City of Woodinville
Non-Motorized Transportation Plan

June 2005

Parks & Recreation Commission
Parks & Recreation Department
Community Development Department
Public Works Department

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EXECUTIVE SUMMARY

In May 2004 the City Council directed the Parks and Recreation Commission to work with Public Works and Parks and Recreation Department staff to create a new and improved Non-Motorized Transportation Plan. They sited the importance of non-motorized transportation to the citizens of Woodinville as evidenced in surveys and public meetings, and noted the need to consolidate elements of non-motorized planning contained in several documents.

The Council noted recreation and transportation benefits of a comprehensive system and directed the staff to create a stand alone document that would be integrated into the City's Capital Improvement Plan, as well as updates to the Comprehensive Plan and the Parks, Recreation and Open Space Plan. The goal was to create a document to guide development of both private and public facilities to achieve a comprehensive non-motorized network both internally within the City and connecting Woodinville to existing and planned facilities within the region.

The resulting Non-Motorized Transportation Plan (the Plan or NMTP) includes analysis of existing facilities and plans, strategic initiatives for meeting demand, and maps and tables describing facilities and investments. It summarizes the public input process and provides a roadmap for service delivery, renovation, construction, and financing of the public vision for an integrated non-motorized system.

Upon adoption by the City Council, the Plan will be used to guide decisions about facilities over the next twenty years. It will also become a referenced and essential element of the City of Woodinville Transportation Plan, required for the City's compliance with the Growth Management Act.

PLAN OBJECTIVES

Objectives that guided the development of the Plan are as follows:

- The Non-Motorized Transportation Plan should study a variety of modes of non-motorized travel and take into account regional and national trends.

- The Plan should examine ways to connect the neighborhoods with downtown Woodinville.

- The Plan should review and recommend ways that non-motorized benefits can support City businesses and tourism.

- The Plan should explore ways to establish the Civic Campus as a hub of recreational, social, and civic activities and work to connect neighborhoods to this civic hub.

- The Plan should examine methods of ensuring that opportunities and constraints for enhancing the non-motorized transportation system are reviewed during the early stages of proposed new development.

- The Plan should review the City's Small Neighborhood Action Projects (SNAP) as a potential method for funding small non-motorized transportation projects and programs.

- The Plan should evaluate the current level of City provision of public information regarding non-motorized facilities.

- The Plan should consider ways in which City departments, boards and commissions, and volunteers can support efforts to sustain and enhance the non-motorized transportation system.

- The Plan should address the City as an employer and review programs and practices that promote non-motorized transportation.

- The Plan should address the linkage between non-motorized transportation and mass transit.

- The Plan should develop a review process to ensure that future plans are responsive to trends, opportunities, and public opinion.

STUDY METHODOLOGY

The Parks and Recreation Commission undertook the following tasks to arrive at the recommendations contained in this document:

a) Analyze demographic statistics and survey results.

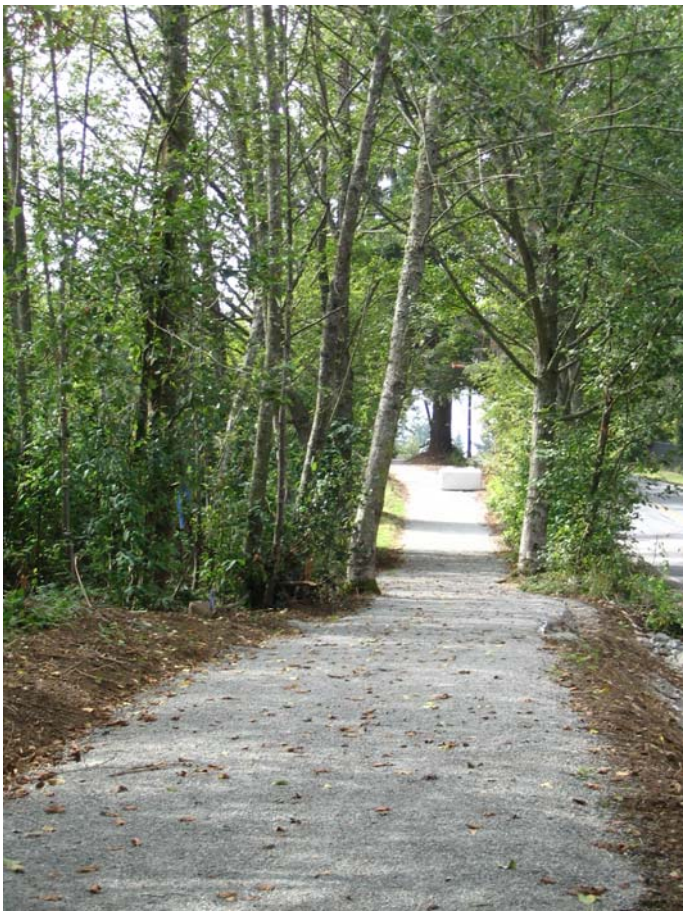
b) Review existing planning documents for non-motorized transportation objectives.

c) Review existing facilities.

d) Review maps to determine opportunities and constraints.

e) Propose a recommended set of goals and objectives.

f) Create a prioritized list of projects using Council adopted criteria.



ROLES OF CITY DEPARTMENTS

The process of planning for non-motorized transportation was a closely coordinated effort between the work of the Parks and Recreation Commission and three City of Woodinville Departments; Planning and Community Development, Public Works, and Parks and Recreation. The following is a summary of how these three departments contributed to this plan and how they will utilize the NMTP in future planning and implementation of land use, transportation, and park and recreation plans and projects.

Planning and Community Development

The Planning and Community Development Department is responsible for maintaining the Comprehensive Plan in compliance with the Growth Management Act. One of the chapters in the Comprehensive Plan is the Transportation Element. This element defines the City's policies for all modes of transportation, including non-motorized transportation.

Public Works

The Public Works Department is responsible for the street design in public rights-of-way for both motorized and non-motorized transportation. This includes sidewalks, landscaping, bicycle facilities, storm drainage, vehicle lanes, and specialized facilities. The Public Works Department ensures that roadways include the necessary facilities to allow the safe use of rights-of-way for non-motorized transportation purposes. In addition, the Department is responsible for acquisition of rights-of-way, development of facilities, project management during the construction phase, and maintenance.

Public Works will utilize the NMTP to ensure that every city street, public right-of-way and private sector project includes the agreed upon non-motorized elements. The NMTP informs Capital Improvements Program (CIP) planning by Public Works staff. The Public Works Department will apply for grants for non-motorized projects, utilizing the Comprehensive Plan and the NMTP to demonstrate the City's planning process and commitment to non-motorized transportation.

Parks and Recreation

The Parks and Recreation Department is responsible for assisting the Parks and Recreation Commission in identifying non-motorized transportation needs and coordinating general transportation planning of non-motorized facilities with recreation facilities in collaboration with the Planning and Public Works Departments. The NMTP has been integrated with park and recreation planning for many years. The 1998 adopted Park, Recreation and Open Space Plan (PRO Plan) includes elements for trail systems, water access, and bicycle and equestrian facilities. These facilities will interconnect the City's park system and other destinations with residential neighborhoods, and a planned regional non-motorized transportation network.

The Parks and Recreation Department is responsible for guiding parkland acquisition and project development to meet non-motorized goals and objectives, construction management of facility projects, and maintenance of facilities.

DEMOGRAPHICS AND CITIZEN OPINION SURVEY RESULTS

The Parks and Recreation Commission's review of demographic information and survey data helped establish the goals and objectives for the Plan. In addition to multiple public meetings on the topic, two citizen opinion surveys shaped the recommendations in the Plan.

A 2004 citizen opinion telephone survey of 250+ city residents echoes the findings of those earlier surveys, noting that improved connections between neighborhoods represent some of the most universally supported uses of taxes. There appears to be a solid level of support for downtown public investments to add grid roads, parks, and pedestrian connections as it relates to the proposed Downtown-Little Bear Creek Corridor Master Plan. These items are among those things that Woodinville residents say would make downtown more appealing. In this survey, residents expressed strong support of capital improvements which will improve the roadways, fix intersections, and other congestion points, and provide new roadways into the important central areas of town. They support local parks and trails as improved connections to neighborhoods.

Samples of public opinions from these surveys are shown below:

"Local park programs within walking distance and neighborhood based programs".

Citizen desire from 2002 Needs Survey

"Well the only thing is sidewalks are really important and there are a few places where it's hard to walk along the street."

2002 Needs Survey

There appears to be a solid level of support for downtown public investments to add grid roads, parks, and pedestrian connections. These items are among those things Woodinville residents say would make downtown more appealing.

Findings of the 2004 Community Opinion Survey

As far as the master plan goes, we need to keep in mind the pedestrians. That is what makes the city fun. We need to be able to go on foot through the city. I feel more comfortable when I can walk through a city, like Kirkland.

