



# Bicycle Master Plan



**City of Portland**  
**Office of Transportation**





# Bicycle Master Plan



City of Portland  
Office of Transportation  
1120 SW 5th Avenue, Room 730  
Portland, OR 97204

Adopted May 1, 1996  
Updated July 1, 1998  
Resolution No. 35515



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BICYCLE MASTER PLAN

# Foreword

## Bicycle Master Plan Process

The Bicycle Master Plan was created over a two and a half year period by Bicycle Program staff with input from over 2,000 residents. The process of creating this Plan was guided by the Bicycle Master Plan Steering Committee, consisting of Bicycle Advisory Committee members; other bicycle, business, and neighborhood activists; and technical advisors from the Oregon Department of Transportation, Metro, Tri-Met, the Port of Portland, and other city bureaus.

Public input has been vigorously solicited throughout the process of preparing this Plan. In the Spring of 1994 the Bicycle Program held an initial series of 12 public workshops attended by over 500 people. Additionally, the Bicycle Program gave over 35 presentations to interested groups and conducted the Bicycle Facility Preference Survey. The public input received was compiled into a report, "Bicycle Master Plan Phase One Report," (June 1994), and used as the basis for the Bicycle Master Plan Preliminary Discussion Draft (March 1995).

Next, to gain public input on the Preliminary Discussion Draft, the Bicycle Program held a series of nine public forums, met with interested groups, and received comments in person and via phone, mail, fax, and E-mail. Mailings announcing the opportunity to comment were sent to over 10,000 individuals and all the city's neighborhood and business associations. Public forums were also announced in the Oregonian, Willamette Week, over the Internet, through local colleges and universities, through flyer postings, and numerous neighborhood and interest group newsletters. Staff and the Steering Committee reviewed all comments and incorporated most of them. In all, more than 1000 people contributed to the Draft Bicycle Master Plan (August 1995).

Over 500 copies of the Draft Master Plan were distributed to interested parties, who were given another opportunity to comment. Four open houses were held, again advertised by mass mailings, and print and electronic media. The Steering Committee and staff reviewed and incorporated this final round of public comments.

**Bicycle Master Plan  
Process***(continued)*

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This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development. TGM grants rely on federal Intermodal Surface Transportation Efficiency Act and Oregon Lottery funds. The contents of this document do not necessarily reflect views or policies of the State of Oregon.



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BICYCLE MASTER PLAN

# Executive Summary

## Introduction

Portland is considered one of the country's most bicycle-friendly cities. In October 1995, it was selected by *Bicycling Magazine* as the most bicycle friendly city in the United States. How did we get there?

Portland's first Bicycle Plan was developed in 1973 by a residents' task force. This effort led to the creation of the Portland Office of Transportation's Bicycle Program—one of the country's oldest—and the Bicycle Advisory Committee, a group of residents appointed by City Council to advise on all matters related to bicycling.

The bicycle is a key means of transportation for thousands of Portland residents and a desired means of transportation for many thousands more. Over half of Portland residents own a bicycle and ride at least occasionally. Bicycle use is rising rapidly. The bicycle share of trips is about two percent in Portland, 3.3 percent in the inner, more dense areas of town. While only 200 cyclists per day were recorded on the Hawthorne Bridge in 1975, by 1995 this number had climbed to nearly 2,000.

Many aspects of Portland encourage bicycle use. Portland's current bikeway network consists of over 150 miles of bicycle lanes, bicycle boulevards, and off-street paths. Tri-Met's entire bus fleet is equipped with bicycle racks. From July 1994 to July 1995, close to 80,000 bicycles were taken on MAX or bus and over 6,300 permits sold. Cyclists can park at over 1,400 publicly-installed bicycle racks or rent longer-term space at one of 190 bicycle lockers. Bicycle commuters can take advantage of one of the new "Bike Central" stations (providing showers, changing facilities, and long-term bicycle storage), while new cyclists will soon be able to enjoy escorted commute rides.

The energy and commitment of many organizations and businesses improve the bicycling environment. Portland's Parks Bureau and Metro's Greenspaces Program are installing dozens of miles of off-street paths, such as the Springwater Corridor and Eastside Esplanade. More than a dozen bicycle shops provide crucial services to Portland cyclists. There is an impressive array of advocacy, education, and riding groups, including the Bicycle Transportation Alliance, Community Cycling Center, Critical Mass, Kaiser Permanente's Injury Prevention Program, Portland United Mountain Pedalers, Portland Wheelmen Touring Club, and Yellow Bike Program.

## Introduction

(continued)

The Portland Police Bureau and the Office of Transportation's Parking Patrol use bicycles, as do some of Portland General Electric's meter readers.

Finally, a diverse coalition of educators, administrators, bicycle advocates, and government agencies are working to make bicycling a more viable and safe option for children. These efforts include the Office of Transportation's Kids on the Move curriculum, Traffic Calming Program (installing speed bumps and signal beacons around schools), Community Traffic Safety Program (For Kids' Sake Slow Down campaign, and bicycle safety workshops), and Bicycle Program (installing bicycle racks at, and bikeways to, schools.) Others involved include Portland Public Schools, parents, educators, the Community Cycling Center (teaching children bicycle safety, repair, and riding skills), and numerous groups working to increase helmet use.

With this kind of momentum, increasing bicycle use should be a snap. However, despite all these efforts, Portland still has a long way to go to be truly bicycle-friendly. Our bikeway network is discontinuous and incomplete; only five percent of arterial streets have bicycle lanes. Bicycle parking is found at only two percent of commercial businesses outside the central city. Very few children bicycle to school even if they live less than a mile away. People from all ages, parts of the city, and walks of life have requested improvements to the bicycling environment. Numerous local surveys, focus groups, and other comment opportunities consistently demonstrate the public's interest in and commitment to bicycling as a means of transportation.

## Background

The Bicycle Master Plan was created over a two and a half year period with input from over 2,000 residents, including neighborhood activists, business people, parents, educators, regular cyclists, and individuals wishing to bicycle—both for the first time and more frequently. Additional input came from staff of the Portland Office of Transportation, Tri-Met, the Port of Portland, Multnomah County, Washington County, Clackamas County, Metro, the Oregon Department of Transportation, and the Portland Bureaus of Planning and Parks.

The Plan provides guidance over a 20-year period for improvements that will encourage more people to ride more frequently for daily needs. The mission of the Master Plan is to make bicycling an integral part of daily life in Portland.

### ***Key Elements***

The Bicycle Master Plan address five key elements:

- 1) policies and objectives that form part of Portland's *Comprehensive Plan Transportation Element*;
- 2) developing a recommended bikeway network;
- 3) providing end-of-trip facilities;
- 4) improving the bicycle-transit link; and
- 5) promoting bicycling through education and encouragement.

Associated with each of these elements are objectives, action items, and five-, 10-, and 20-year benchmarks to measure progress. Where appropriate, the costs of achieving these benchmarks are included. These benchmarks and costs are found at the end of this Executive Summary.

In addition, the Plan provide bikeway design and engineering guidelines and a summary of laws relating to bicycle use.

## Bicycle Transportation Policy and Objectives

Policy 6.12 of the *Transportation Element* of the City's *Comprehensive Plan* is the following statement:

**Make the bicycle an integral part of daily life in Portland, particularly for trips of less than five miles, by implementing a bikeway network, providing end-of-trip facilities, improving bicycle/transit integration, encouraging bicycle use, and making bicycling safer.**

The following objectives accompany this policy statement.

### ***Objectives:***

- A. Complete a network of bikeways that serves bicyclists' needs, especially for travel to employment centers, commercial districts, transit stations, institutions, and recreational destinations.
- B. Provide bikeway facilities that are appropriate to the street classifications, traffic volume, and speed on all rights-of-ways.
- C. Maintain and improve the quality, operation and integrity of bikeway network facilities.
- D. Provide short- and long-term bicycle parking in commercial districts, along Main Streets, in employment centers and multifamily developments, at schools and colleges, industrial developments, special events, recreational areas, and transit facilities such as light rail stations and park-and-ride lots.
- E. Provide showers and changing facilities for commuting cyclists. Support development of such facilities in commercial buildings and at "Bike Central" locations.
- F. Increase the number of bicycle-transit trips. Support Tri-Met's "Bikes on Transit" Program.
- G. Develop and implement education and encouragement plans aimed at youth, adult cyclists, and motorists. Increase public awareness of the benefits of bicycling and of available resources and facilities.
- H. Promote bicycling as transportation to and from school.

## Bicycle Transportation Policy and Objectives

(continued)

### ***Recommended Bikeway Network***

Objectives A, B, and C, listed above, pertain to the development of the bikeway Network.

There are about 185 miles of existing and planned bicycle lanes, bicycle boulevards, and off-street paths in Portland. The bikeway network calls for the addition of approximately 445 miles to this system to create a 630 mile network of preferred and appropriate convenient and attractive bikeways throughout Portland. When complete, this network should enable cyclists to find a bikeway within approximately one-quarter to one-half mile from every location in Portland.

### ***Provide End-of-Trip Facilities***

Objectives D and E pertain to providing end-of-trip facilities.

A survey undertaken for the Master Plan found sub-standard bicycle parking in the majority of Portland's commercial areas. Many public facilities, including schools and parks, were likewise deficient in adequate bicycle parking.

To address this problem, the Master Plan calls for a public-private partnership to install higher levels of bicycle parking; provide for long-term bicycle parking to serve commuters, students, and others needing longer-term bicycle storage; and provide other end-of-trip services like showers, changing rooms, and clothing storage.

An estimated 1,900 short-term and 145 long-term bicycle parking spaces exist in Portland. The Plan calls for the development of an additional 8,600 short-term and 23,000 long-term spaces in 20 years.

### ***Improving the Bicycle-Transit Link***

Objective F pertains to improving the bicycle-transit link.

Two types of bicycle-transit trips are possible in Portland. Riders can take their bicycles aboard buses and light-rail through the Bicycles-on-Tri-Met program, for which over 6,300 permits have been sold. From July, 1994 to June, 1995 almost 80,000 bicycles-on-transit trips were made. Bicyclists can also "bike-and-ride," making use of long-term bicycle parking at transit centers and light-rail stations. As of February, 1996 there were 56 bicycle locker spaces at transit centers and MAX stations.

The City will continue to support and promote the Bicycles on Tri-Met program, and assist Tri-Met in providing and promoting long-term bicycle parking at the transit system to encourage bicycle use.

### ***Promoting Bicycling Through Education and Encouragement***

Objectives G and H pertain to promoting bicycling through education and encouragement.

Bicycle education is concerned with developing safe cycling skills in children, teaching adult cyclists their rights and responsibilities, and teaching motorists how to more effectively share the road with cyclists.

## Bicycle Transportation Policy and Objectives

*(continued)*

Encouragement includes providing a bikeway network, end-of-trip facilities, and bicycle-transit services, holding encouragement events, providing incentives, and providing information and/or maps with recommended cycling routes.

Many organizations throughout Portland provide bicycling education and encouragement. The City will continue to support these organizations as able, with the goal of having three to five annual bicycling promotion events. Additional long-term goals are to have 10 percent of children bicycling to school and 100 percent of children receiving bicycle safety education.

### *Providing Bikeway Design and Engineering Guidelines*

The Master Plan offers detailed design and engineering guidelines for different types of bicycle facilities. Included are intersection designs, signing and marking, maintenance considerations, and bicycle parking code requirements. This information, and the text of state laws and local ordinances pertaining to bicycling, are found in the Master Plan's appendices.

## Conclusion

Bicycling produces no air or noise pollution, decreases traffic congestion, reduces taxpayer burden, helps alleviate parking demand, saves energy, uses land and road space efficiently, provides mobility, saves individuals money, improves health and fitness, and is fast and fun! The success of the Bicycle Master Plan will only be assured by the continued support of Portland's cycling community and other residents recognizing the benefits bicycling brings to all residents.

## POLICY AND OBJECTIVES

AS OF JANUARY 1996

**POLICY 6.12 Bicycle Transportation***Make the bicycle an integral part of daily life in Portland*

2% mode share-all city  
 3.3% inner city  
 160 crashes reported (1994 data)

**POLICY 6.12 A***Complete a network of bikeways that serves bicyclists' needs*

185 existing and planned (funded) miles of bicycle lanes

**POLICY 6.12 B***Provide bikeway facilities that are appropriate to the street classifications, traffic volume and speed on all rights-of-way*

69% of streets today have appropriate bikeway facility

**POLICY 6.12 C***Maintain and improve the quality, operation, and integrity of bikeway network facilities*

300 bicycle facility improvement requests annually  
 25 signal detector loops marked

**POLICY 6.12 D***Provide short- and long-term bicycle parking*

1900 short-term (city-provided)  
 145 long-term (city-provided)

**POLICY 6.12 E***Provide showers and changing facilities for commuting cyclists*

50 spaces at YWCA

**POLICY 6.12 F***Increase the number of bicycle-transit trips*

4,848 permits sold  
 42,736 bikes on buses  
 35,405 bikes on MAX

**POLICY 6.12 G***Develop and implement education and encouragement plans*

3-5 annual city-wide events promoting cycling, including Bicycle Commute Week, Bikefest, Bridge Pedal  
 38% of school-age children receiving bicycle safety education

**POLICY 6.12 H***Promote bicycling as transportation to and from school*

2% of children bicycling to school

BY 5 YEARS BENCHMARKS		BY 10 YEARS BENCHMARKS		BY 20 YEARS BENCHMARKS	
BENCHMARKS	COSTS	BENCHMARKS	CUMULATIVE COSTS	BENCHMARKS	CUMULATIVE COSTS
<i>Inner Portland:</i> bicycle mode share to 5%		Increase bicycle mode share to 10%		Increase bicycle mode share to 15%	
<i>Whole city:</i> bicycle mode share to 3% Number of bicycle-motor vehicle crashes held constant		Increase bicycle mode share to 6% Number of bicycle-motor vehicle crashes reduced by 10%		Increase bicycle mode share to 10% Number of bicycle-motor vehicle crashes reduced by 20%	
40% complete Approximately 252 bikeway miles	\$17,774,000	60% complete Approximately 378 bikeway miles	\$40,122,000	100% complete Approximately 630 bikeway miles	\$149,760,000
75% of streets have appropriate bikeway facility	Not quantified	85% of streets have appropriate bikeway facility	Not quantified	95% of streets have appropriate bikeway facility	Not quantified
Implement improved maintenance procedures such that requests decrease by 15% from today's levels	\$50,000	Requests decrease by 50% from today's levels	\$100,000	Requests decrease by 75% from today's levels	\$200,000
100% of bikeways with signal detection tuned and retrofitted with pavement markings	\$8,000	50% of all signals with detection tuned and retrofitted with pavement markings	\$12,000	100% of all signals with detection tuned and retrofitted with pavement markings	\$24,000
20% of required bicycle parking spaces		40% of required bicycle parking		100% of required bicycle parking	
1,720 short-term parking spaces	\$103,202	3,440 short-term spaces	\$206,404	8,600 short-term spaces	\$516,010
5,922 long-term parking spaces	\$2,671,850	10,765 long-term spaces	\$5,091,800	23,134 long-term spaces	\$12,027,834
Accommodate 300 commuters at the Downtown and Lloyd districts "Bike Central" locations	\$350,000 for "Bike Central" facilities	Showers and changing facilities available to all commuting cyclists needing such accommodations	Not quantified	Showers and changing facilities available to all commuting cyclists needing such accommodations	Not quantified
Tri-Met has not developed a long-range plan					
3 to 5 annual city-wide events promoting cycling	Not quantified	3 to 5 annual city-wide events promoting cycling	Not quantified	3 to 5 annual city-wide events promoting cycling	Not quantified
50% of school-age children receiving bicycle safety education		90% of school age children receiving bicycle safety education		90% of school-age children receiving bicycle safety education	
3% of children bicycling to school	Not quantified	6% of children bicycling to school	Not quantified	10% of children bicycling to school	Not quantified



BICYCLE MASTER PLAN

# Introduction

## Introduction

The bicycle is a low-cost and effective means of transportation that is quiet, non-polluting, extremely energy-efficient, versatile, healthy, and fun. Bicycles also offer low-cost mobility to the non-driving public, including the young; indeed, more than 16 percent of adult Oregonians do not have a driver's license.<sup>1</sup>

The world's 800 million bicycles outnumber automobiles two to one, and annual bicycle production is more than three times annual automobile production.<sup>2</sup> In the United States, bicycles were a popular means of transportation in the pre-automobile age. In 1880, bicycle enthusiasts formed the League of American Wheelmen (later changed to League of American Bicyclists), which successfully lobbied for a national network of paved roads. Portland's history is rich with bicycle enthusiasts, including the Dekums, Glisans, Pittocks, Morelands, and Woodwards. Much of the activity of the early Multnomah Athletic Club revolved around bicycle racing and many day-long family outings took place on bicycles.<sup>3</sup>

As the automobile became more popular, bicycles lost popularity. The automobile gave people the freedom to move farther from their places of work, giving way to rapid suburban development and sprawl. The bicycle—ideal for short trips—lost its advantage as well as its place on the road.

Throughout the United States today, the bicycle is making a comeback. There are an estimated 100 million bicycles in the country, including a half million in the Portland region.<sup>4</sup> Bicycling as a means of transportation has been growing in popularity as many cities work to create more balanced transportation systems and reclaim streets from auto dominance.<sup>5</sup> In addition, recent national and local surveys find that many more people are willing to cycle more frequently if cities provide better bicycle facilities.<sup>6</sup>

Bicycle travel in Portland has increased rapidly in the past decade. Since 1985, bicycle use on the Hawthorne Bridge has more than tripled (Figure 1.1). Bicycle rider counts done in other city locations also show consistent increases.

This increase is due to several factors. First, improvements in equipment, particularly the appearance of the mountain bicycle, have significantly improved the range of available options. With their fatter tires, sturdier geometry, and more



## Introduction

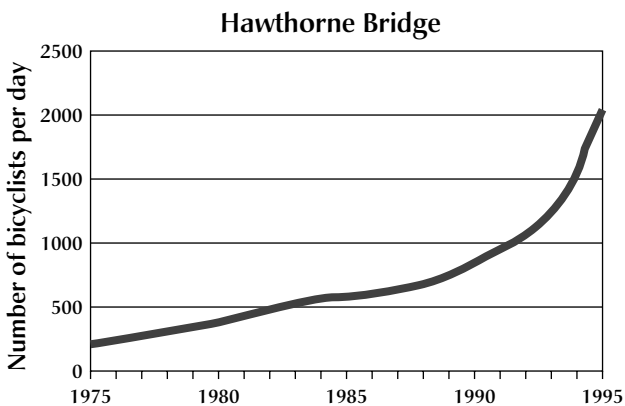
(continued)

user-friendly braking and gearing systems, mountain and hybrid bicycles are well-suited to urban commuting.

Second, increasing environmental awareness in the past two decades, coupled with progressive land-use and transportation leadership, has resulted in Portland's having one of the more respected and user-friendly transportation systems in the country. With its pedestrian orientation, relatively low traffic congestion, and connected street grid, bicycle trips are a pleasant daily option for many people.

Third, as more residents have been cycling for daily transportation, more have been advocating for improved bicycling conditions. This has resulted in more miles of bicycle lanes, bicycle boulevards, and off-street paths; more bicycle parking; and better maintenance of existing facilities, all of which have encouraged more bicycle riding.

FIGURE 1.1 **Bicycle Use over Time**



Source: Bicycle rider counts, Portland Office of Transportation.

These three factors—and the consequent increased bicycling—have led to a growing recognition among policy makers at all levels of the need to treat the bicycle as a serious mode of transportation. As early as 1971, Oregon's leaders adopted state law ORS 366.514, which requires that cities and counties expend a minimum of one percent of transportation revenues on bikeways and walkways, and that bikeways and walkways are included as part of roadway construction and

reconstruction (see Appendix B for full text). Many subsequent goals and policies have been adopted toward this end, including the 1991 Oregon State Land Conservation and Development Commission's Transportation Planning Rule (Goal 12), which requires all jurisdictions in the Portland Metro Area to prepare a plan to reduce vehicle miles traveled per capita by 20 percent over the next 30 years. The regional government, Metro, has been leading an effort to ensure that future land-use development encourages balanced transportation options, including bicycle transportation. In addition, many city goals and policies have been adopted and are discussed in Section II.

Following this growing policy support, additional funding has been made available for bicycle transportation improvements. This has been true on the local and state level, as well as the federal level through the 1990 Clean Air Act and the 1991 Inter-Modal Surface Transportation Efficiency Act (ISTEA), which calls for increased spending on bicycle travel and allows cities more flexibility in spending highway funding on alternative modes, such as bicycling, walking, and transit.

The increased ridership, resulting advocacy, and increased policy and financial support from all government levels have resulted in significant bicycle transportation improvements. The following Bicycle Master Plan is a direct result of these changes and is intended to set an aggressive, proactive 20-year course toward fulfilling the following mission: Making bicycling an integral part of daily life in Portland.

## Portland's Bicycle Program History

The history of the City's Bicycle Program reflects a long-standing commitment to bicycles, an up and down history of public support, and an evolution in the knowledge and treatment of cycling issues.

**THE EARLY YEARS** In 1972, the City organized a Bicycle Path Task Force, which produced the 1973 Bicycle Master Plan. By 1976, the City's effort to implement the plan stalled due to lack of funding, support, and technical knowledge. In 1978, City Council appointed a citizens' Bicycle and Pedestrian Advisory Committee (BAC), which was charged with identifying and prioritizing improvement plans for the bicycle/pedestrian network. The BAC has been meeting ever since to encourage bicycle improvements. A separate Pedestrian Advisory Committee (PAC) was formed in 1992.

The Portland Office of Transportation initiated the Bicycle Program—one of the country's first—in 1979 with one full-time staff person. Over the next five years, the Bicycle Program created a bicycle map, developed bicycle parking code requirements, and installed about 250 bicycle racks and 40 lockers. The program also organized bicycle events, such as bicycle-to-work days, Bike Week, and a "Bike There" encouragement program in conjunction with Metro.

**CORRIDOR IMPROVEMENTS** In 1982, the Bicycle Program identified 22 bicycle "corridors" based on census data and travel use patterns and began an implementation process for bikeway improvements along these corridors. The first corridor completed was SE Reed-Hawthorne.

In 1985, the Bicycle Program decided to discontinue holding events and installing bicycle racks and instead placed more emphasis on bikeway corridor implementation. It then finished several corridor projects, including the SE Ankeny-32nd-Davis-Burnside route, SE Clinton, SE Steele, and NE Fremont. The program also initiated other corridor projects—such as NE Knott—that failed due to public opposition to parking removal, which was necessary to implement the project.

**DISTRICT IMPROVEMENTS** Finding the implementation of corridor projects to be very time consuming and difficult, the Bicycle Program altered the corridor process in 1988 in favor of a more flexible process to make improvements on a district-by-district basis. There are seven districts in Portland: North, Northeast, Southeast, Outer East (east of I-205), Southwest, Northwest, and the Central City. In 1990, the Program implemented the Northeast bikeway Plan that provided today's signed bicycle routes.

In 1993, after many years of negotiation, the Bicycle Program completed and Council adopted the North Portland bikeway Plan. Implementation of the plan was completed in the Spring of 1995, except bicycle lanes on N. Willamette, which are planned for implementation in 1996.

The Program also drafted and is implementing the Central City Transportation Management Plan Bicycle Element. Projects implemented or underway thus far include: SE 7th/Sandy/NE 12th; the Broadway Bridge Lovejoy, 10th Avenue, and Broadway ramps; the Hawthorne Bridge east bound viaduct; SE Hawthorne

## Portland's Bicycle Program History

(continued)

(Martin Luther King, Jr. Blvd. to 12th); NE Multnomah (Martin Luther King, Jr. Blvd to 16th); and NE Lloyd (Martin Luther King, Jr. Blvd to 16th).

**OTHER PROJECTS** With increasing public support for bicycle improvements, the Bicycle Program has aggressively been pursuing bikeway implementation throughout the city based on previously identified corridors, neighborhood requests, Bicycle Advisory Committee priorities, and opportunities as they have arisen. Since 1993, projects implemented include the Burnside Bridge; the Hawthorne and Broadway Bridge viaducts; SW Multnomah; SW Terwilliger; and SW Moody. Bicycle lanes have been implemented as part of major construction and reconstruction projects, including NW 23rd Place and on NE Broadway, Larrabee, Interstate, and Multnomah around the new Blazer Arena. Bicycle lanes have also been installed as part of routine re-paving, on streets such as SW Beaverton-Hillsdale Highway, SE Division (82nd to 122nd), SE 7th (Division to Morrison), and SE 122nd (Market to Bush).

**BICYCLE PARKING** In 1991, the Bicycle Program reinitiated bicycle parking installation and has added about 900 sidewalk bicycle racks, bringing its total inventory to 1400 racks. The Program also manages 156 bicycle lockers and is also developing, in conjunction with health clubs, combined parking/locker/shower facilities for 475 bicycle commuters to the central city. Furthermore, the Program is working with schools to install bicycle racks.

**MAINTENANCE** In March 1994, in response to residents' calls for better maintenance of bicycle facilities, the Bicycle Program initiated the Bicycle Facility Improvement Program to handle such problems as sweeping of glass and debris, fixing potholes, replacing gratings, fine-tuning traffic signal sensitivity, and others. To date, the program has responded to more than 600 requests.

**EVENTS AND EDUCATION** In 1991, the Bicycle Program also reinitiated events to encourage more bicycle use. For example, in 1992, it held a series of neighborhood-based family rides called NeighborRide. It has held over 15 annual Bicycle Commute Days and helped plan the 1993 and 1994 Burnside Bridge BikeFests, which attracted more than 10,000 participants. In 1994, Portland hosted the international Pro-Bike/Pro-Walk conference with several hundred participants from all over the world. The conference attracted planners, engineers, activists, and others interested in learning innovative techniques for making cities more bicycle-friendly. The Bicycle Program has also been involved in education of bicyclists and motorists about bicyclists' rights, responsibilities and practices. It has helped the City's Community Traffic Safety Program (formerly Reclaiming Our Streets) hold traffic safety training for fifth grade classes, worked on the kindergarten to fifth grade "Kids on the Move" bicycle and pedestrian curriculum, and supported the City's annual "Slow Down for Kids Sake" media campaign. It has also been working closely with community education and advocacy groups.

## Bicycle Master Plan

The Bicycle Program's focus has evolved from corridors to districts, to through this Bicycle Master Plan, a comprehensive, city-wide approach. This evolution has followed the increase in public and government support, funding availability, and technical knowledge.

The Bicycle Master Plan was enacted over a two and a half year period with input from over 2000 residents. The public process undertaken to develop the Plan is detailed in Appendix D. The following Plan will outline the actions needed, priorities, costs, and time lines for making Portland truly bicycle friendly. Section II summarizes the goals, policies, and objectives guiding the implementation of the Master Plan. Section III explains the recommended comprehensive, continuous bikeway network, including proposed improvements and estimated costs, and maintenance needs, railroad improvements, and signal modifications. Section IV proposes end-of-trip facilities designed to serve bicyclists' needs at key destinations throughout the city, including parking, shower, and changing facilities. Section V describes the bicycle-transit link. Section VI details a framework for educating youth and adult cyclists and motorists, encouraging more cycling, and increasing the number of children bicycling to schools.

Appendix A is the bikeway Design and Engineering Guidebook to be used by planners and engineers in implementation of bikeway facilities. Appendix B is a summary of laws related to bicycling in Portland and Oregon. Appendix C is the Central City Transportation Management Plan bicycle-related policies. Finally, Appendix D details the Master Plan public process and methodology used to select the bikeway network facilities.

This Plan is meant as a 20-year guide for making Portland bicycle friendly. Its success will only be assured by the continued support of Portland's cycling community and other residents recognizing the benefits bicycling brings to all residents.

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### *Endnotes*

<sup>1</sup> "Oregon Drivers," Oregon Department of Transportation, Driver and Motor Vehicle Services, 1991.

<sup>2</sup> Lowe, Marcia, *The Bicycle: Vehicle for a Small Planet*, Worldwatch Institute, September, 1989: p.5.

<sup>3</sup> Oregon History Center.

<sup>4</sup> Bicycle Federation of America statistics.

<sup>5</sup> "Sports Participation in 1992, City-by-City," National Sporting Goods Association, 1992.

<sup>6</sup> Bicycle Facility Preference Survey, carried out by the City of Portland Bicycle Program, Spring 1994. "A Trend on the Move: Commuting by Bicycle, *Bicycling Magazine*, 1991.



# Policies and Objectives

## Introduction

The City of Portland's *Comprehensive Plan* contains a series of statements that guide the way the city plans and implements improvements. These statements are ordered from the more general to the more specific:

- Goals
- Policies
- Objectives

Policies are ways to achieve the broader goals, and objectives are what should be done to achieve the policies.

Goals, policies, and objectives are formally adopted by City Council ordinance and form the City's *Comprehensive Plan*. Transportation related goals, policies, and objectives are available in a document called the *Transportation Element (TE)*.

The City's main transportation goal is written below. This goal aims to improve the transportation system for all users.

**GOAL 6:** Provide for and protect the public's interest and investment in the public right-of-way and transportation system by encouraging the development of a balanced, affordable and efficient transportation system consistent with the Arterial Streets Classifications and Policies<sup>1</sup> by:

- Providing adequate accessibility to all planned land uses;
- Providing for the safe and efficient movement of people and goods while preserving, enhancing, or reclaiming the neighborhoods' livability;
- Minimizing the impact of inter-regional and longer distance intra-regional trips on city neighborhoods, commercial areas, and the city street system by maximizing the use of regional trafficways and transitways for such trips;
- Reducing reliance upon the automobile and per capita vehicle miles traveled;
- Guiding the use of the city street system to control air pollution, traffic, and livability problems; and
- Maintaining the infrastructure in a good condition.

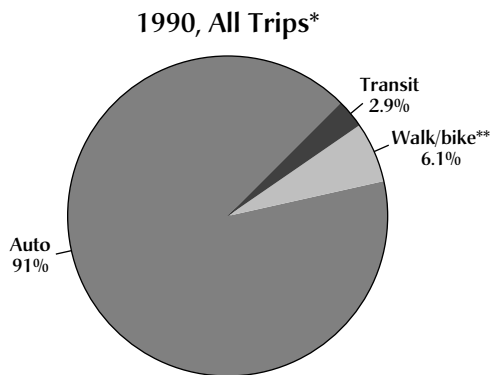
## Comprehensive Plan Transportation Element Bicycle Policy and Objectives

The following policy and objectives are intended to guide the city's approach to bicycling, in order to help reach *Comprehensive Plan* Goal 6 as listed above. These objectives are described in detail in subsequent sections.

### Policy 6.12 Bicycle Transportation

Make the bicycle an integral part of daily life in Portland, particularly for trips of less than five miles, by implementing a bikeway network, providing end-of-trip facilities, improving bicycle/transit integration, encouraging bicycle use, and making bicycling safer.

FIGURE 2.1 Means of Transportation



\*Based on Metro Study Area, encompassing the greater metropolitan region.  
\*\*Bicycle and pedestrian travel are not separated in the model at present.  
Source: Metro Travel Simulation Model, 1992.

#### OBJECTIVES

- A. Complete a network of bikeways that serves bicyclists' needs, especially for travel to employment centers, commercial districts, transit stations, institutions, and recreational destinations.
- B. Provide bikeway facilities that are appropriate to the street classifications, traffic volume, and speed on all right-of-ways.
- C. Maintain and improve the quality, operation, and integrity of bikeway network facilities.
- D. Provide short- and long-term bicycle parking in commercial districts, along Main Streets, in employment centers and multifamily developments, at schools and colleges, industrial developments, special events, recreational areas, and transit facilities such as light rail stations and park-and-ride lots.
- E. Provide showers and changing facilities for commuting cyclists. Support development of such facilities in commercial buildings and at "Bike Central" locations.<sup>2</sup>
- F. Increase the number of bicycle-transit trips. Support Tri-Met's "Bikes on Transit" Program.
- G. Develop and implement education and encouragement plans aimed at youth, adult cyclists, and motorists. Increase public awareness of the benefits of bicycling and of available resources and facilities.
- H. Promote bicycling as transportation to and from school.

## Benchmarks

The Bicycle Master Plan establishes a series of benchmarks by which to judge progress. Every two years, the Office of Transportation will report on the progress toward the benchmarks laid out in this Plan. The two benchmarks below are intended to describe the progress toward Policy 6.12. Benchmarks relating to each objective (6.12A-H) are contained in the subsequent sections. A summary of the policies, objectives, benchmarks, and related costs where available is contained in the Executive Summary.

**Benchmarks**

*(continued)*

Over the past 10 years, bicycle use has been on the rise. Best estimates show bicycling to make up about 3.3 percent of all trips in the inner, urbanized parts of Portland. In the city as a whole, bicycle use is estimated at two percent of trips.<sup>3</sup> This means that 98 percent of trips are accomplished through other means, especially automobiles (Figure 2.1.) The bicycle share of trips should improve as better bikeway facilities, end-of-trip services, education, and encouragement are provided. As bicycle trips increase, all residents will benefit from the reductions in congestion, air pollution, and energy consumption.

The bicycle share of all trips is a good indicator of the success or failure in making bicycling an integral part of daily life. As more people bicycle, another indicator of success or failure is the level of bicycle safety. There are approximately 150 reported bicycle-motor vehicle crashes annually in Portland.<sup>4</sup> Many more accidents are not reported, and most are believed not to involve a motor vehicle.<sup>5</sup> The most common causes of the reported crashes were the cyclist or motorist disregarding traffic control devices, entering or leaving the roadway at a mid-block location, or the bicyclist riding against traffic. The blame for these crashes rests about equally on motorists and bicyclists. Although progress toward bicycle safety can only be measured by the reported crash data, it is presumed that as the bicycle-motor vehicle crash statistics improve, so should bicycle safety as a whole.

The bicycle trip share and bicycle safety are related to the implementation of the objectives listed above, such as quality bikeways, good maintenance, education, and encouragement. Thus, the following benchmarks relating to mode share and safety will be used to gauge overall Master Plan success. Each of the subsequent Plan sections contains benchmarks specific to Objectives 6.12 A–H.

**Policy 6.12 Benchmarks:**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
<b>Inner Portland:</b>		
Increase bicycle mode share to 5%	Increase bicycle mode share to 10%	Increase bicycle mode share to 15%
<b>Whole city:</b>		
Increase bicycle mode share to 3%	Increase bicycle mode share to 6%	Increase bicycle mode share to 10%
Number of bicycle-motor vehicle crashes held constant	Number of bicycle-motor vehicle crashes reduced by 10%	Number of bicycle-motor vehicle crashes reduced by 20%

**Other Comprehensive Plan Bicycle-Related Policies and Objectives**

There are additional Comprehensive Plan policies and objectives relevant to bicycles. These policies and objectives are as follows:

**Goal 5, Economic Development**

**Policy 5.4, Transportation**

**OBJECTIVE E:**

Promote safe and pleasant bicycle access to and circulation within commercial districts and strips. Provide convenient, secure bicycle parking for employees and shoppers where appropriate.

## Other Comprehensive Plan Bicycle-Related Policies and Objectives

(continued)

### OBJECTIVE G:

Pursue special opportunities for alternative modes of transportation to serve as attractors themselves. Such projects include water taxis, streetcars, and bicycle and pedestrian facilities and amenities.

### Goal 6, Transportation

#### Policy 6.6, Urban Form

Support a regional form composed of mixed-use centers served by a multi-modal transportation system. New development should be served by interconnected public streets which provide safe and convenient pedestrian, bicycle and vehicle access. Street and pedestrian connections should be provided to transit routes and within and between new and existing residential, commercial, and employment areas and other activity centers.

### Goal 7, Energy

#### Policy 7.6, Energy Efficient Transportation

Provide opportunities for non-auto transportation, including alternative vehicles, buses, light rail, bikeways, and walkways...

### OBJECTIVE H

Promote walking and bicycle commuting by developing bikeways and walkways, encouraging spot hazard improvements on city streets, providing bicycle lockers at transit centers and park-and-ride lots, and implementing bicycle commuter services such as long-term bicycle parking, showers, and changing facilities, and promoting covered walkways/sidewalks.

### Goal 11B, Public Rights-of-Way

#### Policy 11.13, Bicycle Improvements

Provide bikeway facilities appropriate to the street classification, traffic volume, and speed in the design and construction of all new or reconstructed streets. Where the appropriate bikeway facility cannot be provided on the street, provide alternative access for bicycles on parallel streets. Bicycle safety should be the highest priority in the design of all bikeway facilities.

#### Policy 11.14, Public Bicycle Parking

Provide for safe short-term and safe, sheltered long-term bicycle parking in the right-of-way and in publicly owned garages throughout the downtown Central City and in other appropriate areas of the City where needed.

#### Policy 11.18, Street Vacations

Allow street vacations only when there is no existing or future need for the right-of-way, the established city street pattern will not be significantly interrupted, and the functional purpose of nearby streets will be maintained. Evaluate opportunities and the need for a bikeway, walkway, or other transportation use when considering vacation of a street. Where pedestrian and bicycle facilities are needed, the first preference is to retain right-of-way for these uses. If retaining right-of-way is not feasible, a public easement can be required along with public improvements where they preserve or enhance circulation needs.



## Relationship to Other Plans

### ***Central City Transportation Management Plan***

The Central City Transportation Management Plan (CCTMP) is intended to set policies and practices related to transportation in the Central City and is a companion document to the *Transportation Element*. The CCTMP was drafted from 1992 to 1995 and was adopted by City Council in November, 1995. The bicycle-related CCTMP policies and objectives are listed in Appendix C and are complementary to those proposed in the Bicycle Master Plan. The proposed Central City bikeways have been incorporated in the citywide bikeway network (see Section III).

### ***Portland Transportation System Plan***

The Transportation System Plan (TSP) is currently being developed and is intended to be an implementation plan for the goals, policies, and objectives contained in the *Transportation Element*. In the TSP, the implementation of the Bicycle Master Plan will be combined and balanced with the improvements needed to serve motor vehicles, trucks, transit, and pedestrians.

### ***Metro Regional Bicycle Plan and Regional Transportation Plan***

The Portland Bicycle Master Plan has been coordinated with development of the Regional Bicycle and Transportation Plans. Many of the City's bikeways are part of the regional bikeway network and will thus be developed and implemented with regional funding and cooperation.

### ***Oregon Department of Transportation (ODOT) Bicycle and Pedestrian Plan***

The ODOT Bicycle and Pedestrian Plan sets forth guidelines for designing and implementing bicycle projects. The ODOT guidelines have been used as the basis of the City Bikeway Design and Engineering Guidelines (Appendix A) should be considered a resource for City planners and engineers. The ODOT Bicycle and Pedestrian Plan also establishes policies for the provision of bikeways along state highways.

### ***Arterial Streets Classifications and Policies***

The Arterial Streets Classifications and Policies (ASCP) guide the city on the intended function of each street. Examples of classifications include Bikeway, Major City Traffic Street, Major Transit Street, and Major Truck Route.

During development and implementation of transportation projects, all the classifications of a given street must be considered. Improvements for one mode should not preclude future modifications to accommodate other modes nor encourage inappropriate use of a street.

When a street is to be modified for development purposes, the City can require modifications to the street appropriate to the classification, such as sidewalks or bicycle lanes.

## Relationship to Other Plans

(continued)

### *Community and Neighborhood Plans*

The Planning Bureau, in cooperation with the Office of Transportation, is developing a series of neighborhood and community plans that help guide land-use development and characteristics of a given area over time. Examples include the Albina Community Plan (1993), the Outer Southeast Community Plan (1995), and many neighborhood plans. These plans all consider and recommend transportation improvements. All existing neighborhood and community plans have been reviewed for the Bicycle Master Plan, and the suggested bicycle improvements incorporated wherever possible.

### *Land-Use Ordinances and Zoning Codes*

Land-use ordinances and zoning codes dictate how a project should be developed and administered. For example, if a new retail establishment is built, the zoning code requires a certain amount of bicycle parking be added. A variety of city staff review all proposed developments to ensure the code is met, and enforcement is done through the Bureau of Buildings.

#### *Endnotes*

- <sup>1</sup> The Arterial Streets Classifications and Policies (ASCP) guide the city on the intended function of each street. Examples of classifications include Major City Traffic Street, Bikeways, Major Transit Street, and Major Truck Route.
- <sup>2</sup> Bike Central is a network of central city commuter-oriented bicycle parking, shower, and clothes storage facilities developed by the City, fitness clubs, and parking providers.
- <sup>3</sup> Based on a 1994 survey carried out by Metro, and reported in their Regional Bicycle Plan. The survey was only half compiled as of February, 1996. These same preliminary results indicated a higher mode split for bicycling (3.3 percent) in areas with: good street continuity, sidewalks, easy street crossings, and gentle topography. Much of inner Portland (i.e., west of I-205 to the west hills) is characterized by such conditions. Metro is working to enhance existing travel demand forecasting models to more accurately estimate mode share.
- <sup>4</sup> Oregon Department of Transportation, Bicycle-Motor Vehicle Crash Summaries, 1987-1994.
- <sup>5</sup> Stutts, J.C., Williamson, J.E., Whitley, T. and Sheldon, F.C. (1990). Bicycle accidents and injuries: a pilot study comparing hospital and police reported data. *Accident Analysis and Prevention*, 22(1): pp 67-78.



BICYCLE MASTER PLAN

# Recommended Bikeway Network

## Introduction

National and local polls frequently cite the lack of bikeways as the number one reason more people do not bicycle for daily trips; in Portland, 88 percent of those surveyed in 1994 stated that lack of bikeways prevented more frequent cycling. The survey also found that the most compelling type of bikeway facility is a bicycle lane (49 percent), with bicycle boulevards and off-street paths also considered important (35 percent and 18 percent, respectively).

Furthermore, surveys have also found that the public in the Portland region increasingly supports the expenditure of taxpayer funds to install bikeways. For example, in the “Region 2040: It’s Your Turn” 1994 survey distributed to all Portland region households by Metro, the second most frequently cited comment received was the need for better bikeways and walkways. Other local surveys have also found significant public support for investment in improved bikeway facilities.

Bikeways bring enormous benefits to both the cycling and non-cycling public. Bikeways attract more cyclists, bringing air, noise, and water quality benefits. They use public dollars efficiently, by reducing road maintenance costs. They increase the carrying capacity of the transportation system. They improve safety for all users; bicyclists feel they have a safe space on the road and tend to be more law-abiding, while motorists are placed at greater ease knowing where bicyclists are apt to be. Bikeways also help motorists to be aware of bicyclists’ presence and right to be on the road.

The planning and implementation of bikeways can be relatively simple and inexpensive, as when the City restripes a roadway with bicycle lanes during a routine resurfacing. Bikeways can also be very complicated and costly, as with streets that need to be widened. The installation of some bikeways may not always be desirable from the public’s perspective, if, for example, parking needs to be removed to install bicycle lanes or traffic needs to be diverted to create a bicycle boulevard. These factors have all been analyzed for this Plan. Bikeways were selected because of their connection to land-uses, ease of implementation, need for safety improvements, lack of parallel facilities, and need for continuity (Appendix D presents a detailed description of the methodology used to select bikeways).

While the City's existing bikeways are well used, they tend to be relatively short and unconnected and thus do not well serve cyclists needs. The implementation of the objectives and action items in this section will result in a comprehensive, continuous, and well-maintained bikeway network, maximizing bicycling's benefits to both Portland's cycling and non-cycling public.

## Bikeway Classification Descriptions

As explained in Section II, streets are classified per their intended function in order to guide the city's treatment of streets. The following classification descriptions related to the bikeway network are adopted as part of the *Transportation Element* of the city's *Comprehensive Plan*.

### City Bikeways

*Functional Purpose:* City bikeways are designed to establish direct and convenient bicycle access to all significant destinations and within city, town and regional centers.

*Land Use and Development:* Areas that should be served by city bikeways are employment centers, commercial districts, transit stations, institutions, recreational destinations, and regional and town centers. Auto-oriented land uses should be discouraged on city bikeways not classified as Major City Traffic Streets.

*Design Treatment and Traffic Operations:* Factors to consider in determining appropriate design treatment are: traffic volume, speed of motor vehicles and street width.

