A UNIFIED SYSTEM

Jefferson County’s Olympic Discovery Trail - Eaglemount Design Guidelines support the goals and recommendations described in the 2010 Jefferson County Comprehensive Plan’s section on Transportation. In particular, the Design Guidelines support and are consistent with Jefferson County’s trail vision (Goal TR-G-3) to “promote coordinated and safe bicycle, equestrian, and pedestrian way improvements in accordance with the Non-motorized Transportation and Recreational Trails Plan, and in coordination with Federal, State, and regional agencies, utilities, and citizen groups, emphasizing access to schools, parks, employment, major activity service centers, and transit facilities (ferry, bus, etc.), and links between existing trails during land use and transportation system development planning.”
# TABLE OF CONTENTS

Introduction ............................................................................................................................... 6

1.1: Project Description ........................................................................................................ 7

1.2: Document Purpose ..................................................................................................... 7

1.3: Design Guidance .......................................................................................................... 8

User Guidelines .................................................................................................................. 12

2.1: User-based Design ..................................................................................................... 13

2.2: Accessibility ................................................................................................................ 19

Trail Design .......................................................................................................................... 20

3.1: Trail Design with Equestrians .................................................................................... 21

3.2: Trail Edge & Separation .............................................................................................. 24

3.3: Cross Sections with Steep Slopes .............................................................................. 25

3.4: Vegetative Screening .................................................................................................. 27

3.5: Access Control ........................................................................................................... 29

3.6: Spur Trails ................................................................................................................... 31

3.7: Crime Prevention through Environmental Design ................................................... 31

Roadways and Structures ................................................................................................. 33

4.1: Trail - Roadway Crossings ......................................................................................... 34

4.2: Active Warning Beacons ........................................................................................... 38

4.3: Median Refuge Islands ............................................................................................... 39

4.4: Advisory Bike Lanes ................................................................................................... 41

4.5: Bridges, Overcrossings, & Boardwalks ..................................................................... 42

4.6: Tunnels & Undercrossings ......................................................................................... 44
TABLE OF CONTENTS CONT.

Trail Amenities .................................................................................................................................................... 45
  5.1: Parking Area ........................................................................................................................................ 46
  5.2: Bicycle Parking ..................................................................................................................................... 47
  5.3: Equestrian Parking .............................................................................................................................. 48
  5.4: Equestrian Amenities ........................................................................................................................ 49
  5.5: Bicycle Repair Stations ....................................................................................................................... 50
  5.6: Trailheads .............................................................................................................................................. 51
  5.7: Water ........................................................................................................................................................ 52
  5.8: Seated Rest Areas & Viewpoints ........................................................................................................... 53
  5.9: Public Art & Sculpture ........................................................................................................................... 55

Signage .................................................................................................................................................................. 56
  6.1 Regulatory & Directional ....................................................................................................................... 57
  6.2 Etiquette .................................................................................................................................................. 58
  6.3 Wayfinding ............................................................................................................................................. 59
  6.4 Emergency Locators ................................................................................................................................ 59

LIST OF FIGURES

Figure 1 Typical distribution of bicyclist types ................................................................................................. 13
Figure 2 Typical bicycle operating widths ......................................................................................................... 14
Figure 3 Typical dimensions for common bicycle types ..................................................................................... 15
Figure 4 Pedestrian recommended trail widths ................................................................................................. 16
Figure 5 Assistive device use operating widths ............................................................................................... 17
Figure 6 Equestrian recommended trail widths ............................................................................................... 18
Figure 7 Typical multi-use trail with equestrian section .................................................................................... 21
Figure 8 Typical multi-use trail in conditions with reduced space ....................................................................... 22
Figure 9 Example of trail separation using vegetation ..................................................................................... 24
Figure 10 Trail section with cut and fill profile for stabilized slope .................................................................... 26
Figure 11 Trail section with gabion retaining wall, showing cut and fill profile .................................................. 26
Figure 12 Vegetative screening with attention to transparency ........................................................................ 27
Figure 13 Vegetative screening with attention to site lines ............................................................................ 28
Figure 14 Vertical curb cut.......................................................................................................................29
Figure 15 Typical trail intersection with spur trail..................................................................................35
Figure 16 Typical multi-use trail crossing road at non-signalized intersection....................................36
Figure 17 Typical mid-block crossing.....................................................................................................37
Figure 18 Examples of active warning beacons......................................................................................38
Figure 19 Example section with median refuge islands.........................................................................40
Figure 20 Two-way low volume road with advisory bicycle lanes.........................................................41
Figure 21 Bridge design considerations and dimensions.........................................................................43
Figure 22 Trail undercrossing..................................................................................................................44
Figure 23 Example of multi-use trail parking lot configuration..............................................................46
Figure 24 Example of bicycle parking and dimensions..........................................................................47
Figure 25 Example of bicycle parking along a multi-use trail.................................................................48
Figure 26 Example of a bicycle repair station with tire pump...............................................................50
Figure 27 Example of a trailhead.............................................................................................................51
Figure 28 Section diagram of seating dimensions along a multi-use trail............................................53
Figure 29 Examples of rest area and benches.........................................................................................54
Figure 30 Examples of regulatory signs.................................................................................................57
Figure 31 Examples of etiquette signs.....................................................................................................58
Figure 32: Example emergency locator sign..........................................................................................58

LIST OF TABLES

Table 1 Upright adult bicyclist – typical..................................................................................................15
Table 2 Bicycle design speed expectations.............................................................................................15
Table 3 Pedestrian characteristics by age...............................................................................................16
Table 4 Wheelchair use typical speed.....................................................................................................17
Table 5 Wheelchair user design considerations......................................................................................17
"The Olympic Discovery Trail is a vital and important element of our area's economy, especially as it relates to tourism and bicycle tourists."