Citizens quoted in the 2004 Community Opinion Survey

EXISTING PLANNING DOCUMENTS

A. Woodinville Comprehensive Plan

The City's adopted Comprehensive Plan has many required elements which directly or indirectly give shape to the NMTP. Goals and objectives listed in the sections entitled Transportation include references to both pedestrian facilities and bicycle facilities needed:

> Goal T-6: To promote non-motorized travel and ensure its safety, convenience, and comfort.
>
> T-6.1 Actively promote the use of bicycle and pedestrian transportation as viable alternatives to motorized transportation.
>
> T-6.2 Develop a community-wide trail system for pedestrians, bicyclists, and other non-motorized transportation. Where feasible, this trail system will connect regional trails with local trails and walkways and provide improved access and linkages between the City of Woodinville's commercial/industrial areas, the Sammamish River Trail and other trails, residential neighborhoods, and community amenities.
>
> T-6.3 Pursue opportunities for expansion of multipurpose trails separated from the street systems as a transportation resource to the Woodinville community.
>
> T-6.4 Investigate the potential for linear rights-of-way such as utility corridors, abandoned railroad rights-of-way, and major limited-access highways to serve non-motorized transportation needs through the inclusion of separated trail facilities.
>
> T-6.5 Cooperate with adjacent jurisdictions and public agencies to seek and develop appropriate trail links between elements of the open space system including, but not limited to, completing the connection between existing and proposed trail systems.
>
> T-6.6 Enhance access to the trail system through the provision of increased parking at key access points.
>
> T-6.7 Examine new and existing non-motorized facilities for their ability to meet safe and effective non-motorized design standards.
>
> T-6.8 Incorporate the role of non-motorized travel modes as a viable and legitimate element of the overall transportation system. Transportation projects should accommodate the needs of non-motorized transportation by incorporating a network of facilities:

1. Within the road right-of-way,
2. Within an enhanced trail network, and
3. As part of design and review of development features which can improve non-motorized access and safety.

T-6.9 Incorporate non-motorized friendly design in transportation projects, using a variety of design and traffic control techniques.

T-6.10 Encourage parking facilities for securing bicycles at centers of activity throughout the City of Woodinville.

T-6.11 Ensure that development addresses non-motorized transportation in its site planning.

T-6.12 Plan for a continuous non-motorized transportation system that provides Woodinville's citizens and visitors safe and direct access to the City's schools, employment, housing, shopping and recreation areas.

T-6.13 Encourage employers to provide bike facilities and amenities, such as showers and bike lockers.

T-6.14 Encourage pedestrian facilities to be consistent with the unique downtown character.

B. Park, Recreation and Open Space Plan (PRO Plan)

The City's existing PRO Plan has specific recommendations on the non-motorized elements of the park system. These include:

Trail System

1. Create a water access system to freshwater bodies of interest to kayakers, canoers, paddle boaters, and other non-motorized water craft users – especially along the Sammamish River and on Lake Leota and Cottage Lake.

2. Create an off-road walking trail system providing access to environmental corridors, natural areas, historic sites, scenic vistas, parks, public facilities, and local business districts for local resident hikers – particularly along the Seattle, Lakeshore and Eastern Railroad (SL&E), Little Bear Creek, Woodin Creek, Nelson Creek, Sammamish River, and Tolt Pipeline Trail.

3. Create an on-road bicycle route system providing access to historic areas, scenic vistas, public facilities, and business districts for local resident commuter and recreational biking enthusiasts – especially along 124th Avenue on Norway Hill, 148th Avenue on Hollywood Hills, and NE 145th Street across the Sammamish River valley. Link local on-road bicycle routes with regional routes to provide opportunities for extended touring opportunities for local and regional enthusiasts alike – particularly along Woodinville-Snohomish, Woodinville-Duvall, and Woodinville-Redmond roads.

4. Create an off-road multipurpose hike and bike trail system providing access to major parks, schools, public facilities, business districts, and other trail corridors – especially along the Seattle, Lakeshore and Eastern Railroad, Sammamish River, Tolt Pipeline, and under the electric power lines.

Support Furnishings and Improvements

1. Create trailhead improvements that furnish trail systems with appropriate supporting services including interpretive and directory signage systems, rest stops, drinking fountains, restrooms, parking and loading areas, water and other services.

2. Where appropriate, locate trailheads at or in conjunction with park sites, schools, and other community facilities to increase local area access to the trail system and reduce duplication of supporting improvements – such as the Old Maltby Schoolhouse, Wellington Hills Golf Course, Woodinville High School, East Norway Hill Park, John Muir Elementary School, Gold Creek Park, Hollywood Hills Elementary School, and Old Woodinville Schoolhouse, among others.

3. Install telephones, emergency call boxes, or other means at major trailheads or other appropriate locations by which trail users can summon fire, emergency aid, police, and other safety and security personnel should the need arise.

4. Develop trail improvements to a design and development standard which is easy to maintain and access by maintenance, security, and other appropriate personnel, equipment, and vehicles.

Water Access and Facilities

1. Cooperate with King and Snohomish Counties, the Washington State Department of Fish and Wildlife, and other public and private agencies to acquire and preserve additional shoreline access for waterfront access and facilities.

2. Develop a mixture of watercraft access opportunities including canoe, kayak, sailboard, and other non-motorized boating activities – especially into the Sammamish River and Cottage Lake.

Maintenance

1. Develop low maintenance and high capacity design standards and capabilities to reduce overall facility maintenance and operation requirements and costs.

2. Where appropriate, institute standards for low maintenance materials, settings or other value engineering considerations that reduce care and security requirements, and retain natural conditions and experiences.

C. Capital Improvement Program

The City's Capital Improvement Plan (CIP) is adopted each year to indicate progress within a six year time frame on a variety of projects. It lists the revenue sources used to complete each project including City funds, grants, developer fees, and donations. In addition, it identifies the completed and planned stages of each project.

The State Growth Management Act (GMA) requires that communities prepare and adopt a Capital Facilities Element in their comprehensive plans (36.70A.070 RCW). The City's CIP is reassessed annually to confirm that long-term financial capacity exists to provide adequate capital facilities pursuant to 36.70A.070(3)(e) RCW.

Projects within this Plan will be evaluated using Council adopted criteria and will be identified within the City's six year CIP.

D. Little Bear Creek Linear Park Master Plan

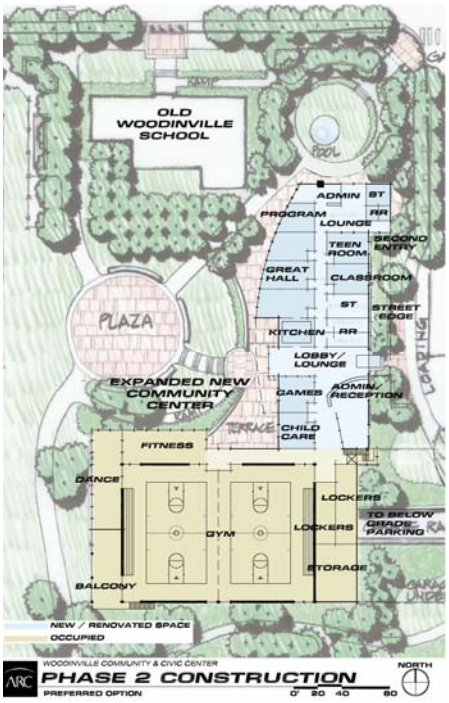
The Little Bear Creek Linear Park Master Plan adopted in 2004 describes how the City plans to develop the resource of the land surrounding Little Bear Creek into a resource conservancy and recreation amenity that helps to provide recreation, social,

economic development, and educational benefits to the community. As part of that plan, a non-motorized trail system through the corridor is proposed:

> *Along with the Sammamish River, Little Bear Creek is one of Woodinville's primary ecological resources. It has value to the citizens of Woodinville as fish and wildlife habitat, as a passive and active recreation amenity, as a surface water conduit for surrounding hillside and valley land use and as an ecological, visual and physical celebration of life. It also has the potential to provide a practical and pleasing recreation amenity to support the current and future land uses that line the Creek and to provide a transportation conduit for connecting the neighborhoods to the C.B.D. Unification of the Park into a linear system of recreation and visual amenities is essential to making the City of Woodinville a place with identity; a place where people like to live, work, and play.*

E. Civic Center Master Plan

The Civic Center Master Plan describes how the City intends to enhance and redevelop a former school property into a civic campus that includes the City Hall, Community Center, City Sports Fields, and the Old Woodinville School. The document speaks to the importance of the non-motorized transportation planning required to support the current and future uses of these facilities by the public.



