TRN-6.01 - Bicycle Master Plan

Non-Binding City Policies (NCP)

Policy category: Transportation Options

Policy number: TRN-6.01

BICYCLE MASTER PLAN
Non-Binding City Policy
NCP-TRN-6.01

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. 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 addresses 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 provides 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 bikeway 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 volumes, and speed on all rights-of-way.

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.

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 lockers 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. 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.

HISTORY
Filed for inclusion in PPD October 27, 2003.
Resolution No. 35515 adopted by City Council May 1, 1996.

Related documents

TRN-6.01 Bicycle Master Plan 1.55 MB

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 Steering Committee

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BillBarber *(Metro)*
RickBrowning *(Portland Bicycle Advisory Committee)*
RexBurkholder *(Bicycle Transportation Alliance, Oregon Bicycle Advisory Committee)*
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Foreword

Bicycle Master Plan Process

TheBicycleMasterPlanwascreatedoveratwoandahalfyearperiodby BicycleProgramstaffwithinputfromover2,000residents. Theprocessof creatingthisPlanwasguidedbytheBicycleMasterPlanSteeringCommittee, consistingofBicycleAdvisoryCommitteemembers; otherbicycle, business, and neighborhoodactivists; andtechnicaladvisorsfromtheOregonDepartmentof Transportation, Metro, Tri-Met, thePortofPortland, andothercitybureaus.

Publicinputhasbeenvigorouslysolicitedthroughouttheprocessofpreparing thisPlan. IntheSpringof1994theBicycleProgramheldaninitialseriesof12 publicworkshopsattendedbyover500people. Additionally, theBicycle Programgaveover35presentationstointerestedgroupsandconductedthe BicycleFacilityPreferenceSurvey. Thepublicinputreceivedwascompiledinto areport, "BicycleMasterPlanPhaseOneReport," (June1994), andusedasthe basisfortheBicycleMasterPlanPreliminaryDiscussionDraft(March1995).

Next, togainpublicinputonthePreliminaryDiscussionDraft, theBicycle Programheldaseriesofninepublicforums, metwithinterestedgroups, and receivedcommentsinpersonandviaphone, mail, fax, andE-mail. Mailings announcingtheopportunitytocommentweresenttoover10,000individuals andallthecity'sneighborhoodandbusinessassociations. Publicforumswere alsoannouncedintheOregonian, WillametteWeek, overtheInternet, through localcollegesanduniversities, throughflyerpostings, andnumerousneighbor-hoodandinterestgroupnewsletters. StaffandtheSteeringCommittee reviewedallcommentsandincorporatedmostofthem. Inall, morethan1000 peoplecontributedtotheDraftBicycleMasterPlan(August1995).

Over500copiesoftheDraftMasterPlanweredistributedtointerestedpar-ties, whoweregivenanotheropportunitytocomment. Fouropenhouseswere held, againadvertisedbymassmailings, andprintandelectronicmedia. The SteeringCommitteeandstaffreviewedandincorporatedthisfinalroundof publiccomments.

Bicycle Master Plan Process

If you have any questions, comments, or ideas while reviewing this Plan, please contact:

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BICYCLE MASTER PLAN

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Executive Summary

Introduction

Portlandisconsideredoneofthecountry 'smostbicycle-friendlycities. In October1995, itwasselectedby *Bicycling Magazine* asthemostbicyclefriendly cityintheUnitedStates. Howdidwegetthere?

Portland'sfirstBicyclePlanwasdevelopedin1973byaresidents 'taskforce. ThiseffortledtothecreationofthePortlandOfficeofTransportation 'sBicycle Program—oneofthecountry' soldest— andtheBicycleAdvisoryCommittee, a groupofresidentsappointedbyCityCounciltoadviseonallmattersrelated tobicycling.

Thebicycleisakeymeansoftransportationforthousandsof Portlandresidents andadesiredmeansoftransportationformanythousandsmore. Overhalfof Portlandresidentsownabicycleandrideatleastoccasionally. Bicycleuseisris-ingrapidly. Thebicycleshareoftripsisabouttwopercentin Portland, 3.3per-centintheinner, moredenseareasoftown. Whileonly200cyclistsperday wererecordedontheHawthorneBridgein1975, by1995thisnumberhad climbedtonearly2,000.

ManyaspectsofPortlandencouragebicycleuse. Portland 'scurrentbikeway net-workconsistsofover150milesofbicyclelanes, bicycleboulevards, andoff-streetpaths. Tri-Met' sentirebusfleetisequippedwithbicycleracks. FromJuly 1994toJuly1995, closeto80,000bicycleswereTakenonMAXorbusand over6,300permitssold. Cyclistscanparkatover1,400publicly-installedbicy-cleracksorrentlonger-termspaceatoneof190bicyclelockers. Bicyclecom-muterscantakeadvantageofoneofthenew "BikeCentral " stations(providing showers, changingfacilities, andlong-termbicyclestorage), whilenewcyclists willsoonbeabletoenjoyescortedcommuterides.

Theenergyandcommitmentofmanyorganizationsandbusinessesimprovethe bicyclingenvironment. Portland' sParksBureauandMetro 'sGreenspacesProgram areinstallingdozensofmilesofoff-streetpaths, suchastheSpringwaterCorridor andEastsideEsplanade. Morethanadozenbicycleshopsprovidecrucialservices toPortlandcyclists. Thereisanimpressivearrayofadvocacy, education, andriding groups, includingtheBicycleTransportationAlliance, CommunityCyclingCenter, CriticalMass, KaiserPermanente' sInjuryPreventionProgram, PortlandUnited MountainPedalers, PortlandWheelmenTouringClub, andYellowBikeProgram.

Introduction

ThePortlandPoliceBureauandtheOfficeofTransportation 's ParkingPatrol 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.

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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 Bureau 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 addresses 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 an 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

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-tripfacilities.

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

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

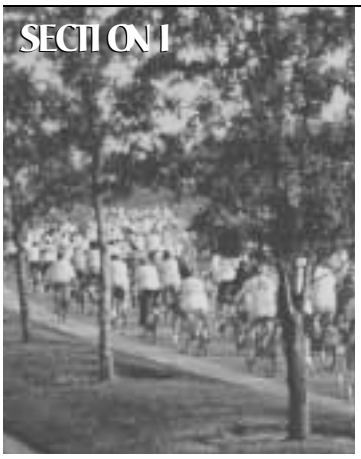
The Master Plan offers detailed design and engineering guidelines for different types of bicycle facilities. Included are intersection designs, signing and marking, maintenance considerations, and bicycle parking code requirements. This information, and the text of state laws and local ordinances pertaining 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 roadspace 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
[illegible] *Make the bicycle an integral part of daily life in Portland*	2% mode share - all city 3.3% in inner city 160 crashes reported (1994 data)
[illegible] *Complete a network of bikeways that serves bicyclists' needs*	185 existing and planned (funded) miles of bicycle lanes
[illegible] *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
[illegible] *Maintain and improve the equality, operation, and integrity of bikeway network facilities*	300 bicycle facility improvement requests annually 25 signal detector loops marked
[illegible] *Provide short- and long-term bicycle parking*	1900 short-term (city-provided) 145 long-term (city-provided)
[illegible] *Provide showers and changing facilities for commuting cyclists*	50 spaces at YWCA
[illegible] *Increase the number of bicycle-transit trips*	4,848 permits sold 42,736 bikes on buses 35,405 bikes on MAX
[illegible] *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
[illegible] *Promote bicycling as transportation to and from school*	2% of children bicycling to school

BY 5 YEARS BENCHMARKS	COSTS	BY 10 YEARS BENCHMARKS	CUMULATIVE COSTS	BY 20 YEARS BENCHMARKS	CUMULATIVE COSTS
InnerPortland: bicyclemodeshare to5%		Increasebicyclemode shareto10%		Increasebicyclemode shareto15%	
Wholecity: bicycle modeshareto3% Numberofbicycle-motorvehiclecrashes heldconstant		Increasebicyclemode shareto6% Numberofbicycle-motorvehiclecrashes reducedby10%		Increasebicyclemode shareto10% Numberofbicycle-motorvehiclecrashes reducedby20%	
40%complete Approximately252 bikewaymiles	$17,774,000	60%complete Approximately378 bikewaymiles	$40,122,000	100%complete Approximately630 bikewaymiles	$149,760,000
75%ofstreetshave appropriatebikeway facility	Notquantified	85%ofstreetshave appropriatebikeway facility	Notquantified	95%ofstreetshave appropriatebikeway facility	Notquantified
Implementimproved maintenance proceduressuchthat requestsdecreaseby 15%fromtoday' slevels	$50,000	Requestsdecrease by50%fromtoday' s levels	$100,000	Requestsdecrease by75%fromtoday' s levels	$200,000
100%ofbikewayswith signaldetectiontuned andretrofittedwith pavementmarkings	$8,000	50%ofallsignals withdetectiontuned andretrofittedwith pavementmarkings	$12,000	100%ofallsignals withdetectiontuned andretrofittedwith pavementmarkings	$24,000
20%ofrequired bicycleparkingspaces		40%ofrequired bicycleparking		100%ofrequired bicycleparking	
1,720short-term parkingspaces	$103,202	3,440short-term spaces	$206,404	8,600short-term spaces	$516,010
5,922long-term parkingspaces	$2,671,850	10,765long-term spaces	$5,091,800	23,134long-term spaces	$12,027,834
Accommodate300 commutersatthe DowntownandLloyd districts "BikeCentral " locations	$350,000for "Bike Central" facilities	Showersandchanging facilitiesavailabletoall commutingcyclists needingsuch accommodations	Notquantified	Showersandchanging facilitiesavailabletoall commutingcyclists needingsuch accommodations	Notquantified
Tri-Methasnot developeda long-rangeplan					
3to5annualcity-wide eventspromoting cycling	Notquantified	3to5annualcity-wide eventspromoting cycling	Notquantified	3to5annualcity-wide eventspromoting cycling	Notquantified
50%ofschool-age childrenreceiving bicyclesafetyeducation		90%ofschoolage childrenreceiving bicyclesafetyeducation		90%ofschool-age childrenreceiving bicyclesafetyeducation	
3%ofchildren bicyclingtoschool	Notquantified	6%ofchildren bicyclingtoschool	Notquantified	10%ofchildren bicyclingtoschool	Notquantified



Introduction

Introduction

Thebicycleisalow-costandeffectivemeansoftransportationthatisquiet, non-polluting, extremelyenergy-efficient, versatile, healthy, andfun. Bicyclesalso offerlow-costmobilitytothenon-drivingpublic, includingtheyoung; indeed, morethan16percentofadultOregoniansdonothaveadriver 'slicense. [1]

Theworld' s800millionbicyclesoutnumberautomobilestwotoone, and annualbicycleproductionismorethanthreetimesannualautomobileproduction.[2] IntheUnitedStates, bicycleswereapopularmeansoftransportationin thepre-automobileage. In1880, bicycleenthusiastsformedtheLeagueof AmericanWheelmen(laterchangedtoLeagueofAmericanBicyclists), which successfullylobbiedforanationalnetworkofpavedroads. Portland 'shistoryis richwithbicycleenthusiasts, includingtheDekums, Glisans, Pittocks, Morelands, andWoodwards. MuchoftheactivityoftheearlyMultnomah AthleticClubrevolvedaroundbicycleracingandmanyday-longfamilyoutingstookplaceonbicycles. [3]

Astheautomobilebecamemorepopular, bicycleslostpopularity. Theautomobilegavepeoplethefreedomtomovefartherfromtheirplacesofwork, giving waytorapidsuburbandevelopmentandsprawl. Thebicycle—idealforshort trips—lostitsadvantageaswellasitsplaceontheroad.

ThroughouttheUnitedStatestoday, thebicycleismakingacomeback. There areanestimated100millionbicyclesinthecountry, includingahalfmillionin thePortlandregion. [4] Bicyclingasameansoftransportationhasbeengrowingin popularityasmanycitiesworktocreatemorebalancedtransportationsystems andreclaimstreetsfromautodominance. [5] Inaddition, recentnationalandlocal surveysfindthatmanymorepeoplearewillingtocyclemorefrequentlyifcities providebetterbicyclefacilities. [6]

BicycletravelinPortlandhasincreasedrapidlyinthepastdecade. Since1985, bicycleuseontheHawthorneBridgehasmorethantripled(Figure1.1). Bicycle ridercountsdoneinothercitylocationsalsoshowconsistentincreases.

Thisincreaseisduetoseveralfactors. First, improvementsinequipment, particularlytheappearanceofthemountainbicycle, havesignificantlyimprovedthe rangeofavailableoptions. Withtheirfattertires, sturdiergeometry, andmore

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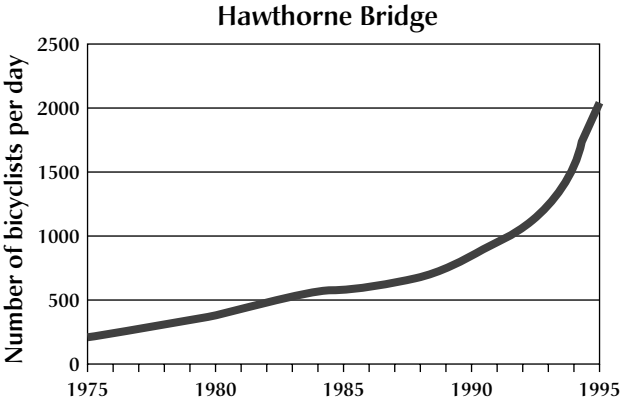
user-friendlybrakingandgearingsystems, mountainandhybridbicyclesare well-suitedtourbancommuting.

Second, increasingenvironmentalawarenessinthepasttwodecades, coupled withprogressiveland-useandtransportationleadership, hasresultedin Portland'shavingoneofthemorerespectedanduser-friendlytransportation systemsinthecountry. Withitspedestrianorientation, relativelylowtrafficcongestion, andconnectedstreetgrid, bicycletripsareapleasantdailyoptionfor manypeople.

Third, asmoreresidentshavebeencyclingfordailytransportation, morehave beenadvocatingforimprovedbicyclingconditions. This hasresultedinmoremilesofbicyclelanes, bicycle boulevards, andoff-streetpaths; morebicycleparking; andbettermaintenanceofexistingfacilities, allof whichhaveencouragedmorebicycleriding.

FIGURE 1.1



Source:Bicycleridercounts,PortlandOfficeofTransportation.

Thesethreefactors—andtheconsequentincreased bicycling—haveledtoagrowingrecognitionamong policymakersatalllevelsoftheneedtotreatthebicycleasaseriousmodeoftransportation. Asearlyas 1971, Oregon'sleadersadoptedstatelawORS 366.514, whichrequiresthatcitiesandcountiesexpend aminimumofonepercentoftransportationrevenues onbikewaysandwalkways, andthatbikewaysandwalkwaysareincludedaspartofroadwayconstructionand reconstruction(seeAppendixBforfulltext). Manysubsequentgoalsandpoliciceshavebeenadoptedtowardthisend, includingthe1991OregonStateLand ConservationandDevelopmentCommission 'sTransportationPlanningRule (Goal12), whichrequiresalljurisdictionsinthePortlandMetroAreatoprepare aplantoreducevehiclemilestraveledpercapitaby20percentoverthenext 30years. Theregionalgovernment, Metro, hasbeenleadinganefforttoensure thatfutureland-usedevelopmentencouragesbalancedtransportationoptions, includingbicycletransportation. Inaddition, manycitygoalsandpolicieshave beenadoptedandarediscussedinSectionII.

Followingthisgrowingpolicysupport, additionalfundinghasbeenmadeavailableforbicycletransportationimprovements. Thishasbeentrueonthelocaland statelevel, aswellasthefederallevelthroughthe1990CleanAirActandthe 1991Inter-ModalSurfaceTransportationEfficiencyAct(ISTEA), whichcallsfor increasedspendingonbicycletravelandallowscitiesmoreflexibilityinspending highwayfundingonalternativemodes, suchasbicycling, walking, andtransit.

Theincreasedridership, resultingadvocacy, andincreasedpolicyandfinancial supportfromallgovernmentlevelshaveresultedinsignificantbicycletransportationimprovements. ThefollowingBicycleMasterPlanisadirectresultof thesechangesandisintendedtosetanaggressive, proactive20-yearcourse towardfulfillingthefollowingmission: Makingbicyclinganintegralpartofdaily lifeinPortland.

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.

1970s 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.

1980s 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.

1990s 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 eastbound viaduct; SE Hawthorne

Portland's Bicycle Program History

(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).

[redacted] 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 Multnoma 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).

[redacted] 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.

[redacted] 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.

[redacted] 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.

BicycleMasterPlan

TheBicycleProgram' sfocushasevolvedfromcorridorstodistricts, tothrough thisBicycleMasterPlan, acomprehensive, city-wideapproach. Thisevolution hasfollowedtheincreaseinpublicandgovernmentsupport, fundingavailability, andtechnicalknowledge.

TheBicycleMasterPlanwasenactedoveratwoandahalfyearperiodwith inputfromover2000residents. ThepublicprocessundertakentodeveloptheMasterPlanisdetailedinAppendixD. ThefollowingPlanwilloutlinetheactionsneeded, priorities, costs, andtimelinesformakingPortlandtrulybicyclefriendly. SectionIIsummarizesthegoals, policies, andobjectivesguidingtheimplementationoftheMasterPlan. SectionIIIexplainstherecommendedcomprehensive, continuousbikewaynetwork, includingproposedimprovementsandestimated costs, andmaintenanceneeds, railroadimprovements, andsignalmodifications. SectionIVproposesend-of-tripfacilitiesdesignedtoservebicyclists 'needsat keydestinationsthroughoutthecity, includingparking, shower, andchanging facilities. SectionVdescribesthebicycle-transitlink. SectionVIdetailsaframeworkforeducatingyouthandadultcyclistsandmotorists, encouragingmore cycling, andincreasingthenumberofchildrenbicyclingtoschools.

AppendixAisthebikewayDesignandEngineeringGuidebooktobeusedby plannersandengineersinimplementationofbikewayfacilities. AppendixBisa summaryoflawsrelatedtobicyclinginPortlandandOregon. AppendixCisthe CentralCityTransportationManagementPlanbicycle-relatedpolicies. Finally, AppendixDdetailstheMasterPlanpublicprocessandmethodologyusedto selectthebikewaynetworkfacilities.

ThisPlanismeantasa20-yearguideformakingPortlandbicyclefriendly. Itssuccesswillonlybeassuredbythecontinuedsupportof Portland 'scycling communityandotherresidentsrecognizingthebenefitsbicyclingbringsto allresidents.

Endnotes

[1] "OregonDrivers, " OregonDepartmentofTransportation, DriverandMotorVehicleServices, 1991.

[2] Lowe, Marcia, TheBicycle: VehicleforaSmallPlanet, WorldwatchInstitute, September, 1989: p.5.

[3] OregonHistoryCenter.

[4] BicycleFederationofAmericastatistics.

[5] "SportsParticipationin1992, City-by-City, " NationalSportingGoodsAssociation, 1992.

[6] BicycleFacilityPreferenceSurvey, carriedoutbytheCityofPortlandBicycleProgram, Spring 1994. "ATrendontheMove: CommutingbyBicycle, BicyclingMagazine, 1991.

SECTION 1

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.

● 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 [1] 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 traffic ways and transit ways 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 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

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.

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 equality, 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.

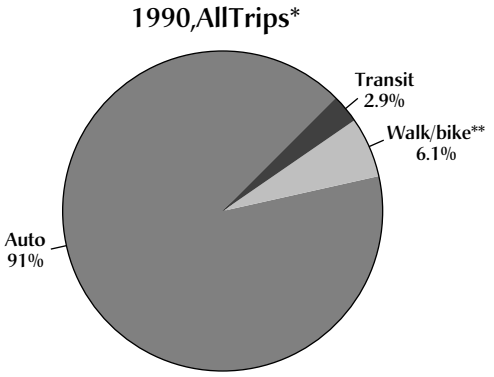
E. Provide showers and changing facilities for commuting cyclists. Support development of such facilities in commercial buildings and at "Bike Central" locations.[2]

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.

FIGURE 2.1



*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.

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

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.[3] 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.[4] Many more accidents are not reported, and most are believed not to involve a motor vehicle.[5] 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 trips 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 6.12A –H.

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
Increase bicycle mode share to 5%	Increase bicycle mode share to 10%	Increase bicycle mode share to 15%
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:

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

[redacted]

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.

[redacted]

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 provides 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.

[redacted]

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

[redacted]

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.

[redacted]

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.

[redacted]

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.

[redacted]

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

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

[1] 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.

[2] 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.

[3] 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.

[4] Oregon Department of Transportation, Bicycle-Motor Vehicle Crash Summaries, 1987-1994.

[5] 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): pp67-78.

SECTION II

Recommended BikewayNetwork

Introduction

Nationalandlocalpollsfrequentlycitethelackofbikewaysasthenumberone reasonmorepeopledonotbicyclefordailytrips; inPortland, 88percentof thosesurveyedin1994statedthatlackofbikewayspreventedmorefrequent cycling. Thesurveyalsofoundthatthemostcompellingtypeofbikewayfacility isabicyclelane(49percent), withbicycleboulevardsandoff-streetpathsalso consideredimportant(35percentand18percent, respectively).

Furthermore, surveyshavealsofoundthatthepublicinthePortlandregion increasinglysupportstheexpenditureoftaxpayerfundstoinstallbikeways. For example, inthe "Region2040: It 'sYourTurn" 1994surveydistributedtoall Portlandregionhouseholdsby Metro, thesecondmostfrequentlycitedcom-mentreceivedwastheneedforbetterbikewaysandwalkways. Otherlocalsur-veyshavealsofoundsignificantpublicsupportforinvestmentinimproved bikewayfacilities.

Bikewaysbringenormousbenefitstobothcyclingandnon-cyclingpublic. Bikewaysattractmorecyclists, bringingair, noise, andwaterqualitybenefits. Theyusepublicdollarsefficiently, byreducingroadmaintenancecosts. They increasethecarryingcapacityofthetransportationsystem. Theyimprovesafety forallusers; bicyclistsfeeltheyhaveasafespaceontheroadandtendtobe morelaw-abiding, whilemotoristsareplacedatgreatereaseknowingwhere bicyclistsareapttobe. Bikewaysalsohelpmotoriststobeawareofbicyclists ' presenceandrighttobeontheroad.

Theplanningandimplementationofbikewayscanberelativelysimpleand inexpensive, aswhentheCityrestripesaroadwaywithbicyclelanesduringa routineresurfacing. Bikewayscanalsobeverycomplicatedandcostly, aswith streetsthatneedtobewidened. Theinstallationofsomebikewaysmaynot alwaysbedesirablefromthepublic 'sperspective, if, forexample, parkingneeds toberemovedtoinstallbicyclelanesortrafficneedstobedivertedtocreatea bicycleboulevard. Thesefactorshaveallbeenanalyzedforthis Plan. Bikeways wereselectedbecauseoftheirconnectiontoland-uses, easeofimplementation, needforsafetyimprovements, lackofparallelfacilities, andneedforcontinuity (AppendixDpresentsadetaileddescriptionofthemethodologyusedtoselect 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' streatment 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*.

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 looses and 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 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

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 shortcuts 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.

Bikeway

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

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

Bike Lane

A **bike 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 **shared roadway** 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-wide curb lane** is a wider than an 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 **bikeway** 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 Path

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 [illegible] serves inter-regional district movement with only one trip end in a transportation district or bypass a district completely.

A [illegible] 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 [illegible] provides concentrated access to district activity centers and serve trips that both start and end in a district.

A [illegible] 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 [illegible] is intended to provide the following: distribute local traffic and emergency vehicle access; access to local residences or commercial uses, visual setting or entryway 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 [illegible] and [illegible]

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). [1] 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

TABLE 3.1

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

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

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

AVERAGE NUMBER OF VEHICLES PER DAY	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, [2] 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. [3] 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

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 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.

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 routes 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

thestreetsnotonthebikewaynetworkwillbeeliminatedorimprovedover timetoprovidedirectionalinformationaboutdestinationsandnearbybikeways. Inaddition, guidesignsmaybeusedtodirectcyclistsstoandaroundrecreational facilitiesortoanalternativeroutewherethepreferredstreetcannotbemodifiedduetoseriousfinancialortopographicalconstraints.

[redacted] Thefunctionalpurposeanddesigntreatmentforbikewaysisanadoptedportionof theArterial StreetsClassificationandPolicyoftheComprehensivePlan *Transportation Element*. Whenastreetisreconstructed, thestreet 's classificationsarereviewed andasmanyclassificationsaspossibleaccommodatedinprojectdesignand implementation. Whenconstraintsexistandalldesigntreatmentscannotbe accommodated, decisionsaremadeonaproject-by-projectbasis. Furtherdetails onselectingtheappropriatebikewaydesigntreatmentaregiveninTable3.2 andinAppendixA, BikewayDesignandEngineeringGuidelines.

Thestreetsproposedinthebikewaynetworkwereselectedwithsignificant publicinput(seeAppendixD, MethodologyforSelectingBikeways). Streets wereincludedbecausethey:

- Connectcyclistsstodesireddestinations, suchasemploymentcenters, commercialdistricts, transitstations, institutions, andrecreationaldestinations;
- ProvidecontinuitywiththeregionalSystemproposedbyMetro, thusprovidingconnectionswithneighboringbikewaysinMultnomah, Washington, andClackamasCounties.
- Providethemostdirectandconvenientroutespossible;
- Provideaparallelbikewayapproximatelyeveryhalfmile; and
- Targetlocationswiththepotentialforimplementationinthenexttwenty years.

TherecommendedbikewayshavebeencompiledintoaBicycleMasterPlan proposedprojectslist(laterthissection)showingprojectlocation, distance, and estimatedcost, andarealsoshownonthebikewaynetworkmap.

Maintenance

Whileimplementingbikewayfacilitiesisimportant, keepingthemingoodcondition isequallyimportant. Whenabicyclelanebecomesfilledwithdebris, for example, cyclistsareforcedintothemotorvehiclelane. Poorbikewaymaintenancecancontributetoaccidentsanddeterpotentialcyclistsunwillingtorisk flattiresandskiddingoncitystreets.

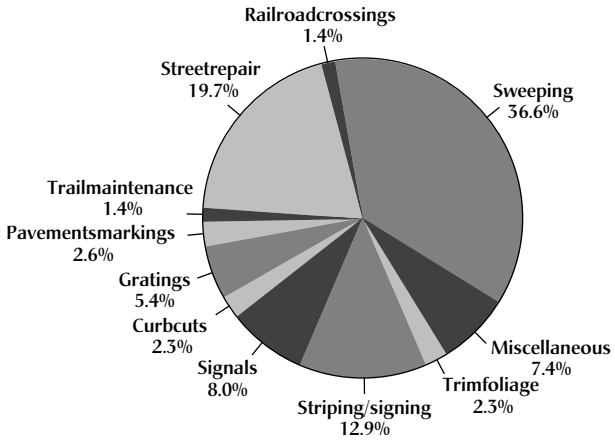
InMarch1994, theCityinitiatedtheBicycleFacilityImprovementProgramto respondtomaintenancerequests. Initsfirstyear, theProgramrespondedto approximately350requests(Figure3.1). TheCityfixedabout50percentofthe requests—mostlysweeping, roadrepair, signing/striping, signalmodifications, and graterepair. Approximately25percentoftherequestswereoutsidetheCity 's jurisdictionandwereforwardedtotheappropriateauthority.TheCitywas

Maintenance

unable to address approximately 25 percent of the requests that were either too expensive, too complicated, or investigations 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.

Overtime, 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.

FIGURE 3.1



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.

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 6.12A

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.

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

Objectives and 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)

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

Objectives and Action Items

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

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 6.12B

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.

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

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

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

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
Total Recommended	**445**	**$150,000,000**
Total Existing and Planned	**185**	
Total Existing, Planned, and Recommended Bikeway Miles	**630**	

Objectives and Action Items

Objective 6.12C

Maintain and improve the equality, 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.

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

- 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)

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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 NW Willamette	Lane
NW 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. Blvd 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 Blvd 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. Blvd 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.

