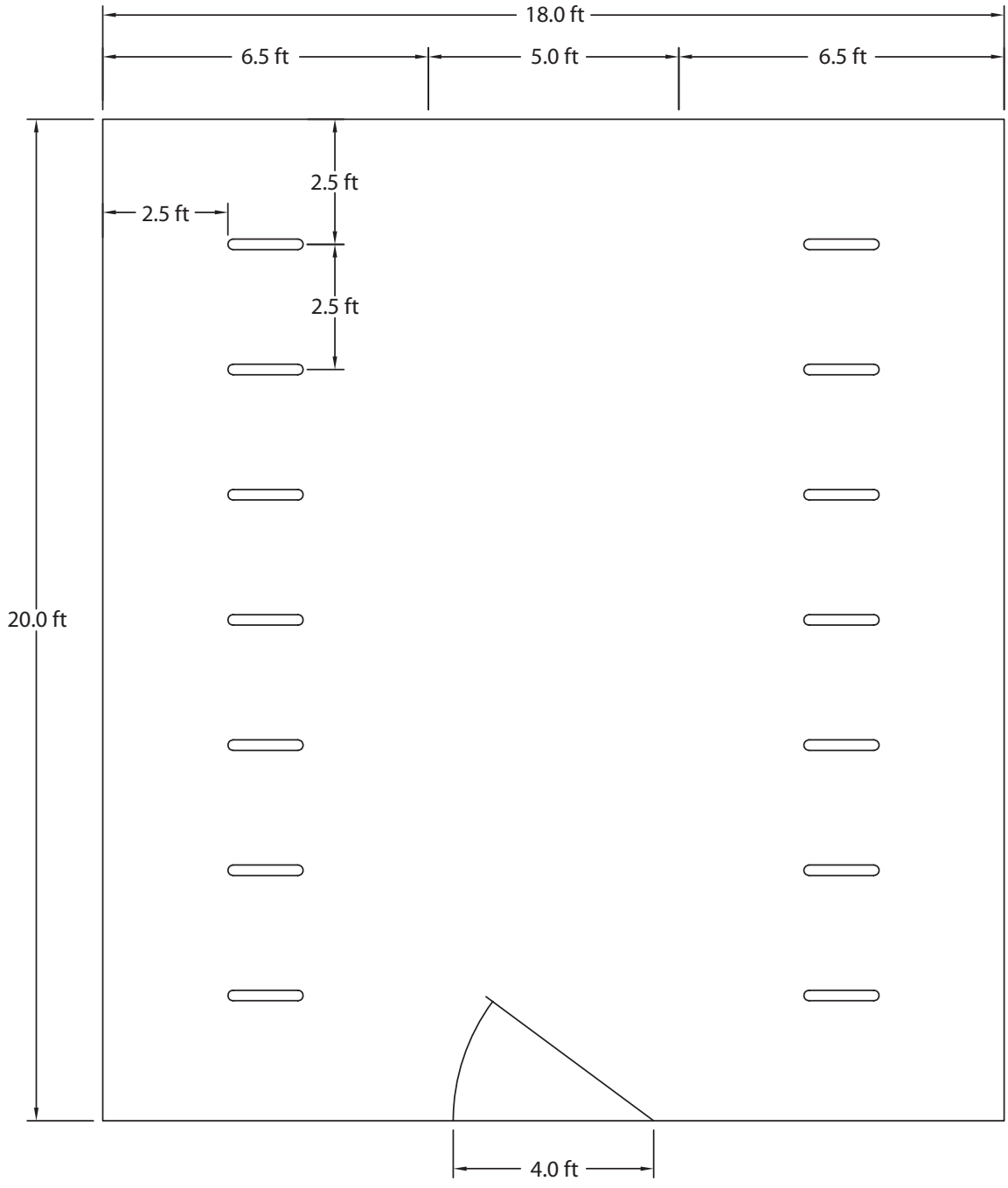

Figure 5.6: *Bicycle Cage for 28 Bicycles (18' x 20').* This bicycle cage occupies the same footprint as two standard parking spaces of 9' x 20' each.