> *The Woodinville Community Center should function as the center of the City's recreational, social, and cultural life. The City should focus resources on development of community services at the civic campus, enhance public access to this site, and place a priority on making connections between the Woodinville Community Center and other parks, recreation, and open space facilities.*

F. Downtown and Little Bear Creek Corridor Master Plan (Draft 1/04)

This plan for the future of downtown Woodinville relies heavily on the enhancement and further emergence of pedestrian and bicycle facilities to support the mobility and vitality of the proposed "pedestrian friendly" downtown:

> *The overall parks and open space concept for the Plan is an integrated system of parks and trails that provides additional open space for passive and active recreation as well as pedestrian/bicycle connections between neighborhoods and the local and regional park system and the downtown.*

GUIDING PRINCIPLES OF RECOMMENDATIONS

For the Pedestrian/Bicycle Trail

Summary of Desired Benefit from Recommendation

- *Provides alternative to motor vehicle transportation,*
- *Helps connect neighborhoods to the downtown and the regional trail,*
- *Helps make Woodinville unique,*
- *Provides source of recreation, and*
- *Helps make downtown a "destination" for visitors and supports downtown business and "vitality".*

G. Woodinville Zoning Code

Chapter 21.14.270 of the Zoning Code requires that trail easements be provided when a development abuts a trail or trail corridor.

> *Trail easements shall be provided by any development, except for single detached residential permits, when such developments are located within any community or regional trail corridor identified by the Comprehensive Plan as a part of a local and/or regional trail systems. The residents or tenants of the development shall be provided access to the trail easement. The area of the trail easement is included in density and floor area calculations. (Ord. 175 § 1, 1997)*

The effect of this language is to encourage trail easements with no negative impact to developers.

ADDITIONAL RESOURCES

A. National Institute of Health

The National Institute of Health reports that for the first time in recorded history, the life expectancy of adults surpasses that of their children. Most of this is due to obesity and related medical problems such as diabetes and heart disease. According to the surgeon general, obesity is now the number one preventable health condition surpassing even smoking as the cause of multiple health problems for the public.

> *The most frequently reported barrier to physical activity is lack of safe and accessible infrastructure near urban residents (near was defined as within 1/2 mile). Robert Woods Johnson MOVE report 2004.*

The Robert Woods Johnson Foundation recently conducted a study titled "Linking Objectively Measured Physical Activity with Objectively Measured Urban Form: Findings from SMARTRAQ," the study published today in the American Journal of Preventive Medicine, established a walkability index that assesses a neighborhood based on the mix of shops, homes and schools, residential density, and the number of connecting streets. Thirty-eight percent of the study participants who lived in the most walkable neighborhoods met government-recommended activity levels. Only 18 percent of the residents in the least walkable neighborhoods met the U.S. Surgeon General's recommendation, which calls for 30 minutes of moderate activity every day. All the study participants wore accelerometers, which measure total activity.

These statistics point to the benefits of the NMTP for promoting health and fitness.

B. King County Executive Horse Council

The most significant equestrian trail advocacy group is the King County Executive Horse Council (KCEHC). This group works to “support the horse industry and equestrian way of life in King County by taking part in pertinent land use issues and by promoting the protection and creation of equestrian trails and facilities”.

In keeping with King County regional trail mapping developed in conjunction with the KCEHC, the most important equestrian facilities within Woodinville city limits are those provided at the Sammamish River Trail and the Tolt Pipeline. According to the King County website, equestrians are allowed on the Sammamish River Trail between NE 175th Street in Woodinville to Marymoor Park in Redmond.

C. Washington Water Trails Association

The Washington Water Trails Association (WWTA) is a volunteer, non-profit organization that promotes the use of small, human- and wind-powered, beach able watercraft. The WWTA has established what is referred to as the Washington State Water Trails Recreation Program. This program includes a number of marine and inland water trails, or blueways, in Western Washington. The water trails consist of secure access points and rest stops and also often include natural and cultural waterside attractions.

The Lakes-to-Locks Water Trail is a series of lakes and rivers extending from Issaquah to Elliot Bay with launch, landing, and rest sites along the shoreline. Woodinville's Parks and Recreation Department was one of many public agencies that cooperated with the WWTA in creating the Lakes-to-Locks Water Trail. This partnership should be continued so that this unique mode of travel can be preserved and encouraged.

In 2002 the National Park Service awarded the City of Woodinville a National Park Partnership Award for its participation in promoting the Lakes-To-Locks Water Trail.

D. State Recreation Immunity Statute

The State affords protection to private property owners who allow recreation use of land. This statute is the primary tool for negotiating public access easements on private land for trail and park uses.

> (1) Except as otherwise provided in subsection (3) or (4) of this section, any public or private landowners or others in lawful possession and control of any lands whether designated resource, rural, or urban, or water areas or channels and lands adjacent to such areas or channels, who allow members of the public to use them for the purposes of outdoor recreation, which term includes, but is not limited to, the cutting, gathering, and removing of firewood by private persons for their personal use without purchasing the firewood from the landowner, hunting, fishing, camping, picnicking, swimming, hiking, bicycling, skateboarding or other non-motorized wheel-based activities, hang gliding, paragliding, rock climbing, the riding of horses or other animals, clam digging, pleasure driving of off-road vehicles, snowmobiles, and other vehicles, boating, nature study, winter or water sports, viewing or enjoying historical, archaeological, scenic, or scientific sites, without charging a fee of any kind therefore, shall not be liable for unintentional injuries to such users.

E. Federal Rails to Trails Act

The City of Woodinville recognizes that the BNSF Railroad may choose to abandon the rail corridor that passes through the City adjacent to SR 202.

The mechanism most likely to be considered in evaluating this rail corridor abandonment process is the Federal Rails to Trails Act. Passed in 1976 and expanded in 1983, it allows railroads to sell, lease or donate the right-of-ways on routes they no longer operate to private organizations or local governments for interim use as trails. In exchange, the railroad can get payments or sizable tax breaks. Called "railbanking," the tool guarantees that a trail can later be reactivated as a railway if needed, but so far few have been. The U.S. Supreme Court upheld the railbanking law in 1990, increasing the number of rails-to-trails projects across the country. Despite lengthy and contentious battles, the national Rails to Trails Conservancy has added more and more miles to the system each year. But while it has broad support around the country, railbanking also has pitted neighbors and local leaders against one another in fierce debates over private property rights versus public good.

The City of Woodinville supports ongoing operation of the “Washington Dinner Train” within this rail corridor as long as the venture is financially viable; the Dinner Train is a valuable tourism asset and source of community pride for Woodinville as the destination for this operation. Woodinville recognizes the synergy between the Dinner Train and the promotion of wineries in our Tourist District.

The abandonment of this rail line is being studied multi-jurisdictionally under the auspices of the Puget Sound Regional Council (PSRC). Woodinville supports this investigation and has participated financially in this ongoing study.

The City of Woodinville would regret abandonment, as it would remove a unique tourism opportunity. However, if such a decision is ultimately reached, Woodinville will support efforts to retain the rail corridors within its corporate limits for multi-modal purposes.

CITY INVESTMENTS IN THE SYSTEM TO DATE

The City of Woodinville has invested significant efforts in planning, building, and maintaining non-motorized facilities and supporting programs and services to encourage and sustain their use. The following partial list shows the investments since incorporation in 1993. These include:

- Bridge over Sammamish River in Tourist District (1997)

This project created a link between the City's Tourist District and the regional multi-purpose Sammamish River Trail. Consisting of a bridge and trail extension along NE 145th Street, it received ISTEA funding due to the safety improvements it made and its contribution toward a safe commuting environment for walkers, equestrians, and bicyclists.

- Bike lanes on NE 195th Street near Woodinville High School (1997)

This project received Transportation Improvement Board (TIB) funding due to the safety improvements for students walking to and from Woodinville High School. It consisted of an asphalt walkway that can support bikes and pedestrians.

- 130th Avenue NE Multi-Modal Path - north of SR522 to 195th Street (1997)

This project also received TIB funding and helped to provide a safer walkway for children and families in the Wedge neighborhood and students at Woodin Elementary School.

- Construction of Wilmot Gateway Park (1997)

This park was constructed as a gateway to the City from the Sammamish River Trail and an inviting trailhead for those seeking access to the regional trail system. Restrooms, parking, picnic tables, and benches support the recreational and commuter traffic on the trail. The trail was rerouted to provide for clear visibility for trail and park users.

- 156th Avenue NE Multi-Modal Path (1998)

This project included shoulder widening on the west side of 156th Avenue NE, just north of Woodinville-Duvall Road, to provide a multi-modal non-motorized facility.

- Woodinville-Duvall Road/178th Place Signalized Ped Crossing (1999)

Woodinville-Duvall Road is a principal arterial and carries a high volume of vehicles. This project provides one of the few pedestrian crossings on Woodinville-Duvall Road for transit and other non-motorized users. This project resulted from field observations of high numbers of pedestrians crossing at an unprotected mid-block location. This protected mid-block crossing provides a connection from the residential development to the City's Park and Ride, as well as the retail core.

- 140th Avenue NE/NE 181st Place – Mid-block Pedestrian Crossing (2002)

This project resulted from field observations of high numbers of pedestrians crossing at an unprotected mid-block location. This mid-block crossing provides a connection from the high density residential development to the City's retail core.