BICYCLEMASTERPLANPROPOSEDPROJECTS:PRIORITY1(FIRST5YEARS)

#	PROJECTNAME	PROJECTLOCATION	LENGTH(FT)	COST($1,000)
1	N. Greeley/Interestate	GoingtoRussell	10,027	$200
2	SWBroadway	BurnsidetoJefferson	3,061	$8
3	NW18th/19th	BurnsidetoVaughn	8,750	Complete
4	SWCapitol	BarburtoTerwilliger	29,082	PedProgram
5	NESandy	Burnsidetocitylimits	41,954	ODOT
6	HawthorneBrSidewalks	Widensidewalks	1,300	$1,300(County)
7	SEUmatilla	7thtoTacomaxing	5,000	$100
8	SW2nd/3rd	JeffersontoCouch	7,500	$15
9	NEHalsey	39thto102nd	16,438	$30
10	NEMarineDrive(I)	MLKto47th	16,817	$10,000
11	SWMoody	BancrofttoGibbs	2,500	$10
12	SEWoodstock	41stto52nd	3,054	$6
13	NWFront	NW9thtoend	24,200	$75
14	SEPowell	SE71toI-205trail	24,541	ODOT
15	NEGlisan	47thto162nd	30,231	$100
16	SE/NE20sBikeway	DekumtoBybee	32,263	$110
17	SW1st	JeffersontoArthur	3,750	$10
18	NE/SE102nd/CherryBlossom	HalseytoMarket	8,800	$250
19	NVancouver/Williams	MLKtoBroadway	25,000	$90
20	NWLovejoy	NW14thtoNW24th	4,541	$30
21	NWEverett/Glisan	Frontto14thand18thto24th	10,560	$30
22	SEMcLoughlinBlvd.	SE17thtoClatsop	17,271	ODOT
23	SEStark/Washington	75thtocitylimits	30,450	$350
24	SW12th/13th	MontgomerytoCouch	7,500	Complete
25	SWSalmon/Taylor/Madison/Main	18thtoHawthorneBr.	1,200	$20
26	NETillamook	Flintto92nd	25,000	$250
27	NE/SE40sBikeway	HolmantoCrystalSprings	39,541	$190
28	NStLouis/Fessenden	ColumbiaWaytoWillamette	3,179	$8
29	SEDivisionPl/9th	7thtoCenter	5,000	$16
30	SEWoodward/Clinton	51stto92nd	10,909	$130
31	NEPrescott(I)	CullytoI-205trail	7,725	$131
32	SWBertha	VermonttoB-HHwy.	1,300	$368
33	NGoing	InterstatetoBasin	5,454	$50
34	N/NEAinsworth	Willametteto37th	18,179	$65
35	SWBarburBlvd.	Berthatocitylimit	10,000	ODOT
36	SellwoodBrlightpoles	Relocatelights, effectivelywidenssidewalk	1,200	$280(County)
37	SEMorrison/Belmont	MorrisonBridgetoSE12th	4,361	$8
38	NEMarineDrive(II)	Airportto122nd	12,725	$1,000
39	GreenwayExtension	SellwoodBr. tocitylimits	4,087	$500
40	NE/SE122nd	MarinetoPrescott/Glisanto Market/BushtoRamona	15,153	$40
41	NWVaughn	Nicolaito23rd	3,179	Complete
42	NDenver	AinsworthtoKillingsworth	1,363	Complete
43	NE/SE70sBikeway	KillingsworthtoClatsop	32,225	$439
44	SE17thAvenue	Powelltocitylimits	13,633	$100
45	NInterstate	LombardtoGreeley	12,376	$35
46	NPortlandRoad	St. LouistoRichmond	2,271	$1,400
47	EBurnside	28thto74th	11,817	$250
48	NLombard	RenotoColumbia	5,909	$25
49	NIvanhoe	ColumbiatoMarineDr.	6,817	$7
50	SEHolgate	42ndto136th	24,087	$60
51	SWMacadam	Fronttocitylimits	19,087	ODOT
52	NECully/57th	PrescotttoSandy	6,363	Complete
53	NE57th	SandytoTillamook	1,658	$10
53	NE21st/20th	NEWeidlertoNEIrving	2,367	$4
54	SEMilwaukie	OdeontoCenter	3,179	$10
55	NEKillingsworth	42ndtoCully	9,807	Complete
			TOTALCOST:	**$16,430**

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 East side 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
			TOTAL COST:	**$22,096**

BICYCLEMASTERPLANPROPOSEDPROJECTS:PRIORITY3(10–20YEARS)

#	PROJECTNAME	PROJECTLOCATION	LENGTH(FT)	COST($1,000)
1	SWPomona	Capitolto35th	3,633	$1,800
2	SWStephenson	35thtoBoonesFy.	10,454	$3,479
3	SW30th	B-HHwy. toVermont	5,000	$931
4	SWTaylorsFerry(I)	35thtoTerwilliger	7,271	$4,900
5	SWBoonesFerryRd.	Terwilligertocitylimits	10,508	$4,900
6	SWKingston	JeffersontoKnights	10,000	$40
7	SWArnold	35thtoBoonesFy.	6,363	$3,479
8	SE7th/Sellwood	SpokanetoBybee	3,633	$5
9	NESullivansGulchtrail	parallelsI-84fromWillametteRivertoI-205	27,725	$2,500
10	WBurnside	23rdtocitylimits	11,817	$265
11	SWVermont(II)	45thtoTerwilliger	10,000	$36
12	SWSunsetBlvd.	DoschtoCapitol	5,909	$3,136
13	SW45thDrive	TaylorsFy. toCameron	10,909	$5,194
14	SWHamilton	SchollsFy. toDosch	8,400	$4,410
15	SWDosch	PattontoB-HHwy.	6,363	$4,165
16	SWVermont(I)	Olesonto45th	5,000	$3,185
17	NW/SWSkyline	Canyontocitylimits	33,426	$5,000
18	SWShattuck	VermonttoPatton	9,087	$4,655
19	NWCornell	30thtocitylimits	6,817	$1,000
20	SW35th	StephensontoTaylorsFy.	6,363	$2,450
21	SE92nd	StarktoLincoln/PowelltoFoster	10,357	$20
22	SWBoone' sFy	SWTaylor' sFytoTerwilliger	2,843	$5
23	NE/SE162nd	SandytoHalsey/StarktoPowell	14,668	$40
24	SWTerwilliger	SWPalatertocitylimit	4,695	$9
25	SEDivision	SE52ndtoSE82nd	7,612	$14
26	SWSpringGarden	TaylorsFy. toCapitol	6,817	$4,165
27	SWPalatineHillRd	SWBoone' sFytocitylimit	8,651	$10,000
28	SE174th	SEStarktocitylimit	10,460	$20
29	SWFairview	Kingstontocitylimits	10,000	$2,000
30	NECornfoot	Alderwoodto47th	7,725	$1,392
31	SEHarneyDr.	52ndtoFlavel	2,350	$1,252
32	SWGardenHome	CapitoltoOleson	11,750	$4,018
33	SEDivision	SE122ndtocitylimit	14,010	$27
34	SEFoster	SE90thtoSE122nd	9,248	Complete
35	SWVeteran' sHospital	TerwilligertoSamJacksonParkRd	3,505	$7
36	SEFoster	SE136thtocitylimit	13,278	$2,515
37	SWPatton	SchollsFy. toVista	10,000	$5,390
38	SESteele	26thto52nd	5,454	$20
39	SWHumphrey	DoschtoCanyon	6,200	$4,000
40	SWMontgomery	11thtoCouncilCrest	7,271	$7
41	SWCorbett	Pendletonto1sttoArthur	10,000	$20
42	SETolman	28thto52nd	6,363	$20
43	SWCameron	Shattuckto45th	9,087	$1,568
44	SWVirgina	TaylorsFy. toPendleton	3,633	$12
45	SE111th/112th	Mt. ScotttoMarket	21,817	$1,755
46	SW12th/Davenport/Broadway	SWMontgomerytoVista	9,776	$4,508
47	SEBarbaraWelchRoad	SEFostertocitylimit	5,288	$1,002
48	SEJenneRoad	SEFostertocitylimit	1,773	$336
49	SEClatsop	SE162ndtoSE132nd	7,825	$1,482
50	SW55th/Pomona/Pasadena	SWTaylorsFerrytoBarbur	6,647	$2,000
51	SW48th/Alfred	SWTaylor' sFerryto55th	2,701	$500
52	SW61st/62nd	SWTaylorsFerrytoPomona	4,187	$1,000
53	SW35th	SWVermonttoBarbur	7,009	$2,250
54	SWIllinois	SWShattucktoSW45th	4,034	$1,000
55	NERussell	NInterstatetoMartinLutherKing, Jr.	3,913	$1
			TOTALCOST:	**$107,880**

Objectives and Action Items

- 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)

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

[1] 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.

[2] 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.

[3] 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

Everybicycletriphastwobasiccomponents: therouteselectedbythecyclist, andthe "end-of-trip" facilitiesavailableatthedestination. Theseend-of-trip facilitiesincludeparkingforthebicycleandshowersandchangingspacefor commuters. Iftheend-of-tripfacilitiesdonotmeettheusers 'needs, other meansoftransportationwillbesubstituted.

InanationwideHarrisPollconductedin1991, 42percentoftherespondents saidthattheyhadriddenabicycleinthepastyear. Ofthisgroup, almosthalf saidthattheywouldsometimescommutetoworkbybicycle, orcommutemore often, iftherewereshowers, lockers, andsecurebicyclestorageatwork. Similarly, 21percentoftherespondentsina1992Portlandbicycleusersurvey citedalackofend-of-tripfacilitiesasareasonfornotridingabicycletothe downtownarea. Clearly, theavailabilityofconvenient, securebicycleparkingis acriticalfactorinanindividual 'sdecisionwhetherornottouseabicyclefor commuting.

Good, securebicycleparkingoffersthesebenefits:

- itinexpensivelyandefficientlyincreasesabuilding' sparkingcapacity;
- itservesthosewhousebicyclesasamodeoftransportation; and
- itencouragesbicycleuse.

Cyclists'needsforbicycleparkingrangefromsimplyaconvenientpieceof streetfurniture, tostorageinabicyclelockerthataffordsweather, theftand vandalismprotection, gearstoragespace, and24-hourpersonalaccess. Wherea cyclist'sneedfallsonthisspectrumisdeterminedbyseveralfactors:

- whetherornotthebicyclewillbeleftunattendedall dayorjustforafewminutes.
- coveredbicycleparkingisapttobeofgreaterimportanceduringthewettermonths.
- themoreacyclisthasinvestedinabicycle, themore concernsheorhewillshowfortheftprotection. Mostnewbicyclescost $400-500, andoftenconsiderablymore.

Introduction

- [redacted] 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.

[redacted] 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.

[redacted] 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 [redacted]

TYPE	FUNCTION	CHARACTERISTICS	EXAMPLE*
I personal or limited access enclosure	Long Term	•highest level of theft protection available •weather protection •locked enclosure or room with individual/very limited access	•bicycle locker •storage room
I high security rack	usually Long Term (off street)	•accommodates locking of bicycle frame with standard U-shaped lock •design reasonably safeguards bicycle from damage if it is accidentally pushed •offers additional theft security by shielding lock •may secure one or both wheels •best in off-street, limited pedestrian use areas	•three point locking
I normal security rack	Short Term (can be used for long term where additional security measures are provided)	•accommodates locking of bicycle frame with standard U-shaped lock •design reasonably safeguards bicycle frame and wheel from damage if it is accidentally pushed •design is compatible for pedestrian area installation •security is only as good as the user lock	•ribbon rack •freestanding •bike rail
X substandard rack designs*	Unacceptable	•does not allow frame of bicycle to be easily locked with standard U-shaped lock •often designed to hold only wheel of bicycle •design does not adequately safeguard bicycle from damage if it is pushed	•all traditional and wheel holder bike racks

* 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

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.

[illegible] 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").

[illegible] As invulnerable as possible to theft, depending on an appropriate combination of parking type, location, and access.

[illegible] Enough short-and long-term bicycle parking spaces to exceed peak season demand. [1] Requests for additional bicycle parking, beyond existing code requirements, are to be met by the property owner.

[illegible] 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.

[illegible] 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.

[illegible] Having sufficient shelter to protect the parked bicycle from the elements, particularly rain.

[illegible] 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

[illegible]

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

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.

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 in adequate 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

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."

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.

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

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.

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. [2]

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

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

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 "BikeCentral", and a city sponsored "BikeCentral " 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 —BikeCentral 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

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

Objective 6.12D

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, homebuilders, 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 if greater that $10,000).

[3]

Comparing the proposed bicycle parking code for commercial uses to the existing automobile parking codes shows that on average, for every 100 required automobile parking spaces, approximately 12 bicycle parking spaces would be required.[4] 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. [5] This brings the total number of required spaces to 10,700, including approximately 7,500 long-term spaces and 3,200 short-term spaces.

At 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.

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

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.

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
Commercial parking		
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
School parking		
2,159 long-term spaces	3,238 long-term spaces	4,317 long-term spaces
Multi-family dwelling unit parking		
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
Special events and public recreational facilities parking		
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.

- 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

TABLE 4.4

BICYCLE PARKING*

USE CATEGORIES	LONG TERM SPACES	SHORT TERM SPACES
Residential Categories		
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
Commercial Categories		
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
Industrial Categories		
Manufacturing	2, or 1 per 7,500 ft2 floor area	None
Warehousing	2, or 1 per 20,000 ft2 floor area	None
Institutional Categories		
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
Other Categories		
Agriculture	None	None
Aviation Facilities, Detention Facilities	per CU review	per CU review
Mining, Radio and TV Towers, Utility Corridors	None	None

*Note: Where ever this table indicates some number of spaces or a ratio, which ever will result in the greater number of spaces will apply.

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

Objectives and Action Items

- 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).

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.). [6]

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

ObjectivesandAction Items

installingcover, acostestimateof$150perspacetoprovidelong-termbicycle parkingatschoolsisused. [7]

Thepublicsectorwilllikelybearallcostsforbicycleparkinginstallationatthe publicschools, byeithertheCityofPortlandBicycleProgram, orbythefive Portlandschooldistricts. Privatesponsorsmaybesoughttohelpdefraythese costs. Thetotalcostof$648,000worksouttoanaveragecostof$420perclass-roomserved($21perclassroomperyearoverthe20-yearperiod).

Formultifamilydwellings, thetotalcostoverthe20-yearperiodisestimatedtobe $325,150for5,420short-termand$6.8millionfor11,325long-termspaces. The privatesectorwillbearthelion' sshareat$7million(98percentoftotalcosts). Thiswillamounttoanestimatedcostof$150perunitservedoverthe20-year period, $8perunitperyear, or$0.65perunitpermonthoverthe20-yearperiod.

TABLE 4.5

YEARSFROMSTART	5	10	20	TOTAL
PERCENT OF REQUIREMENTS	20%	40%	100%	
Commercial				
TotalShort-Term	636	1,272	3,181	3,181
TotalLong-Term	1,498	2,997	7,492	7,492
AdditionalShort-Term	$38,172	$38,172	$114,517	$190,861
AdditionalLong-Term	$989,050	$899,050	$2,697,151	$4,585,251
TOTALCOSTS	$1,027,222	$937,222	$2,811,667	$4,776,112
PublicInstallation				
Short-Term	636	2,136	4,045	4,045
Long-Term	450	450	450	450
PrivateInstallation				
Short-Term	0	0	0	0
Long-Term	1,048	2,547	7,042	7,042
COSTS				
PublicSector	$398,172	$90,000	$114,517	$602,689
PrivateSector	$629,050	$899,050	$2,697,151	$4,225,251
Schools				
TotalLong-Term	2,159	3,238	4,317	4,317
TOTALCOSTS	$323,810	$161,905	$161,905	$647,620
Multi-familydwellingcomplexes				
TotalShort-Term	1,084	2,168	5,419	5,419
TotalLong-Term	2,265	4,530	11,325	11,325
AdditionalShort-Term	$65,030	$65,030	$195,089	$325,149
AdditionalLong-Term	$1,358,993	$1,358,993	$4,076,978	$6,794,963
TOTALCOSTS	$1,424,022	$1,424,022	$4,272,067	$7,120,112
PublicInstallation				
Short-Term	864	864	4,115	4,115
Long-Term	0	0	0	0
PrivateInstallation				
Short-Term	220	1,304	1,304	1,304
Long-Term	2,265	4,530	11,325	11,325
COSTS				
PublicSector	$0	$0	$195,089	$246,917
PrivateSector	$1,372,194	$1,424,022	$4,076,978	$6,873,194

Objectives and Action Items

Objective 6.12E

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

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	

- 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). [8]
- 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 workplaces (Responsible parties: Bicycle Program, health clubs, parking providers).

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

Endnotes

[1] 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.

[2] 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 on to 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.

[3] "Commercial," as used here, refers to Commercial Districts, Main Streets, and Employment Centers.

[4] 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 floorspace, will continue to increase as a percentage of off-street automobile parking.

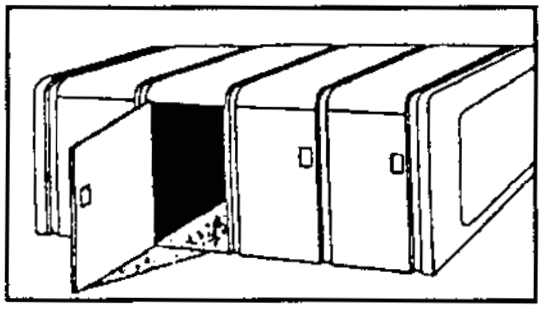
[5] The Bike Central Draft Plan, available from the City's Bicycle Program, includes an estimate of 37,500 downtown commuters who live within a five-mile radius. Ten percent is the target modal share for bicycles for all trips.

[6] 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.

[7] 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 covers 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).

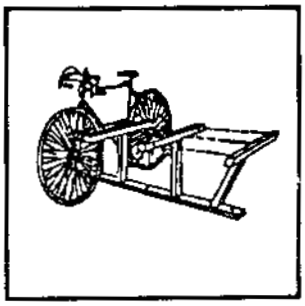
[8] This concept has been adopted as part of the City of Eugene's zoning code.

FIGURE 4.1

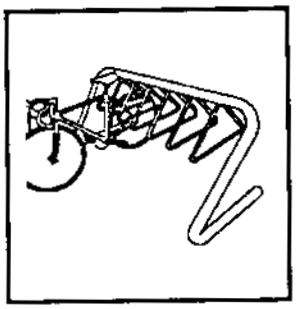


BicycleLocker

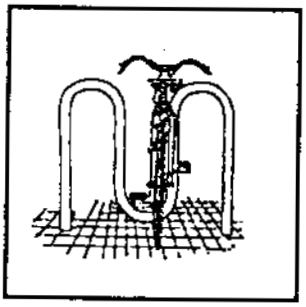
BikeRail



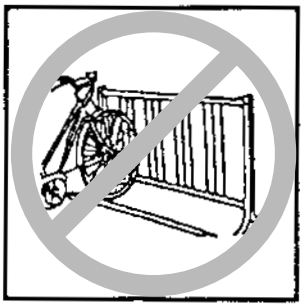
3-pt.Locking



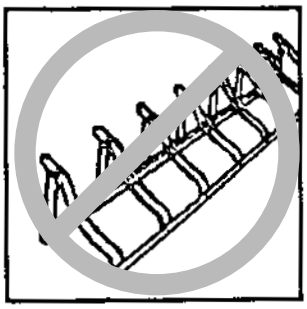
Freestanding



RibbonRack



Traditional



Wheelholder

SECTION V

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 length y 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-ride 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-ride and "kiss-and-ride" is being re-examined. Many of the auto trips to park-and-ride 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.

Therearefourmaincomponentsofbicycle-transitintegration:

- allowingbicyclesontransit;
- offeringbicycleparkingattransitlocations;
- improvingbikewaystotransit; and
- encouragingusageofbicycleandtransitprograms.

CurrentStateof BicyclesandTransit

IntheUnitedStates, Portlandhasbeenintheforefrontofthemovetointegrate bicyclingwithtransitridership. Bikes-on-Tri-Methashadsuccessbyimplementingthefollowing:

- bicycleaccessibilityonallbusesandlightrailcars
- bicyclelockersatmostpark-and-ridesandsometransitcenters; and
- anaggressivebicycles-on-transitmarketingstrategy

AbriefdescriptionofthebicycleandtransitprogramsimplementedbyTri-Met andtheBicycleProgramfollows. Fordetailsonthebikewaynetwork(Bicycling toTransit)seeSectionIII. Fordetailsontheend-of-tripfacilities(Bicycle ParkingatTransit)seeSectionIV. Fordetailsontheencouragementandeducationefforts, seeSectionVI.

BicyclingtoTransit

Localandnationalsurveysshowthatthebiggestbarriertomorefrequent cycling, ingeneral, isalackofbikeways. [1] Traditionally, transitstationshavenot beenviewedasmajordestinationsforbicyclists; thusfewsafeandconvenient bikewaysfromneighborhoodstotransitstationshavebeendeveloped. Such bikeways, alongwithsecurebicycleparkingattransitstationsandbicycles-on-transit, arethekeystoattractingbicyclecommuterstotransitfromsuburban andurbancommunities.

TheCityofPortlandplanstoimprovetheavailabilityofbikewaystotransit. SectionIIIoutlinestheproposednetworkofbikewaysthatwillservetransitstationsasmajordestinations. Inaddition, Metro, theregionalgovernmententity, is workingtoencouragemixed-usedevelopmentsaroundtransitandbetterbikewayplanningaroundtransitlocationsthroughouttheregion. Planningand implementingbicycle-to-transitroutesisclearlyanareaofopportunityfor Portlandinthefuture.

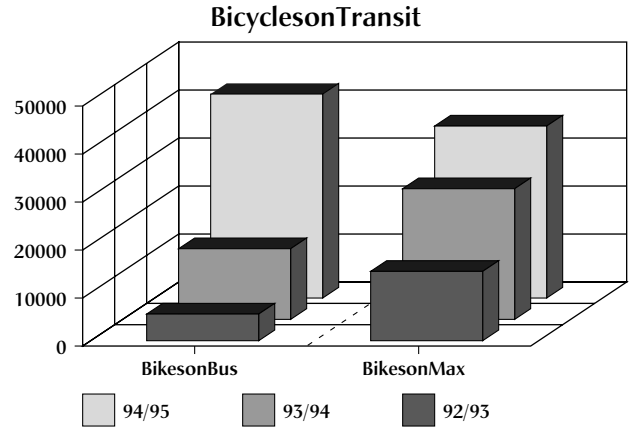
BicycleParkingatTransit

Thesecondcomponentofpromotingbicycle-transitintegrationissecurebicycle parkingattransitstations. AtPortlandmetro-areatransitstations(bothbusand lightrail), Tri-Methasaddedbicycleparkingtomeetthegrowingdemand. It hasprovidedbetweenfourandeightbicyclelockersatsevenMAXlightrailstations, onebustransitcenter, andthreebuspark-and-rides. Afewlightrailstationshavebicycleracks. Onaverage, closeto40percentofthelockersarerent-

CurrentStateof BicyclesandTransit

ed(Table5.1); usageishigherinsummermonthsthaninwinter. Usagewill likelyincreaseinthefutureasbikewaysareimprovedandpotentialusers becomemoreawareoflockeravailability. Indeed, accordingtoasurveyofBikes-on-Tri-Metpermitholders, seventypercentwouldparktheirbicyclesatapark-and-ridelotortransitcenterifsecureparkingwasavailable. Althoughautomo-bileparkingisfreeatallPortland-areapark-and-ridelots(alllotsare unattended), mostcyclistswerewillingtopayalocker-feetoguaranteethesafetyoftheirbicycles.

FIGURE 5.1



TheWestsideMAXpark-and-ridestationsundercon-structionin1995-7willimplementbicycleparkingat araticooffivepercentofautoparkingspaces. The amountoffuturelockerinstallationswilldependon localjurisdictionalzoningrequirements, mostof whichalsoplacebicycleparkingataboutfivepercent ofautoparking. Tri-Metisinvestigatinglimitedaccess bicycleparkingroomsasanalternativetolockersin structuredparkinggarages.

BicyclesonTransit

Tri-Methasbeenanationalleaderinpromotingbicy-clesonthetransitsystem. InJuly1992, attherequestof5000residentsorga-nizedbytheBicycleTransportationAlliance, Tri-Metinitiatedabicycles-on-transitprogramallowingcyclistst obringtheirbicyclesonboardMAXanduse front-mountedbusracks. Duringfiscalyear1994/95(July1, 1994toJune30, 1995), morethan35,400peopletooktheirbicyclesonMAX, anaverageof97 perridersday. Duringthesameperiod, 42,700bicyclesonbustripsweremade averagingmorethansixtripsperpermitholder(seeFigure5.1). Thisincreaseis due, inpart, totheincreasingnumbersofbuseswiththefront-mountedrack, as

TABLE 5.1

LOCATION	AVERAGE#OFLOCKERS RENTEDJULY-DEC94	TOTALLOCKERS AVAILABLE
MaxStations:		
ClevelandAvenue	2.6	4
GreshamCentral	1	4
GreshamCityHall	.5	4
181stAve.	1.3	4
122ndAve.	.16	4
Gateway	2.3	8
HollywoodTransitCenter	5	8
Others:		
BeavertonTransitCenter	4.5	8
TVHwy—WestBeavertonPark&Ride	3	4
BarburBlvdTransitCenter	0	4
TualatinPark&Ride	0	4
Total	**20.36**	**56**

CurrentStateof BicyclesandTransit

wellastoTri-Met' spromotionalefforts. AsofFebruary1995, allbuseswere outfittedwiththebicycleracks.

Theprogram' sregulationsareasfollows:

- Bicyclesareallowedonlightrailcarsatallhoursexceptweekdayrush hours. Sixbicyclesareallowedoneachtwo-cartrain; twoonaone-cartrain.
- Bicyclesareallowedatallhoursonthefront-mountedbusracks.
- Bicyclistsmustpurchasea$5permit, watchashortinstructionalvideo, and demonstratethattheycanusethebicycleracks. Toloadtheirbicycles, bicyclistsmustshowthepermittobusdriversandhaveitavailableonMAX. Over6,300permitshavebeensoldtodate. AccordingtoaTri-Metsurvey, mostpermitholdersfeelthattheamountofinstructiongivenwasadequate anduseful.

TABLE 5.2

BICYCLESONTRI-METPERMITS	1994/95	1993/94	1992/93
#ofPermitsSold	4,848*	2,758	1,349

*Includespermitrenewals

Therehavebeenveryfewreportedproblemswiththebus-bicyclesystem. Bus driversreportminimaldelaysandminortechnicalproblems, andbicyclistsare overwhelminglypositiveaboutthesystem.

Tri-Methasbeenworkingtoimprovethebicycles-on-transitsysteminresponse tocyclists'comments. Forexample, whileinitiallycyclistswererequiredto standwiththeirbicyclesonMAX, Tri-Metnowallowsthemtostraptheirbicycletothehand-restbarandsitifseatsareavailable. Tri-Metisalsoconsidering relaxingand/oreliminatingthepeak-hourrestrictionsonMAX, aswellaseliminatingthepermitsystem. Tri-Methasalreadyworkedtomakethepermit processmoreconvenientbyofferingthepermitsthroughbicycleshops.

EncouragementandEducationEffortsforBicyclesand Transit

Tri-Metispresentatmanyofthebicycle-relatedspecialeventsinPortland encouragingbicyclistostousetheexistingfacilitiesandeducatingnewriderson thebenefitsoflinkingbicycleandtransittrips. Tri-Metalsohasinstituteda "BicycleBuddy" program. Thisisacomputerizedmatchingservicethatmatches abicyclistwithsomeonewholivesandworksnearthemandwhowouldliketo biketowork. Tri-Metalsoadvertisestheavailabilityoftransit-bicycleservices throughnewspapersandbusads.

ObjectivesandActionItems

Objective6.12F

[redacted]

Increasingthenumberofbicycle-transittripswillimprovethebicyclemode shareaswellasTri-Met 'sridership. However, Tri-Metmustalsoconsideroperationalefficiencyandsafetyashighpriorities. Giventhenumberofbusesand lightraillinesanticipatedtobeinoperationoverthenext20yearsandconsideringthetimedelaysofincreasedbicycle-on-transitusage, Tri-Metanticipates beingabletohandleanincreaseinthenumbersofbicyclesontransit. However, theactualprojectednumbersareunavailableatthistime.

[redacted]

Nobenchmarks; Tri-Methasnotdevelopedalong-rangebicycle/transitplan.

[redacted]

- SupportandpromoteTri-Met' sBicycles-on-Tri-Metprogram.

Tri-Met'sBicycles-on-Tri-MetProgramhasbeenatremendoussuccess. TheCity shouldcontinuetoofferTri-Metitssupport, whilepromotingTri-Met 'sbicycle servicesateveryturn. TheCityshoulddistributeTri-Met' sbrochuresatallpublicgatheringsandactivelypromoteTri-Met 'sprograms.

- AssistTri-Metinprovidingandpromotinglong-termparkinginthetransit systemtoencouragebicycleuse.

TheCityshouldcontinuetoworkwithTri-Mettoprovideandpromotethe existingbicyclelockersattransitstationsandpark-and-ridelots. Tri-Metwill providebicycleparkingtomeetZoningCoderequirements(Table4.2, Section IV)andwillincreasebicycleparkingasdemandrises. TheCityshouldcontinue toadministerTri-Met 'sbicyclelockersandworkwithTri-Mettoprovide monthlyandday-uselong-termbicycleparkingatpark-and-ridelotsleasedby Tri-Metasdemandrises.

[redacted]

Thecostsofincreasingtheamountofbicycle-transittripsincludeproviding bicycleracksonallnewbuses, administeringandpromotingtheBicycles-on-Tri-Metprogram, andaddingbicycleparkingspaces. Asmostofthesecostswillbe bornebyTri-Met, nocostestimateswillbemadehere.

ContactTri-Metat239-3044formoreinformation.

Endnotes

[1] BicycleFacilityPreferenceSurvey, Portland, Spring, 1994. "ATrendontheMove: Commutingby Bicycle," BicyclingMagazine, 1991.

SECTION V

Educationand Encouragement

Introduction

Educationisanimportantelementinincreasingbicyclingwhilealsoimproving safety. Peopleoftenassumethatascyclingincreases, sowillthenumberofcrashes. Thisneednotbethecaseashasbeendemonstratedinothercities. Probably themosteffectivewaytoimprovethesafetyofcyclingissimplytoimprovethe qualityofPortland' sbikewayfacilities, ashasbeendescribedinpreviouschapters. Forexample, bicyclelanesresultinlesscompetitionforroadspacebetween bicyclesandmotorvehicles, whilebicycleboulevardsmeanlowermotorvehicle speedsandvolumes. However, bikewayscannotdoitalone; thereisalsoaneed forproper *education* ofbothyouthandadultcyclistsandmotorists.

Theword "education" hasmanydifferentfacetswhenitcomestobicycling. This sectionwilladdressthesethreeeducationcomponents:

- Developingsafecyclingskillsinchildren;
- Teachingadultcycliststheirrightsandresponsibilities; and
- Teachingmotoristshowtomoreeffectivelysharetheroadwithcyclists.

Educationgoeshand-in-handwith *encouragement* toincreasecycling; together theyimproveskillsandraiseawareness. Forexample, abicyclecommuteday encouragesmorepeopletoridefortransportationpurposes, butitalsoteaches urbanridingskillsandtheimportanceofwearingahelmet. Teachingchildren cyclingskillsandtheimportanceofwearingahelmetbuildsconfidenceasriders andencouragesthemtoridemorebothaschildrenandfutureadults. Encouragementincludessuchmeasuresas:

- Providingabikewaynetwork, end-of-tripfacilities, andbicycle-transitservicesashasbeendiscussedinSectionsIII, IV, andV.
- Holdingencouragementevents, suchasbicyclecommutedays, business challenges(Eugene), BikeFest(Portland), BicycleintheRainDay(Portland), BikeWeek(Boulder), andmassbicyclerides(Montreal, Seattle).
- Providingincentives, suchascashbonuses, discountsatshopsforcycling thereoradvocacygroupmembership, andothernonfinancialincentives.
- Providinginformationand/ormapswithrecommendedcyclingroutes, end-of-tripfacilities, bicycles-on-transitservices, educationprograms, andother bicyclerelatedactivities.