-Local Resident
1.1 PROJECT DESCRIPTION

The Olympic Discovery Trail is a regional multi-use trail system that traverses the Olympic Peninsula in an East-West alignment; it begins in Jefferson County in Port Townsend and travels across the part of the northern coast of the Olympic Peninsula then turning inland and cuts through Clallam County, ending at La Push, on the Peninsula’s Pacific Coast. The existing trail consists of a combination of on-road segments and separated trails, some of which are paved some of which are not. The total length of the trail covers 130 miles, over half of which is on multi-use trails, the remainder are on a combination of state and local roadways of varying levels of traffic intensity.

For more than 30 years the Peninsula Trails Coalition (PTC) has advocated for the Olympic Discovery Trail through its stakeholder, membership and public engagement, political activity, its leadership in route-finding and problem-solving and its volunteer activities related to maintenance. The PTC’s multi-use trail design criteria are consistent with best practices for similar trails.

The eastern portal of the Olympic Discovery Trail begins at the Port of Port Townsend and extends 7.3 miles on an unpaved separated pathway called the Larry Scott Trail, to a trailhead at Four Corners. The remaining 20 miles of the eastern section are currently on a short segment of multi-use trail on the west shore of Discovery Bay and paved roads including State Routes 20 and 101.

The Olympic Discovery Trail - Eaglemount (ODT-E) would provide an alternative to 7 miles of state highway, providing an accessible, paved, non-motorized, multi-use trail connecting the Larry Scott Trail, at its current terminus in Four Corners to Old Gardiner Road East Discovery Bay.

The ODT-E will be a multi-use trail, meaning that it will be serving pedestrians, bicyclists and equestrians as well as those using mobility assistive devices. It will not be open to use by motorized vehicles.

The trail is recommended to pass through Anderson Lake State Park, along county roads, and along State Route 101 near the southern end of Discovery Bay. There are cut and fill slopes throughout the corridor. Trail construction is anticipated to be completed in phases and should follow the design guidelines provided in this document.

1.2 DOCUMENT PURPOSE

The Olympic Discovery Trail - Eaglemount Design Guidelines is intended to assist Jefferson County in the design of a multi-use trail. This document will serve as a guide to help planners, designers, and engineers select appropriate facilities or treatments given the project context for the proposed multi-use trail. The guidelines build upon national, state and local best practices for bicycle, pedestrian, equestrian, and multi-use trails, and apply them to the local context.

The Olympic Discovery Trail - Eaglemount Design Guidelines support the goals and recommendations described in the Jefferson County Non-Motorized Transportation and Recreation Plan. In particular, the Design Guidelines support and are consistent with Jefferson County’s trail vision: “Promote coordinated and safe bicycle, equestrian, and pedestrian way improvements...emphasizing access to schools, parks, employment, major activity service centers, and mass transit facilities opportunities to provide links between existing trails during land use and transportation system development planning.”
1.3 DESIGN GUIDANCE

National Guidance

Federal Highway Administration’s (FHWA) Manual on Uniform Traffic Control Devices (MUTCD)

https://mutcd.fhwa.dot.gov/

The MUTCD defines the standards used by road managers nationwide to install and maintain traffic control devices on public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.

To further clarify the MUTCD standards, the FHWA created a table of contemporary bicycle facilities that lists various bicycle related signs, markings, signals, and other treatments and identifies their official status (e.g., can be implemented, currently experimental). See Bicycle Facilities and the Manual on Uniform Traffic Control Devices.

Bikeway treatments not explicitly covered by the MUTCD are often subject to experiments, interpretations and official rulings by the FHWA. The MUTCD Official Rulings is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available on this website.

American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities

The AASHTO Guide for the Development of Bicycle Facilities, updated in June 2012, provides guidance on dimensions, use, and layout of specific bicycle facilities. The standards and guidelines presented by AASHTO provide basic design information, such as minimum multi-use trail widths, bicycle lane dimensions, geometric design, detailed striping requirements and recommended signage and pavement markings.

AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities

http://www.wsdot.wa.gov/travel/commute-choices/walk/designing

The 2004 AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities provides comprehensive guidance on planning and design for people on foot.
National Association of City Transportation Officials’ (NACTO) 2012 Urban Bikeway Design Guide

https://nacto.org/publication/urban-bikeway-design-guide/

The NACTO Urban Bikeway Design Guide is the newest publication of nationally recognized bikeway design, and offers guidance on current state-of-the-practice designs. The NACTO Urban Bikeway Design Guide is based on current practices in the best cycling cities in the world. The intent of the guide is to offer substantive guidance for cities seeking to improve bicycle transportation in places where competing demands for the use of the right of way present unique challenges. All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US.