- 124th Avenue NE Multi-Modal Improvements (2002)

A portion of this project improved the pedestrian connection between the Kingsgate neighborhood and Woodmoor Elementary School by the installation of an extruded concrete curb along the paved shoulder on the east side of 124th Avenue NE along with some sidewalk repair between 146th Street and 160th Street.

- 136th Avenue NE Roundabout and Multi-Modal Path (2003)

This project constructed a multi-modal path on the east side of 136th Avenue NE from NE 195th Street to the new roundabout at the Woodinville High School entrance. The roundabout provides a safe crossing for pedestrians to the high school as well as serves as a traffic calming device for vehicles.

- NE 175th Pedestrian Path and Storm Drainage Improvements (2004)

This project consisted of approximately 1,500 linear feet of storm drainage improvements and pervious pedestrian path construction, clearing and grubbing, grading, paving, channelization, restoration, and erosion/sedimentation control along the south side of NE 175th Street from 159th Avenue NE to 164th Avenue NE, all within the City of Woodinville corporate limits.

- Maintenance

The City investment in maintenance of existing trails and bicycle lanes has grown with the expansion of facilities and their use. Through signage and pavement markings, cleaning, landscaping, and other on-going tasks, the City repairs and maintains bike lanes, multi-purpose trails, and soft trails.

- Purchase of a Sweeper

Responding to the need to keep regional bicycle routes well maintained and free of debris, the City purchased a street sweeper and routinely grooms the on-street bike lanes throughout the City.

PROPOSED GOALS AND OBJECTIVES

MODES OF TRAVEL
The Non-Motorized Transportation Plan should provide for pedestrian and bicycle travel and should look at equestrian and new forms of transportation as they emerge and relate to the planned development of the City and the region.

RESOURCES
The City should focus resources on development of the primary backbone facilities for the Non-Motorized Transportation Plan and those projects or plans which connect the neighborhoods to this backbone.

ECONONOMIC DEVELOPMENT
The City should invest in facilities that can provide needed infrastructure that supports local businesses. Special consideration should be given to facilities that link the Tourist District with Downtown or enhance the experience of visitors to Woodinville.

COMMUNITY DEVELOPMENT
The City should establish the Civic Campus as a hub of recreational, social, and civic activities and work to connect neighborhoods to this civic hub.

PRIVATE DEVELOPMENT REVIEW
The City should use its developer Technical Review Committee (TRC) to ensure that every opportunity for connectivity within and between developments is considered during the early stages of residential and commercial development review. TRC staff should receive training each year on the NMTP to ensure that opportunities are captured for partnerships between the public and private sectors.

Staff should make the existing language in the zoning code and the Recreation Use Statute available to developers in order to promote the development and enhancement of trails on private property and the development of informal trails into formal trails.

Developments should be tested for the following:

- Does any portion of the proposed development lie adjacent to routes identified in the NMTP?
- Does any portion of the development lie adjacent to routes identified in the Park, Recreation & Open Space Plan or that might have significance for nearby park and recreation facilities?
- Does the project contain critical or sensitive areas that have the potential to provide value for non-motorized transportation?

- Does the development contain any informal unmarked non-motorized trails that have a pattern of historical use?

CAPITAL IMPROVEMENT PROGRAM (CIP)
The City should continue to use evaluation criteria which reflect the positive benefits of non-motorized transportation to all Woodinville citizens. The City's Small Neighborhood Action Projects (SNAP) evaluation should prioritize projects which enhance neighborhood non-motorized transportation. A minimum of 30% of the SNAP projects in both Parks and Public Works should be those that enhance non-motorized transportation.

TRANSPORTATION IMPROVEMENT PROGRAM (TIP)
The City should continue to include non-motorized transportation projects in the City's six-year TIP that is submitted annually to the Washington State Department of Transportation (WSDOT) and the Puget Sound Regional Council (PSRC). Through this process these projects become part of the regional non-motorized system and compete for area wide funding through regional grant opportunities.

PUBLIC INFORMATION
The City should provide on-going public information on bicycle and pedestrian facilities and their safe use as well as the benefits of non-motorized transportation to fitness, economic development, recreation, congestion relief, and air quality. This information should include facilities maps, progress reports on planned project construction, and public information regarding route changes, construction, and alternate modes of transportation.

ACCESSIBILITY
It is the intent of the City of Woodinville to allow a person with a physical disability to independently get to, enter, and use its non-motorized facilities to the greatest extent reasonably practicable. Woodinville will follow applicable ADA guidelines and rules for construction on new or renovated trails and modify practices as new rules emerge.

EQUESTRIAN FACILITIES
Woodinville continues to support King County in preserving identified equestrian facilities and trails within the Rural Area and to allow equestrian use of non-motorized multi-purpose trail facilities within the City where appropriate and not in conflict with the terms of utility easements or sensitive areas regulations.

WATER TRAILS
Woodinville should continue to cooperate with the Washington Water Trails Association and with neighboring jurisdictions to maintain and enhance the Lakes-to-Locks Water Trail.

TRAIL GUIDELINES
Woodinville should attempt to follow standardized guidelines for trail development to provide continuity and uniform appearance using the Iowa State Department of Transportation Trail guidelines.

VOLUNTEERS
The City should institute an "Adopt a Trail" system to encourage volunteer maintenance of City facilities.

ON-GOING REVIEW
The Non-Motorized Transportation Plan should be reviewed every year to allow for changes in the general transportation system, to reconfirm community goals and objectives, and to respond to unfolding circumstances such as grant opportunities, acquisitions, private and public development, and changes in public opinion. The Parks and Recreation Commission should prepare its annual recommendation to Council in time for changes to be included in the City's annual Capital Improvement Plan update.

ROLE OF THE CITY
As an employer, the City should continue to encourage employees to explore and use non-motorized transportation through participation in the City's Commute Trip Reduction (CTR) program. Incentives in the form of vouchers are awarded to employees who choose an alternative (walk, bike, carpool, etc.) to driving alone. FlexPass is a transit pass that provides access to all King County Metro Transit and Sound Transit buses and trains. These passes are issued to all City employees to encourage use of the transit system. The City also works with King County Metro to administer the CTR program to all of Woodinville's employers who have at least 100 employees.

PUBLIC HEALTH BENEFITS
As a provider of recreation programs, the City should collaborate with King County Public Health to promote the use of its non-motorized transportation system to residents and visitors as a vehicle for helping individuals and families to reach and maintain standards for fitness.

TRANSIT
The City should continue to work with Sound Transit and King County Metro Transit in developing an integrated non-motorized and transit system. Public Works staff should continue to review changes to transit facilities and routes to ensure efficient non-motorized access to the transit system.

RAILS TO TRAILS
The City of Woodinville supports ongoing operation of the "Washington Dinner Train" within the BNSF rail corridor as long as the venture is financially viable; the Dinner Train is a valuable tourism asset and Woodinville continues as the destination for this operation. The abandonment of this rail line is being studied multi-jurisdictionally

under the auspices of the Puget Sound Regional Council (PSRC). And Woodinville supports this investigation. Should the rail line be abandoned in the future, Woodinville should participate in retention of the rail line for multi-modal purposes.

PROPOSED FACILITY IMPROVEMENTS

20-Year Non-Motorized Transportation Projects
(Prioritized by Council adopted CIP criteria)

NM-05	135th Avenue NE (LBC Pkwy to south of Lumpkin property)	**$ 70**
NM-08	Pedestrian Bridge (West Industrial Area to Woodin Creek Park)	**$ 940**
NM-07	Pedestrian Bridge (LBC Linear Park to 136th Avenue)	**$ 3,360**
NM-16	Woodinville-Duvall Road NE City Limits to NE North Woodinville Way	**$ 300**
PK-23	Downtown Bike/Pedestrian Loop	**$ 375**
PED-3	Derby Pedestrian Path	**$ 180**
NM-04	City Hall to 131st Ave Pedestrian Crossing	**$ 70**
NM-09	Greenbrier to Woodinville-Duvall Road	**$ 80**
NM-10	Greenbrier to 140th Avenue NE	**$ 105**
NM-11	Wood-Duvall Road (from Woodinville Way to 178th Street)	**$ 180**
NM-12	Sammamish River Trail to King County Property	**$ 90**
NM-15	Leota to North Industrial Connection	**$ 150**
PK-26	131st Avenue Pedestrian Crossing	**$ 1,500**
NM-03	NE 143rd Place (138th Way to Wood-Red Road)	**$ 150**
NM-01	195th Street (156th Ave to Wellington Elementary)	**$ 300**
NM-14	North 132nd Avenue Non-Motorized Facility	**$ 200**
RO-1	168th Avenue NE (Wood-Duvall Road to NE 195th Street)	**$ 155**
NM-02	South Power Line Trail	**$ 115**
NM-06	136th Avenue to future Brightwater Site	**$ 785**
NM-13	Tolt River Bridge	**$ 915**
TOTAL NMTP		**$ 10,020**

Shaded = Six-Year CIP

(Dollars shown in thousands)