Introduction

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.

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).

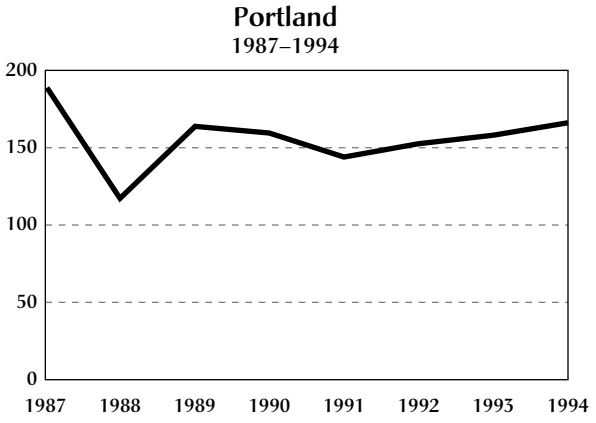
A crash between a cyclist and a motor vehicle driver will inevitably be fatal.

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.

Bicyclists are often hit from behind.

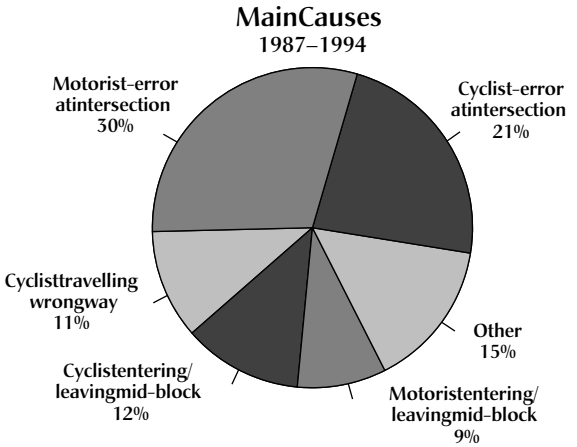
In fact, bicycles are hit from behind in only two percent of bicycle-motor vehicle crashes in Portland.

FIGURE 6.1



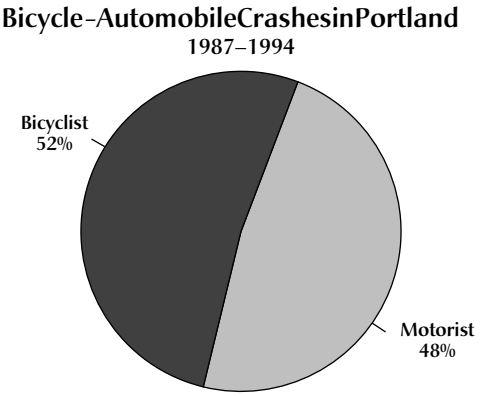
Source: Oregon Department of Transportation Bicycle-Motor Vehicle Crash Summaries, 1987–1994.

FIGURE 6.2



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

FIGURE 6.3



Source:OregonDepartmentofTransportationBicycle-MotorVehicleCrash Summaries,1987–1994.

Themaincausesofcrashes(Figure6.2)are:

- Motoristsorbicyclistsfailingtoyieldatanintersection(30percentand23percent, respectively). Crashesatintersectionsaretypicallycausedbyone orbothpartiesdisregardingasignorsignalorfailing toyieldright-of-way.
- Bicyclistst ravelingagainsttheflowoftraffic(11 percent). Wrong-wayridingisequallyaproblemin Portlandasintherestofthestateandinvolvesadult andyouthcyclistsinsimilarproportions.
- Bicyclistsormotoristsenteringorleavingmid-block (12percentand9percent, respectively).

Thoseinjuredinthistypeofcrashareprimarilyyoung bicyclists(67percentundertheage16)whoaremostoftenresponsiblefor crashesduetodisregardorignoranceofthelaw.

Motoristsarealwaysatfaultincrashes. OrBicyclists arealwaysatfaultincrashes.

Infact, onanaveragefrom1987to1993, bicyclistswereatfaultinabout52 percentofcrashes, motoristsat48percent(Figure6.3). Atintersections, where 53percentofallbicycle-motorvehiclecrashesinPortlandoccur, motoristsand bicyclistsalsosharesimilarlevelsofblame(56percentversus44percent, respectively).

Therewillbeincreasingnumbersofconflictsasmore bicycliststaketotheroad.

Infact, theyearlytrend(Figure6.1)showsthatthenumberofbicycle-motor vehiclecrashesappearstobelevelingoffeventhoughthenumberofcyclistshas morethantripledinthelast10years. Asbicyclistsbecomeanincreasinglyvisibleandacceptedpresenceontheroadandasroadwaydesignincorporatesmore bikewayfacilities, therewilllikelybegreaterawarenessamongmotoristsof bicyclists'rights. Also, witheducation, encouragement, andimplementationof morebikewayfacilities, cyclists 'behaviorcanbeexpectedtoimprove.

ConsistentMessages toTeach

Withbettereducation, cyclingcanbecomesafer. Bothmotoristsandcyclists needtodotheirparttomakecyclingsaferandmoreattractive.

Youthbicyclists

Schoolchildrenaremosteffectivelyreachedwhenanaction-orientedteaching approachandarepetitivepracticeprocessarecoupledwithawardsandincentives. Awardsandincentivescanconsistofcertificatesofcompletionorbicycle/pedestrianlicenses, freeorreduced-costbicyclehelmetsandotheraccessories, ordiscountcouponsforareabicycleshops.

ConsistentMessages toTeach

Toreachthemostchildren, itisimportanttoworkcloselywithschoolsto insurethatschool-agechildrenarereceivinganage-appropriatebicyclesafety messageandarelearningskillsthatwillhelpthemfunctionsafelyonthepublic right-of-way. Thefollowingmessagesshouldbeconsistentlytaught:

- Intheeventofabicyclecrash, wearingahelmetreduces theriskofseriousheadinjurybyupto85%whenwearingahelmet. Itcould saveyourlife.
- Bicyclistshavethesamerights, andconsequentlythe sameresponsibilitiesasmotorists.
- Alwayssignalyourintentions.
- Wearlight-coloredclothingandbrightorreflectiveclothingand alwaysuseafrontlightandrearreflectorsatnight.
- Inaddition, veryyoungchildren(sevenorless)shouldridewithsupervision.

Adultbicyclists

Adultbicyclistsfallintoseveraldifferentcategoriesofriders. Someadultsare comfortableridingonbusystreetsandmixingwithtrafficwhileotherspref er quieterstreetsoroff-streetpaths. Thereareadultswhorideabicycleonlyafew timesayearandthosewhorideoftenbutprimarilyforrecreation. Finally, some ridefortheirprofession, suchasbicyclepoliceormessengers. Eachtypeof cyclisthastheirownconcernsandphilosophyabouthowbicyclesfitintothe transportationsystem. Educationandencouragementeffortsmustrecognizethis andtailormessagestoeachgroup.

Itisalsoimportanttoreachaswidearangeofbicyclistsaspossible. Sinceadults donotoftengrouptogetherasacaptiveaudienceasschoolchildrendo, itis importanttoofferawiderangeofopportunitiestoimprovetheirknowledgeand skillsrelatedtobicycling. Thefollowingmessagesshouldbeconsistentlytaught:

- Watchforotherusersandsuddenbehaviorchanges. Also, paycare- fulattentiontopotentialroadhazards, suchaspotholesandgravel. Adjust speedtomaintaincontrolofthebicycle.
- Thoughitistemptingtorunthroughtrafficsignals andstopsigns, donotdoit. Bicyclistshavethesamerights, andconsequently thesameresponsibilitiesasmotorists. Disobeyingtrafficlawsgivescyclistsa badreputationandispotentiallydangerous.
- Ridewheremotoristsandothers expectcyclists, andneveragainsttraffic.
- Signalyourturns, donotweaveinandoutoftraffic, and stayasfartotherightasispracticable, exceptwhen:

Consistent Messages to Teach

- travelingthesamespeedastraffic(asindowntown)
- avoidinghazardousconditions
- preparingtomakealeftturn, passinganothervehicleorusingaone-waystreet(inwhichcaseridingalongsidetheleftcurbispermitted)
- theroadwayistoonarrowforabicycleandamotorvehicletotravel safelysidebyside
- ridingalongsideanothercyclistinamannerthatdoesnotimpedethe normalmovementoftraffic

- **B** Wearlight-colored, brightorreflectiveclothingandusefront lightsandrearreflectorsorlightsatnight.
- **W**
- **P** InOregon, bicyclesarelegallyclassifiedasvehiclesandshouldbehaveassuch. Unlessspecificallysignedfor shareduse, asonbridgesidewalksoroff-streetpaths, sidewalksareintended forusebypedestrians, notcyclists. Whenusingsidewalks, bicyclistsare requiredtowarnpedestriansaudiblywhenpassing(verballyorbyuseofa bell), yieldtheright-of-wayinconflictsituations, andtravelatawalking speedatdrivewaysandintersectionswhenamotorvehicleisapproaching. Remember, motoristsarenotexpectingcyclistscomingatthematdriveways orapproaches.
- **D** Youareoperatingavehicle. Takeitseriously.

Forfurtherinformationaboutcyclists 'rightsandresponsibilitiesasroadusers, seeAppendixB, SummaryofBicycle-relatedLaws.

Motorists

Thegoalineducatingmotoristsistofosterabroadandgeneralpublicawareness andrespectforbicycling. Manymotoristsarealreadyoccasionalorregular cyclistsThemselvesinsomecapacity, andcanbeencouragedtoridemoreoften. Allmotoristsshouldbetaughtgooddrivingbehaviorandinformationabout cyclistbehaviortohelpimprovesafety.

- **B** Watchforotherusersandsuddenbehaviorchanges. Payattention especiallyatintersections.
- **D** Whatwouldamounttoaminorfenderbender betweentwomotorvehiclescouldbeaseriousinjuryforacyclistinabicycle-motorvehiclecrash. Also, drivingthespeedlimitandcomingtoafull stopatredlightscreatesasaferenvironmentforall.
- **S** Signalyourturnswellbeforeanintersection. Thelaw requiresuseofturnsignalsinadvanceofintersections, andcyclistsdepend onturnsignalstojudgewheretobe.
- **S** Cyclistshavearighttotraveloneveryroadexceptlimited accessfreeways. Passingbicyclistsjustbeforeastoplightorsigncreatesan atmosphereofunnecessaryhostility.

Consistent Messages to Teach

- Cyclists can hear and see motor vehicles; honking simply jars their nerves.
- 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.

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.

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.

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 Bike Fest.

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 Strebig 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

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.

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.

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 6.12G

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

[redacted]

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

[redacted]

- 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 though 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

[redacted]

[redacted]

- 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.

[redacted]

- Work with utility companies to provide an insert in to 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)

ObjectivesandActionItems

- Developa "SharetheRoad" campaignwheremotoristsandbicyclistspubliclypledgetosharetheroad. (Responsibleparties: BicycleTransportation Alliance, BicycleProgram, OregonDepartmentofTransportation)

[redacted]

Thefollowingactionitemsrelatetotheeducationofengineers, police, business owners, planners, architects, andotherrelatedprofessionalstowardmaking Portlandmorebicyclefriendly.

- Developandholdbicycleplanninganddesigntrainingforalltransportation engineersandplannersatstate, regional, andlocallevels. (Responsibleparties: BureauofTrafficManagement, OregonDepartmentofTransportation)
- Incorporateastrongbicyclemessageintransportationtrainingofalltypes. (Responsibleparties: PortlandOfficeofTransportation, OregonDepartment ofTransportation)
- ImplementBicycleFriendlyBusinessesProgram(Responsibleparties: AssociationforPortlandProgress, otherbusinessassociations, Portland ChamberofCommerce, BicycleProgram, BicycleTransportationAlliance)
- Enforcetrafficrulesforbicyclistsandmotorists. (Responsibleparty: Bureau ofPolice)
- Workwithtowingcompaniesandemergencycleanupcrewssotheybetter understandtheneedsofbicycles. (Responsibleparties: BicycleProgram, OregonDepartmentofTransportation, communitygroups)
- Workwithcontractorsandsubcontractorsandcitymaintenanceandutility crewstohelpthembetterunderstandtheneedsofbicyclists. (Responsible parties: BicycleProgram, BureauofMaintenance, BureauofEnvironmental Services, BureauofTransportationEngineeringandDevelopment, Oregon DepartmentofTransportation)

[redacted]

- Implementhigherfeesforautomobileuseand/orfinancialincentivesfor bicycleuse. (Responsibleparties: Federalgovernment, StateLegislature, Metro, CityofPortland)
- Develop, promoteandpublicizebicyclecommuterservices, suchasBike Centralandregularescortedcommuterides. (Responsibleparties: Bicycle Program, privatebusinesses, communitygroups)
- Createanannualcommuterchallengeforareabusinesses. (Responsibleparties: communitygroups, BicycleProgram)
- Createeventssuchas "bicycletothegrocerystore" days, whencyclistsget vouchersfor, orcouponsoffitemsinthestore, or "bicycletothemovies" days, whencyclistsreceivefreepopcornoradiscountonamovieorrefreshments. (Responsibleparties: communitygroups)

ObjectivesandActionItems

- Createpublicserviceannouncementsonradioandtvtopromotethehealth andlivabilitybenefitsofbicycling, aswellasthedetrimentaleffectsofexcessivemotorvehicleuse(e.g. pollution, trafficnoise, congestion, lossoflifeand mobility). (Responsibleparties: communitygroups, BicycleProgram)
- WorkwithParksBureautodelivera "benefitsofbicyclingmessage" toyouth whoareworkingonwaterandairandgeneralpollutionactivities. (Responsibleparties: ParksBureau, MetroGreenspaces, BicycleProgram)
- ContinuetoholdannualBikeFestasaneventtoencourageresidentsto replaceonecartripaweekwithabicycletrip. (Responsibleparties: communitygroups, privatesponsors, PortlandOfficeofTransportation, Bicycle Program)
- Promoteandpublicizenewandexistingeducationandencouragement effortsbycommunitygroupsandbusinesses. (Responsibleparties: Bicycle Program, communitygroups, businesses)
- Supportplanningandimplementationofanannualmassbicyclingridein Portlandtoattractnewriders, showcasePortland, anddemonstratethebenefitsofbicycling. (Responsibleparties: communitygroups, privatesponsors, BicycleProgram, PortlandOfficeofTransportation)
- Developandimplementapubliceducationcampaigntoencouragebicycling, suchasadsonmoviescreens, citybench, bicyclelockerandbillboard advertizing, videosoncableaccesstelevision, and "burmashave" typesigns alongbikeroutes. (Responsibleparties: BicycleProgram, BureauofTraffic Management, BicycleTransportationAlliance, privatesponsors, community groups)
- Developmeasurestoreducebicycletheftsuchasaregistrationprogram, subsidizedlocks, andtrainingforproperlockingtechniques.

Sincemanyeducationandencouragementprogramsandactivitieswilllikelybe cooperativeeffortsbetweentheCityofPortlandBicycleProgram, otherCityof Portlanddepartments, privatesponsors, andcommunitygroups, actualcostsare difficulttoquantify. Ideally, theCityofPortlandBicycleProgramwouldbean informationresourceforalleducationalandencouragementeffortsbutwould notnecessarilybethesoleorprimaryorganizer.

Objective6.12H

Promotebicyclingastransportationtoandfromschool.

Whileridingabicycletoschoolwasapartofgrowingupformanyoftoday's adults, todayitisararity. Yet, oneofthemostfrequentcomplaintsreceivedby theOfficeofTransportationistrafficproblemsaroundschools, muchofwhich comesfromparentsdroppingtheirchildrenoff. Throughconversationswith someprincipalsandschooladministrators, thebenefitsofbicyclingareclearly overruledbyconcernsaboutchildsafetyandbicycletheft. Iftheseconcerns

ObjectivesandActionItems

wereaddressed, bicyclingtoschoolcouldreturnasanormalcourseoflife. At thesametime, attheNortheastCommunitySchool, 20percentofchildrenride toschoolduringgoodweather, witheightpercentevenduringheavyrains. The differentisparentalandschoolsupport, havinginvestedinsafetyeducation training, parentalsupervision, promotionofbicycling, andcoveredbicyclepark-ing. Thiskindofefforthelpstoday 'schildrenseebicyclingasapartofdailylife, leadingtheirgenerationtowardwisetransportationdecisions.

[redacted]

Becauseitisnotknownhowmanychildrenarebicyclingtoschooltoday, itis difficulttodevelopstandardsbywhichtojudgeprogress. Thus, thisplanwill usethesamemodesharebenchmarksasareusedforalltrips.

BY 5 YEARS	BY 10 YEARS	BY 20 YEARS
3%ofchildrenbicycling toschool	6%ofchildrenbicycling toschool	10%ofchildrenbicycling toschool

[redacted]

Sinceencouragingbicyclingtoschoolgoeshand-in-handwithyoutheducation, manyactionitemsforthiscategoryhavealreadybeenlisted. Additionalideas aredescribedbelow.

- Developplanstoincreasecyclingtoschools. (Responsibleparty: Bicycle Program, communitygroups, schools)
- Undertakesurveystodeterminebicycletoschoolmodeshare. (Responsible parties: BicycleProgramwithareaschools)
- Implementbikewaysthatleadtoschools. (Responsibleparty: Portland OfficeofTransportation)
- Installhigh-qualitybicycleracksatallschools, worktoensureallchildren haveaccesstohigh-qualitylocks, andtrainchildrenonproperlockingproce-dures. (Responsibleparties: BicycleProgram, schools, communitygroups)
- Designandimplementride-to-schoolencouragementprogramssuchas "BicycletoSchool" days, after-schoolridingclubs, andanannualYouthBike Ride. (Responsibleparties: BicycleProgram, BicycleTransportationAlliance, privatesponsors, theCommunityCyclingCenter)
- Createanannualfamily/funrideinPortlandthatfollowscommonbicycle routesandpassespopulardestinationstoshowhoweasyandfunitistoget aroundbybicycle. (Responsibleparties: communitygroups, privatesponsors, BicycleProgram)
- Createahighprofilecontestforschoolchildrenonthethemeofreplacing onecartripaweekwithabicycletrip. (Responsibleparties: community groups, privatesponsors, BicycleProgram).

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APPENDIX A

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 riddenon 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 shortcuts 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.TypesofBicycle Facilities

(continued)

B2. BicycleLane

Abicyclelaneisaportionoftheroadwaydesignatedforexclusiveorpreferentialusebybicyclistsinurbanareas. Bicyclelanesareappropriateonmosturban arterialsandcollectorstreets. Bicyclelanesmustalwaysbewellmarkedtocall attentiontotheirpreferentialusebybicyclists.

Ashoulderbikewayisastreetuponwhichthepavedshoulder, separatedbya four-inchstripeandnobicyclelanemarkings, isusablebybicycles. Althoughthe shouldercanbeusedbybicycles, autoparkingcanbeallowed.

B3. BicycleBoulevard

Abicycleboulevardisastreetwithlowtrafficvolumeswherethethrough movementofbicyclesisgivenpriorityovermotorvehicletravel. Abicycle boulevardiscreatedbymodifyingtheoperationofalocalstreettofunctionasa throughstreetforbicycleswhilemaintaininglocalaccessforautomobiles. Trafficcalmingdevicesareusedtocontroltrafficspeedsanddiscouragethrough tripsbyautomobiles. Trafficcontrolisdesignedtolimitconflictsbetweenautomobilesandbicyclesandgivepriorityto throughbicyclemovement. Bicycle lanesaretypicallynotneededonabicycleboulevard.

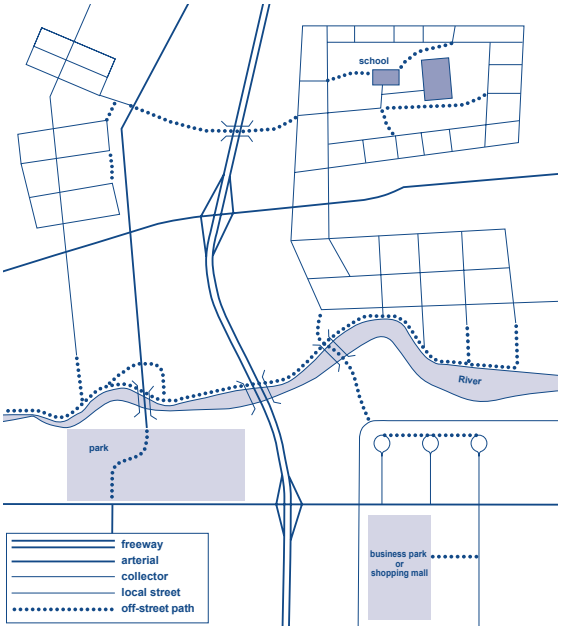
TABLE3.2 **Guidelines for Selecting Bikeway Facilities**

AVERAGENUMBEROF VEHICLESPERDAY	*TRANSPORTATION ELEMENT* TRAFFICCLASSIFICATION	RECOMMENDED BIKEWAYFACILITY
≤3000	LocalServiceStreet	Streetasis, unlessspecifiedonBikewayNetworkas bicycleboulevardorsignedconnection.
>3000	LocalServiceStreet	Bicyclelanes. Wherenotpossibleduetowidth constraintsandparkingneeds, trafficcalming improvementsacceptable.*
≥3000<10,000	NeighborhoodCollector	Bicyclelanes. Wherenotpossibleduetowidth constraintsandparkingneeds, trafficcalming improvementsorwideoutsidelaneacceptable.*
≥10,000<20,000	NeighborhoodCollectorand higherclassifications Major&MinorTransitRoutes Major&MinorTruckRoutes	Bicyclelanes. Wherenotpossibleduetowidth constraintsandparkingneeds, wideoutside laneacceptable.*
≥20,000	NeighborhoodCollectorand higherclassifications Major&MinorTransitRoutes Major&MinorTruckRoutes	Bicyclelanes. Wherenotpossibleduetowidth constraintsandparkingneeds, aparallelalternative facilityshouldbedeveloped.

* Trafficcalmingimprovementsorwideoutsidelaneacceptablewhereanyofthefollowingconditionsexist:
- Itisnotpossibletoeliminatelanesorreducelanewidths;
- Topographicalconstraintsexist;
- Additionalpavementwoulddisruptthenaturalenvironmentorcharacterofthenaturalenvironment;
- Parkingisessentialtoserveadjacentlandusesortoimprovethecharacterofthepedestrianenvironment.

Constructionofaparallelbikewaywithinone-quartermileisalsoanacceptablealternativewheretheseconstraintsexist, aslongastheparallelbikewayprovidesanequallyconvenientroutetolocaldestinations.

FIGUREA1.1 **Appropriate Use of Off-Street Path**



B4. SharedRoadway

Onasharedroadway, bicyclistsandmotoristssharethesame travellanes. Amotorvehicledriverwillusuallyhavetocross overintotheadjacenttravellanetopassabicyclist, unlessa wideoutsidelaneisprovided(seebelow). Sharedroadways areadequateforneighborhoodstreetswithverylowtraffic volumes.

Therearetwovariationsofthesharedroadwayconcept. Thosewithwideoutsidelanes, andthosewithnormallane widths.

B4a. Wide outside lane

Onstreetswithhighervolumesandspeedswherebicycle lanesarewarrantedbutcannotbeprovidedduetosevere physicalconstraints, awideoutsidelanemaybeprovidedto accommodatebicycletravel. Awideoutsidelaneshouldbe wideenoughtoallowanaveragesizemotorvehicletopassa bicyclistwithoutcrossingoverintotheadjacentlane.

Onneighborhoodstreets(localservicestreets)withlowtrafficvolumesand speeds, wideoutsidelanesarenotnecessaryforsafeconductofbicycletraffic. (SeeTableA1.1, GuidelinesforSelectingBicycleFacilities.)

C.DesignGuidelines forBicycleFacilities

C1. Off-StreetPath

C1a. General Design Practices

Off-streetpathscanprovideagoodfacility, particularlyfornoviceriders, recreationaltrips, andcyclistsofallskilllevelspreferringseparationfromtraffic (FigureA1.1). However, ifpoorlydesigned, theycanbe, atbest, apoorinvestmentofpublicdollars, andatworst, dangerous. Someoftheadvantageouspracticesinoff-streetpathdesigninclude:

- Implementingfrequentaccesspointsfromthelocalroadnetwork; ifaccess pointsarespacedtoofarapart, userswillhavetotraveloutofdirectionto enterorexitthepath, whichwilldiscourageuse;
- Placingdirectionalsignstodirectuserstoandfromthepath;
- Buildingtoastandardhighenoughtoallowheavymaintenanceequipment tousethepathwithoutcausingittodeteriorate;
- Limitingthenumberofat-gradecrossingswithstreetsordriveways;
- Terminatingthepathwhereitiseasilyaccessibletoandfromthestreetsystem, preferablyatacontrolledintersectionoratthebeginningofadead-end street—poorlydesignedpathscanputpedestriansandcyclistsinaposition wheremotorvehicledriversdonotexpectthemwhenthepathjoinsthe streetsystem.
- Addressingpotentialsecurityproblemsupfront.

C.DesignGuidelines forBicycleFacilities

(continued)

Off-streetpathsshouldnotbeplaceddirectlyadjacenttoroadways. Thiscreates asituationwhereaportionofthebicycletrafficridesagainstthenormalflowof motorvehicletraffic, whichiscontrarytotherulesoftheroad. Thiscanresult inbicyclistsgoingagainsttrafficwheneitherenteringorexitingthepath. This canalsoresultinanunsafesituationwheremotoristsenteringorcrossingthe roadwaydonotnoticebicyclistscomingfromtheirright, astheyarenotexpecting vehiclescomingfromthatdirection. Evenbicyclistscomingfromtheleft oftengounnoticed, especiallywhensightdistancesarepoor.

Off-streetpathsmaybeconsideredalongroadwaysunderthefollowingconditions:

- Thepathwillgenerallybeseparatedfromallmotorvehicletraffic.
- Bicycleandpedestrianuseisanticipatedtobehigh.
- Thereisacommitmenttoprovidepathcontinuitythroughoutthecorridor.
- Thepathcanbeterminatedateachendontostreetswithgoodbicycleand pedestrianfacilities, orontoanothersafe, well-designedpath.
- Thereisadequateaccesstolocalcross-streetsandotherfacilitiesalongthe route.
- Anyneededgradeseparationstructuresdonotaddsubstantialout-of-direction travel.
- Thetotalcostofprovidingtheproposedpathisproportionatetotheneed.

Asbicyclistsgainexperienceandrealizesomeoftheadvantagesofridingonthe roadway, manystopridingonpathsplacedadjacenttoroadways. Thiscanbe confusingtomotorists, whomayexpectbicyclistotousethepath.

Whendesigningabikewaynetwork, thepresenceofanearbypathshouldnot beusedasareasontonotprovideadequateshoulderorbicyclelanewidthon theroadway.

C1b. Off-street path design standards

Formoredetailedinformationconsultthe *AASHTOGuidetoBicycleFacilities* and *TrailsfortheTwenty-FirstCentury: Planning, Design, andManagement ManualforMulti-UseTrails* , bytheRails-to-TrailsConservancy. Bothareavailablefromthe BicycleProgramat823-7082.

FIGUREA1.2 **Off-Street Path Structure Width**

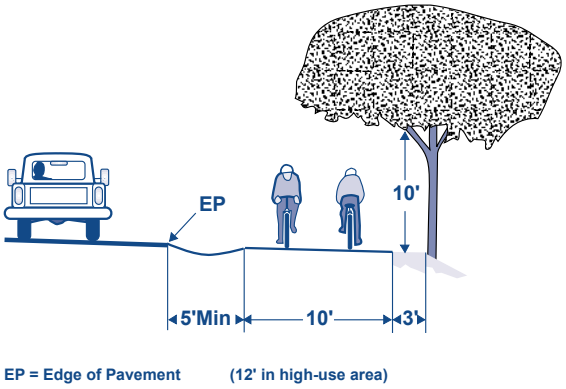
C1B(1) WIDTH AND CLEARANCES

Width

Tenfeet(3m)isthestandardwidthforatwo-way off-streetpath(FigureA1.2). Thepathshouldbe 12feet(3.6m)wideinareaswithhighusebybicyclists, pedestrians, andjoggers. Theminimumwidth is8feet(2.4m), butisnotrecommendedinmost situationsbecausetheyoftenbecomeovercrowded.

Althoughone-waypathsmaybeintendedforonedirectionofbicycletravel, theywilloftenbeusedastwo-wayfacilities. Becauseofthis, cautionmustbe

FIGUREA1.3 **Off-Street Path Standards**



usedinselectingthistypeoffacility. Ifnecessary, theyshould be6feet(1.8m)wide(min. 5feet[1.5m])anddesigned andsignedtoassureone-wayoperationbybicyclists. They willmostlikelybeusedastwo-wayfacilitiesbypedestrians.

LateralClearance

A2foot(0.6m)orgreatergraded "shy" orcleardistanceon bothsidesofanoff-streetpathisnecessaryforsafeopera-tion.

OverheadClearance

Clearancetooverheadobstructionsshouldbe10feet(3m), minimum8feet(2.4m). (SeesectionC1b(5), Structures.)

Separationfromroadway

Whereapathmustbeparallelandadjacenttoaroadway, thereshouldbea5 foot(1.5m)minimumwidthseparatingthepathfromtheedgeofroadway (FigureA1.3), oraphysicalbarrierofsufficientheightshouldbeinstalled. (See Railings, FencesandBarriers, sectionC1b(6).

C1B(2) TYPICAL PAVEMENT STRUCTURAL SECTIONS

Surfacing

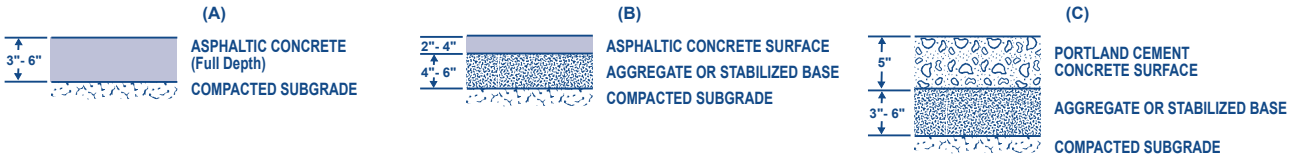
Theuseofconcretesurfacingforpathshasproventobethemostsuitablefor long-termuse. Usingmodernconstructionpractices, concreteprovidesasmooth ridewithlowmaintenancecosts. Concretepathscanbeplacedwithaslip-form paver. Thesurfacemustbecross-broomed. Thecrack-controljointsshouldbe saw-cut, nottroweled. Concretepathscostmoretobuildthanasphaltpaths, yet donotbecomebrittle, crackedandroughwithage, ordeformedbyrootsand weedsaswithasphalt.