US Department of Transportation (USDOT) Small Town and Rural Multimodal Networks (STAR) Guide

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/

The STAR Guide translates existing street design guidance and facility types for bicycle and pedestrian safety and comfort for the smaller scale places not addressed in guides such as the NACTO Street Design Guide and ITE Walkable Urban Thoroughfares report. The guide provides clear examples of how to interpret and apply design flexibility to improve bicycling and walking conditions.

The stated goals of the STAR guide include “to provide a bridge between existing guidance on bicycle and pedestrian design and rural practice, encouraging innovation in the development of safe and appealing networks for bicycling and walking in small towns and rural areas, and to provide examples of peer communities and project implementation that is appropriate for rural communities.”

https://www.fhwa.dot.gov/environment/recreational_trails/publications/fs_publications/07232816/

The Equestrian Design Guidebook provides guidance for construction of trails and associated facilities with specific treatments for use by equestrians.

2010 Americans with Disabilities Act (ADA) Standards for Accessible Design

https://www.ada.gov/2010ADASTANDARDS_INDEX.HTM

The 2010 ADA Standards contain guidance for the construction of accessible facilities. This includes requirements for sidewalk curb ramps, slopes, and pedestrian railings along stairs.

Some of these treatments are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many elements of the treatments are found within these documents. In all cases, engineering judgment is recommended to match the application to the context of each treatment. Meeting the requirements of the ADA is an important part of any bicycle and pedestrian facility project.

Public Rights-of-Way Accessibility Guidelines (PROWAG)


The U.S. Access Board’s proposed Public Rights-of-Way Accessibility Guidelines (PROWAG) also provides guidance on accessible design for public outdoor facilities.
State Guidelines

Washington State Department of Transportation (WSDOT) Design Manual

http://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm

The WSDOT Design Manual provides policies, procedures, and methods for developing transportation design improvements in Washington. The manual was primarily developed for state facilities and may not be appropriate for all county or city roads (WSDOT Design Manual). Division 15, Chapter 1515, of the manual details design standards for bicycle and pedestrian facilities, with a specific emphasis on multi-use trails. The Design Manual has been adopted by WSDOT as an equivalent resource to the AASHTO guidelines for designing both bicycle facilities and multi-use trails.

Local Guidelines

The Peninsula Trails Coalition Design Guidelines, Approved September 2013.

Since its founding in 1988, the PTC has advocated for a fully functioning, demonstrably safe, multi-modal, bi-directional, non-motorized Olympic Discovery Trail (ODT), extending from Port Townsend west to La Push. The guidelines created in 2013 outline the features that should be apart of any trail segment of the ODT. These include adhering to AASHTO guidelines for shared use pathways and standards set forth by the Americans with Disabilities Act (ADA) Access Board. In addition typical dimensions for the trail are identified.
USER GUIDELINES
2.1 USER-BASED DESIGN

People Riding Bicycles

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. A detailed understanding of the U.S. population as a whole is illustrated in Figure 1. Developed by planners in Portland, Oregon and supported by data collected nationally since 2005, this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

Strong and Fearless (approximately 1% of population) – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections — even if shared with vehicles — over separate bicycle facilities such as multi-use trails.

Enthused and Confident (7% of population) – This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or multi-use trails when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type.

Interested but Concerned (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or multi-use trails under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues.

No Way, No How (approximately 33% of population) – Persons in this category are not bicyclists, are disinterested in cycling or physically unable to ride a bicycle. Some may perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

Figure 1: Typical distribution of bicyclist types (Roger Geller, Portland Office of Transportation, 2009).
Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

Figure 2 illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the physical dimensions of a person on a bicycle. Bicyclists prefer 5 feet or more operating width, although 4 feet may be minimally acceptable. Table 1 summarizes the typical dimensions of an upright adult bicyclist.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. Figure 3 summarizes the typical dimensions for bicycle types.

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as multi-use trails. Table 2 provides typical bicyclist speeds for a variety of conditions.

The growing use of electric-assist cycles also contributes to a higher average speed of traffic on multi-use trails.

As a recreational and social activity, cycling on multi-use trails has seen a growing desire for people to be able to ride next to each other, while passing pedestrians who are walking next to each other. The minimum trail width that accommodates this is 12 feet, with a preferred width of 14 feet.

Figure 2: Typical bicycle operating widths.
Figure 3: Typical dimensions for common bicycle types.

Table 1: Upright adult bicyclist - typical

<table>
<thead>
<tr>
<th>Feature</th>
<th>Typical Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical width</td>
<td>2 ft 6 in</td>
</tr>
<tr>
<td>Operating width (Minimum)</td>
<td>4 ft.</td>
</tr>
<tr>
<td>Operating width (Preferred)</td>
<td>5 ft.</td>
</tr>
<tr>
<td>Physical length</td>
<td>5 ft 10 in</td>
</tr>
<tr>
<td>Physical height of handlebars</td>
<td>3 ft 8 in</td>
</tr>
<tr>
<td>Operating height</td>
<td>8 ft 4 in</td>
</tr>
<tr>
<td>Eye height</td>
<td>5 ft</td>
</tr>
<tr>
<td>Vertical clearance to obstructions (tunnel height, lighting etc.)</td>
<td>10 ft</td>
</tr>
<tr>
<td>Approximate center of gravity</td>
<td>2 ft 9 in = 3 ft 4 in</td>
</tr>
</tbody>
</table>

Table 2: Bicycle design speed expectations.