- Design treatments to be considered for city bikeways are bicycle lanes, extra width curb lanes, wide shoulders, bicycle boulevards, and signage for local street connections (see Table 3.2 for guidelines for selecting bikeway facilities).
- On-street motor vehicle parking may be removed on city bikeways to provide bicycle lanes, except where deemed essential to serve adjacent land uses.
- All destinations along a city bikeway should have long- and/or short-term end-of-trip facilities to meet bicyclists' needs.
- Bikeways should be maintained to minimize surface hazards such as grates, potholes, and loose sand and gravel.
- Crossings of city bikeways and all other rights-of-way should be designed to minimize conflicts and provide adequate bicycle crossings.

### Central City Bikeways

Central City bikeways are city bikeways located in the central city, which includes the Lloyd Center, Lower Albina, the Central Eastside Industrial District, the River District, downtown, Goose Hollow, the University District, and North Macadam. Central City bikeways were identified through the Central City Transportation Management Plan.

## Bikeway Classification Descriptions

(continued)

### Local Service Bikeways

*Functional Purpose:* Local service bikeways are intended to serve as local circulation routes for bicyclists and provide access to adjacent properties.

All streets not classified as bikeways or off-street paths, with the exception of controlled access roadways, are classified as local service bikeways.

*Design Treatment & Traffic Operations:* Design treatments to be considered for local service bikeways are shared roadways, traffic calming, bicycle lanes and extra width curb lanes.

- On-street motor vehicle parking will not be removed on local service bikeways to provide bicycle lanes.
- Treatment to and operation of local service bikeways should not, as a side effect, create, accommodate or encourage additional through automobile traffic.
- Crossings of local service bikeways and all other rights-of-way should be designed to minimize conflicts and provide adequate bicycle crossings.

### Off-Street Paths

*Functional Purpose:* Off-street paths are designed to establish adequate and convenient routes for bicycling, walking and other non-motorized uses.

*Land Use and Development:* Off-street paths may be appropriate in corridors not well-served by the street system to create short cuts that link urban destinations and origins along continuous greenbelts such as rivers, park and forest areas, and other scenic corridors; and as elements of a community or citywide recreational trail plan.

*Design Treatment and Traffic Operations:* Specific guidance on the treatment of off-street paths can be found in the Design and Engineering Guidelines (Appendix A).

- off-street paths should be designed as separated facilities which can be shared with pedestrians and other non-motorized users.
- Landscaping and trail design for off-street paths in the Greenway should conform with the Zoning Code specifications for the Greenway Trail. Landscaping and trail design for off-street paths in the 40-Mile Loop should conform with the design guidelines for the 40-Mile Loop.
- Off-street paths should be protected or grade-separated at intersections with major roadways.
- Off-street paths should be identified through signing.

### Design Treatments

The word “bikeway” will be used in this plan to refer to classified city bikeways and off-street paths, which are shown on the bikeway network. All streets not classified as city bikeways or off-street paths, except limited access highways, are considered local service bikeways, which should still be designed to facilitate safe bicycle travel. Local service bikeways are not shown on the bikeway network.

## Bikeway Classification Descriptions

(continued)

As described above, the appropriate treatment for a city bikeway depends on motor vehicle traffic volumes and speeds and street width.

### City Bikeway Treatments

A **bicycle lane** is that portion of the roadway designated by eight-inch striping and bicycle pavement markings for the exclusive or preferential use of bicycles (see Appendix A). Examples include the Burnside Bridge, N Portsmouth, and SE 7th.

A **shoulder bikeway** is a street upon which the paved shoulder, separated by a four-inch stripe and no bicycle lane markings, is usable by bicycles. Although the shoulder can be used by bicycles, auto parking can be allowed on a shoulder. Examples currently include parts of Marine Drive and Airport Way west of I-205.

A **bicycle boulevard** is a shared roadway (bicycles and motor vehicles share the space without marked bicycle lanes) where the through movement of bicycles is given priority over motor vehicle travel on a local street. Traffic calming devices are used to control traffic speeds and discourage through trips by motor vehicles. Traffic control devices are designed to limit conflicts between automobiles and bicycles and favor bicycle movement on the boulevard street. Examples include SE Harrison/Lincoln and SE Clinton.

An **extra width curb lane** is a wider than a normal curbside travel lane provided to give extra room for bicycle operation where there is insufficient space for a bicycle lane or shoulder bicycle lane.

A **signed connection** is a bikeway upon which guide signing is placed to direct bicyclists to a destination or another bikeway. Signed connections are used on local, low-traffic streets where bicycle lanes or bicycle boulevards are not needed, and on and around major recreational cycling destinations, such as Rocky Butte, Council Crest, and Mount Tabor.

### Off-Street Paths

An **off-street path** is a bikeway that is physically separated from motorized vehicular traffic by an open space or barrier and either within the roadway right-of-way or within an independent right-of-way. Off-street paths are intended to provide adequate and convenient routes for bicycling, walking and other non-motorized uses. Off-street paths may be implemented in corridors not well served by the street system. Examples include the Westside Greenway Trail and the Springwater Corridor.

### Local Service Bikeway

Local service bikeways will in general be shared roadways, meaning no special treatment will be needed. However, depending on traffic volumes and speeds, some local service bikeways will require other treatments to facilitate safe bicycle travel. These treatments are bicycle lanes, extra width curb lanes, or traffic calming techniques.

## Other Definitions

The following definitions are adopted in the *Transportation Element* of the Comprehensive Plan and are useful for understanding the relationship between bikeways and other modes of traffic.

A **Regional Trafficway** serves interregional district movement with only one trip end in a transportation district or bypass a district completely.

A **Major City Traffic Street** serves as the principal route for traffic and emergency vehicle movements that have at least one trip end within a transportation district. Major City Traffic Streets should provide connections to Regional Trafficways and serve major activity centers within each transportation district.

A **District Collector** provides concentrated access to district activity centers and serve trips that both start and end in a district.

A **Neighborhood Collector** is intended to serve as a distributor of traffic from a Major City Traffic Street or District Collector Street to the local service Streets, and to serve trips that both start and end within an area bounded by Major City Traffic Streets and District Collector Streets.

A **Local Service Street** is intended to provide the following: distribute local traffic and emergency vehicle access; access to local residences or commercial uses, visual setting or entry way to land uses; pedestrian circulation system; meeting place for residences; and play area for children where a woonerf treatment (traffic calming) has been implemented.

There are also **Pedestrian Districts, City Walkways, Regional Transitways, Major City Transit Streets, Minor Transit Streets, Truck Districts, Regional Truck Routes, Major Truck Routes, and Minor Truck Routes.**

## Current State of the Portland Bikeway Network

As of January 1996, there were approximately 67 miles of bicycle lanes and 49 miles of off-street paths in the City of Portland (Table 3.1).<sup>1</sup> There were also approximately 30 miles of signed "bicycle routes" directing cyclists on neighborhood streets, with about 10 of these miles qualifying as bicycle boulevards. These existing bikeways are widely dispersed and do not form an interconnected network.

There are approximately 59 miles of planned bikeways, meaning projects for which funding has been committed and construction will likely begin by 1997. The bikeway network identifies all existing and planned projects (see bikeway network map).

**Current State of the Portland Bikeway Network**

*(continued)*

TABLE 3.1 **Existing and Planned Bikeway Network**

FACILITY	MILES
Existing bicycle lanes	66.8
Existing bicycle boulevards	9.7
Existing off-street paths	48.9
<b>Total existing bikeway miles</b>	<b>125.4</b>
Planned bicycle lanes	43.3
Planned bicycle boulevards	2.4
Planned off-street paths	13.2
<b>Total planned bikeway miles</b>	<b>58.9</b>
<b>Total existing and planned miles</b>	<b>184.3</b>

The current and planned bikeways exist on a street system (city- and state-owned roadways within the City of Portland) that includes 3,642 miles of paved streets. As of 1994, 67 percent (2457 miles) were local streets and 33 percent (1185 miles) were arterial streets (Neighborhood Collector, District Collector, Major City Traffic Street, and Regional Trafficway). It is assumed that most local streets are already comfortable for bicyclists (although some have been recommended for bicycle boulevard treatments). Approximately six percent of arterial streets have the appropriate treatment—bicycle lanes. Thus, 69 percent of Portland’s streets have appropriate facilities.

***Oregon Department of Transportation Highways***

There are close to 50 miles of state-owned highways within city limits. These include St. Helens Road (Highway 30), SE McLoughlin Boulevard, Martin Luther King Jr. Boulevard, NE Sandy Boulevard, 82nd Ave, Lombard, SW Barbur Boulevard, SW Macadam, SE Powell, and Grand Avenue. It is Oregon Department of Transportation (ODOT) policy that all their roads should have bicycle lanes, and most state-owned roads are considered bikeways on the City’s bikeway network. The City will work with ODOT to retrofit state roadways, and include and rank these roads on the Bicycle Master Plan proposed projects list later this section.

***Willamette River Bridges***

In 1994, Multnomah County adopted a plan for improved bicycle, pedestrian, and disabled access to the County-owned Willamette River bridges (Hawthorne, Morrison, Burnside, Broadway, and Sellwood Bridges), and the state-owned Ross Island and St. Johns Bridges. The Willamette River Bridges Accessibility Project recommended \$7,000,000 of bridges improvements, many of which will be implemented through a \$1,000,000 federal grant. Through state and local funds, some of the recommended improvements that are the City of Portland’s responsibility are already underway, including bicycle lane installations on the approaches to the Broadway, Burnside, and Hawthorne Bridges. Unfunded bicycle access projects within Portland’s jurisdiction are included on the project list and bikeway network.



**Current State of the Portland Bikeway Network**

*(continued)*

The railroad-owned Steel Bridge is being upgraded for bicycle access through a federal grant to construct a bicycle and pedestrian crossing on the lower deck.

**Central City Bikeways**

The Central City Transportation Management Plan (CCTMP) Bicycle Transportation Study was conducted in 1992-3. Staff conducted a survey to determine cyclists’ central city trip origins and destinations, which streets cyclists currently prefer to use, which streets cyclists would like to use, and the priorities for improvements. Staff also collected and analyzed data about central city street widths, volumes, intersections, maintenance needs (such as gratings needing replacement and potholes), signing, driveways, and other street characteristics affecting the cycling environment. The Portland Bicycle Advisory Committee and staff then worked with the technical advisory committee to recommend a network of bikeways, which were then incorporated into the plans for the other modes of transportation.

Improvements to the Willamette River bridges were rated the highest priorities by far; many of these intended improvements have been funded through Multnomah County, the state, and the federal government, as described above. The City also has funded a multi-year project called “Central City Bicycle Lanes,” with the intention of implementing the bicycle improvements identified

**TABLE 3.2 Guidelines for Selecting Bikeway Facilities for All New or Reconstructed Streets**

AVERAGE NUMBER OF VEHICLES PER DAY	TRANSPORTATION ELEMENT TRAFFIC CLASSIFICATION	RECOMMENDED BIKEWAY FACILITY
≤3000	Local Service Street	Street as is, unless specified on Bikeway Network as bicycle boulevard or signed connection.
>3000	Local Service Street	Bicycle lanes. Where not possible due to width constraints and parking needs, traffic calming improvements acceptable.*
≥3000 < 10,000	Neighborhood Collector	Bicycle lanes. Where not possible due to width constraints and parking needs, traffic calming improvements or wide outside lane acceptable.*
≥10,000 < 20,000	Neighborhood Collector and higher classifications Major & Minor Transit Routes Major & Minor Truck Routes	Bicycle lanes. Where not possible due to width constraints and parking needs, wide outside lane acceptable.*
≥20,000	Neighborhood Collector and higher classifications Major & Minor Transit Routes Major & Minor Truck Routes	Bicycle lanes. Where not possible due to width constraints and parking needs, a parallel alternative facility should be developed.

\* Traffic calming improvements or wide outside lane acceptable where any of the following conditions exist:

- It is not possible to eliminate lanes or reduce lane widths;
- Topographical constraints exist;
- Additional pavement would disrupt the natural environment or character of the natural environment;
- Parking is essential to serve adjacent land uses or to improve the character of the pedestrian environment.

Construction of a parallel bikeway within one-quarter mile is also an acceptable alternative where these constraints exist, as long as the parallel bikeway provides an equally convenient route to local destinations.

through the CCTMP within five years. The projects completed thus far include NE Multnomah, SE Hawthorne (eastbound to SE 12th), and the Lovejoy Ramp of the Broadway Bridge. Many other central city bicycle projects are underway (see project list this section).

## Safe Bicycle Passage on All Streets

All streets except limited access highways should be accessible by bicycle. Whenever streets are reconstructed or constructed, appropriate bikeway facilities must be included to accommodate bicyclists' needs. This is also a state law, ORS 366.514, adopted in 1971, which states that *"Footpaths and bicycle trails,<sup>2</sup> including curb cuts or ramps as part of the project, shall be provided wherever a highway, road or street is being reconstructed, constructed or relocated."* The law provides for exceptions and is written in its entirety in Appendix B.

The guidelines in Table 3.2 should be used to determine the appropriate treatment for all new or reconstructed streets. In general, the appropriate treatment for local streets with fewer than 3,000 motor vehicles per day, and not designated as bikeways, is the street as is (shared roadway); no special bicycle facility is necessary, although traffic calming may be necessary if volumes or speeds increase to an unacceptable level.<sup>3</sup> However, some local streets are recommended for bicycle boulevard modifications on the bikeway network.

For streets with more than 3,000 vehicles per day, the preferred treatment is bicycle lanes. Where bicycle lanes cannot be included (see Bicycle Lanes explanation next page for circumstances allowing for alternatives) the alternative treatments are traffic calming or wider than normal outside lanes. Where the appropriate bikeway and acceptable alternatives cannot be included in a project, bikeway facilities may be constructed on a nearby (within a quarter mile) parallel street.

Whenever a road is constructed or reconstructed, staff from the bureau managing the project should consult Table 3.2 to determine the appropriate bikeway facility to be installed.

## Bikeway Network Development

While all streets should be accessible by bicycle, and the appropriate facilities phased in as streets are constructed or reconstructed, the reality is that relying on street reconstruction for bikeway improvements will leave cyclists with few improvements in the foreseeable future. Streets are simply not rebuilt that often. Thus, to provide a bikeway system that attracts cyclists and helps realize the policy of integrating bicycling into daily life in Portland, the City must aggressively pursue development of a comprehensive, connected bikeway network—a system of selected streets on which bikeway facilities will be implemented.

The bikeway network is to provide a higher level of service for cyclists and encourage bicycle use. The network, including the recommended bikeway treatment for each segment, is proposed on the bikeway network Map.

## Bikeway Network Development

(continued)

**BICYCLE LANES** Bicycle lanes are to be implemented by 1) narrowing existing travel lanes; 2) removing a travel lane; 3) removing parking, except where it is essential to serve adjacent land uses; and 4) shoulder widening. Bicycle lanes may be implemented through stand-alone bikeway projects, through reconstruction or construction of roadways, and through routine resurfacing of roadways when the street configuration can be modified without parking removal or serious additional congestion (in which case a public process will be undertaken before bicycle lanes can be installed).

Some streets where bicycle lanes are the preferred treatment have circumstances that make bicycle lane installation very difficult. These circumstances include: 1) harm to the natural environment or character of the natural environment due to additional pavement; 2) severe topographical constraints; 3) economic or aesthetic necessity of retaining parking on one or both sides of the street; and 4) crippling levels of traffic congestion that would result from eliminating travel lanes or reducing lane widths. These circumstances are to be evaluated very carefully before a decision is made to implement an alternative treatment.

For example, before deciding that on-street parking is necessary, off-street (including driveways and garages) and alternative parking opportunities (such as parking on the opposite side of the street) must be investigated. As another example, a travel lane should be removed even if traffic congestion may increase, unless the congestion that may be caused by lane removal cripples the flow of people and goods.

Only if after careful investigation bicycle lanes are proven unfeasible, then traffic calming improvements, a wider outside lane, or alternative parallel bikeways may be substituted.

**BICYCLE BOULEVARDS** Bicycle boulevards are intended to provide an advantage for bicycles over motor vehicles, and as such, significantly improve the pedestrian environment. Bicycle boulevards are to be implemented on local streets, generally with fewer than 3,000 vehicles per day, through a combination of traffic calming, intersection treatments, and signing. Bicycle lanes are normally not used on a bicycle boulevard, thus little or no parking removal is proposed. The implementation of bicycle boulevards should not result in significant traffic diversion onto other local streets.

**OFF-STREET PATHS** Portland Parks Bureau and Metro's Greenspaces Program generally develop off-street paths linking urban origin and destinations along continuous greenbelts such as rivers and recreational trails. Many paths shown on the bikeway network are already planned for implementation, including the Eastside Esplanade and the Peninsula Crossing Trail. Other proposed paths are listed on the project list and are shown on the bikeway network map.

**SIGNED CONNECTIONS** Local streets providing short—generally, less than a half mile—connections between bikeways or between a bikeway and a destination will be delineated by guide signs. Some streets that are already signed as bicycle routes will be upgraded with either bicycle lanes or boulevards; signs on

## Bikeway Network Development

(continued)

the streets not on the bikeway network will be eliminated or improved over time to provide directional information about destinations and nearby bikeways. In addition, guide signs may be used to direct cyclists to and around recreational facilities or to an alternative route where the preferred street cannot be modified due to serious financial or topographical constraints.

**ARTERIAL STREETS CLASSIFICATION AND POLICY** The functional purpose and design treatment for bikeways is an adopted portion of the Arterial Streets Classification and Policy of the Comprehensive Plan *Transportation Element*. When a street is reconstructed, the street's classifications are reviewed and as many classifications as possible accommodated in project design and implementation. When constraints exist and all design treatments cannot be accommodated, decisions are made on a project-by-project basis. Further details on selecting the appropriate bikeway design treatment are given in Table 3.2 and in Appendix A, Bikeway Design and Engineering Guidelines.

The streets proposed in the bikeway network were selected with significant public input (see Appendix D, Methodology for Selecting Bikeways). Streets were included because they:

- Connect cyclists to desired destinations, such as employment centers, commercial districts, transit stations, institutions, and recreational destinations;
- Provide continuity with the regional System proposed by Metro, thus providing connections with neighboring bikeways in Multnomah, Washington, and Clackamas Counties.
- Provide the most direct and convenient routes possible;
- Provide a parallel bikeway approximately every half mile; and
- Target locations with the potential for implementation in the next twenty years.

The recommended bikeways have been compiled into a Bicycle Master Plan proposed projects list (later this section) showing project location, distance, and estimated cost, and are also shown on the bikeway network map.

## Maintenance

While implementing bikeway facilities is important, keeping them in good condition is equally important. When a bicycle lane becomes filled with debris, for example, cyclists are forced into the motor vehicle lane. Poor bikeway maintenance can contribute to accidents and deter potential cyclists unwilling to risk flat tires and skidding on city streets.

In March 1994, the City initiated the Bicycle Facility Improvement Program to respond to maintenance requests. In its first year, the Program responded to approximately 350 requests (Figure 3.1). The City fixed about 50 percent of the requests—mostly sweeping, road repair, signing/stripping, signal modifications, and grate repair. Approximately 25 percent of the requests were outside the City's jurisdiction and were forwarded to the appropriate authority. The City was

## Maintenance

unable to address approximately 25 percent of the requests that were either too expensive, too complicated, or investigation showed that action was not needed. All the requests for bicycle lane striping, shoulder construction, or other projects requiring larger sums of funding have been examined as part of this Plan.

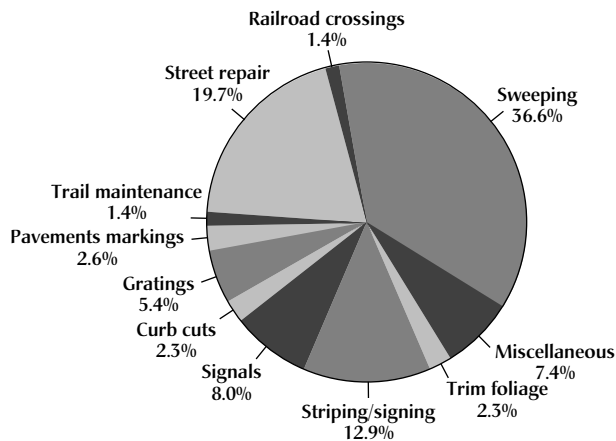
Over time, the City should be able to reduce the number of requests for routine maintenance such as sweeping by improving the amount of attention paid to the City's bikeways. The improvements routinely requested by cyclists through the Bicycle Facility Improvement Program should be considered high priorities

for regular maintenance. The Bicycle Program will provide an annual list of high priority streets to the Bureau of Maintenance for special consideration.

The majority of requests for bikeway maintenance annually come after the City lays gravel after winter ice storms. While the gravel presents little problem for motorists, it collects in bicycle lanes and on shoulders and causes a hazard, as well as a severe nuisance for cyclists. The City should prioritize gravel pick-up from bikeways as soon as possible after winter storms.

For more information about Maintenance Guidelines for bikeways, see Appendix A.

FIGURE 3.1 Maintenance Requests



## Railroad Crossings

Because of their tendency to grab and channelize bicycle tires, railroad crossings present a difficult challenge for bicyclists. Three main factors affect crossing safety: the angle of the crossing (the more oblique, the more dangerous the crossing); the surface quality (the more buckled the asphalt adjacent to the rails, the more dangerous); and the width of the flange between the pavement and rail is also a factor (the wider the flange, the more dangerous).

In the Fall of 1994, the Bicycle Program surveyed all railroad crossings in the City of Portland. Each crossing was rated based on its angle and surface quality, with additional consideration given to flange width. As shown on the Railroad Crossings Map, the crossings with a rating of one to four warrant immediate attention, those rated five to six need attention in the near future, and seven and above are reasonably safe.

The 222 crossings on the bikeway network should be considered of highest priority. Of these, about 75 are rated one to four, requiring immediate repair. Another 71 are rated five to six, requiring attention in the near future. The rest are considered reasonably safe.

The maintenance and repair of railroad crossings are the responsibility of rail companies for commercial rail lines, regulated by the Public Utility Commission, and Tri-Met for light rail. The Bicycle Program will work with the Public Utility Commission and rail companies to remove tracks that are not in use, repair crossings that are dangerous to cyclists, and install all new crossings to current standards.

**Traffic Signal Operations**

While most traffic signals in Portland change from green to yellow to red and back at preset times, some signals will not turn green until after the presence of a vehicle is detected. These often have pedestrian push buttons. To be detected at one of these, bicyclists need to be correctly positioned over a signal detector loop, which is sensitive wire buried in the pavement, usually in the shape of a diamond. The loop detects the presence of metal in a vehicle, then relays the information to a signal control box. Many bicyclists are unaware of the proper place to stand to be detected, and thus cycle onto the sidewalk to push the pedestrian button or run the red light when they tire of waiting for a signal that does not seem to detect them.

The City of Portland has about 400 intersections with signal detection for vehicles. About half of these intersections are “semi-actuated,” meaning only the side street or left-turn lane has the signal detection. The rest are “fully-actuated,” meaning all approaches and movements are actuated. Pavement loops can generally detect bicycles in the correct position, although the sensitivity of some may need to be increased. Bicycle-sized traffic signal detector loops are normally installed in bicycle lanes at intersections with signal detection.

The City has begun a process of installing pavement markings to indicate where bicyclists should stand, and will continue to improve the sensitivity of signals to bicyclists.

**Objectives and Action Items**

The following sections outline the objectives and action items needed to bring the bikeway network in Portland to levels adequate to serve present and future riders. Also included will be a discussion of the costs of implementing these objectives.

***Objective 6.12 A***

**Complete a network of bikeways that serves bicyclists’ needs, especially for travel to employment centers, commercial districts, transit stations, institutions, and recreational destinations.**

As of Spring 1996, approximately 184 miles of the bikeway network were either complete or planned (funding committed)—approximately 30 percent of the total 654 bikeway network miles. Below is displayed the number of new bikeway miles to be added to the network over the 20 year implementation period.

**Objective 6.12 A Benchmarks (Cumulative over time):**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
40% Complete	60% Complete	100% Complete
Approximately 252 bikeway miles	Approximately 378 bikeway miles	Approximately 630 bikeway miles

**Objectives and Action Items**

*(continued)*

**Objective 6.12 A Action Items:**

- Implement bikeway facilities as part of all transportation improvements, including road construction and reconstruction and other transportation projects (e.g., traffic calming improvements, intersection improvements). (Responsible parties: Portland Office of Transportation, private developers)
- Implement bicycle lanes on streets defined in the bikeway network (see bikeway network map) as part of routine resurfacing. (Responsible parties: Bureau of Maintenance, Bicycle Program)
- Fund and implement individual bikeway projects. (Responsible parties: Portland Office of Transportation, Bicycle Program)
- Develop and implement destination-based signing system for the bikeway network. (Responsible parties: Portland Office of Transportation, Bicycle Program)
- Continue to coordinate with the Oregon Department of Transportation, Metro, Clackamas County, Washington County, Multnomah County, and other jurisdictions and agencies to ensure appropriate bicycle connections are planned, constructed, and maintained. (Responsible parties: Bicycle Program, Metro, other jurisdictions)
- Periodically review City Bikeway Design and Engineering Guidelines (Appendix A) to ensure consistency with State and Federal Standards. (Responsible party: Bicycle Program)
- Consider innovative design treatments where appropriate, such as different colored and/or textured bicycle lanes, and advance bicycle stop lines at intersections. (Responsible parties: Portland Office of Transportation, Bicycle Program)
- Implement demonstration project that targets increased usage of a single or several high quality bikeways. (Responsible parties: Portland Office of Transportation, Bicycle Program)
- Coordinate with Portland State University, University of North Portland, Lewis and Clark College and Law School, and other higher education institutions on improvements in transportation services, particularly bicycle facilities. (Responsible parties: Portland Office of Transportation, Bicycle Program, higher education institutions)
- Support innovative funding efforts that may help implement bikeways, such as congestion pricing. (Responsible parties: Portland Office of Transportation, Metro, Oregon Department of Transportation)

**Objective 6.12 A Costs (Cumulative over time):**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
\$17,774,000	\$40,122,000	\$149,760,000

## Objectives and Action Items

(continued)

It costs approximately \$10,000 per mile to implement bicycle lanes on an existing curbed street, less if done after a routine overlay, more if signal modifications are needed. The cost of implementing bicycle lanes through shoulder widening is considerably higher and varies widely—depending on topography, geographical constraints, underground facilities, and right-of-way acquisition. Estimates done for this plan show average shoulder widening costs to be between \$200,000 and \$5,000,000 per mile, with most of the higher-end costs in Southwest Portland where significant topographical constraints exist. Bicycle boulevard implementation is estimated to cost \$20,000 per mile, up to \$100,000 if boulevard implementation involves addition of traffic control devices (e.g., traffic signals) at major intersections. Off-street paths cost between \$50,000 and \$500,000 per mile, depending on the need for right-of-way acquisition, topographical constraints, and drainage issues.

Implementation of the complete bikeway network is estimated to cost \$150,000,000 (Table 3.3), not including the portions of the network already complete or planned, and not including implementation of bikeways on State-owned roadways or Multnomah County bridges. The estimated costs will change as priorities for implementation of the bikeway network are established and the needs matched with future resources. The cost estimates shown are very rough.

The Bicycle Master Plan proposed projects list has been ranked using the following criteria:

- Land uses served: higher priority for projects that serve intensive land uses, trip generators, and commercial areas apt to attract bicyclists.
- Barriers overcome: higher priority for a bikeway that helps to overcome barriers such as river crossings (e.g. bridge improvements); freeway, arterial, or railroad crossings; and other “squeeze points” such as lacks of shoulders of high speed/volume roadways, complicated intersections, etc.
- Potential cyclist usage: higher priority for projects that have or are likely to have high cyclist usage.
- Connectivity: higher priority for projects that connect to existing or funded bikeways.
- Lack of parallel facilities: higher priority for those projects where an existing parallel route is not nearby;
- Ease of implementation: higher priority for those projects that will be relatively easy to implement (e.g. no contentious parking removal, signal modifications, other design issues).
- Topographical constraints: higher score for those projects without terrain that limits potential usage (e.g. steep slopes, limited access).



**Objectives and Action Items**

(continued)

The project list has been broken into three parts: priority one (within five years), priority two (within 10 years), and priority three (within 20 years) priority projects; the amounts shown above as benchmark costs reflect this breakdown.

This list should not be considered an absolute ranking; rather, it provides a general sense of each project’s priority given the state of the bikeway network today. No matter where a project is on the list, its implementation should be pursued at each opportunity.

**Objective 6.12 B**

**Provide bikeway facilities that are appropriate to the street classification, traffic volume and speed on all rights-of-way.**

Streets not designated as bikeways in the bikeway network should still be treated with the appropriate facility as delineated in Table 3.2 to ensure safe passage by bicycles on all streets. As explained earlier, 69 percent of city- and state-owned streets in Portland currently have the appropriate bikeway facility.

**Objective 6.12 B Benchmarks:**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
75% of streets have appropriate bikeway facility	85% of streets have appropriate bikeway facility	95% of streets have appropriate bikeway facility

**Objective 6.12 B Action Items**

- Implement appropriate bikeway facilities as part of all construction and reconstruction. (Responsible parties: Portland Office of Transportation, Bicycle Program, private developers)

**Objective 6.12 B Costs**

As most improvements will be made as part of street construction and reconstruction, the cost of the appropriate bikeway improvement will be an integral part of each project. Thus, the cost of achieving this objective will not be quantified.

TABLE 3.3 Recommended Bikeway Network Implementation Costs

FACILITY	ESTIMATED NUMBER OF MILES	ESTIMATED COSTS
Bicycle lanes, existing curbed streets	238	\$9,100,000
Bicycle lanes, shoulder widening	80	\$125,700,000
Bicycle boulevards	66	\$1,896,000
Off-street paths	39	\$13,260,000
Local street connections, signing only	22	\$44,000
<b>Total Recommended</b>	<b>445</b>	<b>\$150,000,000</b>
<b>Total Existing and Planned</b>	<b>185</b>	
<b>Total Existing, Planned, and Recommended Bikeway Miles</b>	<b>630</b>	

**Objectives and Action Items**

(continued)

**Objective 6.12 C**

Maintain and improve the quality, operation, and integrity of bikeway network facilities.

All bikeway network facilities should be well maintained, including regular sweeping, repair of potholes and other street surface problems, and replacement of problematic gratings. Traffic signal operation and railroad crossing improvements are other examples of needed operational priorities.

**Objective 6.12 C Benchmarks\***

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
Implement improved maintenance procedures such that requests decrease by 15%** from today's levels	Requests decrease by 50% from today's levels	Requests decrease by 75% from today's levels
100% of bikeways with signal detection tuned and retrofitted with pavement markings	50% of all signals with detection tuned and retrofitted with pavement markings	100% of all signals with detection tuned and retrofitted with pavement markings

\* No benchmark is included for railroad crossings as their repair is the responsibility of rail companies.

\*\* Increased awareness of the program may increase requests initially

**Objective 6.12 C Action Items:**

- Undertake routine maintenance of bikeway network facilities, particularly sweeping. (Responsible party: Bureau of Maintenance)
- Respond to requests for maintenance needs on bikeway network. (Responsible party: Bureau of Maintenance, Bicycle Program)
- Pick up gravel from bikeways as soon as possible. (Responsible party: Bureau of Maintenance)
- Ensure that road and bridge repair and construction do not disrupt the cycling environment. (Responsible party: Bureau of Maintenance, utilities, contractors)
- Provide better signage during construction to indicate work in progress, road or path conditions, and, if necessary, alternate route information. (Responsible party: Bureau of Maintenance, utilities, contractors)
- Examine and implement "Adopt-a-Bikeway" Program to improve level of maintenance on bikeways. (Responsible Party: Bicycle Program)
- Build new railroad crossings to bicycle standards, as specified in Appendix A, Section IV. (Responsible parties: Railroad companies, Public Utility Commission, Portland Office of Transportation, Oregon Department of Transportation)
- Encourage railroad companies to retrofit existing railroad crossings needing improvements. (Responsible parties: Public Utility Commission, Portland Office of Transportation, Oregon Department of Transportation, Bicycle Program)

## PROJECT LIST UPDATED JUNE 1998

## BICYCLE MASTER PLAN PROPOSED PROJECTS: FUNDED PROJECTS

PROJECT NAME	PROJECT LOCATION	TYPE
N Marine	East from Lombard to near Portland Road	Lane
N Lombard	Rivergate to Kelly Point Park	Lane
N Burlington	N Princeton to N Willamette	Lane
N Willamette	N Buchanan to N Portland	Complete
NE Broadway/Weidler	N Flint to NE 24th	Complete
NE 9th	NE Broadway to NE Lloyd	Complete
NE Multnomah	NE 16th to NE 21st	Complete
NE Irving/Glisan	NE 12th to NE 47th	Complete
NE 12th	E Burnside to NE Lloyd	Complete
SE Sandy	SE 7th to E Burnside	Complete
SE Ankeny	SE 6th to SE 28th	Complete
SE Madison	SE Martin Luther King, Jr. Blv to SE 12th	Complete
SE 16th	NE Irving to Ladd's Circle	Complete
NW Broadway	NW Hoyt to W Burnside	Complete
SW Broadway	SW Jefferson to I-405 overpass	Complete
SW Jefferson/Canyon	SW 1st to SW 18th	Complete
NW Naito Parkway	SW Market to NW 9th	Lane
NW Couch	NW 2nd to NW 19th	Boulevard
SE Bybee/28th	SE 17th to SE Woodstock	Complete
SE 28th/26th	SE Woodstock to SE Gladstone	Complete
SE 41st	SE Woodstock to SE Raymond	Complete
SE Woodstock	SE 32nd to SE 41st	Complete
SE Woodstock	SE 52nd to I-205 path	Complete
SE Duke	SE 52nd to SE 92nd	Complete
SE 52nd	SE Woodstock to SE Harney	Complete
SE Harney	SE 45th to SE 52nd	Complete
SE 45th/46th	SE Woodstock to SE Harney	Complete
SE Flavel	SE 52nd to SE 92nd	Complete
SE 92nd	SE Foster to city limit	Complete
SE Spokane/21st/Tacoma	SE Grand to Tacoma overcrossing	Boulevard
SW Canyon	SW Knights Blv to SW Skyline	Lane
SW 6th	SW Broadway to SW Sheridan	Complete
SW Barbur	SW Hamilton to Front	Lane (ODOT)
SW 4th/Barbur	SW Front to Sheridan	Complete
NE/SE 148th	I-84 to SE Powell	Complete
NE Sandy	NE 122nd to I-205 path	Lane (ODOT)
NE Lombard	NE Martin Luther King, Jr. Blv to NE 60th	Lane (ODOT)

**Note:** As of July 1998, the total cost of the remaining projects shown on the next three pages is estimated at \$146,503,000. The original estimate from May of 1996 was approximately \$150,000,000. The lower current projected cost reflects projects completed as well as revised estimates due to more current information.

## PROJECT LIST UPDATED JUNE 1998

## BICYCLE MASTER PLAN PROPOSED PROJECTS: PRIORITY 1 (FIRST 5 YEARS)

#	PROJECT NAME	PROJECT LOCATION	LENGTH (FT)	COST (\$1,000)
1	N. Greeley/Interstate	Going to Russell	10,027	\$200
2	SW Broadway	Burnside to Jefferson	3,061	\$8
3	NW 18th/19th	Burnside to Vaughn	8,750	Complete
4	SW Capitol	Barbur to Terwilliger	29,082	Ped Program
5	NE Sandy	Burnside to city limits	41,954	ODOT
6	Hawthorne Br Sidewalks	Widen sidewalks	1,300	\$1,300 (County)
7	SE Umatilla	7th to Tacoma xing	5,000	\$100
8	SW 2nd/3rd	Jefferson to Couch	7,500	\$15
9	NE Halsey	39th to 102nd	16,438	\$30
10	NE Marine Drive (I)	MLK to 47th	16,817	\$10,000
11	SW Moody	Bancroft to Gibbs	2,500	\$10
12	SE Woodstock	41st to 52nd	3,054	\$6
13	NW Front	NW 9th to end	24,200	\$75
14	SE Powell	SE 71 to I-205 trail	24,541	ODOT
15	NE Glisan	47th to 162nd	30,231	\$100
16	SE/NE 20s Bikeway	Dekum to Bybee	32,263	\$110
17	SW 1st	Jefferson to Arthur	3,750	\$10
18	NE/SE 102nd/Cherry Blossom	Halsey to Market	8,800	\$250
19	N Vancouver/Williams	MLK to Broadway	25,000	\$90
20	NW Lovejoy	NW 14th to NW 24th	4,541	\$30
21	NW Everett/Glisan	Front to 14th and 18th to 24th	10,560	\$30
22	SE McLoughlin Blvd.	SE 17th to Clatsop	17,271	ODOT
23	SE Stark/Washington	75th to city limits	30,450	\$350
24	SW 12th/13th	Montgomery to Couch	7,500	Complete
25	SW Salmon/Taylor/Madison/Main	18th to Hawthorne Br.	1,200	\$20
26	NE Tillamook	Flint to 92nd	25,000	\$250
27	NE/SE 40s Bikeway	Holman to Crystal Springs	39,541	\$190
28	N St Louis/Fessenden	Columbia Way to Willamette	3,179	\$8
29	SE Division Pl / 9th	7th to Center	5,000	\$16
30	SE Woodward/Clinton	51st to 92nd	10,909	\$130
31	NE Prescott (I)	Cully to I-205 trail	7,725	\$131
32	SW Bertha	Vermont to B-H Hwy.	1,300	\$368
33	N Going	Interstate to Basin	5,454	\$50
34	N/NE Ainsworth	Willamette to 37th	18,179	\$65
35	SW Barbur Blvd.	Bertha to city limit	10,000	ODOT
36	Sellwood Br lightpoles	Relocate lights, effectively widens sidewalk	1,200	\$280 (County)
37	SE Morrison/Belmont	Morrison Bridge to SE 12th	4,361	\$8
38	NE Marine Drive (II)	Airport to 122nd	12,725	\$1,000
39	Greenway Extension	Sellwood Br. to city limits	4,087	\$500
40	NE/SE 122nd	Marine to Prescott/Glisan to Market/Bush to Ramona	15,153	\$40
41	NW Vaughn	Nicolai to 23rd	3,179	Complete
42	N Denver	Ainsworth to Killingsworth	1,363	Complete
43	NE/SE 70s Bikeway	Killingsworth to Clatsop	32,225	\$439
44	SE 17th Avenue	Powell to city limits	13,633	\$100
45	N Interstate	Lombard to Greeley	12,376	\$35
46	N Portland Road	St. Louis to Richmond	2,271	\$1,400
47	E Burnside	28th to 74th	11,817	\$250
48	N Lombard	Reno to Columbia	5,909	\$25
49	N Ivanhoe	Columbia to Marine Dr.	6,817	\$7
50	SE Holgate	42nd to 136th	24,087	\$60
51	SW Macadam	Front to city limits	19,087	ODOT
52	NE Cully/57th	Prescott to Sandy	6,363	Complete
53	NE 57th	Sandy to Tillamook	1,658	\$10
53	NE 21st/20th	NE Weidler to NE Irving	2,367	\$4
54	SE Milwaukie	Odeon to Center	3,179	\$10
55	NE Killingsworth	42nd to Cully	9,807	Complete
			<b>TOTAL COST:</b>	<b>\$16,430</b>

## PROJECT LIST UPDATED JUNE 1998

## BICYCLE MASTER PLAN PROPOSED PROJECTS: PRIORITY 2 (5-10 YEARS)

#	PROJECT NAME	PROJECT LOCATION	LENGTH (FT)	COST (\$1,000)
1	N Portland Blvd	Willamette to 7th/Dekum	5,280	\$16
2	NE Alderwood	Columbia to Alderwood trail	6,363	\$400
3	NW 14th/16th	Couch to Thurman	11,700	Complete
4	NE 92nd	Halsey to Rocky Butte Rd.	2,271	\$250
5	SE Harrison/Mill	60th to I-205 trail	5,909	\$16
6	NE Broadway/Weidler	NE 24th to NE 28th	1,204	\$2
7	Morrison Br Pathway	Separated path on Morrison Bridge	1,300	\$1,270 (County)
8	NE/SE 50s Bikeway	Tillamook to Harney	31,350	\$130
9	NE Knott	Williams to 39th	10,909	\$35
10	SE 11th/12th	Burnside to Odeon	13,633	\$85
11	NE 47th/42nd	Cornfoot to Siskiyou	13,900	\$1,600
12	NW Bridge Rd.	St. Helens to St. Helens	4,541	\$2,655
14	SE Hawthorne	12th to 53rd	11,363	\$35
15	NE 148th	Marine Dr. to I-84	6,664	\$20
16	NE Klickitat/Siskiyou	7th to Rocky Butte Rd.	21,363	\$65
17	N Lagoon/Channel	entire length	8,633	\$28
18	SW Capitol /Lesser	49th to city limits	7,674	\$3,773
19	NE 33rd	Columbis Slough to Lombard	2,271	\$7
20	Burnside Br Esplanade Ramp	Burnside Bridge to Eastside Esplanade	500	\$1,070
21	N Fessenden	St. Louis to Portsmouth	8,179	\$26
22	Burnside Br Waterfront Ramp	Burnside Bridge to Waterfront Park	500	\$1,070
23	N Basin	entire length	7,725	\$25
24	NE 82nd	Columbia to Airport Way	2,725	\$10
25	SE Taylor / Belmont / Yamhill	44th to I-205 trail	12,725	\$35
26	NW Overton	12th to 24th	4,087	\$20
27	SE Water	Stark to Division	6,363	Complete
28	NE/SE MLK/Grand	Division to Columbia Slough	41,363	ODOT
29	Sellwood Br Eastside Underxg	Ramps to cross Tacoma	1,000	\$160
30	NW 24th	Everett to Vaughn	4,087	Complete
31	SE Salmon/Taylor	SE 52nd to 60th	3,516	\$40
32	NE Couch	Grand to 32nd	5,000	\$50
33	N. Willis/Kilpatrick	Portsmouth to Denver	8,850	\$28
34	SE 136th	Division to Foster	9,500	\$1,500
35	N Force / Broadacre / Victory	Marine Dr. to Denver	10,909	\$20
36	SW Taylors Ferry (II)	Terwilliger to Macadam	5,000	\$1,800
37	N Willamette	Buchanan to Reno	6,363	\$20
38	SW Hamilton	SW Terwilliger to SW Corbett	2,044	\$1
39	NE Cully	Prescott to Columbia	5,000	\$910
40	SE Ellis	Foster to 92nd	1,817	\$382
41	NE Prescott (II)	I-205 trail to 122nd	8,179	\$1,000
42	N/NE Lombard	St. Johns Br. to MLK	24,541	ODOT
43	N/NE Skidmore	Interstate to Cully	20,000	\$65
44	NE/SE 82nd	Columbia to city limits	22,271	ODOT
45	SW Taylors Ferry (III)	Capitol to city limits	5,909	\$1,500
46	SE Harold	52nd to Foster	7,271	\$200
47	SE Holgate	McLoughlin to SE 42nd	8,921	\$17
48	SE Gladstone/Center	SE 42nd to 72nd	7,948	\$15
49	NE Fremont	NE 7th to Vancouver	2,800	\$5
50	N Columbia Blvd	Lombard to MLK	29,451	\$95
51	N Pensinular/Villard	Columbia to Ainsworth	5,000	\$20
52	NE Alameda	Klickitat to 72nd	10,000	\$35
53	SE Market/Mill/Main	SE 72nd to city limit	31,158	\$240
54	SE Crystal Springs	Bybee to Springwater corr.	7,725	\$20
55	SW 49th	Capitol to city limits	2,400	\$500
56	NE Tillamook/San Rafael	Gateway to 148th	13,000	\$1,300
			<b>TOTAL COST:</b>	<b>\$22,096</b>

## PROJECT LIST UPDATED JUNE 1998

## BICYCLE MASTER PLAN PROPOSED PROJECTS: PRIORITY 3 (10-20 YEARS)

#	PROJECT NAME	PROJECT LOCATION	LENGTH (FT)	COST (\$1,000)
1	SW Pomona	Capitol to 35th	3,633	\$1,800
2	SW Stephenson	35th to Boones Fy.	10,454	\$3,479
3	SW 30th	B-H Hwy. to Vermont	5,000	\$931
4	SW Taylors Ferry (I)	35th to Terwilliger	7,271	\$4,900
5	SW Boones Ferry Rd.	Terwilliger to city limits	10,508	\$4,900
6	SW Kingston	Jefferson to Knights	10,000	\$40
7	SW Arnold	35th to Boones Fy.	6,363	\$3,479
8	SW 7th / Sellwood	Spokane to Bybee	3,633	\$5
9	NE Sullivans Gulch trail	parallels I-84 from Willamette River to I-205	27,725	\$2,500
10	W Burnside	23rd to city limits	11,817	\$265
11	SW Vermont (II)	45th to Terwilliger	10,000	\$36
12	SW Sunset Blvd.	Dosch to Capitol	5,909	\$3,136
13	SW 45th Drive	Taylors Fy. to Cameron	10,909	\$5,194
14	SW Hamilton	Scholls Fy. to Dosch	8,400	\$4,410
15	SW Dosch	Patton to B-H Hwy.	6,363	\$4,165
16	SW Vermont (I)	Oleson to 45th	5,000	\$3,185
17	NW/SW Skyline	Canyon to city limits	33,426	\$5,000
18	SW Shattuck	Vermont to Patton	9,087	\$4,655
19	NW Cornell	30th to city limits	6,817	\$1,000
20	SW 35th	Stephenson to Taylors Fy.	6,363	\$2,450
21	SE 92nd	Stark to Lincoln/Powell to Foster	10,357	\$20
22	SW Boone's Fy	SW Taylor's Fy to Terwilliger	2,843	\$5
23	NE/SE 162nd	Sandy to Halsey/Stark to Powell	14,668	\$40
24	SW Terwilliger	SW Palater to city limit	4,695	\$9
25	SE Division	SE 52nd to SE 82nd	7,612	\$14
26	SW Spring Garden	Taylors Fy. to Capitol	6,817	\$4,165
27	SW Palatine Hill Rd	SW Boone's Fy to city limit	8,651	\$10,000
28	SE 174th	SE Stark to city limit	10,460	\$20
29	SW Fairview	Kingston to city limits	10,000	\$2,000
30	NE Cornfoot	Alderwood to 47th	7,725	\$1,392
31	SE Harney Dr.	52nd to Flavel	2,350	\$1,252
32	SW Garden Home	Capitol to Oleson	11,750	\$4,018
33	SE Division	SE 122nd to city limit	14,010	\$27
34	SE Foster	SE 90th to SE 122nd	9,248	Complete
35	SW Veteran's Hospital	Terwilliger to Sam Jackson Park Rd	3,505	\$7
36	SE Foster	SE 136th to city limit	13,278	\$2,515
37	SW Patton	Scholls Fy. to Vista	10,000	\$5,390
38	SE Steele	26th to 52nd	5,454	\$20
39	SW Humphrey	Dosch to Canyon	6,200	\$4,000
40	SW Montgomery	11th to Council Crest	7,271	\$7
41	SW Corbett	Pendleton to 1st to Arthur	10,000	\$20
42	SE Tolman	28th to 52nd	6,363	\$20
43	SW Cameron	Shattuck to 45th	9,087	\$1,568
44	SW Virginia	Taylors Fy. to Pendleton	3,633	\$12
45	SE 111th/112th	Mt. Scott to Market	21,817	\$1,755
46	SW 12th/Davenport/Broadway	SW Montgomery to Vista	9,776	\$4,508
47	SE Barbara Welch Road	SE Foster to city limit	5,288	\$1,002
48	SE Jenne Road	SE Foster to city limit	1,773	\$336
49	SE Clatsop	SE 162nd to SE 132nd	7,825	\$1,482
50	SW 55th/Pomona/Pasadena	SW Taylors Ferry to Barbur	6,647	\$2,000
51	SW 48th/Alfred	SW Taylor's Ferry to 55th	2,701	\$500
52	SW 61st/62nd	SW Taylors Ferry to Pomona	4,187	\$1,000
53	SW 35th	SW Vermont to Barbur	7,009	\$2,250
54	SW Illinois	SW Shattuck to SW 45th	4,034	\$1,000
55	NE Russell	N Interstate to Martin Luther King, Jr.	3,913	\$1
			<b>TOTAL COST:</b>	<b>\$107,880</b>

## Objectives and Action Items

(continued)

- Work with the Public Utility Commission to adopt a proactive railroad crossing standard for bicycles and to induce the railroad companies to make needed changes. (Responsible parties: Public Utility Commission, Railroad companies, Oregon Department of Transportation Bicycle Program, City of Portland Bicycle Program)
- Install pavement marking at signals with detector loops to instruct cyclists where to stop to activate detection. (Responsible parties: Bicycle Program, Bureau of Maintenance, Traffic Management–Signals)
- Tune signals with detector loops to detect bicyclists. (Responsible party: Bureau of Traffic Management–Signals)
- Install and maintain traffic loops in bicycle lanes on streets with signal detection loops. (Responsible parties: Bicycle Program, Bureau of Maintenance, Bureau of Traffic Management–Signals)
- Consider installation of separate bicycle phasing in some locations, as well as the use of “queue jumping” technologies. (Responsible party: State legislature, Bureau of Traffic Management–Signals)

### Objective 6.12 C Costs:

Maintenance costs will generally be absorbed into the budget of the Bureau of Maintenance, with additional support from the Bicycle Program. Ideal maintenance attention on bikeways is estimated to cost approximately \$2,000 per mile per year, including sweeping, striping, street repair, and pavement markings. Much of this cost is covered through routine maintenance of streets.