PROPOSED TRAIL GUIDELINES

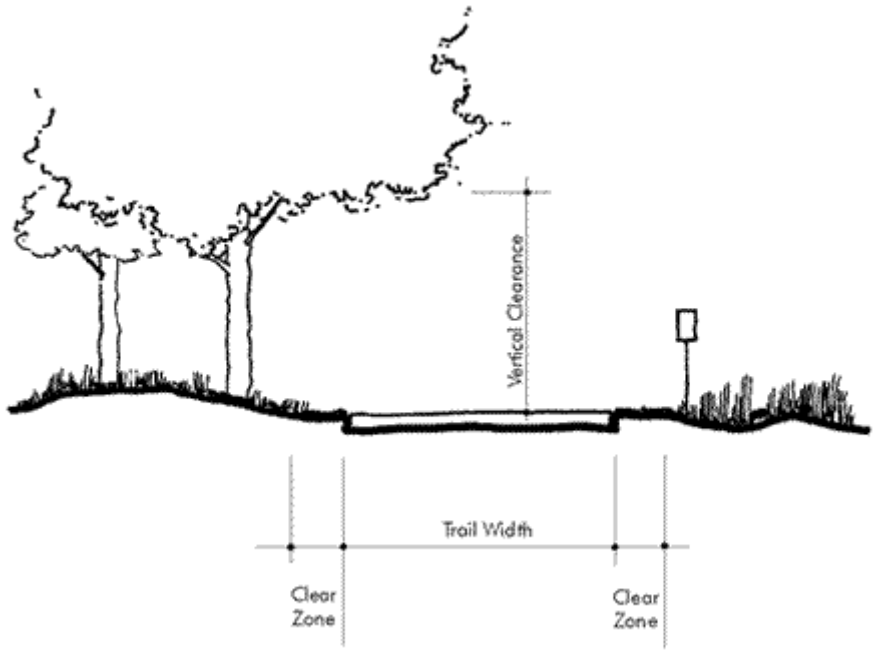
Source: Iowa Department of Transportation
Iowa Trails 2000

Trail Design Guidelines: Use Modes

While it is most common for use modes to be combined on trails or within corridors, Iowa Trails 2000 discusses each mode to ensure that the needs of various users are thoroughly considered. When combining use modes, the guidelines for each mode should be consulted and the most stringent should be used (see "Multi-Use Corridors"). The modes considered include hiking/walking, bicycling, in-line skating, equestrian. Each of these use modes is described below, and guidelines are set forth relating to the following design considerations.

- Clear Trail Width refers to the width of the traveled part of the trail that is free of protruding objects and obstacles, such as trees and overgrown vegetation (see Figure 4-5).
- Clear Zones refer to the area on each side of the trail between the traveled surface and any obstructions, such as trees, walls, or fences (see Figure 4-5).
- Vertical Clearance refers to the height above the trail which is free from protruding objects and overhead obstructions, such as tree branches or bridges (see Figure 4-5).

FIGURE 4-5: TRAIL DIMENSIONS



- Trail surface refers to the type of surface on the traveled part of the trail, such as asphalt, concrete, granular, or alternative. Surface quality is affected by tread obstacles, such as roots or rocks, and by any openings such as gaps and grates located within the trail surface.
- Drainage refers to techniques used to move and keep water off the trail and trail embankment.
- Alignment refers to the horizontal curvature of the trail.

- Profile refers to the vertical curvature of the trail.

- Edge protection refers to any protective barrier designed to separate the trail from its surrounding environment, such as a fence or curb. As a general rule, curbs should not be less than 4 inches in height. Other types of edge protection are discussed, where appropriate, under each trail mode.

  These design guidelines are meant as general recommendations. Many of the design considerations listed above will be impacted by local conditions, such as topography, right-of-way width, and intensity of use. Each trail project is unique, and while these guidelines should be employed wherever possible, deviations may occur.

Hiking/Walking Trails

Pedestrian facilities can take several forms. Hiking/walking trails, sidewalks, and pedestrian trails provide different user experiences for pedestrians.

Hiking/walking trails, covered in this section, are facilities used exclusively by pedestrians, and are typically found in natural areas. They offer a low-impact means of allowing pedestrians to come in contact with the natural environment. Hiking/walking trails are used by a variety of people with a broad range of abilities, skill levels, and desired experiences, and should be designed to accommodate all persons. New and reconstructed trails should be made as accessible as possible while maintaining the essential character of the resource. Furthermore, all trail amenities, such as restrooms, drinking fountains, and picnic tables should comply with the ADA accessibility guidelines. Because of their

rustic nature, the guidelines for hiking/walking trails are very general, and trail design will be primarily determined by site conditions.

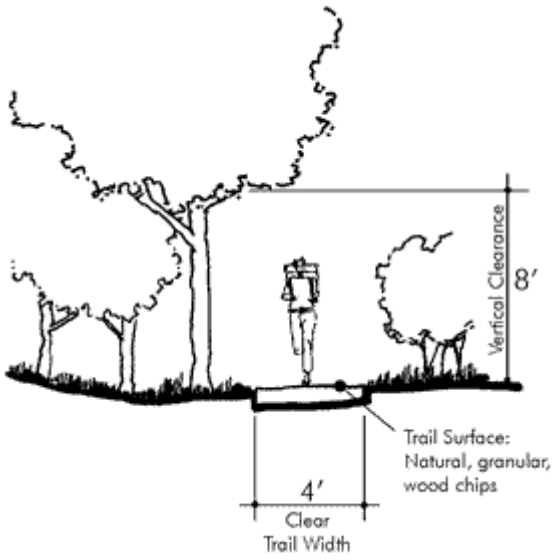
Clear Trail Width

- Recommended clear trail width for hiking/walking trails: 4 feet (this may be reduced based on site conditions and desired trail experience) (see Figure 4-6).
- Hiking/walking trails should include widened areas at regular intervals to allow users to pass one another. These widened areas should be at least 5 feet by 5 feet.
- In urban or suburban locations, hiking/walking trails should be set back at least 5 feet from any roadway curb.

Clear Zones

Hiking/walking trails do not typically require clear zones, since users are moving at relatively slow speeds. In natural areas, underbrush should be trimmed so that it does not hang over the trail edge or obstruct the traveled way.

FIGURE 4-6: TRAIL DIMENSIONS FOR HIKING/WALKING TRAILS



Vertical Clearance

- Hiking/walking trails should maintain an 8-foot minimum vertical clearance (see Figure 4-6). If the hiking/walking trail is used by cross-country skiers during the winter months, the average snow level should be added to the 8-foot minimum.

Trail Surface

- Hiking/walking trails may be surfaced with wood chips or crushed stone, or may be made of compacted earth. In any case, the surface should be firm and stable. It should be noted, however, that wood chips are not considered an accessible surface.
- In wet areas a boardwalk is recommended (see "Wetland Boardwalks").
- Any tread obstacles, such as rocks or roots, imbedded into the trail surface should be less than 2 inches.
- Any openings within the trail surface, including on bridges, should not permit passage of a 0.5-inch diameter sphere and should be perpendicular to the dominant direction of travel.

Drainage

Because users of a hiking/walking trail will come in direct contact with the trail surface, drainage is very important. Natural surface trails can become watercourses during heavy rains, causing severe erosion. The following methods effectively move water off the trail.

- In flat areas, the trail should be cross-sloped or crowned at approximately 2 percent.
- Where a trail is benched into a slope, a swale on the uphill side should be considered to catch water before it crosses the trail.
- Culverts may be necessary to move water under the trail.
- Disturbed areas should be seeded and mulched or sodded to prevent erosion.

Alignment

Users of hiking/walking trails can navigate even the tightest of turns. Alignment guidelines are not necessary for hiking/walking trails.

Profile

It is recommended that no more than one-third of the total trail length for a hiking/walking trail exceed 8.3 percent. In addition, the following guidelines should be followed:

- Trail grade may be 5 percent or less for any distance.
- Trail grade may be 8.3 percent for a maximum distance of 200 feet.
- Trail grade may be 10 percent for a maximum distance of 30 feet.
- Trail grade may be 12.5 percent for a maximum distance of 10 feet.

The trail grade between the maximum grade segments should return to 5 percent for a minimum distance of 5 feet to allow resting opportunities for people who have difficulty traveling over sloped surfaces.

If, due to local topography, the trail would be steeper than the above recommendations permit, switchbacks should be used to lessen the overall slope.

Edge protection

Edge protection is not required on a hiking/walking trail; however, if provided it should be at least 4 inches. Pedestrians with vision impairments tend to adjust their obstacle detection to a slightly higher level on hiking/walking trails because of all the small obstacles contained within a natural trail surface. Edge protection that is at least 4 inches high is much more likely to be detected.

Pedestrian Trails

Pedestrians are typically accommodated with other trail users such as bicyclists and in-line skaters, within a multi-use corridor. In some cases, however, pedestrians may be accommodated on an exclusive trail, as a means of separating pedestrians from faster moving bicyclists and in-line skaters.