Off-streetpathsshouldbedesignedwithsufficientsurfacingstructuraldepth forthesubgradesoiltypetosupportmaintenanceandemergencyvehicles (FigureA1.4). Ifthepathmustbeconstructedoveraverypoorsubgrade(wet and/orpoormaterial), treatmentofthesubgradewithlime, cementorgeotex-tilefabricshouldbeconsidered.

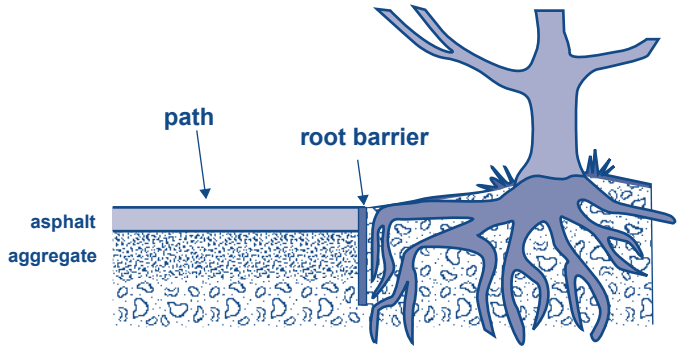
Drainage

Off-streetpathsmustbeconstructedwithadequatedrainagetopreventwash-outs, floodingandsiltfromintrudingontothepath. Allvegetation, including roots, mustberemovedinthepreparationofthesubgrade. Specialcareisneed-edtocontrolnewgrowth, suchastheuseofsoilsterilizationorlimetreatment ofthesubgrade.

FIGUREA1.4 **Off-Street Pavement Structure**



FIGUREA1.5 **Off-Street Path Adjacent to Trees**



Vegetation

Off-streetpathsbuiltalongstreamsandinwoodedareaspresentspecialproblems. Vegetationcan begintoencroachonapathinasinglegrowing season, andtherootsofshrubsandtreescan piercethroughthepathsurfacingandcauseitto bubbleupandbreakapartinashortperiodof time. Preventivemethodsinclude: regularremoval ofvegetation, realignmentofthepathawayfrom trees, andplacementofrootbarriers(a12inch [300mm]deepmetalshield)alongtheedgeof thepath(FigureA1.5).

C1B(3) GRADES

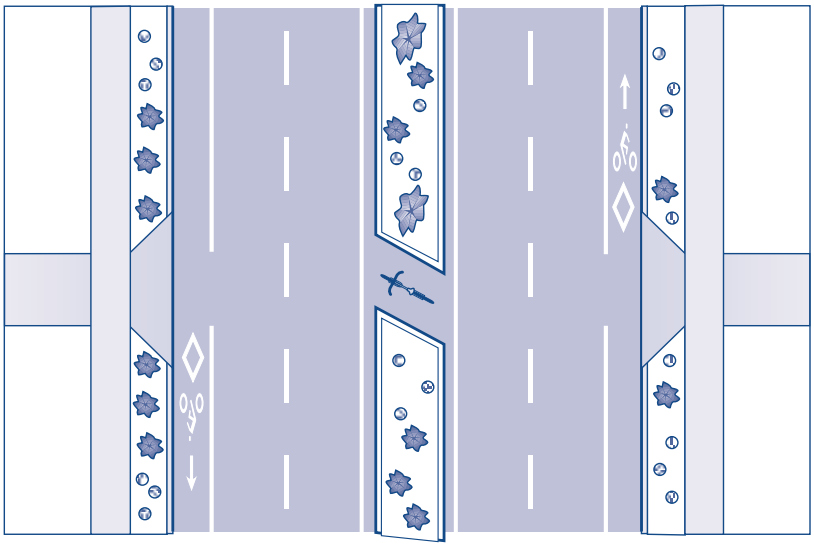
BasedonAASHTOrecommendationsandAmericanswithDisabilitiesAct (ADA)requirements, 5percentshouldbeconsideredthemaximumgrade allowableforoff-streetpaths. Agradeof10percentisallowedunderAASHTO guidelinesfordistancesofupto500ft., providedthereisgoodhorizontalalignmentandsightdistance, butanexceptiontotheADAstandardswillbeneeded.

C1B(4) CROSSINGS

GradeSeparatedCrossings

Whenthedecisiontoconstructaoff-streetpathhasbeenmade, gradeseparationshouldbeconsideredforallcrossingsofthoroughfares, particularlyforfreewayrampcrossings, asmostpathusersexpectcontinuedseparationfromtraffic. At-gradecrossingsintroduceconflictpoints. Thegreatestconflictsoccurswhere pathscrossfreewayentranceandexitramps. Motorvehicledriversusingthese rampsareseekingopportunitiestomergewithothermotorvehicles; theyare notexpectingbicyclistsandpedestrianstoappearattheselocations. However, grade-separatedcrossingsshouldminimizetheburdenfortheuser, andnot, for example, requireasteepuphilland/or windingclimb.

FIGUREA1.6 **At-Grade Crossing of a Thoroughfare with a Median Island**



At-gradeCrossings

Whenagrade-separatedcrossingcannotbeprovided, theoptimumatgradecrossinghaseitherlighttraffic oratrafficsignalthattrailuserscan activate(FigureA1.6). Ifasignalis provided, signalloopdetectorsmaybe placedinthepavementtodetectbicyclesiftheycanprovideadvancedetection, andapedestrian-actuatedbutton provided(placedsuchthatcyclists canpressitwithoutdismounting.)

C.DesignGuidelines forBicycleFacilities

(continued)

Astopsignshouldbeplacedabout5ft. beforetheintersection. Directionflow shouldbetreatedeitherwithphysicalseparationoracenterlineapproaching theintersectionforthelast100feet.

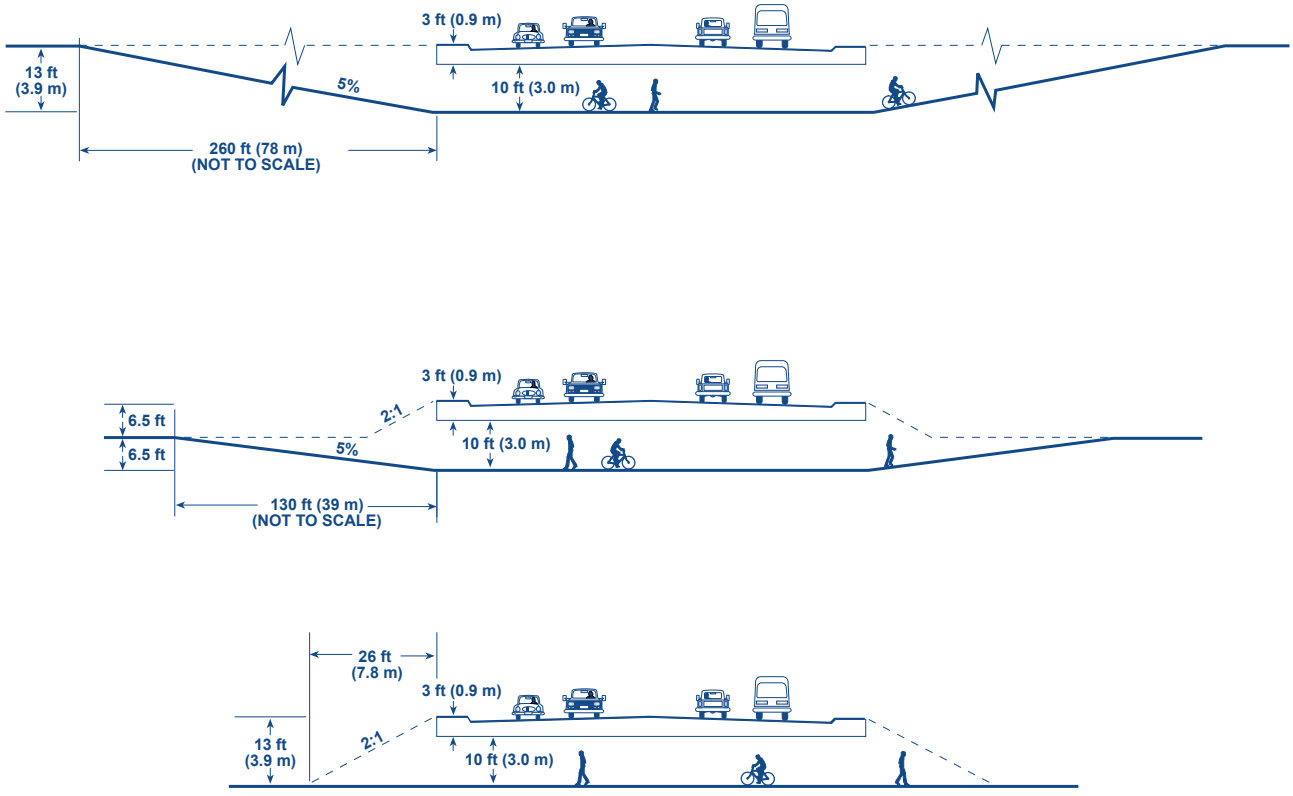
Ifthestreetisabovefourormorelanesortwo/threelaneswithoutadequate gaps, amedianrefugeshouldbeprovidedinthemiddleofthestreetcrossed. Therefugeshouldbe8feetataminimum, 10feetisdesired. Anotherpotential designoptionforstreetcrossingsistoslowmotorvehicletrafficapproaching thecrossingthroughsuchtechniquesasspeedbumpsinadvanceofthecross- ing, orapaintedortexturedcrosswalk .

C1B(5) STRUCTURES

Theminimumtotalwidthofoff-streetpathstructuresshouldbethesameas theapproachpavedpath, includingaminimum2foot(0.6m)shydistanceon bothsides. Forexample, a10foot(3m)widepathrequiresa14foot(4.2m) widestructure(FigureA1.2). Thisappliesforbothovercrossingsandunder- crossings.

Theoverheadclearanceofanunder-crossingshouldbeatleast10feet(3m). An8foot(2.4m)minimummaybeallowablewithgoodhorizontalandverti- calclearance, sousersapproachingthestructurecanseethroughtotheother end. Undercrossingsshouldbeasvisuallyopenaspossibleforthesafetyand personalsecurityofbicyclistsandpedestrians(FigureA1.7). Illuminationmust beprovidedinareasofpoordaytimeandnighttimevisibility.

FIGUREA1.7 **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 (3m) 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.

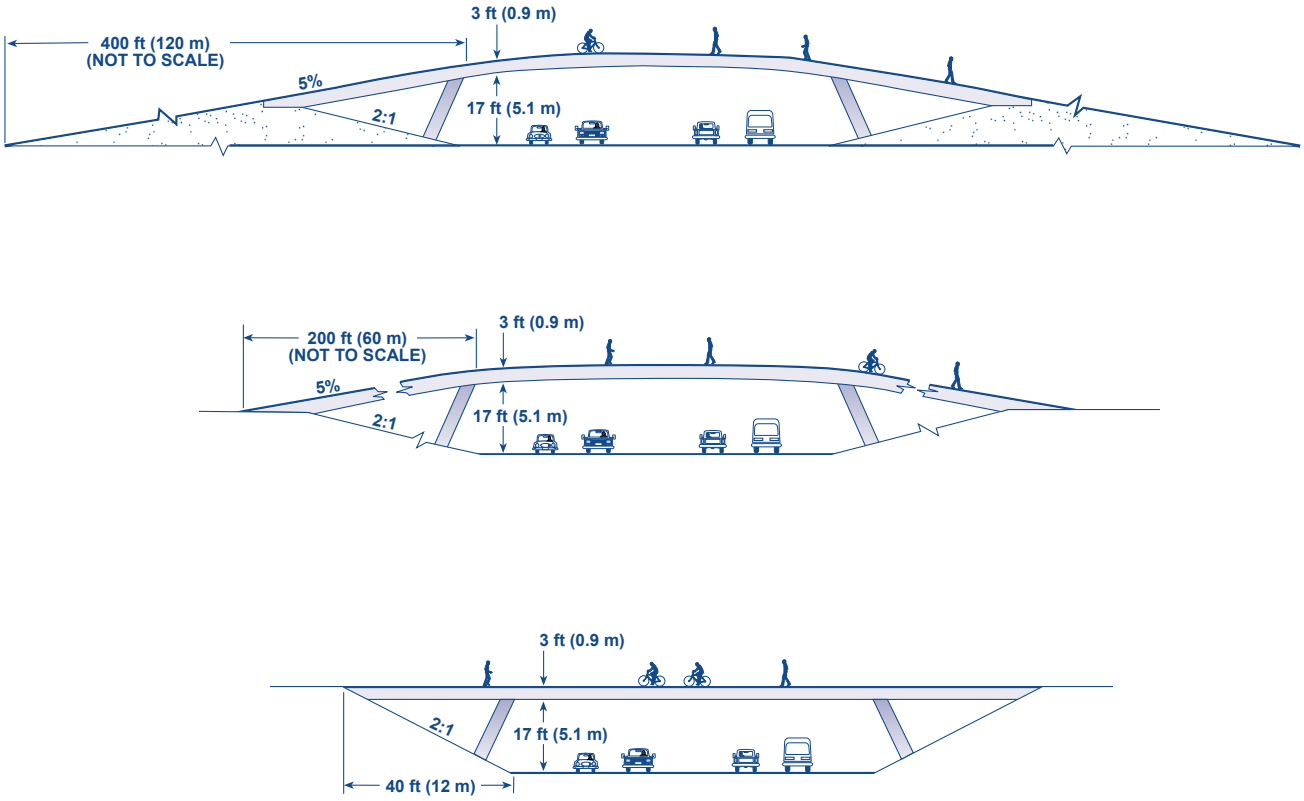
Disadvantages: They often present security problems, due to reduced visibility. An open, well-lighted structure may end up costing as much as an over-crossing. They may require drainage if the sag point is lower than the surrounding terrain.

Over-crossings

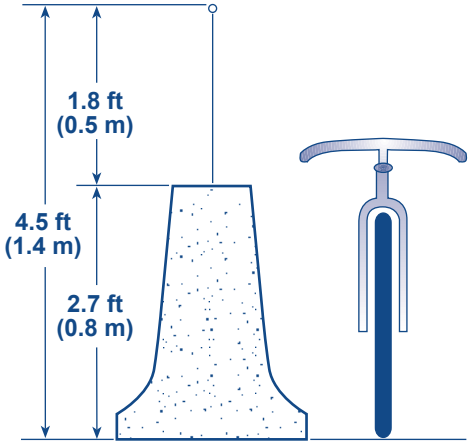
Advantages: They are more open and present fewer security problems.

Disadvantages: They require longer approaches to achieve the standard 17 feet (5.1m) of clearance over most roadways. With an additional structural depth of 3 feet (0.9m), the total rise will be 20 feet (6m). At 5 percent, this will require a 400 foot (120m) approach ramp at each end, for a total of 800 feet (240m). 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).

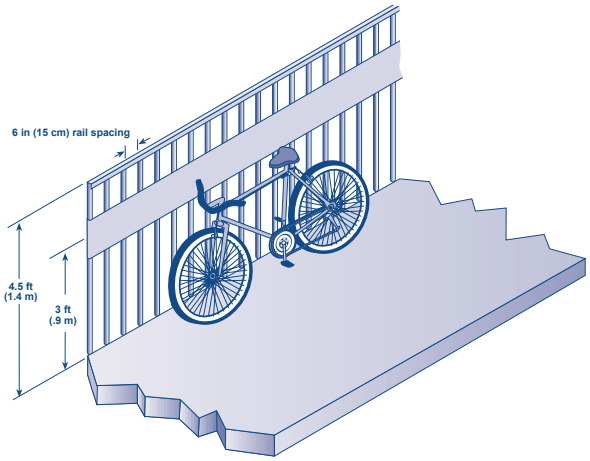
FIGURE A1.8 **Overcrossing Configurations**



FIGUREA1.9 **Adding a Railing to a Concrete Barrier**



FIGUREA1.10 **Off-Street Path with Rub Rail**



FIGUREA1.11 **"Cattle Chute" Effect**

C1B(6) RAILINGS, FENCES AND BARRIERS

Fenceorrailingtreatmentalongpathsisoftenneeded forsafetyreasons, suchaseliminatingaccesstohigh-speedfreewaysorprovidingprotectionalongsteepside slopesanddeepwaterways. Aheightof4.5feet(1.3 m)keepsacyclistfromfallingovertherailingorfence (FigureA1.9). Openingsintherailingmustnotexceed 6inches(150mm)inwidth. Whereacyclist 'shandle-barmaycomeintocontactwithafenceorbarrier, a smooth, widerub-railshouldbeinstalledataheightof 3feet(0.9m)(FigureA1.10).

Whereconcreteshoulderbarriersareused, sometype oftreatmentontopofthebarriermaybenecessaryto achievetherequiredheight. Thiscanbeachievedby addingtuberailingorchainlinkfencing.

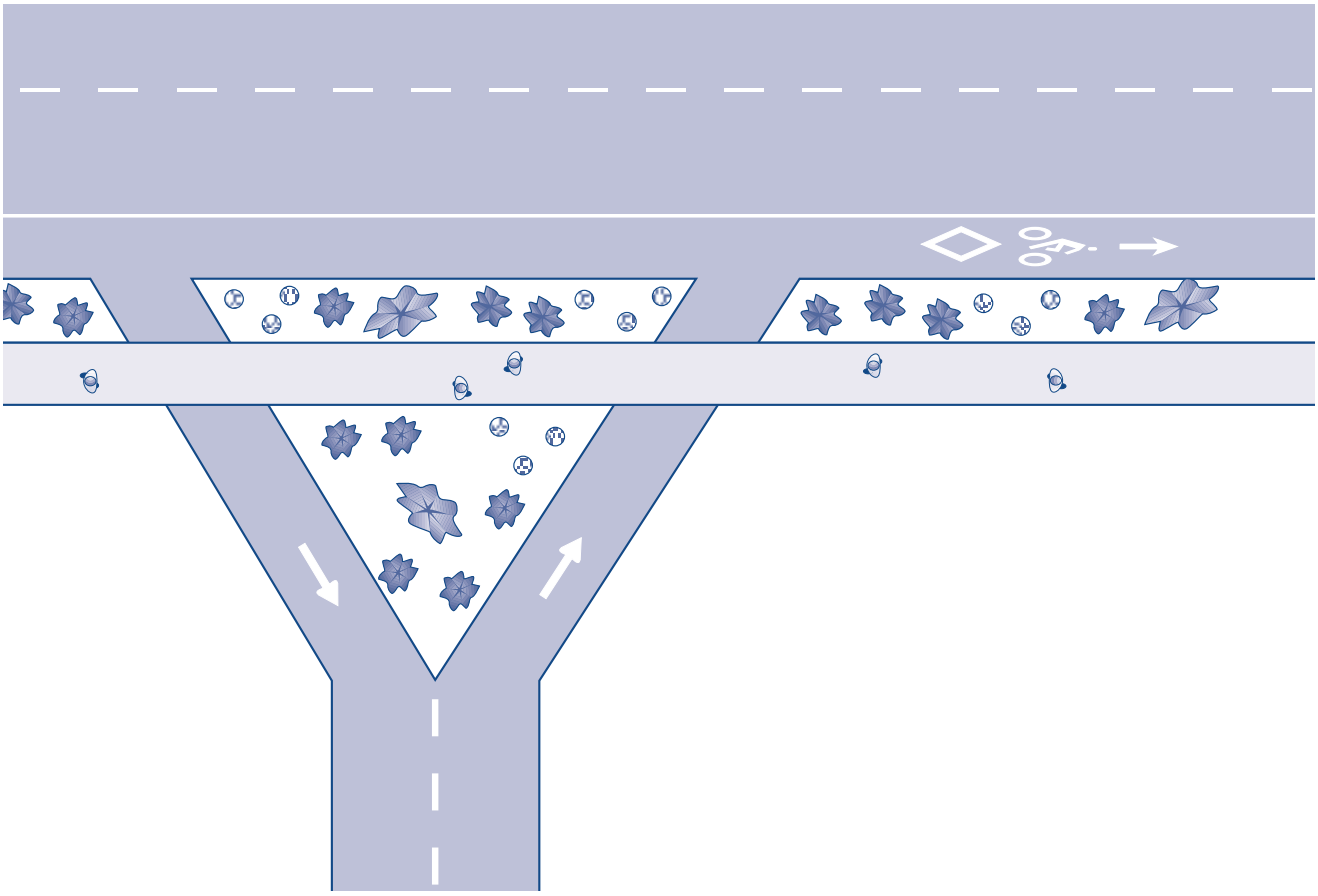
Caremustbetakentoavoida "cattlechute" effect (FigureA1.11). Thisoccurswhena6foot(1.8m) highchain-linkfencedisplacedoneachsideofthe path. Fencesshouldonlybeplacedwheretheyare neededforsafetyreasons. Theyshouldbeplacedasfar awayfromthepathaspossible. Duplicationoffences, suchasfencesonright-of-wayandfencestokeep pedestriansofffreeways, shouldbeavoidedwherever possible.

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

Apreferredmethodofrestrictingtheentryofmotor vehiclesistosplittheentrywayintotwo6footsec-tionsseparatedbylowlandscaping. Emergencyvehicles canstillenterifnecessarybystraddlingthelandscaping (FigureA1.12).

Analternativemethodistousebarrierposts("bol-lards")tolimitvehicletrafficonanoff-streetpath; however, theycanbecomeahazardtocyclistsifnot wellplaced. Whenused, theymustbespacedwide enough(minimum3foot[0.9m], 5footpreferred)for easypassagebycyclistsandbicycletrailersaswellas wheelchairusers. Eitheroneorthreebollardsshould beused, nevertwo. Thecenterbollardmustberemov-able. Twoposts, bothplacedinthepavedportionofa path, willchannelpathusersintothecenterofthe path, causingpossiblehead-oncollisions.

FIGUREA1.12 **Split-PathDiscouragesMotorVehicleAccess**



C1B(8)GUIDELINESFOROFF-STREETPATHSWITHHEAVYUSE

Abrokenyellowcenterstripeisagoodwaytoseparatedirectionalflowifa pathisexpectedtohaveheavyusage. Ifanexistingpathistoonarrowtohandle uservolumes, thepathcanbewidenedtoprovidethenecessarycapacity. Also, a separatejoggerorequestrianpathmaybeconstructedwithbarkmulchalong-sidethepavedpath.

C2. BicycleLaneDesign

Bicyclelanesareone-wayfacilitiesthatcarrybicycletrafficinthesamedirec-tionasadjacentmotorvehicletraffic. Bicyclelanesarethepreferredfacilityfor urbanarterialandcollectorstreets.

Bicyclelanesarecreatedbytheadditionofan8inch(200mm)stripeandsten-cils. Motoristsareprohibitedfromusingbicyclelanesfordrivingandparking. Thisdoesnotprecludemotorvehiclesfromusingabicyclelaneforemergency avoidancemaneuversorbreakdowns.

C.DesignGuidelines forBicycleFacilities

(continued)

C2a.Curbedstreets

PDOT'spreferredstandardsforbicyclelanedimensions(FigureA1.13)areas follows:

Forabicyclelaneadjacenttocurborparking:

- 5footpreferredwidth.

Bicyclelanewidthsof6feetmaximum *maybe* desirablewhenoneoracombinationofthefollowingconditionsexists:

- trafficvolumesandspeedsarehigh;
- adjacentparkinguseandturnoverishigh;
- catchbasingrates, gutterjoints, andotherfeaturesinthebicyclelanemay presentanobstacletocyclists;
- steepgradesexist;
- truckvolumesarehigh; or
- bicyclevolumesarehigh.

Bicyclelanewidthsof4feetminimum *may* beacceptablewhen:

- physicalconstraintsexist, forasegmentoflessthan1milethatlinksto existingbikewaysonbothends; or
- implementedinconjunctionwithtrafficcalmingdevices(seesectionB7); or
- adjacenttoparkingwith[very]lowuseandturnover; or
- adjacenttoanuncurbedstreetshoulder.

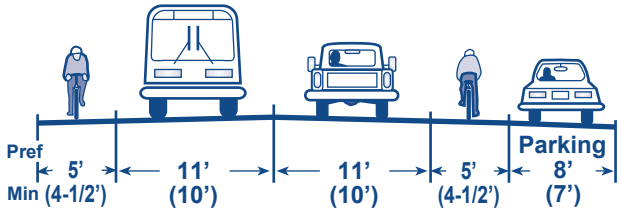
Additionally, foron-streetparking, PDOTrecommendsthattherebean8foot preferred(7footminimum)parkingareawidthadjacenttothebicyclelane.

PDOTrecommendsthatthetravellanewidthadjacenttoabicyclelanebe11 foot(10footminimum). Afour-footbicyclelaneshouldnotbeusedincombinationwitha7footparkinglaneand/ora10foottravellane.

BicycleLanesonOne-wayStreets

Bicyclelanesonone-waystreetsshouldbeontherightsideoftheroadway, except whereabicyclelaneontheleftwilldecreasethenumberofconflicts(e.g., those causedbyheavybustrafficordualright-turnlanes, etc.). Directionalarrowpavementmarkingsshouldbeusedtoindicatetheproper directionoftravelanddiscouragewrongwayriding.

FIGUREA1.13 **PreferredTravelLaneWidth**

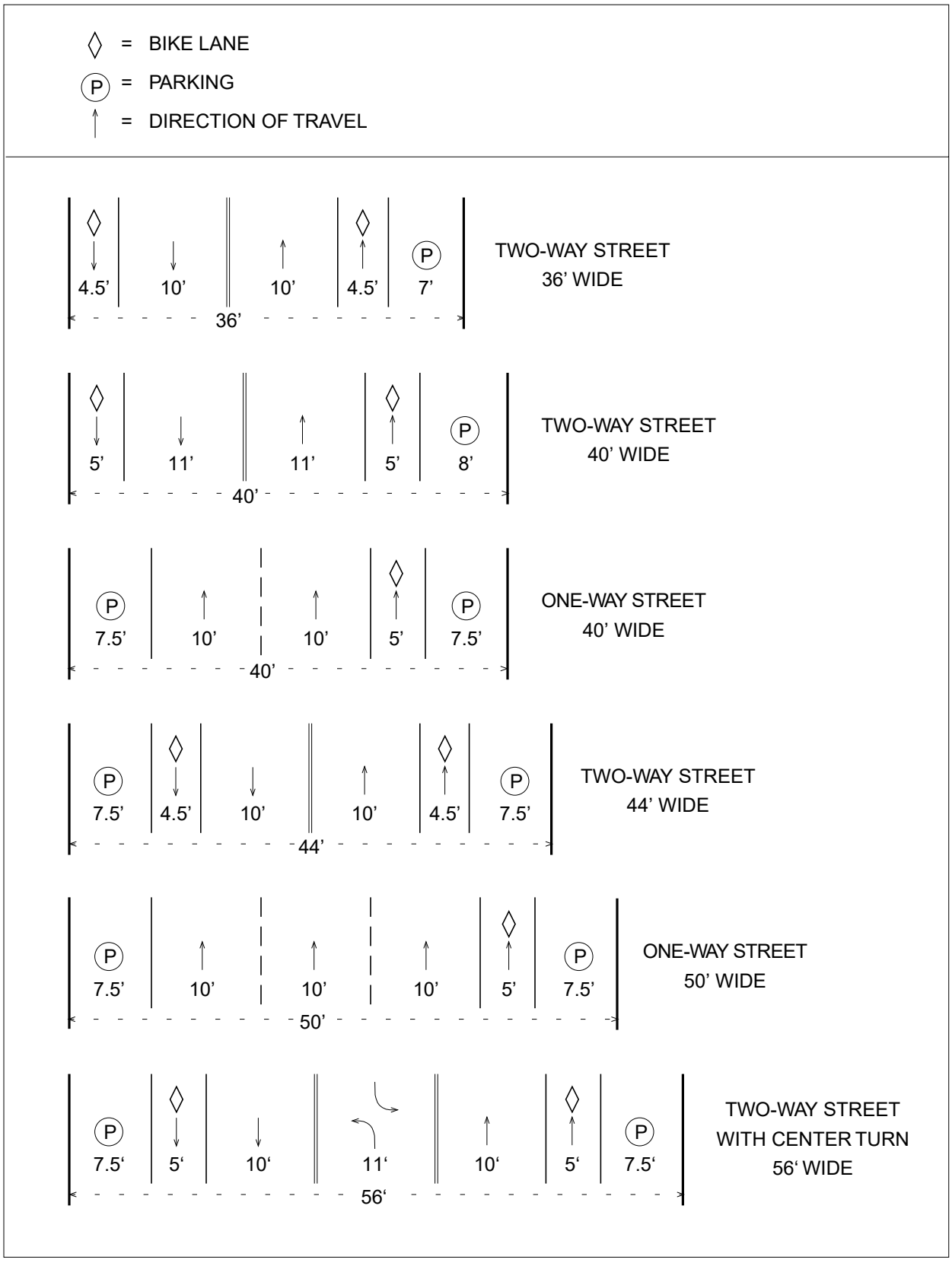


FigureA1.14showsexamplesoftypicalstreetcross-sectionswithpreferredandacceptabledesigntreatments.