<table>
<thead>
<tr>
<th>Bicycle Type</th>
<th>Feature</th>
<th>Typical Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upright Adult Bicyclist</td>
<td>Paved level surfacing</td>
<td>8-15 mph</td>
</tr>
<tr>
<td></td>
<td>Crossing intersection</td>
<td>10 mph</td>
</tr>
<tr>
<td></td>
<td>Downhill</td>
<td>20-30 mph</td>
</tr>
<tr>
<td></td>
<td>Uphill</td>
<td>5-12 mph</td>
</tr>
<tr>
<td>Recumbent Bicyclist</td>
<td>Paved level surfacing</td>
<td>11-18 mph</td>
</tr>
</tbody>
</table>

*Tandem bicycles and bicyclists with trailers have typical speeds equal to or less than upright adult bicyclists.*
People Walking

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and special needs. Age is one major factor that affects pedestrians’ physical characteristics, walking speed, and environmental perception. Children have low eye height, walk at slower speeds than adults, and have slow reaction times and sometimes unpredictable lines of travel. They also perceive the environment differently at various stages of their cognitive development, including difficulty with speed perception. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. Table 3 summarizes common pedestrian characteristics for various age groups and Figure 4 indicates recommended widths for multi-use trails from a pedestrian perspective.

The MUTCD recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent. Demographic data and population trends can be gathered on the county and sub-county levels using a number of public resources, including the U.S. Census Bureau’s American Community Survey.

Table 3: Pedestrian characteristics by age.

<table>
<thead>
<tr>
<th>Age</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>Learning to walk</td>
</tr>
<tr>
<td></td>
<td>Requires constant adult supervision</td>
</tr>
<tr>
<td></td>
<td>Developing peripheral vision and depth perception.</td>
</tr>
<tr>
<td>5-8</td>
<td>Increasing independence, but still requires supervision</td>
</tr>
<tr>
<td></td>
<td>Poor depth perception</td>
</tr>
<tr>
<td>9-13</td>
<td>Susceptible to “dart out” intersection dash</td>
</tr>
<tr>
<td></td>
<td>Poor judgment</td>
</tr>
<tr>
<td></td>
<td>Sense of invulnerability</td>
</tr>
<tr>
<td>14-18</td>
<td>Improved awareness of traffic environment</td>
</tr>
<tr>
<td></td>
<td>Poor judgment</td>
</tr>
<tr>
<td>19-40</td>
<td>Active, fully aware of traffic environment</td>
</tr>
<tr>
<td>41-65</td>
<td>Slowing of reflexes</td>
</tr>
<tr>
<td>65+</td>
<td>Difficulty crossing street</td>
</tr>
<tr>
<td></td>
<td>Vision loss</td>
</tr>
<tr>
<td></td>
<td>Difficulty hearing vehicles approaching from behind</td>
</tr>
</tbody>
</table>

Figure 4: Pedestrian recommended trail widths.
People Using Assistive Devices

As the American population ages, the number of people using mobility assistive devices (such as manual and powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs use battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement based on their ability (e.g., joystick control, breath controlled, etc).

Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element for accessible design.

Table 4: Wheelchair use typical speed.

<table>
<thead>
<tr>
<th>User</th>
<th>Typical Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Wheelchair</td>
<td>3.6 mph</td>
</tr>
<tr>
<td>Powered Wheelchair</td>
<td>6.8 mph</td>
</tr>
</tbody>
</table>

Table 5: Wheelchair user design considerations.

<table>
<thead>
<tr>
<th>Effect on Mobility</th>
<th>Design Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty propelling over uneven soft surfaces</td>
<td>Firm, stable surfaces and structures, including ramps or beveled edges.</td>
</tr>
<tr>
<td>Cross-slopes cause wheelchairs to veer downhill.</td>
<td>Cross-slopes of less than two percent.</td>
</tr>
<tr>
<td>Require wider path of travel</td>
<td>Sufficient width and maneuvering space.</td>
</tr>
</tbody>
</table>

Figure 5: Assistive device use operating widths.
People Riding Horses

Equestrians and their mounts require specific considerations, not only for their size but also in consideration of the behavior of the animals and a variety of age and experience levels of riders, who may need additional space to be able to control their mounts should they become excited and move out of their track. Horses and mules (generally referred to as ‘stock’) prefer natural surfaces to hard surfaces, which cause wear on their joints but also can become hazardous and slippery under their hooves.

For these reasons, it is typically preferable to provide a separate natural surface trail alignment to accommodate equestrians.

Stock typically require a shy distance between the track edge and nearby objects or dense vegetation of 2 feet to 3 feet and prefer a distance of 6 feet with a vegetative buffer between themselves and bicycle traffic of moderate volume and speed.

A minimum 2 foot buffer is preferable where equestrian trails must be adjacent to multi-use trails.