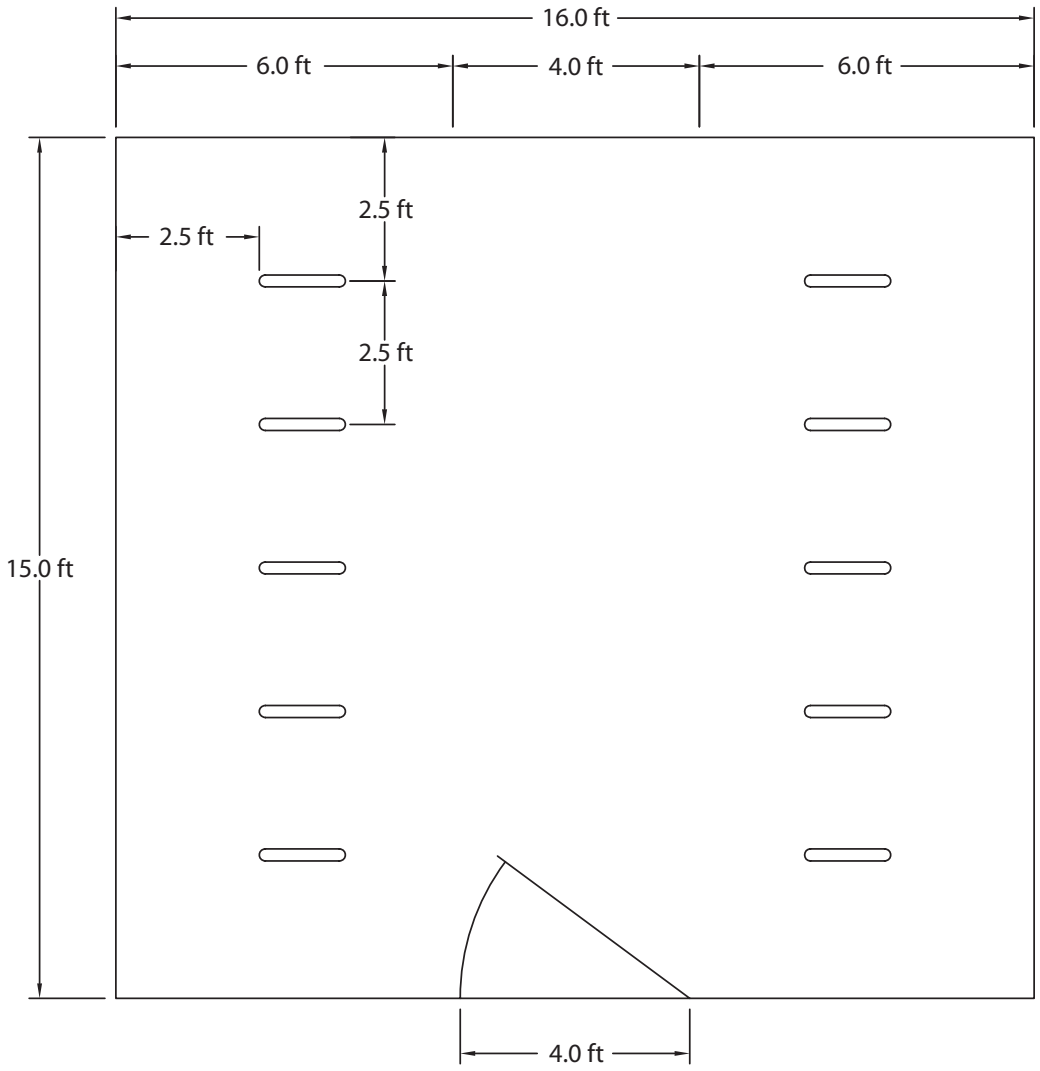

Figure 5.7: *Bicycle Cage for 20 Bicycles (16' x 15').* This bicycle cage occupies the same footprint as two compact parking spaces of 8' x 15' each.

more people. As a general guideline, bicycle parking spaces should be provided for 1% of the expected attendees and each bicycle requires nine square feet of storage space. For example, an event expecting 10,000 attendees should plan for 100 bicycles by allocating 900 square feet of storage space. The service provider for each event should track the number of bicycles parked and this documentation will be used by the event organizer to plan for the following year's event. The storage corral should be enclosed and secure on three sides with tables on the fourth side to allow bicycles to be checked in and out. It should be located in a visible and easily accessible location, preferably at the event's entrance gate and no more than one block from the event. The valet parkers will monitor and handle the bicycles, using claim checks to match patrons and their bicycles. The service must be provided throughout the event's hours of operation.

6. Implementation

Achieving the goals of the *Bicycle Master Plan* requires the careful coordination of staff time with available funding and public input. This chapter identifies priority projects and programs—those bicycle facilities and outreach efforts that are likely feasible and most capable of providing the greatest community benefit. This implementation plan is a critical component of the overall planning effort. It helps ensure a consensus-based approach to project development that involves the bicycling community, the general public, elected officials, city staff, partner organizations, and funding agencies. Additionally, the implementation plan serves as a measure of Oakland's progress on achieving these goals through the completion of particular projects with each passing year.

6.1 Priority Bikeway Projects

All segments of the proposed bikeway network are designated as either primary bikeways or secondary bikeways. This distinction is a prioritization tool—from the perspective of the overall bikeway network—to specify the relative importance of various bikeway connections. It is analogous to the distinctions between arterial/collector roadways and trunk/local bus lines. The primary bikeway network provides basic connectivity throughout Oakland and includes only those segments that passed the citywide feasibility analysis (as described in Section 4.2). The secondary bikeway network provides additional connections at a finer level of detail, decreasing the distance between the bikeways on the primary network. The secondary network also includes a small number of segments that, based on the planning level analysis, were determined to be infeasible at this time. While an effort was made to minimize the number of such segments, some were retained because they provide critical connections that should be considered in the long term. A map of the "Primary Bikeways" is on page 207.

Priority projects give direction to staff in using discretionary resources and pursuing grant funding. As explained below, the priorities have an element of flexibility for responding to the coordination of bikeways with other projects and the changing nature of bikeway gaps as projects are completed. To develop priorities, the proposed bikeway network was divided into projects of approximately one-half mile to two miles in length. These projects were then awarded points based on the following criteria, creating a ranking system of zero to ten for all proposed bikeways. The priority bikeways are listed in Figures 6.1 to 6.3. The