Retrofit of each railroad crossing costs between \$5000 and \$15,000. Using a median cost of \$10,000 per crossing, the cost to retrofit the 146 targeted crossings will be \$1,460,000. The railroad companies are responsible for ensuring the safety of their crossings. The cost of retrofitting crossings will thus be borne by the railroads, with city support where appropriate.

The cost of installing each signal detector pavement marking is approximately \$60. There are approximately 400 intersections to analyze, with varying numbers of signal loops to be tuned and marked with bicycle pavement markings. Because many loops are located in places bicyclists would not need to worry about (e.g., industrial areas), it is estimated that about 200 intersections will need attention, with a typical intersection of two loops. The estimated cost is thus \$24,000 to analyze, tune, and mark these signal loops.

### Endnotes

<sup>1</sup> These include bikeways on roads owned by the Oregon Department of Transportation within City or Portland limits: St. Helens Road (Highway 30) and SE Powell bicycle lanes and the I-205 and I-84 off-street paths.

<sup>2</sup> The State interprets the outdated terms “footpaths and bicycle trails” to mean “walkways and bikeways.” “Bicycle and Pedestrian Plan,” Oregon Department of Transportation, draft, December 1994.

<sup>3</sup> More information on traffic calming for local and arterial streets is available from the City of Portland Traffic Calming Program.



BICYCLE MASTER PLAN

# End-of-Trip Facilities

## Introduction

Every bicycle trip has two basic components: the route selected by the cyclist, and the “end-of-trip” facilities available at the destination. These end-of-trip facilities include parking for the bicycle and showers and changing space for commuters. If the end-of-trip facilities do not meet the users’ needs, other means of transportation will be substituted.

In a nationwide Harris Poll conducted in 1991, 42 percent of the respondents said that they had ridden a bicycle in the past year. Of this group, almost half said that they would sometimes commute to work by bicycle, or commute more often, if there were showers, lockers, and secure bicycle storage at work. Similarly, 21 percent of the respondents in a 1992 Portland bicycle user survey cited a lack of end-of-trip facilities as a reason for not riding a bicycle to the downtown area. Clearly, the availability of convenient, secure bicycle parking is a critical factor in an individual’s decision whether or not to use a bicycle for commuting.

Good, secure bicycle parking offers these benefits:

- it inexpensively and efficiently increases a building’s parking capacity;
- it serves those who use bicycles as a mode of transportation; and
- it encourages bicycle use.

Cyclists’ needs for bicycle parking range from simply a convenient piece of street furniture, to storage in a bicycle locker that affords weather, theft and vandalism protection, gear storage space, and 24-hour personal access. Where a cyclist’s need falls on this spectrum is determined by several factors:

- **Type of trip being made:** whether or not the bicycle will be left unattended all day or just for a few minutes.
- **Weather conditions:** covered bicycle parking is apt to be of greater importance during the wetter months.
- **Value of the bicycle:** the more a cyclist has invested in a bicycle, the more concern she or he will show for theft protection. Most new bicycles cost \$400-500, and often considerably more.



## Introduction

(continued)

- **Security of area:** determined by the cyclist's perception of how prone a given area is to bicycle theft. This is fairly subjective, and probably predicated to a degree on an individual's experiences with bicycle theft. Over 1,000 bicycle thefts are reported annually citywide.

A final need for some potential commuting cyclists are shower, locker, and changing rooms at trip destinations. For those cyclists needing to dress more formally, travel longer distances, or cycle during wet or hot weather, the ability to shower and change clothing can be as critical as bicycle storage.

## End-of-Trip Facilities Definitions

Common terms describing end-of-trip facilities are defined below.

**SHORT-TERM PARKING** Bicycle parking meant to accommodate visitors, customers, messengers and others expected to depart within two hours. Requires approved standard rack, appropriate location and placement, and weather protection.

**LONG-TERM PARKING** Bicycle parking meant to accommodate employees, students, residents, commuters, and others expected to park more than two hours. This parking is to be provided in a secure, weather-protected manner and

TABLE 4.1 **Bicycle Parking Typology**

TYPE	FUNCTION	CHARACTERISTICS	EXAMPLE*
I personal or limited access enclosure	Long Term	<ul style="list-style-type: none"> <li>• highest level of theft protection available</li> <li>• weather protection</li> <li>• locked enclosure or room with individual/very limited access</li> </ul>	<ul style="list-style-type: none"> <li>• bicycle locker</li> <li>• storage room</li> </ul>
II high security rack	usually Long Term (off street)	<ul style="list-style-type: none"> <li>• accommodates locking of bicycle frame with standard U-shaped lock</li> <li>• design reasonably safeguards bicycle from damage if it is accidentally pushed</li> <li>• offers additional theft security by shielding lock</li> <li>• may secure one or both wheels</li> <li>• best in off-street, limited pedestrian use areas</li> </ul>	<ul style="list-style-type: none"> <li>• three point locking</li> </ul>
III normal security rack	Short Term (can be used for long term where additional security measures are provided)	<ul style="list-style-type: none"> <li>• accommodates locking of bicycle frame with standard U-shaped lock</li> <li>• design reasonably safeguards bicycle frame and wheel from damage if it is accidentally pushed</li> <li>• design is compatible for pedestrian area installation</li> <li>• security is only as good as the user lock</li> </ul>	<ul style="list-style-type: none"> <li>• ribbon rack</li> <li>• freestanding</li> <li>• bike rail</li> </ul>
X substandard rack designs*	Unacceptable	<ul style="list-style-type: none"> <li>• does not allow frame of bicycle to be easily locked with standard U-shaped lock</li> <li>• often designed to hold only wheel of bicycle</li> <li>• design does not adequately safeguard bicycle from damage if it is pushed</li> </ul>	<ul style="list-style-type: none"> <li>• all traditional and wheelholder bike racks</li> </ul>

\* See Figure 4.1 for illustrations of the different rack types, both approved and substandard designs. Some types may not be shown, and may or may not be acceptable depending on whether they meet the design criteria.

## End-of-Trip Facilities Definitions

(continued)

location. Long-term parking type will be either a bicycle locker, a locked room with standard racks and access limited to bicyclists only, or standard racks in a monitored location.

**STANDARD RACK** A non-enclosed rack that is designed to reasonably protect the wheels from accidental damage and allows use of a high security U-shaped lock to lock the frame and one wheel (see Table 4.1, “Bicycle Parking Typology”).

**SECURE** As invulnerable as possible to theft, depending on an appropriate combination of parking type, location, and access.

**PLENTIFUL** Enough short- and long-term bicycle parking spaces to exceed peak season demand.<sup>1</sup> Requests for additional bicycle parking, beyond existing code requirements, are to be met by the property owner.

**EASILY-ACCESSIBLE** Per Portland’s zoning code, bicycle parking should not be impeded by nearby stationary objects, parked bicycles or parked cars.

Indoor bicycle parking must be on a floor that has an outdoor entrance open for use and a floor location that does not require stairs to access the space; exceptions may be made for parking on upper stories with elevator access within multi-story buildings.

Directional signs should be used to locate bicycle parking areas when it is not visible from the street.

**ADJACENT TO DESTINATIONS** Short-term bicycle parking should be located no farther from the main entrance than the closest auto parking, and within 50 feet of a main entrance to the building. Close proximity to a main entrance is desirable for long-term parking but is not required.

**COVERED** Having sufficient shelter to protect the parked bicycle from the elements, particularly rain.

**SHOWER AND LOCKER FACILITIES** Any facility providing showers, changing space, and permanent clothes storage lockers sufficient to the needs of bicycle commuting employees.

## The Current State of End of Trip Facilities in Portland

### *Bicycle Parking*

#### **Central City Area Bicycle Parking**

Much of the bicycle parking found in Portland’s central city is the result of a vigorous installation program conducted by the Bicycle Program in the Office of Transportation’s Bureau of Traffic Management. Throughout the central city, there are more than 1,100 city-installed short-term parking spaces (mostly on sidewalks), 300 privately-installed short-term spaces, over 600 long-term spaces, and 145 additional long-term spaces in the form of bicycle lockers.

Unfortunately, many spaces intended for long-term parking (not including bicycle lockers) do not comply with existing city code and do not provide adequate security. A 1993 survey of central city bicycle parking spaces revealed that only 41 percent of long-term spaces meet all code requirements and only 62 percent

## The Current State of End of Trip Facilities in Portland

(continued)

provide adequate security against theft. The overlap of those long-term spaces that both meet code requirements and provide adequate security is only 14 percent, or approximately 90 parking spaces.

### Outside Central City Area Bicycle Parking

The City has installed approximately 600 short-term spaces outside the central city.

In the winter of 1995, the Bicycle Program conducted a bicycle parking survey in all of Portland's commercial and industrial districts outside the central city.

The survey investigated those elements of bicycle parking required by Portland's zoning code, by assessing:

- total number of off-street automobile and bicycle parking spaces;
- total number of covered off-street automobile and bicycle parking spaces;
- bicycle rack type;
- bicycle parking cover;
- bicycle rack visibility;
- signage for racks not readily visible; and
- rack location.

The main findings of the survey were:

1. Total bicycle parking amounts to only three percent of available off-street automobile parking (current city code calls for bicycle parking equal to five percent of available off-street automobile parking).
2. Two of every five bicycle racks (41 percent) are an inadequate type; bicycle parking meeting existing city code requirements amounts to only two percent of available off-street automobile parking.
3. Office buildings and retail businesses provide the least amount of bicycle parking, at only two to three percent of off-street automobile parking.
4. Municipal buildings provide the most bicycle parking at nine percent of off-street motor vehicle parking.
5. Over 88 percent of all addresses surveyed provided no bicycle parking.
6. Forty percent of the "covered" bicycle spaces still allowed bicycles to get wet in the rain.
7. Less than two percent of bicycle parking is adequate for long-term parking.
8. Most bicycle parking was clearly visible from the street (83 percent) and placed in a good location (82 percent). None was indicated by a sign and 13 percent was poorly placed; five percent was so poorly placed as to invite the theft of any bicycle parked there.

## The Current State of End of Trip Facilities in Portland

*(continued)*

The results of this survey point to gross deficiencies in the availability of adequate bicycle parking outside the central city. Many existing racks violate city code because they do not protect a bicycle's wheels from damage or are poorly placed. When the racks do meet the letter of city code—as with the provision of cover—the intent of the code is often not realized.

These results also point to deficiencies in Portland's zoning code that need to be addressed to foster increased bicycle use. Deficiencies in the current code include:

- inadequate level of required bicycle parking;
- inadequate provision for long-term parking;
- no mechanism to provide bicycle parking for other than new development; and
- inadequate provisions for code enforcement.

A plan to address these deficiencies and hence achieve sufficient bicycle parking will be discussed later under "Objectives and Action Items."

### **Bicycle Parking at Primary, Middle and Secondary Schools**

Two features characterize the present state of bicycle parking at schools: lack of and/or substandard racks and an environment that actively discourages students from cycling to school due to bicycle vandalism and/or theft and traffic problems near schools. Vandalism and theft are due, in part, to poor placement of bicycle racks plus inadequate locking devices and techniques used by students. The lack of adequate racks is a result of many factors, including the absence of a zoning code requirement prior to 1990, the lack of code enforcement, the lack of capital with which to purchase bicycle racks, a perceived lack of need in some cases, and a view on the part of some school administrators and parents that bicycle riding is a low priority and/or unsafe means of transportation.

There are approximately 68,000 students from five school districts with 110 schools within Portland's city limits. As of early 1995, the problems associated with bicycle riding to schools, including inadequate parking, had begun to be addressed at 20 schools by a coalition of school principals, the Community Cycling Center, the Bicycle Transportation Alliance, the City of Portland Bicycle Program, and volunteers. As of Summer 1995, this coalition was working to install 200 bicycle parking spaces at these participating schools and to initiate regular, escorted rides to each. In addition, the City's Traffic Calming Program has been installing traffic calming devices around schools on high traffic speed streets to increase safety.

### **Bicycle Parking at Other Institutions**

Other institutions in Portland—primarily hospitals and colleges—have both long-term needs for employees and students, and short-term needs for visitors. Institutions are allowed to develop master plans that, in part, determine the amount of bicycle parking they are to provide. For these listed institutions, the amount of parking provided meets or exceeds existing code requirements (see Table 4.2).

## The Current State of End of Trip Facilities in Portland

(continued)

### Bicycle Parking and the Transit System

To achieve a greater bicycle-transit link, three types of transit facilities need bicycle parking: light rail stations, transit centers, and park-and-ride lots. As of February 1996, within the City of Portland, there were four permanent park-and-ride lots owned by Tri-Met, two transit centers, and 15 light rail stations, six of which are outside the central city. Tri-Met leases park-and-ride space from a number of private entities to provide an additional seven park-and-ride lots within Portland's city limits.

Tri-Met, in conjunction with the City of Portland Bicycle Program, has installed and maintains a total of 24 bicycle lockers at four park-and-ride lots/light rail stations. Those stations are: Gateway, which is both a transit center and park-and-ride facility (eight bicycle lockers/eight rack spaces); 122nd Avenue (four bicycle lockers); and Barbur Boulevard (four bicycle lockers). Their occupancy averaged approximately 30 percent from July 1994 to January 1995. Tri-Met owns a fourth park-and-ride lot at Parkrose that presently has no bicycle lockers. Of the two other transit centers in Portland—Hollywood and Coliseum—the first has eight bicycle lockers and additional bicycle rack spaces, the latter has none.

### Bicycle Parking at Multi-Family Residential Buildings

There are almost 2,500 multi-family residential complexes in Portland of five units or more, containing approximately 60,000 individual dwelling units (as of August 1994). No survey has been conducted to determine availability of short- and long-term bicycle parking at these facilities. It is assumed that the smallest complexes (those with five to nine units) have the best arrangements for long-term bicycle parking, and the largest complexes (those with 100+ units) have the worst. The other complexes will, as a group, fall on this continuum based on their size.<sup>2</sup>

### Bicycle Parking at Special Events and Recreational Destinations

Many special events attract bicycle riders, including sporting events, festivals throughout the city, especially along Waterfront Park, and various trade shows. Over the past several years, some special events in Portland have had temporary, attended long-term bicycle parking. The event sponsors provide a fence-enclosed area, the City of Portland Bicycle Program provides wooden barricades to which bicycles are locked, and volunteers from the Bicycle Transportation Alliance staff these parking enclosures to guard against bicycle theft.

TABLE 4.2 Bicycle Parking at Selected Institutions

INSTITUTION	BICYCLE PARKING SPACES PROVIDED
Lewis and Clark College	355
Portland Community College/Sylvania	160
Portland Community College/Cascade	50
Portland State University	300
Kaiser Hospital	25
Legacy/Emanuel Hospital	87
Providence Hospital	58

## The Current State of End of Trip Facilities in Portland

(continued)

Recreational destinations include the many city parks, community centers, pools, and other points of interest. All city parks and recreation facilities require some bicycle parking, especially where much of the park is inaccessible to bicycles, it is impractical to bicycle around, or there is an inside destination. In the Winter 1995, the Bicycle Program, together with the City's Bicycle Advisory Committee, began working with the Parks Department to assist in the provision and placement of bicycle parking. Some facilities listed below (Table 4.3) may already have adequate bicycle parking, or may have varying degrees of demand for bicycle parking, so the appropriate amount to provide will need to be determined.

### *Showers and Changing Facilities for Commuting Cyclists*

As of Spring 1996, there existed three publicly-accessible facilities providing showers for commuting bicyclists: The Lloyd Athletic "Lockerbreak", a private co-op called "Bike Central", and a city sponsored "Bike Central" station at the YWCA downtown (described below).

Some commuting cyclists are served by showers and changing spaces at their workplaces. Some workplaces allow for the permanent storage of work clothing and provide secure bicycle parking. There is no existing zoning code in Portland requiring showers and changing space for cycling commuters.

As many as six additional shower, changing and bicycle parking facilities throughout the central city—Bike Central locations—are expected to open by the Summer of 1996. These facilities, like the YWCA, are planned as cooperative ventures between the City, athletic clubs and automobile parking providers, and will accommodate 250 commuters. However, the demand for such facilities in the downtown and Lloyd Districts is likely to be quite a bit higher.

## Objectives and Action Items

The following section outlines the objectives, action items, benchmarks, and costs needed to bring bicycle end-of-trip facilities in Portland to levels adequate to serve present and future riders.

TABLE 4.3 Needed Recreational Facility Parking Improvements

COMMUNITY CENTERS	OTHER FACILITIES	POOLS
Fulton Park & Community Center	Crystal Springs Rhododendron Gardens	Abernethy
Hillsdale Community Center	Washington Park (all facilities)	Columbia
Montavilla Park Community Center	Willamette Park restrooms	Creston
Peninsula Park Community Center	Interstate Firehouse Cultural Center	Grant
Overlook Community Center	Metro Performing Arts—Rice	MLC
St. Johns Community Center	Portland Tennis Center	Pier
University Park Community Center	Metro Performing Arts—Laurelhurst	Wilson
Sellwood Community Center	Pittock Mansion	Woodlawn
Woodstock Community Center	Forest Park access points	Buckman

## Objectives and Action Items

(continued)

### **Objective 6.12 D**

Provide short- and long-term bicycle parking in commercial districts, along Main Streets, in employment centers and multifamily developments, at schools and colleges, industrial developments, special events, recreational areas, and transit facilities such as light rail stations and park-and-ride lots.

The basis for defining plentiful short- and long-term bicycle parking is the City's proposed zoning code for bicycle parking, the numbers for which are shown in Table 4.4. This code was proposed in the Spring of 1994 after over three years of committee work involving school officials, home builders, developers, business representatives, bicycle activists, other residents, and city staff. The proposed code has not been adopted as of this writing. The code proposal would also potentially add bicycle parking to the list of items that existing buildings must upgrade if reconstructing (with a maximum expenditure of ten percent of building costs, and only if the construction cost is greater than \$10,000).

#### **Commercial<sup>3</sup> Parking**

Comparing the proposed bicycle parking code for commercial uses to the existing automobile parking code shows that on average, for every 100 required automobile parking spaces, approximately 12 bicycle parking spaces would be required.<sup>4</sup> The ratio between short- and long-term bicycle parking was determined by weighting the proposed code's requirements for short- and long-term bicycle parking by the actual number of spaces, by land-use type, assessed in the bicycle parking survey.

For commercial areas outside Portland's central city, an estimated 6,200 new or upgraded bicycle parking spaces will be needed. Of this total, 3,200 (59 percent) will be short-term spaces and 3,000 (41 percent) will be long-term.

The central city is generally doing well in terms of short-term bicycle parking. However, it is sorely in need of long-term parking to encourage more bicycle commuting. An estimated 4,500 long-term parking spaces will be required in the central city to service ten percent of the downtown commuters living within a five-mile radius.<sup>5</sup> This brings the total number of required spaces to 10,700, including approximately 7,500 long-term spaces and 3,200 short-term spaces.

#### **Elementary, middle, and high schools**

A total of approximately 4,300 bicycle parking spaces at Portland's schools will need to be implemented to comply with the proposed city code for bicycle parking.

#### **Transit stations**

Tri-Met has already achieved much of this objective. As explained in Section V, Tri-Met and the City of Portland Bicycle Program will be working cooperatively to increase parking availability to meet the growing demand. The action items related to this objective are discussed in Section V.

**Objectives and Action Items**

(continued)

**Multi-family residential buildings**

Using the proposed code requirement of one long-term bicycle parking space per four multi-family dwelling units, an estimated 11,325 long-term spaces should be installed over the 20-year implementation period. Additionally, an estimated 5,420 short-term parking spaces will be required, based on the assumption that there are essentially no short-term spaces at existing multi-family complexes.

**OBJECTIVE 6.12 D BENCHMARKS (CUMULATIVE OVER TIME)**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
20 percent of required bicycle parking	40 percent of required bicycle parking	100 percent of required bicycle parking
<b>Commercial parking</b>		
636 short-term spaces	1,272 short-term spaces	3,181 short-term spaces
1,498 long-term spaces	2,997 long-term spaces	7,492 long-term spaces
<b>School parking</b>		
2,159 long-term spaces	3,238 long-term spaces	4,317 long-term spaces
<b>Multi-family dwelling unit parking</b>		
1,084 short-term spaces	2,168 short-term spaces	5,419 short-term spaces
2,265 long-term spaces	4,530 long-term spaces	11,325 long-term spaces
<b>Special events and public recreational facilities parking</b>		
All special events and public recreational facilities supply plentiful bicycle parking		

The benchmarks establish that approximately one-fifth of all required bicycle parking should be in place within the first five years following Master Plan adoption. Remaining required parking would be phased in over time. This proposed phased-in approach is based on the 1993 Bicycle Parking Task Force recommendations.

**OBJECTIVE 6.12 D ACTION ITEMS**

- Adopt proposed zoning code (as shown in Table 4.4), phased-in over time, including increasing number of spaces, increasing the amount of adequately covered spaces, and improving definitions for acceptable types and siting of racks (Responsible party: Planning Bureau, Bicycle Program, City Council).
- Adopt a code mechanism to force compliance with bicycle parking requirements in existing buildings that do not comply with the bicycle parking code. (Responsible party: Planning Commission, City Council).
- Proactively install short- and long-term bicycle parking in the public right-of-way (Responsible party: Bicycle Program).
- Consider offering no-cost long-term bicycle parking, such as bicycle lockers and other types of lockable enclosures. (Responsible party: Bicycle Program)
- Investigate the usability of short-term or day-use bicycle lockers. (Responsible party: Bicycle Program)



**Objectives and Action Items**

(continued)

**TABLE 4.4 Recommended Zoning Code Minimum Required Bicycle Parking Spaces**

BICYCLE PARKING*		
USE CATEGORIES	LONG TERM SPACES	SHORT TERM SPACES
<b>Residential Categories</b>		
Household Living		
Multi-Unit Dwellings	1 per dwelling unit	2, or 1 per 10 dwelling units
Multi-Unit Dwellings w/private garage	None	2, or 1 per 10 dwelling units
Retirement Center Apartments	1 per 4 dwelling units	_____
Group Living	2, or 1 per 10 residents	None
<b>Commercial Categories</b>		
Retail Sales & Service	2, or 1 per 8,000 ft2 floor area	2, or 1 per 5,000 ft2 floor area
Office	2, or 1 per 3,000 ft2 floor area	2, or 1 per 10,000 ft2 floor area
Quick Vehicle Servicing	2, or 1 per 3,500 ft2 floor area	None
Vehicle Repair	2, or 1 per 5,000 ft2 floor area	None
Commercial Parking Facilities	10, or 1 per 20 auto spaces	None
Commercial Outdoor Recreation	10, or 1 per 20 auto spaces	None
Major Event Entertainment	10, or 1 per 40 seats or per CU review	None
<b>Industrial Categories</b>		
Manufacturing	2, or 1 per 7,500 ft2 floor area	None
Warehousing	2, or 1 per 20,000 ft2 floor area	None
<b>Institutional Categories</b>		
Light Rail Stations and Transit Centers (Outside of the Central City Plan District)	8	None
Park and Ride Lots	10, or 5 per acre	None
Community Service	2, or 1 per 6,000 ft2 floor area	2, or 1 per 5,000 ft2 floor area
Essential Service Providers		
Transit Transfer Centers	4, or 10 per acre	
Schools		
High Schools	4 per classroom	None
Middle Schools	2 per classroom	None
Elementary Schools	2 per 4th & 5th grade classroom or per CU or IMP review**	None
Colleges	2, or 1 per 20,000 ft2 floor area, exclusive of dormitories and structured parking, plus 1 per dormitory unit, or per CU review	None
Medical Centers	2, or 1 per 7,000 ft2 floor area or per CU or IMP review	2, or 1 per 20,000 ft2 floor area or per CU or IMP review
Religious Institutions	2, or 1 per 2,000 ft2 floor area	2, or 1 per 2,000 ft2 floor area
Daycare Uses	2, or 1 per 10,000 ft2 floor area	None
Parks & Open Areas	per CU review	per CU review
<b>Other Categories</b>		
Agriculture	None	None
Aviation Facilities, Detention Facilities	per CU review	per CU review
Mining, Radio and TV Towers, Utility Corridors	None	None

\* Note: Wherever this table indicates some number of spaces or a ratio, whichever will result in the greater number of spaces will apply.

\*\* Institutional Master Plan Review Schools can request an adjustment through Conditional Use.

## Objectives and Action Items

(continued)

- Work with private automobile parking providers to create supervised, for-pay, long-term bicycle parking spaces as an expansion of the supervised parking provided as part of the Bike Central program (Responsible party: Bicycle Program).
- Work with Portland colleges and universities to promote bicycle commuting and to assist in purchasing and siting long- and short-term bicycle parking (Responsible parties: Bicycle Program, area colleges and universities)
- Encourage innovative bicycle parking facility designs, such as covered bicycle sheds in existing motor vehicle parking spaces or at neckdown intersections (Responsible party: Bicycle Program)
- Install bicycle racks to bring all elementary, middle, and high schools up to code requirements. (Responsible party: Area schools, Bicycle Program, private sponsors).
- Establish a program to assist multi-family dwelling complex owners in purchasing and siting long-term bicycle parking (Responsible party: Bicycle Program, multi-family dwelling complex owners).
- Work with community bicycle organizations to create permanent relationships for provision of temporary, long-term bicycle parking at special events (Responsible party: Bicycle Program, Bicycle Transportation Alliance, events sponsors).
- Work with Portland Parks Bureau to provide short- and long-term bicycle parking at recreational destination “attractors” requiring bicycle parking, beginning with the facilities listed in Table 4.3 (Responsible parties: Bicycle Program, Parks Bureau).

### OBJECTIVE 6.12 D COSTS

A summary of the estimated costs for bicycle parking installation is shown in Table 4.5.

For most uses, short-term spaces are estimated to cost \$60 per space; this cost can vary from as little as \$25 for a hanging rack to more than \$100 per space for certain rack types. Long-term spaces are estimated at \$600 per space; though bicycle lockers usually cost more than \$600, the average cost of long-term spaces will be lower as many businesses can provide less expensive long-term bicycle parking (i.e., dedicated rooms with bicycle racks, supervised parking with less-expensive racks, etc.).<sup>6</sup>

Estimated overall costs for installing an estimated 10,700 additional bicycle parking spaces over the 20-year period for commercial districts, main streets, employment centers, industrial developments, and higher education institutions will be \$4.8 million in current dollars, split between the public (11 percent) and private sectors (89 percent).

At schools, the City is currently working to install 200 bicycle parking spaces at 20 participating schools, at \$60 per space. However, considering the cost of

## Objectives and Action Items

(continued)

installing cover, a cost estimate of \$150 per space to provide long-term bicycle parking at schools is used.<sup>7</sup>

The public sector will likely bear all costs for bicycle parking installation at the public schools, by either the City of Portland Bicycle Program, or by the five Portland school districts. Private sponsors may be sought to help defray these costs. The total cost of \$648,000 works out to an average cost of \$420 per classroom served (\$21 per classroom per year over the 20-year period).

For multifamily dwellings, the total cost over the 20-year period is estimated to be \$325,150 for 5,420 short-term and \$6.8 million for 11,325 long-term spaces. The private sector will bear the lion's share at \$7 million (98 percent of total costs). This will amount to an estimated cost of \$150 per unit served over the 20-year period, \$8 per unit per year, or \$0.65 per unit per month over the 20-year period.

TABLE 4.5 Bicycle Parking Spaces and Costs

YEARS FROM START	5	10	20	TOTAL
PERCENT OF REQUIREMENTS	20%	40%	100%	
<b>Commercial</b>				
Total Short-Term	636	1,272	3,181	3,181
Total Long-Term	1,498	2,997	7,492	7,492
Additional Short-Term	\$38,172	\$38,172	\$114,517	\$190,861
Additional Long-Term	\$989,050	\$899,050	\$2,697,151	\$4,585,251
<b>TOTAL COSTS</b>	<b>\$1,027,222</b>	<b>\$937,222</b>	<b>\$2,811,667</b>	<b>\$4,776,112</b>
<b>Public Installation</b>				
Short-Term	636	2,136	4,045	4,045
Long-Term	450	450	450	450
<b>Private Installation</b>				
Short-Term	0	0	0	0
Long-Term	1,048	2,547	7,042	7,042
<b>COSTS</b>				
Public Sector	\$398,172	\$90,000	\$114,517	\$602,689
Private Sector	\$629,050	\$899,050	\$2,697,151	\$4,225,251
<b>Schools</b>				
Total Long-Term	2,159	3,238	4,317	4,317
<b>TOTAL COSTS</b>	<b>\$323,810</b>	<b>\$161,905</b>	<b>\$161,905</b>	<b>\$647,620</b>
<b>Multi-family dwelling complexes</b>				
Total Short-Term	1,084	2,168	5,419	5,419
Total Long-Term	2,265	4,530	11,325	11,325
Additional Short-Term	\$65,030	\$65,030	\$195,089	\$325,149
Additional Long-Term	\$1,358,993	\$1,358,993	\$4,076,978	\$6,794,963
<b>TOTAL COSTS</b>	<b>\$1,424,022</b>	<b>\$1,424,022</b>	<b>\$4,272,067</b>	<b>\$7,120,112</b>
<b>Public Installation</b>				
Short-Term	864	864	4,115	4,115
Long-Term	0	0	0	0
<b>Private Installation</b>				
Short-Term	220	1,304	1,304	1,304
Long-Term	2,265	4,530	11,325	11,325
<b>COSTS</b>				
Public Sector	\$0	\$0	\$195,089	\$246,917
Private Sector	\$1,372,194	\$1,424,022	\$4,076,978	\$6,873,194

**Objectives and Action Items**

(continued)

**Objective 6.12 E**

Provide showers and changing facilities for commuting cyclists. Support development of such facilities in commercial buildings and at “Bike Central” locations.

**OBJECTIVE 6.12 E BENCHMARKS**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
Accommodate 250 commuters at the Downtown and Lloyd districts “Bike Central” locations	Showers and changing facilities available to all commuting cyclists needing such accommodations	

**OBJECTIVE 6.12 E ACTION ITEMS**

- Work with private business transportation coordinators and business owners to promote bicycle commuting (Responsible parties: Bicycle Program, DEQ Air Quality Division, businesses).
- Create “bonus” provisions in the city code to encourage developers of larger properties to provide showers, changing space and bicycle parking above the minimum requirements (Responsible party: Planning Bureau, City Council).<sup>8</sup>
- Recruit additional health, athletic and fitness clubs to participate in the Bike Central program (Responsible parties: Bicycle Program, athletic and fitness clubs).
- Establish commuter facilities, providing a minimum of secure parking, showers, and changing rooms in private work places (Responsible parties: Bicycle Program, health clubs, parking providers).

**OBJECTIVE 6.12 E COSTS**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
\$350,000 for “Bike Central” facilities	Not yet determined	Not yet determined

*Endnotes*

<sup>1</sup> The idea here is to provide enough parking so that cyclists can always find a parking space. Direct observation of bicycle parking during peak times at the peak season is how demand is measured.

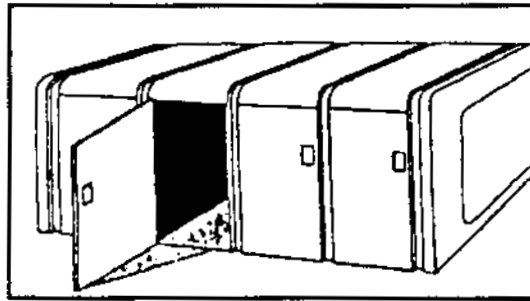
<sup>2</sup> This assumption is based on the notion that smaller buildings will generally permit easier access for tenants to carry bicycles into their dwelling units. For example, residents on the upper floors of a large multi-family dwelling complex will be hard-pressed to carry a bicycle to their unit, especially if it is not allowed through a lobby and onto an elevator, which is often the case. The same resident in a smaller building will generally need to carry a bicycle up, at most, four to five floors.

<sup>3</sup> “Commercial,” as used here, refers to Commercial Districts, Main Streets, and Employment Centers.

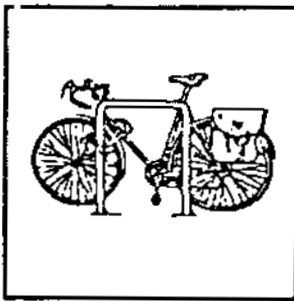
<sup>4</sup> Portland’s 20-year goal is to increase bicycle transportation to ten percent of modal share for all trips. The 12:100 ratio of bicycle parking to off-street automobile parking (equivalent to 12 percent) represents the average ratio across land uses of proposed minimum required bicycle parking (both long-term and short-term as detailed in Table 4.4) to minimum required off-street automobile parking (as defined in Title 33 of Portland’s zoning code). This ratio allows sufficient bicycle parking at any one location to service maximum demand periods, which can easily exceed ten percent of available automobile parking. Second, on-street automobile parking is not considered in this equation. Third, code-required minimum off-street automobile parking has been, and will continue to decrease in conjunction with the region’s desire to reduce automobile use; bicycle parking, which will be tied to land uses and floor space, will continue to increase as a percentage of off-street automobile parking.

- <sup>5</sup> The Bike Central Draft Plan, available from the City's Bicycle Program, includes an estimate of 37,500 downtown commuters who live within a five-mile radius. Ten percent is the target modal share for bicycles for all trips.
- <sup>6</sup> The total cost of creating an additional 6,200 parking spaces in sectors outside the central city is estimated to be \$2 million current dollars over the 20 year period. The total cost of creating an additional 4,500 bicycle parking spaces in the central city is estimated to be \$2.7 million current dollars over the 20-year period.
- <sup>7</sup> Proposed city code defines long-term bicycle parking facilities at schools as standard racks that are covered as bicycle lockers are simply too costly and not the best option for most schools. Actually building rack cover costs approximately \$200 per space; however, based on the experience of placing bicycle racks in school for the past year, it is estimated that half of school bicycle parking will make use of existing cover, reducing average cover cost to \$100 per space. Therefore, a cost estimate of \$150 per space was used (\$50 per rack space and \$100 average cost per space to cover).
- <sup>8</sup> This concept has been adopted as part of the City of Eugene's zoning code.

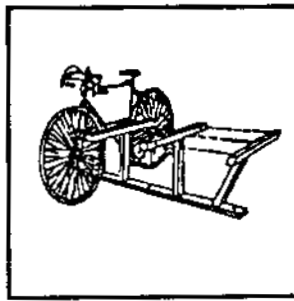
FIGURE 4.1 Common Bicycle Parking Racks



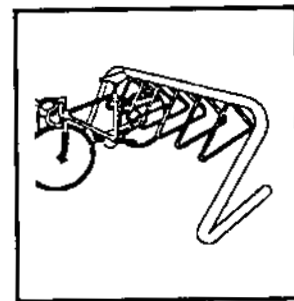
Bicycle Locker



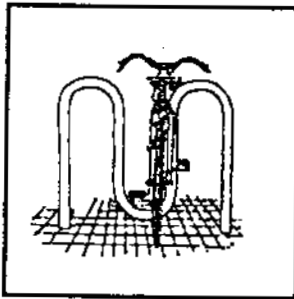
Bike Rail



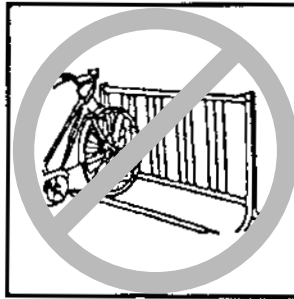
3-pt. Locking



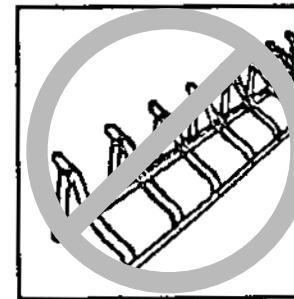
Freestanding



Ribbon Rack



Traditional  
(SUBSTANDARD)



Wheelholder  
(SUBSTANDARD)



BICYCLE MASTER PLAN

# Bicycles and Transit

## Introduction

Tri-Met, Portland's mass transit agency, manages most of the aspects related to bicycle-transit integration. Tri-Met provides bicycle parking at transit stations and Tri-Met-owned park-and-ride lots. Tri-Met also created and administers the bicycles-on-transit program, which allows bicycles to be carried on-board MAX and via racks on Tri-Met buses. The City's Bicycle Program joins with Tri-Met in these efforts by promoting bicycle-transit services, providing bikeways to transit stations, and administering bicycle locker rentals.

This section is written with the cooperation of Tri-Met, and is intended to establish action items toward which the City of Portland Bicycle Program and Tri-Met will jointly work to achieve.

### *Improving the Bicycle-Transit Link*

Improving the bicycle-transit link is an important part of making bicycling a part of daily life in Portland. Linking bicycles with mass transit (both bus and rail) overcomes such barriers as lengthy trips, personal security concerns, and riding at night, in poor weather, or up hills. This link also enables bicyclists to reach more distant areas and increases transit ridership on weekends and midday.

The bicycle-transit link can also make access to transit less expensive. In suburban communities, population densities are often too low to offer transit service within walking distance (one-quarter mile) of every commuter. Within the last twenty years, many transit agencies have built expansive motor vehicle park-and-rides as an alternative to costly feeder bus service. But as cities fight to maintain air quality and transit agencies tighten their budgets further, the concept of park-and-rides and "kiss-and-rides" is being re-examined. Many of the auto trips to park-and-rides are less than two miles—an easy bicycling distance. Bicycling to transit instead of driving benefits communities by reducing taxpayer costs, air pollution, demand for park-and-ride land, energy consumption and traffic congestion with relatively low cost investments.

There are four main components of bicycle-transit integration:

- allowing bicycles on transit;
- offering bicycle parking at transit locations;
- improving bikeways to transit; and
- encouraging usage of bicycle and transit programs.

## Current State of Bicycles and Transit

In the United States, Portland has been in the forefront of the move to integrate bicycling with transit ridership. Bikes-on-Tri-Met has had success by implementing the following:

- bicycle accessibility on all buses and light rail cars
- bicycle lockers at most park-and-rides and some transit centers; and
- an aggressive bicycles-on-transit marketing strategy

A brief description of the bicycle and transit programs implemented by Tri-Met and the Bicycle Program follows. For details on the bikeway network (Bicycling to Transit) see Section III. For details on the end-of-trip facilities (Bicycle Parking at Transit) see Section IV. For details on the encouragement and education efforts, see Section VI.

### *Bicycling to Transit*

Local and national surveys show that the biggest barrier to more frequent cycling, in general, is a lack of bikeways.<sup>1</sup> Traditionally, transit stations have not been viewed as major destinations for bicyclists; thus few safe and convenient bikeways from neighborhoods to transit stations have been developed. Such bikeways, along with secure bicycle parking at transit stations and bicycles-on-transit, are the keys to attracting bicycle commuters to transit from suburban and urban communities.

The City of Portland plans to improve the availability of bikeways to transit. Section III outlines the proposed network of bikeways that will serve transit stations as major destinations. In addition, Metro, the regional government entity, is working to encourage mixed-use developments around transit and better bikeway planning around transit locations throughout the region. Planning and implementing bicycle-to-transit routes is clearly an area of opportunity for Portland in the future.