Figure 6: Equestrian recommended trail widths.
2.2 ACCESSIBILITY

General guidelines have been created in response to the Americans for Disabilities Act (ADA) for accessible trails.

Guidance

- Trail surface: hard surface such as asphalt, concrete, wood, compacted gravel.
- Trail gradient: less than 5% maximum without landings.
- Trail cross slope: 2% maximum.
- Passage width: 5 feet minimum.
- Detectable pavement changes at curb ramp approaches should be placed at the end of ramps before entering roadways.
- Crosswalks should incorporate appropriate non-slip materials where striping is used to avoid slipping on slick surfaces.
- Desired height for pedestrian actuated push buttons is 42 inches. The minimum height is 15 inches and maximum height 48 inches (2014 WSDOT Chapter 1510).
- Trailhead signage should provide accessibility information, such as trail gradient/profile, distances, tread conditions, location of water facilities, and rest stops.
- At trailheads, parking areas should meet ADA parking requirements.
- Locate seating and rest areas at regular intervals along the trail.

Materials, Maintenance, and Safety

The trail surface should be solid, free of obstacles and tripping hazards. Trail edge vegetation, screening, and signage should be maintained and located so as not to present obstacles for visually impaired trail users.

Discussion

Steeper grades call for landings at regular intervals. Tactile queues and audible push-button indicators at crossings provide visually impaired trail users with a safer, more comfortable experience. Trail amenities, drinking fountains and pedestrian-actuated push buttons should be placed no higher than four feet off the ground.

Constructing multi-use trails may have limitations that make meeting Americans for Disabilities Act (ADA) guidelines difficult and sometimes prohibitive. Prohibitive impacts include harm to significant cultural or natural resources; a significant change in the intended purpose of the trail; requirements of construction methods that are against federal, state, or local regulations; or terrain characteristics that prevent compliance.
TRAIL DESIGN
3.1 TRAIL DESIGN WITH EQUESTRIANS

Multi-use trails provide a desirable facility, particularly for recreation and users of all skill levels preferring separation from traffic. The following guidance provides general and typical design recommendations for trails with equestrians.

The Jefferson County Non-motorized Transportation and Recreational Trails Plan recommends that the County use either the AASHTO Guidelines for Development of Bicycle Facilities or the WSDOT Design Manual Chapter 1515 and 1520 for multi-use trail design guidelines.


Figure 7: Typical multi-use trail with equestrian section.
Figure 8: Typical section of multi-use trail in conditions with reduced space.
Guidance:

Width of Paved Tread

- 12 feet, excluding shoulders, is recommended in most situations along the trail. (2014 WSDOT Chapter 1515; AASHTO 2012)
- A minimum width for the trail with an equestrian/running surface is 16 feet with a 10 foot hardened trail surface, 4 foot packed gravel equestrian/running surface, and 2 foot gravel shoulder on the side of the trail opposite of the 4 foot gravel surface (The Peninsula Trails Coalition Design Guidelines 2013).
- When 12 feet is not achievable, 10 feet, excluding shoulders, is the minimum in most situations and will only be adequate for light to moderate use.
- Exceptions to this minimum exist when there is a physical constraint, short trail distance, or low use. A width of 8 feet is the absolute minimum trail width in these rare circumstances. (2014 WSDOT Chapter 1515)

Lateral Clearance

- A 2 foot or greater shoulder on both sides of the trail should be provided. The installation of signage or other furnishings should be located at least 2 feet beyond the 2 foot shoulder. (2014 WSDOT Chapter 1515; MUTCD 2009)

Overhead Clearance

Clearance to overhead obstructions should be 12 feet recommended. (2014 WSDOT Chapter 1515; MUTCD 2009)

Materials, Maintenance, and Safety

Due to strain on the animals’ joints and lack of traction, paved surfaces are not recommended for equestrian use. Compacted natural surface trails are the most preferred surface type for equestrian use. Some types of compacted gravel are also suitable.

The hardened surface of the trail can be a variety of surfaces, such as concrete, asphalt, or chip-sealed gravel. The key feature is that the surface should support all typical wheeled devices and all uses without mud, sinking, or slipping (The Peninsula Trails Coalition Design Guidelines 2013).

Vegetation should be trimmed to permit a vertical clearance of 12 feet and 2 feet on either side of trail should be maintained free of heavy shrubbery or fallen trees to allow for appropriate clearance.

Stream crossings should be appropriately stabilized to withstand equestrian traffic without eroding and sedimentation as well as maintain adequate traction. Refer to current environmental standards for crossings in other sensitive areas.

Horses can walk on boardwalk surfaces, however consideration for animal and rider’s safety should be considered carefully when considering boardwalks for portions of equestrian trails and generally additional traction is recommended.
3.2 TRAIL EDGE & SEPARATION

Vegetation, topography, ditches, fencing, railings, or walls may be used to clearly mark trail edges. Such features serve multiple purposes, including:

- Providing visual separation/privacy screens
- Delineating public space from properties adjacent to the trail
- Discouraging the development of informal access trails
- Separating users from hazardous drop-offs or land uses
- Providing drainage and erosion control to maintain a stable walkway and trail surface

Figure 9: Example of trail separation using vegetation.