Project	From	To	Segments	Miles	Class
104th/105th/106th Aves	Stanley Ave	Edes Ave	195, 197, 639, 193, 194, 751, 758	2.14	2, 3A
14th St	Wood St	Brush St	424, 425	0.75	2
16th Ave	E 21st St	Embarcadero	695, 677, 749	0.79	2, 3B
20th St	San Pablo Ave	Harrison St	628, 427, 426, 344	0.55	2, 3A
2nd St	Brush St	Oak St	28, 29	0.99	3A
38th Ave	MacArthur Blvd	E 12th St	433, 432, 621, 620, 619	1.76	2, 3A
4th/5th Aves	E 18th St	Embarcadero	336, 338, 757	0.87	2, 3B
53rd St/55th St/Cavour St	Emeryville border	Shafter Ave	655, 624, 623, 690, 691	1.58	2, 3B
Camden/Havenscourt (1)	MacArthur Blvd	International Blvd	105, 108	1.32	2
College Ave	Alcatraz Ave	Broadway	374, 51, 612, 692, 52	2.38	3A
E 12th St (1)	Fruitvale Ave	40th Ave	409	0.50	3A
E 7th St	Kennedy St	Fruitvale Ave	663, 33	0.55	2, 3B
Foothill Blvd	23rd Ave	Fremont Wy	237, 241, 242, 657	1.45	3A
Fruitvale Ave	MacArthur Blvd	Foothill Blvd	82	1.20	3A
Hollis St/32nd St/San Pablo	Emeryville border	16th St	101, 104, 674, 2, 3, 675, 659, 660	2.88	3A, 3B
MacArthur Blvd	35th Ave	High St	269	0.55	3A
Market St (1)	Berkeley border	Adeline St	128, 688, 127	0.44	3A
Mountain Blvd	Lake Temescal Path	Park Blvd	299, 302, 747, 748, 641, 308	1.92	3A, 3B
San Leandro St (1)	66th Ave	85th Ave	164, 165	0.93	2
Telegraph Ave (2)	20th St	Broadway	282, 283, 597	0.28	3A
Webster/Shafter/Forest/Colby	Berkeley border	29th St	202, 203, 204, 205, 206, 207, 385, 755	2.99	3B

Figure 6.1: *Priority Projects – Signing and Striping Projects.* (1) Under development; (2) Construction pending.

Project	From	To	Segments	Miles	Class
12th St Reconstruction (2)	Lakeside Dr	Foothill Blvd	693, 694	0.56	2
14th St	Brush St	Lakeside Dr	617, 618	0.96	2, 3A
40th St (1)	Emeryville border	Telegraph Ave	434, 729	0.77	2
Bancroft Ave (2)	66th Ave	82nd Ave	244, 115	1.36	2
Broadway (1)	Keith Ave	MacArthur Blvd	470, 471, 472, 473,	1.89	2
E 12th St (1)	1st Ave	Fruitvale Ave	157, 158, 496, 173, 408, 156	2.29	2
Fruitvale Ave	Foothill Blvd	E 12th St	83, 84	0.55	2
Lakeshore Ave (2)	MacArthur Blvd	E 12th St	538, 367, 368, 539, 369, 253, 418	1.13	2
MacArthur Blvd (1)	Park Blvd	Lincoln Ave	550, 551, 552, 553, 266, 744, 745, 754, 759	1.86	2
Madison/Oak/Lakeside Dr	2nd St	Grand Ave	251, 252, 558, 559, 560, 577, 576, 378, 361, 540, 541, 521, 31	2.36	2
Market St (2)	MacArthur Blvd	18th St	130, 562, 131	1.19	2
Telegraph Ave (1) (*)	Aileen St	20th St	280, 281, 596	2.26	2
W Grand Ave	Mandela Pkwy	Market St	318	0.61	2
W MacArthur Blvd (1)	Market St	Broadway	543	0.91	2
Washington/Clay Sts	Telegraph Ave	2nd St	349, 654, 345, 346, 351, 348, 347, 352, 353	1.28	2, 3A
Webster/Franklin couplet (1)	25th St	8th St	604, 627, 603, 602, 509, 638, 508, 673	1.97	2, 3A

Figure 6.2: *Priority Projects – Lane Conversion Projects.* (1) Under development; (2) Construction pending; (*) Telegraph Ave (Aileen St to 20th St) is provisionally designated as part of the Proposed Bikeway Network. The provisional designation will only be lifted, and those segments automatically incorporated into the Proposed Bikeway Network, if further environmental review is performed and appropriate CEQA findings are adopted by the City.

Project	From	To	Segments	Miles	Class
Bay Bridge Connector Paths (1)	Bay Bridge Path	Maritime St / Shellmound St	1, 736, 319, 756	4.14	1
Coliseum BART to Bay Trail Connector Path (1)	San Leandro St	Oakport Rd	738	0.90	1
East Bay Greenway (1)	Fruitvale Ave	San Leandro border	739	4.35	1
Estuary Crossing (*)	Jack London Square	Alameda	43	0.25	1*
Lake Merritt Channel Path (1)	Lake Merritt Path	Waterfront Trail	850, 852, 853, 17	0.55	1
Lake Merritt Path (1)			860, 862, 865	1.83	1
Park Blvd Path	Mountain Blvd	Leimert Blvd	309	0.80	1
Waterfront Trail (1)	Jack London Square	MLK Jr Shoreline	801 to 835	3.39	1

Figure 6.3: *Priority Projects – Bicycle Path Projects.* (1) Under development. (*) The Estuary Crossing project may include a water taxi, improvements to the Posey Tube, and/or some other facility type.

project types—"Signing and Striping Projects," "Lane Conversion Projects," and "Bicycle Path Projects"—are defined in Section 6.3.

1. *Primary Bikeway*: Is the project part of a primary bikeway?
   (a) 2 points: Yes.
   (b) 0 points: No.
2. *Gap Closure*: Does the project connect to existing bikeways (Class 1, 2, 3A, or 3B)?
   (a) 2 points: The project closes a gap between existing bikeways.
   (b) 1 point: The project extends an existing bikeway.
   (c) 0 points: The project does not connect to an existing bikeway.
3. *Safe Routes to Transit*: Does the project create a direct connection to a transit station?
   (a) 2 points: Yes.
   (b) 0 points: No.
4. *Land Use*: Do the surrounding land uses support cycling or include key destinations?
   (a) 2 points: Strongly supportive.
   (b) 1 point: Supportive.
   (c) 0 points: Not supportive.
5. *Feasibility*: From the planning level analysis, how feasible is the project compared to other projects of the same project type (Signing and Striping, Lane Conversion, Bicycle Path)?
   (a) 2 points: Comparatively easy.
   (b) 1 point: Typical.
   (c) 0 points: Comparatively difficult.