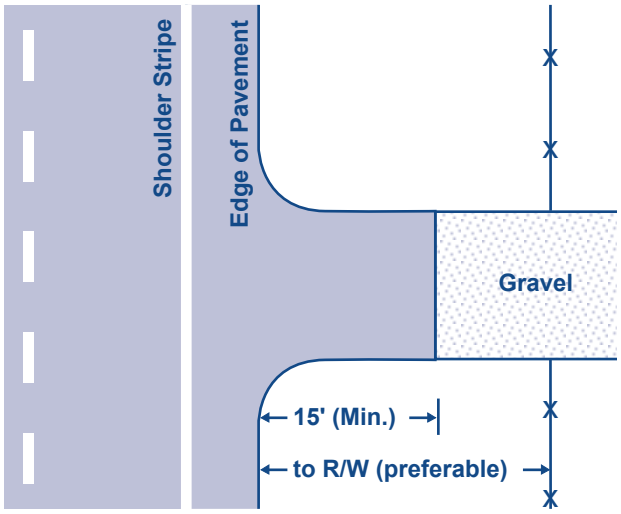
C2b.Uncurbedstreets

Whenprovidingashoulderforbicycleuse, awidthof 6feet(1.8m)isrecommended. Thisallowsacyclist toridefarenoughfromtheedgeofthepavementto

FIGUREA1.14 **BikeLaneDesignsforCurbedStreets**



FIGUREA1.15 **PavedDrivewayApron**



avoiddebris, yetfarenoughfrompassingvehiclesto avoidconflicts. Iftherearephysicalwidthlimitations, aminimum4footshouldermaybeadequate. Onclimbinglanes, itisdesirabletomaintaina6foot (1.8m)shoulder, asuphillcyclistsneedmorespace formaneuvering(minimum5foot[1.5m]).

Whereveraroadwayisconstructedorwidened, all graveldrivewaysandstreetsshouldbepavedback5-10feet(1.5-3m)topreventloosegravelfrom spillingontotheshoulders(FigureA1.15).

Manyexistinggravelshouldershavesufficientwidth andbasetosupportshoulderbikeways. Minorexcavationandtheadditionof3to4inches(75-100 mm)ofasphalticconcreteisoftenallthatisrequired toprovidesufficientshoulderbikeways. Itismost desirabletoconstructshoulderwideningprojectsinconjunctionwithpavement overlaysforseveralreasons:

- Thetopliftofasphaltwilladdstructuralstrength;
- Thefinalliftwillprovideasmooth, seamlessjoint;
- Thecostwillbegenerallyless, asgreateroverallquantitiesofmaterialswill bepurchased; and
- Trafficwillbedisruptedonlyonceforbothoperations.

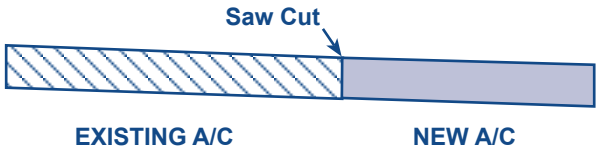
Pavementdesignforshoulderbikeways

Whenshouldersareconstructedaspartofanintegralreconstructionproject, thepavementstructuraldesignshouldbethesameasthatoftheroadway.

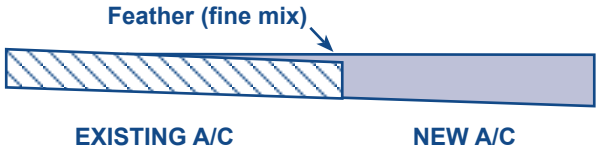
Onprojectsthatwidenshouldersforthebenefitofbicyclists, theremaybe someopportunitiestoreducecostsbybuildingtoalesserthickness. 3-4inches (75-100mm)ofasphaltand2-3inches(50-75mm)ofaggregateoverexisting roadwayshouldersmaybeadequateifthefollowingconditionsaremet:

- Therearenoplannedwideningprojectsfortheroadsectionintheforeseeablefuture.
- Theexistingshoulderareaandroadbedarestableandthereisadequate drainageoradequatedrainagecanbeprovidedwithoutmajorexcavation andgradingwork.
- Theexistingtravellaneshaveadequatewidthandareinstablecondition.
- Thehorizontalcurvatureisnotexcessive, sothatthewheelsoflargevehicles donottrackontotheshoulderarea. Onroadsthathavegenerallygoodhorizontalalignment, itmaybefeasibletobuildonlytheinsideofcurvestofull depth.

FIGUREA1.16 **Saw-CutJointforShoulderBikeway**



FIGUREA1.17 **AsphaltFeathering**



- Theexistingandprojectedaveragedailytraffic(ADT) andheavytrucktrafficisnotconsideredexcessive (e.g., under10percent).

Thethicknessofpavementandbasematerialwill dependuponlocalconditionsandengineeringjudgementshouldbeused. Iftherearesshortsectionswhere thetravellanesmustbereconstructedorwidened, these areasshouldbeconstructedtonormalfull-depthbase designstandards.

Thejointbetweentheshouldersandtheexistingroadway Whenaddingpavedshoulderstoroadwaysforbicycle usewherenooverlayprojectisscheduled, asaw-cutone foot(300mm)insidetheexistingedge ofpavementprovidestheopportunitytoconstructagoodtightjoint. Thiseliminatesaraggedjointattheedgeoftheexistingpavement(FigureA1.16).

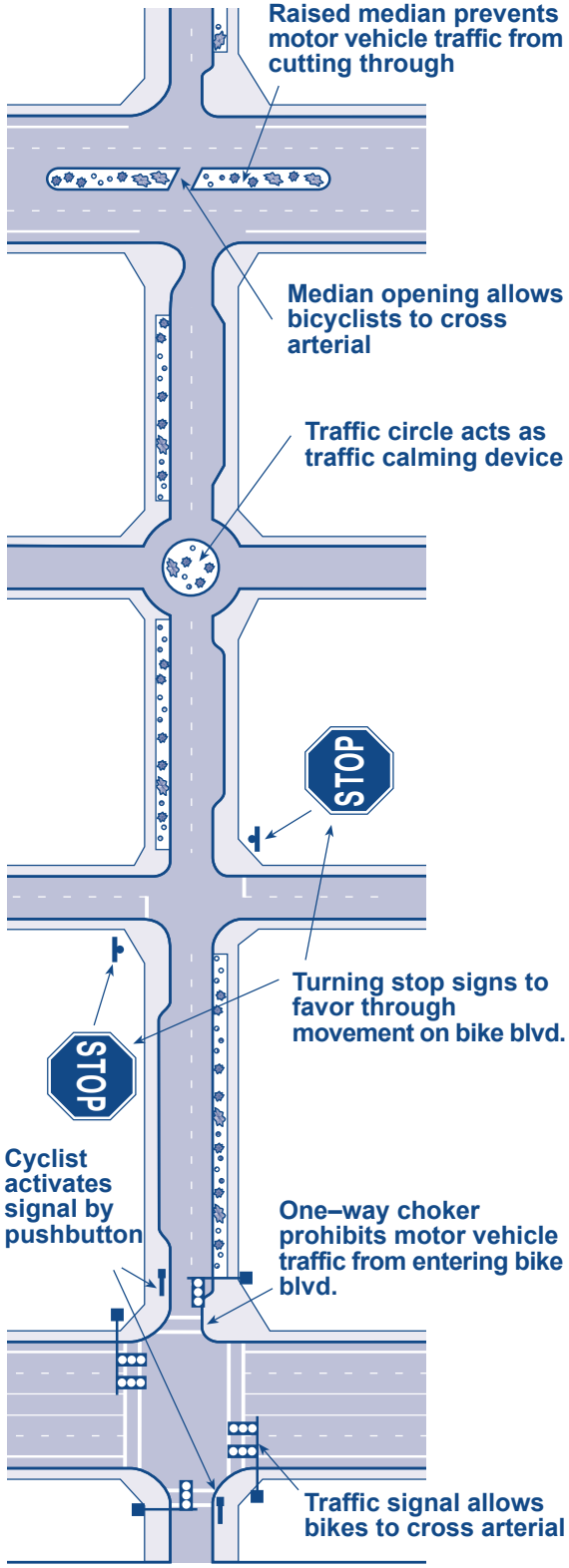
Ifthismethodisnotpractical, "feathering" thenewasphaltontotheexisting pavementmaybesubstitutedifafinemixisused(FigureA1.17).

C3. BicycleBoulevard

Abicycleboulevardonalocalservicestreetcanprovideagoodalternativetoa bicyclelaneorwideoutsidelaneonahighervolume/higherspeedstreet. Itcan beanexcellentattractorfornewandinexperiencedcyclistsandprovideapleasantridetoreachmanydestinations. Elementsofabicycleboulevardincludethe following:

- Selectingastreetthatprovidesadirectandcontinuousconnectionforbicyclists, asopposedtoaroutethatrequiresbicyclisttowindthroughneighborhoods. Bicycleboulevardsworkbestonastreetgridsystem.
- Turningstopsignstowardsintersectingtraffic, sobicyclistscanridewithout interruption.
- Placingmotorvehicletrafficdivertersatkeyintersectionstostabilizemotor vehiclevolumes. Thedivertersmustbedesignedtoallowthroughbicycle movement. Afulldivertermustincludeacut-throughwideenoughto accommodateabicyclewithatrailer(4feetwide).
- Alternatively, placingtrafficcalmingdevicesonthestreettostabilizemotor vehicletrafficspeeds. Theseincludetrafficcircles, speedbumps(14footor 22foot), curbextensions, slowpoints, chicanes, etc. Insomesituations, both trafficdivertersandtrafficcalmingdeviceswillbeneeded.
- Providingprotectionwheretheboulevardcrosseshighervolumearterial streets(FigureA1.18). Thiscanbeaccomplishedintwoways:

FIGUREA1.18 **BicycleBoulevardStreetCrossings**



- Withasignalwhereatrafficstudyhasshownthata signalinbetweenarterialswillbesafeandeffective. To ensurethatbicyclistswillbeabletoactivatethesignal, thepreferredtreatmentisasignalloopinthe pavementmarkedwithastenciltoshowthebicyclists wheretostandtotriptheloop. Alternatively, apush buttonthatwillnotrequiredismountingmaybeprovided, inadditiontopushbuttonactivationforpedestrians.
- Withamedianrefuge. Amedianrefugeshouldbewide enoughsoitallowsabicyclistwithatrailertobeprotectedfromthetravellanes(minimum8feet, 10feet preferred.)Thedesignshouldallowbicyclistostosee thetravellanestheymustcross.

- Placingdirectionalsignstoroutecyclistostokeydestinations, toguidecyclistsstroughdifficultsituations, andto alertmotoristsofthepresenceofbicyclists.

C4. SharedRoadway

Therearenospecificbicyclestandardsortreatmentsfor low-volume, low-speedsharedroadways; theyaresimplythe roadsasconstructed. Sharedroadwaysfunctionwellon roadssuchaslocalstreetsandminorcollectorswithspeed limitsof25mph(40km/h), ortrafficvolumesof3,000 averagedailytraffic(ADT)orless.

Manyurbanlocalstreetsarecarryinggreatertrafficvolumes andathigherspeedsthantheirdesignationshouldnormally allow. Thesecouldfunctionwellassharedroadwaysif excessivetrafficspeedsandvolumeswereeffectively reducedthroughtrafficcalmingtechniques, suchascurb extensions, speedbumps, roundabouts, etc. Refertothe PortlandOfficeofTransportation' sTrafficCalmingProgram formoreinformation.

C4a.Wideoutsidelane

Forhighervolume/higherspeedstreets(above25mphor 3000ADT)wherethereisinadequatewidthtoprovidethe requiredbicyclelanesorshoulderbikeways, awideoutside lanemaybeprovidedthataccommodatesbothcyclistsand motorvehicles. Thiscouldoccuronretrofitprojectswhere thereareseverephysicalconstraints, andallotheroptions havebeenpursued, suchasremovingparkingornarrowing travellanestominimumacceptablewidths.

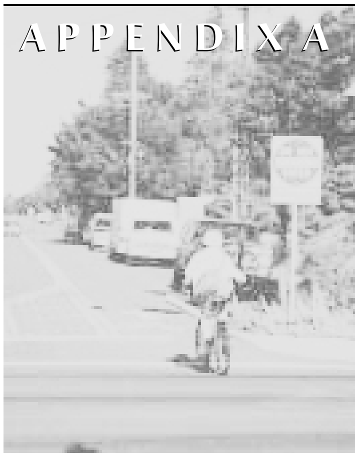
C.DesignGuidelines forBicycleFacilities

(continued)

Awideoutsidelaneistypically14feet(4.2m)wide. Usablewidthisnormally measuredfromcurbfacetothecenterofthe lanestripe, butadjustmentsneed tobemadefordrainagegrates, parking, andlongitudinalridgesbetweenpavementandguttersections. Forwidthsof15feet(4.8m)orgreater, abicyclelane orshoulderbikewayshouldbestriped.

C4b.SignedBikewayConnection

Forsharedroadwaysthatactasconnectionsbetweenbikewaysand/ormajor destinations, a "BicycleRoute" signwithdirectionalinformationshouldbeprovided. [SeeSectionIVB3formoreinformation.]



PartII:
IntersectionDesign

Intersectionsareareaswheremostconflictsbetweenvariousroadwayusers occur. Bytheirverynature, intersectionsputonegroupoftravelersinthepath ofothers. Goodintersectiondesigncreatesasituationwherethoseapproaching theintersectionhaveaclearindicationwhatpaththeymustfollowandwhohas theright-of-way. Aswithotherroadwaydesignfeatures, bicyclistsmustbetreat-edasvehicles: onlyinextremelyrarecasesshouldtheybeencouragedtopro-ceedthroughintersectionsaspedestrians.

A.BasicPrinciples

Somebasicprinciplestobefollowedwhendesigningintersectionsare:

- Unusualconflictsshouldbeavoided.
- Intersectiondesignshouldcreateapathforbicycliststhatisdirect, logical andasclosetothepathofmotorvehicletrafficaspossible.
- Bicyclistsfollowingtheintendedtrajectoryshouldbevisibleandtheirmove-mentsshouldbepredictable.
- Potentialsafetyproblemsassociatedwiththedifferencebetweenautoand bicyclespeedsshouldbeminimized.

B.SimpleRightAngle Intersections

Simplerightangleintersectionsareusuallythesimplesttotreatforbicycle movement. Bicyclistsmustbeallowedtofollowapaththatisasdirectaspossi-ble, usingthefollowingtechniques:

- Bicyclelanesshouldbestripedtoamarkedorunmarkedcrosswalk.
- Thebicyclelanestripeshouldbeasolidstripeallthewaytothecrosswalk.
- Thelanesshouldresumeattheothersideoftheintersection.

(SeeAppendixIVB2, BicycleLanes, formoredetailedinformation)

C.Complicated Intersections

Intersectionswithmultiplestreetsenteringfromdifferentanglescancreatecon-fusionforusers. Suchintersectionsshouldbeavoidedanddesignedinsteadassim-plerightangleintersectionswheneverpossible. Foranalreadyexistingcomplicat-edintersection, orifacomplexintersectionisabsolutelyneeded, bicyclelanes maybestripedwithdashestoguidebicycliststhroughalongundefinedarea.

D.Right-TurnLanes

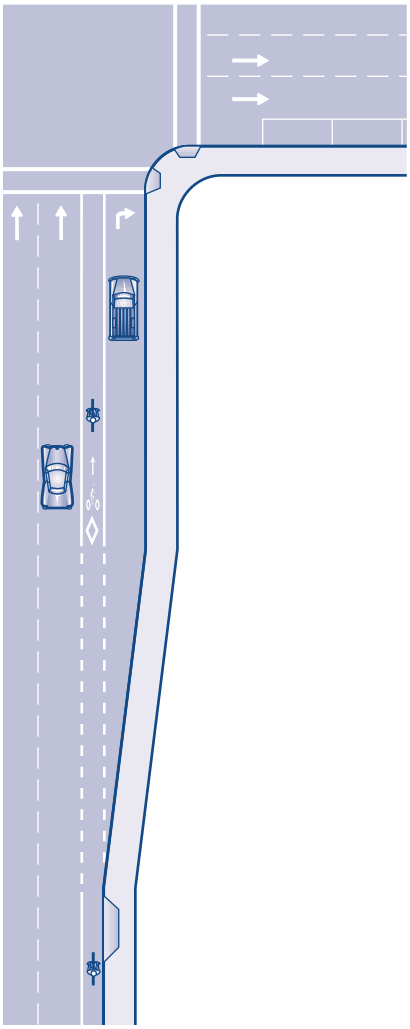
Right-turnlanespresentspecialproblemsforcyclistsbecauseright-turningcars andthroughbicyclistsmustcrosspaths. Toalleviatetheseconcerns, thedesign inFigureA2.1shouldbeusedforbicyclelanes. Thepathsofthethroughbicyclistandtheright-turningmotorvehicleshouldcrosspriortotheintersection. Thisconfigurationhasthreeadvantages:

- Itallowsthisconflicttooccurawayfromtheintersectionwhereothercon-flictscouldoccur.
- Thedifferenceintravelspeedsisanadvantage, asamotorvehicledrivercan passabicyclistratherthanrideside-by-side.
- Allusersareencouragedtofollowtherulesoftheroad: throughvehicles (includingbicyclists)proceedtotheleftofright-turningvehicles.

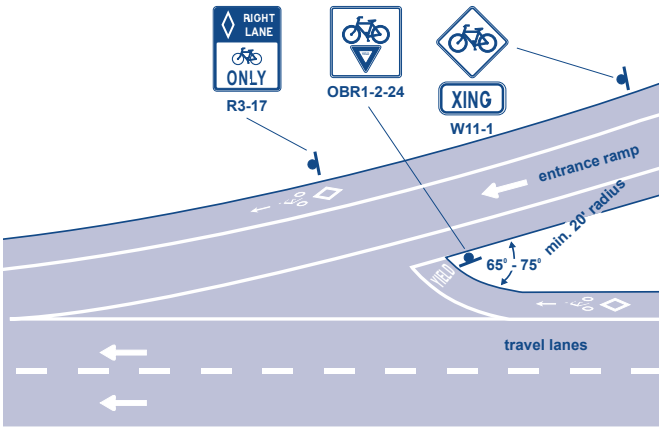
E.Right-LaneMerge andExitRamps

Bicyclelanesarenotusuallyprovidedonlimitedaccessfreeways, butsome urbanparkwaysaredesignedwithmerginglanesandexitramps, ratherthan simpleintersections. Theseroadsmayotherwisebesuitableforbicyclelanes.

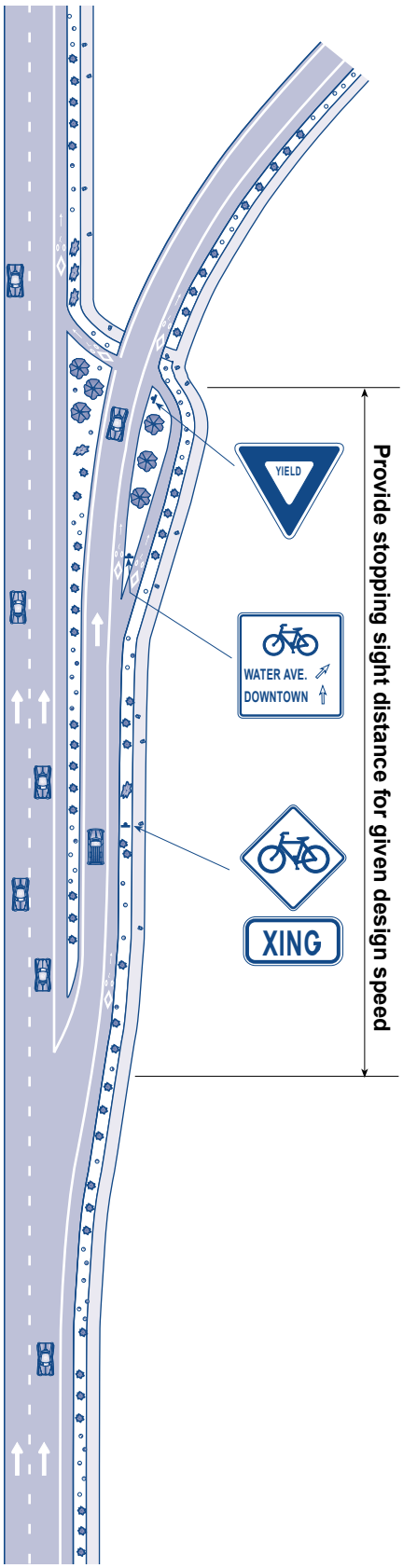
FIGUREA2.1 **StandardRight-TurnLaneConfiguration**



FIGUREA2.2 **BikeLanesatRight-LaneMerge**



FIGUREA2.3 **BikeLanesatExitRamps**



Trafficlanesthatallowmergingtraffictoflowontoaroadwayathigh speedscreatedifficultiesforslower-movingbicyclists. Exitrampsthat allowmotorvehiclestoleavetheroadwayathighspeedsposesimilar problems.

Thefollowingdesignscomplywithabasictrafficengineeringprinci-plethatencouragescrossingsatorclosetoarightangle.

E1. Right-LaneMerge

Itisdifficultforcyclistst otraversetheundefinedareacreatedby right-lanemergemovements, forthefollowingreasons:

- Theacuteangleofapproachcreatesvisibilityproblems.
- Motorvehiclesareoftenacceleratingtomergeintotraffic.
- Thespeeddifferentialbetweenthecyclistandthemotorist.

Toalleviatetheseconcerns, thedesigninFigureA2.2guidescyclists inamannerthatprovides:

- Ashortdistanceacrosstheramptotraverseatclosetoaright angle.
- Improvedsightdistanceinanareawheretrafficspeedsareslower thanfurtherdownstream.
- Acrossinginanareawheredrivers'attentionisnotentirely focusedonmergingwithtraffic.

E2. ExitRamps

Exitrampsnormallypresentgreatdifficultiesforbicyclistsandpedes-triansforthefollowingreasons:

- Motorvehiclesareexitingatfairlyhighspeeds.
- Theacuteanglecreatesvisibilityproblems.
- Motorvehicledriversusingtheexitrampoftendonotusetheir right-turnsignal, whichcreatesconfusionforbicyclistsseekinga gapinthetrafficstream.

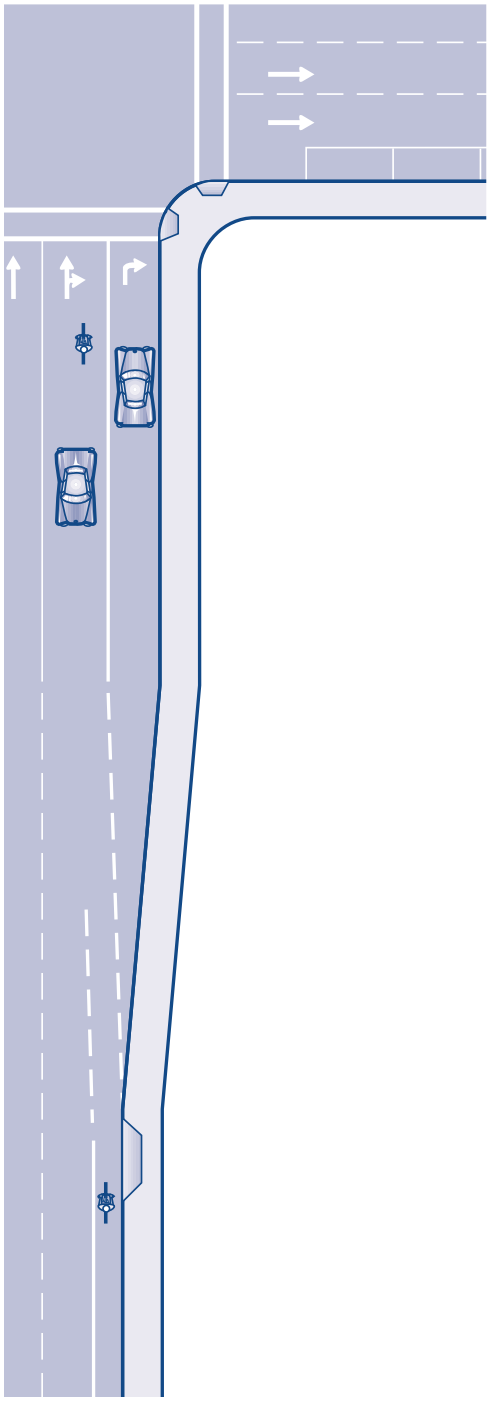
Toalleviatetheseconcerns, thedesigninFigureA2.3guidescyclists inamannerthatprovides:

- Ashortdistanceacrosstheramp, atclosetoarightangle.
- Improvedsightdistanceinanareawheretrafficspeedsareslower thanfurtherdownstream.
- Acrossinginanareawherethedriver' sattentionisnotdistracted byothermotorvehicles.

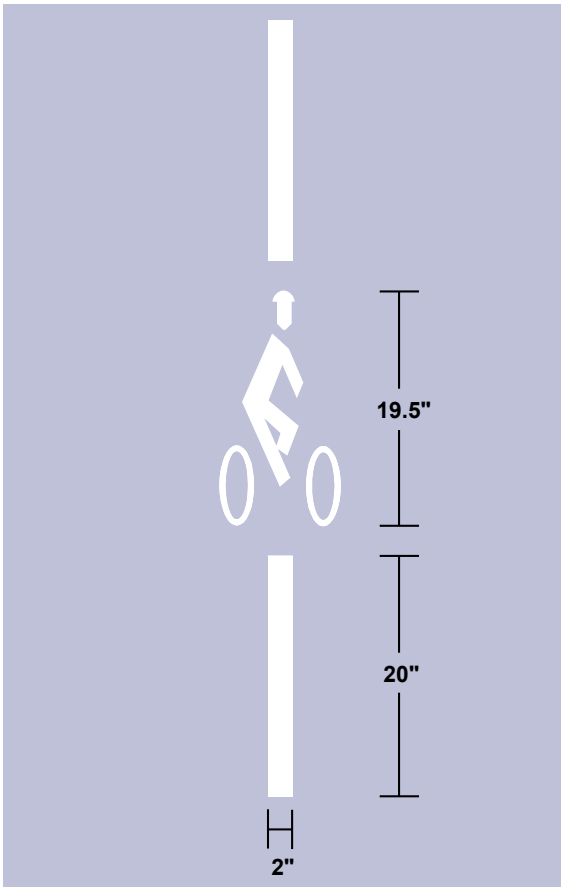
F.DualRight-Turn Configurations

Dualright-turnlanesoraright-turn, right/throughlaneconfigurationare unpleasantchallengesforcyclistsatintersectionsbecausecyclistsmusteither mergeacrosstwolanesormergeacrossintoalanewheredriverscouldbeturn-ingorgoingstraight(FigureA2.4). Boththeseconfigurationsshouldbeavoided wheneverpossible. Warrantsforusingdualturnlanesshouldbecloselyscruti-nized, sothispatternisusedonlyifabsolutelynecessary.

FIGUREA2.4 **BikeLanethroughDualRight-TurnLanes**



FIGUREA2.5 **PavementMarkingforSignalActivation**



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 below (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.

APPENDIX A

Part III: Miscellaneous Design Considerations

BICYCLE MASTER PLAN

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, signposts, 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 in 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.

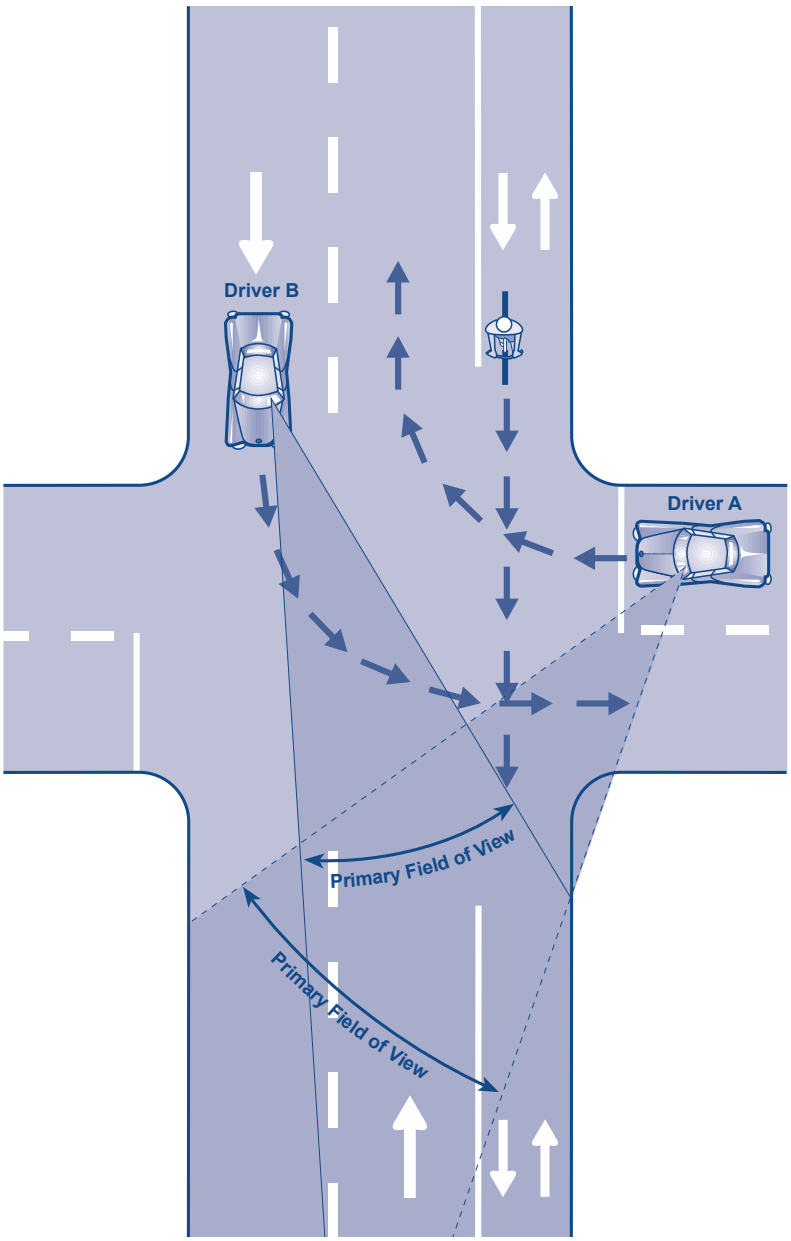
A2. Extruded Curbs

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

FIGUREA3.1 **ProblemswithTwo-wayBikeLaneonOneSideoftheRoad**



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.

bicyclistclosesttothemotorvehicle lanehasopposingmotortrafficonone sideandopposingbicycletrafficon theother. Thisconfigurationalsopro-motesillegalwrong-wayridingand createsawkwardanddangerousmove-mentsintransitionsbacktostandard bikeways.