### *Bicycle Parking at Transit*

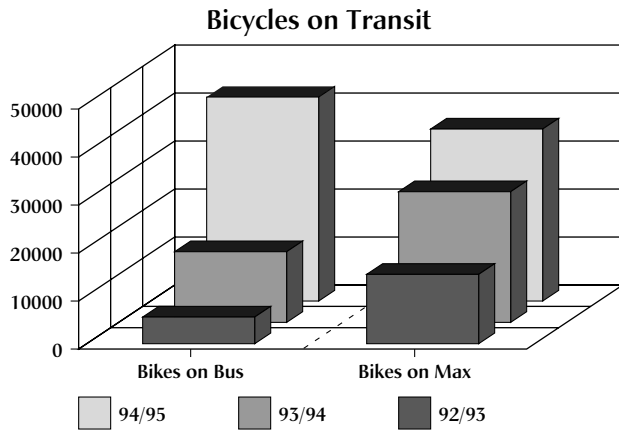
The second component of promoting bicycle-transit integration is secure bicycle parking at transit stations. At Portland metro-area transit stations (both bus and light rail), Tri-Met has added bicycle parking to meet the growing demand. It has provided between four and eight bicycle lockers at seven MAX light rail stations, one bus transit center, and three bus park-and-rides. A few light rail stations have bicycle racks. On average, close to 40 percent of the lockers are rent-



## Current State of Bicycles and Transit

(continued)

FIGURE 5.1 **Bicycles on Transit**



ed (Table 5.1); usage is higher in summer months than in winter. Usage will likely increase in the future as bikeways are improved and potential users become more aware of locker availability. Indeed, according to a survey of Bikes-on-Tri-Met permit holders, seventy percent would park their bicycles at a park-and-ride lot or transit center if secure parking was available. Although automobile parking is free at all Portland-area park-and-ride lots (all lots are

unattended), most cyclists were willing to pay a locker fee to guarantee the safety of their bicycles.

The Westside MAX park-and-ride stations under construction in 1995-7 will implement bicycle parking at a ratio of five percent of auto parking spaces. The amount of future locker installations will depend on local jurisdictional zoning requirements, most of which also place bicycle parking at about five percent of auto parking. Tri-Met is investigating limited access bicycle parking rooms as an alternative to lockers in structured parking garages.

### *Bicycles on Transit*

Tri-Met has been a national leader in promoting bicycles on the transit system. In July 1992, at the request of 5000 residents organized by the Bicycle Transportation Alliance, Tri-Met initiated a bicycles-on-transit program allowing cyclists to bring their bicycles on board MAX and use front-mounted bus racks. During fiscal year 1994/95 (July 1, 1994 to June 30, 1995), more than 35,400 people took their bicycles on MAX, an average of 97 per riders day. During the same period, 42,700 bicycles on bus trips were made averaging more than six trips per permit holder (see Figure 5.1). This increase is due, in part, to the increasing numbers of buses with the front-mounted rack, as

TABLE 5.1 **Existing Bicycle Locker Rentals**

LOCATION	AVERAGE # OF LOCKERS RENTED JULY-DEC 94	TOTAL LOCKERS AVAILABLE
<b>Max Stations:</b>		
Cleveland Avenue	2.6	4
Gresham Central	1	4
Gresham City Hall	.5	4
181st Ave.	1.3	4
122nd Ave.	.16	4
Gateway	2.3	8
Hollywood Transit Center	5	8
<b>Others:</b>		
Beaverton Transit Center	4.5	8
TV Hwy—West Beaverton Park & Ride	3	4
Barbur Blvd Transit Center	0	4
Tualatin Park & Ride	0	4
<b>Total</b>	<b>20.36</b>	<b>56</b>

**Current State of Bicycles and Transit**

*(continued)*

well as to Tri-Met’s promotional efforts. As of February 1995, all buses were outfitted with the bicycle racks.

The program’s regulations are as follows:

- Bicycles are allowed on light rail cars at all hours except weekday rush hours. Six bicycles are allowed on each two-car train; two on a one-car train.
- Bicycles are allowed at all hours on the front-mounted bus racks.
- Bicyclists must purchase a \$5 permit, watch a short instructional video, and demonstrate that they can use the bicycle racks. To load their bicycles, bicyclists must show the permit to bus drivers and have it available on MAX. Over 6,300 permits have been sold to date. According to a Tri-Met survey, most permit holders feel that the amount of instruction given was adequate and useful.

TABLE 5.2 **Permit Sales for Tri-Met Bicycles on Transit**

BICYCLES ON TRI-MET PERMITS	1994/95	1993/94	1992/93
# of Permits Sold	4,848*	2,758	1,349

\* Includes permit renewals

There have been very few reported problems with the bus-bicycle system. Bus drivers report minimal delays and minor technical problems, and bicyclists are overwhelmingly positive about the system.

Tri-Met has been working to improve the bicycles-on-transit system in response to cyclists’ comments. For example, while initially cyclists were required to stand with their bicycles on MAX, Tri-Met now allows them to strap their bicycle to the hand-rest bar and sit if seats are available. Tri-Met is also considering relaxing and/or eliminating the peak-hour restrictions on MAX, as well as eliminating the permit system. Tri-Met has already worked to make the permit process more convenient by offering the permits through bicycle shops.

***Encouragement and Education Efforts for Bicycles and Transit***

Tri-Met is present at many of the bicycle-related special events in Portland encouraging bicyclists to use the existing facilities and educating new riders on the benefits of linking bicycle and transit trips. Tri-Met also has instituted a “Bicycle Buddy” program. This is a computerized matching service that matches a bicyclist with someone who lives and works near them and who would like to bike to work. Tri-Met also advertises the availability of transit-bicycle services through newspapers and bus ads.

## Objectives and Action Items

### **Objective 6.12 F**

#### **Increase the number of bicycle-transit trips.**

Increasing the number of bicycle-transit trips will improve the bicycle mode share as well as Tri-Met's ridership. However, Tri-Met must also consider operational efficiency and safety as high priorities. Given the number of buses and light rail lines anticipated to be in operation over the next 20 years and considering the time delays of increased bicycle-on-transit usage, Tri-Met anticipates being able to handle an increase in the numbers of bicycles on transit. However, the actual projected numbers are unavailable at this time.

#### **OBJECTIVE 6.12 F BENCHMARKS:**

No benchmarks; Tri-Met has not developed a long-range bicycle/transit plan.

#### **OBJECTIVE 6.12 F ACTION ITEMS:**

- Support and promote Tri-Met's Bicycles-on-Tri-Met program.

Tri-Met's Bicycles-on-Tri-Met Program has been a tremendous success. The City should continue to offer Tri-Met its support, while promoting Tri-Met's bicycle services at every turn. The City should distribute Tri-Met's brochures at all public gatherings and actively promote Tri-Met's programs.

- Assist Tri-Met in providing and promoting long-term parking in the transit system to encourage bicycle use.

The City should continue to work with Tri-Met to provide and promote the existing bicycle lockers at transit stations and park-and-ride lots. Tri-Met will provide bicycle parking to meet Zoning Code requirements (Table 4.2, Section IV) and will increase bicycle parking as demand rises. The City should continue to administer Tri-Met's bicycle lockers and work with Tri-Met to provide monthly and day-use long-term bicycle parking at park-and-ride lots leased by Tri-Met as demand rises.

#### **OBJECTIVE 6.12 F COSTS**

The costs of increasing the amount of bicycle-transit trips include providing bicycle racks on all new buses, administering and promoting the Bicycles-on-Tri-Met program, and adding bicycle parking spaces. As most of these costs will be borne by Tri-Met, no cost estimates will be made here.

Contact Tri-Met at 239-3044 for more information.

#### *Endnotes*

<sup>1</sup> Bicycle Facility Preference Survey, Portland, Spring, 1994. "A Trend on the Move: Commuting by Bicycle," Bicycling Magazine, 1991.



BICYCLE MASTER PLAN

# Education and Encouragement

## Introduction

Education is an important element in increasing bicycling while also improving safety. People often assume that as cycling increases, so will the number of crashes. This need not be the case as has been demonstrated in other cities. Probably the most effective way to improve the safety of cycling is simply to improve the quality of Portland's bikeway facilities, as has been described in previous chapters. For example, bicycle lanes result in less competition for road space between bicycles and motor vehicles, while bicycle boulevards mean lower motor vehicle speeds and volumes. However, bikeways cannot do it alone; there is also a need for proper *education* of both youth and adult cyclists and motorists.

The word "education" has many different facets when it comes to bicycling. This section will address these three education components:

- Developing safe cycling skills in children;
- Teaching adult cyclists their rights and responsibilities; and
- Teaching motorists how to more effectively share the road with cyclists.

Education goes hand-in-hand with *encouragement* to increase cycling; together they improve skills and raise awareness. For example, a bicycle commute day encourages more people to ride for transportation purposes, but it also teaches urban riding skills and the importance of wearing a helmet. Teaching children cycling skills and the importance of wearing a helmet builds confidence as riders and encourages them to ride more both as children and future adults.

Encouragement includes such measures as:

- Providing a bikeway network, end-of-trip facilities, and bicycle-transit services as has been discussed in Sections III, IV, and V.
- Holding encouragement events, such as bicycle commute days, business challenges (Eugene), BikeFest (Portland), Bicycle in the Rain Day (Portland), BikeWeek (Boulder), and mass bicycle rides (Montreal, Seattle).
- Providing incentives, such as cash bonuses, discounts at shops for cycling there or advocacy group membership, and other nonfinancial incentives.
- Providing information and/or maps with recommended cycling routes, end-of-trip facilities, bicycles-on-transit services, education programs, and other bicycle related activities.

## Introduction

(continued)

In addition, the greater the presence of cyclists on the road, the more aware motorists will become; over time both should gain comfort around each other and do a better job sharing the road. Because education and encouragement work so closely together, this section addresses both.

### ***Bicycle-Motor Vehicle Crash Information***

Many potential bicyclists cite the fear of traffic as their main objection to riding a bicycle on urban streets. The City can help alleviate this fear by providing good bikeway facilities. However, many concerns about cycling’s level of danger are based on misconceptions.

**MISCONCEPTION #1** *Most bicycle crashes involve an automobile.*

In fact, the vast majority of bicycle crashes do not involve a motor vehicle; rather, 65 to 85 percent of all bicycle crashes involve falls or collisions with stationary objects, other cyclists, or pedestrians. Approximately 150 bicycle-motor vehicle crashes per year are reported in Portland, with the number of crashes decreasing since 1987 and leveling off since 1990 (Figure 6.1 and Bicycle-Motor Vehicle Crash Location Map).

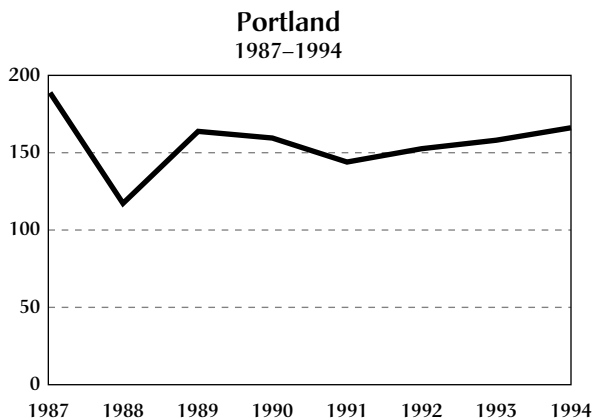
**MISCONCEPTION #2** *A crash between a cyclist and a motor vehicle driver will inevitably be fatal.*

In fact, death of a bicyclist occurs in only two percent of all bicycle-motor vehicle crashes in Portland. According to recent studies, wearing a helmet can reduce the risk of serious head injury by as much as 85 percent.

**MISCONCEPTION #3** *Bicyclists are often hit from behind.*

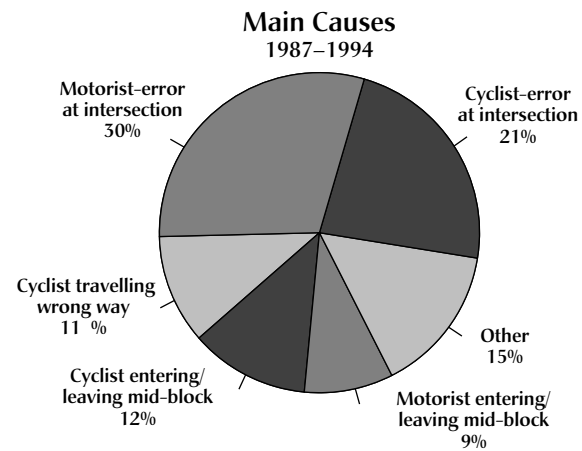
In fact, bicycles are hit from behind in only two percent of bicycle-motor vehicle crashes in Portland.

FIGURE 6.1 Number of Bicycle - Motor Vehicle Crashes



Source: Oregon Department of Transportation Bicycle-Motor Vehicle Crash Summaries, 1987-1994.

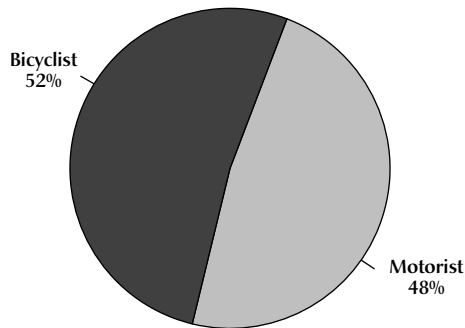
FIGURE 6.2 Bicycle - Motor Vehicle Crashes



Source: Oregon Department of Transportation Bicycle-Motor Vehicle Crash Summaries, 1987-1994.

FIGURE 6.3 Presumption of Fault

### Bicycle–Automobile Crashes in Portland 1987–1994



Source: Oregon Department of Transportation Bicycle-Motor Vehicle Crash Summaries, 1987–1994.

The main causes of crashes (Figure 6.2) are:

- Motorists or bicyclists failing to yield at an intersection (30 percent and 23 percent, respectively). Crashes at intersections are typically caused by one or both parties disregarding a sign or signal or failing to yield right-of-way.
- Bicyclists traveling against the flow of traffic (11 percent). Wrong-way riding is equally a problem in Portland as in the rest of the state and involves adult and youth cyclists in similar proportions.
- Bicyclists or motorists entering or leaving mid-block (12 percent and 9 percent, respectively).

Those injured in this type of crash are primarily young bicyclists (67 percent under the age 16) who are most often responsible for crashes due to disregard or ignorance of the law.

**MISCONCEPTION #4** *Motorists are always at fault in crashes. Or Bicyclists are always at fault in crashes.*

In fact, on an average from 1987 to 1993, bicyclists were at fault in about 52 percent of crashes, motorists at 48 percent (Figure 6.3). At intersections, where 53 percent of all bicycle-motor vehicle crashes in Portland occur, motorists and bicyclists also share similar levels of blame (56 percent versus 44 percent, respectively).

**MISCONCEPTION #5** *There will be increasing numbers of conflicts as more bicyclists take to the road.*

In fact, the yearly trend (Figure 6.1) shows that the number of bicycle-motor vehicle crashes appears to be leveling off even though the number of cyclists has more than tripled in the last 10 years. As bicyclists become an increasingly visible and accepted presence on the road and as roadway design incorporates more bikeway facilities, there will likely be greater awareness among motorists of bicyclists' rights. Also, with education, encouragement, and implementation of more bikeway facilities, cyclists' behavior can be expected to improve.

## Consistent Messages to Teach

With better education, cycling can become safer. Both motorists and cyclists need to do their part to make cycling safer and more attractive.

### *Youth bicyclists*

School children are most effectively reached when an action-oriented teaching approach and a repetitive practice process are coupled with awards and incentives. Awards and incentives can consist of certificates of completion or bicycle/pedestrian licenses, free or reduced-cost bicycle helmets and other accessories, or discount coupons for area bicycle shops.

## Consistent Messages to Teach

(continued)

To reach the most children, it is important to work closely with schools to insure that school-age children are receiving an age-appropriate bicycle safety message and are learning skills that will help them function safely on the public right-of-way. The following messages should be consistently taught:

- **Wear a helmet.** In the event of a bicycle crash, wearing a helmet reduces the risk of serious head injury by up to 85% when wearing a helmet. It could save your life.
- **Obey all traffic laws.** Bicyclists have the same rights, and consequently the same responsibilities as motorists.
- **Look both ways before crossing streets.**
- **Always ride with the flow of traffic.**
- **Be predictable.** Always signal your intentions.
- **Be visible.** Wear light-colored clothing and bright or reflective clothing and always use a front light and rear reflectors at night.
- In addition, very young children (seven or less) should ride with supervision.

### *Adult bicyclists*

Adult bicyclists fall into several different categories of riders. Some adults are comfortable riding on busy streets and mixing with traffic while others prefer quieter streets or off-street paths. There are adults who ride a bicycle only a few times a year and those who ride often but primarily for recreation. Finally, some ride for their profession, such as bicycle police or messengers. Each type of cyclist has their own concerns and philosophy about how bicycles fit into the transportation system. Education and encouragement efforts must recognize this and tailor messages to each group.

It is also important to reach as wide a range of bicyclists as possible. Since adults do not often group together as a captive audience as school children do, it is important to offer a wide range of opportunities to improve their knowledge and skills related to bicycling. The following messages should be consistently taught:

- **Be alert.** Watch for other users and sudden behavior changes. Also, pay careful attention to potential road hazards, such as potholes and gravel. Adjust speed to maintain control of the bicycle.
- **Obey all traffic laws.** Though it is tempting to run through traffic signals and stop signs, do not do it. Bicyclists have the same rights, and consequently the same responsibilities as motorists. Disobeying traffic laws gives cyclists a bad reputation and is potentially dangerous.
- **Always ride with the flow of traffic.** Ride where motorists and others expect cyclists, and never against traffic.
- **Be predictable.** Signal your turns, do not weave in and out of traffic, and stay as far to the right as is practicable, except when:

## Consistent Messages to Teach

(continued)

- traveling the same speed as traffic (as in downtown)
- avoiding hazardous conditions
- preparing to make a left turn, passing another vehicle or using a one-way street (in which case riding alongside the left curb is permitted)
- the roadway is too narrow for a bicycle and a motor vehicle to travel safely side by side
- riding alongside another cyclist in a manner that does not impede the normal movement of traffic
- **Be visible.** Wear light-colored, bright or reflective clothing and use front lights and rear reflectors or lights at night.
- **Wear a helmet.**
- **Stay off sidewalks, whenever possible.** In Oregon, bicycles are legally classified as vehicles and should behave as such. Unless specifically signed for shared use, as on bridge sidewalks or off-street paths, sidewalks are intended for use by pedestrians, not cyclists. When using sidewalks, bicyclists are required to warn pedestrians audibly when passing (verbally or by use of a bell), yield the right-of-way in conflict situations, and travel at a walking speed at driveways and intersections when a motor vehicle is approaching. Remember, motorists are not expecting cyclists coming at them at driveways or approaches.
- **Do not drink alcohol and ride.** You are operating a vehicle. Take it seriously.

For further information about cyclists' rights and responsibilities as road users, see Appendix B, Summary of Bicycle-related Laws.

### *Motorists*

The goal in educating motorists is to foster a broad and general public awareness and respect for bicycling. Many motorists are already occasional or regular cyclists themselves in some capacity, and can be encouraged to ride more often. All motorists should be taught good driving behavior and information about cyclist behavior to help improve safety.

- **Be alert.** Watch for other users and sudden behavior changes. Pay attention especially at intersections.
- **Obey all traffic laws.** What would amount to a minor fender bender between two motor vehicles could be a serious injury for a cyclist in a bicycle-motor vehicle crash. Also, driving the speed limit and coming to a full stop at red lights creates a safer environment for all.
- **Be predictable.** Signal your turns well before an intersection. The law requires use of turn signals in advance of intersections, and cyclists depend on turn signals to judge where to be.
- **Be patient.** Cyclists have a right to travel on every road except limited access freeways. Passing bicyclists just before a stop light or sign creates an atmosphere of unnecessary hostility.



## Consistent Messages to Teach

(continued)

- **Do not honk unless necessary.** Cyclists can hear and see motor vehicles; honking simply jars their nerves.
- **Give room.** Cyclists have to react to hazards that a motorist may not see (e.g., glass, storm grates, dogs, car doors). Follow and pass at a safe distance.

If everyone were to behave according to these principles, bicycle-motor vehicle crashes would decrease rapidly, as would many other types of crashes.

## Current State of Educational and Encouragement Efforts in Portland

There are many educational efforts underway in Portland. Some of the more noteworthy are described below and summarized in Table 6.1.

**The Bicycle Advisory Committee (BAC)** is a group of residents who advise the City on all matters related to bicycles. The 18 member BAC is appointed by City Council and meets monthly to examine, discuss, and make recommendations on projects and other bicycle-related activities. BAC meetings are open to the public.

**The Bicycle Transportation Alliance (BTA)** is an advocacy group that promotes bicycling in Portland and the state of Oregon. BTA maintains an influential voice for cyclists on local and state transportation issues to advocate for more bikeways, end-trip facilities and sustainable community planning. Education and encouragement projects include: a Bicyclists' Legal Clinic that helps bicyclists become self-advocates; a Bicycle Commuter Workshop offered to employers and organizations to encourage bicycle commuting. Public awareness projects include producing a four-color poster and organizing May Bike Month events to increase the interest in bicycle transportation and bicycle safety education.

**The City of Portland Bicycle Program** is a Portland Office of Transportation program that works to make bicycling a more attractive transportation choice by planning, implementing, and maintaining a network of bikeways, providing long- and short-term bicycle parking, and educating people about the benefits of bicycling as a means of transportation. An informational brochure, available at local bicycle shops, community events, and upon request, outlines: how the Bicycle Program functions, the many positive benefits of bicycling, laws and safety tips for bicyclists, and resources available to those who need information or who want to get involved in creating a better transportation future for Portland. A free Portland bikeways map is inserted in the brochure. The Bicycle Program also collaborates to sponsor promotional events throughout the year, such as Bicycle Commute Day, Bicycle in the Rain Day, and BikeFest.

**The Community Cycling Center** is a community-based youth center. Its mission is to teach youth and adults bicycle safety and mechanics to bring them the associated benefits of education, health, transportation, and job skills. The Center runs a variety of programs including after-school and to-and-from school escorted small group rides, Learn-A-Bike (youth earn a bicycle by completing a basic repair, riding, and security skills course), adult repair classes, vocational education for young adults (ages 16 to 20), and community repair services.

## Current State of Educational and Encouragement Efforts in Portland

(continued)

**Kaiser Permanente** is a health maintenance organization that has distributed more than 1,000 free helmets to low-income youth in North Portland and has sold reduced-cost helmets to other organizations, such as the Portland Wheelmen Touring Club and the City of Portland for further distribution. A traveling education show called “Professor Body Wise” educates school children on day-to-day safety, including bicycle safety.

**Portland Kids on the Move** is a traffic safety curriculum produced by the City of Portland’s Bureau of Traffic Management, Portland Public Schools, and a group of advisors for kindergarten through fifth grade. The curriculum has two primary goals: instruct children in basic pedestrian, bicycle, and motor vehicle

TABLE 6.1 Existing Education and Encouragement Efforts in Portland

NAME	TYPE	CONTACT	EDUCATION	ENCOURAGEMENT
American Automobile Association (AAA)	Traffic Safety Services	Charlie Lloyd 222-6702	●	
Bicycle Advisory Committee	Advisory Board	Rick Browning 223-3082		●
Bicycle Transportation Alliance	Bicycle Advocacy Group	Karen Frost Mecey 226-0676	●	●
Bike Gallery	Club Rides, Advocacy Nights	Chris Bowan 281-9800 x212	●	●
City of Portland Bicycle Program/ Community Traffic Safety	Government Agency	Mia Birk 823-7082	●	●
Community Cycling Center	Youth Learning Center	Brian Lacy 288-8864	●	●
Critical Mass	Advocacy Group Ride	Sara Stout or Fred Nemo 249-7049		●
Kaiser Permanente	Injury Prevention	Mary Strebbig 721-6824	●	
Portland Kids on the Move	Curriculum for K through 5	Shannon Parker 823-5391	●	●
Portland United Mountain Pedalers	Mountain Bicycle Club	Theo Patterson 223-3954		●
Portland Wheelmen Touring Club	New Member Group Rides, Effective Cycling Classes	257-PWTC	●	●
Trauma Nurses	Injury Prevention	Joanna Fairchild 413-4960	●	
Tri-Met Bikes on Buses	Transit Authority	Hotline 239-3044		●
Yellow Bicycle Program	Free Community Bicycles	United Community Action Network (UCAN) 331-0526		●

## Current State of Educational and Encouragement Efforts in Portland

*(continued)*

occupant safety and encourage children to walk, ride bicycles, and use mass transit as regular means of transportation. The curriculum is available to all public and private schools within the City of Portland. Two teacher trainings have taken place thus far and more are planned in the future. Over 100 teachers have participated in the training and more than 300 copies of the curriculum have been distributed. However, it is unknown how many teachers have used or are using the curriculum at this time. Future development of middle and high school curriculums are planned.

The City has developed an action-oriented component available to schools called Traffic Safety Town, which is a 40 by 60 foot tarp with the layout of typical city street blocks complete with motor vehicle travel lanes, bicycle lanes, sidewalks, crosswalks, driveways, homes, parks, and schools. The tarp (coupled with a physical education class) is used in a school gymnasium. In the two years of its existence, Traffic Safety Town has been to all grade schools in Portland and has reached an estimated 5,000 children.

Traffic Safety Workshops are held at three to four schools during May (National Traffic Safety Month). The City of Portland's Bureau of Traffic Management selects schools based on criteria such as vehicle speed and accident counts near the school. The workshops are an intensive, all-school assembly focusing on all aspects of traffic safety and are held in cooperation with the Police Bureau and the Emmanuel Hospital-based group Trauma Nurses Talk Tough.

It is estimated that through the Kids on the Move program activities, approximately 38% of school-age children receive some form of bicycle safety education.

**The Portland Wheelmen Touring Club (PWTC)** is a recreational bicycle riding club, with many club rides outside the central city. While many rides focus on distance and speed, the Club holds New Member Group Rides that teach safe riding habits, as well as more leisurely paced social rides. The Club also conducts bicycle rodeos, purchases and distributes helmets to low-income youth or adult riders, and leads rides for Bicycle Commute Day and other organized events.

**Other groups** that work to provide a bicycle safety and encouragement message in Portland include: the Police Bureau and Neighborhood Policing Offices; the Oregon Department of Transportation; the Driver and Motor Vehicles Services (DMV); Tri-Met; the American Automobile Association, Trauma Nurses Talk Tough; and area bicycle shops.

## Objectives and Action Items

Following are the objectives, recommended actions to be taken and estimated costs associated with education and encouragement efforts.

### ***Objective 6.12 G***

**Develop and implement education and encouragement plans aimed at youth, adult cyclists, and motorists. Increase public awareness of the benefits of bicycling and of available resources and facilities.**

**Objectives and Action Items**

*(continued)*

**OBJECTIVE 6.12 G BENCHMARKS**

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
3 to 5 annual city-wide events promoting cycling	3 to 5 annual city-wide events promoting cycling	3 to 5 annual city-wide events promoting cycling
50% of school-age children receiving bicycle safety education	90% of school-age children receiving bicycle safety education	90% of school-age children receiving bicycle safety education

As described earlier, currently a combination of public and private initiatives result in many annual events promoting cycling. These include Bicycle Commute Week, Bike Fest, and various organized rides. Furthermore, through the Kids on the Move program, about 38% of school-age children are estimated to be receiving some form of bicycle safety education annually.

**OBJECTIVE 6.12 G ACTION ITEMS (YOUTH, EDUCATION)**

- Develop middle and high school curricula as companions to Portland Kids on the Move. (Responsible parties: Bureau of Traffic Management with area school districts)
- Work with elementary, middle, and high schools to ensure that all school age children in Portland complete the Portland Kids on the Move and companion curricula. (Responsible parties: Bureau of Traffic Management, area schools, community groups, parent-teacher associations)
- Ensure that all bicycling children under the age of 16 have access to a low-cost or free approved bicycle helmet. (Responsible parties: local injury prevention organizations)
- Promote and encourage more bicycle-related education through repair and maintenance classes, safe bicycle handling classes, and fun and educational field trips. (Responsible parties: Community Cycling Center, Portland Parks Bureau, area schools, other community groups)
- Create a regional clearinghouse on information about programs aimed at bicycle and traffic safety. (Responsible party: Metro)
- Distribute appropriate informational materials to all schools during National Bike Week, Traffic Safety Forums, at the end of the school year, and other appropriate times. (Responsible parties: Bureau of Traffic Management, area schools, Parent-Teacher Associations)
- Develop and implement a bicycle safety component of high school driver education programs. (Responsible parties: Bureau of Traffic Management, Oregon Department of Transportation, Driver and Motor Vehicles Services, community groups)

## Objectives and Action Items

(continued)

### OBJECTIVE 6.12 G ACTION ITEMS (ADULTS, EDUCATION)

- Support the Portland Parks Bureau, Metro Greenspaces, and area bicycle shops to continue to promote bicycle related classes such as repair and maintenance, commuter how-to, effective cycling skills, and rides. (Responsible parties: Bicycle Program, Parks Bureau, Metro Greenspaces, Portland Area Bicycle Dealers Association, community groups)
- Publicize behaviors that can help cyclists avoid common crashes. (Responsible parties: Bicycle Program, Oregon Department of Transportation, community groups)
- Publicize the importance of bicycle helmet use among adults. (Responsible parties: Bicycle Program, injury prevention specialists, community groups, bicycle shops)
- Develop a “Share the Road” campaign where motorists and bicyclists publicly pledge to share the road. (Responsible parties: Bicycle Transportation Alliance, Oregon Department of Transportation, Portland Office of Transportation, Bicycle Program)
- Distribute informational brochures regarding bicycle safety, rights, and responsibilities to all area bicycle shops and at public events. (Responsible party: Bicycle Program)
- Monitor and support any legislation that promotes safe cycling habits in a responsible way. (Responsible parties: Portland Office of Transportation, interested cycling support groups)
- Develop a public service advertising campaign that targets cyclists with bicycle safety messages. (Responsible parties: community groups, Bicycle Program, Oregon Department of Transportation)
- Train cyclists in bicycle security measures, such as proper locking techniques.

### OBJECTIVE 6.12 G ACTION ITEMS (MOTORISTS, EDUCATION)

- Work with utility companies to provide an insert into mailings describing cyclists’ right to the road and how to safely behave around cyclists. (Responsible parties: Utility companies, Driver and Motor Vehicles Services, Bicycle Program, community groups)
- Work with Driver and Motor Vehicles Services on updates to the drivers’ manual to strengthen the bicycle section and exam questions. (Responsible parties: Driver and Motor Vehicles Services, Bicycle Program, community groups)
- Work for inclusion of motorist-bicyclist safety information in defensive driving courses (Responsible parties: Bicycle Program, Driver and Motor Vehicles Services, Oregon Safety Commission)
- Create a public service campaign that focuses on courtesy, predictability, and competency at all times but especially when operating around bicycles and that emphasizes bicyclists’ rights to roadways. (Responsible parties: community groups, Oregon Department of Transportation, Bicycle Program)

## Objectives and Action Items

(continued)

- Develop a “Share the Road” campaign where motorists and bicyclists publicly pledge to share the road. (Responsible parties: Bicycle Transportation Alliance, Bicycle Program, Oregon Department of Transportation)

### **OBJECTIVE 6.12 G ACTION ITEMS (EDUCATION, OTHERS)**

The following action items relate to the education of engineers, police, business owners, planners, architects, and other related professionals toward making Portland more bicycle friendly.

- Develop and hold bicycle planning and design training for all transportation engineers and planners at state, regional, and local levels. (Responsible parties: Bureau of Traffic Management, Oregon Department of Transportation)
- Incorporate a strong bicycle message in transportation training of all types. (Responsible parties: Portland Office of Transportation, Oregon Department of Transportation)
- Implement Bicycle Friendly Businesses Program (Responsible parties: Association for Portland Progress, other business associations, Portland Chamber of Commerce, Bicycle Program, Bicycle Transportation Alliance)
- Enforce traffic rules for bicyclists and motorists. (Responsible party: Bureau of Police)
- Work with towing companies and emergency clean up crews so they better understand the needs of bicycles. (Responsible parties: Bicycle Program, Oregon Department of Transportation, community groups)
- Work with contractors and subcontractors and city maintenance and utility crews to help them better understand the needs of bicyclists. (Responsible parties: Bicycle Program, Bureau of Maintenance, Bureau of Environmental Services, Bureau of Transportation Engineering and Development, Oregon Department of Transportation)

### **OBJECTIVE 6.12 G ACTION ITEMS (ENCOURAGEMENT)**

- Implement higher fees for automobile use and/or financial incentives for bicycle use. (Responsible parties: Federal government, State Legislature, Metro, City of Portland)
- Develop, promote and publicize bicycle commuter services, such as Bike Central and regular escorted commute rides. (Responsible parties: Bicycle Program, private businesses, community groups)
- Create an annual commuter challenge for area businesses. (Responsible parties: community groups, Bicycle Program)
- Create events such as “bicycle to the grocery store” days, when cyclists get vouchers for, or coupons off items in the store, or “bicycle to the movies” days, when cyclists receive free popcorn or a discount on a movie or refreshments. (Responsible parties: community groups)

**Objectives and Action Items***(continued)*

- Create public service announcements on radio and tv to promote the health and livability benefits of bicycling, as well as the detrimental effects of excessive motor vehicle use (e.g. pollution, traffic noise, congestion, loss of life and mobility). (Responsible parties: community groups, Bicycle Program)
- Work with Parks Bureau to deliver a “benefits of bicycling message” to youth who are working on water and air and general pollution activities. (Responsible parties: Parks Bureau, Metro Greenspaces, Bicycle Program)
- Continue to hold annual BikeFest as an event to encourage residents to replace one car trip a week with a bicycle trip. (Responsible parties: community groups, private sponsors, Portland Office of Transportation, Bicycle Program)
- Promote and publicize new and existing education and encouragement efforts by community groups and businesses. (Responsible parties: Bicycle Program, community groups, businesses)
- Support planning and implementation of an annual mass bicycling ride in Portland to attract new riders, showcase Portland, and demonstrate the benefits of bicycling. (Responsible parties: community groups, private sponsors, Bicycle Program, Portland Office of Transportation)
- Develop and implement a public education campaign to encourage bicycling, such as ads on movie screens, city bench, bicycle locker and billboard advertizing, videos on cable access television, and “burma shave” type signs along bike routes. (Responsible parties: Bicycle Program, Bureau of Traffic Management, Bicycle Transportation Alliance, private sponsors, community groups)
- Develop measures to reduce bicycle theft such as a registration program, subsidized locks, and training for proper locking techniques.

**OBJECTIVE 6.12 G COSTS:**

Since many education and encouragement programs and activities will likely be cooperative efforts between the City of Portland Bicycle Program, other City of Portland departments, private sponsors, and community groups, actual costs are difficult to quantify. Ideally, the City of Portland Bicycle Program would be an information resource for all educational and encouragement efforts but would not necessarily be the sole or primary organizer.

***Objective 6.12 H***

**Promote bicycling as transportation to and from school.**

While riding a bicycle to school was a part of growing up for many of today’s adults, today it is a rarity. Yet, one of the most frequent complaints received by the Office of Transportation is traffic problems around schools, much of which comes from parents dropping their children off. Through conversations with some principals and school administrators, the benefits of bicycling are clearly overruled by concerns about child safety and bicycle theft. If these concerns

**Objectives and Action Items**

*(continued)*

were addressed, bicycling to school could return as a normal course of life. At the same time, at the Northeast Community School, 20 percent of children ride to school during good weather, with eight percent even during heavy rains. The difference is parental and school support, having invested in safety education training, parental supervision, promotion of bicycling, and covered bicycle parking. This kind of effort helps today’s children see bicycling as a part of daily life, leading their generation toward wise transportation decisions.

**OBJECTIVE 6.12 H BENCHMARKS**

Because it is not known how many children are bicycling to school today, it is difficult to develop standards by which to judge progress. Thus, this plan will use the same mode share benchmarks as are used for all trips.

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
3% of children bicycling to school	6% of children bicycling to school	10% of children bicycling to school

**OBJECTIVE 6.12 H ACTION ITEMS**

Since encouraging bicycling to school goes hand-in-hand with youth education, many action items for this category have already been listed. Additional ideas are described below.

- Develop plans to increase cycling to schools. (Responsible party: Bicycle Program, community groups, schools)
- Undertake surveys to determine bicycle to school mode share. (Responsible parties: Bicycle Program with area schools)
- Implement bikeways that lead to schools. (Responsible party: Portland Office of Transportation)
- Install high-quality bicycle racks at all schools, work to ensure all children have access to high-quality locks, and train children on proper locking procedures. (Responsible parties: Bicycle Program, schools, community groups)
- Design and implement ride-to-school encouragement programs such as “Bicycle to School” days, after-school riding clubs, and an annual Youth Bike Ride. (Responsible parties: Bicycle Program, Bicycle Transportation Alliance, private sponsors, the Community Cycling Center)
- Create an annual family/fun ride in Portland that follows common bicycle routes and passes popular destinations to show how easy and fun it is to get around by bicycle. (Responsible parties: community groups, private sponsors, Bicycle Program)
- Create a high profile contest for school children on the theme of replacing one car trip a week with a bicycle trip. (Responsible parties: community groups, private sponsors, Bicycle Program).





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BICYCLE MASTER PLAN

# Part I:

## Design and Engineering Guidelines

### A. Existing Standards

The design practices and standards outlined in this manual are based on the American Association of State and Highway Transportation Officials' (AASHTO) manual "Guide for the Development of Bicycle Facilities 1991," with supplementary material from the 1996 Oregon Department of Transportation (ODOT) "Oregon Bicycle and Pedestrian Plan." Guidelines related to Portland's specific practices have been written by staff from the Portland Office of Transportation (PDOT).

All traffic control devices must conform to the "Manual on Uniform Traffic Control Devices" (MUTCD) as supplemented and adopted by the Oregon Traffic Control Devices Committee.

### B. Types of Bicycle Facilities

Bicycles are legally classified as vehicles and can, and will, be ridden on most public roadways in Oregon (with the exception of limited access freeways). The City of Portland Comprehensive Plan *Transportation Element* states that, "...all streets should be designed for bicycle passage..." Thus, all streets should be accessible by bicycle, with the appropriate bicycle facility depending on motor vehicle traffic speed and volume, as well as on the street's classification and presence on the Portland Bikeway Network. (See Table A1.1 "Guidelines for Selecting Appropriate Bicycle Facilities" for more details.)

There are four basic types of Bikeways used to accommodate bicycle travel: Off-Street Path; Bicycle Lane; Bicycle Boulevard; and Shared Roadway.

#### ***B1. Off-Street Path***

An off-street path (also called an off-street trail or multi-use path) is a facility separated from motor vehicle traffic by an open space or barrier, either within the roadway right-of-way or within an independent right-of-way. Off-street paths are typically used by pedestrians, joggers, skaters, and bicyclists as two-way facilities. Off-street paths may be appropriate in corridors not well served by the street system (if there are few intersecting roadways), to create short cuts that link urban destination and origin points, along continuous greenbelts such as rivers and abandoned rail corridors, and as elements of a community recreational trail plan.

## B. Types of Bicycle Facilities

(continued)

### ***B2. Bicycle Lane***

A bicycle lane is a portion of the roadway designated for exclusive or preferential use by bicyclists in urban areas. Bicycle lanes are appropriate on most urban arterials and collector streets. Bicycle lanes must always be well marked to call attention to their preferential use by bicyclists.

A shoulder bikeway is a street upon which the paved shoulder, separated by a four-inch stripe and no bicycle lane markings, is usable by bicycles. Although the shoulder can be used by bicycles, auto parking can be allowed.

### ***B3. Bicycle Boulevard***

A bicycle boulevard is a street with low traffic volumes where the through movement of bicycles is given priority over motor vehicle travel. A bicycle boulevard is created by modifying the operation of a local street to function as a through street for bicycles while maintaining local access for automobiles. Traffic calming devices are used to control traffic speeds and discourage through trips by automobiles. Traffic control is designed to limit conflicts between automobiles and bicycles and give priority to through bicycle movement. Bicycle lanes are typically not needed on a bicycle boulevard.

TABLE 3.2 **Guidelines for Selecting Bikeway Facilities**

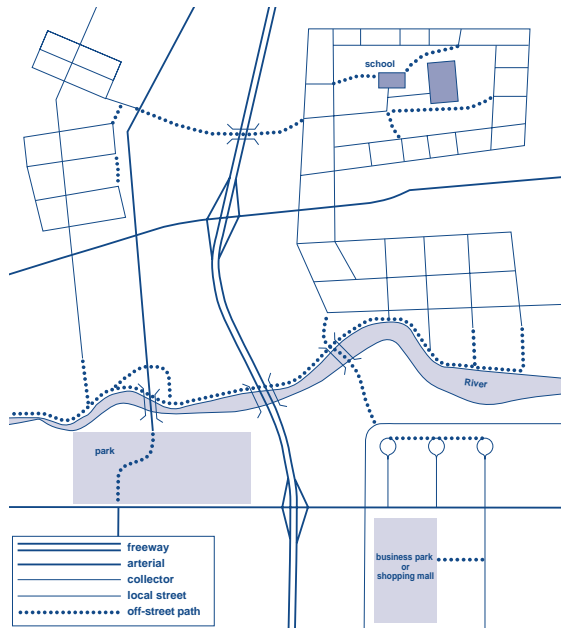
AVERAGE NUMBER OF VEHICLES PER DAY	TRANSPORTATION ELEMENT TRAFFIC CLASSIFICATION	RECOMMENDED BIKEWAY FACILITY
≤3000	Local Service Street	Street as is, unless specified on Bikeway Network as bicycle boulevard or signed connection.
>3000	Local Service Street	Bicycle lanes. Where not possible due to width constraints and parking needs, traffic calming improvements acceptable.*
≥3000 < 10,000	Neighborhood Collector	Bicycle lanes. Where not possible due to width constraints and parking needs, traffic calming improvements or wide outside lane acceptable.*
≥10,000 < 20,000	Neighborhood Collector and higher classifications Major & Minor Transit Routes Major & Minor Truck Routes	Bicycle lanes. Where not possible due to width constraints and parking needs, wide outside lane acceptable.*
≥20,000	Neighborhood Collector and higher classifications Major & Minor Transit Routes Major & Minor Truck Routes	Bicycle lanes. Where not possible due to width constraints and parking needs, a parallel alternative facility should be developed.

\* Traffic calming improvements or wide outside lane acceptable where any of the following conditions exist:

- It is not possible to eliminate lanes or reduce lane widths;
- Topographical constraints exist;
- Additional pavement would disrupt the natural environment or character of the natural environment;
- Parking is essential to serve adjacent land uses or to improve the character of the pedestrian environment.

Construction of a parallel bikeway within one-quarter mile is also an acceptable alternative where these constraints exist, as long as the parallel bikeway provides an equally convenient route to local destinations.

FIGURE A1.1 Appropriate Use of Off-Street Path



### B4. Shared Roadway

On a shared roadway, bicyclists and motorists share the same travel lanes. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane is provided (see below). Shared roadways are adequate for neighborhood streets with very low traffic volumes.

There are two variations of the shared roadway concept. Those with wide outside lanes, and those with normal lane widths.

#### B4a. Wide outside lane

On streets with higher volumes and speeds where bicycle lanes are warranted but can not be provided due to severe physical constraints, a wide outside lane may be provided to accommodate bicycle travel. A wide outside lane should be wide enough to allow an average size motor vehicle to pass a bicyclist without crossing over into the adjacent lane.

On neighborhood streets (local service streets) with low traffic volumes and speeds, wide outside lanes are not necessary for safe conduct of bicycle traffic. (See Table A1.1, Guidelines for Selecting Bicycle Facilities.)

## C. Design Guidelines for Bicycle Facilities

### C1. Off-Street Path

#### C1a. General Design Practices

Off-street paths can provide a good facility, particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic (Figure A1.1). However, if poorly designed, they can be, at best, a poor investment of public dollars, and at worst, dangerous. Some of the advantageous practices in off-street path design include:

- Implementing frequent access points from the local road network; if access points are spaced too far apart, users will have to travel out of direction to enter or exit the path, which will discourage use;
- Placing directional signs to direct users to and from the path;
- Building to a standard high enough to allow heavy maintenance equipment to use the path without causing it to deteriorate;
- Limiting the number of at-grade crossings with streets or driveways;
- Terminating the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street—poorly designed paths can put pedestrians and cyclists in a position where motor vehicle drivers do not expect them when the path joins the street system.
- Addressing potential security problems up front.