These points were awarded based on the following methods and assumptions. The evaluation of "primary bikeway" projects was based on the accompanying map of primary bikeways. Gap closures were determined based on the map of existing bikeways. The evaluation of "Safe Routes to Transit" projects was based on the streets listed in Figure 4.8. The land use points were awarded by a qualitative assessment that considered land

use density and mix, recreational opportunities, and topography. The relative feasibility of projects was determined from the data and fieldwork of the citywide feasibility analysis included in Appendix H.

The priority projects were then checked against the streets and intersections with the greatest number of bicyclist-involved collisions as described in Section 2.5. All of these locations are either included in the priority projects list, addressed by a nearby priority project that provides a preferred routing, or the location already has an existing bikeway.[1]

When pursuing project implementation, city staff will also consider the following factors:

1. *Concurrent Project*: The proposed bikeway would be included, where feasible, as part of a pending street resurfacing, streetscape, reconstruction, or development project.
2. *Gap Closure*: The project rankings will be updated as new bikeways are constructed to reflect the changing nature of key gaps in the bikeway network.
3. *BPAC Review*: Modifications to the bikeway prioritization list shall be reviewed by the Bicycle and Pedestrian Advisory Committee.

In particular, lower priority projects may be implemented sooner if they are bundled with resurfacing projects, other transportation improvements, or major development because of the improved efficiencies in project delivery.

6.2 Priority Parking and Programs

The following priorities offer a holistic approach for promoting safe and convenient bicycling. This prioritization emphasizes (a) the maintenance and expansion of existing programs; and (b) the creation of new programs to meet specific and pressing needs regarding increasing bicycle use, adult education, and improved enforcement.

Bicycle Parking

1. *Short-term Bicycle Parking*: Continue and expand the CityRacks Program to meet the ongoing need for bicycle parking in the downtown, neighborhood commercial districts, at transit stations, and other activity centers. Work proactively to increase the parking supply in response to public requests and the removal of parking meters.

[1] In the case of existing facilities, the concentration of collisions may be explained by the larger number of cyclists using that bikeway when compared to other streets without bikeways. See Section 2.5 for a discussion of bicyclist collisions with respect to cycling rates.

Through outreach and technical assistance, encourage the business community and public agencies to install bicycle racks that serve their buildings.

2. *Long-term Bicycle Parking*: Work with BART, major development proposals, and other stakeholders for the creation of high-capacity public bicycle cages or bicycle stations at Oakland's BART stations. Support BART's efforts to install electronic bicycle lockers at stations throughout Oakland.

3. *Bicycle Parking Ordinance*: Draft an ordinance for consideration by the Planning Commission and City Council that would establish requirements for short-term bicycle parking, long-term bicycle parking, and support facilities in new development.

Education

1. *Youth*: Continue and expand on- and off-road bicycle safety education for youth through the Parks and Recreation Department, Oakland Unified School District, and community-based organizations.

2. *Adults*: Develop an ongoing program of bicycle education classes for adults using the League of American Bicyclists' "Road I" course curriculum.

Encouragement

1. *Bike to Work Day*: Continue and expand Bike to Work Day as Oakland's primary event to promote bicycling.

2. *Youth Encouragement*: Work with stakeholder organizations to develop an event for encouraging youth to bicycle.

3. *Maps*: Continue to update the *Walk Oakland! Map & Guide* to provide current and complete information on bicycling in Oakland. Consider renaming this resource as the *Walk/Bike Oakland! Map & Guide*.

Enforcement

1. *Bicycle Citations*: Lower the fines for bicycle moving violations and thereby encourage police officers to issue bicycle citations.

2. *Bicycle Traffic School*: Develop a diversion program whereby individuals may reduce the penalty of their bicycle citations by completing a course on bicyclist safety.

The City of Oakland should continue to work with and support related programs offered by community-based organizations. In particular, Cycles of Change, the Crucible, and the East Bay Bicycle Coalition have developed programs and resources for youth and adults.

6.3 Project Implementation

The implementation of new bikeways begins with the specification of a priority project or through coordination with another roadway project. Priority projects and the process for their selection are described in Section 6.1. The coordination of a new bikeway with another roadway project is most common with resurfacing projects but may also occur in conjunction with streetscape projects, bridge replacements, and other types of roadway reconstruction. Such coordination delivers better projects through integrated design while also realizing significant cost savings through the coordinated project delivery. For a project to move forward, a feasibility study must be completed to provide an engineering analysis of the planning-level recommendation made in this document. In general, these feasibility studies consider traffic operations and roadway geometrics to understand how the proposed bikeway would be integrated into the given street. Proposed bikeways on certain transit streets undergo an additional level of analysis regarding bus operations. A detailed explanation of these feasibility studies is provided in the following subsections.

Public Outreach

The public outreach process begins at the planning level with the specification of roadways and proposed cross-sections for improving bicycle access. In completing the *Bicycle Master Plan*, the proposed bikeways for particular areas throughout the city were reviewed by neighborhood groups and merchants associations to provide early notification and an opportunity to comment. This outreach process is described in detail in Section C.1. Depending on the nature of the proposal, the outreach for a specific project may include mailings, presentations to neighborhood groups, and town hall meetings. A flyer is mailed to all addresses in the project area and recipients are encouraged to provide written comments. Community meetings are held for projects that generate significant community interest. If possible, project presentations should be coordinated with the regular meetings of nearby neighborhood groups and merchants associations. Large or complicated projects may require one or more standalone meetings. All bikeway projects that reduce the number of travel lanes or on-street parking spaces (by 10% or more in the project area) must be approved by City Council vote before project implementation. Oakland's Bicycle and Pedestrian Advisory Committee (BPAC) also provides a monthly forum for citizen involvement in the prioritization and design of new bikeways.