Guidance

- Select landscaping material (e.g. vegetation with thorns) approximately 3 feet tall should be used when vegetation is used to create separation between adjacent land uses and a multi-use trail.
- For physical separation aimed at preventing trespassing or guarding against hazardous slopes, consider the use of topography, ditches, semi-transparent fencing or railings, and hostile vegetation.
- If drop-off is greater than 2 feet 6 inches then a pedestrian rail is needed (WSDOT Design Manual Chapter 1515).
- Railings on bridges, boardwalks, and at the edges of steep drop-offs of more than 30 inches, should be at least 42 inches above the surface.
- Fences and railings adjacent to equestrian passages should stand between 48 inches and 54 inches maximum and have a 4 inch strip of white reflective vinyl fence tape along the top rail, especially if wire fencing is used where visibility may be reduced and/or the fence is separating the trail from traffic. This will help the fences to be visible to horses during twilight hours.
Materials, Maintenance, and Safety

Use native plant species to reduce maintenance costs and enhance local identity and avoid invasive species such as blackberries and scotch broom. Follow Crime Prevention Through Environmental Design (CPTED) principles to address safety concerns. See Chapter 3.7 CPTED for additional information.

Discussion

Wildlife passage and safety for trail users are important factors in determining appropriate trail edge treatments. Although the public often perceives fencing as a means of providing safety by prevention of unwanted access, fencing that blocks visual access can have the opposite effect by impairing informal trail surveillance.

3.3 CROSS SECTIONS WITH STEEP SLOPES

Multi-use path cross sections where there are significant cross slopes may or may not require retaining walls. When needed, retaining walls can be used either on the uphill or downhill slope (see Figures 10 & 11, next page) to minimize site disturbance and/or reduce impact to areas with sensitive habitat and mature trees.

Guidance

• Trail width is at least 14 feet including shoulders and 15 feet where equestrian trail is alongside paved trail.
• Provide 6 foot setback from retaining wall to property line. This will allow for the construction of walls without impacting adjacent properties (Coordinate with civil, structural and geotechnical engineers).
• Match existing grade at property line.
• Side slopes should be 2H:1V or flatter.
• For paved surfaces, a 2% cross slope will resolve most drainage issues on a paved trail and should be used for both the trail and its shoulders. A maximum 1:6 slope may be used for the shoulders although 2% is preferred. For sections of cut where uphill water is collected in a ditch, water should be directed under the trail in a drainage pipe of suitable dimensions.

Materials

When wall design criteria allows, use rockeries for retaining walls to reduce costs. Use locally sourced boulders to reduce environmental impact of constructing retaining walls. Plant the base of rockeries with native plants to soften the visual impact of walls.
Maximum slope condition without retaining structure.
Figure 10: Trail section with cut and fill profile for stabilized slope.

Slope condition with retaining structure.
Figure 11: Trail section with gabion retaining wall, showing cut and fill profile.

Note: Retaining walls could be on the downside slope which would require a railing.
3.4 VEGETATIVE SCREENING

Landscape features, including trees and shrubs along trails, can enhance the visual environment and improve the trail user experience. Trees and shrubs can also shade users from sun and shelter users from rain. When possible, landscaping is the first choice for creating separation between the trail and adjacent properties. Vegetative buffers create a natural privacy screen, provide habitat for wildlife, and stabilize erodible soils. Select landscaping material (e.g. vegetation with thorns) can deter unwanted access or exit points, entrapment areas, and undesired off-trail routes.

Safety and personal security is a concern for many trail users that should be considered in the selection and placement of landscape features including planting. Blocking visibility at intersections and creating hiding places are key design concerns to be avoided or mitigated.

Guidance

- When using shrubs for screening from adjacent properties, use plants that are not dense and allow light to pass through (Figure 12).
- Groundcover and shrubs should be trimmed to a maximum of 3 feet above ground level height.
- Trees should be trimmed to provide a minimum of 8 feet of vertical clearance over the trail and shoulder.
- Tree canopies should not obstruct trail illumination.
- Select and place trail vegetation to provide seasonal comfort: shade in the warmer months and sunlight in colder months.

Figure 12: Vegetative screening with attention to transparency.
Materials, Maintenance, and Safety

Use native plant species and plants appropriate to the Pacific Northwest that are already adapted to the local soil and climate. Keep the vegetation buffer maintained so that it does not impede views or interfere with trail circulation.

Discussion

Select plant species based on the desired effect or function along trail segments. For example, consider the use of plant species that assist with stormwater management along trail edges. In some situations, vegetative buffers alone may not create the desired degree of separation. Where separation is desired to protect users from adjacent roadways, steep slopes, or wetlands consider additional treatments.

Consider plants that have some transparency rather than those that block views for safety reasons.
3.5 ACCESS CONTROL

Access control on multi-use trails may take many different forms, but all serve to deter motor vehicle access onto the trail. Access control devices should be located far enough off any roadway so that maintenance or emergency vehicles can safely pull off the roadway while gaining access through the device. Access control should be prioritized according to the following: first, raised crosswalks should be used when appropriate; second, use vertical curb cuts in all other locations; and third bollards may be considered when there is a demonstrated problem with motor vehicles accessing the trail (every effort should be made to minimize using bollards along the trail because they present a collision hazard).