## C. Design Guidelines for Bicycle Facilities

(continued)

Off-street paths should not be placed directly adjacent to roadways. This creates a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic, which is contrary to the rules of the road. This can result in bicyclists going against traffic when either entering or exiting the path. This can also result in an unsafe situation where motorists entering or crossing the roadway do not notice bicyclists coming from their right, as they are not expecting vehicles coming from that direction. Even bicyclists coming from the left often go unnoticed, especially when sight distances are poor.

Off-street paths may be considered along roadways under the following conditions:

- The path will generally be separated from all motor vehicle traffic.
- Bicycle and pedestrian use is anticipated to be high.
- There is a commitment to provide path continuity throughout the corridor.
- The path can be terminated at each end onto streets with good bicycle and pedestrian facilities, or onto another safe, well-designed path.
- There is adequate access to local cross-streets and other facilities along the route.
- Any needed grade separation structures do not add substantial out-of-direction travel.
- The total cost of providing the proposed path is proportionate to the need.

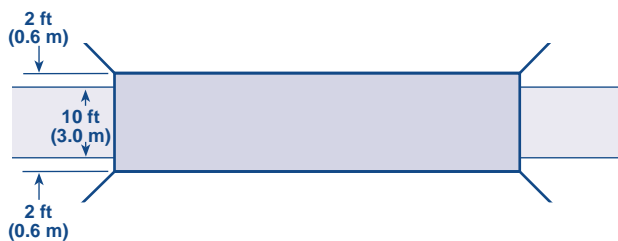
As bicyclists gain experience and realize some of the advantages of riding on the roadway, many stop riding on paths placed adjacent to roadways. This can be confusing to motorists, who may expect bicyclists to use the path.

When designing a bikeway network, the presence of a nearby path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway.

### C1b. Off-street path design standards

For more detailed information consult the *AASHTO Guide to Bicycle Facilities* and *Trails for the Twenty-First Century: Planning, Design, and Management Manual for Multi-Use Trails*, by the Rails-to-Trails Conservancy. Both are available from the Bicycle Program at 823-7082.

FIGURE A1.2 Off-Street Path Structure Width



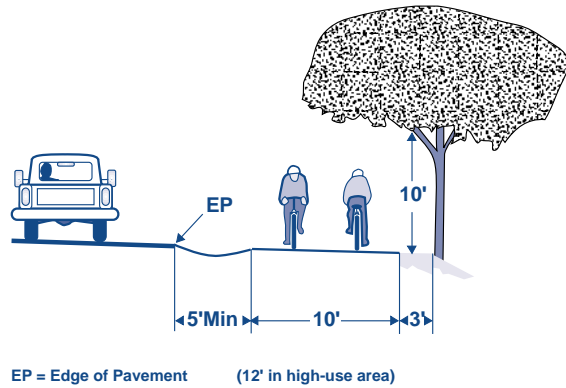
#### C1B(1) WIDTH AND CLEARANCES

##### Width

Ten feet (3 m) is the standard width for a two-way off-street path (Figure A1.2). The path should be 12 feet (3.6 m) wide in areas with high use by bicyclists, pedestrians, and joggers. The minimum width is 8 feet (2.4 m), but is not recommended in most situations because they often become overcrowded.

Although one-way paths may be intended for one direction of bicycle travel, they will often be used as two-way facilities. Because of this, caution must be

FIGURE A1.3 Off-Street Path Standards



used in selecting this type of facility. If necessary, they should be 6 feet (1.8 m) wide (min. 5 feet [1.5 m]) and designed and signed to assure one-way operation by bicyclists. They will most likely be used as two-way facilities by pedestrians.

**Lateral Clearance**

A 2 foot (0.6 m) or greater graded “shy” or clear distance on both sides of an off-street path is necessary for safe operation.

**Overhead Clearance**

Clearance to overhead obstructions should be 10 feet (3 m), minimum 8 feet (2.4 m). (See section C1b(5), Structures.)

**Separation from roadway**

Where a path must be parallel and adjacent to a roadway, there should be a 5 foot (1.5 m) minimum width separating the path from the edge of roadway (Figure A1.3), or a physical barrier of sufficient height should be installed. (See Railings, Fences and Barriers, section C1b(6).

**C1B(2) TYPICAL PAVEMENT STRUCTURAL SECTIONS**

**Surfacing**

The use of concrete surfacing for paths has proven to be the most suitable for long-term use. Using modern construction practices, concrete provides a smooth ride with low maintenance costs. Concrete paths can be placed with a slip-form paver. The surface must be cross-broomed. The crack-control joints should be saw-cut, not troweled. Concrete paths cost more to build than asphalt paths, yet do not become brittle, cracked and rough with age, or deformed by roots and weeds as with asphalt.

Off-street paths should be designed with sufficient surfacing structural depth for the subgrade soil type to support maintenance and emergency vehicles (Figure A1.4). If the path must be constructed over a very poor subgrade (wet and/or poor material), treatment of the subgrade with lime, cement or geotextile fabric should be considered.

**Drainage**

Off-street paths must be constructed with adequate drainage to prevent wash-outs, flooding and silt from intruding onto the path. All vegetation, including roots, must be removed in the preparation of the subgrade. Special care is needed to control new growth, such as the use of soil sterilization or lime treatment of the subgrade.

FIGURE A1.4 Off-Street Pavement Structure

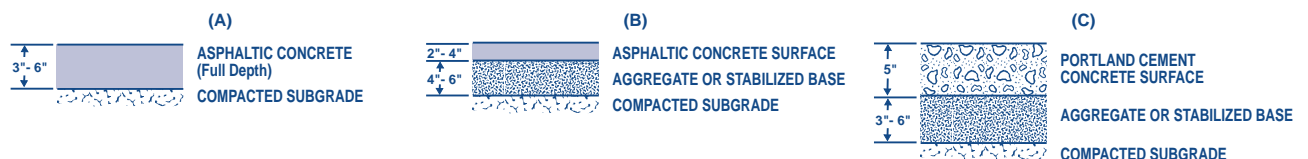
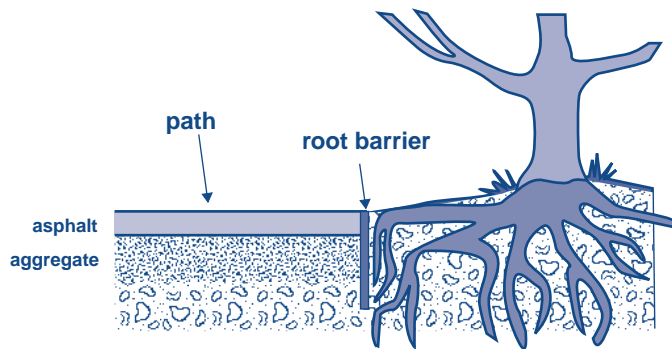




FIGURE A1.5 Off-Street Path Adjacent to Trees

**Vegetation**

Off-street paths built along streams and in wooded areas present special problems. Vegetation can begin to encroach on a path in a single growing season, and the roots of shrubs and trees can pierce through the path surfacing and cause it to bubble up and break apart in a short period of time. Preventive methods include: regular removal of vegetation, realignment of the path away from trees, and placement of root barriers (a 12 inch [300 mm] deep metal shield) along the edge of the path (Figure A1.5).

**C1B(3) GRADES**

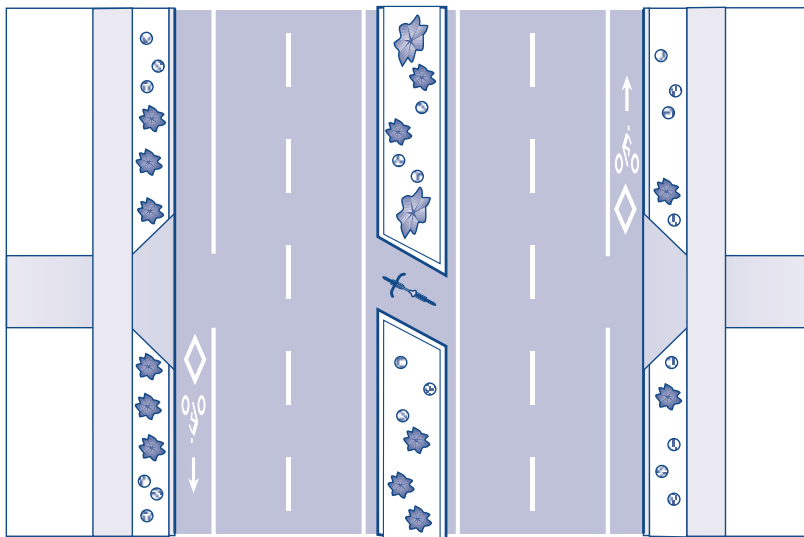
Based on AASHTO recommendations and Americans with Disabilities Act (ADA) requirements, 5 percent should be considered the maximum grade allowable for off-street paths. A grade of 10 percent is allowed under AASHTO guidelines for distances of up to 500 ft., provided there is good horizontal alignment and sight distance, but an exception to the ADA standards will be needed.

**C1B(4) CROSSINGS****Grade Separated Crossings**

When the decision to construct an off-street path has been made, grade separation should be considered for all crossings of thoroughfares, particularly for freeway ramp crossings, as most path users expect continued separation from traffic. At-grade crossings introduce conflict points. The greatest conflicts occurs where paths cross freeway entrance and exit ramps. Motor vehicle drivers using these ramps are seeking opportunities to merge with other motor vehicles; they are not expecting bicyclists and pedestrians to appear at these locations. However, grade-separated crossings should minimize the burden for the user, and not, for

example, require a steep uphill and/or winding climb.

FIGURE A1.6 At-Grade Crossing of a Thoroughfare with a Median Island

**At-grade Crossings**

When a grade-separated crossing cannot be provided, the optimum at-grade crossing has either light traffic or a traffic signal that trail users can activate (Figure A1.6). If a signal is provided, signal loop detectors may be placed in the pavement to detect bicycles if they can provide advance detection, and a pedestrian-actuated button provided (placed such that cyclists can press it without dismounting.)

### C. Design Guidelines for Bicycle Facilities

(continued)

A stop sign should be placed about 5 ft. before the intersection. Direction flow should be treated either with physical separation or a center line approaching the intersection for the last 100 feet.

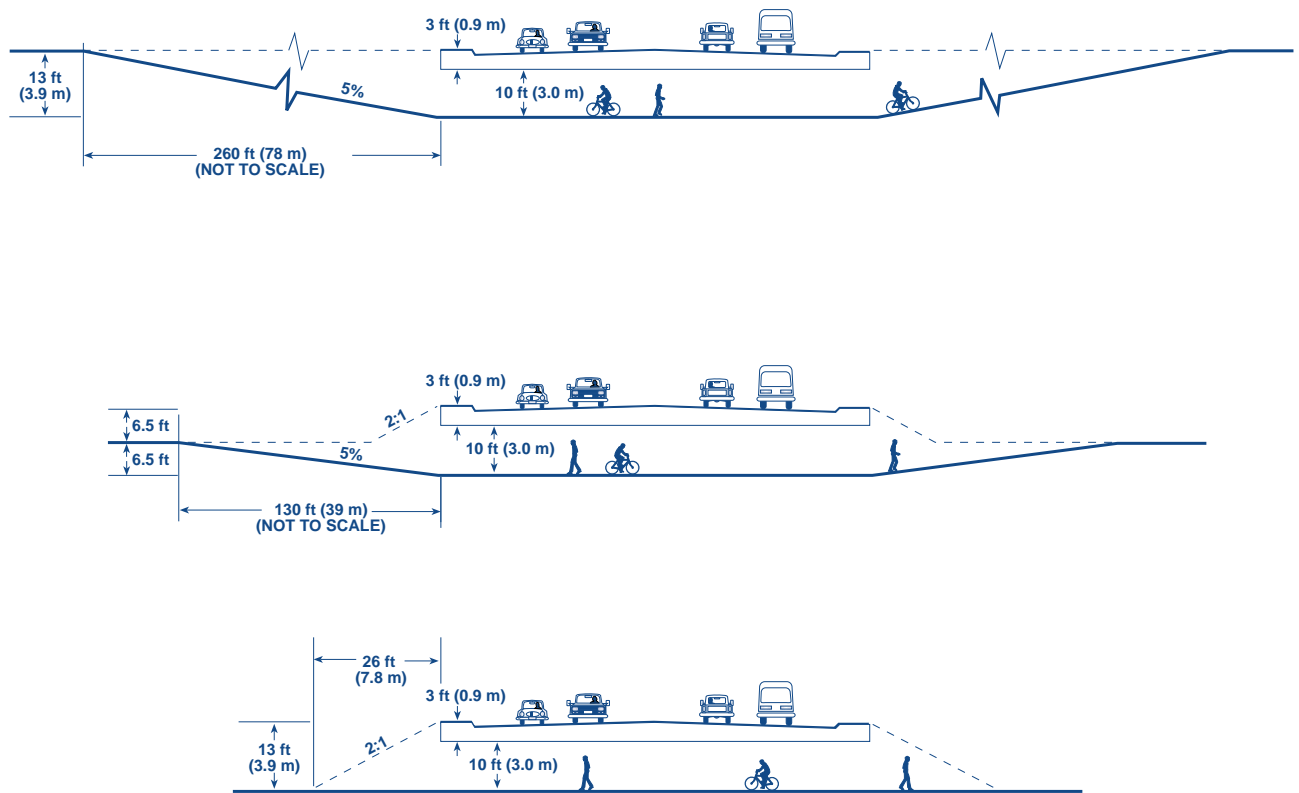
If the street is above four or more lanes or two/three lanes without adequate gaps, a median refuge should be provided in the middle of the street crossed. The refuge should be 8 feet at a minimum, 10 feet is desired. Another potential design option for street crossings is to slow motor vehicle traffic approaching the crossing through such techniques as speed bumps in advance of the crossing, or a painted or textured crosswalk.

#### C1B(5) STRUCTURES

The minimum total width of off-street path structures should be the same as the approach paved path, including a minimum 2 foot (0.6 m) shy distance on both sides. For example, a 10 foot (3 m) wide path requires a 14 foot (4.2 m) wide structure (Figure A1.2). This applies for both overcrossings and undercrossings.

The overhead clearance of an under-crossing should be at least 10 feet (3 m). An 8 foot (2.4 m) minimum may be allowable with good horizontal and vertical clearance, so users approaching the structure can see through to the other end. Undercrossings should be as visually open as possible for the safety and personal security of bicyclists and pedestrians (Figure A1.7). Illumination must be provided in areas of poor daytime and nighttime visibility.

FIGURE A1.7 Undercrossing Configurations



## C. Design Guidelines for Bicycle Facilities

(continued)

There are advantages and disadvantages to both over-crossings and under-crossings.

### *Under-crossings*

*Advantages:* They often provide an opportunity to reduce approach grades, as the required 10 foot (3 m) clearance is less than the clearance required for crossing over a roadway. There may be occasions where the roadway is elevated and an undercrossing can be constructed with little or no grade. They are generally less expensive to build.

*Disadvantages:* They often present security problems, due to reduced visibility. An open, well-lighted structure may end up costing as much as an over-crossing. They may require drainage if the sag point is lower than the surrounding terrain.

### *Over-crossings*

*Advantages:* They are more open and present fewer security problems.

*Disadvantages:* They require longer approaches to achieve the standard 17 feet (5.1 m) of clearance over most roadways. With an additional structural depth of 3 feet (0.9 m), the total rise will be 20 feet (6 m). At 5 percent, this will require a 400 foot (120 m) approach ramp at each end, for a total of 800 feet (240 m). This can be alleviated if there are opportunities to take advantage of the natural terrain, such as where the roadway is built in a cut section (Figure A1.8).

FIGURE A1.8 Overcrossing Configurations

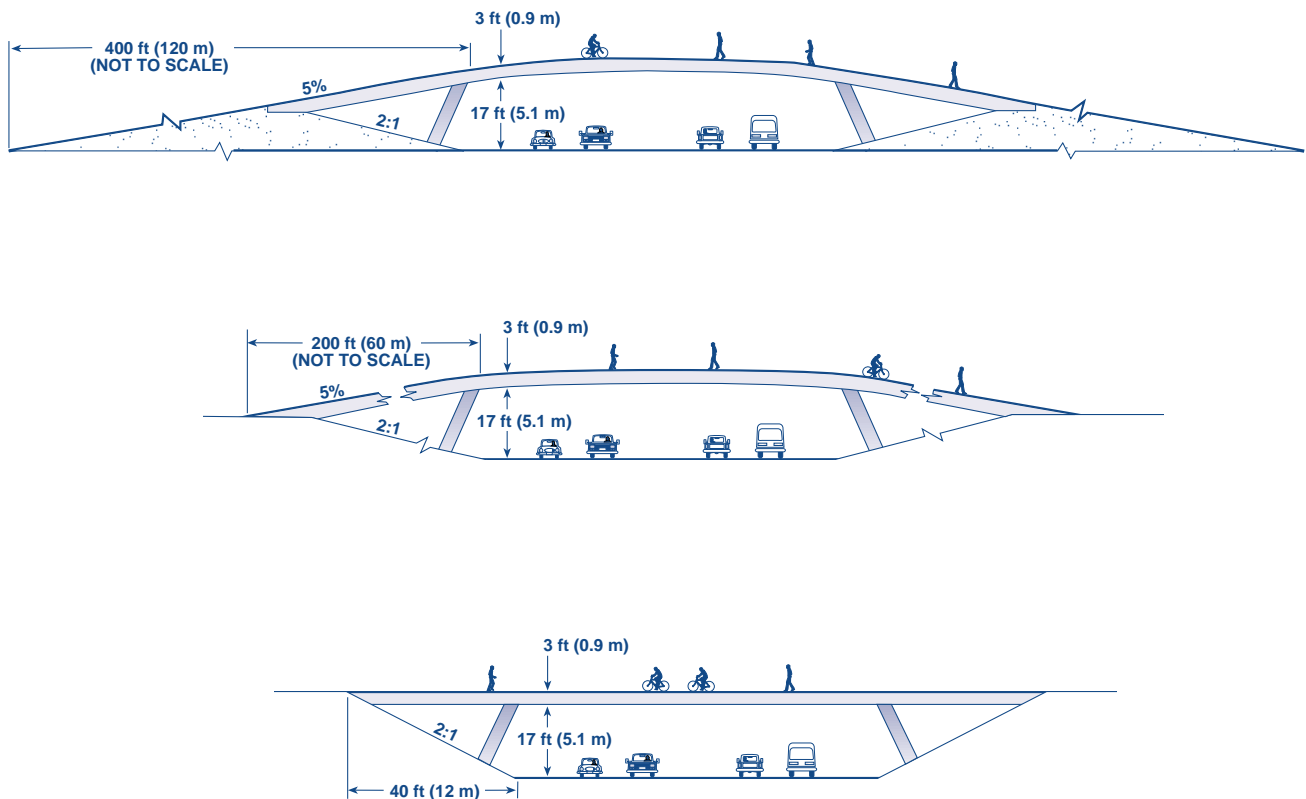


FIGURE A1.9 Adding a Railing to a Concrete Barrier

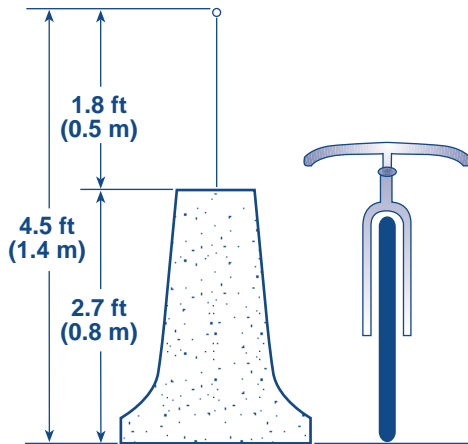


FIGURE A1.10 Off-Street Path with Rub Rail

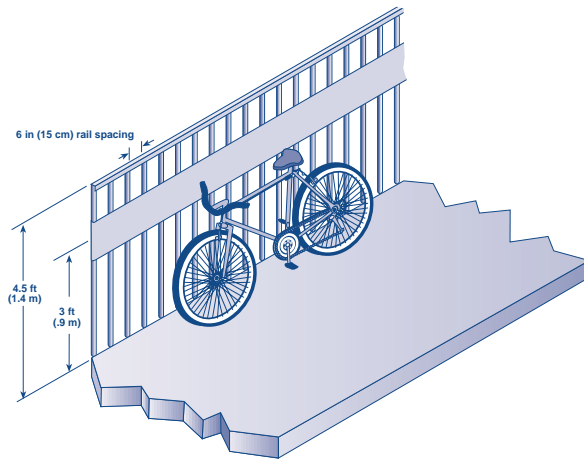


FIGURE A1.11 "Cattle Chute" Effect

**C1B(6) RAILINGS, FENCES AND BARRIERS**

Fence or railing treatment along paths is often needed for safety reasons, such as eliminating access to high-speed freeways or providing protection along steep side slopes and deep waterways. A height of 4.5 feet (1.3 m) keeps a cyclist from falling over the railing or fence (Figure A1.9). Openings in the railing must not exceed 6 inches (150 mm) in width. Where a cyclist's handlebar may come into contact with a fence or barrier, a smooth, wide rub-rail should be installed at a height of 3 feet (0.9 m) (Figure A1.10).

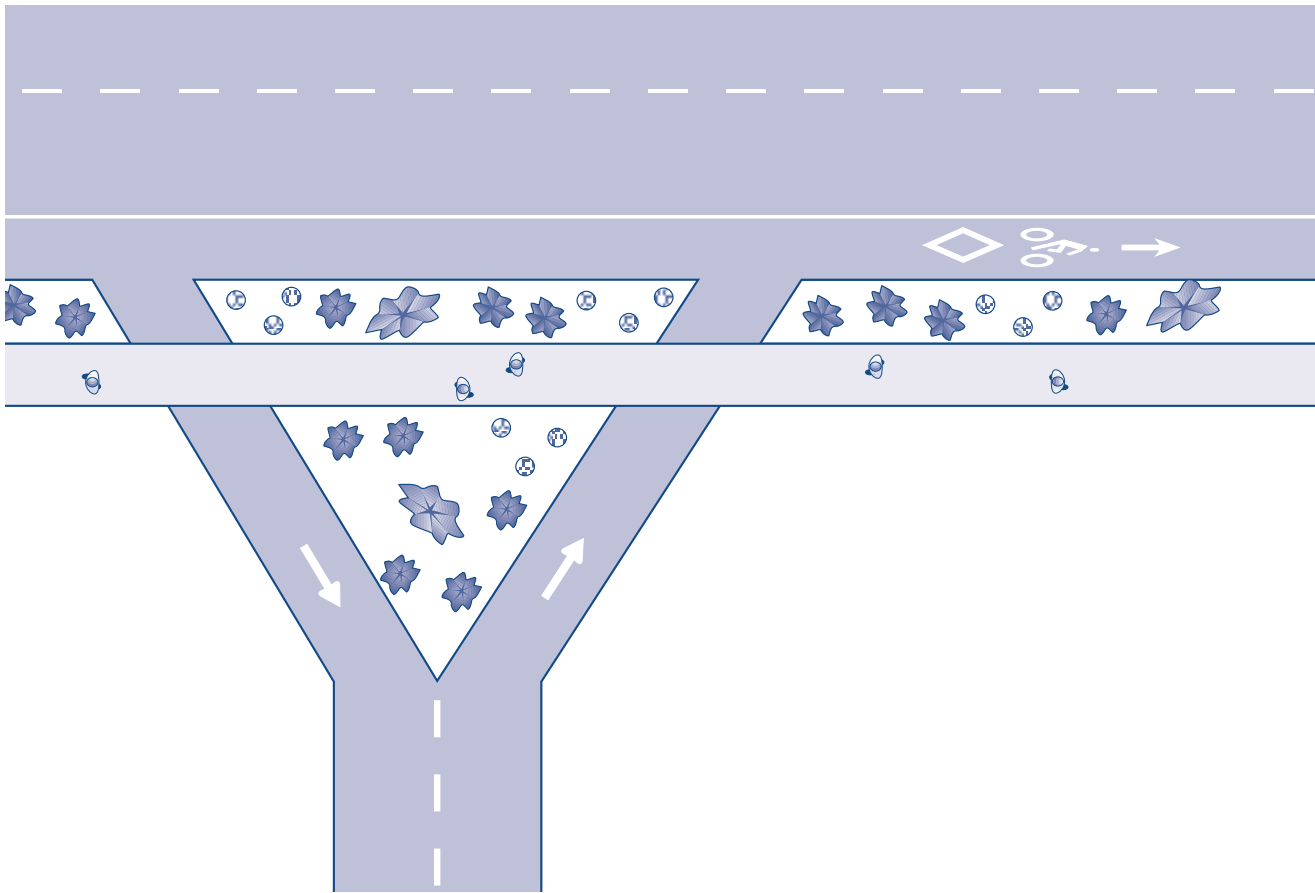
Where concrete shoulder barriers are used, some type of treatment on top of the barrier may be necessary to achieve the required height. This can be achieved by adding tube railing or chain link fencing.

Care must be taken to avoid a "cattle chute" effect (Figure A1.11). This occurs when a 6 foot (1.8 m) high chain-link fenced is placed on each side of the path. Fences should only be placed where they are needed for safety reasons. They should be placed as far away from the path as possible. Duplication of fences, such as fences on right-of-way and fences to keep pedestrians off freeways, should be avoided wherever possible.

**C1B(7) MOTOR VEHICLE BARRIERS (BOLLARDS AND TRAIL SPLITTING)**

A preferred method of restricting the entry of motor vehicles is to split the entryway into two 6 foot sections separated by low landscaping. Emergency vehicles can still enter if necessary by straddling the landscaping (Figure A1.12).

An alternative method is to use barrier posts ("bollards") to limit vehicle traffic on an off-street path; however, they can become a hazard to cyclists if not well placed. When used, they must be spaced wide enough (minimum 3 foot [0.9 m], 5 foot preferred) for easy passage by cyclists and bicycle trailers as well as wheelchair users. Either one or three bollards should be used, never two. The center bollard must be removable. Two posts, both placed in the paved portion of a path, will channel path users into the center of the path, causing possible head-on collisions.

FIGURE A1.12 **Split-Path Discourages Motor Vehicle Access****C1B(8) GUIDELINES FOR OFF-STREET PATHS WITH HEAVY USE**

A broken yellow center stripe is a good way to separate directional flow if a path is expected to have heavy usage. If an existing path is too narrow to handle user volumes, the path can be widened to provide the necessary capacity. Also, a separate jogger or equestrian path may be constructed with bark mulch alongside the paved path.

***C2. Bicycle Lane Design***

Bicycle lanes are one-way facilities that carry bicycle traffic in the same direction as adjacent motor vehicle traffic. Bicycle lanes are the preferred facility for urban arterial and collector streets.

Bicycle lanes are created by the addition of an 8 inch (200 mm) stripe and stencils. Motorists are prohibited from using bicycle lanes for driving and parking. This does not preclude motor vehicles from using a bicycle lane for emergency avoidance maneuvers or breakdowns.

## C. Design Guidelines for Bicycle Facilities

(continued)

### C2a. Curbed streets

PDOT's preferred standards for bicycle lane dimensions (Figure A1.13) are as follows:

For a bicycle lane adjacent to curb or parking:

- 5 foot preferred width.

Bicycle lane widths of 6 feet maximum *may be* desirable when one or a combination of the following conditions exists:

- traffic volumes and speeds are high;
- adjacent parking use and turnover is high;
- catch basin grates, gutter joints, and other features in the bicycle lane may present an obstacle to cyclists;
- steep grades exist;
- truck volumes are high; or
- bicycle volumes are high.

Bicycle lane widths of 4 feet minimum *may be* acceptable when:

- physical constraints exist, for a segment of less than 1 mile that links to existing bikeways on both ends; or
- implemented in conjunction with traffic calming devices (see section B7); or
- adjacent to parking with [very] low use and turnover; or
- adjacent to an uncurbed street shoulder.

Additionally, for on-street parking, PDOT recommends that there be an 8 foot preferred (7 foot minimum) parking area width adjacent to the bicycle lane.

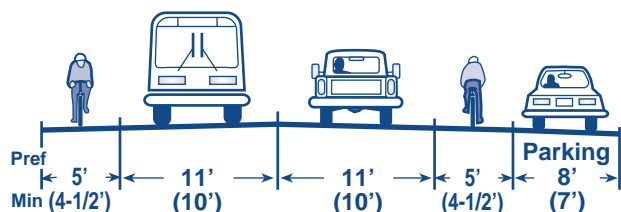
PDOT recommends that the travel lane width adjacent to a bicycle lane be 11 foot (10 foot minimum). A four-foot bicycle lane should not be used in combination with a 7 foot parking lane and/or a 10 foot travel lane.

#### *Bicycle Lanes on One-way Streets*

Bicycle lanes on one-way streets should be on the right side of the roadway, except where a bicycle lane on the left will decrease the number of conflicts (e.g., those caused by heavy bus traffic or dual right-turn lanes, etc.). Directional arrow pavement markings should be used to indicate the proper direction of travel and discourage wrong way riding.

Figure A1.14 shows examples of typical street cross-sections with preferred and acceptable design treatments.

FIGURE A1.13 Preferred Travel Lane Width



### C2b. Uncurbed streets

When providing a shoulder for bicycle use, a width of 6 feet (1.8 m) is recommended. This allows a cyclist to ride far enough from the edge of the pavement to

FIGURE A1.14 Bike Lane Designs for Curbed Streets

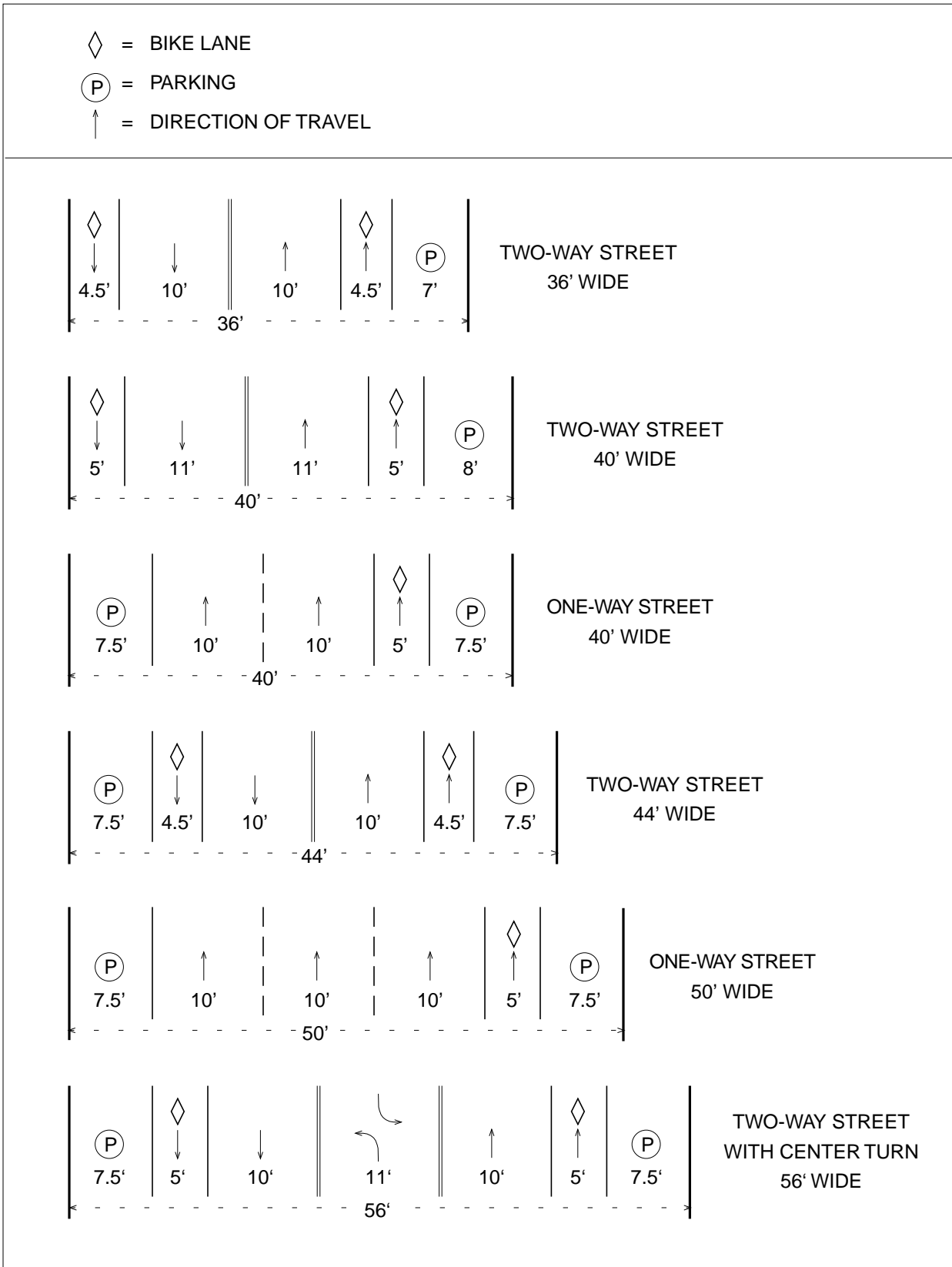
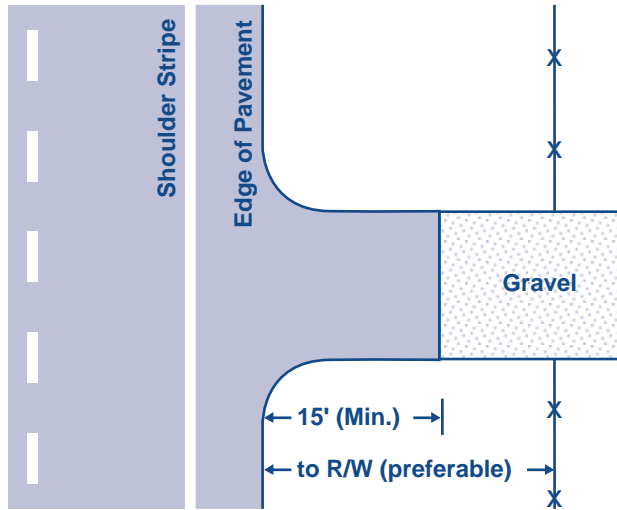


FIGURE A1.15 **Paved Driveway Apron**

avoid debris, yet far enough from passing vehicles to avoid conflicts. If there are physical width limitations, a minimum 4 foot shoulder may be adequate. On climbing lanes, it is desirable to maintain a 6 foot (1.8 m) shoulder, as uphill cyclists need more space for maneuvering (minimum 5 foot [1.5 m]).

Wherever a roadway is constructed or widened, all gravel driveways and streets should be paved back 5-10 feet (1.5-3 m) to prevent loose gravel from spilling onto the shoulders (Figure A1.15).

Many existing gravel shoulders have sufficient width and base to support shoulder bikeways. Minor excavation and the addition of 3 to 4 inches (75-100 mm) of asphaltic concrete is often all that is required to provide sufficient shoulder bikeways. It is most

desirable to construct shoulder widening projects in conjunction with pavement overlays for several reasons:

- The top lift of asphalt will add structural strength;
- The final lift will provide a smooth, seamless joint;
- The cost will be generally less, as greater overall quantities of materials will be purchased; and
- Traffic will be disrupted only once for both operations.

#### *Pavement design for shoulder bikeways*

When shoulders are constructed as part of an integral reconstruction project, the pavement structural design should be the same as that of the roadway.

On projects that widen shoulders for the benefit of bicyclists, there may be some opportunities to reduce costs by building to a lesser thickness. 3-4 inches (75-100 mm) of asphalt and 2-3 inches (50-75 mm) of aggregate over existing roadway shoulders may be adequate if the following conditions are met:

- There are no planned widening projects for the road section in the foreseeable future.
- The existing shoulder area and roadbed are stable and there is adequate drainage or adequate drainage can be provided without major excavation and grading work.
- The existing travel lanes have adequate width and are in stable condition.
- The horizontal curvature is not excessive, so that the wheels of large vehicles do not track onto the shoulder area. On roads that have generally good horizontal alignment, it may be feasible to build only the inside of curves to full depth.



FIGURE A1.16 Saw-Cut Joint for Shoulder Bikeway

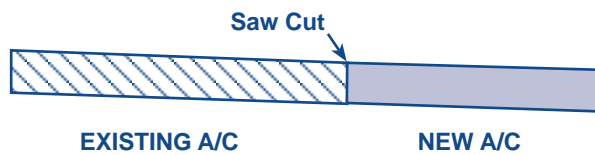
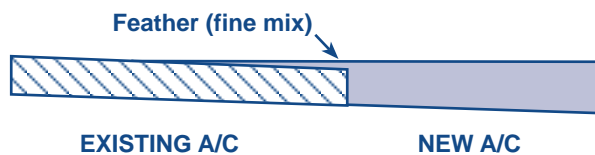


FIGURE A1.17 Asphalt Feathering



- The existing and projected average daily traffic (ADT) and heavy truck traffic is not considered excessive (e.g., under 10 percent).

The thickness of pavement and base material will depend upon local conditions and engineering judgment should be used. If there are short sections where the travel lanes must be reconstructed or widened, these areas should be constructed to normal full-depth base design standards.

*The joint between the shoulders and the existing roadway*

When adding paved shoulders to roadways for bicycle use where no overlay project is scheduled, a saw-cut one foot (300 mm) inside the existing edge

of pavement provides the opportunity to construct a good tight joint. This eliminates a ragged joint at the edge of the existing pavement (Figure A1.16).

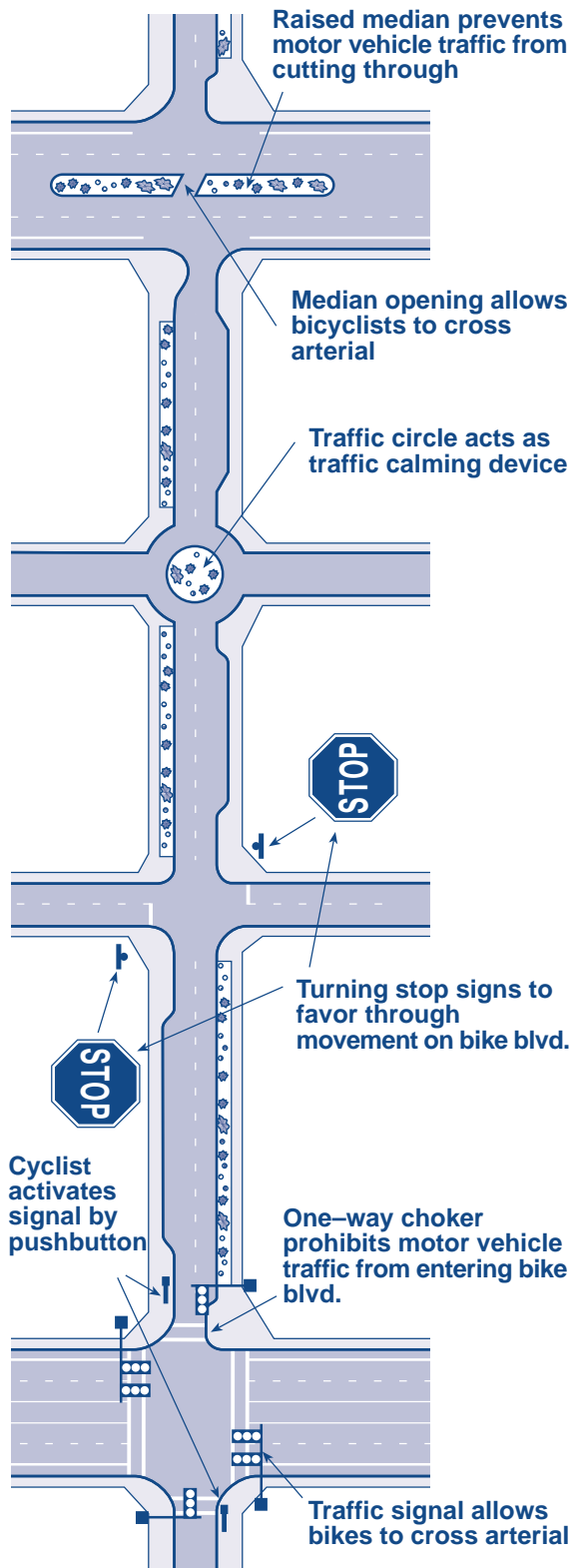
If this method is not practical, “feathering” the new asphalt onto the existing pavement may be substituted if a fine mix is used (Figure A1.17).

### C3. Bicycle Boulevard

A bicycle boulevard on a local service street can provide a good alternative to a bicycle lane or wide outside lane on a higher volume/higher speed street. It can be an excellent attractor for new and inexperienced cyclists and provide a pleasant ride to reach many destinations. Elements of a bicycle boulevard include the following:

- Selecting a street that provides a direct and continuous connection for bicyclists, as opposed to a route that requires bicyclists to wind through neighborhoods. Bicycle boulevards work best on a street grid system.
- Turning stop signs towards intersecting traffic, so bicyclists can ride without interruption.
- Placing motor vehicle traffic diverters at key intersections to stabilize motor vehicle volumes. The diverters must be designed to allow through bicycle movement. A full diverter must include a cut-through wide enough to accommodate a bicycle with a trailer (4 feet wide).
- Alternatively, placing traffic calming devices on the street to stabilize motor vehicle traffic speeds. These include traffic circles, speed bumps (14 foot or 22 foot), curb extensions, slow points, chicanes, etc. In some situations, both traffic diverters and traffic calming devices will be needed.
- Providing protection where the boulevard crosses higher volume arterial streets (Figure A1.18). This can be accomplished in two ways:

FIGURE A1.18 Bicycle Boulevard Street Crossings



- With a signal where a traffic study has shown that a signal in between arterials will be safe and effective. To ensure that bicyclists will be able to activate the signal, the preferred treatment is a signal loop in the pavement marked with a stencil to show the bicyclists where to stand to trip the loop. Alternatively, a push button that will not require dismounting may be provided, in addition to push button activation for pedestrians.
- With a median refuge. A median refuge should be wide enough so it allows a bicyclist with a trailer to be protected from the travel lanes (minimum 8 feet, 10 feet preferred.) The design should allow bicyclists to see the travel lanes they must cross.
- Placing directional signs to route cyclists to key destinations, to guide cyclists through difficult situations, and to alert motorists of the presence of bicyclists.

#### C4. Shared Roadway

There are no specific bicycle standards or treatments for low-volume, low-speed shared roadways; they are simply the roads as constructed. Shared roadways function well on roads such as local streets and minor collectors with speed limits of 25 mph (40 km/h), or traffic volumes of 3,000 average daily traffic (ADT) or less.

Many urban local streets are carrying greater traffic volumes and at higher speeds than their designation should normally allow. These could function well as shared roadways if excessive traffic speeds and volumes were effectively reduced through traffic calming techniques, such as curb extensions, speed bumps, roundabouts, etc. Refer to the Portland Office of Transportation's Traffic Calming Program for more information.

##### C4a. Wide outside lane

For higher volume/higher speed streets (above 25 mph or 3000 ADT) where there is inadequate width to provide the required bicycle lanes or shoulder bikeways, a wide outside lane may be provided that accommodates both cyclists and motor vehicles. This could occur on retrofit projects where there are severe physical constraints, and all other options have been pursued, such as removing parking or narrowing travel lanes to minimum acceptable widths.

## C. Design Guidelines for Bicycle Facilities

*(continued)*

A wide outside lane is typically 14 feet (4.2 m) wide. Usable width is normally measured from curb face to the center of the lane stripe, but adjustments need to be made for drainage grates, parking, and longitudinal ridges between pavement and gutter sections. For widths of 15 feet (4.8 m) or greater, a bicycle lane or shoulder bikeway should be striped.

### **C4b. Signed Bikeway Connection**

For shared roadways that act as connections between bikeways and/or major destinations, a “Bicycle Route” sign with directional information should be provided. [See Section IV B3 for more information.]