Project Feasibility

The proposed bikeway network is based on a citywide feasibility analysis that—from a planning level—considered the curb-to-curb street width and current motor vehicle volumes for the proposed on-street bikeways. Based on these factors, the plan recommends proposed cross-sections and bikeway types to improve bicycle safety and access on these streets. This planning-level analysis specifies feasible proposals that merit further study at an engineering level. That additional feasibility study will develop proposals into projects for implementation. In other words, identifying a feasible proposal is a necessary but insufficient condition for implementing a new bikeway. The feasibility of a proposed project will be determined through a feasibility study based on engineering analysis and design.

There are three basic project types and each requires a different kind of engineering analysis:

- *Signing and Striping Projects (SS)* add sharrows or bicycle lanes and their accompanying signage to the street's existing lane configuration. Examples include bicycle boulevards (Class 3B) on local streets and bicycle lanes (Class 2) on streets with sufficient width to accommodate the bicycle lanes without additional modifications. These projects may also include arterial bicycle routes (Class 3A) where the lane widths are reallocated to maximize the width of the outside travel lanes. Signing and striping projects do not require a study of traffic operations because the projects do not affect the streets' motor vehicle capacity. In these cases, the engineering focuses on the design of the signing, striping, and intersection control for improving bicycle safety and access.

- *Lane Conversion Projects (LC)* convert travel lanes to bicycle lanes and typically require the restriping of the street's overall lane configuration. Often called road diets, these projects may take advantage of a street's excess motor vehicle capacity and/or be motivated by pedestrian safety and neighborhood traffic calming concerns. In some cases, lane conversion projects are recommended for arterial bicycle routes (Class 3A) to increase the width of the outer travel lane (but where there is not enough width to include bicycle lanes). Each lane conversion project requires a feasibility study to assess the impacts of the proposed lane conversion on traffic operations. In the limited number of cases where parking removal is proposed, a parking occupancy study must be completed if the project would remove 10% or more of the on-street parking spaces within the project area.

- *Bicycle Path Projects (BP)* create paved paths that are separated from the street for use by bicyclists and pedestrians. Bicycle paths are proposed in public rights-of-

way, in park lands, on the waterfront, and along railroad rights-of-way. Feasibility studies for these projects address right-of-way width and alignment, street crossings, and potential environmental impacts. The analyses consider water resources, biological resources (including sensitive habitats and trees), hazardous materials, and cultural resources that may be affected by bicycle path projects. For each project, the feasibility study examines these issues to develop a design that would avoid or mitigate potential impacts through modifications to the path's alignment. Typically, bicycle paths are integrated with park or waterfront improvements and not developed as standalone bicycle projects.

The requirements for bikeway feasibility studies are included in Appendix G. A set of the requirements apply to all projects while additional analyses apply to projects of particular types. These project types include on-street bikeways that would remove travel lanes or parking spaces and off-street bikeways that require the development of specific bicycle path alignments.[2]

Transit Streets and Multimodal Corridors

A key constraint to the planning and implementation of Oakland's bikeway network is the limited number of streets that connect one neighborhood to the next. This irregular street grid is attributable to topographical features, land subdivision in the streetcar era, and the construction of urban freeways. All transportation modes share the through streets which can create competition between modes in the allocation of limited right-of-way and complicate the streets' operations. In other words, there are limited opportunities for prioritizing different transportation modes on different streets in the same corridor. As a consequence, there is significant overlap between Oakland's bikeway network and AC Transit's bus network because of a shared reliance on the same streets. This update to the *Bicycle Master Plan* provided an opportunity to address this overlap in a comprehensive manner. This section establishes a framework for addressing these issues through the ongoing implementation of Oakland's bikeway network. Due to limitations on available research and examples, this framework requires ongoing dialogue and cooperation between the stakeholders to ensure that key concerns are effectively understood and addressed.

[2]These feasibility study requirements do not address bikeway projects that would require the removal of a continuous two-way center turn lane. The proposed bikeway network provisionally includes two segments of this project type: Telegraph Ave (Aileen St to 20th St) and International Blvd (54th Ave to 82nd Ave). This provisional designation will only be lifted, and those segments automatically incorporated into the proposed bikeway network, if further environmental review is performed and appropriate CEQA findings are adopted by the City.

Roadway	From	To	Cross-section	Miles
14th Ave	E 31st St	E 19th St	T2	0.83
40th St	Adeline St	MLK Jr Wy	T2	0.55
66th Ave	San Leandro St	Coliseum Wy	T3	0.28
Adeline St	36th St	5th St	T3	1.77
Broadway	College Ave	MacArthur Blvd	T4	0.91
Foothill Blvd	14th Ave	23rd Ave	T3	0.68
Fruitvale Ave	Foothill Blvd	E 12th St	T2, T3	0.55
MacArthur Blvd	High St	Buell St	T2, T3	0.46
MacArthur Blvd	73th Ave	Foothill Blvd	TS2, TS3	1.94
Park Blvd	Grosvenor Pl	E 18th St	T3	1.13
W Grand Ave	Market St	Mandela Pkwy	T4	0.61
Total Mileage				**9.71**

Figure 6.4: *Transit Streets for Additional Study*. See Section 4.2, "Proposed Bikeway Network," for an explanation of the cross-sections referenced in this figure.

Through the citywide feasibility analysis, the bikeway network was revised in part to minimize the extent of proposed bikeways on rapid, trunk, and major bus lines. (See Section 4.2 for additional explanation.) Examples include the realignment of proposed bikeways from International Blvd to E 12th St (from 1st Ave to 54th Ave) and from Broadway to Franklin/Webster Streets (in downtown). Where such realignments were not possible, bikeway proposals were modified to minimize the number of proposed lane conversion projects that would result in a single travel lane per direction. This single-lane configuration is of particular concern to AC Transit because of its potential effects on bus travel times. By considering alternative alignments and treatments, the extent of overlapping bikeways and bus lines was reduced without compromising the integrity of the overall bikeway network.