**Vertical Curb Cuts**

Curb cut design and signage are appropriate methods used to reduce the likelihood of motor vehicle access on multi-use trails (Figure 14). Vertical curb cut design with pavement markings or splitting the trail into smaller directional lanes divided by a median is a preferred access control method for the Olympic Discovery Trail - Eaglemount.

**Guidance**

- Use vertical curb cuts for access control when raised crosswalks are not used
- “No Motor Vehicles” signage (MUTCD R5-3) may be used to reinforce access rules (see Figure 31).
- At intersections, split the trail tread into two sections separated by a 4 inch tall and 3 foot wide concrete curb or painted diagonal stripes
- Vertical curb cuts should be used to discourage motor vehicle access.
- Consider targeted surveillance and enforcement at specific intrusion locations.

*Figure 14: Vertical Curb Cut*
**Bollards**

AASHTO states that bollards should **not** be considered the default solution to potential motor vehicle access problems as they are often ineffective at preventing access, and they create safety hazards to all trail users. Bollard should only be used to retrofit when there is a demonstrated problem with continued motor vehicle access, and other techniques and devices have proven ineffective.

**Guidance**

- Bollards should not be used in the traveled way.
- Locate bollards beyond the edge of the paved surface on either side.
- Bollards should be permanently reflectorized for nighttime and “brightly colored” for daytime use.
- Include standard striping per MUTCD.

> “Bollards are often ineffective at preventing access, and they create safety hazards to legitimate trail users.”

-AASHTO
3.6 SPUR TRAILS

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, trails, green spaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, typically having their own rights-of-way and easements. Additionally, these trails can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.

Guidance

- Neighborhood accessways should remain open to the public.
- Trail pavement shall be at least 10 feet wide with a 2 foot shoulder, the same minimum width as the Olympic Discovery Trail, in order to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Trail widths should be designed to be less than 10 feet wide only when there is a physical constraint, short trail distance, or low use.
- The site line triangle at the junction of spur trails and the Olympic Discovery Trail should remain clear for safety reasons.

Discussion

Neighborhood accessways should be designed into parks, recreation areas, new subdivisions at every opportunity and should be required by city/county when new development occurs. An example of a possible spur trail for the Olympic Discovery Trail - Eaglemount would be a trail connection to Gibb’s Lake.

3.7 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

Personal safety, both real and perceived, heavily influences a trail user’s decision to use a facility and a community’s decision to embrace the trail system. Proper design must address both the perceived safety issues (i.e., feeling safe or fear of crime) and actual safety threats (i.e., infrastructure failure and criminal acts). Crime Prevention through Environmental Design (CPTED) is a proactive approach to deterring undesired behavior in neighborhoods and communities. When all spaces have a defined use and the use is clearly legible in the landscape, it is easier to identify undesired behavior.

Apply CPTED guidelines to multi-use trail facilities, management features, and amenities when appropriate.
Guidance

- If fencing is installed along the trail, it should not obstruct the view of trail users.
- If fencing is installed for long stretches, intermittent openings should be located to allow users to enter and exit the trail. Access points to the trail should be at locations with good visibility from the surrounding neighbors.
- Trail signage should include the contact number to report graffiti, suspicious behavior, and maintenance issues (e.g., “Immediately report any observed graffiti to 911”).
- All groundcover and shrubs along multi-use trails should be trimmed to a maximum height of 3 feet above ground level.
- Trees should be limbed-up to provide a minimum of 8 feet of vertical clearance over the trail and 12 feet of clearance over equestrian trails.
- Tree canopies should not obstruct pathway illumination.
- Hostile native landscaping material (e.g. vegetation with thorns) can be used in strategic areas to discourage unauthorized use and eliminate entrapment areas.
- Add anti-graffiti application to retaining walls, where appropriate.
- Trail alignments and maintenance strategies should maintain clear visibility and line of site to avoid situations such as blind corners.
- Where possible lighting should be added at trailheads.
ROADWAYS & STRUCTURES
4.1 TRAIL-ROADWAY CROSSINGS

At-grade roadway crossings can create potential conflicts between trail users and motorists. However, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for trail users. At-grade crossings between trails and roadways can be complex because it requires thinking about all types of users who pass through the intersection: motorists, bicyclists, equestrians, and pedestrians. The multi-user trail design should minimize new at-grade crossings wherever possible. In most cases, at-grade trail crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture. Signing for trail users may include a standard “STOP” or “YIELD” sign, and pavement markings, possibly combined with other features such as a bend in the trail to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

Jefferson County should refer to the WSDOT Design Manual, AASHTO, and MUTCD for trail design recommendations for roadway crossings. However, a few important pieces to keep in mind are:

- In order to determine the need and what kind of traffic control devices that are to be used at all trail/roadway intersections, the County should use the MUTCD warrants and engineering judgment in consultation with Jefferson County Public Works.
- Bicycles are vehicles in Washington State and bicycle traffic on the trail can be classified as vehicular traffic for the MUTCD warrants.
- Right-of-way should be assigned appropriately.
- Jefferson County should avoid designing trees and landscaping that would at all obscure views within the stopping sight distance for bikes and for motor vehicles.