Where pedestrian use is expected, facilities should be accessible to a variety of people with a broad range of abilities, skill levels, and desired experiences, and should be designed to accommodate all persons. New and reconstructed trails should be made as accessible as possible while maintaining the essential character of the resource. Furthermore, all trail amenities, such as restrooms, drinking fountains, and picnic tables, should comply with the ADA accessibility guidelines.

Pedestrian trails, unlike hiking/walking trails, are designed for a more formalized trail experience. Whereas hiking/walking trails may be quite rugged, pedestrian trails are typically designed for more leisurely walking on finished surfaces.

Clear Trail Width

- Recommended width for pedestrian trails: 5 feet.

Clear Zones

Because of the relatively slow speed of pedestrians, clear zones are not necessary.

Vertical Clearance

- Pedestrian trails should maintain an 8-foot minimum clearance. If the hiking/walking trail is used by cross-country skiers during the winter months, the average snow level should be added to the 8-foot minimum.

Trail Surface

Pedestrian trails, as discussed above, will almost always exist in conjunction with non-motorized multi-use trails. Their surface, therefore, should be the same as that used for the adjacent multi-use trail. Where pedestrian trails occur alone, they may be asphalt, concrete, or granular. Whenever possible, the surface of a pedestrian trail should be smooth and free of tread obstacles. Any openings imbedded into the trail surface should not permit passage of a 0.5-inch diameter sphere and should be perpendicular to the dominant direction of travel.

Drainage

- Pedestrian trails should have a 2 percent cross-slope.

Alignment

Users of pedestrian trails can navigate even the tightest of turns. Alignment guidelines are not necessary for pedestrian trails.

Profile

It is recommended that no more than one-third of the total trail length for a pedestrian trail exceed 8.3 percent. In addition, the following guidelines should be followed:

- Trail grade may be 5 percent or less for any distance.
- Trail grade may be 8.3 percent for a maximum distance of 200 feet.
- Trail grade may be 10 percent for a maximum distance of 30 feet.
- Trail grade may be 12.5 percent for a maximum distance of 10 feet.

The trail grade between the maximum grade segments should return to 5 percent for a minimum distance of 5 feet to allow resting opportunities for people who have difficulty traveling over sloped surfaces.

Edge protection

Edge protection is not required on a pedestrian trail; however, if provided it should be at least 4 inches.

Sidewalks

Sidewalks are pedestrian facilities primarily used in cities and towns. They are typically designed for pedestrians only, and should not be used by bicyclists. Sidewalks typically offer pedestrian connections within a community, and are, therefore, important components of local pedestrian planning. Guidelines for this type of facility are found in the handbook "Local Community Planning for Bicyclists and Pedestrians," (Iowa Trails 2000).

Bicycle Trails

There are extensive guidelines that have been established for bicycle facilities. Bicycles, however, are unlikely to ever enjoy exclusive use of a trail facility. In most cases, bicycle trails will also accommodate pedestrians and in-line skaters on a single paved tread way.

Because bicycles typically travel at higher speeds than pedestrians, trail geometrics are a major consideration. The AASHTO Guide is an invaluable resource when designing bicycle trails. The guide gives detailed information on alignment and profile layout and design.

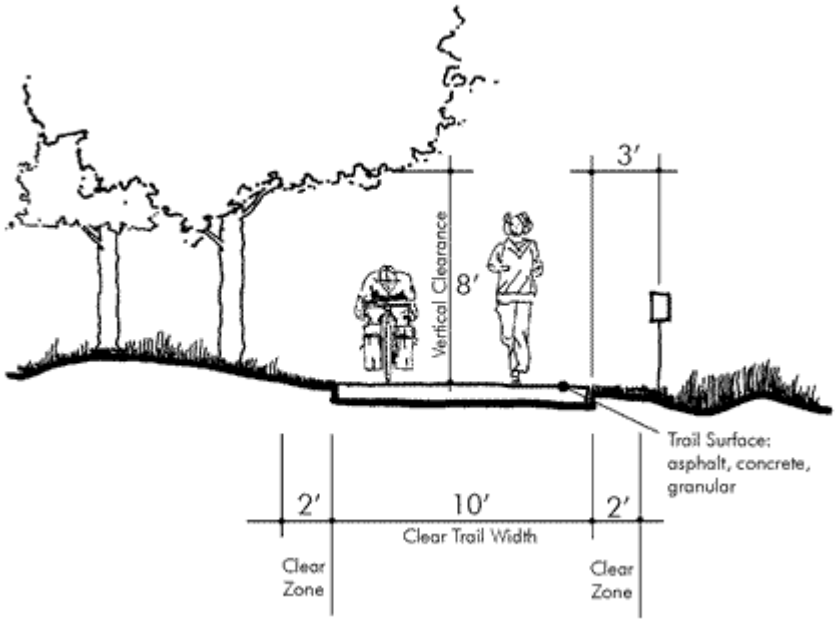
Clear Trail Width

- Recommended width for two-way bicycle trail: 10 feet (may be increased to 12 feet depending on trail traffic) (see Figure 4-7).
- Recommended width for one-way bicycle trail: 6 feet (Separated one-way trails in the same corridor should have a minimum 2-foot median between them).

Clear Zones

- Bicycle trails should maintain a minimum 2-foot graded area on each side of the trail, graded at a maximum slope of 6:1 (see Figure 4-7).
- Bicycle trails should maintain a minimum 1-foot buffer zone between the edge of the graded clear zone and any fixed objects such as signs or trees. On bridges this guideline does not apply (see Figure 4-7).

FIGURE 4-7: TRAIL DIMENSIONS FOR BICYCLE TRAILS



Vertical Clearance

Bicycle trails should maintain an 8-foot minimum vertical clearance (see Figure 4-7).

Trail Surface

- Asphalt or concrete are the preferred surfaces for bicycle trails.

The surface of a bicycle trail should be smooth and free of tread obstacles. In some cases, granular surfacing may be used as an interim solution. Granular trails can be difficult to maintain, and can be harder on bicycles than paved trails. In addition, granular surfacing eliminates use of the trail by in-line skaters. Any decision to use granular surfacing for bicycle trails should be carefully evaluated.

Drainage

It is very important that bicycle trails are well drained. Standing water on the trail will adversely affect the trail surface and decrease the life and quality of the trail.

- Bicycle trails should not exceed a uniform cross slope of 2 percent (see Figure 4-8). Crowning of the trail at 2 to 3 percent is acceptable, but may be more difficult and costly to construct (see Figure 4-9).
- Where a trail is benched into a slope, a swale on the uphill side should be considered to catch water before it crosses the trail (see Figure 4-10).
- Culverts may be necessary to move water under the trail.
- Disturbed areas should be seeded and mulched or sodded to prevent erosion.

FIGURE 4-8: TRAIL CROSS SLOPE

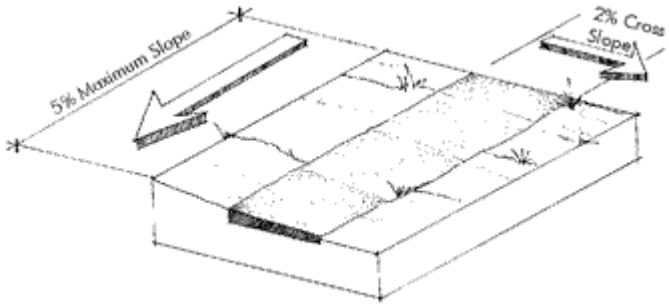


FIGURE 4-9: CROWNING OF A TRAIL

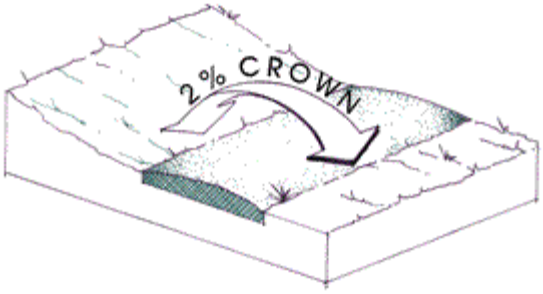
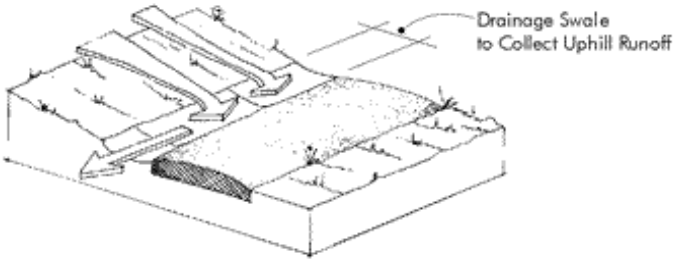


FIGURE 4-10: TRAIL WITH DRAINAGE SWALE



Alignment

The design of bicycle trail alignment can be as complex as roadway design. Many factors must be taken into consideration, including design speed, the surface type, and sight lines. The AASHTO Guide and "Minnesota Bicycle Transportation Planning and Design Guidelines" offer detailed information on alignment and super-elevation. In general, a typical curve radius for a bicycle trail will be approximately 100 feet.