However, in some cases such alternatives were not available and thus there is a group of proposed bikeways that require additional study. These projects fall into two categories: (1) proposed bikeways with lane conversions on rapid, trunk, or major bus lines that would result in one travel lane per direction; and (2) proposed bikeways that would remove a travel lane or two-way center turn lane on a street with an existing or proposed rapid bus or bus rapid transit line.

To address these types of projects, the City of Oakland received a grant from the Safe Routes to Transit program (funded by Regional Measure 2) to study one such project—40th St in the vicinity of MacArthur BART—as a case study. The following approach is based on the work of this MacArthur BART Bicycle Access Study. It applies to the streets identified in Figure 6.4. For each of these projects, the City of Oakland will include the following considerations in the project's feasibility study and thereby assess the effects of the proposed project on bus operations:

1. *Bus Travel Times*: What is the sum of the delays created by the proposed project at the controlled intersections in the project area and along the bus line?

2. *Bus Stop Access*: What is the effect of queue lengths on the bus accessing its stops? What is the effect on traffic gaps for bus egress from the stop?

3. *Incident Delays*: How will double-parked vehicles (including delivery vans, garbage trucks, private vehicles, and the like) affect bus movements? (This study parameter only applies to projects that would result in one travel lane per direction. It does not apply to the roadway segments listed in Figure 6.4 with T4 cross-sections.)

4. *Total Travel Delay*: What is the bus's total travel delay in the project area associated with bus travel times, bus stop access, and incident delays (if applicable)?

5. *Cumulative Effects*: What other bikeway and/or streetscape projects are proposed on the rapid, trunk, or major bus line in question? Would those projects have similar effects on bus travel times?

Some of these issues—like incident delays and cumulative effects—do not have established methods of study. Ongoing dialogue and cooperation between the stakeholders are necessary for making progress on these issues with the available tools. The collaborative process for these projects will follow the protocol established by the Transit Street Cooperative Agreement.[3] This Agreement establishes a process for project development and notification between the City of Oakland and AC Transit for proposed modifications to key streets. By assessing the potential effects on transit, the feasibility studies for the specified bikeway projects will provide a more comprehensive accounting of the proposed project and thus guide decision-making on project feasibility, development, and implementation.

Bicycle Performance Measures

Action 1B.9 of this plan recommends that the City of Oakland work to integrate a quantitative measure of street performance for bicycles into transportation decision-making. Such tools, including bicycle level of service (BLOS) and bicycle compatibility index (BCI) (Federal Highway Administration 1998), are not in common usage but could help evaluate how different design alternatives serve cyclists. This analysis would inform the design process and thus improve the overall quality of the proposed facility by providing feedback before the facility is built. It would also help inform decision-making where trade-offs are

[3]The Transit Streets Cooperative Agreement was adopted by Oakland City Council Resolution No. 80566 on May 15, 2007.

required to accommodate bicyclists. By quantifying the costs/benefits to cyclists, such a performance measure would provide more complete accounting of street design—and thus promote better decision-making—when used in conjunction with other methodologies (like the Highway Capacity Manual's LOS analysis). Given the lack of an industry standard, it is recommended that various performance measures like the BLOS and BCI be tested and evaluated as part of future bikeway feasibility studies.

6.4 Other Roadway and Development Projects

Other roadway or development projects may have an impact on existing or proposed bicycle facilities. This issue may be addressed in a project's transportation impact analysis and/or through the environmental review process in the Initial Study and Environmental Checklist Form under Transportation/Traffic: "Would the project conflict with adopted policies, plans, or programs supporting alternative transportation?" For example, projects that would remove an existing bikeway or preclude the installation of a proposed bikeway may have a significant impact. These impacts would require study that may lead to mitigation measures.

In addition to a project's direct impacts on bicycle facilities, the project's proposed mitigation measures (for example, to accommodate additional motor vehicle traffic) may negatively impact existing or proposed bicycle facilities. The two most common traffic mitigations with negative impacts on bicycle travel are signal re-timing and the addition of dedicated right turn lanes. All new and modified signals should include adequate yellow time for cyclists to clear intersections as well as bicycle detection (for actuated signals). Due to safety concerns, dedicated right turn lanes are strongly discouraged, particularly on existing and proposed bikeways.

These issues are addressed in the Policy Recommendations through Action 1A.6 (Dedicated Right Turn Lanes and "Slip Turns") and Action 1B.2 (Traffic Signals). Other actions that may relate to new development include Action 1A.7 (Diagonal Parking), Action 1B.9 (Bicycle Performance Measure), Action 1D.6 (Bicycle Parking Ordinance), and Action 1D.7 (Development Incentives). Greater detail on the design treatments associated with these issues is provided in Section 4.5.