A4. ReflectorsinPavement

Pavementreflectorsorotherraised markingscandeflectabicyclewheel, causingthecyclisttolosecontrol. If pavementmarkersareneededfor motorists, theyshouldbeinstalledon themotorist 'ssideofthestripe, and haveabeveledfrontedge. Thismaybe desirableinsomeisolatedinstances, suchaswheredriversconsistently intrudeonabicyclelaneattheinside ofacurve.

A5. ContinuousRight-turn Lanes

Continuousright-turnlanesmakeit extremelydifficultforbicycliststo judgewheretheyshouldberiding (FigureA3.2). Ridingagainstthecurb putstheminconflictwithright-turn-ingcars, butridingtotheleftofthe right-turnlaneputstheminconflict withcarsmergingintoandoutofthe right-turnlane. Thebestsolutionisto eliminatethecontinuousright-turn lane, consolidateaccessesandcreate well-definedintersections, withthe bicyclelanetotheleftofright-turning cars.

A6. BicycleLanesbehindDiagonalParking

Diagonalparkingcancauseconflictsonstreetswithhighbicycleuse. Cardri-versbackingouthaveverypoorvisibilityofoncomingcyclists. Itisgenerallynot recommendedtoplacebicyclelanesadjacenttodiagonalparking.

B.OtherDesign Considerations

B1. CurbCuts

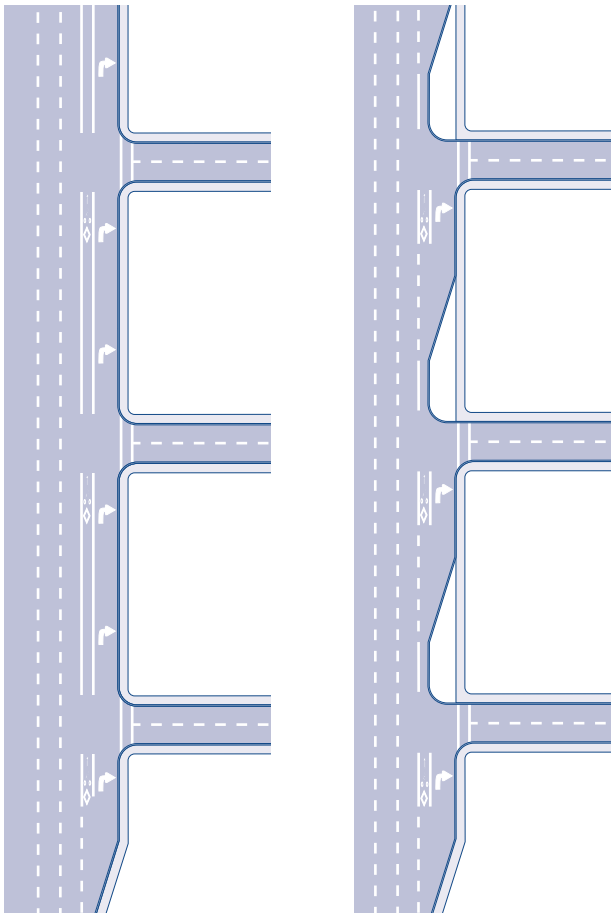
Curbcutsforbicycleaccesstooff-streetpathsandsidewalksshouldbedesigned sothebottomofthecurbcutmatchestheguttergradewithoutanelevatedlip (FigureA3.3). Thebottomwidthofthecurbcutshouldbethefullwidthofthe bikewaywhentheapproachingpathisperpendiculartothecurb, andamini-mumof8feet(2.4m)widewhentheapproachingpathisparallelandadjacent tothecurb. Tenor12feet(3or3.6m)maybenecessaryondownhillgrades.

B2. DrainageGrates

Caremustbetakentomakesurethatdrainagegratesarebicycle-safe. Ifnot, a bicyclewheelmayfallintotheslotsofthegratecausingthecyclisttofall. Replacingexistinggrates(preferredmethod)orweldingthinmetalstrapsacross thegrateperpendiculartothedirectionoftravel(alternatemethod)isrequired (FigureA3.4). Metalstrapsshouldbecheckedperiodicallytoensurethatthey remaininplace.

Inletsinthecurbface(typeCG-3)arepreferabletostreet-surfacedesigns (typesG-1, G-2, CG-1andCG-2). Ifastreet-surfacegrateisrequiredfor drainage, caremustbetakentoensurethatthefrontofthegrateisflushwith theroadsurface. [1]

FIGUREA3.2 **ContinuousRight-TurnLaneCreatesConstantConflicts**



Undesirable **Desirable**

Inletsshouldberaisedafterapavement overlay, towithin1/4 " (6mm)ofthenew surface. Ifthisisnotpossibleorpractical, thepavementmusttaperintodrainage inletssotheydonotcauseanabruptedge attheinlet. Anotheroptionistorecessthe curblineintheareaofthegrate, removing thegratefromthecyclist 'stravelpath.

B3. Railroadcrossings

Specialcaremustbetakenwherevera bikewayintersectsarailroadcrossing. The mostimportantdesignconsiderationsfor bicyclistsatcrossingsaresmoothness, angle ofcrossing, andflangedepthandwidth (FigureA3.5).

B3a.Smoothness

Rubberizedcrossingshaveprovenvery effectiveinmaintainingadurable, smooth crossing. Concreteisamaterialthatisalso widelyused. Whenlaidwithprecision, concreteprovidesasmoothride, andmay bethebestoverallmaterial. Ifasphalt pavementisused, itmustbemaintainedin ordertopreventaridgebuildupnextto

FIGURE A3.3 **Curb Cuts for Paths**

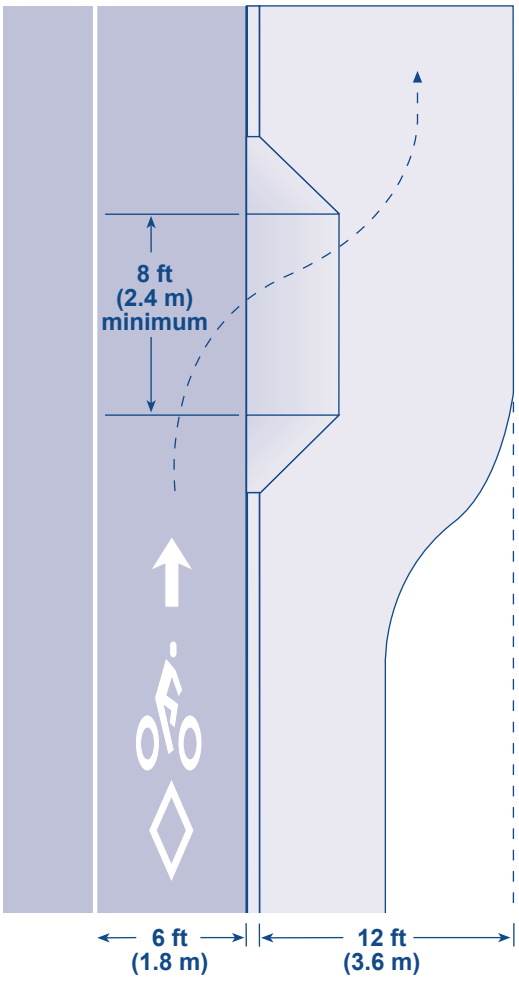
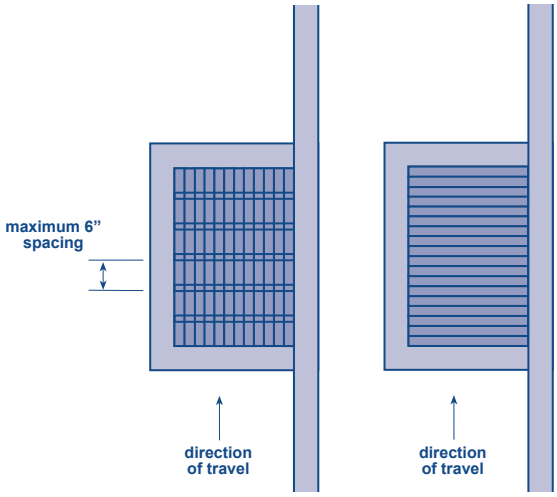


FIGURE A3.4 **Bicycle-Safe Drainage Grates**



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

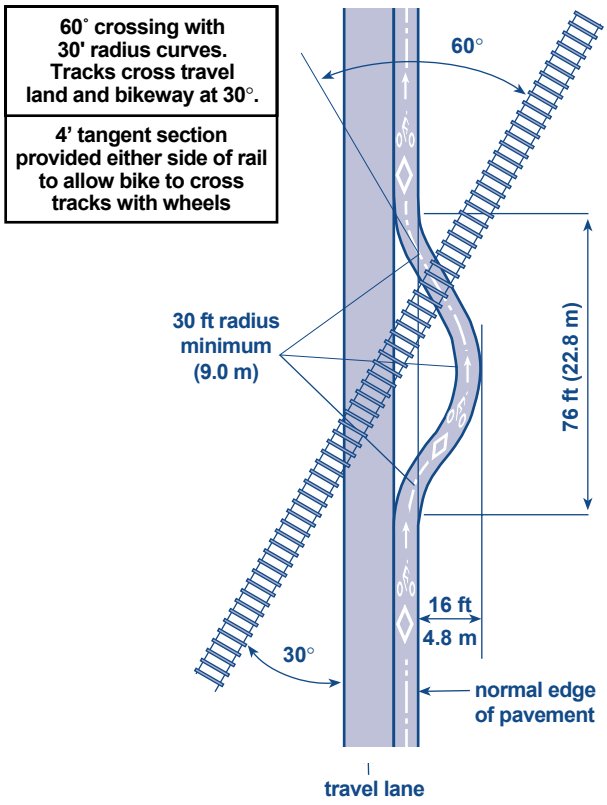
Advance warning signs should be installed on off-street paths and on-street bikeways in advance of railroad crossings.

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 side-walks 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 Railboad 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).

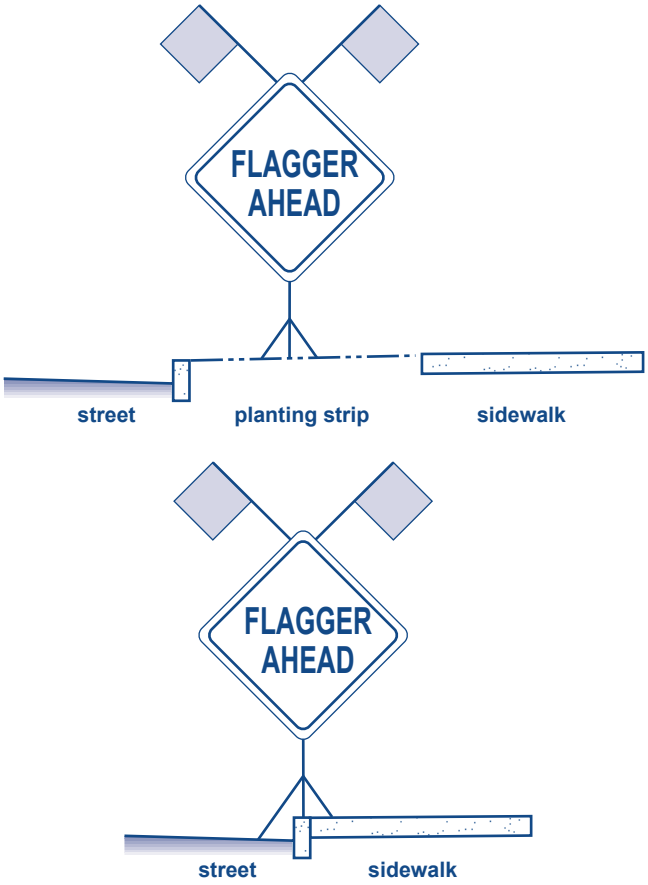
Construction project managers should notify the Bicycle Program in the case of major disruptions and release information to the local media.

B5. Contra-Flow Bicycle Lanes

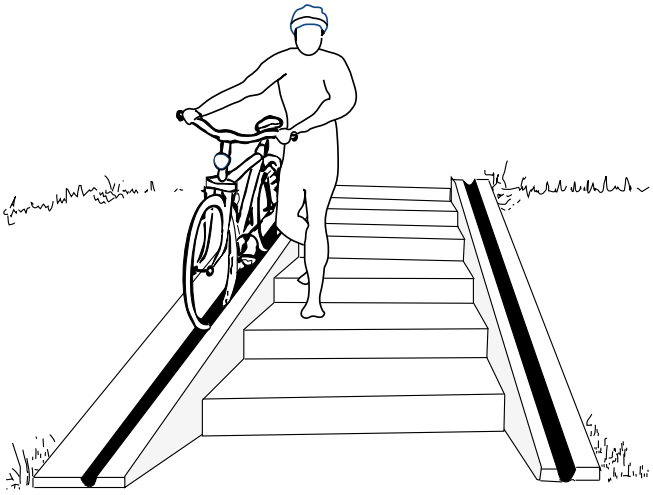
Contra-flow bicycle lanes on a one-way street are not usually recommended. There are, however, special circumstances under which this design may be desirable, if the following conditions are met:

- 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;

FIGUREA3.6 **PlacementofConstructionSigns**



FIGUREA3.7 **BicycleRamponStairs**



- Therearenoorveryfewintersectingdriveways, alleysorstreetsonthesideoftheproposedcontra-flowlane;
- Bicyclistscansafelyandconvenientlyreenterthe trafficstreamateitherendofthesection;
- Asubstantialnumberofcyclistsarealreadyusing thestreet; and
- Thereissufficientstreetwidthtoaccommodatea full-dimensionbicyclelane.

Acontra-flowbicyclelanemayalsobeappropriate onaone-waystreetrecentlyconvertedfromatwo-waystreet(especiallywherethischangeoccurredto reducemotorvehicletraffic throughneighborhoods).

Foracontra-flowbicyclelanetofunctionwell, these specialfeaturesmustbeincorporatedintothedesign:

- Thecontra-flowbicyclelanemustbeplacedon therightsideofthestreet(todrivers 'left)and mustbeseparatedfromoncomingtrafficbya doubleyellowline. Thisindicatesthatthebicy-clistsareridingonthestreetlegally, inadedicated travellane.
- Anyintersectingalleys, majordrivewaysandstreets musthavesignsindicatingtomotoristsththatthey shouldexpecttwo-waybicycletraffic.
- Existingtrafficsignalsmustbefittedwithspecial signalsforbicyclists, withloopdetectorsorpush-buttons. Thepush-buttonsmustbeplacedsothey canbeeasilyreachedbybicyclists, withouthaving todismount.
- Itispreferabletoplaceaseparatebicyclelanein thedirectionofmotorvehicletraffic, stripedasa normalbicyclelane. Wheretheroadwaywidth doesnotallowthis, bicyclistswillhavetoshare the roadwithtraffic. Inthissituation, stripingthecon-tra-flowbicyclelaneshouldtakeprecedence, oth-erwisesomecyclistswillbetemptedtorideillegal-lyagainsttraffic.

B6. StaircaseDesign

Staircasesshouldbedesignedwithabicyclewheelgutteronthesideordown themiddletoallowbicyclistsrolltheirbicyclesupanddownthestairs(see FigureA3.7). Wherepossible, bicyclewheelguttersshouldbeprovidedasan

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 stair path, 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 four teen or twenty-two feet. These bumps will slow motor vehicles while providing a smooth ride for cyclists.

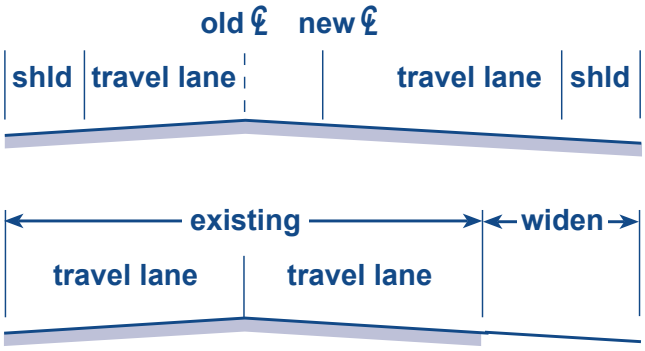
B7b. Rumble Strips

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 center line stripe, motor vehicles can safely pass cyclists at an intersection with a curb extension. On streets with a center line 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**



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 considerations 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 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 where 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, considerations 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 (100mm) 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.

BICYCLE MASTER PLAN

PartIV: SigningandMarking

A.BasicPrinciples

Well-designedroadsusuallyrequireverylittlesigning, becausetheyarebuiltso allusersunderstandhowtoproceed. Conversely, anoverabundanceofwarning andregulatorysignsmayindicateafailuretohaveaddressedproblems. The attentionofdrivers, bicyclistsandpedestriansshouldbeontheroadandother users, notonsignsalongthesideoftheroad.

Oversigningofroadwaysisineffectiveandcandegradetheirusefulnesstousers. Toomanysignsaredistractingandavisualblight, theycreateaclutteredeffect andwasteresources.

Themessageconveyedbythesignshouldbeeasilyunderstandablebyallroad-wayusers. Theuseofsymbolsispreferredovertheuseoftext.

B.BikewaySigning

B1. Off-streetpaths

Off-streetpathsshouldbesignedwithappropriateregulatory, warninganddes-tinationsigns.

B1a.RegulatorySigns

TheregulatorysignsR1-1(Stop)andR1-2(Yield)shouldbeusedtoregulate bicycletravelonoff-streetpaths(FiguresA4.1andA4.2).

Note: signsR1-1andR2-2arereducedversionsofstandardmotorvehiclesigns. Theyshouldbeusedwheretheywillbevisibleonlytobicyclists, forexample, wherea pathcrossesanotherpathorwhereapathintersectsaroadwayatrightangles.

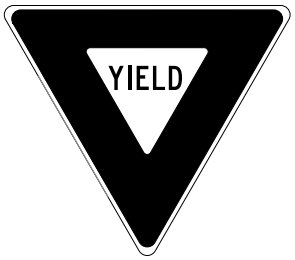
B1b.WarningSigns

Thefollowingwarningsignsshouldbeusedtoinformpathusersofpotentially hazardousconditions:

- SignsW1-1andW1-2indicateturns(FiguresA4.3andA4.4).
- SignsW2-1andW2-2giveinformationabouttheapproachingintersection (FiguresA4.5andA4.6).
- SignW10-1indicatesarailroadcrossing(FigureA4.7).
- SignW7-5warnsofanapproachinghill(FigureA4.8).

FIGUREA4.1 **Stop(R-1)**

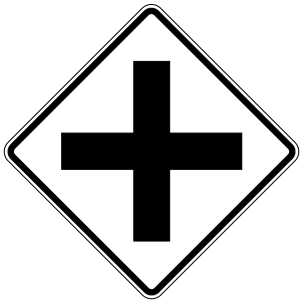
FIGUREA4.2 **Yield(R1-2)**



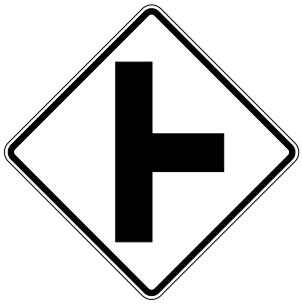
FIGUREA4.3 **Turn(W1-1)**

FIGUREA4.4 **Curve(W1-2)**

FIGUREA4.5 **IntersectionSign(W2-1)**



FIGUREA4.6 **IntersectionSign(W2-2)**



- SignOBW11-1with "XING" rider(FigureA4.9)shouldbeplacedin advanceofapointwhereanoff-streetpathcrossesaroadway, ifthecrossing isinanareawhereitisnotexpected. Thissignisnotappropriatewhere bicyclelanesandshoulderbikewayscrossstreetsatcontrolledintersections (trafficsignalsandstopsigns).

B1c.Striping

Onpathswithhighuse, abrokenyellowcenterlinestripemaybeusedtosepa-ratethetravelintotwodirections. Spacingshouldbe3foot(0.9m)centerline segmentswith9foot(2.7m)gapsor10foot(3m)segmentsand30foot(9m) gapsbetweensegments. Asolidcenterlinestripeshouldbeusedthroughcurves andareasofpoorsightdistance.

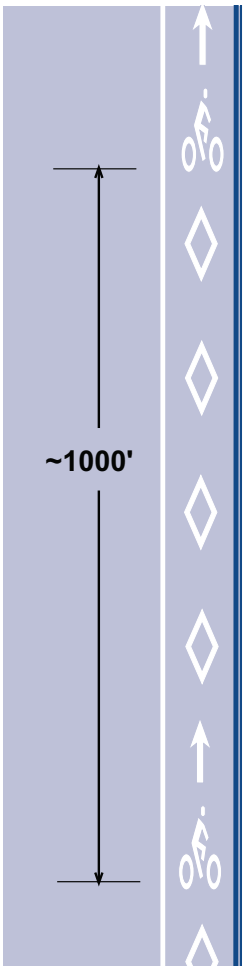
Note: Attemptstoseparatepedestriansfromcyclistswithanadditionalpaintedlane havenotprovensuccessfulandarenotrecommended.

FIGURE A4.7 **Railroad (W10-1)**

FIGURE A4.8 **Hill (W7-5)**

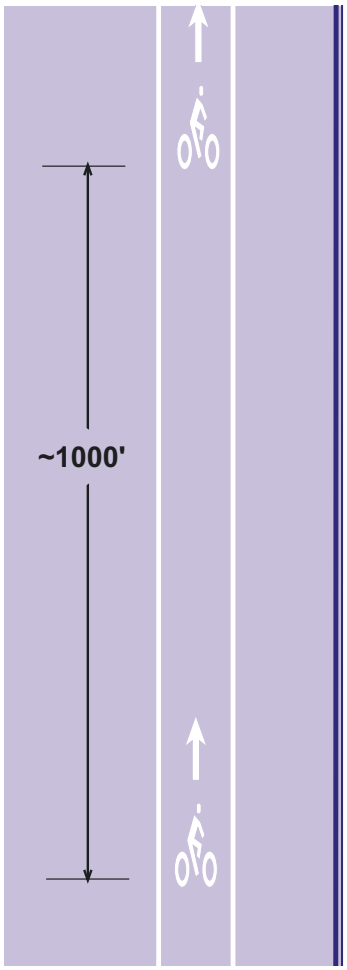
FIGURE A4.9 **OBW11-1 with "XING"**

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.

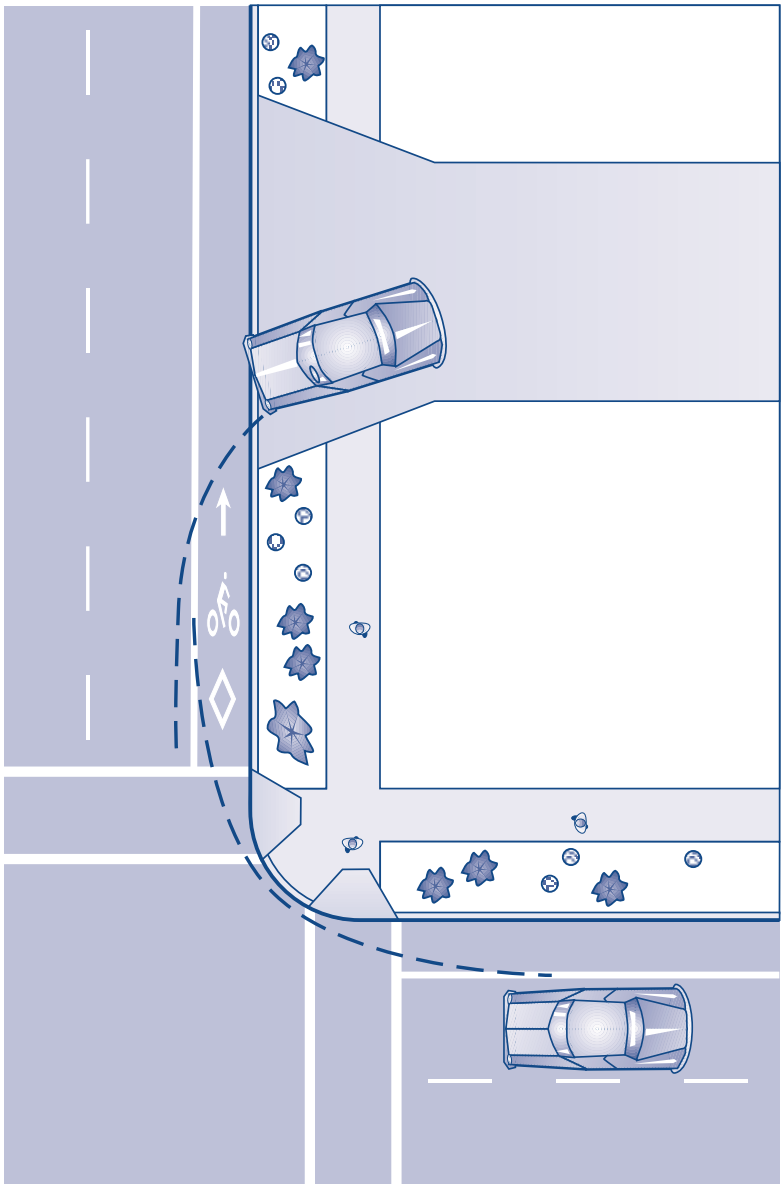
If the bicycle lane is adjacent to on-street parking:

- 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)

FIGUREA4.11 **RightLaneBikeOnly**

FIGUREA4.12 **BikeLaneEnds**

FIGUREA4.13 **BikeLaneStencilPlacedoutofSweptPathof TurningVehicles**



ThepreviousODOTstandardguided PDOTtousethe "BikeOnly" marking ratherthanthebicyclestencilwithan arrow. Sincethereareconsequently manyoftheseoldermarkingson Portlandstreets, itwilltakealongtime andconsiderableexpense, toreplace them. Thus, whileallnewbikeways shouldusethecurrent(bicycle/arrow/ diamond)standard, theoldoneswill onlybereplacedastheywearout.

Ingeneral, "NoParking" signsarenotto beusedwithbicyclelanes; thebicycle laneshouldbemarkedwellenoughto beaparkingdeterrent. "NoParking" signs(P100, P103, andP106; or MUTCDR7-9a)maybeusedincases whereparkinginbicyclelanesisacon-tinualproblem. Yellowpaintedcurbs mayalsobeusedtoindicatethatpark-ingisprohibited.

"RightLane, BikeOnly" signshouldbe usedsparinglyincaseswhereclarityis needed(FigureA4.11).

Bicycleroutesignsaretobeusedfor directionalinformationorbikeway identification. Theyshouldnotbe usedinisolation; theyshouldbeused inconjunctionwithotherinforma-tionalsignage.

Bikelaneaheadandbikelaneends signsshouldbeusedsparingly. The "Bikelaneends" signmaybeusedasa riderinconjunctionwiththesign depictedinFigureA4.12toindicatea mergesituation(FigureA4.12).

B2b.MarkingPlacement

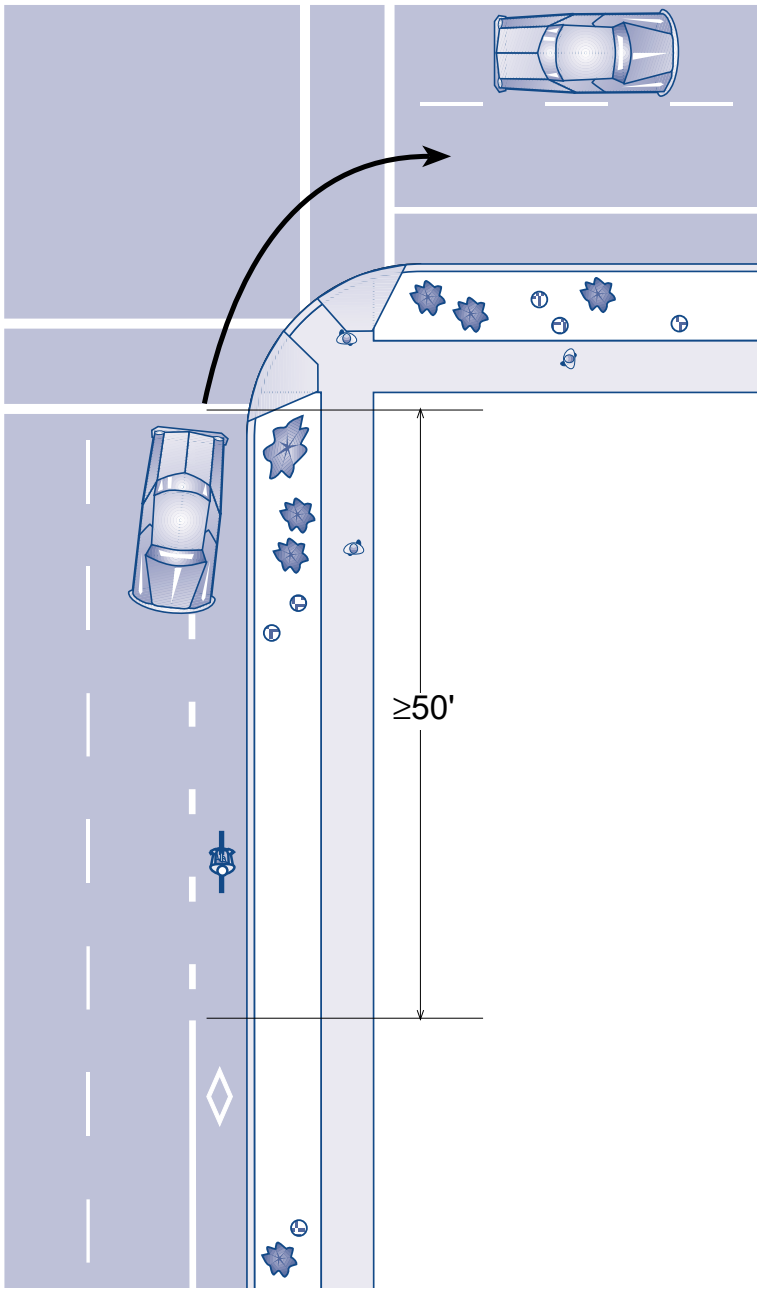
Markingsshouldbeofcoldplastic material. Theyshouldbeplacedafter mostintersectionstoalertdriversand bicyclistsenteringtheroadwaytothe exclusivenatureofthebicyclelanes. Markingsshouldbeplacedafterevery intersectionwhereaparkinglaneis

placedbetweenthebicyclelaneandthecurb. Caremustbetakentoavoidplacingmarkingsinanareawheremotorvehiclesareexpectedtocrossabicycle lane(FigureA4.13). Thisincludesdrivewaysandtheareaimmediatelyafteran intersection.