Another issue to consider when designing a trail's alignment is visibility on horizontal curves, which is based on stopping sight distance. Stopping sight distance refers to the amount of time it would take a user to stop once an obstruction has come into view. As a general rule, the distance a user can see along the trail should never be less than the distance it would take that user to stop. Procedures for determining stopping sight distance are detailed in the AASHTO Guide and should be applied to both alignment and profile.

Profile

The profile of a bicycle trail is also a major consideration which requires detailed analysis and design. Issues to consider when designing a trail's profile include steepness (or overall grade of the trail) and stopping sight distance (discussed above). The following recommendations are for general planning purposes only. Final trail design requires more detailed analysis based primarily on the AASHTO Guide.

- Maximum recommended grade for bicycle trails: 5 percent.

- Grades on bicycle trails steeper than 5 percent are possible, but should be restricted to distances as indicated in the AASHTO Guide.

Stopping sight distance applies to vertical curves (hills) just as it does to horizontal curves. This consideration is especially important on downhill sections, as speeds will be higher. As described above, the AASHTO Guide is an invaluable resource for detailed trail design, and should be consulted during the final design process.

Edge Protection

Edge protection, typically in the form of fencing, is required on bicycle trails only in areas where safety is a concern. Such safety considerations should be evaluated in detail during the final design of the trail. If fencing is provided, it should be at least 42 inches high. Some possible situations where fencing might be warranted include:

- Locations where the land on either side of the trail drops off steeply.
- Locations where sharp curves may cause users to lose control and leave the trail.
- Locations where adjacent uses, such as railroad tracks or active industry, may cause a threat to trail user safety.
- Bridges (see "Grade-Separated Crossings").

Where fencing is included, rub-rails should be installed for the safety of bicyclists and wheelchair users. Rub-rails should be installed at ground level and at the general level of an adult bicyclist's handlebars.

In-line Skating Trails

In-line skaters are typically accommodated along with other modes. They will be commonly found along with bicyclists and pedestrians on multi-use trails. In-line skating trails, therefore, can use the standards described for bicycle trails (see "Bicycle Trails").

On-Road Bicycle Facilities

There is extensive literature relating to guidelines for on-road bicycle facilities. AASHTO and FHWA, as well as many states, offer a wide range of guidelines for various types of bicycle accommodations. There are essentially three types of on-road bicycle facilities: paved shoulders, shared roadways (including wide curb lanes), and bicycle lanes. All on-road bicycle facilities should be designed so bicyclists travel in the same direction as motorists.

Safety is of great concern in the design of on-road bicycle facilities. Conflicts with pedestrians, automobiles, or other bicyclists can lead to serious injury. Poorly maintained pavement, snow build-up and debris can also lead to safety problems. The guidelines listed below are minimum recommendations only, and site-specific conditions may dictate variations for safety purposes.

Clear Trail Width

- Paved shoulders: minimum 4 feet, to accommodate bicycle use, but refer to AASHTO's "A Policy on Geometric Design of Highways and Streets (Green Book)" and FHWA's "Selecting Roadway Design Treatments to Accommodate Bicycles" for recommendations for greater shoulder width, which is desirable where shoulders provide multiple benefits and where motor vehicle speeds exceed 50 miles per hour (see Figure 4-11).
- Paved shoulders adjacent to guardrails or other roadside barriers: 5 feet.
- Widened curb lanes: 14 feet of usable lane width (see Figure 4-12).
- Widened curb lanes on steep uphill segments: 15 feet (continuous wide lanes greater than 15 feet are not recommended, as motor vehicles may use them as two lanes).

FIGURE 4-11: PAVED SHOULDER DIMENSIONS

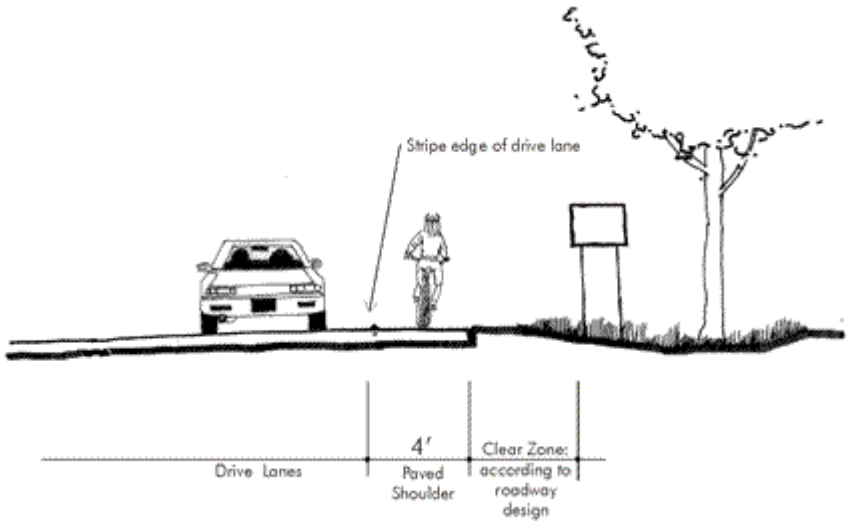
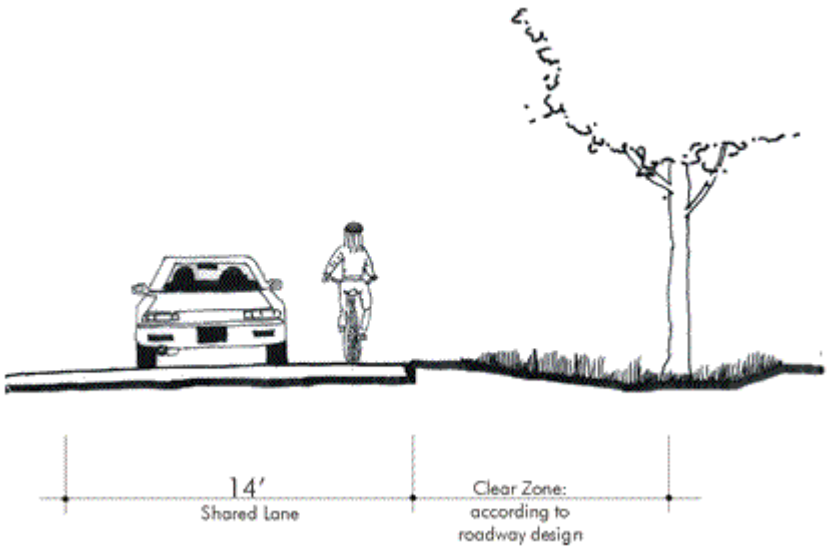


FIGURE 4-12: SHARED LANE DIMENSIONS



- Minimum width of bicycle lanes: 4 feet as measured from edge of roadway, or 5 feet as measured from the face of the curb or a guardrail to the bicycle lane stripe (see Figure 4-13).
- Desirable width of bicycle lanes: 5 feet as measured from edge of roadway.
- Minimum width of bicycle lanes adjacent to parking: 5 feet (see Figure 4-14).

FIGURE 4-13: BICYCLE LANE DIMENSIONS

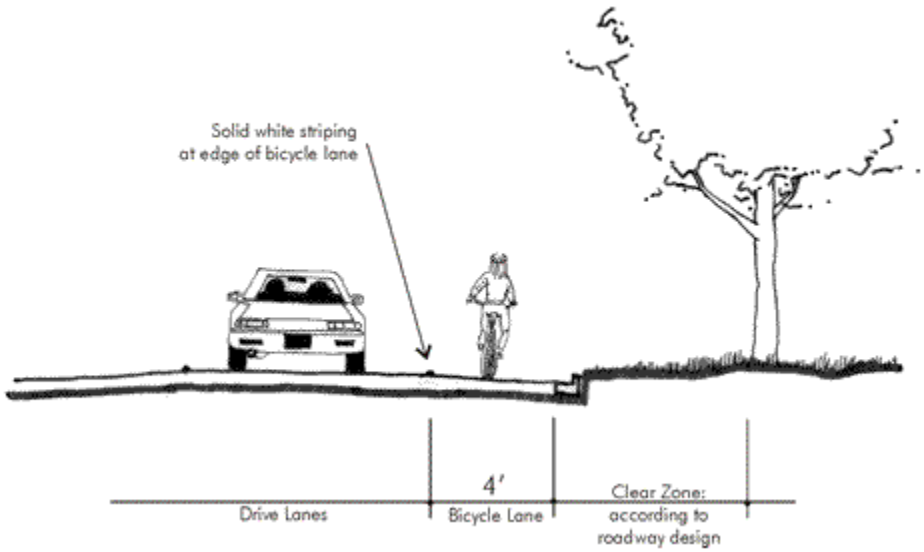
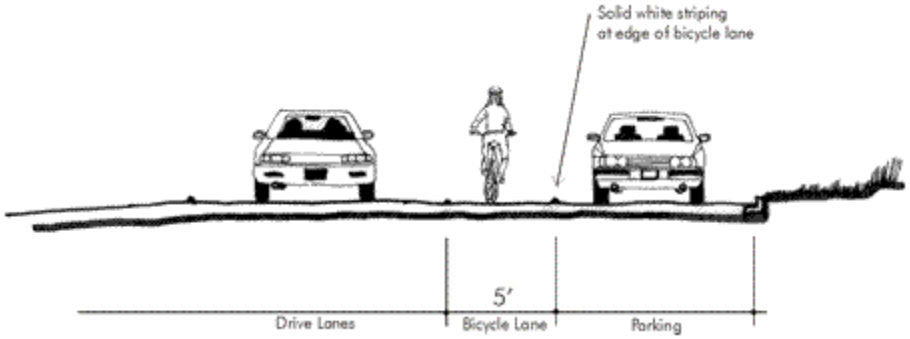