BICYCLE MASTER PLAN

# Part II:

## Intersection Design

Intersections are areas where most conflicts between various roadway users occur. By their very nature, intersections put one group of travelers in the path of others. Good intersection design creates a situation where those approaching the intersection have a clear indication what path they must follow and who has the right-of-way. As with other roadway design features, bicyclists must be treated as vehicles: only in extremely rare cases should they be encouraged to proceed through intersections as pedestrians.

### A. Basic Principles

Some basic principles to be followed when designing intersections are:

- Unusual conflicts should be avoided.
- Intersection design should create a path for bicyclists that is direct, logical and as close to the path of motor vehicle traffic as possible.
- Bicyclists following the intended trajectory should be visible and their movements should be predictable.
- Potential safety problems associated with the difference between auto and bicycle speeds should be minimized.

### B. Simple Right Angle Intersections

Simple right angle intersections are usually the simplest to treat for bicycle movement. Bicyclists must be allowed to follow a path that is as direct as possible, using the following techniques:

- Bicycle lanes should be striped to a marked or unmarked crosswalk.
- The bicycle lane stripe should be a solid stripe all the way to the crosswalk.
- The lanes should resume at the other side of the intersection.

(See Appendix IV B2, Bicycle Lanes, for more detailed information)

### C. Complicated Intersections

Intersections with multiple streets entering from different angles can create confusion for users. Such intersections should be avoided and designed instead as simple right angle intersections whenever possible. For an already existing complicated intersection, or if a complex intersection is absolutely needed, bicycle lanes may be striped with dashes to guide bicyclists through a long undefined area.

## D. Right-Turn Lanes

Right-turn lanes present special problems for cyclists because right-turning cars and through bicyclists must cross paths. To alleviate these concerns, the design in Figure A2.1 should be used for bicycle lanes. The paths of the through bicyclist and the right-turning motor vehicle should cross prior to the intersection. This configuration has three advantages:

- It allows this conflict to occur away from the intersection where other conflicts could occur.
- The difference in travel speeds is an advantage, as a motor vehicle driver can pass a bicyclist rather than ride side-by-side.
- All users are encouraged to follow the rules of the road: through vehicles (including bicyclists) proceed to the left of right-turning vehicles.

## E. Right-Lane Merge and Exit Ramps

Bicycle lanes are not usually provided on limited access freeways, but some urban parkways are designed with merging lanes and exit ramps, rather than simple intersections. These roads may otherwise be suitable for bicycle lanes.

FIGURE A2.1 Standard Right-Turn Lane Configuration

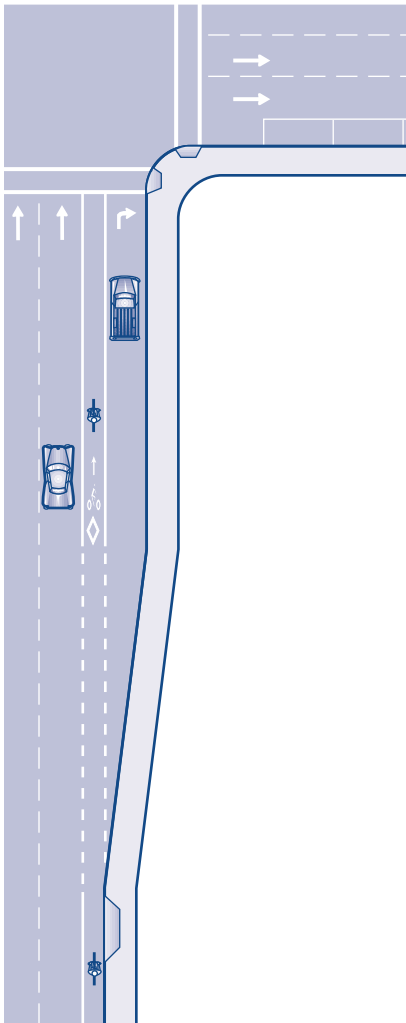


FIGURE A2.2 Bike Lanes at Right-Lane Merge

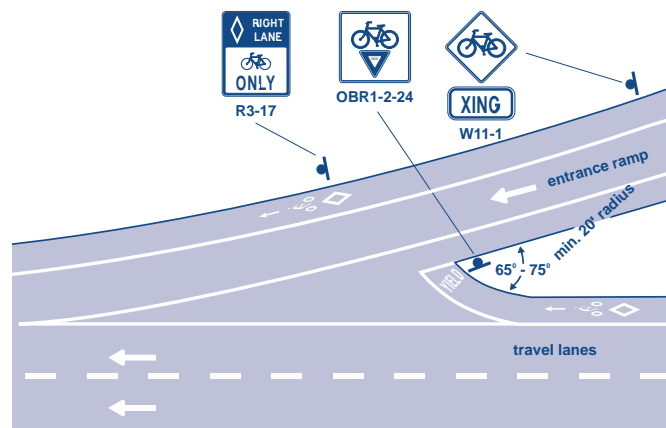
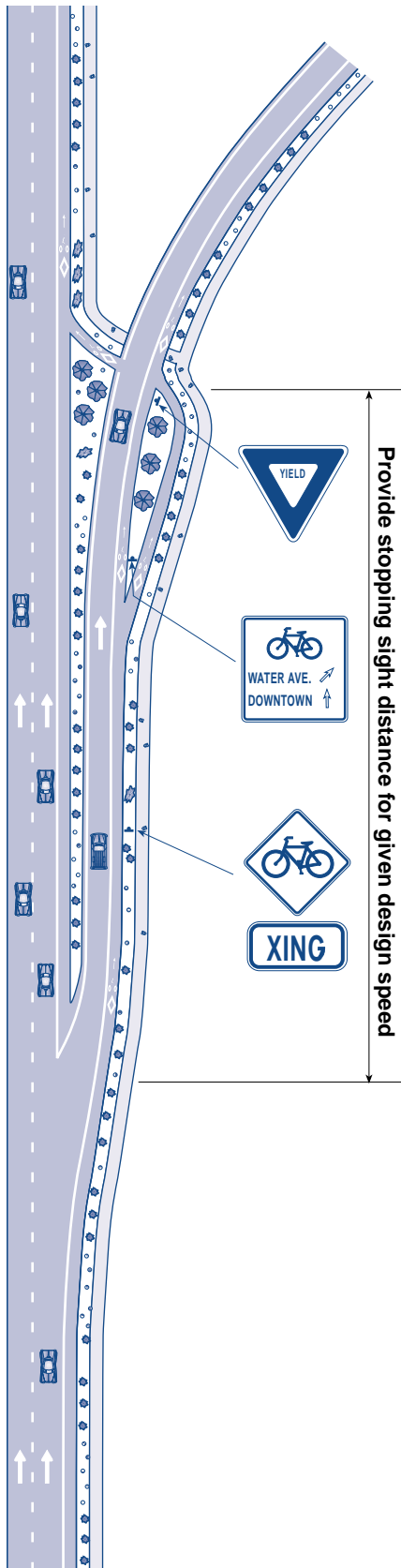


FIGURE A2.3 Bike Lanes at Exit Ramps



Traffic lanes that allow merging traffic to flow onto a roadway at high speeds create difficulties for slower-moving bicyclists. Exit ramps that allow motor vehicles to leave the roadway at high speeds pose similar problems.

The following designs comply with a basic traffic engineering principle that encourages crossings at or close to a right angle.

### ***E1. Right-Lane Merge***

It is difficult for cyclists to traverse the undefined area created by right-lane merge movements, for the following reasons:

- The acute angle of approach creates visibility problems.
- Motor vehicles are often accelerating to merge into traffic.
- The speed differential between the cyclist and the motorist.

To alleviate these concerns, the design in Figure A2.2 guides cyclists in a manner that provides:

- A short distance across the ramp to traverse at close to a right angle.
- Improved sight distance in an area where traffic speeds are slower than further downstream.
- A crossing in an area where drivers' attention is not entirely focused on merging with traffic.

### ***E2. Exit Ramps***

Exit ramps normally present great difficulties for bicyclists and pedestrians for the following reasons:

- Motor vehicles are exiting at fairly high speeds.
- The acute angle creates visibility problems.
- Motor vehicle drivers using the exit ramp often do not use their right-turn signal, which creates confusion for bicyclists seeking a gap in the traffic stream.

To alleviate these concerns, the design in Figure A2.3 guides cyclists in a manner that provides:

- A short distance across the ramp, at close to a right angle.
- Improved sight distance in an area where traffic speeds are slower than further downstream.
- A crossing in an area where the driver's attention is not distracted by other motor vehicles.

## F. Dual Right-Turn Configurations

Dual right-turn lanes or a right-turn, right/through lane configuration are unpleasant challenges for cyclists at intersections because cyclists must either merge across two lanes or merge across into a lane where drivers could be turning or going straight (Figure A2.4). Both these configurations should be avoided whenever possible. Warrants for using dual turn lanes should be closely scrutinized, so this pattern is used only if absolutely necessary.

FIGURE A2.4 Bike Lane through Dual Right-Turn Lanes

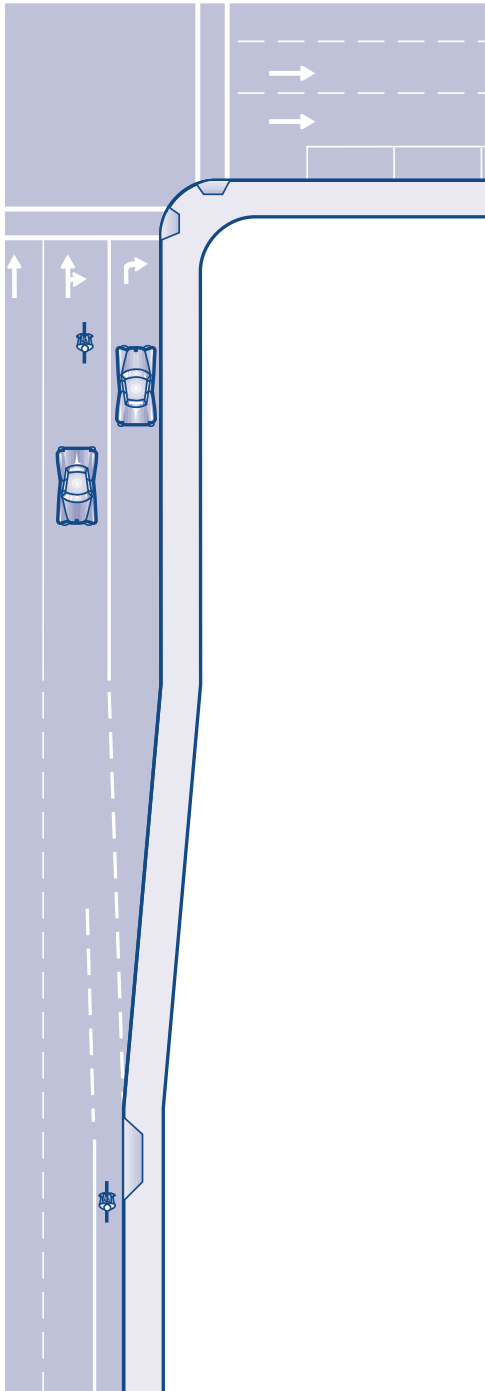
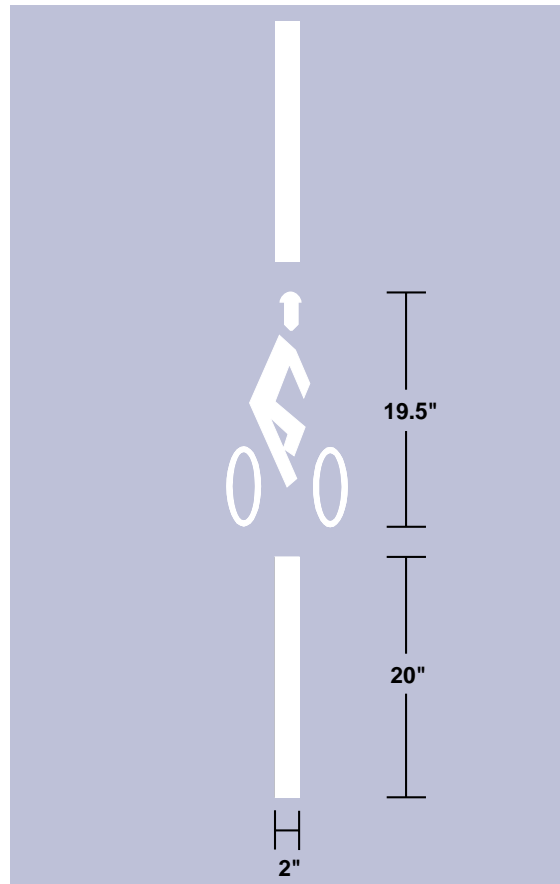


FIGURE A2.5 Pavement Marking for Signal Activation



## G. Signal Timing and Bicycle Detection

### ***G1. Signal Timing***

At intersections, bicycle traffic should be considered in the timing of the traffic signal and vehicle detection. Consideration should be given to ensure that adequate clearance intervals are provided for bicyclists where appropriate, based on analysis by the City of Portland Bureau of Traffic Management. A bicyclist's speed, perception/reaction time, and intersection geometry should be factored in when the intervals are analyzed.

Where bicycle traffic is channelized such that bicycles can be detected exclusive of the detection of motor vehicles, loop detectors should be used to provide for the needs of bicyclists.

### ***G2. Detection***

Traffic detectors for traffic-actuated signals should be set to detect bicycles. Loops should be located in bicycle lanes in the bicyclist's expected path. All signalized locations with vehicular actuation and without bicycle lanes for the left turn and outside through lanes should have pavement markings to indicate to bicyclists where they should be to activate signal detection (Figure A2.5). If the loop is invisible, the pavement marking should be installed; if the loop is visible and bicycle use anticipated to be low (e.g., in a remote location), a pavement marking may not be necessary.

In some cases, the use of pedestrian-actuated buttons may be an alternative to the use of detectors, provided the button can be pushed by a cyclist from the street.







BICYCLE MASTER PLAN

# Part III:

## Miscellaneous Design Considerations

### A. Detrimental Practices

#### *A1. Sidewalk Bikeways*

Early bikeway efforts were aimed at multiple use of sidewalks for pedestrians and bicyclists.

While in rare instances this type of facility may be necessary, or desirable for use by small children, in most cases it should be avoided.

Sidewalks are generally not suited for cycling for several reasons:

- They put cyclists in conflict with pedestrians.
- There are potential conflicts with utility poles, sign posts, benches and other “street furniture.”
- Bicyclists face conflicts at virtually every driveway, alley or intersection, as motorists are not expecting bicyclists. A cyclist on a sidewalk is generally not visible to motorists, so that the cyclist emerges unexpectedly. This is especially true of cyclists riding in the direction opposite to adjacent motor vehicle traffic—drivers are not looking for a vehicle coming from this direction.
- Bicyclists are put into awkward situations at intersections where they cannot safely act like a vehicle but are not in the pedestrian flow either, which creates confusion for other road users.

Cyclists are safer when they are allowed to function as roadway vehicle operators, rather than as pedestrians.

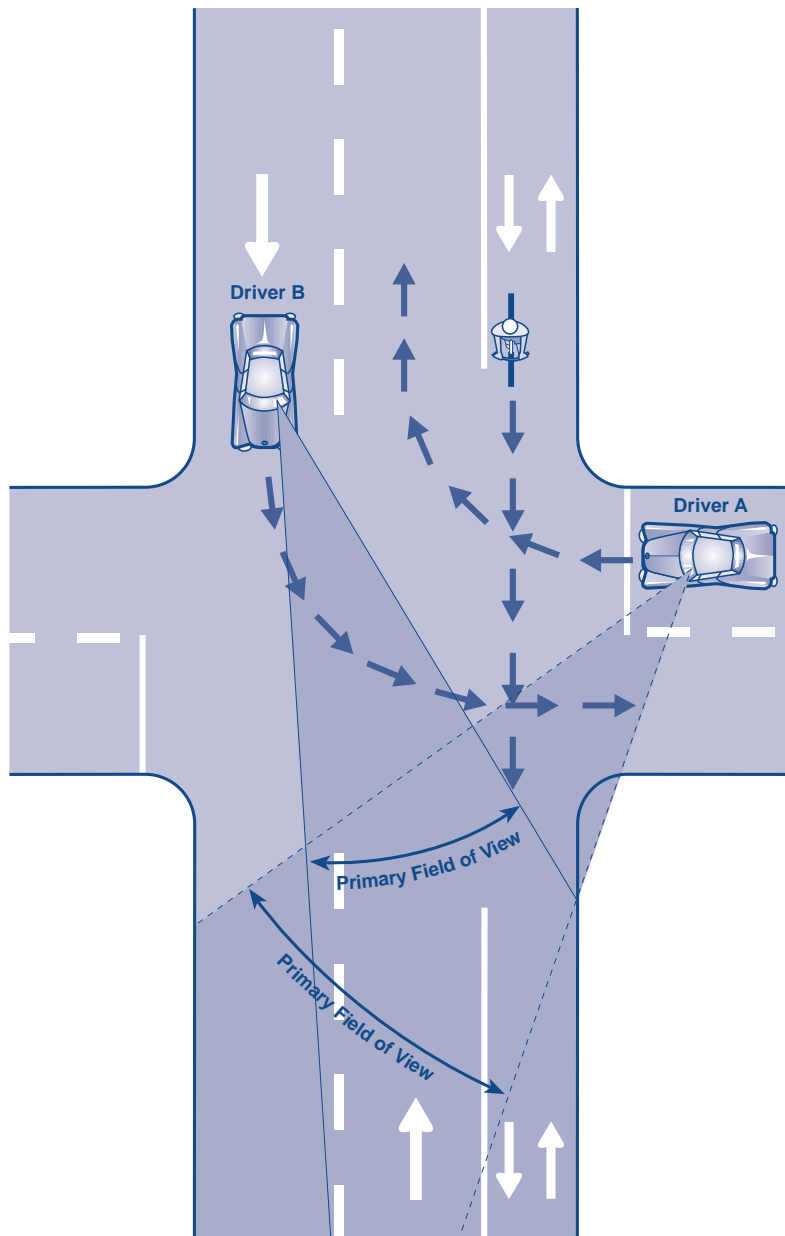
#### *A2. Extruded Curbs*

These low curbs, when used to separate motor vehicles from cyclists, create an undesirable condition. Bicyclists or motorists may hit the curb and lose control, with the motor vehicle crossing onto the bikeway or more often the cyclist falling onto the roadway. Extruded curbs also make bikeways difficult to maintain and tend to collect debris.

#### *A3. Two-Way Bicycle Lane on one side of road*

While this may seem a practical alternative to the expense of two bicycle lanes, it creates a condition that is very dangerous for bicyclists (Figure A3.1). The

FIGURE A3.1 Problems with Two-way Bike Lane on One Side of the Road



Right-turning driver A is looking for traffic on the left;  
Left-turning driver B is looking for traffic ahead;  
In both cases, a wrong-way bicyclist is not in the driver's  
main field of vision.

bicyclist closest to the motor vehicle lane has opposing motor traffic on one side and opposing bicycle traffic on the other. This configuration also promotes illegal wrong-way riding and creates awkward and dangerous movements in transitions back to standard bikeways.

#### A4. Reflectors in Pavement

Pavement reflectors or other raised markings can deflect a bicycle wheel, causing the cyclist to lose control. If pavement markers are needed for motorists, they should be installed on the motorist's side of the stripe, and have a beveled front edge. This may be desirable in some isolated instances, such as where drivers consistently intrude on a bicycle lane at the inside of a curve.

#### A5. Continuous Right-turn Lanes

Continuous right-turn lanes make it extremely difficult for bicyclists to judge where they should be riding (Figure A3.2). Riding against the curb puts them in conflict with right-turning cars, but riding to the left of the right-turn lane puts them in conflict with cars merging into and out of the right-turn lane. The best solution is to eliminate the continuous right-turn lane, consolidate accesses and create well-defined intersections, with the bicycle lane to the left of right-turning cars.

#### A6. Bicycle Lanes behind Diagonal Parking

Diagonal parking can cause conflicts on streets with high bicycle use. Car drivers backing out have very poor visibility of oncoming cyclists. It is generally not recommended to place bicycle lanes adjacent to diagonal parking.

## B. Other Design Considerations

### B1. Curb Cuts

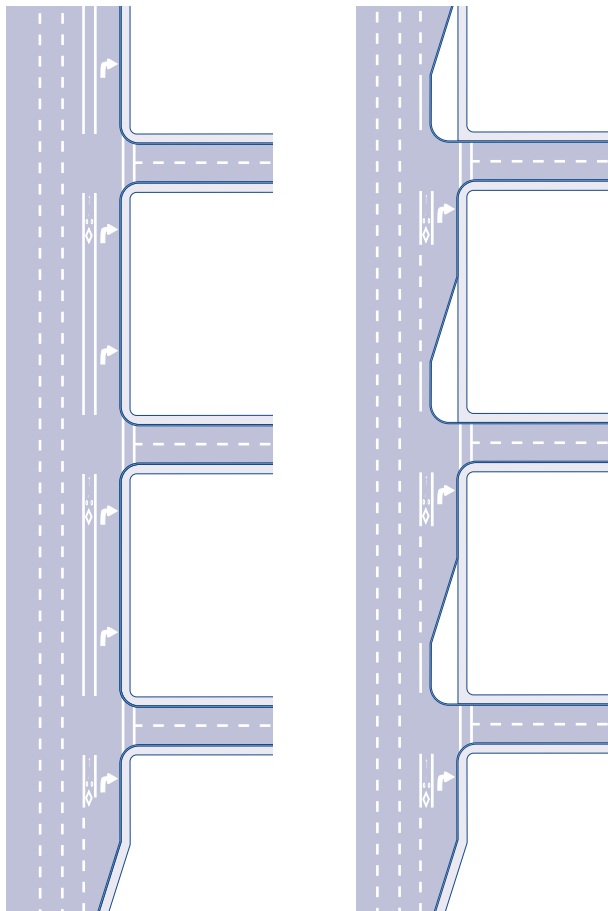
Curb cuts for bicycle access to off-street paths and sidewalks should be designed so the bottom of the curb cut matches the gutter grade without an elevated lip (Figure A3.3). The bottom width of the curb cut should be the full width of the bikeway when the approaching path is perpendicular to the curb, and a minimum of 8 feet (2.4 m) wide when the approaching path is parallel and adjacent to the curb. Ten or 12 feet (3 or 3.6 m) may be necessary on downhill grades.

### B2. Drainage Grates

Care must be taken to make sure that drainage grates are bicycle-safe. If not, a bicycle wheel may fall into the slots of the grate causing the cyclist to fall. Replacing existing grates (preferred method) or welding thin metal straps across the grate perpendicular to the direction of travel (alternate method) is required (Figure A3.4). Metal straps should be checked periodically to ensure that they remain in place.

Inlets in the curb face (type CG-3) are preferable to street-surface designs (types G-1, G-2, CG-1 and CG-2). If a street-surface grate is required for drainage, care must be taken to ensure that the front of the grate is flush with the road surface.<sup>1</sup>

FIGURE A3.2 Continuous Right-Turn Lane Creates Constant Conflicts



Undesirable

Desirable

Inlets should be raised after a pavement overlay, to within 1/4" (6 mm) of the new surface. If this is not possible or practical, the pavement must taper into drainage inlets so they do not cause an abrupt edge at the inlet. Another option is to recess the curb line in the area of the grate, removing the grate from the cyclist's travel path.

### B3. Railroad crossings

Special care must be taken wherever a bikeway intersects a railroad crossing. The most important design considerations for bicyclists at crossings are smoothness, angle of crossing, and flange depth and width (Figure A3.5).

#### B3a. Smoothness

Rubberized crossings have proven very effective in maintaining a durable, smooth crossing. Concrete is a material that is also widely used. When laid with precision, concrete provides a smooth ride, and may be the best overall material. If asphalt pavement is used, it must be maintained in order to prevent a ridge buildup next to

FIGURE A3.3 Curb Cuts for Paths

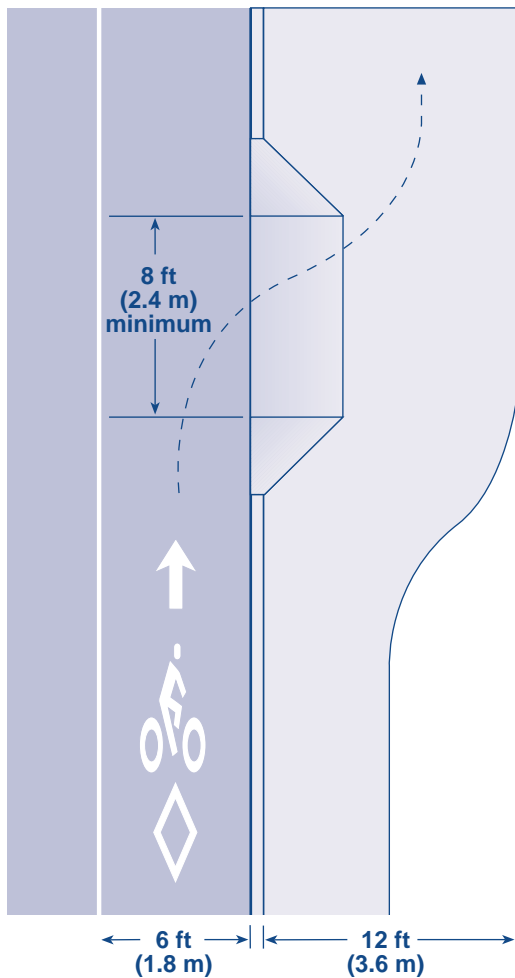
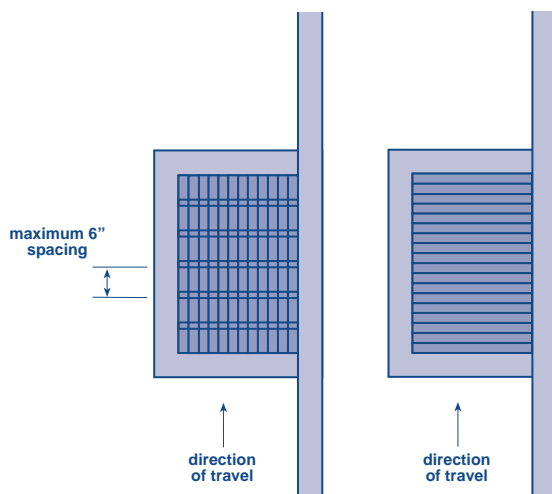


FIGURE A3.4 Bicycle-Safe Drainage Grates



the rails. Timber crossings may prove to be smoother in some circumstances, but they can wear down rapidly and are often slippery when wet.

### B3b. Angle of crossing

The risk is kept to a minimum where the bikeway crosses the tracks at a 90° angle. The minimum acceptable angle is 45°. If the skew angle is less than 45°, special attention must be given to the bikeway alignment to improve the angle of approach, preferably to 60° or greater.

### B3c. Flange

The open flange area between the rail and the roadway surface can cause problems for cyclists, since it can catch a bicycle tire, causing the rider to be thrown off the bicycle. Flange width (the space between the rail and the crossing material) must be kept to a minimum.

### B3d. Signs

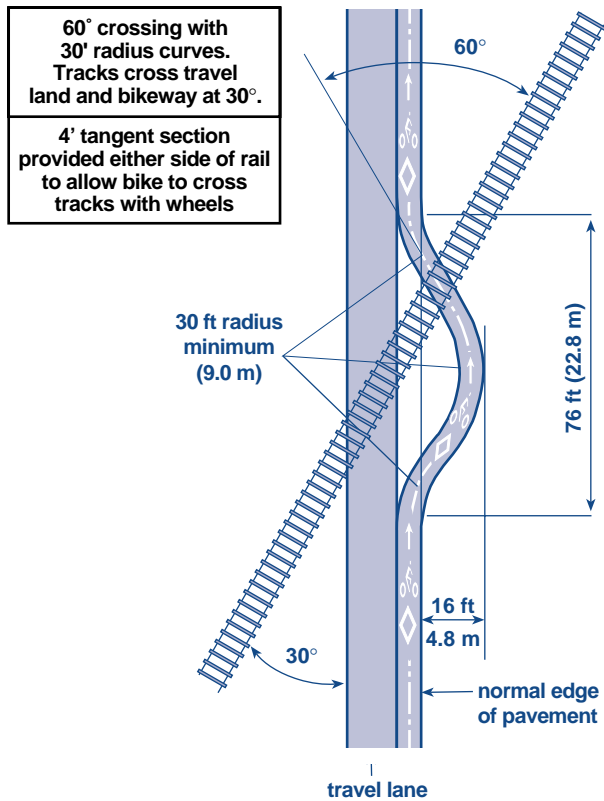
Advance warning signs should be installed on off-street paths and on-street bikeways in advance of railroad crossings.

## B4. Keeping bikeways open during construction and other travel disruptions

Through bicycle and pedestrian movement must be maintained during construction and other projects disrupting travel (e.g., filming for commercials, special events), particularly on bridges. Pedestrians and bicyclists are the most susceptible to disruptions in their normal travel routes, because of their slower speeds and exposure to noise, dirt and fumes. Temporary lane restrictions, detours and other traffic control measures instituted during construction or other travel disruptions should be designed to accommodate non-motorized travelers whenever possible, especially in areas where these modes are normally encountered.

If the disruption occurs in a bicycle lane over a short distance (approximately 500 ft or less), bicyclists should be routed to share a motor vehicle lane. On longer projects, and on busy roadways, a temporary bicycle lane or wide outside lane should be provided. Bicyclists should not be routed onto sidewalks with pedestrians unless the traffic engineer deems there to be no reasonable alternative. If the proposed work is on a designated bikeway and there can be no accommodation for bicyclists, a reasonable detour needs to be established and signed.

FIGURE A3.5 Treatment for Bike Lanes Crossing Railroad Tracks



Important considerations for street disruptions include:

- Metal plates create a slick and dangerous surface for cyclists, and are not easily visible at night or in the rain. If metal plates are to be used to accommodate traffic, the plates may not have a vertical edge greater than one inch without a temporary asphalt lip to accommodate bicyclists. Type II or III Barricades with flashers should be placed at least 20 feet in advance.
- Construction holes or depressions should never be left without physical barriers preventing cyclists from falling in. For holes that need to be left for over two days, temporary fill should be used to create a level surface for the hole or depression. If the hole is to remain for less than two days, Type II or III Barricades with flashers should be placed to prevent cyclists from riding into it.
- In all cases of road surface construction or other disruptions, Type II or III Barricades with flashers should be placed at least 20 ft in advance.
- The placement of advance construction signs should obstruct neither the pedestrian's nor the bicyclist's path. Where there is sufficient room, placing signs half on the sidewalk and half on the roadway may be the best solution where there is no planting strip (Figure A3.6).

Construction project managers should notify the Bicycle Program in the case of major disruptions and release information to the local media.

### B5. Contra-Flow Bicycle Lanes

Contra-flow bicycle lanes on a one-way street are not usually recommended. There are, however, special circumstances under which this design may be desirable, if the following conditions are met:

- The contra-flow bicycle lane provides a substantial savings in out-of-direction travel compared to the route motor vehicles must follow;
- The contra-flow bicycle lane is short and provides direct access to a high-use destination point;
- Safety is improved because of reduced conflicts;

FIGURE A3.6 Placement of Construction Signs

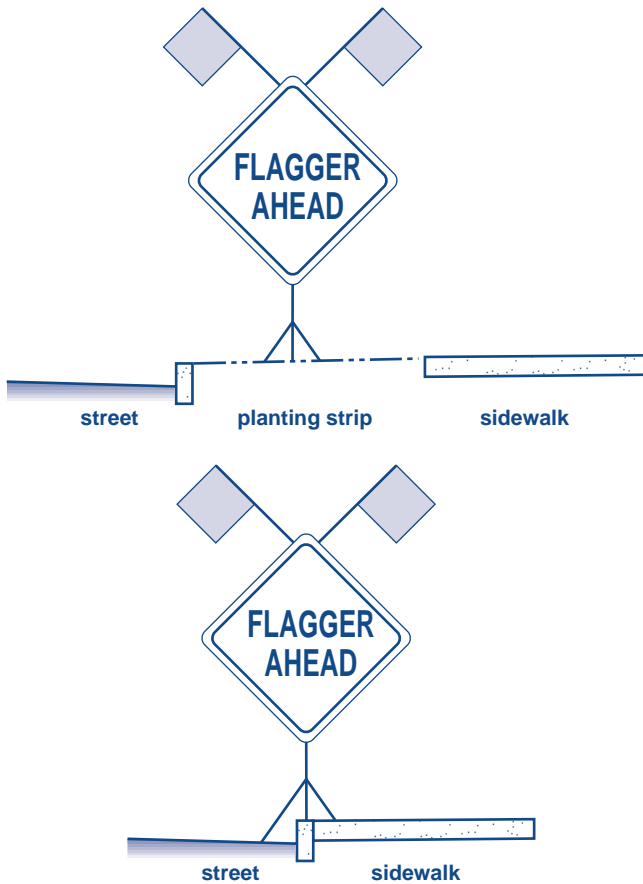
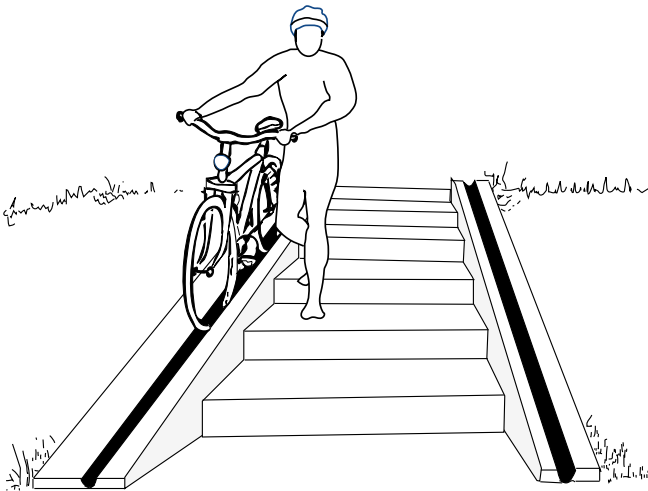


FIGURE A3.7 Bicycle Ramp on Stairs



### B6. Staircase Design

Staircases should be designed with a bicycle wheel gutter on the side or down the middle to allow bicyclists to roll their bicycles up and down the stairs (see Figure A3.7). Where possible, bicycle wheel gutters should be provided as an

- There are no or very few intersecting driveways, alleys or streets on the side of the proposed contra-flow lane;
- Bicyclists can safely and conveniently reenter the traffic stream at either end of the section;
- A substantial number of cyclists are already using the street; and
- There is sufficient street width to accommodate a full-dimension bicycle lane.

A contra-flow bicycle lane may also be appropriate on a one-way street recently converted from a two-way street (especially where this change occurred to reduce motor vehicle traffic through neighborhoods).

For a contra-flow bicycle lane to function well, these special features must be incorporated into the design:

- The contra-flow bicycle lane must be placed on the right side of the street (to drivers' left) and must be separated from oncoming traffic by a double yellow line. This indicates that the bicyclists are riding on the street legally, in a dedicated travel lane.
- Any intersecting alleys, major driveways and streets must have signs indicating to motorists that they should expect two-way bicycle traffic.
- Existing traffic signals must be fitted with special signals for bicyclists, with loop detectors or push-buttons. The push-buttons must be placed so they can be easily reached by bicyclists, without having to dismount.
- It is preferable to place a separate bicycle lane in the direction of motor vehicle traffic, striped as a normal bicycle lane. Where the roadway width does not allow this, bicyclists will have to share the road with traffic. In this situation, striping the contra-flow bicycle lane should take precedence, otherwise some cyclists will be tempted to ride illegally against traffic.

## B. Other Design Considerations

(continued)

integral part of the staircase design instead of add-on feature. The gutter should have dimensions of no less than 3" x 3" x 1/2" and, if not designed as an integral component of the stairpath, should be firmly affixed to the handrail.

Attachments should be made flush with the gutter surface, and the gutter itself should be flush with all landings. Bicycle wheel gutters should be constructed of a material designed to withstand the elements.

The City of Portland has a number of staircases with bicycle wheel gutters, none of which have conflicted with pedestrian use. Because of the potential for such conflicts, bicycle wheel gutter design and inclusion will be left to the discretion of the supervising engineer.

### ***B7. Traffic Calming Devices: Considerations for Bicycles***

The City of Portland's Traffic Calming Program (TCP) works to improve neighborhood livability by addressing the impacts of excessive traffic and speeds. The Program plans and implements projects on local streets to encourage the use of the arterial system and reduce traffic speeds. The Program also plans and implements projects on residential neighborhood collector streets to slow traffic speeds and enhance alternative transportation options. TCP's Neighborhood Speed Watch Program increases public awareness about the impacts of speeding by loaning radar guns to citizen volunteers and sending reminders to drivers observed exceeding the speed limit.

Most traffic calming projects involve the installation of such measures as speed bumps, curb extensions, diverters, rumble strips, and traffic circles. Generally, these measures are complementary to bicycle travel and are treatments used on bicycle boulevards. However, these measures can also be problematic to bicycles if not well planned and installed. The following considerations apply to all streets, but in particular, those streets identified as bikeways on the City's Bikeway Network.

#### **B7a. Speed Bumps**

*Consideration:* Speed bumps should be built to the City standard of fourteen or twenty-two feet. These bumps will slow motor vehicles while providing a smooth ride for cyclists.

#### **B7b. Rumble Strips**

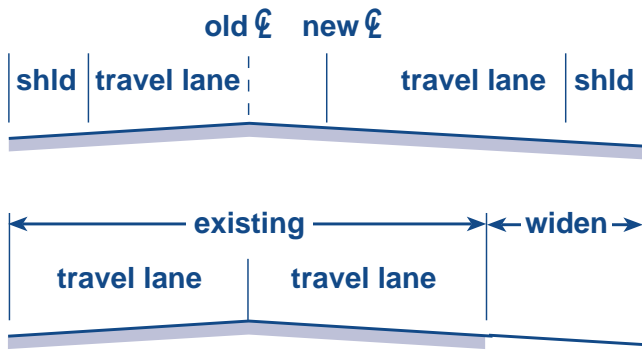
*Consideration:* Rumble strips should not be placed in a bicycle lane or within the right-most four feet of a vehicle travel lane.

#### **B7c. Curb Extensions**

*Consideration:* On streets without a centerline stripe, motor vehicles can safely pass cyclists at an intersection with a curb extension. On streets with a centerline stripe, the curb extension should be placed such that a 12 foot (minimum) to 14 foot (desirable) outside lane is left on the roadway to allow bicyclists to pass through the intersection safely. A ten foot (minimum) auto lane next to a four foot (minimum) bicycle lane is also acceptable. Otherwise, bicyclists will have to veer out into traffic, or motor vehicles will "squeeze" bicyclists going through the intersection.



FIGURE A3.8 Shoulder Widening on One Side of the Road



access unless overriding safety concerns exist. A bicycle “cut-through” at full diverters should be wide enough (four feet) to accommodate a bicycle trailer.

### ***B8. Lighting for bikeways***

During low light conditions the presence of fixed-source lighting helps a bicyclist to see road surface conditions and avoid potential obstacles. Lighting for both off-street paths and on-street bikeways should be considered where night riding is expected, particularly through underpasses and tunnels, at major intersections, and when nighttime security could be a problem. All bikeways should be lit to appropriate City lighting standards.

### ***B9. Roadway shoulder widening***

If widening is performed on only one side of the roadway, consideration should be given to shifting the centerline stripe to allow for adequate travel lanes and shoulder bikeway or bicycle lanes (Figure A3.8). A normal 4-inch (100 mm) wide fog line stripe is used to delineate shoulder bikeways. Where physical constraints exist it may be acceptable to widen the shoulder to provide for bicycle travel in the uphill direction only, or to provide shoulder widening at strategic points along the roadway.

### **B7d. Circles**

*Consideration:* In general, cyclists often complain that they feel “squeezed” by motor vehicles trying to pass at a traffic circle. On streets where bicycle lanes are recommended (generally on streets above 3000 ADT), speed bumps are preferable to traffic circles. When implementing traffic circles, careful consideration should be given to the impact of the circle on bicycle travel.

### **B7e. Diverters**

*Consideration:* All traffic diverters should preserve bicycle turning movement options and through



BICYCLE MASTER PLAN

# Part IV:

## Signing and Marking

### A. Basic Principles

Well-designed roads usually require very little signing, because they are built so all users understand how to proceed. Conversely, an overabundance of warning and regulatory signs may indicate a failure to have addressed problems. The attention of drivers, bicyclists and pedestrians should be on the road and other users, not on signs along the side of the road.

Oversigning of roadways is ineffective and can degrade their usefulness to users. Too many signs are distracting and a visual blight, they create a cluttered effect and waste resources.

The message conveyed by the sign should be easily understandable by all roadway users. The use of symbols is preferred over the use of text.

### B. Bikeway Signing

#### ***B1. Off-street paths***

Off-street paths should be signed with appropriate regulatory, warning and destination signs.

##### **B1a. Regulatory Signs**

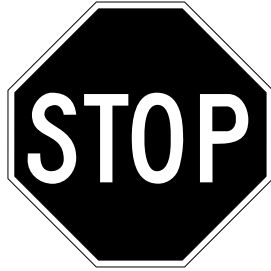
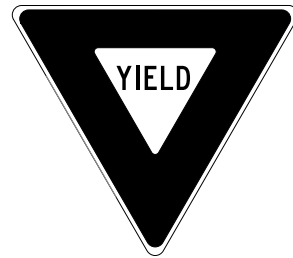
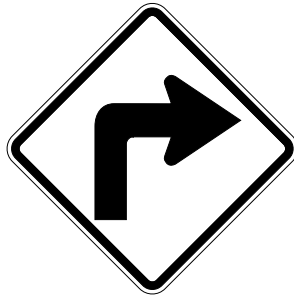
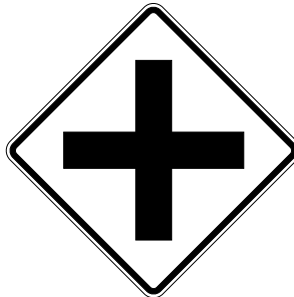
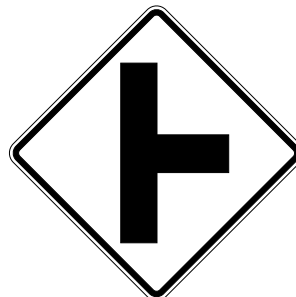
The regulatory signs R1-1 (Stop) and R1-2 (Yield) should be used to regulate bicycle travel on off-street paths (Figures A4.1 and A4.2).

*Note: signs R1-1 and R2-2 are reduced versions of standard motor vehicle signs. They should be used where they will be visible only to bicyclists, for example, where a path crosses another path or where a path intersects a roadway at right angles.*

##### **B1b. Warning Signs**

The following warning signs should be used to inform path users of potentially hazardous conditions:

- Signs W1-1 and W1-2 indicate turns (Figures A4.3 and A4.4).
- Signs W2-1 and W2-2 give information about the approaching intersection (Figures A4.5 and A4.6).
- Sign W10-1 indicates a railroad crossing (Figure A4.7).
- Sign W7-5 warns of an approaching hill (Figure A4.8).

FIGURE A4.1 **Stop (R-1)**FIGURE A4.2 **Yield (R1-2)**FIGURE A4.3 **Turn (W1-1)**FIGURE A4.4 **Curve (W1-2)**FIGURE A4.5 **Intersection Sign (W2-1)**FIGURE A4.6 **Intersection Sign (W2-2)**

- Sign OBW11-1 with “XING” rider (Figure A4.9) should be placed in advance of a point where an off-street path crosses a roadway, if the crossing is in an area where it is not expected. This sign is not appropriate where bicycle lanes and shoulder bikeways cross streets at controlled intersections (traffic signals and stop signs).

### **B1c. Striping**

On paths with high use, a broken yellow center line stripe may be used to separate the travel into two directions. Spacing should be 3 foot (0.9 m) centerline segments with 9 foot (2.7 m) gaps or 10 foot (3m) segments and 30 foot (9m) gaps between segments. A solid centerline stripe should be used through curves and areas of poor sight distance.