B2c.Intersections

Bicyclelanesshouldnormallybemarkedtothecrosswalkortoapointwhere turningvehicleswouldcrossthem. Atintersectionswithahighvolumeofright-turningtraffic, itmaybeadvisabletomarkadashedlineforthebicyclelanefor

FIGUREA4.14 **Optionaldashedbikelanelines**



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**

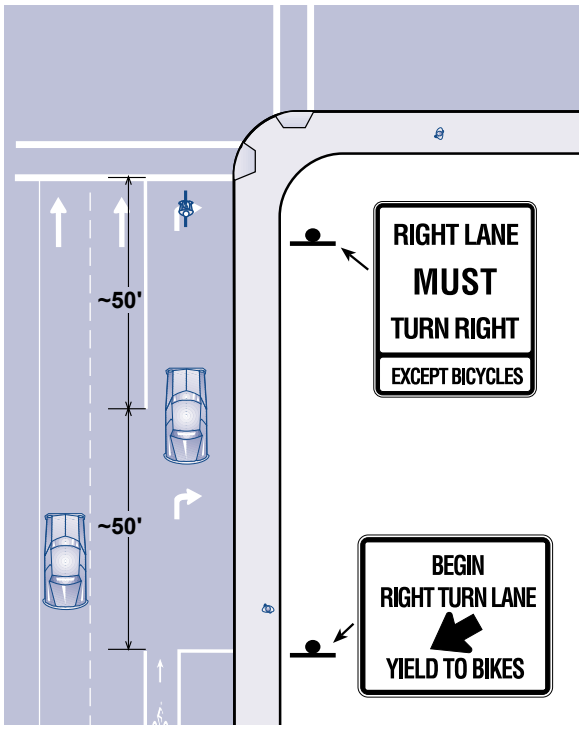
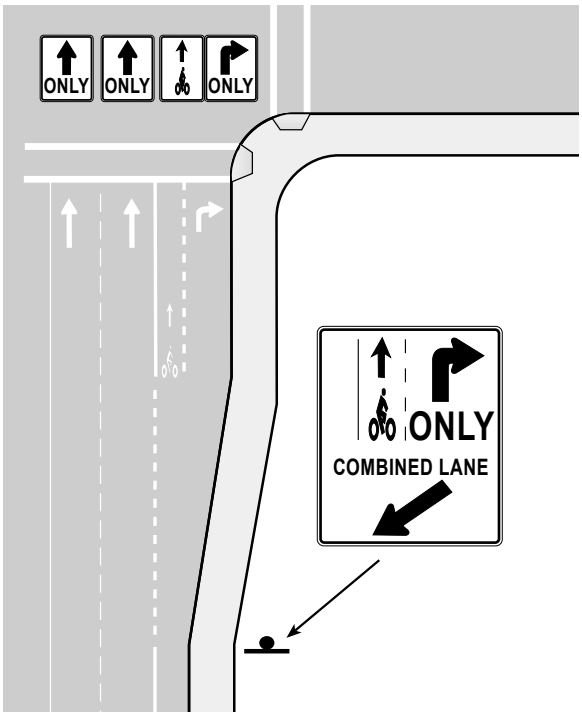


FIGURE A4.16 **ODOT treatment for combined right-turn lane**



FIGUREA4.18 **BikeLaneSignat Right-TurnLane**

B2d.RightTurnLanesatIntersections

Theshortthroughbicyclelanesegmentshouldbemarkedwithtwo8"(200 mm)solidlanelinestotheleftofright-turnlaneandconnectedtothepreced-ingbicyclelanewithdashedlanelines, using3-foot(0.9m)segmentswith9-foot(2.7m)gaps. Thedashedlanelineshouldbecoldplasticmaterial. Amark-ingshouldbeplacedatthebeginningofthethroughbicyclelane. SignR4-4, BEGINRIGHTTURNLANE, YIELDTOBIKES, shouldbeplacedatthe beginningofthetaper(FigureA4.18).

B2e.OuterEdgeofBicycleLane

Ifparkingisallowednexttoabicyclelane, theparkingareashouldbedefined byparkingspacemarkingsorasolid4-inch(100mm)stripe.

FIGUREA4.17 **Dashedbikelanethroughsignalizedintersection**

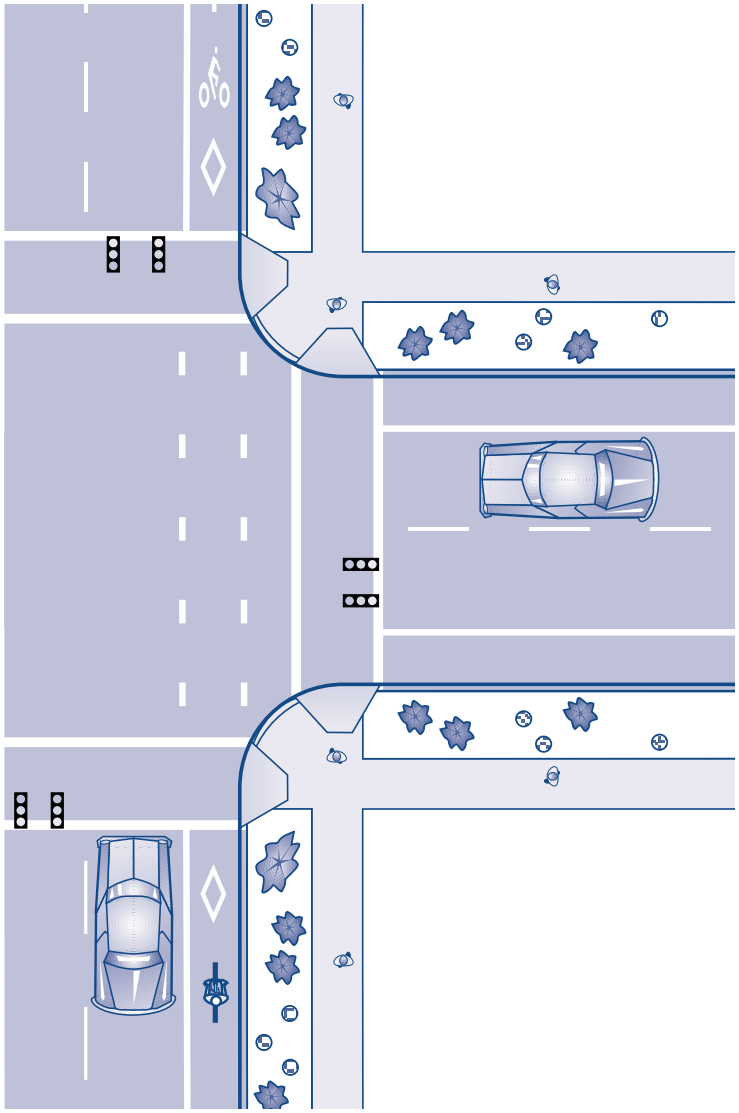


FIGURE A4.19 **Directional Bicycle Route Sign**

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 onto 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 (1.5m) above the path. If a secondary sign is mounted below another sign, it should be a minimum of 4 feet (1.2m) above the path. The signs should have sufficient lateral clearance from the edge of the path: recommended 3 feet (0.9m), minimum 2 feet (0.6m).

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

PartV: Maintenance

Abicyclistisridingontwoverynarrow, high-pressuretires. Whatmayappearto beanadequateroadwaysurfaceforautomobiles(withfourwide, low-pressure tires)canbetreacherousforcyclists. Fairlysmallrockscandeflectabicycle wheel, aminorridgeinthepavementcancauseaspill, apot-holecancausea wheelrimtobend. Wetleavesareslipperyandcancauseabicyclisttofall. The gravelthatgetsblownoffthetravellanebytrafficaccumulatesagainstthecurb, inthareawherebicyclistsareriding. Thus, itisimportanttoproperlymaintain existingfacilities. Bikewayswillalwaysbesubjecttodebrisaccumulationand surfacedeterioration.

Adequatemaintenancewillhelptoprotecttheinvestmentofpublicfundsin bikeways, sotheycancontinuetobeusedsafely. Poorlymaintainedfacilitieswill becomeunusableandtheymaybecomealegalliability. Cyclistswhocontinue tousethemmayriskequipmentdamageandinjury. Otherswillchoosenotto usethefacilityatall.

A. Facility Maintenance Request Program

TheCity' sBicycleFacilityMaintenanceRequestProgram, initiatedinMarch 1994, respondstorequestsforsmall-scale, low-costimprovements, suchas sweeping, repairingsurfaceproblems, andreplacingunsafegratings. Bicyclists canmakearequestintwoways:

- Bysendinginarequestcard. Cardsareavailableatareabikeshops, through interestgroupsandPDOT.
- BycallingtheBicycleProgram(823-7082).

BicycleProgramstaffcatalogueallrequestsandroutethemtotheappropriate BureauofMaintenance(BOM)department. RequestsforworkoutsidePDOT 's jurisdictionaresenttotheappropriatejurisdiction, andrequeststhatareoutside thescopeoftheprogramareconsideredforCapitalImprovementProgram (CIP)orotherfundingsources. Thepersonmakingtherequestiscontacted eitherbyletterortelephoneonceactionistaken.

B.Routine Maintenance

B1. Sweeping

PDOT'scurrentpracticeistosweeparterialstreetsandbridgeseighttoten timesperyear, residentialstreetssixtimesperyear, andthecentralbusinessdistrictsixtimesperweek. PDOT 'sstreetcleaningprogramissubjecttochange basedonfundinglevelsandotherconsiderations.

Eachyear, theBicycleProgramprovidesalistofhighprioritystreetstothe BureauofMaintenance. ThislistwillbeusedbytheBureauinplanning resourceallocationsforstreetcleaningforroutineserviceaswellasforremovingsandingmaterialsusedduringwintersnowandicestorms.

B2. SurfaceRepairs

Asmoothsurface, freeofpotholesandothermajorsurfaceirregularities, should beprovidedandmaintained. Careshouldbetakentoeliminateotherphysical problems. Requestsforsurfaceimprovementsshouldbemadethroughthe BicycleFacilityImprovementRequestProgram.

B3. PavementOverlays

Theseareusuallyidealopportunitiestogreatlyimproveconditionsforcyclists. Butbyignoringtheouteredgeoftheroadway, someconditionsmayworsen. It isparticularlyimportanttoavoidleavingaridgeintheareawherecyclistsride, whichoccurswhereanoverlayextendspart-wayintoashoulderorbikelane. Manyoverlayprojectsofferachancetowidentheroadwayforgreaterbicycle space, ortorestripetheroadwaywithbikelanes.

RECOMMENDATIONS:

- TheBicycleProgramshouldrevieweachpavinglistandworkwithBOMto implementbikelanesduringrepavingwherepossibleandfeasiblegiven streetwidthsandtrafficvolumes.
- Extendtheoverlayovertheentiresurfaceoftheroadwaytoavoidleavingan abruptedge. Ifthisisnotpossible, andthereisadequateshoulderorbike lanewidth, itmaybeappropriatetostopattheshoulderorbikelanestripe, providednoabruptridgeremains.
- Afteroverlays, raiseinletgrates, manholeandutilitycoverstowithin1/4 " (6 mm)ofthepavement.

Inaddition, privatepropertyownerswithgraveldrivewaysalongashoulder shouldpavethedriveway5-10feet(1.5-3m)backfromtheedgeofpavement, or toright-of-way, topreventgravelfromspillingontotheshouldersorbikelanes.

B4. Vegetation

Vegetationencroachingintoandunderthebikewayisbothanuisanceanda hazard. PropertyownersinPortlandareresponsibleforensuringtheirtreesand shrubsdonotcausesafetyproblems. ViolationscanbereportedtotheNuisance ControlDepartmentat823-7306ortotheBicycleProgramthroughtheBicycle FacilityMaintenanceRequestProgram.

B.Routine Maintenance

(continued)

Treerootscausingprematurebreak-upofsurfacesshouldbereportedtothe CityForester(823-4484), whoisresponsibleforapprovingrootremoval.

B5. Signs, StripesandLegends

Itisveryimportantthatbikewaysigns, striping, andlegendsbekeptinaread-ablecondition.

RECOMMENDATIONS:

- Inspectbikewaysignsandlegendsregularly.
- Replacedefectiveandobsoletesignsassoonaspossible.
- Dependingonwear, repaintbikelanesonanannualbasis. Bikelanestripes maywearoutlessoftenonlowertrafficvolumestreetsthanonhighervol-umestreets.
- Usecoldplasticforskipstripingbikelanesacrossrightturnlanes.
- Repairproblemswithbikelanestripingandmarkingsonarequestbasis throughtheBicycleFacilityImprovementProgramorthroughroutinemain-tenance.

B6. DrainageImprovements

Thoughdrainagefacilitiesareusuallywell-designedandconstructedwhennew, theydochangegradesanddeteriorateovertime. Itisoftennecessarytoadjust orreplacecatchbasinstoimprovedrainage. Abicycle-safedrainagegrateatthe properheightgreatlyimprovesbicyclesafety. Sometimessmallasphaltdamsare constructedonhighwayshoulderstodivertstormwaterintocatchbasins. These canbeahazardtocyclists.

RECOMMENDATIONS:

- Raiselowcatchbasingratestotheproperpavementelevation.
- Modifyorreplacenon-standarddrainagegrateswithbicycle-safegrates.
- Repairorrelocatefaultydrainsatintersectionswherethewaterbacksup ontothecurbcutorintothecrosswalk.

UnsafegratesshouldbereplacedonarequestbasisthroughtheBicycleFacility MaintenanceRequestProgramandwheneverbikewayimprovementsaremade, e.g., duringinstallationofnewbikelanesorbikeboulevards.

C.OtherMaintenance Activities

C1. ChipSealing

Chipsealsleavearoughsurfaceforbicycling. Sometimesachipsealwillcover thetravelwayandpartoftheshoulderarea. Thisleavesaraggededgeorridgein theshoulder, withmaterialofdifferentheightandtexture, whichbecomesa problemforbicycling.

C.OtherMaintenance Activities

(continued)

RECOMMENDATIONS:

- Iftheshoulderorbikelanesareamustbechipsealed, theentireshoulder areashouldbecoveredwithawell-rolled, fine-texturedmaterial: 3/8 "-10or finerforsinglepass, 1/4 "-10forsecondpass.
- Sweeptheshoulderareaassoonaspossiblefollowingchipsealoperations.

C2. PatchingActivities

Looseasphaltmaterialsfrompatchingoperationsoftenenduponthe shoulder, wherethelargerparticlesadheretotheexistingsurfacing, causingaveryrough surface.

RECOMMENDATION:

- Sweepfreshloosematerialsofftheroadbeforetheyhaveachancetoadhere tothepavement.

C3. UtilityCuts

Utilitycutscanleavearoughsurfaceforcyclistsifnotback-filledwithcare. Sidewalkcutsshouldberepairedtothesamedegreeofsmoothnessasanew sidewalk.

RECOMMENDATIONS:

- Back-fillcutsinbikelanestothelevelofthe roadway: anexaggeratedhump willnotgetpackeddownbybicycletraffic.
- Exerciseextracarewithcutsparalleltobicycletraffictoavoidaridgeor grooveinthebicyclewheeltrack.
- Back-fillcutsinsidewalkswithconcrete, flushwiththesurroundingside-walkgrade.

APPENDIX A

BICYCLE MASTER PLAN

Part VI: Portland Bicycle Parking Code Requirements

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.

Title 33, Planning and Zoning Code, Bicycle Parking

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.

Title33,Planningand ZoningCode,Bicycle Parking

(continued)

D.Racktypesandrequiredareas

Bicycleracksandthearearequiredforparkingandmaneuveringmustmeetthe standardsoftheOfficeofTransportation(seebelow).

StandardsforBicycleRackTypesandDimensions

A.RackType

1. Theintentoftherackstandardssectionistoensurethatrequiredbicycle racksaredesignedsothatbicyclesmaybesecurelylockedtothemwithout undueinconvenienceandwillbereasonablysafeguardedfromaccidental damage.
2. Bicycleracksmustholdbicyclessecurely, andsupportttheframesothatso thatthebicyclecannotbepushedorfalltoonesideinamannerthatwill damagethewheelsorcomponents.
3. Bicycleracksmustaccommodatelockingtheframeandthefrontwheelto therackwithastandardhigh-securityU-shapedshacklelock, ifthebicyclist doesnotremoveeitherwheelfromthebicycle.
4. Bicycleracksmustbesecurelyanchored.

TABLE266-6 **MinimumRequiredBicycleParkingSpaces**

USECATEGORIES	MINIMUMREQUIREDSPACES
HouseholdLiving	
Multi-dwelling	2, or1per10autospaces
Allotherresidentialstructuretypes	None
Groupliving	1per20autospaces
CommercialCategories	
RetailSalesandServices, Office	2, or1per20autospaces, whicheverisgreater
Drive-UpVehicleServicing, VehicleRepair	None
CommercialParkingFacilities, CommercialOutdoorRecreation, MajorEventEntertainment	4, or1per20autospaces, whicheverisgreater
SelfStorage	None
IndustrialCategories	2, or1per40spaceswhicheverisgreater
ServiceCategories	
Basic Utilities	
ParkandRideFacilities	2, or1perautospaces, whicheverisgreater
Allothers	None
CommunityService, EssentialProviders, ParksandOpenAreas	2, or1per20autospaces, whicheverisgreater
Schools	
Highschools	4perclassroom
Middleschools	2perclassroom
Elementaryschools	2per4thand5thgradeclassroom
Colleges, MedicalCenters, ReligiousInstitutions, DaycareUses	2, or1per20autospaces, whicheverisgreater

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)
Residential Categories	
Multi-Unit Dwellings	2, or 1 per 10 units
Commercial Categories	
Retail Sales & Service	2, or 1 per 5,000 ft2 floor area
Office	2, or 1 per 10,000 ft2 floor area
Service Categories	
Community Service	2, or 1 per 5,000 ft2 floor area
Parks & Open Areas	determined by Conditional Use review
Medical Centers	2, or 1 per 20,000 ft2 floor area
Religious Institutions	2, or 1 per 2,000 ft2 floor area

LONG-TERM BICYCLE PARKING	
USE CATEGORIES	MINIMUM REQUIRED SPACES
Residential Categories	
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
Commercial Categories	
Retail Sales & Service	2, or 1 per 8,000 ft2 floor area
Office	2, or 1 per 3,000 ft2 floor area
Quick Vehicle Servicing	2, or 1 per 3,500 ft2 floor area
Vehicle Repair	2, or 1 per 5,000 ft2 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
Industrial Categories	
Manufacturing	2, or 1 per 7,500 ft2 floor area
Warehousing	2, or 1 per 20,000 ft2 floor area
Service Categories	
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 ft2 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 ft2 floor area, plus 1 per dormitory unit
Medical Centers	2, or 1 per 3,500 ft2 floor area
Religious Institutions	2, or 1 per 2,000 ft2 floor area
Daycare Uses	2, or 1 per 10,000 ft2 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

(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"

(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 or 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"

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"

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.

- 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.

- 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.

- this exemption most commonly applies to rural roads or highways where walkways and bikeways would get very little use.

- 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.

- 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:

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(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 where ever roads are reconstructed, 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

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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

[redacted]

(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.

[redacted]

(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.

[redacted]

(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

(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.

[illegible]

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

[illegible]

(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

[redacted]

[redacted]

(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 an 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.

[redacted]

(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.

[redacted]

(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

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 alongside 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.

(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 e 100 feet before executing the turn.

Oregon Vehicle Code

(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.

(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 bicycle, is a Class D traffic infraction.

(1) A person commits the offense of unlawful passenger 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 passenger on a bicycle, is a Class D Traffic infraction.

(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.

(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.

OregonVehicleCode

(1) Apersoncommitstheoffenseofviolationofbicycleequipmentrequirementsifthepersondoesanyofthefollowing:

(a) Operatesonanyhighwayabicycleinviolationoftherequirementsofthissection.

(b) Istheparentorguardianofaminorchildorwardandauthorizesorknowinglypermitsthechildorwardtooperateabicycleonanyhighwayinviolationoftherequirementsofthissection.

(2) Abicycleisoperatedinviolationtherequirementsofthissectionifanyofthefollowingrequirementsareviolated:

(a) Abicyclemustbeequippedwithabrakethatenablestheoperatortomakethebrakedwheelsskidondry, level, cleanpavement.

(b) Apersonshallnotinstalloruseanysirenorwhistleuponabicycle.

(c) Atthetimesdescribedinthefollowing, abicycleoritsridermustbeequippedwithlightingequipmentthatmeetsthedescribedrequirements.

(A) Thelightingequipmentmustbeusedduringlimitedvisibilityconditions.

(B) Thelightingequipmentmustshowawhitelightvisiblefromadistanceofatleast500feettothefrontofthebicycle.

(C) Thelightingequipmentmusthavearedreflectororlightingdeviceormaterialofsuchsizeorcharacteristicandsomountedastobevisiblefromalldistancesupto600feettotherearwhendirectlyinfrontoflawfullowerbeamsofheadlightsonamotorvehicle.

(3) Nothingcontainedinthissectionshallbeconstruedtoprohibittheuseofadditionalpartsandaccessoriesonanybicyclenotinconsistentwiththissection.

(4) Theoffensedescribedinthissection, violationofbicycleequipmentrequirements, isaClassDtrafficinfraction. [1983c.338 §502; 1985c.16§260; 1985c.69§5]

BicycleHelmetLaw

Sections2, 3, 3a3b, 3cand7ofthisActareaddedtoandmadeapartofORSchapter814.

SEC. 2. (1)Apersoncommitstheoffenseoffailureofabicycleoperatororridertowearprotectiveheadgearifthepersonisunder16yearsofage, operatesorridesonabicycleonahighwayoronpremisesopentothepublicandisnotwearingprotectiveheadgearofatypeapprovedundersection6ofthis1993Act.

BicycleHelmetLaw

(2)Theoffensedescribedinthissection, failureofabicycleoperatororriderto wearprotectiveheadgear, isatrafficinfractionpunishablebyamaximumfine of$25.

SEC. 3. (1)Apersoncommitstheoffenseofendangeringabicycleoperatoror passengerif:

(a)Thepersonisoperatingabicycleonahighwayoronpremisesopentothe publicandthepersoncarriesanotherpersononthebicyclewhoisunder16 yearsofageandisnotwearingprotectiveheadgearofatypeapprovedunder section6ofthis1993Act; or

(b)Thepersonistheparent, legalguardianorpersonwithlegalresponsibility forthesafetyandwelfareofachildunder16yearsofageandthechildoperates orridesonabicycleonahighwayoronpremisesopentothepublicwithout wearingprotectiveheadgearofatypeapprovedundersection6ofthis1993 Act.

(2)Theoffensedescribedinthissection, endangeringabicycleoperatororpas- senger, isatrafficinfractionpunishablebyamaximumfineof$25.

Sec. 3a. Forpurposesofsections2, 3, 5and6ofthis1993Act, "bicycle" has themeaninggiveninORS801.150exceptthat:

(1)Italsoincludesvehiclesthatmeetthecriteriaspecifiedin ORS801.1.50(1) to(4)butthathavewheelslessthan14inchesindiameter.

(2)Itdoesnotincludetricyclesdesignedtoberiddenbychildren.

Sec. 3b. Forpurposesoftheoffensesdefinedinsections3, 3and5(2)ofthis 1993Act, apersonshallnotbeconsideredtobeoperatingorridingonabicycle onahighwayoronpremisesopentothepublicifthepersonisoperatingorrid- ingonathree-wheelednonmotorizedvehicleonabeachwhileitisclosedto motorvehicletraffic.

Sec. 3c. (1)Ifachildinviolationofsection2ofthis1993Actis11yearsof ageoryounger, anycitationissuedshallbeissuedtotheparent, legalguardian orpersonwithlegalresponsibilityforthesafetyandwelfareofthechildforvio- lationofsection3ofthis1993Act, ratherthantothechildforviolationofsec- tion2ofthis1993Act.

(2)Ifachildinviolationofsection2ofthis1993Actisatleast12yearsofage andisunder16yearsofage, acitationmaybeissuedtothechildforviolation ofsection2ofthis1993Actortotheparent, legalguardianorpersonwithlegal responsibilityforthesafetyandwelfareofthechildforviolationofsection3of this1993Act, butnottoboth.

SEC. 4. Sections5and6ofthisActareaddedtoandmadeapartofORS chapter815.

SEC. 5. (1)Apersoncommitstheoffenseofsellingunapprovedbicycleequip- mentifthepersonsellsoroffersforsaleanybicycleheadgearthatisnot

BicycleHelmetLaw

approvedbytheDepartmentofTransportationundersection6ofthis1993Act.

(2)Apersoncommitstheoffenseofunlawfullyrentingorleasingabicycleto anotheriftheperson:

(a)Isinthebusinessofrentingorleasingbicycles; and

(b)Doesnothavebicycleheadgearapprovedundersection6ofthis1993Act availableforrentalforusebypersonsunder16yearsofage.

(3)Theoffensesdescribedinthissectionare ClassDtrafficinfractions.

SEC. 6. TheDepartmentofTransportationshalladoptandenforcerules establishingminimumstandardsandspecificationsforsafeprotectiveheadgear tobewornbypeopleoperatingbicyclesandbypassengersonbicycles. Therules shallconform, insofaraspracticable, tosafetystandardsandspecificationsfor suchheadgearissuedbytheAmericanNationalStandardsInstitute, Snellorthe UnitedStatesDepartmentofTransportation.

SEC. 7. Thefirsttimeapersonisconvictedofanoffensedescribedinsection 2or3ofthis1993Act, thepersonshallnotberequiredtopayafineifthepersonprovestothesatisfactionofthecourtthatthepersonhasprotectiveheadgearofatypeapprovedundersection6ofthis1993Act.

SEC. 8. EvidenceofviolationofSection2or3ofthisActandevidenceoflack ofprotectiveheadgearshallnotbeadmissible, applicableoreffectivetoreduce theamountofdamagesortoconstituteadefensetoanactionfordamages broughtbyoronbehalfofaninjuredbicyclistorbicyclepassengerorthesurvivorsofadeceasedbicyclistorpassengeriftheBicyclistorpassengerwas injuredorkilledasaresultinwholeorinpartofthefaultofanother.

SEC. 9. ThisActbecomesoperativeonJuly1, 1994. Priortothattime, the DepartmentofTransportationshalladoptandpublishtherulesdescribedin section6ofthisAct.

CityofPortland Title16

16.70MiscellaneousRegulations

16.70.300 Bicycles

16.70.310 Person Riding Bicycles To Obey Traffic Regulations

Everypersonridingabicycleuponaroadwayissubjecttostatelawandthe provisionsofthisTitleapplicabletothedriverofavehicle, exceptstatelawand thoseprovisionsofthisTitlewhichbytheirverynaturecanhavenoapplication.

16.70.320 Operating Rules

Nopersonmay:

A. leaveabicyclesothatitobstructsvehicleorpedestriantrafficonaroadway, sidewalk, driveway, handicapaccessramp, buildingentrance, orsothatit preventsoperationofaparkingmeterornewspaperrack;

B. leaveabicyclesecuredtoafirehydrantortoapoliceorfirecallbox;

CityofPortland Title16

C. leaveabicycleonprivatepropertywithoutconsentoftheownerorlegal tenant. Consentisimpliedonprivatecommercialproperty;

D. leaveabicycleonastreetorotherpublicpropertyformorethan72hours; or

E. rideabicycleonasidewalk, unlessavoidingatraffichazardintheimmediatearea, withintheareaboundedbyandincludingSWJefferson, Front Avenue, NWHoytand13thAvenue, except:

1. onsidewalksdesignatedasbikelanesorpaths;
2. ontherampsorapproachestoanyWillametteRiverBridge; or
3. intheareafromthewestpropertylineofSWNinthAvenue, totheeast propertylineofSWParkAvenue; fromthepropertylineofSWJefferson tothesouthpropertylineofSWSalmonStreet; commonlyknownasthe SouthParkBlocks.
4. forpoliceorspecialofficersoperatingabicycleinthecourseandscopeof theirduties; or
5. foremployeesoftheAssociationforPortlandProgressandcompanies providingsecurityservicesoperatingabicycleinthecourseandscopeof theirduties. Theseemployeesmusthaveinpossessionanidentification cardissuedbytheChiefofPolicecertifyingtheriderhascompleteda trainingcourseintheuseofabicycleforsecuritypatrol.

16.70.330 Impounding Bicycles

A. Abicycleleftonastreetotherpublicpropertyformorethan72hoursmay beimpounded.

B. Abicyclemaybeimmediatelyimpoundedif:

1. itisparkedinviolationofthiscodeandobstructsorimpedespedestrian orvehiculartraffic; or
2. itisanimmediatethreattothepublicwelfare.

C. Theimpoundingagencymustmakereasonableeffortstonotifytheownerof theimpoundmentandadescriptionofhowandbywhatdatethebicycle mustbeclaimed.

D. Afeemaybechargedtotheownerofanimpoundedbicycle. Noimpoundmentfeewillbechargedtotheownerofastolenbicyclethathasbeen impounded.

E. Animpoundedbicyclethatremainsunclaimedafter30daysmaybedisposedofinaccordancewithcityproceduresfordisposalofabandonedor lostpersonalproperty.

16.70.340 Renting Bicycles

Nopersonmayrentabicycletoanotherpersonunlessthebicycleisequipped asrequiredbystatelaw.

CityofPortland
Title16

16.70.400 Other Transportation

16.70.410 Roller Skates and Skateboards

A. Nopersonmayuserollerskates, includingin-lineskates, askateboard, or othersimilardeviceuponanystreet(roadwayand/orsidewalk)withinthe areaboundedbyandincludingSWJefferson, FrontAvenue, NWHoytand 13thAvenue, exceptwherespecificallydesignatedasallowedbytheCity TrafficEngineer.

B. Nopersonmayuserollerskates, includingin-lineskates, skateboard, orother similardeviceuponanystreetwithintheCitybetweenthehoursofsunset andsunrise.