6.5 Funding

A planning-level estimate of the cost to implement Oakland's *Bicycle Master Plan* is $28 million (or $70 per resident). This amount is based on the estimates provided in Figure 6.5. For items with a unit cost per year, this total assumes a twenty-year time frame. These

Capital Projects	Cost	Unit	Notes
Bicycle Path (Class 1)	$750,000	mile	
Bicycle Lane (Class 2)	$100,000	mile	
Bicycle Route (Class 3)	$10,000	mile	
Arterial Bike Route (Class 3A)	$75,000	mile	
Bicycle Boulevard (Class 3B)	$50,000	mile	
CityRacks (bicycle parking)	$20,000	year	approx 100 spaces (on average)
Education and Encouragement	**Cost**	**Unit**	**Notes**
Youth education programs	$30,000	year	
Adult education programs	$7,000	year	2 courses reaching 40 people each
Bike to Work Day	$5,000	year	downtown event only
Maps and outreach materials	$2,000	year	

Figure 6.5: *Cost Estimates for Bikeway Projects and Programs.* These unit costs for capital projects are generalized estimates for planning purposes only and should not be used for estimating the cost of any particular project. The estimates were adapted from the *Alameda Countywide Bicycle Plan* (2006) to reflect Oakland-specific circumstances. Program costs do not include staff time.

estimates do not include a number of physical improvements like road resurfacing or new traffic signals that may benefit bicyclists but are not standalone bicycle projects. Such costs should be integrated into various project budgets in light of the policies on routine accommodation. Two proposed pedestrian/bicyclist bridges—the Lake Merritt Channel Bridge and the Lake Temescal Bridge—are part of the bikeway network. Including these two projects (at roughly $5 million each), the total cost of plan implementation is $38 million.

The following sources are the primary funding mechanisms for bicycle facilities and programs in Oakland. Bicycle facilities may also be included as part of other capital projects including resurfacing and streetscapes (often funded by grants and redevelopment funds, respectively). The City of Oakland's Measure DD includes funding for extensive bicycle projects along Lake Merritt, the Lake Merritt Channel, and the Oakland Estuary. Bicycle planning for specific neighborhoods may be included in planning grants from the Transportation for Livable Communities (Metropolitan Transportation Commission) or Environmental Justice Planning and Community Based Transportation Planning (Caltrans) programs. For additional information on funding, refer to the Alameda Countywide Bicycle Plan (Alameda County Congestion Management Agency 2006, pp. 74–79).

Funding Sources

Bay Trail Project: The Bay Trail Project, a program of the Association of Bay Area Governments (ABAG), is a non-profit organization that offers grants for the planning, design, and construction of Bay Trail segments. ABAG administers these competitive grants funded

by a variety of sources which currently include State Proposition 84 (Water Quality, Safety and Supply, Flood Control, Natural Resource Protection, and Park Improvements). The Bay Trail Board recommends grant awards that are reviewed and approved by the Board of the Coastal Conservancy.
www.baytrail.org

Bicycle Transportation Account (BTA): Caltrans administers this state program that funds projects to improve safety and convenience for bicycle commuters. The required local match is ten percent of the total project cost. A single applicant may not receive more than 25% of the total amount transferred to the BTA in a single fiscal year. In recent years, $5–7 million have been available statewide on an annual basis.
www.dot.ca.gov/hq/LocalPrograms

Congestion Mitigation and Air Quality Improvement Program (CMAQ): This federal block grant program funds projects in Clean Air Act non-attainment areas that will help meet the national ambient air quality standards stated in the 1990 Clean Air Act amendments. CMAQ funds are typically bundled by the Metropolitan Transportation Commission with other federal funds to create programs like the Regional Bicycle and Pedestrian Program and the Transportation for Livable Communities Program.
www.dot.ca.gov/hq/transprog/reports/Official_CMAQ_Web_Page.htm

Environmental Enhancement and Mitigation Program (EEM): The State Air Resources Board administers the EEM program which provides $10 million annually in grants to local, state, and federal agencies and to not-for-profit organizations. The program is funded through the state gasoline tax. Eligible projects mitigate the environmental impacts of new or modified state transportation facilities. Bicycle projects fall within two of the EEM grant categories: (1) Highway Landscape and Urban Forestry (projects designed to improve air quality through the planting of trees and other suitable plants, including urban streetscape projects); (2) Roadside Recreational (projects for the acquisition and/or development of roadside recreational opportunities, including rest stops for bicyclists).
http://resources.ca.gov/eem/

Hazard Elimination and Safety Program (HES): Administered by Caltrans, this federally funded program provides grants for safety improvements on all public roads and highways, including railroad crossings. Eligible projects, including bicycle safety improvements, should reduce or eliminate the number and/or severity of traffic collisions. For example, Oakland received an HES grant to replace drainage grates that posed a hazard to bicyclists.
www.dot.ca.gov/hq/LocalPrograms/hesp/hesp.htm

Lifeline Transportation Program: The San Francisco Bay Area's county congestion management agencies administer this program for overcoming transportation gaps and improving transportation choices in low-income communities. Projects must be developed through a community-based transportation plan or a similarly inclusive planning process. Eligible projects include transit operations, voucher programs, and capital improvement projects. Note that historically these funds have been dedicated to transit operations.
`www.mtc.ca.gov/planning/lifeline/index.htm`

Measure B Pedestrian and Bicycle Funds: The Alameda County Transportation Improvement Authority (ACTIA) administers the half-cent sales tax of which five percent is allocated to bicycle and pedestrian projects. The Measure B Local Pedestrian and Bicycle Funds are distributed directly to local jurisdictions and account for 75% of the total bicycle and pedestrian funding. Over the 20-year time horizon of the sales tax, the City of Oakland will receive an estimated $29 million for bicycle and pedestrian projects. The remaining 25% of the funds are awarded competitively. Eligible projects include bikeways, bicycle parking, signage, plans, and educational programs.
`www.acta2002.com/bikeped.html`

Office of Traffic Safety (OTS): The State of California's Office of Traffic Safety provides grants for education and enforcement programs that reduce traffic-related injuries and fatalities. Bicycle-related grants may include safety training courses, helmet programs, public service announcements, and other educational materials.
`www.ots.ca.gov`

Regional Bicycle and Pedestrian Program (RBPP): The Metropolitan Transportation Commission's long-range transportation plan, *Transportation 2030*, provides $200 million to the RBPP over a 25-year period for building the Regional Bikeway Network and regionally significant pedestrian projects. The Alameda County Congestion Management Agency administers the RBPP funds for the county. The Alameda County portion of this program may amount to $40 million over the life of the program.
`www.mtc.ca.gov/planning/bicyclespedestrians/regional.htm`