*Note: Attempts to separate pedestrians from cyclists with an additional painted lane have not proven successful and are not recommended.*

FIGURE A4.7 Railroad (W10-1)

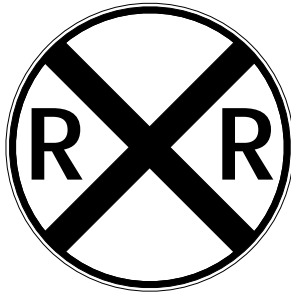


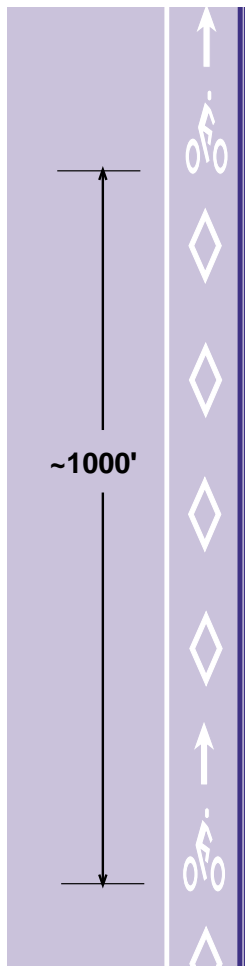
FIGURE A4.8 Hill (W7-5)



FIGURE A4.9 OBW11-1 with 'XING'

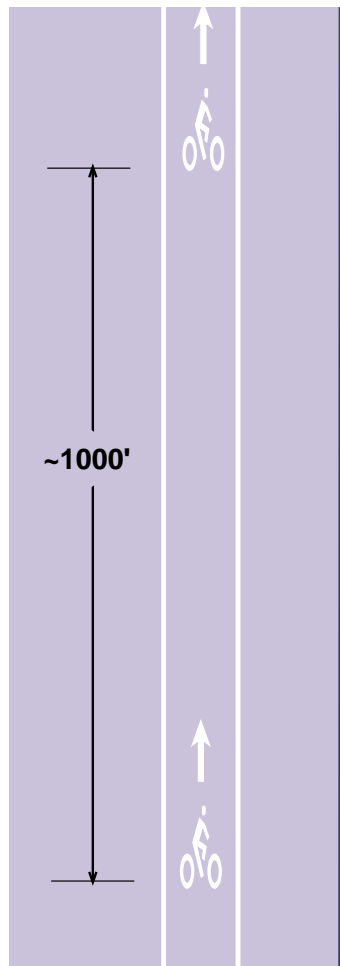


FIGURE A4.10A Bike lane next to curb



Not to scale

FIGURE A4.10B Bike lane next to parking



Not to scale

## B2. Bicycle Lanes

### B2a. Bicycle Lane Designation

Bicycle lanes should be designated with the following markings:

If the bicycle lane is adjacent to a curb:

- 8-inch (200 mm), solid white lane line.
- Bicycle stencil, directional arrow, and diamond spaced every 1000 feet or after every major intersection, with three diamonds in between (Figure A4.10a). The use of the extra three diamonds helps with the enforcement of no parking in bike lanes.

If the bicycle lane is adjacent to on-street parking:

- 4-inch (100 mm) solid white lane line or marked parking stalls
- 8-inch (200 mm) solid white lane line
- Bicycle stencil and directional arrow spaced every 1000 feet or after every major intersection. No diamonds need be used, as there will not be demand for parking. (Figure A4.10b)

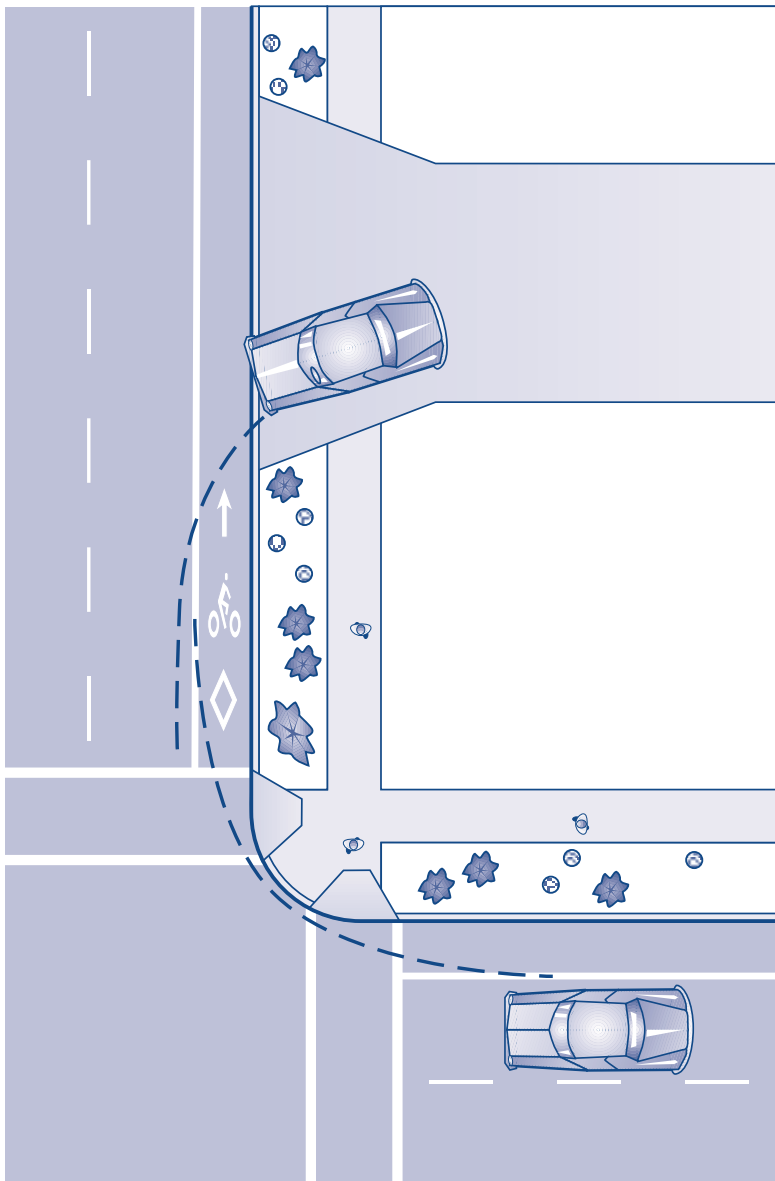
FIGURE A4.11 Right Lane Bike Only



FIGURE A4.12 Bike Lane Ends



FIGURE A4.13 Bike Lane Stencil Placed out of Swept Path of Turning Vehicles



The previous ODOT standard guided PDOT to use the “Bike Only” marking rather than the bicycle stencil with an arrow. Since there are consequently many of these older markings on Portland streets, it will take a long time and considerable expense, to replace them. Thus, while all new bikeways should use the current (bicycle/arrow/diamond) standard, the old ones will only be replaced as they wear out.

In general, “No Parking” signs are not to be used with bicycle lanes; the bicycle lane should be marked well enough to be a parking deterrent. “No Parking” signs (P 100, P103, and P106; or MUTCD R 7-9a) may be used in cases where parking in bicycle lanes is a continual problem. Yellow painted curbs may also be used to indicate that parking is prohibited.

“Right Lane, Bike Only” sign should be used sparingly in cases where clarity is needed (Figure A4.11).

Bicycle route signs are to be used for directional information or bikeway identification. They should not be used in isolation; they should be used in conjunction with other informational signage.

Bike lane ahead and bike lane ends signs should be used sparingly. The “Bike lane ends” sign may be used as a rider in conjunction with the sign depicted in Figure A4.12 to indicate a merge situation (Figure A4.12).

**B2b. Marking Placement**

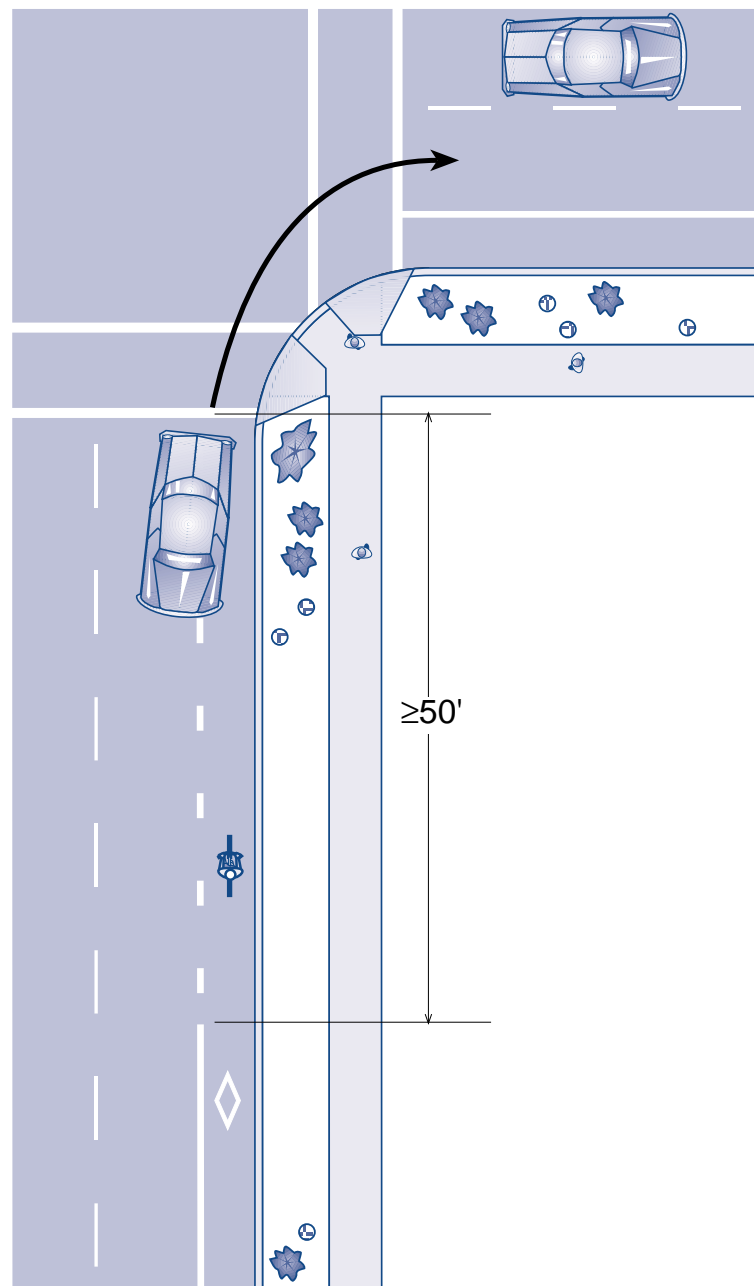
Markings should be of cold plastic material. They should be placed after most intersections to alert drivers and bicyclists entering the roadway to the exclusive nature of the bicycle lanes. Markings should be placed after every intersection where a parking lane is

placed between the bicycle lane and the curb. Care must be taken to avoid placing markings in an area where motor vehicles are expected to cross a bicycle lane (Figure A4.13). This includes driveways and the area immediately after an intersection.

### B2c. Intersections

Bicycle lanes should normally be marked to the crosswalk or to a point where turning vehicles would cross them. At intersections with a high volume of right-turning traffic, it may be advisable to mark a dashed line for the bicycle lane for

FIGURE A4.14 Optional dashed bike lane lines



approximately 50 feet preceding the intersection. The lanes should resume at the other side of the intersection (Figure A4.14).

Where the bike lane is placed adjacent to relatively lightly-used parking and there is a heavy volume of right-turning traffic, the following design should be considered:

- Remove parking approximately 50 feet before the crosswalk,
- Create a dedicated right-turn lane,
- Drop bike lane, and
- Place standard “Right Lane Must Turn Right Except Bicycles” sign (Figure A4.15) with standard right-turn only lane markings.

*Note: ODOT has proposed a modified version of this, whereby the bicycle lane continues but is dashed, and is placed on the left side of the right turn lane, in effect creating a shared right-turn lane/bike lane. (Figure A4.16 shows ODOT’s recommended (not adopted) marking and sign).*

Dashed lines should be used to guide bicyclists through signalized intersections, skewed or complex intersections. Spacing for a dashed lane line should be 3-foot (0.9 m) segments with 9-foot (2.7 m) gaps. (Figure A4.17)

FIGURE A4.15 Recommended treatment for combined right-turn lane

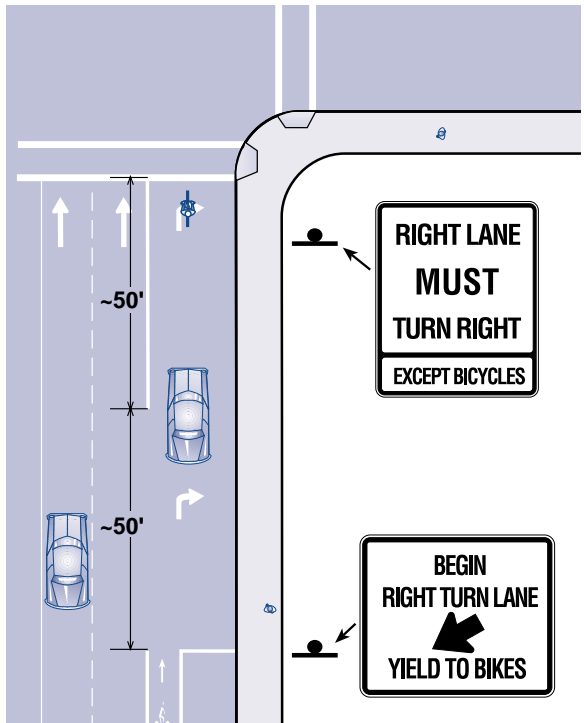


FIGURE A4.16 ODOT treatment for combined right-turn lane

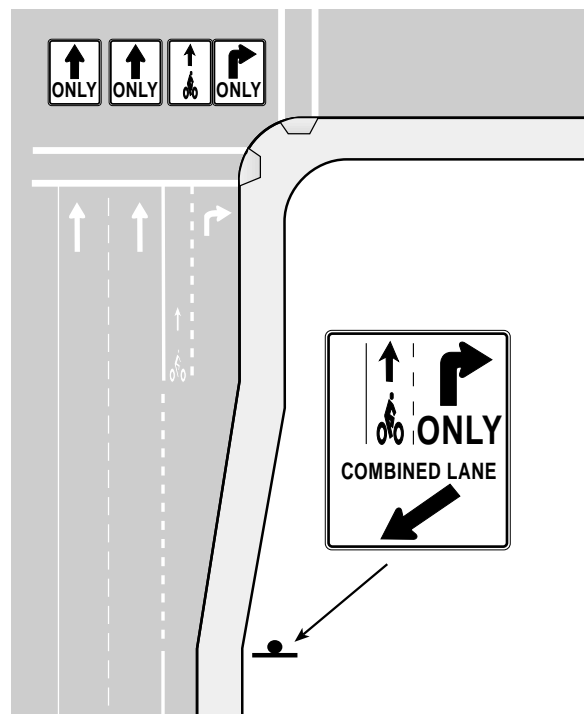


FIGURE A4.18 Bike Lane Sign at Right-Turn Lane



**B2d. Right Turn Lanes at Intersections**

The short through bicycle lane segment should be marked with two 8" (200 mm) solid lane lines to the left of right-turn lane and connected to the preceding bicycle lane with dashed lane lines, using 3-foot (0.9 m) segments with 9-foot (2.7 m) gaps. The dashed lane line should be cold plastic material. A marking should be placed at the beginning of the through bicycle lane. Sign R4-4, BEGIN RIGHT TURN LANE, YIELD TO BIKES, should be placed at the beginning of the taper (Figure A4.18).

**B2e. Outer Edge of Bicycle Lane**

If parking is allowed next to a bicycle lane, the parking area should be defined by parking space markings or a solid 4-inch (100 mm) stripe.

FIGURE A4.17 Dashed bike lane through signalized intersection

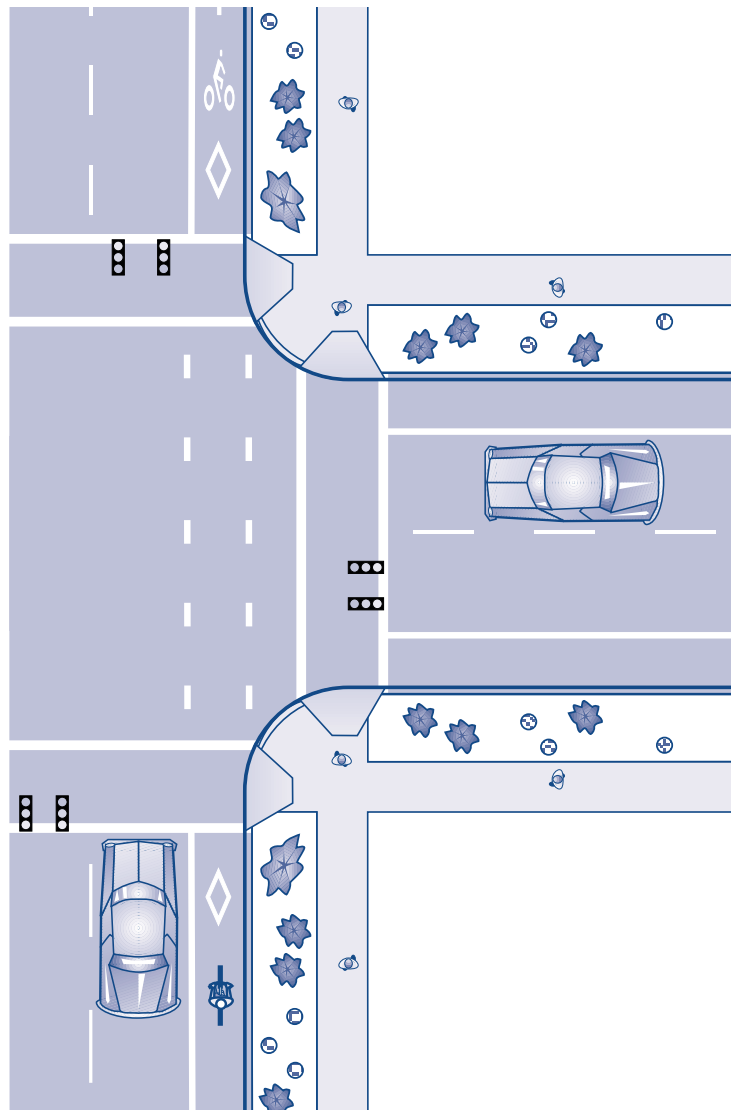




FIGURE A4.19 **Directional  
Bicycle Route  
Sign**



FIGURE A4.20 **W11-1  
with Riders**



### ***B3. Bicycle Boulevard***

Directional “Bicycle Route” signs should be used on a bicycle boulevard to guide bicyclists to specific destinations, e.g., “Bicycle Route...To Lloyd Center,” or “Mt. Tabor Bikeway” (Figure A4.19).

“Bike Xing” signs (MUTCD W11-1) should be used where bicycle boulevard crosses a major roadway (Figure A4.9).

### ***B4. Shared Roadways***

#### **B4a. Signing**

In general, no signs are required for a shared roadway not on the city’s Bikeway Network. Bicyclists should be expected on all urban local streets, which are mostly shared roadways.

On narrow roads heavily used by cyclists, it may be helpful to install bicycle warning signs (W11-1) with the rider ON ROADWAY. These signs should be used where there is insufficient shoulder width for a significant distance. This signing should be in advance of the roadway condition. If the roadway condition is continuous, an additional rider “NEXT XX MILES” may be used (Figure A4.20).

#### **B4b. Directional and Destination Signs**

Directional “Bicycle Route” signs should be used on shared roadways to direct bicyclists from one bikeway to another where the bikeway is not continuous, e.g., “Bicycle Route...To SE Ankeny Bikeway” (see Figure A4.19), or between a bikeway and a destination. In Portland, there are presently hundreds of “Bike Route” signs that were intended to guide bicyclists on to the best shared roadways for bicycle travel. Although these serve a useful function, they do not provide enough information to assist bicyclists in reaching their destinations. Furthermore, the bicycle community has consistently requested better facilities than simply signing shared roadways. Thus, over time these signed shared roadways will either be treated with the appropriate bicycle facility [see Section III, Recommended Bikeway Network] or the “Bike Route” signs eliminated or improved with the addition of directional information to assist with connections.

#### **B4c. Placement of Signs**

Because of cyclists’ and pedestrians’ lower line of sight, on off-street paths the bottom of signs should be about 5 feet (1.5 m) above the path. If a secondary sign is mounted below another sign, it should be a minimum of 4 feet (1.2 m) above the path. The signs should have sufficient lateral clearance from the edge of the path: recommended 3 feet (0.9 m), minimum 2 feet (0.6 m).

Signing for on-street bikeways should conform to City standards.



BICYCLE MASTER PLAN

# Part V: Maintenance

A bicyclist is riding on two very narrow, high-pressure tires. What may appear to be an adequate roadway surface for automobiles (with four wide, low-pressure tires) can be treacherous for cyclists. Fairly small rocks can deflect a bicycle wheel, a minor ridge in the pavement can cause a spill, a pot-hole can cause a wheel rim to bend. Wet leaves are slippery and can cause a bicyclist to fall. The gravel that gets blown off the travel lane by traffic accumulates against the curb, in the area where bicyclists are riding. Thus, it is important to properly maintain existing facilities. Bikeways will always be subject to debris accumulation and surface deterioration.

Adequate maintenance will help to protect the investment of public funds in bikeways, so they can continue to be used safely. Poorly maintained facilities will become unusable and they may become a legal liability. Cyclists who continue to use them may risk equipment damage and injury. Others will choose not to use the facility at all.

## A. Facility Maintenance Request Program

The City's Bicycle Facility Maintenance Request Program, initiated in March 1994, responds to requests for small-scale, low-cost improvements, such as sweeping, repairing surface problems, and replacing unsafe gratings. Bicyclists can make a request in two ways:

- By sending in a request card. Cards are available at area bike shops, through interest groups and PDOT.
- By calling the Bicycle Program (823-7082).

Bicycle Program staff catalogue all requests and route them to the appropriate Bureau of Maintenance (BOM) department. Requests for work outside PDOT's jurisdiction are sent to the appropriate jurisdiction, and requests that are outside the scope of the program are considered for Capital Improvement Program (CIP) or other funding sources. The person making the request is contacted either by letter or telephone once action is taken.

## **B. Routine Maintenance**

### ***B1. Sweeping***

PDOT's current practice is to sweep arterial streets and bridges eight to ten times per year, residential streets six times per year, and the central business district six times per week. PDOT's street cleaning program is subject to change based on funding levels and other considerations.

Each year, the Bicycle Program provides a list of high priority streets to the Bureau of Maintenance. This list will be used by the Bureau in planning resource allocations for street cleaning for routine service as well as for removing sanding materials used during winter snow and ice storms.

### ***B2. Surface Repairs***

A smooth surface, free of potholes and other major surface irregularities, should be provided and maintained. Care should be taken to eliminate other physical problems. Requests for surface improvements should be made through the Bicycle Facility Improvement Request Program.

### ***B3. Pavement Overlays***

These are usually ideal opportunities to greatly improve conditions for cyclists. But by ignoring the outer edge of the roadway, some conditions may worsen. It is particularly important to avoid leaving a ridge in the area where cyclists ride, which occurs where an overlay extends part-way into a shoulder or bike lane. Many overlay projects offer a chance to widen the roadway for greater bicycle space, or to restripe the roadway with bike lanes.

#### **RECOMMENDATIONS:**

- The Bicycle Program should review each paving list and work with BOM to implement bike lanes during repaving where possible and feasible given street widths and traffic volumes.
- Extend the overlay over the entire surface of the roadway to avoid leaving an abrupt edge. If this is not possible, and there is adequate shoulder or bike lane width, it may be appropriate to stop at the shoulder or bike lane stripe, provided no abrupt ridge remains.
- After overlays, raise inlet grates, manhole and utility covers to within 1/4" (6 mm) of the pavement.

In addition, private property owners with gravel driveways along a shoulder should pave the driveway 5-10 feet (1.5-3 m) back from the edge of pavement, or to right-of-way, to prevent gravel from spilling onto the shoulders or bike lanes.

### ***B4. Vegetation***

Vegetation encroaching into and under the bikeway is both a nuisance and a hazard. Property owners in Portland are responsible for ensuring their trees and shrubs do not cause safety problems. Violations can be reported to the Nuisance Control Department at 823-7306 or to the Bicycle Program through the Bicycle Facility Maintenance Request Program.

## B. Routine Maintenance

(continued)

Tree roots causing premature break-up of surfaces should be reported to the City Forester (823-4484), who is responsible for approving root removal.

### ***B5. Signs, Stripes and Legends***

It is very important that bikeway signs, striping, and legends be kept in a readable condition.

#### **RECOMMENDATIONS:**

- Inspect bikeway signs and legends regularly.
- Replace defective and obsolete signs as soon as possible.
- Depending on wear, repaint bike lanes on an annual basis. Bike lane stripes may wear out less often on lower traffic volume streets than on higher volume streets.
- Use cold plastic for skip striping bike lanes across right turn lanes.
- Repair problems with bike lane striping and markings on a request basis through the Bicycle Facility Improvement Program or through routine maintenance.

### ***B6. Drainage Improvements***

Though drainage facilities are usually well-designed and constructed when new, they do change grades and deteriorate over time. It is often necessary to adjust or replace catch basins to improve drainage. A bicycle-safe drainage grate at the proper height greatly improves bicycle safety. Sometimes small asphalt dams are constructed on highway shoulders to divert storm water into catch basins. These can be a hazard to cyclists.

#### **RECOMMENDATIONS:**

- Raise low catch basin grates to the proper pavement elevation.
- Modify or replace non-standard drainage grates with bicycle-safe grates.
- Repair or relocate faulty drains at intersections where the water backs up onto the curb cut or into the crosswalk.

Unsafe grates should be replaced on a request basis through the Bicycle Facility Maintenance Request Program and whenever bikeway improvements are made, e.g., during installation of new bike lanes or bike boulevards.

## C. Other Maintenance Activities

### ***C1. Chip Sealing***

Chip seals leave a rough surface for bicycling. Sometimes a chip seal will cover the travelway and part of the shoulder area. This leaves a ragged edge or ridge in the shoulder, with material of different height and texture, which becomes a problem for bicycling.

## C. Other Maintenance Activities

*(continued)*

### RECOMMENDATIONS:

- If the shoulder or bike lanes area must be chip sealed, the entire shoulder area should be covered with a well-rolled, fine-textured material: 3/8"-10 or finer for single pass, 1/4"-10 for second pass.
- Sweep the shoulder area as soon as possible following chip seal operations.

### ***C2. Patching Activities***

Loose asphalt materials from patching operations often end up on the shoulder, where the larger particles adhere to the existing surfacing, causing a very rough surface.

### RECOMMENDATION:

- Sweep fresh loose materials off the road before they have a chance to adhere to the pavement.

### ***C3. Utility Cuts***

Utility cuts can leave a rough surface for cyclists if not back-filled with care. Sidewalk cuts should be repaired to the same degree of smoothness as a new sidewalk.

### RECOMMENDATIONS:

- Back-fill cuts in bike lanes to the level of the roadway: an exaggerated hump will not get packed down by bicycle traffic.
- Exercise extra care with cuts parallel to bicycle traffic to avoid a ridge or groove in the bicycle wheel track.
- Back-fill cuts in sidewalks with concrete, flush with the surrounding sidewalk grade.



BICYCLE MASTER PLAN

# Part VI:

## Portland Bicycle Parking Code Requirements

### Title 33, Planning and Zoning Code, Bicycle Parking

Following are the current code requirements for providing bicycle parking as part of new development in Portland. A revised version of these requirements is currently proposed (see Table 4.4) to comply with the Transportation Planning Rule, but as yet there is no scheduled date for adoption. For a more detailed discussion of bicycle parking considerations, see Section IV, End-of-Trip Facilities.

#### **33.266.200 Purpose**

Bicycle parking is required in some use categories to encourage the use of bicycles by providing safe and convenient places to park bicycles. The required number of spaces is lower for uses that do not tend to attract bicycle riders and higher for those uses that do.

#### **33.266.210 Required Bicycle Parking**

The required minimum number of bicycle parking spaces for each use category is shown on Table 266-6 (see below).

#### **33.266.220 Bicycle Parking Standards**

##### **A. Location**

1. Required bicycle parking must be located within 50 feet on an entrance to the building. With permission of the Office of Transportation bicycle parking may be located in the public right-of-way.
2. Bicycle parking may be provided within a building, but the location must be easily accessible to bicycles.

##### **B. Covered Spaces**

1. If motor vehicle parking is covered, required bicycle parking must also be covered.
2. If 10 or more bicycle spaces are required, then at least 50 percent of the bicycle spaces must be covered.

##### **C. Signs**

If the bicycle parking is not visible from the street, then a sign must be posted indicating the location of the bicycle parking facilities.

**Title 33, Planning and Zoning Code, Bicycle Parking**

*(continued)*

**D. Rack types and required areas**

Bicycle racks and the area required for parking and maneuvering must meet the standards of the Office of Transportation (see below).

***Standards for Bicycle Rack Types and Dimensions***

**A. Rack Type**

1. The intent of the rack standards section is to ensure that required bicycle racks are designed so that bicycles may be securely locked to them without undue inconvenience and will be reasonably safeguarded from accidental damage.
2. Bicycle racks must hold bicycles securely, and support the frame so that so that the bicycle cannot be pushed or fall to one side in a manner that will damage the wheels or components.
3. Bicycle racks must accommodate locking the frame and the front wheel to the rack with a standard high-security U-shaped shackle lock, if the bicyclist does not remove either wheel from the bicycle.
4. Bicycle racks must be securely anchored.

TABLE 266-6 Minimum Required Bicycle Parking Spaces

USE CATEGORIES	MINIMUM REQUIRED SPACES
<b>Household Living</b>	
Multi-dwelling	2, or 1 per 10 auto spaces
All other residential structure types	None
Group living	1 per 20 auto spaces
<b>Commercial Categories</b>	
Retail Sales and Services, Office	2, or 1 per 20 auto spaces, whichever is greater
Drive-Up Vehicle Servicing, Vehicle Repair	None
Commercial Parking Facilities, Commercial Outdoor Recreation, Major Event Entertainment	4, or 1 per 20 auto spaces, whichever is greater
Self Storage	None
<b>Industrial Categories</b>	2, or 1 per 40 spaces whichever is greater
<b>Service Categories</b>	
<i>Basic Utilities</i>	
Park and Ride Facilities	2, or 1 per auto spaces, whichever is greater
All others	None
Community Service, Essential Providers, Parks and Open Areas	2, or 1 per 20 auto spaces, whichever is greater
<i>Schools</i>	
High schools	4 per classroom
Middle schools	2 per classroom
Elementary schools	2 per 4th and 5th grade classroom
Colleges, Medical Centers, Religious Institutions, Daycare Uses	2, or 1 per 20 auto spaces, whichever is greater

## Title 33, Planning and Zoning Code, Bicycle Parking

(continued)

TABLE 4.2 Recommended Zoning Code Minimum Required Bicycle Parking Spaces

SHORT-TERM BICYCLE PARKING	
USE CATEGORIES	MINIMUM REQUIRED SPACES (WHICHEVER IS GREATER)
<b>Residential Categories</b>	
Multi-Unit Dwellings	2, or 1 per 10 units
<b>Commercial Categories</b>	
Retail Sales & Service	2, or 1 per 5,000 ft <sup>2</sup> floor area
Office	2, or 1 per 10,000 ft <sup>2</sup> floor area
<b>Service Categories</b>	
Community Service	2, or 1 per 5,000 ft <sup>2</sup> floor area
Parks & Open Areas	determined by Conditional Use review
Medical Centers	2, or 1 per 20,000 ft <sup>2</sup> floor area
Religious Institutions	2, or 1 per 2,000 ft <sup>2</sup> floor area
LONG-TERM BICYCLE PARKING	
USE CATEGORIES	MINIMUM REQUIRED SPACES
<b>Residential Categories</b>	
Multi-Unit Dwellings	1 per dwelling unit
Retirement Center Apartments	1 per 4 dwelling unit
Multi-Unit Dwellings w/private garages	None
Group Living	2, or 1 per 10 residents
<b>Commercial Categories</b>	
Retail Sales & Service	2, or 1 per 8,000 ft <sup>2</sup> floor area
Office	2, or 1 per 3,000 ft <sup>2</sup> floor area
Quick Vehicle Servicing	2, or 1 per 3,500 ft <sup>2</sup> floor area
Vehicle Repair	2, or 1 per 5,000 ft <sup>2</sup> floor area
Commercial Parking Facilities	10, or 1 per 20 auto parking spaces
Commercial Outdoor Recreation	10, or 1 per 20 auto parking spaces
Major Event Entertainment	10, or 1 per 40 seats
<b>Industrial Categories</b>	
Manufacturing	2, or 1 per 7,500 ft <sup>2</sup> floor area
Warehousing	2, or 1 per 20,000 ft <sup>2</sup> floor area
<b>Service Categories</b>	
Light Rail Stations (outside central city)	4
Park and Ride Lots	10, or 10 per acre
Transit Transfer Centers	4, or 10 per acre
Community Service	2, or 1 per 6,000 ft <sup>2</sup> floor area
High Schools	8 per classroom
Middle Schools	8 per classroom
Elementary Schools (4th & 5th grade only)	4 per classroom
Colleges	2, or 1 per 10,000 ft <sup>2</sup> floor area, plus 1 per dormitory unit
Medical Centers	2, or 1 per 3,500 ft <sup>2</sup> floor area
Religious Institutions	2, or 1 per 2,000 ft <sup>2</sup> floor area
Daycare Uses	2, or 1 per 10,000 ft <sup>2</sup> floor area



## Title 33, Planning and Zoning Code, Bicycle Parking

*(continued)*

### **B. Rack Approval Process**

1. Staff of the Bicycle Program in the Bureau of Traffic Management will make an initial determination as to whether a rack meets the requirements of this section. A list of acceptable bicycle racks will be provided by the Bicycle Program.
2. Any person or organization selecting a bicycle rack not on the list provided may request that the staff of the Bicycle Program review the rack for acceptance.
3. Any person or organization who is denied approval of a proposed bicycle rack because it does not meet the requirements of this section, but who feels the rack meets the intent stated above, may request an adjustment.

### **C. Parking Space Dimensions**

1. Bicycle parking spaces must be at least 6 feet long and 2 feet wide, and in covered situations the overhead clearance must be at least 7 feet.
2. An aisle for bicycle maneuvering must be provided and maintained beside or between each row of bicycle parking. This aisle must be at least 5 feet wide.
3. Each required bicycle parking space must be accessible without moving another bicycle.
4. Areas set aside for bicycle parking must be clearly marked and reserved for bicycle parking only.



# Summary of Laws Related to Bicycling in Oregon

## ORS 366.514 "The Bicycle Bill"

### *Funding for Bicycle and Pedestrian Facilities*

#### **366.514 Use of highway fund for footpaths and bicycle trails.**

- (1) Out of the funds received by the department or by any county or city from the State Highway Fund reasonable amounts shall be expended as necessary to provide footpaths and bicycle trails, including curb cuts or ramps as part of the project. Footpaths and bicycle trails, including curb cuts and ramps as part of the project, shall be provided wherever a highway, road or street is being constructed, reconstructed or relocated. Funds received from the State Highway Fund may also be expended to provide footpaths and trails along other highways, roads and streets and in parks and recreation areas.
- (2) Footpaths and trails are not required to be established under subsection (1) of this section:
  - (a) Where the establishment of such paths and trails would be contrary to public safety;
  - (b) If the cost of establishing such paths and trails would be excessively disproportionate to the need or probable use; or
  - (c) Where sparsity of population, other available ways or other factors indicate an absence of any need for such paths and trails.
- (3) The amount expended by the department or by a city or county as required or permitted by this section shall never in any one fiscal year be less than one percent of the total amount of the funds received from the highway fund. However:
  - (a) This subsection does not apply to a city in any year in which the one percent equals \$250 or less, or to a county in any year in which the one percent equals \$1,500 or less.
  - (b) A city or county in lieu of expending the funds each year may credit the funds to a financial reserve or special fund in accordance with ORS 280.100, to be held for not more than 10 years, and to be expended for the purposes required or permitted by this section.

## ORS 366.514 "The Bicycle Bill"

(continued)

(c) For purposes of computing amounts expended during a fiscal year under this subsection, the department, a city or county may record the money as expended:

(A) On the date actual construction of the facility is commenced if the facility is constructed by the city, county or department itself; or

(B) On the date a contract for the construction of the facilities is entered with a private contractor or with any other governmental body.

(4) For the purposes of this chapter, the establishment of paths, trails and curb cuts or ramps and the expenditure of funds as authorized by this section are for highway, road and street purposes. The department shall, when requested, provide technical assistance and advice to cities and counties in carrying out the purpose of this section. The department shall recommend construction standards for footpaths and bicycle trails. Curb cuts or ramps shall comply with the requirements of ORS 447.310 and rules adopted under ORS 447.231. The department shall, in the manner prescribed for marking highways under ORS 810.200, provide a uniform system of signing footpaths and bicycle trails which shall apply to paths and trails under the jurisdiction of the department and cities and counties. The department and cities and counties may restrict the use of footpaths and bicycle trails under their respective jurisdictions to pedestrians and nonmotorized vehicles, except that motorized wheelchairs shall be allowed to use footpaths and bicycle trails.

(5) As used in this section, "bicycle trail" means a publicly owned and maintained lane or way designated and signed for use as bicycle route.

[1971 c.376 §2; 1979 c.825 §1; 1983 c.19 §1; 1983 c.338 §919; 1991 c.417 §7; 1993 c.503 §12] 366.515 [Amended by 1971 c.376 §3; 1973 c.249 §39; repealed by 1975 c.436 §7]

### ***ODOT Interpretation of ORS 366.514***

Notes:

1. The bill is divided into Sections (1)-(5).
2. The original language of the bill is written in italics, with ODOT's interpretation following in regular print.
3. The terminology of the original bill is outdated: "footpaths and bicycle trails" should read "walkways and bikeways."

(1) "Out of the funds received by the department or by any county or city from the State Highway Fund reasonable amounts shall be expended as necessary to provide footpaths and bicycle trails, including curb cuts or ramps as part of the project."

The law requires that reasonable amounts of State Highway Funds be expended by the Department of Transportation, counties and cities to provide walkways and bikeways. Reasonable amounts are related to the need for bikeways and walkways; if there is a need, the governing jurisdiction shall expend a reasonable amount to construct the needed facilities.

**ORS 366.514**  
**“The Bicycle Bill”***(continued)*

When the bill was introduced in 1971, most road projects were funded through the highway fund. While the law itself refers to the highway fund, several drafters of the original bill have indicated that the intent was not to limit this requirement to the highway fund only, but rather to make this fund available for the construction of walkways and bikeways, to benefit all users of the highway.

“Footpaths and bicycle trails, including curb cuts or ramps as part of the project, shall be provided wherever a highway, road or street is being constructed, reconstructed or relocated.”

The law requires the Department of Transportation, counties and cities to provide walkways and bikeways on all roadway construction, reconstruction or relocation projects. The funding source or amount are not the determining factors; what is important is that pedestrian and bicycle facilities be provided as part of road improvements.

“Construction, reconstruction and relocation” refers to all projects where a roadway is built or upgraded. Walkways and bikeways don’t necessarily have to be provided on projects such as signal or signing improvements, landscaping and other incidental work. Preservation overlays are also excluded if the only intent of the project is to preserve the riding surface in usable condition, without any widening or realignment. Projects where the entire depth of the roadway bed is replaced are usually considered reconstruction projects.

“Funds received from the State Highway Fund may also be expended to maintain footpaths and trails and to provide footpaths and trails along other highways, roads and streets and in parks and recreation areas.”

The law also allows highway funds to be used for maintenance and to provide walkways and bikeways independently of road construction. The Department, a city or a county may use its highway funds for projects whose primary purpose is to provide improvements for pedestrians and bicyclists.

The 1980 Constitutional Amendment (Article IX, section 3a) now prohibits the expenditure of highway fund in parks and recreation areas. A subsequent Oregon Supreme Court opinion, *Rogers v. Lane County*, supports continued use of highway funds to construct and maintain walkways and bikeways within the highway right-of-way, but allows such use only when they are within the highway right-of-way.

(2) Footpaths and trails are not required to be established under subsection (1) of this section:

- (a) Where the establishment of such paths and trails would be contrary to public safety;
- (b) If the cost of establishing such paths and trails would be excessively disproportionate to the need or probable use: or
- (c) Where sparsity of population, other available ways or other factors indicate an absence of any need for such paths and trails.

## ORS 366.514 "The Bicycle Bill"

(continued)

The law provides for reasonable exemptions. The determination that one or more exemption is met should be well-documented. The decision should allow opportunities for public review and input by interested parties. Exemptions (b) and (c) refer back to the need. The burden is on the governing jurisdiction to show the lack of need to provide facilities; the need is legislatively presumed but can be rebutted.

**...contrary to public safety:** this exemption applies where the safety of any group of highway users would be jeopardized by the inclusion of walkways or bikeways. In most instances, the addition of walkways and bikeways improves safety, both for motorists and non-motorized users, but there may be instances where the inclusion of a walkway or bikeway decreases safety, for example, sidewalks on a limited access freeway would be considered unsafe.

**...cost is excessively disproportionate to need or probable use:** this exemption applies if it can be shown that there is insufficient need or probable use to justify the cost. Probable use must extend to cover the anticipated life of the project, which can be twenty years or longer for roadway projects, fifty years or longer for bridge projects. It is not sufficient to claim that there is little or no current pedestrian or bicycle use. This is often due to the lack of appropriate facilities. The law does not provide guidelines for determining when costs are excessively disproportionate.

**...sparsity of population ... indicates an absence of any need:** this exemption most commonly applies to rural roads or highways where walkways and bikeways would get very little use.

**...other available ways...indicate an absence of any need:** for this exemption to apply, it must be shown that the "other available ways" serve bicyclists and pedestrians as well as or better than would a facility provided on the road, street or highway in question. The "other available ways" must provide equal or greater access and mobility than the road, street or highway in question. An example sufficient to indicate other available ways would be providing sidewalks and bike lanes on a parallel or adjacent street rather than along a freeway. An example not sufficient would be choosing not to provide bike lanes and sidewalks on an arterial street and encouraging use of local side streets that do not include bicycle and pedestrian facilities nor offer the equivalent direct route or access as the arterial street.

**...other factors...indicate an absence of any need:** this exemption allows consideration of other factors that are particular to a project. A common example is the acceptability of cyclists sharing the roadway with automobiles on low volume, low traffic local streets. Again, the absence of any need must be found.

(3) The amount expended by the department or by a city or county as required or permitted by this section shall never in any one fiscal year be less than one percent of the total amount of the funds received from the highway fund. However:

## ORS 366.514 "The Bicycle Bill"

(continued)

- (a) This subsection does not apply to a city in any year in which the one percent equals \$250 or less, or to a county in any year in which the one percent equals \$1500 or less.
- (b) A city or county in lieu of expending the funds each year may credit the funds to a financial reserve or special fund in accordance with ORS 280.100, to be held for not more than 10 years, and to be expended for the purposes required or permitted by this section.
- (c) For purposes of computing amounts expended during a fiscal year under this subsection, the department, a city or county may record the money as expended:
  - (A) On the date actual construction of the facility is commenced if the facility is constructed by the city, county or department itself; or
  - (B) On the date a contract for the construction of the facilities is entered with a private contractor or with any other governmental body.

The law requires that in any given fiscal year, the amounts expended to provide walkways and bikeways must be a minimum of 1% of the state highway fund received by the Department, a city or county. The law does not establish a special fund ("bicycle fund"), nor does it limit the expenditures to 1%: section (1) requires that "reasonable amounts" be expended. 1% is only a minimum.

Cities and counties are not required to spend a minimum of 1% each year; they may credit this amount to a reserve fund and expend these amounts within a period not to exceed ten years.

The 1% minimum requirement is independent from the requirement to provide bikeways and walkways as part of road construction. A jurisdiction spending more than 1% of its funds on walkways and bikeways must still provide bikeways and walkways as part of all new construction projects, unless determined not to be otherwise required pursuant to section (2).

The 1% minimum requirement does not apply to cities receiving less than \$25,000 a year, or counties receiving less than \$150,000 a year from the fund. However, bikeways and walkways must be provided wherever roads are constructed, as required in Section 1, subject to the exemptions in Section 2.

- (4) For the purposes of this chapter, the establishment of paths, trails and curb cuts or ramps and the expenditure of funds as authorized by this section are for highway, road and street purposes.