BICYCLE MASTER PLAN

CentralCityTransportation ManagementPlan

BicycleMovement PoliciesandActions

TheBicyclePoliciesandactionsarederivedfromtheBicycleTransportationStudy (July1993)conductedaspartoftheCCTMP. Thestudyfocusedonhowtosupportbicyclingasaseriousmodeoftransportationthatcanhelptominimizecongestion, improveairquality, andreducevehiclemilestraveledpercapita.

Abicycleusersurveyidentifiedthefactorsthatencourageordiscouragepeople fromusingabicyclecommutetoandfromtheCentralCity. Manyofthefactors discouragingbicycleuse, suchaslackofon-roadbicycleways, inaccessible bridges, lackofend-of-tripfacilities, andbridgeimprovements, areaddressedby theBicyclePoliciesandtheirassociatedactions.

Policy8: BicycleMovement

Explanation: Giventhecurrentneedsofthebicyclingcommunityandthepolicy andplanningrequirementsinplaceatthestate, regional, andlocallevels, the questionisnotwhetherafunctionalbicycletransportationsystemshouldbe developed, buthowtheCityandotherresponsiblejurisdictionswillgoaboutit.

Policy 8.1: Bicycle Mode Split

ImprovethebicyclenetworktosupporttheCCTMPmodesplitgoalsfor home-basedwork(HBW)trips, recognizebicyclingasanimportantmodeof transportation, andencouragegreateruseofbicyclesforalltypesofutilitarian andrecreationaltrips.

Explanation: Increasingthepercentageofperson-tripsthataretakenviabicycle willhelptoreducetrafficcongestionandimproveairquality. Thesebenefits willbemostquicklyrealizedbyconvertingautomobilecommutetripstobicycle, transit, andwalkcommutetrips. Improvementsneedtobemadeinsupport ofthebike/walkHBWmode-sharegoal, butitisequallyimportanttofocuson increasingthebicyclemodeshareoftripstakenforotherpurposes.

Policy 8.2: Bicycle Trip-End Facilities

Supporttheprovisionofbicycleparking, locker, andshowerfacilitiesbytheprivateandpublicsectortoaidinachievingthebicyclemodesharegoal. IncorporateincentiveprogramsasapreferredmeansofprovidingforthesefacilitiesasapartofimplementationoftheTransportationPlanningRule.

BicycleMovement PoliciesandActions

Explanation: Thispolicyrecognizestheprivateandpublicsectors'rolesinprovidingfacilitiestosupportthebicyclemodeoftravel. Thepolicyrecommends thatincentivesbeusedasameanstoensurethatbicyclefacilitiesandparking aboverequiredratiosareprovidedbytheprivatesector. Changestorequirementsandincentivesforbicycleparkingandfacilitiesarebeingexaminedas partoftheCity' seffortstocomplywiththeTransportationPlanningRule.

Policy 8.3: Bicycle Access
EnsurethatallpublicstreetsandpublicwayswithintheCentralCity, except freeways, expressways, andexclusivetransitways, areaccessibletobicycles. Accommodatetheneedsofbicyclistsasappropriateoneachstreet, basedon theTraffic, Transit, Bicycle, Pedestrian, andTruckdesignationsoftheright-of-wayintheStreetClassificationsandDescriptionsoftheCCTMP.

Explanation: Thedegreeofaccommodationprovidedtobicycles, particularlyon non-bicyclenetworkstreets, shouldbedeterminedbythecombinationofstreet classificationsassignedtothestreet. Guidelineswillbedevelopedtohelpdetermine whatlevelofaccommodationforbicycleandothermodesisappropriate inanygivencase.

Policy 8.4: Bicycle Network
Provideanetworkofbicycleroutesweretheneedsofbicyclistsreceivedue considerationbasedonthemodesplitgoalsintheCCTMP. Thebicyclenetwork should, ataminimum, provideforbicycleaccesstotheCentralCityfromall areasoftheCityandalsoprovideforconnectionsbetweenmajorattractions, suchasthoseidentifiedontheCentralCityPlanmap. CentralCityBicycle Routesshould:

- Bedirect. Thenetworkshouldconnectareasandsitesinasdirectalineas possible.
- Minimizeconflictsbetweenbicyclesandmotorizedvehicles. Whenturning movementorotherconflictpointsareunavoidable, trafficdesignsshould accommodatethesafetyneedsofbicyclists.
- Berelativelyobstructionfree. Obstructions, suchasstairs, surfacehazards, lackofadequateshoulders, etc. shouldnotexistonthebicyclenetwork routes. Wheretheydo, theyshouldbeeliminated.
- Becomplete. TheCitywillsupportcompletionofregionalbicycleroutesegmentsthatconnecttotheCentralCity.

Explanation: Whileallpublicstreets(exceptfreewaysandcertainexpressways) shouldbeaccessibletobicycles, CentralCityBicycleRoutesarethoseroutes wherethebicycletransportationmodeisprovidedspecialconsideration. Public improvementprogramstofacilitatebicycletravelshouldbeginwithCentral CityBicycleRoutes.

BicycleMovement PoliciesandActions

Policy 8.5: Bicycle Connections

Thebicyclenetworkshouldbeintegratedwithothertransportationsystemsto accommodatecommutingandothertripsbybicycle. Safe, direct, andcontinuous bikewaysfreeofunnecessarydelaysshouldbeprovidedalongallurbanarterial andmajorcollectorroutes. Thebicyclenetworkshouldconnectnewresidential developmentdistrictstoexistingresidentialareasandcommercialdistricts.

Explanation: TheTransportationPlanningRuleandotherstatemandatesrequire bikewaysonarterialsandmajorcollectorswhichconnectnewresidentialand commercialdevelopmenttootherresidentialareas, transitstops, andactivity centers.

BICYCLE ACTION ITEMS

1. Implementationstrategies

a. UsetheCity 'sCapitalImprovementProgramfundingprocesstophasein implementationoftheCentralCityBicyclePlan.

b. IncorporateneededCentralCityBicycleRouteimprovementsintostreet constructionandreconstructionprojects.

c. Retrofitexistingstreetswithbicyclefacilitieswheneverreasonableopportunitiesexist.

2. BicycleNetworkFacilities

a. Implementtheneededchangestorealizeanintegratedandcompletebicycle networkconsistentwiththeCCTMPBicycleNetworkMapwithin6years.

b. Increasetheuseofdirectionalsigningforbicyclestoclearlyindicatenetwork routes.

c. Provide "bicyclepriority" atappropriateintersectionsthroughtheuseofseparatebicyclesignals, advancedstoplines, etc.

d. Providebikewaystoallowmovementduringperiodsofpeakcongestion.

e. Improvebicycle, pedestrian, anddisabledaccessibilityintheSouth Auditorium "superblocks."

3. Trip-EndFacilities

a. ExpandtheCity 'sprogramofprovidingfreebicyclerackstoassuresecure bicycleparkingoneverycityblockwithintheCCTMP.

b. Encourageretrofittingorreplacingbikerackstoserveusersofolderbuildingsthroughpublicandprivateeffortstoensurethatatleast1000usable racksareavailablebytheyear2000and1500bytheyear2005.

c. Increasethenumberofpublicbicyclelockersavailabletomeetdemand. Considercoinoperatedlockersforcasualuse.

d. Build "bikecentral" facilitiesinstrategiclocations.

e. Providesecureparkingtomeetdemandatallexistingandfuturetransit centers.

BicycleMovement PoliciesandActions

4. Regulations

a. EnforceZoningCoderequirementsforbicycleparking.

b. Encourageandprovideincentivesforemployerstoprovidesubsidiesto employeescommutingbyalternativemodes, includingbicycles.

c. Allowbusinessestotaketaxdeductionsforemployeebenefitsrelatingto bicycleuseuptotheamountprovidedforautouse.

d. Providetaxcreditsforemployersbasedonemployeebicycleuse.

e. Provideincentivesfortheprovisionofemployee-accessiblelockersand showersinallnewofficebuildingswithover20employees.

f. ProvideFARbonusesforbicyclefacilitiesprovidedabovetherequiredmini-mums.

5. Promotion

a. Developprogramstoencouragetheprovisionofbicycleparking.

b. Provideinformationabouttheavailabilityandlocationofbicycleparking, lockers, andshowers.

c. Helpemployerspromotebicycleuse.

d. Supportbicycleeducationprogramsinschoolsandencouragetheuseof bicyclesbystudents.

e. Supportbicycleeducationprogramsforchildrenandadults.

f. Supporteducationprogramsonthebenefitsofbicycleridingtomotorists.

g. Scheduleweekendclosuresofselectedstreetstoallowandencourageuseby pedestriansandcyclistswithconsiderationtotheneedsofadjacentland uses.

h. ImplementaCity-sponsored "sharetheroad" campaign.

i. Encouragetheestablishmentanduseof "bicyclepools." ActivatetheCity's "bicyclepool" program. (Bicyclepoolsareanumberofbicyclesthatare sharedamongusersofabuilding, business, neighborhood, etc.)

6. BicyclesandTransit

a. Expandthe "BikesonTransit" programsothatallbusesandtrainscancarry bicyclesatallhours.

b. Supportpurchaseoftransitvehiclesthataredesignedtoaccommodate bicycles.

Note: Actionitemsareproposedtobeadoptedthrough CityCouncilResolution. Theseitemsare suggestionsonhowtheCentralCitycanbeimprovedTheActionItemslistedareastartingplace. Additionalstudiesandevaluationsaretobeundertaken. Somewillneedtobemodified, orinsome cases, replacedwithotherproposalsfoundtobebetterormorefeasibleforimplementationafter theappropriatereviewprocess.

CentralCity Transportation ManagementPlan BicycleDescriptions

4.1 CentralCityBikeways

Functional Purpose

CentralCityBikewaysareintendedtoprovidesafe, direct, andconvenientbicycleaccessbetweenandwithintransportationdistrictsandsub-districts. Adequatespacewithintheright-of-wayandotherformsofaccommodation shouldbeprovidedsuchthatcyclistswithmoderateskilllevelsenjoyasenseof safetyandconveniencewhenusingtheroute. CentralCityBikewaysshouldbe designatedonstreetsthatprovideaccesstotransportationdistricts; serve, or havethepotentialtoserve, highbicycletraveldemand; orarelocatedatconfluencesinthetransportationsystem, suchasatbridges, viaducts, transitstations, andothertransportationcenters. TheCentralCityBikewaymaybeshiftedtoa parallelstreetwherethestreetcanbedesignedtoaccommodatebicycles throughacapitalimprovementproject.

Design Treatment and Traffic Operations

TrafficOperations. StreetsdesignatedasCentralCityBikewaysshouldoperate sothatbicyclesmaynegotiatetherouteatleastassafelyandeasilyasother transportationmodes. Inordertoaccommodatebicycles, modificationstoroadwayoperationsmaybewarranted. Suchmodificationsmayinclude:

a. reductionofmixed-usetravellanewidths,

b. reductioninthenumberofmixed-usetravellanes,

c. relocationoftransitstopswheretransitoperationsarenotnegatively impacted,

d. removalofon-streetparkingexceptwhereitisdeterminedtobecriticalto adjacentlanduses, and

e. measurestoreducetrafficvolumeorspeed.

INTERSECTIONS. IntersectionsofbikewayswithRegionalTrafficways, Major CityTrafficStreets, TrafficAccessRoutes, andDistrictCollectorStreetsshould besignalized. Considerationshouldbegiventoallowingcycliststoutilize "transitpreference" improvements–allowingbicyclistsa "jumpstart" alongwithtransit–atsuchintersections. IntersectionswithNeighborhoodCollectorStreets shouldprovideforsafeandconvenientbicyclecrossing. Wherepossible, stop sign-controlledintersectionsonCentralCityBikewaysshouldforceopposing traffic, ratherthanbicycletrafficontheroute, tostop.

SURFACE TREATMENT. CentralCityBikewaysshouldbepavedandmaintainedsothatbicyclistscansafelyandeasilytravelonthem.

SIGNS AND MARKINGS. CentralCityBikewaysshouldbesignedassuch, andprovidedirectionalsignsandmarkingstoguidecyclistsontheirroutes.

Designtreatmentoptionsare:

BICYCLE LANES. Markedon-streetbicyclelanesshouldbeprovidedon CentralCityBikewayswherebothautospeedsandtrafficvolumesarehigh,

CentralCity Transportation ManagementPlan BicycleDescriptions

wherethedifferencebetweenautospeedsandbicyclespeedsissubstantial(e.g. uphills), orwhereotherwiseneededtoenhancebicyclistsafety. Bicyclelanes shouldbedevelopedinamannerthatprovidesforroutecontinuity. Theinstallationofbicyclelanesonshortorfragmentedstreetsegmentsshouldbeavoided unlesstheyprovideanecessaryconnectionorsurmountabarriertosafebicycle travel.

SHARED ROADWAY. Wherebicyclelanesaredesirable, butcannotbeprovidedduetotheconstraintofroadwaywidth, andbicyclesmustshareatraffic lanewithmotorvehicles; anextra-widecurblaneshouldbeprovided. On CentralCityBikewaysthatarealsoclassifiedasLocalServiceStreets(SE Ankeny, SESalmon, andNECouch), trafficcalmingmeasuresmaybeusedto provideprioirityforbicyclists.

APPENDIX D

BICYCLE MASTER PLAN

BicycleMasterPlan PublicProcessand MethodologyforSelecting RecommendedBikeways

PublicProcess

TheBicycleMasterPlanwascreatedoverthepasttwoandhalfyearswithinput fromover2000residents. ThePlanwasdevelopedintwophases.

Phase1—InitialEducationandOutreach

ThecompletereportonPhase1(InitialEducationandOutreach)isavailable fromtheBicycleProgram. Tosummarize, theeducationphasewasintendedto:

1. Provideinformationabouttheimportanceofplanningforthebicyclemode oftransportation.
2. Providethemeansavailabletomakethecitysaferandmoreattractiveto bicyclists(e.g., bicyclelanes, bicycleboulevards, multi-usetrails, end-of-trip facilities, bicyclesonTri-Met).
3. Engageparticipantsinactivelyhelpingdesigntheplan.
4. Encourageparticipantstospreadthepositivemessageabouttheeffectof bicyclesonPortland' slivability.
5. Learnwhatparticipantslikeanddislikeaboutbicyclinginportlandtoday, wheretheywouldliketobicycleifbetterbicycletransportationfacilities wereprovided, andwhichtypesofbicyclefacilitiesbestservetheirneeds.

OverafourmonthperiodintheSpringof1994, theCity 'sBicycleAdvisory CommitteeandBicycleProgramhostedaseriesof12two-hourpublicforums. Theworkshopswereadvertisedbyaflyersenttoover12,000households, as wellaseveryneighborhoodandbusinessassociationandmediaoutlet. Each workshopwasannouncedintheOregonianandinneighborhoodnewsletters. Theflyeralsoofferedtheavailabilityofbicycleprogramstafftospeaktoany interestedgrouponanindividualbasis.

Phase 1 Forums

February15	NorthwestServiceCenter
February17	GrantHighSchool
February19	RoseCityParkUnitedMethodistChurch
February22	MultnomahCommunityCenter
February26	BensonHighSchool
February28	MarshallHighSchool
March1	Lewis&ClarkCollege

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March2	PortlandStateUniversity
March16	PortlandBuilding
March19	UniversityofPortland
March24	ClevelandHighSchool
April9	FloydLightMiddleSchool

Ateachoftheseforums, participantsdiscussedgoodandnot-so-goodfeaturesof bicyclinginPortland, learnedaboutwaystomakePortlandmorebicyclefriendly, andmulledoverwaystolinkkeydestinationswithpreferredtypesoffacilities. Participantsalsodiscussedtheroleofactivisminpromotingbicyclingand participatedinasurveyonpreferredbikewayfacilities.

BicycleProgramstaffalsogavepresentations(inmostcasesaslideshow)tothe followinggroups, anddistributedasurvey. The25groupsthatinitiallyhosted BicycleProgramstaffarelistedbelowandtheysubsequentlymetwithanother 15-20groups. Inall, over600peoplecametoaPhase1MasterPlanforumof presentation.

Additional Phase 1 Presentations

AppropriateTechnologyGroup
Beaumont-WilshireNeighborhoodAssociation
BicycleTransportationAllianceBoardofDirectors
BikeGalleryAdvocatesNight
BureauofPlanning
BureauofTrafficManagement
BureauofTransportationPlanning
CentralEastsideLionsClub
CentralNortheastNeighborsBoardofDirectors
CH2MHill, Inc.
ClubGnarly
EastPortlandDistrictCoalitionTrafficCommittee
HollywoodLionsClub
IDC, Inc
KPFF, Inc.
MultnomahCountyBicycleAdvisoryCommittee
North/NortheastBusinessAssociationLand-UseCommittee
OregonCatholicPress
OregonLeagueofConservationVoters
PortlandWheelmenTouringClub
PortlandAreaBikeDealers 'Association
PortlandStateUniversityTrafficManagementClass
PortlandUrbanMountainPedalers
REI
ReturnedPeaceCorpsVolunteersofPortland
SouthwestNeighborhoodInformation, Inc., TrafficCommittee
StandardInsuranceCorporation
SunnysideNeighborhoodAssociation
Vancouver, WABicycleAdvisoryCommittee

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Resultsoftheseforumsandpresentationsareincludedinthenextsection. Inall over600peopleparticipatedinaforumorpresentation.

Additional Phase 1 Events

Inaddition, BicycleProgramstaffparticipatedinthefollowingevents, attended byhundredsofadditionalpeople. Surveyswerealsodistributedattheseevents.

February26	RegionalRailSummit
March11-12	PortlandBikeShow
March11	SouthwestNeighborhoodInformation, Inc. Traffic/TransportationForum
April9	EastPortlandDistrictCoalitionTraffic/TransportationForum
April16	NorthPortlandLibraryFair
April16	ParkroseNeighborhoodAssociationCommunityForum
April22	WalkYourTalkFair

Results

Theresultsofthesurveys, groupexercises, anddiscussionswerenotsurprising, consideringthattherearemanydifferenttypesofbicyclistswhooftenwantdifferenttypesoffacilities. Phase1madeitclearthattheCityshouldprovidea combinationoffacilitytypes: on-streetbicyclelanes, bicycleboulevards, andoff-streetpaths. Themostprevalentviewsexpressedduring Phase1includethefollowing.

From the Workshops

- Mostexistingbicycletransportationfacilitiesgethighkudos, yetthelackof connectionsbetweenfacilitiescausesthegreatestfrustration.
- Bicyclelanesonmajorroadsarethemostfavoredbicycletransportation facility.
- Bicycleboulevardsarehighlyfavoredaswell, particularlyforattractingnew users.
- Off-streetpaths(multi-usetrails)arenotthemostcosteffectivebicycle transportationfacility, buttheydoattractnewcyclists.

From the Survey

- 88percentofthosewhocompletedaBicycleFacilityPreferenceSurveysaid theywouldbicyclemoreoftenfordailytrips —particularlywork, errands, andrecreation—ifagoodsystemofbicyclefacilitieswereprovided.
- Overfortypercentwouldliketoseeabikewaysystemconsistingofacombinationofbicyclelanesandbicycleboulevards.

Best/Worst Features of Bicycling in Portland

AtthebeginningofeachBicycleMasterPlanForum, staffasked, "whatarethe bestandworstfeaturesofbicyclinginPortland? " Theanswersvariedfromspecificlocations(e.g., "IliketheBurnsideBridgebicyclelanes " and "Idislike BurnsideStreet")tobehavior("theworstisinconsiderate motorists "). Participantsgenerallyapprovedofexistingbicycletransportationfacilities(e.g.,

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bicyclelanes, neighborhoodstreetswithtrafficcalmingmeasures, andoff-street paths, buttheydislikedthelackofconnectivitybetweenthesefacilities. Bridge accessandbridgecrossings(orlackthereof)wereconsistentlygivenpoormarks. Manytimesthesamefeatureappearedonboth____ the "best" andthe "worst" lists. Forexample, peoplelikemuchoftheI-205bicyclepathitselfbuthatethe roadwaycrossings, thelackofmaintenance, andthelackofconnectionstothe path. Atalloftheforums, peopleexpressedfrustrationatthebehaviorofinconsideratemotorists. Ontheflipside, somealsoexpresseddislikeofothercyclists ' behavior(e.g., blatantlyrunningredlights, goingthewrongwayonthe HawthorneBridgesidewalkoronone-waystreets), whichtheyfeeltarnishes thebicyclistsimage.

Althoughthe "best" and "worst" listsdidnotprovideacompletepictureofbicyclingconditionsinPortland, theydidindicatethedirectionbeingtakenandthe areaswheremajorimprovementsareneeded. The "best" and "worst" listsare availableuponrequestfromtheBicycleProgram.

Phase 2: Master Plan Design

FollowingPhase1, theBicycleMasterPlanSteeringCommitteebegantomeet monthlytodesignthefirstMasterPlandraft. AlistoftheSteeringCommittee membersisontheinsidecoverofthisPlan. TheresultsofthePhase1initial outreacheffortswereusedasguidinginformationindesigningthefirstdraft.

FromJune1994toMarch1995, BicycleProgramstaff, withtechnicaladvice fromotherbureausandguidancefromtheSteeringCommittee, workedonthe "PreliminaryDiscussionDraft " (April1995). Thisdraftwasdistributedtoover 500people. Aflyerwassentannouncingitsavailabilityaswellasanothernine publicforumstoreviewthedraft. Theseforumswereheldinconjunctionwith thePedestrianPrograminthedesignofthePedestrianMasterPlan. Again, this flyerwasdistributedwidelybydirectmail, andtheinformationannouncedin newslettersandnewspapers.

Theworkshopswereasfollowsin theSpringof1995:

March30	MultnomahArtCenter, heldinconjunctionwiththePlanning BureauftheSouthwestCommunityPlan
April5	NorthwestServiceCenter
April6	RoseCityParkChurch
April8	OregonHealthSciencesUniversity, heldinconjunctionwith thePlanningBureauftheSouthwestCommunityPlan
April20	GrantHighSchool
April25	FloydLightMiddleSchool
April26	RooseveltHighSchool
May2	ClevelandHighSchool
May17	PortlandBuilding

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Theworkshopswerewellattended, withover500participants. Allthesecommentswerereviewedbystaffandthe SteeringCommittee, andmostintegrated intothenextdraft(publishedSeptember1995).

ThePreliminaryDiscussionDraftwasalsoreviewedinternallyandbytheCity 's BicycleAdvisoryCommittee, theBicycleTransportationAlliance, andthe BicycleMasterPlanSteeringCommittee. Allneighborhoodandbusinessassociationswereinvitedtocomment. Severalhundredwrittenandoralcomments werereceivedinperson, andbyfax, mail, E-mail, andphone. Thecomments wereassimilatedandincorporatedintothedraftwherepossible. Changeswere madebasedonthispublicinput, SteeringCommitteeadvice, andstaffreview.

InSeptember1995, therevisedraftBicycleMasterPlanwaspublishedanddistributedtoover500interestedpartiesthroughoutthecommunity. Finally, four additionalpublicopenhouseswereheldtoreviewtheSeptember1995draft. Theseforumswereheldinconjunctionwith TransportationPlanningandthe PedestrianPrograminthedesignofthePedestrianMasterPlanandthe TransportationSystemPlan. Theopenhouseswereasfollows:

November6	BensonHighSchool
November13	GrayMiddleSchool
November14	SoutheastUplift
November16	NorthwestDistrictAssociationServiceCenter

Thecommentsfromtheseforumswerealsoassimilated, reviewedbythe SteeringCommitteeandstaff, andincorporatedwherepossibleintothisfinal BicycleMasterPlan. Thecommentsfromallthepublicforumsareavailable uponrequest.

Methodologyfor Selecting Recommended Bikeways

TheRecommendedBikewayNetworkstreetswereselectedusingthefollowing process:

1. BicycleProgramstaffreviewedandassimilatedallpreviousplansfor BikewaysinPortland, including: the1973 "BicycleFacilitiesforPortland " Plan, ImprovementoftheSWSunsetBlvd-SWDoschRdBikeway(1977), Reed-HawthorneBicycleRouteStudy(1985), AnalysisoftheReed-HawthorneBicycleRoute(1987and1988), UpperSoutheastCorridor BicycleRouteStudy(1986), OuterCentralCorridorBicycleRouteStudy (1987), LowerSoutheastCorridorBicycleRouteStudy(1987), An EvaluationoftheAnkeny-BurnsideBicycleRoute(1987), NEFremont StreetBikewayProject(1989), LowerNortheastCorridorBicycleRoute Study(1989), AlbinaCorridorBicycleRouteStudy(1989), Northeast BikewaySigningandImprovementPlan(1991), SWTerwilligerBoulevard BikewayProject(1991), NorthPortlandBikewayImprovementPlan(1993), CentralCityTransportationManagementPlan(CCTMP)BicycleStudy (1993), andthefinalCCTMP(adoptedDecember, 1995). Inaddition, staff reviewedthepreviousbikewayclassificationsintheTransportationElement oftheCity 'sComprehensivePlan, andincludedthebicycle-relatedrecom-

Methodologyfor Selecting Recommended Bikeways

mendationsfromalltheneighborhoodandcommunityplans.

2. BicycleProgramstaff, withinputfromtheBicycleMasterPlanSteering Committeeandotherinterestedresidents, proposedasystemofbikeways forfurtherreviewthatmetthefollowingcriteria:
   - Connectcyclistst odesireddestinations, suchasemploymentcenters, commercialdistricts, transitstations, universities, schools, andrecreational destinations;
   - Providecontinuitywiththeregionalbikewaysystemproposedby Metro, thusprovidingconnectionswithneighboringbikewaysinMultnomah, Washington, andClackamasCounties;
   - Providethemostdirectroutespossible; and
   - Provideabikewayapproximatelyeveryhalfmile.
3. Forstreetsproposedforbicyclelanes, staffcollectedthefollowing information:
   - Trafficvolume(averagedailytraffic)whereexistinginformation wasavailable
   - Streetwidth
   - Numberofexistingtrafficlanes
   - Presence/absenceofcurbs
   - Availabilityofparking, parkingusage, andtheneedforon-streetparking
   - Otherrelevantobservations
4. Forstreetsproposedforbicycleboulevards, staffcollectedthefollowing information:
   - Trafficvolume(averagedailytraffic)whereexistinginformation wasavailable
   - Streetwidth
   - Presence/absenceofcurbs
   - Availabilityofparkingandparkingusage
   - Stopsignpresenceateachintersection
   - Difficultycrossingmajorintersections
   - Surfacequality
   - Otherrelevantobservations

Methodologyfor Selecting Recommended Bikeways

5. Whenthemostdirectroutebetweendesireddestinationsoccurredon streetswhereconstraintswereknowntoexistsuchastopographical problemsandlackofwidth, etc., staffsurveyedalternativeparallelstreets wherepossible.

6. Staffranaseriesofdataanalysestodeterminethefeasibilityofbicyclelanes. Theanalysesincluded:

   - Queryofstreetwidthmaintainingexistingcrosssectionusingminimum acceptablemotorvehicletravellaneandparkinglanewidths. [Street widthminus(numberoftravellanestimes10feet)minus(numberof parkinglanestimessevenfeet)]Theremainingspace, ifany, wascross checkedwithneededbicyclelanespace(fivefeetforaone-waystreet, 10feetforatwo-waystreet.)

   - Queryofstreetwidthwithonesideofparkingremovedonstreetswhere parkingremovaldifficultywasjudgedtobelow. [Streetwidthminus (numberoftravellanestimes10feet)minussevenfeet]. Theremaining space, ifany, wascrosscheckedwithneededbicyclelanespace(fivefeet foraone-waystreet, 10feetforatwo-waystreet.)

   - Queryoftravellaneremovaleffectonmotorvehiclecongestion. [Maximumaveragedailytraffic(ADT)overagivenlegdividedbythe numberofexistinglanesminusone.]Ifthestreet 'slanesweretocarry morethan10,000ADTeachafterlaneremoval, bicyclelaneimplementationwasjudgedtobelessfeasible, althoughnotimpossible.

7. Staffranaseriesofqueriesonproposedbicycleboulevardsuitabilityincluding:

   - Numberofmajorunprotectedintersectionsasapercentageoftotal intersectionsalongagivenleg.

   - Numberofintersectionswithstopsignsfavoringthebicycleboulevard.

   - Averagesurfacequalityalongagivenleg.

   - Compositebicycleboulevardsuitabilityratingcombiningthelatterthree factorswithADTandstreetwidth.

8. BasedontheresultsofthesequeriesstaffadjustedtheRecommended BikewayNetworkwhilestillstrivingtomeetthecriteriastatedabove. For streetswherebicyclelaneorboulevardimplementationwasshowntobe relativelyunfeasible, andnoalternativebikewaywassurveyed, furtherstudy corridorswereidentifiedfordatacollectionandanalysis.

9. ThePreliminaryDiscussionDraftBikewaysNetwork(April1995)was reviewedinternallyandthrough10publicforums, andbytheCity 'sBicycle AdvisoryCommittee, theBicycleTransportationAlliance, andtheBicycle MasterPlanSteeringCommittee. Inaddition, theBicycleProgramdistributedmorethan600copiesofthedraftatthepublicforumsandtoother

Methodologyfor Selecting Recommended Bikeways

interestedparties. Allneighborhoodandbusinessassociationswereinvited tocomment. Severalhundredwrittenandoralcommentswerereceivedin person, andbyfax, mail, E-mail, andphone.

10. ThecommentswereassimilatedandincorporatedintotheRecommended Bikeway. Networkwherepossible. Changesweremadebasedonthispublic input, SteeringCommitteeadvice, andstaffreview.

11. Staffdistributedover500copiesoftheDraftBicycleMasterPlan (September1995)tointerestedpartiesthroughoutthecommunity. Severaladditionalpublicforumswereheld, andcommentsreceived. Commentswerereviewedandchangesincorporatedwherepossible.

Note: Initially, allstate-ownedhighwaysintheCityofPortlandwereincludedasbikeways, perrequestbythestatetocomplywiththeirpolicythatallstatehighwaysshouldhave bicyclelanes. Afterfurtherdiscussionwiththestateandmanypubliccommentsconcerned withthesafetyandnecessityofbicyclelanesoncertainstatehighways, afew(seeSectionIII, BikewayNetwork)havenotbeenclassifiedasbikeways. Ifthesestreetsarereconstructed, bicyclelanesshouldstillbeincluded. However, thesearenotconsideredofhighpriority.