Regional Surface Transportation Program (RSTP): This federal block grant program funds a variety of transportation projects including bicycle parking facilities at terminals, bicycle racks on buses, bicycle transportation facilities, pedestrian walkways, bicycle-actuated traffic signals and preservation of abandoned railway corridors for pedestrian and bicycle paths. In the Bay Area, funds from the RSTP are administered through the congestion management agencies. In Alameda County, these funds are dedicated to street resurfacing projects that can be bundled with bikeway projects.
`www.dot.ca.gov/hq/transprog/reports/Official_RSTP_Web_Page.htm`

Safe Routes to Transit (SR2T): This program was established in 2004 by Regional Measure 2, a $1 bridge toll increase to reduce bridge congestion. SR2T includes $20 million in grant funding for capital and planning projects that improve bicyclist and pedestrian access to regionally significant transit stations. Beginning in 2005, the grants are being awarded through five calls for projects of $4 million each over the next ten years.
`www.transcoalition.org/c/bikeped/bikeped_saferoutes.html`

Transportation Development Act Article 3 (TDA): This state program specifies that one quarter cent of the gasoline tax is returned to the county of origin to fund transportation improvements in that county that primarily benefit bicyclists and pedestrians. Oakland typically receives between $250,000 and $300,000 per year in TDA Article 3 funds. MTC Resolution 875 requires that each county and city in the San Francisco Bay Area have a Bicycle Advisory Committee "to review and prioritize TDA Article 3 bicycle projects and to participate in the development and review of comprehensive bicycle plans."
`www.mtc.ca.gov/funding/STA-TDA/index.htm`

Transportation Enhancement Activities Program (TEA): This federal program funds projects that enhance local quality of life by better integrating major transportation facilities into their surrounding communities. Eligible projects include bicycle facilities, bicycle education, and "rails-to-trails" projects.
`www.dot.ca.gov/hq/TransEnhAct/index1_files/index1.html`

Transportation for Livable Communities Program (TLC): TLC funds are awarded in regional and countywide competitive grant programs administered by the Metropolitan Transportation Commission and the county congestion management agencies, respectively. These funds support community-based transportation projects that bring new vibrancy to downtown areas, commercial districts, and transit hubs. The goal is to develop the character of these mixed-use places and ensure that they are easily accessible by bicycling, walking, and transit.
`www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm`

Transportation Fund for Clean Air (TFCA): The Bay Area Air Quality Management District manages this program with funds generated by a $4 surcharge paid on all motor vehicles registered in the Bay Area. Bikeways and bicycle parking that promote utilitarian bicycling are eligible for funding. Education and marketing campaigns are not eligible.
`www.baaqmd.gov/planning/plntrns/tfcapage.htm`

6.6 Staffing and Public Participation

Multiple city agencies are involved in the planning, design, delivery, and administration of Oakland's bicycle programs. The Transportation Services Division of the Community

and Economic Development Agency (CEDA) houses the Bicycle and Pedestrian Program. This program has two full-time staff (the Bicycle/Pedestrian Program Manager and the Bicycle/Pedestrian Facilities Coordinator) who coordinate grant applications, feasibility studies, design, and project delivery for bicycle facilities and provide design review for related projects. The program focuses on developing new bikeways, installing bicycle parking, and organizing Bike to Work Day. The Planning and Zoning Division of CEDA has been involved in transportation planning. The Planning and Zoning Division's ongoing involvement could focus on planning-level coordination with other projects, agencies, and the public. The Office of Parks and Recreation offers children's programs on bicycle safety, education, and promotion. Staff in these three agencies should work to provide closer coordination between Oakland's capital improvements, planning efforts, and education programs. Additionally, improved coordination with the Oakland Police Department on bicycle education and traffic enforcement is a key component in Oakland's efforts to become a bicycle-friendly community.

Public Participation

There are three primary mechanisms for ongoing public participation in the implementation of Oakland's *Bicycle Master Plan*. First, the plan requires the notification of nearby residents, merchants, and property owners prior to the implementation of new bikeway projects. In addition to mail notification, public meetings should be held with neighborhood groups and merchants associations in the immediate vicinity. Where possible, the proposed project should be included on the agenda of a regularly scheduled meeting (out of respect for the existing organization and for people's time). In general, one-time, one-issue meetings should be avoided because they tend to have poor participation. Neighborhood-level meetings provide an ongoing opportunity for publicizing the *Bicycle Master Plan* while keeping staff apprised of neighborhood-specific interests and concerns that shape the implementation process.

Second, bikeway projects must be approved by the City Council if the project would require the conversion of travel lanes or the removal of 10% or more of the parking spaces in the project area. These projects are thus subject to the public notification, review, and comment that accompanies all City Council actions.

Third, the City of Oakland's Bicycle and Pedestrian Advisory Committee (BPAC) provides a monthly forum for public participation in the planning, design, and implementation of bicycle facilities. The BPAC also reviews plans and projects that are not specifically bicycle-related for their effects on cyclists. The committee provides the following basic input to the City via staff in the Transportation Services Division:

- Review plans and projects for their effects on bicyclists and pedestrians. In particular, the BPAC must review all projects submitted for TDA Article 3 funding (Metropolitan Transportation Commission, Resolution 875).
- Help prioritize projects for implementation.
- Advise staff on improving bicyclist/pedestrian safety and access in Oakland.

For additional information on Oakland's Bicycle Master Plan*, including opportunities for public participation in bicycle projects, contact the Bicycle and Pedestrian Facilities Coordinator (510-238-3983, bikeped@oaklandnet.com) or see* `www.oaklandbikes.info`.