This section is the legislature's statement of intent that these uses would qualify under the Constitution as highway uses. This is reinforced in the 1980 constitutional amendment (Article IX, section 3a) and by *Rogers v. Lane County*.

The department shall, when requested, provide technical assistance and advice to cities and counties in carrying out the purpose of this section. The division shall recommend construction standards for footpaths and bicycle trails. Curb cuts or

## ORS 366.514 "The Bicycle Bill"

(continued)

ramps shall comply with the requirements of ORS 447.310. The division shall, in the manner prescribed for marking highways under ORS 810.200, provide a uniform system of signing footpaths and bicycle trails which shall apply to paths and trails under the jurisdiction of the department and cities and counties.

One of the purposes of this Bicycle/Pedestrian Plan is to implement this section. ODOT develops standards and designs for bikeways and walkways. ODOT staff is available to assist cities and counties with technical problems, as well as with planning and policy issues.

The department and cities and counties may restrict the use of footpaths and bicycle trails under their respective jurisdictions to pedestrians and non-motorized vehicles.

Motor vehicles are generally excluded from using bike lanes, sidewalks and multi-use paths.

(5) As used in this section, "bicycle trail" means a publicly owned and maintained lane or way designated and signed for use as a bicycle route.

A "bicycle trail" is currently defined as a "bikeway."

## Oregon Vehicle Code

### *Duties to Pedestrians and Bicycles*

#### **811.050 Failure to yield to rider on bicycle lane.**

- (1) A person commits the offense of failure of a motor vehicle operator to yield to a rider on a bicycle lane if the person is operating a motor vehicle and the person does not yield the right of way to a person operating a bicycle, moped or motorized wheelchair upon a bicycle lane.
- (2) This section does not require persons operating mopeds to yield the right of way to bicycles if the mopeds are operated on bicycle lanes in the manner permitted under ORS 811.440.
- (3) The offense described in this section, failure of a motor vehicle operator to yield to a rider on a bicycle lane, is a Class B traffic infraction.

#### **811.055 Failure to yield to bicyclist on sidewalk.**

- (1) The driver of a motor vehicle commits the offense of failure to yield the right of way to a bicyclist on a sidewalk if the driver does not yield the right of way to any bicyclist on a sidewalk.
- (2) The driver of a motor vehicle is not in violation of this section when a bicyclist is operating in violation of ORS 814.410. Nothing in this subsection relieves the driver of a motor vehicle from the duty to exercise due care.
- (3) The offense described in this section, failure to yield the right of way to a bicyclist on a sidewalk, is a Class C traffic infraction.

#### **811.435 Operation of motor vehicle on bicycle trail; exemptions; penalty.**

- (1) A person commits the offense of operation of a motor vehicle on a bicycle trail if the person operates a motor vehicle upon a bicycle lane or a bicycle path.

**Oregon Vehicle Code***(continued)*

- (2) Exemptions to this section are provided under ORS 811.440.
- (3) This section is not applicable to mopeds. ORS 811.440 and 814.210 control the operation and use of mopeds on bicycle lanes and paths.
- (4) The offense described in this section, operation of a motor vehicle on a bicycle trail, is a Class B traffic infraction.

**811.440 When motor vehicles may operate on bicycle lane.**

This section provides exemptions from the prohibitions under ORS 811.435 and 814.210 against operating motor vehicles on bicycle lanes and paths. The following vehicles are not subject to ORS 811.435 and 814.210 under the circumstances described:

- (1) A person may operate a moped on a bicycle lane that is immediately adjacent to the roadway only while the moped is being exclusively powered by human power.
- (2) A person may operate a motor vehicle upon a bicycle lane when:
  - (a) Making a turn;
  - (b) Entering or leaving an alley, private road or driveway; or
  - (c) Required in the course of official duty.
- (3) An implement of husbandry may momentarily cross into a bicycle lane to permit other vehicles to overtake and pass the implement of husbandry.
- (4) A person may operate a motorized wheelchair on a bicycle lane or path.

***Bicycles*****814.400 Application of vehicle laws to bicycles.**

- (1) Every person riding a bicycle upon a public way is subject to the provisions applicable to and has the same rights and duties as the driver of any other vehicle concerning operating on highways, vehicle equipment and abandoned vehicles, except:
  - (a) Those provisions which by their very nature can have no application.
  - (b) When otherwise specifically provided under the vehicle code.
- (2) Subject to the provisions of subsection (1) of this section:
  - (a) A bicycle is a vehicle for purposes of the vehicle code; and
  - (b) When the term "vehicle" is used, the term shall be deemed to be applicable to bicycles.
- (3) The provision of the vehicle code relating to the operation of bicycles do not relieve a bicyclist or motorist from the duty to exercise due care.



**Oregon Vehicle Code***(continued)***814.410 Unsafe operation of bicycle on sidewalk; penalty.**

- (1) A person commits the offense of unsafe operation of a bicycle on a sidewalk if the person does any of the following:
  - (a) Operates the bicycle so as to suddenly leave a curb or other place of safety and move into the path of a vehicle that is so close as to constitute an immediate hazard.
  - (b) Operates a bicycle upon a sidewalk and does not give an audible warning before overtaking and passing a pedestrian and does not yield the right of way to all pedestrians on the sidewalk.
  - (c) Operates a bicycle on a sidewalk in a careless manner that endangers or would be likely to endanger any person or property.
  - (d) Operates the bicycle at a speed greater than in ordinary walk when approaching or entering a crosswalk, approaching or crossing a driveway or crossing a curb cut or pedestrian ramp and a motor vehicle is approaching the crosswalk, driveway, curb cut or pedestrian ramp. This paragraph does not require reduced speeds for bicycles either:
    - (A) At places on sidewalks or other pedestrian ways other than places where the path for pedestrians or bicycle traffic approaches or crosses that for motor vehicle traffic; or
    - (B) When motor vehicles are not present.
- (2) Except as otherwise specifically provided by law, a bicyclist on a sidewalk or in a crosswalk has the same rights and duties as a pedestrian on a sidewalk or in a crosswalk.
- (3) The offense described in this section, unsafe operation of a bicycle on a sidewalk, is a Class D traffic infraction.

**814.420 Failure to use bicycle lane or path; exceptions; penalty.**

- (1) Except as provided in subsection (2) of this section, a person commits the offense of failure to use a bicycle lane or path if the person operates a bicycle on any portion of a roadway that is not a bicycle lane or bicycle path when a bicycle lane or bicycle path is adjacent to or near the roadway.
- (2) A person is not required to comply with this section unless the state or local authority with jurisdiction over the roadway finds, after public hearing, that the bicycle lane or bicycle path is suitable for safe bicycle use at reasonable rates of speed.
- (3) The offense described in this section, failure to use a bicycle lane or path, is a Class D traffic infraction.

**814.430 Improper use of lanes; exceptions; penalty.**

- (1) A person commits the offense of improper use of lanes by a bicycle if the person is operating a bicycle on a roadway at less than the normal speed of traffic using the roadway at that time and place under the existing condi-

## Oregon Vehicle Code

*(continued)*

tions and the person does not ride as close as practicable to the right curb or edge of the roadway.

- (2) A person is not in violation of the offense under this section if the person is not operating a bicycle as close as practicable to the right curb or edge of the roadway under any of the following circumstances:
- (a) When overtaking and passing another bicycle or vehicle that is proceeding in the same direction.
  - (b) When preparing to execute a left turn.
  - (c) When reasonably necessary to avoid hazardous conditions including, but not limited to, fixed or moving objects, parked or moving vehicles, bicycles, pedestrians, animals, surface hazards or other conditions that make continued operation along the right curb or edge unsafe or to avoid unsafe operation in a lane on the roadway that is too narrow for a bicycle and vehicle to travel safely side by side. Nothing in this paragraph excuses the operator of a bicycle from the requirements under ORS 811.425 or from the penalties for failure to comply with those requirements.
  - (d) When operating within a city as near as practicable to the left curb or edge of a roadway that is designated to allow traffic to move in only one direction along the roadway. A bicycle that is operated under this paragraph is subject to the same requirements and exceptions when operating along the left curb or edge as are applicable when a bicycle is operating along the right curb or edge of the roadway.
  - (e) When operating a bicycle along side not more than one other bicycle as long as the bicycles are both being operated within a single lane and in a manner that does not impede the normal and reasonable movement of traffic.
  - (f) When operating on a bicycle lane or bicycle path.
- (3) The offense described in this section, improper use of lanes by a bicycle, is a Class D traffic infraction.

### **814.440 Failure to signal turn; exceptions; penalty.**

- (1) A person commits the offense of failure to signal for a bicycle turn if the person does any of the following:
- (a) Stops a bicycle the person is operating without giving the appropriate hand and arm signal continuously for at least 100 feet before executing the stop.
  - (b) Executes a turn on a bicycle the person is operating without giving the appropriate hand and arm signal for the turn for at least 100 feet before executing the turn.

**Oregon Vehicle Code***(continued)*

(c) Executes a turn on a bicycle the person is operating after having been stopped without giving, while stopped, the appropriate hand and arm signal for the turn.

(2) A person is not in violation of the offense under this section if the person is operating a bicycle and does not give the appropriate signal continuously for a stop or turn because circumstances require that both hands be used to safely control or operate the bicycle.

(3) The appropriate hand and arm signals for indicating turns and stops under this section are those provided for other vehicles under ORS 811.395 and 811.400.

(4) The offense described under this section, failure to signal for a bicycle turn, is a Class D traffic infraction.

**814.450 Unlawful load on bicycle; penalty.**

(1) A person commits the offense of having an unlawful load on a bicycle if the person is operating a bicycle and the person carries a package, bundle or article which prevents the person from keeping at least one hand upon the handlebar and having full control at all times.

(2) The offense described in this section, unlawful load on a bicycle, is a Class D traffic infraction.

**814.460 Unlawful passengers on bicycle; penalty.**

(1) A person commits the offense of unlawful passengers on a bicycle if the person operates a bicycle and carries more persons on the bicycle than the number for which it is designed or safely equipped.

(2) The offense described in this section, unlawful passengers on a bicycle, is a Class D Traffic infraction.

**814.470 Failure to use bicycle seat; penalty.**

(1) A person commits the offense of failure to use a bicycle seat if the person is operating a bicycle and the person rides other than upon or astride a permanent and regular seat attached to the bicycle.

(2) The offense described in this section, failure to use bicycle seat, is a Class D traffic infraction.

**814.480 Nonmotorized vehicle clinging to another vehicle; penalty.**

(1) A person commits the offense of nonmotorized vehicle clinging to another vehicle if the person is riding upon or operating a bicycle, coaster, roller skates, sled or toy vehicle and the person clings to another vehicle upon a roadway or attaches that which the person is riding or operating to any other vehicle upon a roadway.

(2) The offense described in this section, nonmotorized vehicle clinging to another vehicle, is a Class D Traffic infraction.

**Oregon Vehicle Code***(continued)***815.280 Violation of bicycle equipment requirements; requirements; penalty.**

- (1) A person commits the offense of violation of bicycle equipment requirements if the person does any of the following:
- (a) Operates on any highway a bicycle in violation of the requirements of this section.
  - (b) Is the parent or guardian of a minor child or ward and authorizes or knowingly permits the child or ward to operate a bicycle on any highway in violation of the requirements of this section.
- (2) A bicycle is operated in violation the requirements of this section if any of the following requirements are violated:
- (a) A bicycle must be equipped with a brake that enables the operator to make the braked wheels skid on dry, level, clean pavement.
  - (b) A person shall not install or use any siren or whistle upon a bicycle.
  - (c) At the times described in the following, a bicycle or its rider must be equipped with lighting equipment that meets the described requirements.
    - (A) The lighting equipment must be used during limited visibility conditions.
    - (B) The lighting equipment must show a white light visible from a distance of at least 500 feet to the front of the bicycle.
    - (C) The lighting equipment must have a red reflector or lighting device or material of such size or characteristic and so mounted as to be visible from all distances up to 600 feet to the rear when directly in front of lawful lower beams of headlights on a motor vehicle.
- (3) Nothing contained in this section shall be construed to prohibit the use of additional parts and accessories on any bicycle not inconsistent with this section.
- (4) The offense described in this section, violation of bicycle equipment requirements, is a Class D traffic infraction. [1983 c.338 §502; 1985 c.16 §260; 1985 c.69 §5]

**Bicycle Helmet Law****Chapter 408, Oregon Laws 1993, is set forth for the user's convenience:**

**SEC. 1.** Sections 2, 3, 3a 3b, 3c and 7 of this Act are added to and made a part of ORS chapter 814.

**SEC. 2.** (1) A person commits the offense of failure of a bicycle operator or rider to wear protective headgear if the person is under 16 years of age, operates or rides on a bicycle on a highway or on premises open to the public and is not wearing protective headgear of a type approved under section 6 of this 1993 Act.

## Bicycle Helmet Law

(continued)

(2) The offense described in this section, failure of a bicycle operator or rider to wear protective headgear, is a traffic infraction punishable by a maximum fine of \$25.

**SEC. 3.** (1) A person commits the offense of endangering a bicycle operator or passenger if:

(a) The person is operating a bicycle on a highway or on premises open to the public and the person carries another person on the bicycle who is under 16 years of age and is not wearing protective headgear of a type approved under section 6 of this 1993 Act; or

(b) The person is the parent, legal guardian or person with legal responsibility for the safety and welfare of a child under 16 years of age and the child operates or rides on a bicycle on a highway or on premises open to the public without wearing protective headgear of a type approved under section 6 of this 1993 Act.

(2) The offense described in this section, endangering a bicycle operator or passenger, is a traffic infraction punishable by a maximum fine of \$25.

**Sec. 3a.** For purposes of sections 2, 3, 5 and 6 of this 1993 Act, "bicycle" has the meaning given in ORS 801.150 except that:

(1) It also includes vehicles that meet the criteria specified in ORS 801.150 (1) to (4) but that have wheels less than 14 inches in diameter.

(2) It does not include tricycles designed to be ridden by children.

**Sec. 3b.** For purposes of the offenses defined in sections 3, 3 and 5 (2) of this 1993 Act, a person shall not be considered to be operating or riding on a bicycle on a highway or on premises open to the public if the person is operating or riding on a three-wheeled nonmotorized vehicle on a beach while it is closed to motor vehicle traffic.

**Sec. 3c.** (1) If a child in violation of section 2 of this 1993 Act is 11 years of age or younger, any citation issued shall be issued to the parent, legal guardian or person with legal responsibility for the safety and welfare of the child for violation of section 3 of this 1993 Act, rather than to the child for violation of section 2 of this 1993 Act.

(2) If a child in violation of section 2 of this 1993 Act is at least 12 years of age and is under 16 years of age, a citation may be issued to the child for violation of section 2 of this 1993 Act or to the parent, legal guardian or person with legal responsibility for the safety and welfare of the child for violation of section 3 of this 1993 Act, but not to both.

**SEC. 4.** Sections 5 and 6 of this Act are added to and made a part of ORS chapter 815.

**SEC. 5.** (1) A person commits the offense of selling unapproved bicycle equipment if the person sells or offers for sale any bicycle headgear that is not

**Bicycle Helmet Law***(continued)*

approved by the Department of Transportation under section 6 of this 1993 Act.

(2) A person commits the offense of unlawfully renting or leasing a bicycle to another if the person:

(a) Is in the business of renting or leasing bicycles; and

(b) Does not have bicycle headgear approved under section 6 of this 1993 Act available for rental for use by persons under 16 years of age.

(3) The offenses described in this section are Class D traffic infractions.

**SEC. 6.** The Department of Transportation shall adopt and enforce rules establishing minimum standards and specifications for safe protective headgear to be worn by people operating bicycles and by passengers on bicycles. The rules shall conform, insofar as practicable, to safety standards and specifications for such headgear issued by the American National Standards Institute, Snell or the United States Department of Transportation.

**SEC. 7.** The first time a person is convicted of an offense described in section 2 or 3 of this 1993 Act, the person shall not be required to pay a fine if the person proves to the satisfaction of the court that the person has protective headgear of a type approved under section 6 of this 1993 Act.

**SEC. 8.** Evidence of violation of section 2 or 3 of this Act and evidence of lack of protective headgear shall not be admissible, applicable or effective to reduce the amount of damages or to constitute a defense to an action for damages brought by or on behalf of an injured bicyclist or bicycle passenger or the survivors of a deceased bicyclist or passenger if the bicyclist or passenger was injured or killed as a result in whole or in part of the fault of another.

**SEC. 9.** This Act becomes operative on July 1, 1994. Prior to that time, the Department of Transportation shall adopt and publish the rules described in section 6 of this Act.

**City of Portland  
Title 16*****16.70 Miscellaneous Regulations*****16.70.300 Bicycles****16.70.310 Person Riding Bicycles To Obey Traffic Regulations**

Every person riding a bicycle upon a roadway is subject to state law and the provisions of this Title applicable to the driver of a vehicle, except state law and those provisions of this Title which by their very nature can have no application.

**16.70.320 Operating Rules**

No person may:

A. leave a bicycle so that it obstructs vehicle or pedestrian traffic on a roadway, sidewalk, driveway, handicap access ramp, building entrance, or so that it prevents operation of a parking meter or newspaper rack;

B. leave a bicycle secured to a fire hydrant or to a police or fire call box;

## City of Portland Title 16

(continued)

- C. leave a bicycle on private property without consent of the owner or legal tenant. Consent is implied on private commercial property;
- D. leave a bicycle on a street or other public property for more than 72 hours; or
- E. ride a bicycle on a sidewalk, unless avoiding a traffic hazard in the immediate area, within the area bounded by and including SW Jefferson, Front Avenue, NW Hoyt and 13th Avenue, except:
  - 1. on sidewalks designated as bike lanes or paths;
  - 2. on the ramps or approaches to any Willamette River Bridge; or
  - 3. in the area from the west property line of SW Ninth Avenue, to the east property line of SW Park Avenue; from the property line of SW Jefferson to the south property line of SW Salmon Street; commonly known as the South Park Blocks.
  - 4. for police or special officers operating a bicycle in the course and scope of their duties; or
  - 5. for employees of the Association for Portland Progress and companies providing security services operating a bicycle in the course and scope of their duties. These employees must have in possession an identification card issued by the Chief of Police certifying the rider has completed a training course in the use of a bicycle for security patrol.

### **16.70.330 Impounding Bicycles**

- A. A bicycle left on a street other public property for more than 72 hours may be impounded.
- B. A bicycle may be immediately impounded if:
  - 1. it is parked in violation of this code and obstructs or impedes pedestrian or vehicular traffic; or
  - 2. it is an immediate threat to the public welfare.
- C. The impounding agency must make reasonable efforts to notify the owner of the impoundment and a description of how and by what date the bicycle must be claimed.
- D. A fee may be charged to the owner of an impounded bicycle. No impoundment fee will be charged to the owner of a stolen bicycle that has been impounded.
- E. An impounded bicycle that remains unclaimed after 30 days may be disposed of in accordance with city procedures for disposal of abandoned or lost personal property.

### **16.70.340 Renting Bicycles**

No person may rent a bicycle to another person unless the bicycle is equipped as required by state law.

**City of Portland  
Title 16***(continued)***16.70.400 Other Transportation****16.70.410 Roller Skates and Skateboards**

- A. No person may use roller skates, including in-line skates, a skateboard, or other similar device upon any street (roadway and/or sidewalk) within the area bounded by and including SW Jefferson, Front Avenue, NW Hoyt and 13th Avenue, except where specifically designated as allowed by the City Traffic Engineer.
- B. No person may use roller skates, including in-line skates, skateboard, or other similar device upon any street within the City between the hours of sunset and sunrise.







BICYCLE MASTER PLAN

# Central City Transportation Management Plan

## Bicycle Movement Policies and Actions

The Bicycle Policies and actions are derived from the Bicycle Transportation Study (July 1993) conducted as part of the CCTMP. The study focused on how to support bicycling as a serious mode of transportation that can help to minimize congestion, improve air quality, and reduce vehicle miles traveled per capita.

A bicycle user survey identified the factors that encourage or discourage people from using a bicycle commute to and from the Central City. Many of the factors discouraging bicycle use, such as lack of on-road bicycleways, inaccessible bridges, lack of end-of-trip facilities, and bridge improvements, are addressed by the Bicycle Policies and their associated actions.

### ***Policy 8: Bicycle Movement***

*Explanation:* Given the current needs of the bicycling community and the policy and planning requirements in place at the state, regional, and local levels, the question is not whether a functional bicycle transportation system should be developed, but how the City and other responsible jurisdictions will go about it.

#### **Policy 8.1: Bicycle Mode Split**

Improve the bicycle network to support the CCTMP mode split goals for home-based work (HBW) trips, recognize bicycling as an important mode of transportation, and encourage greater use of bicycles for all types of utilitarian and recreational trips.

*Explanation:* Increasing the percentage of person-trips that are taken via bicycle will help to reduce traffic congestion and improve air quality. These benefits will be most quickly realized by converting automobile commute trips to bicycle, transit, and walk commute trips. Improvements need to be made in support of the bike/walk HBW mode-share goal, but it is equally important to focus on increasing the bicycle mode share of trips taken for other purposes.

#### **Policy 8.2: Bicycle Trip-End Facilities**

Support the provision of bicycle parking, locker, and shower facilities by the private and public sector to aid in achieving the bicycle mode share goal. Incorporate incentive programs as a preferred means of providing for these facilities as a part of implementation of the Transportation Planning Rule.

## Bicycle Movement Policies and Actions

(continued)

*Explanation:* This policy recognizes the private and public sectors' roles in providing facilities to support the bicycle mode of travel. The policy recommends that incentives be used as a means to ensure that bicycle facilities and parking above required ratios are provided by the private sector. Changes to requirements and incentives for bicycle parking and facilities are being examined as part of the City's efforts to comply with the Transportation Planning Rule.

### **Policy 8.3: Bicycle Access**

Ensure that all public streets and public ways within the Central City, except freeways, expressways, and exclusive transitways, are accessible to bicycles. Accommodate the needs of bicyclists as appropriate on each street, based on the Traffic, Transit, Bicycle, Pedestrian, and Truck designations of the right-of-way in the Street Classifications and Descriptions of the CCTMP.

*Explanation:* The degree of accommodation provided to bicycles, particularly on non-bicycle network streets, should be determined by the combination of street classifications assigned to the street. Guidelines will be developed to help determine what level of accommodation for bicycle and other modes is appropriate in any given case.

### **Policy 8.4: Bicycle Network**

Provide a network of bicycle routes where the needs of bicyclists receive due consideration based on the mode split goals in the CCTMP. The bicycle network should, at a minimum, provide for bicycle access to the Central City from all areas of the City and also provide for connections between major attractions, such as those identified on the Central City Plan map. Central City Bicycle Routes should:

- Be direct. The network should connect areas and sites in as direct a line as possible.
- Minimize conflicts between bicycles and motorized vehicles. When turning movement or other conflict points are unavoidable, traffic designs should accommodate the safety needs of bicyclists.
- Be relatively obstruction free. Obstructions, such as stairs, surface hazards, lack of adequate shoulders, etc. should not exist on the bicycle network routes. Where they do, they should be eliminated.
- Be complete. The City will support completion of regional bicycle route segments that connect to the Central City.

*Explanation:* While all public streets (except freeways and certain expressways) should be accessible to bicycles, Central City Bicycle Routes are those routes where the bicycle transportation mode is provided special consideration. Public improvement programs to facilitate bicycle travel should begin with Central City Bicycle Routes.

## Bicycle Movement Policies and Actions

*(continued)*

### **Policy 8.5: Bicycle Connections**

The bicycle network should be integrated with other transportation systems to accommodate commuting and other trips by bicycle. Safe, direct, and continuous bikeways free of unnecessary delays should be provided along all urban arterial and major collector routes. The bicycle network should connect new residential development districts to existing residential areas and commercial districts.

*Explanation:* The Transportation Planning Rule and other state mandates require bikeways on arterials and major collectors which connect new residential and commercial development to other residential areas, transit stops, and activity centers.

#### **BICYCLE ACTION ITEMS**

##### **1. Implementation strategies**

- a. Use the City's Capital Improvement Program funding process to phase in implementation of the Central City Bicycle Plan.
- b. Incorporate needed Central City Bicycle Route improvements into street construction and reconstruction projects.
- c. Retrofit existing streets with bicycle facilities whenever reasonable opportunities exist.

##### **2. Bicycle Network Facilities**

- a. Implement the needed changes to realize an integrated and complete bicycle network consistent with the CCTMP Bicycle Network Map within 6 years.
- b. Increase the use of directional signing for bicycles to clearly indicate network routes.
- c. Provide "bicycle priority" at appropriate intersections through the use of separate bicycle signals, advanced stop lines, etc.
- d. Provide bikeways to allow movement during periods of peak congestion.
- e. Improve bicycle, pedestrian, and disabled accessibility in the South Auditorium "superblocks."

##### **3. Trip-End Facilities**

- a. Expand the City's program of providing free bicycle racks to assure secure bicycle parking on every city block within the CCTMP.
- b. Encourage retrofitting or replacing bike racks to serve users of older buildings through public and private efforts to ensure that at least 1000 usable racks are available by the year 2000 and 1500 by the year 2005.
- c. Increase the number of public bicycle lockers available to meet demand. Consider coin operated lockers for casual use.
- d. Build "bike central" facilities in strategic locations.
- e. Provide secure parking to meet demand at all existing and future transit centers.

## Bicycle Movement Policies and Actions

(continued)

### 4. *Regulations*

- a. Enforce Zoning Code requirements for bicycle parking.
- b. Encourage and provide incentives for employers to provide subsidies to employees commuting by alternative modes, including bicycles.
- c. Allow businesses to take tax deductions for employee benefits relating to bicycle use up to the amount provided for auto use.
- d. Provide tax credits for employers based on employee bicycle use.
- e. Provide incentives for the provision of employee-accessible lockers and showers in all new office buildings with over 20 employees.
- f. Provide FAR bonuses for bicycle facilities provided above the required minimums.

### 5. *Promotion*

- a. Develop programs to encourage the provision of bicycle parking.
- b. Provide information about the availability and location of bicycle parking, lockers, and showers.
- c. Help employers promote bicycle use.
- d. Support bicycle education programs in schools and encourage the use of bicycles by students.
- e. Support bicycle education programs for children and adults.
- f. Support education programs on the benefits of bicycle riding to motorists.
- g. Schedule weekend closures of selected streets to allow and encourage use by pedestrians and cyclists with consideration to the needs of adjacent land uses.
- h. Implement a City-sponsored “share the road” campaign.
- i. Encourage the establishment and use of “bicycle pools.” Activate the City’s “bicycle pool” program. (Bicycle pools are a number of bicycles that are shared among users of a building, business, neighborhood, etc.)

### 6. *Bicycles and Transit*

- a. Expand the “Bikes on Transit” program so that all buses and trains can carry bicycles at all hours.
- b. Support purchase of transit vehicles that are designed to accommodate bicycles.

Note: Action items are proposed to be adopted through City Council Resolution. These items are suggestions on how the Central City can be improved. The Action Items listed are a starting place. Additional studies and evaluations are to be undertaken. Some will need to be modified, or in some cases, replaced with other proposals found to be better or more feasible for implementation after the appropriate review process.

## Central City Transportation Management Plan Bicycle Descriptions

### 4.1 *Central City Bikeways*

#### **Functional Purpose**

Central City Bikeways are intended to provide safe, direct, and convenient bicycle access between and within transportation districts and sub-districts. Adequate space within the right-of-way and other forms of accommodation should be provided such that cyclists with moderate skill levels enjoy a sense of safety and convenience when using the route. Central City Bikeways should be designated on streets that provide access to transportation districts; serve, or have the potential to serve, high bicycle travel demand; or are located at confluences in the transportation system, such as at bridges, viaducts, transit stations, and other transportation centers. The Central City Bikeway may be shifted to a parallel street where the street can be designed to accommodate bicycles through a capital improvement project.

#### **Design Treatment and Traffic Operations**

**Traffic Operations.** Streets designated as Central City Bikeways should operate so that bicycles may negotiate the route at least as safely and easily as other transportation modes. In order to accommodate bicycles, modifications to roadway operations may be warranted. Such modifications may include:

- a. reduction of mixed-use travel lane widths,
- b. reduction in the number of mixed-use travel lanes,
- c. relocation of transit stops where transit operations are not negatively impacted,
- d. removal of on-street parking except where it is determined to be critical to adjacent land uses, and
- e. measures to reduce traffic volume or speed.

**INTERSECTIONS.** Intersections of bikeways with Regional Trafficways, Major City Traffic Streets, Traffic Access Routes, and District Collector Streets should be signalized. Consideration should be given to allowing cyclists to utilize “transit preference” improvements—allowing bicyclists a “jump start” along with transit—at such intersections. Intersections with Neighborhood Collector Streets should provide for safe and convenient bicycle crossing. Where possible, stop sign-controlled intersections on Central City Bikeways should force opposing traffic, rather than bicycle traffic on the route, to stop.

**SURFACE TREATMENT.** Central City Bikeways should be paved and maintained so that bicyclists can safely and easily travel on them.

**SIGNS AND MARKINGS.** Central City Bikeways should be signed as such, and provide directional signs and markings to guide cyclists on their routes.

Design treatment options are:

**BICYCLE LANES.** Marked on-street bicycle lanes should be provided on Central City Bikeways where both auto speeds and traffic volumes are high,

## Central City Transportation Management Plan Bicycle Descriptions

*(continued)*

where the difference between auto speeds and bicycle speeds is substantial (e.g. up hills), or where otherwise needed to enhance bicyclist safety. Bicycle lanes should be developed in a manner that provides for route continuity. The installation of bicycle lanes on short or fragmented street segments should be avoided unless they provide a necessary connection or surmount a barrier to safe bicycle travel.

**SHARED ROADWAY.** Where bicycle lanes are desirable, but cannot be provided due to the constraint of roadway width, and bicycles must share a traffic lane with motor vehicles; an extra-wide curb lane should be provided. On Central City Bikeways that are also classified as Local Service Streets (SE Ankeny, SE Salmon, and NE Couch), traffic calming measures may be used to provide priority for bicyclists.



BICYCLE MASTER PLAN

# Bicycle Master Plan Public Process and Methodology for Selecting Recommended Bikeways

## Public Process

The Bicycle Master Plan was created over the past two and half years with input from over 2000 residents. The Plan was developed in two phases.

### *Phase 1 — Initial Education and Outreach*

The complete report on Phase 1 (Initial Education and Outreach) is available from the Bicycle Program. To summarize, the education phase was intended to:

1. Provide information about the importance of planning for the bicycle mode of transportation.
2. Provide the means available to make the city safer and more attractive to bicyclists (e.g., bicycle lanes, bicycle boulevards, multi-use trails, end-of-trip facilities, bicycles on Tri-Met).
3. Engage participants in actively helping design the Master Plan.
4. Encourage participants to spread the positive message about the effect of bicycles on Portland's livability.
5. Learn what participants like and dislike about bicycling in Portland today, where they would like to bicycle if better bicycle transportation facilities were provided, and which types of bicycle facilities best serve their needs.

Over a four month period in the Spring of 1994, the City's Bicycle Advisory Committee and Bicycle Program hosted a series of 12 two-hour public forums. The workshops were advertised by a flyer sent to over 12,000 households, as well as every neighborhood and business association and media outlet. Each workshop was announced in the Oregonian and in neighborhood newsletters. The flyer also offered the availability of Bicycle Program staff to speak to any interested group on an individual basis.

### **Phase 1 Forums**

February 15	Northwest Service Center
February 17	Grant High School
February 19	Rose City Park United Methodist Church
February 22	Multnomah Community Center
February 26	Benson High School
February 28	Marshall High School
March 1	Lewis & Clark College



**Public Process***(continued)*

March 2	Portland State University
March 16	Portland Building
March 19	University of Portland
March 24	Cleveland High School
April 9	Floyd Light Middle School

At each of these forums, participants discussed good and not-so-good features of bicycling in Portland, learned about ways to make Portland more bicycle friendly, and mulled over ways to link key destinations with preferred types of facilities. Participants also discussed the role of activism in promoting bicycling and participated in a survey on preferred bikeway facilities.

Bicycle Program staff also gave presentations (in most cases a slide show) to the following groups, and distributed a survey. The 25 groups that initially hosted Bicycle Program staff are listed below and they subsequently met with another 15-20 groups. In all, over 600 people came to a Phase 1 Master Plan forum of presentation.

**Additional Phase 1 Presentations**

Appropriate Technology Group  
 Beaumont-Wilshire Neighborhood Association  
 Bicycle Transportation Alliance Board of Directors  
 Bike Gallery Advocates Night  
 Bureau of Planning  
 Bureau of Traffic Management  
 Bureau of Transportation Planning  
 Central Eastside Lions Club  
 Central Northeast Neighbors Board of Directors  
 CH2MHill, Inc.  
 Club Gnarly  
 East Portland District Coalition Traffic Committee  
 Hollywood Lions Club  
 IDC, Inc  
 KPFF, Inc.  
 Multnomah County Bicycle Advisory Committee  
 North/Northeast Business Association Land-Use Committee  
 Oregon Catholic Press  
 Oregon League of Conservation Voters  
 Portland Wheelmen Touring Club  
 Portland Area Bike Dealers' Association  
 Portland State University Traffic Management Class  
 Portland Urban Mountain Pedalers  
 REI  
 Returned Peace Corps Volunteers of Portland  
 Southwest Neighborhood Information, Inc., Traffic Committee  
 Standard Insurance Corporation  
 Sunnyside Neighborhood Association  
 Vancouver, WA Bicycle Advisory Committee

## Public Process

*(continued)*

Results of these forums and presentations are included in the next section. In all over 600 people participated in a forum or presentation.

### **Additional Phase 1 Events**

In addition, Bicycle Program staff participated in the following events, attended by hundreds of additional people. Surveys were also distributed at these events.

February 26	Regional Rail Summit
March 11-12	Portland Bike Show
March 11	Southwest Neighborhood Information, Inc. Traffic/Transportation Forum
April 9	East Portland District Coalition Traffic/Transportation Forum
April 16	North Portland Library Fair
April 16	Parkrose Neighborhood Association Community Forum
April 22	Walk Your Talk Fair

### **Results**

The results of the surveys, group exercises, and discussions were not surprising, considering that there are many different types of bicyclists who often want different types of facilities. Phase 1 made it clear that the City should provide a combination of facility types: on-street bicycle lanes, bicycle boulevards, and off-street paths. The most prevalent views expressed during Phase 1 include the following.

#### **From the Workshops**

- Most existing bicycle transportation facilities get high kudos, yet the lack of connections between facilities causes the greatest frustration.
- Bicycle lanes on major roads are the most favored bicycle transportation facility.
- Bicycle boulevards are highly favored as well, particularly for attracting new users.
- Off-street paths (multi-use trails) are not the most cost effective bicycle transportation facility, but they do attract new cyclists.

#### **From the Survey**

- 88 percent of those who completed a Bicycle Facility Preference Survey said they would bicycle more often for daily trips — particularly work, errands, and recreation — if a good system of bicycle facilities were provided.
- Over forty percent would like to see a bikeway system consisting of a combination of bicycle lanes and bicycle boulevards.

#### **Best/Worst Features of Bicycling in Portland**

At the beginning of each Bicycle Master Plan Forum, staff asked, “what are the best and worst features of bicycling in Portland?” The answers varied from specific locations (e.g., “I like the Burnside Bridge bicycle lanes” and “I dislike Burnside Street”) to behavior (“the worst is inconsiderate motorists”). Participants generally approved of existing bicycle transportation facilities (e.g.,

## Public Process

*(continued)*

bicycle lanes, neighborhood streets with traffic calming measures, and off-street paths, but they disliked the lack of connectivity between these facilities. Bridge access and bridge crossings (or lack thereof) were consistently given poor marks. Many times the same feature appeared on both the “best” and the “worst” lists. For example, people like much of the I-205 bicycle path itself but hate the roadway crossings, the lack of maintenance, and the lack of connections to the path. At all of the forums, people expressed frustration at the behavior of inconsiderate motorists. On the flip side, some also expressed dislike of other cyclists’ behavior (e.g., blatantly running red lights, going the wrong way on the Hawthorne Bridge sidewalk or on one-way streets), which they feel tarnishes the bicyclists image.

Although the “best” and “worst” lists did not provide a complete picture of bicycling conditions in Portland, they did indicate the direction being taken and the areas where major improvements are needed. The “best” and “worst” lists are available upon request from the Bicycle Program.

### ***Phase 2: Master Plan Design***

Following Phase 1, the Bicycle Master Plan Steering Committee began to meet monthly to design the first Master Plan draft. A list of the Steering Committee members is on the inside cover of this Plan. The results of the Phase 1 initial outreach efforts were used as guiding information in designing the first draft.

From June 1994 to March 1995, Bicycle Program staff, with technical advice from other bureaus and guidance from the Steering Committee, worked on the “Preliminary Discussion Draft” (April 1995). This draft was distributed to over 500 people. A flyer was sent announcing its availability as well as another nine public forums to review the draft. These forums were held in conjunction with the Pedestrian Program in the design of the Pedestrian Master Plan. Again, this flyer was distributed widely by direct mail, and the information announced in newsletters and newspapers.

The workshops were as follows in the Spring of 1995:

March 30	Multnomah Art Center, held in conjunction with the Planning Bureau for the Southwest Community Plan
April 5	Northwest Service Center
April 6	Rose City Park Church
April 8	Oregon Health Sciences University, held in conjunction with the Planning Bureau for the Southwest Community Plan
April 20	Grant High School
April 25	Floyd Light Middle School
April 26	Roosevelt High School
May 2	Cleveland High School
May 17	Portland Building

**Public Process***(continued)*

The workshops were well attended, with over 500 participants. All these comments were reviewed by staff and the Steering Committee, and most integrated into the next draft (published September 1995).

The Preliminary Discussion Draft was also reviewed internally and by the City's Bicycle Advisory Committee, the Bicycle Transportation Alliance, and the Bicycle Master Plan Steering Committee. All neighborhood and business associations were invited to comment. Several hundred written and oral comments were received in person, and by fax, mail, E-mail, and phone. The comments were assimilated and incorporated into the draft where possible. Changes were made based on this public input, Steering Committee advice, and staff review.

In September 1995, the revised draft Bicycle Master Plan was published and distributed to over 500 interested parties throughout the community. Finally, four additional public open houses were held to review the September 1995 draft. These forums were held in conjunction with Transportation Planning and the Pedestrian Program in the design of the Pedestrian Master Plan and the Transportation System Plan. The open houses were as follows:

November 6	Benson High School
November 13	Gray Middle School
November 14	Southeast Uplift
November 16	Northwest District Association Service Center

The comments from these forums were also assimilated, reviewed by the Steering Committee and staff, and incorporated where possible into this final Bicycle Master Plan. The comments from all the public forums are available upon request.

**Methodology for Selecting Recommended Bikeways**

The Recommended Bikeway Network streets were selected using the following process:

1. Bicycle Program staff reviewed and assimilated all previous plans for Bikeways in Portland, including: the 1973 "Bicycle Facilities for Portland" Plan, Improvement of the SW Sunset Blvd-SW Dosch Rd Bikeway (1977), Reed-Hawthorne Bicycle Route Study (1985), Analysis of the Reed-Hawthorne Bicycle Route (1987 and 1988), Upper Southeast Corridor Bicycle Route Study (1986), Outer Central Corridor Bicycle Route Study (1987), Lower Southeast Corridor Bicycle Route Study (1987), An Evaluation of the Ankeny-Burnside Bicycle Route (1987), NE Fremont Street Bikeway Project (1989), Lower Northeast Corridor Bicycle Route Study (1989), Albina Corridor Bicycle Route Study (1989), Northeast Bikeway Signing and Improvement Plan (1991), SW Terwilliger Boulevard Bikeway Project (1991), North Portland Bikeway Improvement Plan (1993), Central City Transportation Management Plan (CCTMP) Bicycle Study (1993), and the final CCTMP (adopted December, 1995). In addition, staff reviewed the previous bikeway classifications in the Transportation Element of the City's Comprehensive Plan, and included the bicycle-related recom-

## Methodology for Selecting Recommended Bikeways

*(continued)*

- mendations from all the neighborhood and community plans.
2. Bicycle Program staff, with input from the Bicycle Master Plan Steering Committee and other interested residents, proposed a system of bikeways for further review that met the following criteria:
    - Connect cyclists to desired destinations, such as employment centers, commercial districts, transit stations, universities, schools, and recreational destinations;
    - Provide continuity with the regional bikeway system proposed by Metro, thus providing connections with neighboring bikeways in Multnomah, Washington, and Clackamas Counties;
    - Provide the most direct routes possible; and
    - Provide a bikeway approximately every half mile.
  3. For streets proposed for bicycle lanes, staff collected the following information:
    - Traffic volume (average daily traffic) where existing information was available
    - Street width
    - Number of existing traffic lanes
    - Presence/absence of curbs
    - Availability of parking, parking usage, and the need for on-street parking
    - Other relevant observations
  4. For streets proposed for bicycle boulevards, staff collected the following information:
    - Traffic volume (average daily traffic) where existing information was available
    - Street width
    - Presence/absence of curbs
    - Availability of parking and parking usage
    - Stop sign presence at each intersection
    - Difficulty crossing major intersections
    - Surface quality
    - Other relevant observations

## Methodology for Selecting Recommended Bikeways

*(continued)*

5. When the most direct route between desired destinations occurred on streets where constraints were known to exist such as topographical problems and lack of width, etc., staff surveyed alternative parallel streets where possible.
6. Staff ran a series of data analyses to determine the feasibility of bicycle lanes. The analyses included:
  - Query of street width maintaining existing cross section using minimum acceptable motor vehicle travel lane and parking lane widths. [Street width minus (number of travel lanes times 10 feet) minus (number of parking lanes times seven feet)] The remaining space, if any, was cross checked with needed bicycle lane space (five feet for a one-way street, 10 feet for a two-way street.)
  - Query of street width with one side of parking removed on streets where parking removal difficulty was judged to be low. [Street width minus (number of travel lanes times 10 feet) minus seven feet]. The remaining space, if any, was cross checked with needed bicycle lane space (five feet for a one-way street, 10 feet for a two-way street.)
  - Query of travel lane removal effect on motor vehicle congestion. [Maximum average daily traffic (ADT) over a given leg divided by the number of existing lanes minus one.] If the street's lanes were to carry more than 10,000 ADT each after lane removal, bicycle lane implementation was judged to be less feasible, although not impossible.
7. Staff ran a series of queries on proposed bicycle boulevard suitability including:
  - Number of major unprotected intersections as a percentage of total intersections along a given leg.
  - Number of intersections with stop signs favoring the bicycle boulevard.
  - Average surface quality along a given leg.
  - Composite bicycle boulevard suitability rating combining the latter three factors with ADT and street width.
8. Based on the results of these queries, staff adjusted the Recommended Bikeway Network while still striving to meet the criteria stated above. For streets where bicycle lane or boulevard implementation was shown to be relatively unfeasible, and no alternative bikeway was surveyed, further study corridors were identified for data collection and analysis.
9. The Preliminary Discussion Draft Bikeways Network (April 1995) was reviewed internally and through 10 public forums, and by the City's Bicycle Advisory Committee, the Bicycle Transportation Alliance, and the Bicycle Master Plan Steering Committee. In addition, the Bicycle Program distributed more than 600 copies of the draft at the public forums and to other

## Methodology for Selecting Recommended Bikeways

*(continued)*

interested parties. All neighborhood and business associations were invited to comment. Several hundred written and oral comments were received in person, and by fax, mail, E-mail, and phone.

10. The comments were assimilated and incorporated into the Recommended Bikeway Network where possible. Changes were made based on this public input, Steering Committee advice, and staff review.
11. Staff distributed over 500 copies of the Draft Bicycle Master Plan (September 1995) to interested parties throughout the community. Several additional public forums were held, and comments received. Comments were reviewed and changes incorporated where possible.

Note: Initially, all state-owned highways in the City of Portland were included as bikeways, per request by the state to comply with their policy that all state highways should have bicycle lanes. After further discussion with the state and many public comments concerned with the safety and necessity of bicycle lanes on certain state highways, a few (see Section III, Bikeway Network) have not been classified as bikeways. If these streets are reconstructed, bicycle lanes should still be included. However, these are not considered of high priority.