FIGURE 4-14: BICYCLE LANE DIMENSIONS ADJACENT TO PARKING



One issue that may impact on-road bicycle facilities is the presence of rumble strips. Occasionally used on roadways with rural sections, they will lessen the usable width of an on-road bicycle facility. Rumble strips "…are not recommended where shoulders are used by bicyclists unless there is a minimum clear path of 1 foot from the rumble strip to the traveled way, 4 feet from the rumble strip to the outside edge of paved shoulder, or 5 feet to adjacent guardrail, curb or other obstacle." (AASHTO Guide, 1999).

Clear Zones, Vertical Clearance, Trail Surface, Alignment, Profile, and Edge Protection

On-road bicycle facilities will normally benefit from design standards required by the roadway itself. Such requirements are sufficient for the bicycle facility. On-road bicycle facilities should only be designated on hard-surfaced roadways.

Drainage

The primary drainage issue to consider regarding on-road bicycle facilities is the existence of roadway drain inlets. Some types of inlet grates may trap a bicycle wheel or send the rider off course. Bicycle-compatible inlets are widely available, and these should be used on all roadways where bicyclists are expected. On rural sections, the cross-slope required by roadway construction is adequate to drain the bicycle facility.

Mountain Bike Trails

Mountain bike trails are typically rugged, off-road facilities. They have far less stringent guidelines than non-motorized multi-use trails, but can accommodate only one type of bicycle. The hallmark of mountain bike trails is the "single track," which is a narrow pathway with many hills and sharp turns. Such facilities can vary greatly in difficulty.

Recently, there has been a surge of people who recreate in off-road wheelchairs that are designed similarly to mountain bikes. However, not every mountain biking trail will accommodate the additional width of off road wheelchairs (approximately 28 to 34 inches). Therefore, trail designers should post objective information about the minimum clear width of the trail, so people who use off road wheelchairs can make informed recreation decisions.

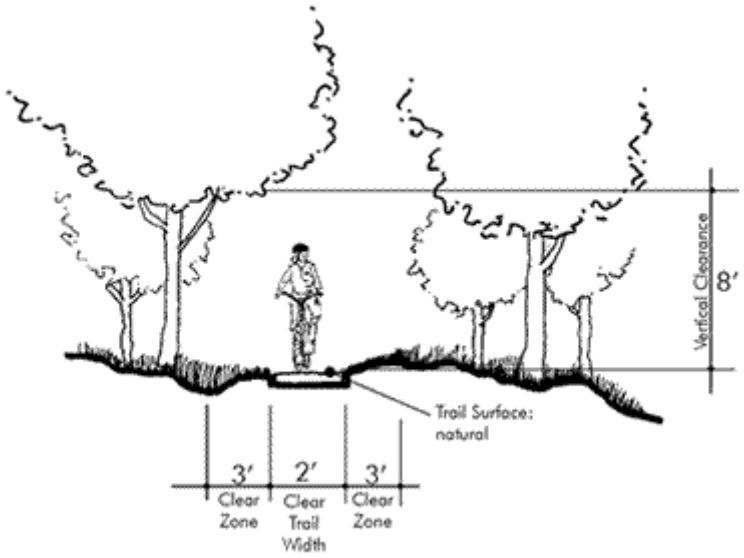
Clear Trail Width

- Desirable width for mountain bike trails: 2 feet (see Figure 4-15).

Clear Zones

- Shrubby vegetation should be removed to a distance of 3 feet on each side of the tread. Established trees and grasses may remain (see Figure 4-15).

FIGURE 4-15: TRAIL DIMENSIONS FOR MOUNTAIN BIKE TRAILS



Vertical Clearance

- Mountain bike trails should maintain an 8-foot minimum clearance (see Figure 4-15).

Trail Surface

- Preferred surface for mountain bike trails: compacted earth.

Drainage

Without proper drainage, mountain bike trails may become severely eroded. Several options exist for properly draining mountain bike trails.

- Mountain bike trails should be cross-sloped at 3 to 5 percent.
- Flexible water bars or swales should be used to remove water from trails.
- Special consideration should be given to placement of trails.

Alignment

Alignment of mountain bike trails will primarily depend on the difficulty of the trail to be constructed. In general, the tighter the turn, the more challenging a trail may become.

Profile

- Maximum overall grade for mountain bike trails: 10 percent. This level of steepness will allow minor increases or decreases in slope to avoid obstacles. Dips and inclines should be built into the trail to provide interest and facilitate drainage.

Edge Protection

Edge protection is not usually required for mountain bike trails. In areas where safety is of great concern, fences with a minimum height of 42 inches should be installed.

Equestrian Trails

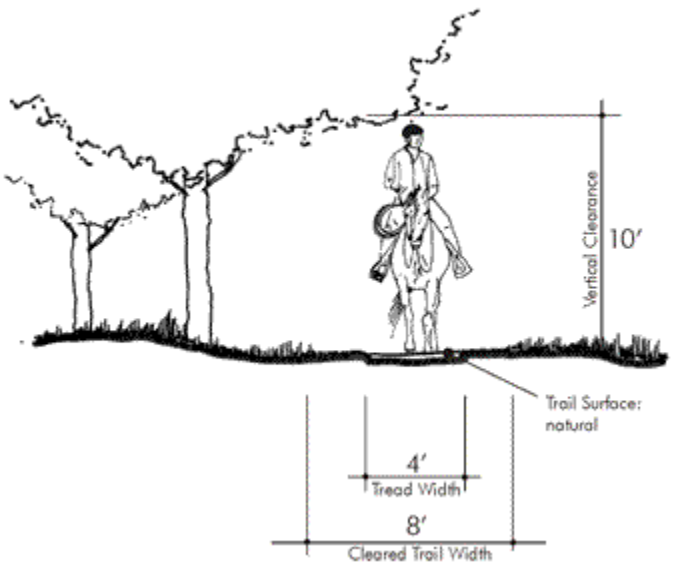
Trails designed to accommodate horses have a great deal of flexibility in design. The most important consideration for equestrian trails is the surface, which should be designed to reduce injuries to animals and riders. The placement of obstacles is also a key issue for designing equestrian trails. Some people with mobility impairments are able to travel by horseback but are not able to walk a horse around obstructions. Therefore, equestrian trails should not require the rider to dismount to avoid obstacles while on the trail. In all design elements, the safety of the horse and rider is paramount.

Clear Trail Width

- Desirable tread width for equestrian trails: 4 feet (see Figure 4-16).
- Desirable cleared trail width for equestrian trails: 8 feet (see Figure 4-16).

Tread width refers to the actual traveled surface of the trail. Cleared trail width refers to the areas where underbrush, branches, and other obstructions have been removed. In most cases, there will be little difference between the two, as riders will use the entire cleared area, especially when passing in opposite directions.

FIGURE 4-16: TRAIL DIMENSIONS FOR EQUESTRIAN TRAILS



Clear Zones

The cleared trail width listed above includes adequate clear zones for equestrian use.

Vertical Clearance

- Equestrian trails should maintain a minimum vertical clearance of 10 feet (see Figure 4-16).

Trail Surface

- Equestrian trails should have a surface of uncompacted natural material.
- Equestrian trails should be free from brush, stumps, logs, large rocks, and other obstructions that may injure horses.

Drainage

Areas where standing water is likely should be drained by sloping the trail or installing ditches.

Alignment

Horses can maneuver almost any corner, and can travel at low speeds. Therefore, no alignment guidelines are necessary for equestrian trails.

Profile

Because equestrian trails are used by animals carrying a significant amount of weight, trail grade is an important consideration.

- Maximum grade for equestrian trails: 10 percent.

- Maximum grade for shorter slopes (100 feet) on equestrian trails: 20 percent.
- Switchbacks should be used for surmounting slopes greater than the above parameters.

Edge Protection

Edge protection is not usually required for equestrian trails. In areas where safety is of great concern, fences should be installed.