Guidance

- The trail has the right-of-way at all private driveway crossings and low volume residential (i.e., vehicles stop for trail users).
- The trail users stop at arterial and highway crossings and roadways with restricted sight-lines.
- Provide four-way stop at low volume arterials
Typical conditions

Figure 15: Typical trail intersection with spur trail
Figure 16: Typical multi-use trail crossing road at non-signalized intersection.

**The distance between the specific crossing point and advance Bicycle/Pedestrian sign should be determined in accordance to Table 2C-4 - Placement of Warning Signs (MUTCD 9B.18).**
Figure 17: Typical mid-block crossing.
4.2 ACTIVE WARNING BEACONS

Enhanced marked crossings are unsignalized crossings with additional treatments designed to increase motor vehicle yielding compliance on rural, multi-lane or high volume roadways, in addition to signing, these enhancements include trail user or sensor actuated warning beacons, Rectangular Rapid Flash Beacons (RRFB), or in-roadway warning lights.

Guidance

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.
- Warning beacons shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.
- To provide access for mounted equestrians, a second activation button should be located at a position between five and six feet above the ground. The button should also be set back from the travel lanes 6 feet 6 inches to keep the animals' heads out of traffic.

Figure 18: Examples of active warning beacons.
4.3 MEDIAN REFUGE ISLANDS

Median refuge islands are located at the mid-point of a marked crossing and help improve bicycle and pedestrian safety by allowing bikes and pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

Guidance

- Can be applied on any roadway with a left turn center lane or median that is at least 6 feet wide.
- Appropriate at signalized or unsignalized crosswalks.
- The refuge island must be accessible, preferably with an at-grade passage through the island rather than with ramps and landings.
- The island should be at least 6 feet wide between travel lanes (to accommodate bikes with trailers and wheelchair users) and at least 20 feet long.
- On streets with speeds higher than 25 mph there should also be double centerline marking, reflectors, and “KEEP RIGHT” signage.

Materials, Maintenance, and Safety

Locate markings out of wheel tread when possible to minimize wear and maintenance costs. Signing and striping need to be maintained to help users understand any unfamiliar traffic control. A second activation button can be installed for equestrians between 5 feet and 6 feet above the trail surface.

Discussion

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding by motorized vehicles from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent. Additional studies of long term installations show little to no decrease in yielding behavior over time.
Materials, Maintenance, and Safety

Refuge islands may collect road debris and may require some maintenance. Refuge islands should be visible to snow plow crews and should be kept free of snow berms that block access.

Discussion

If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance.

Cut through median islands are preferred over curb ramps, to better accommodate bicyclists.

Figure 19: Example section with median refuge islands.
4.4 ADVISORY BIKE LANES

Advisory shoulders create a usable area for bicyclists on a roadway that is otherwise too narrow to accommodate one. The shoulder is delineated by pavement markings and optional pavement color. Motorists may only enter the shoulder when no bicyclists are present and must overtake these users with caution due to potential oncoming traffic and cyclist safety.

Guidance
- The preferred width of the advisory shoulder space is six feet. Absolute minimum width is four feet when no curb and gutter is present.
- Preferred two-way center travel lane width is 13.5 to 16 feet although may function with widths of 10 to 18 feet.

Discussion
Advisory shoulders are an emerging treatment in the US. While all required traffic control device elements are included in the MUTCD in some capacity, the manual does not fully address the particular combination of traffic control devices which make up the treatment. It is recommended communities implement advisory shoulders within the experimentation process established by the FHWA. The experimentation process has monitoring and reporting requirements, but offers benefits to communities and agencies in the form of stronger liability protection, FHWA technical support, and makes a positive contribution to the body of knowledge regarding this facility type. The process involves writing a letter to the FHWA with the details of the existing circumstances, a proposed plan, and answering questions that may arise (Lessons Learned: Advisory Bike Lanes in North America, 9).

Figure 20: Two-way low volume road with advisory bicycle lanes.
4.5 BRIDGES, OVERCROSSINGS, & BOARDWALKS

Trail bridges (also called, ‘bicycle/pedestrian bridges’ or ‘footbridges’) are most often used to provide trail access over natural features such as wetlands and rivers, where a culvert is not an option. The type and size of bridges can vary widely depending on the trail type and specific site requirements. When determining a bridge design for multi-use trails, it is important to consider emergency and maintenance vehicle access.

Bicycle/pedestrian overcrossings provide critical non-motorized system links by joining areas separated by barriers such as major transportation corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

Guidance

Bridge

- The preferred clear width of the bridge deck is 16 feet. (Figure 23)
- Bridge deck height should match that of the trail surface to provide a smooth transition.
- A minimum vertical clearance of 12 feet is desirable for motor vehicle access.
- Protective railings, fences, or barriers on the bridge should be 48 inches high or greater and 42 inches high at minimum. Where equestrian users will be crossing the bridge, railings of 54 inches are recommended with a continuous 4 inch or wider white top rail.
- Maximum opening in the railing posts is not to exceed 4 inches
- It is recommended that a smooth railing or barrier be included between 36 and 44 inches to minimize bicycle handlebars being caught in the railing.
- A trail bridge should support 6.25 tons if motor vehicle access is permitted.
- Where appropriate, a separate crossing for stock to ford shallower streams may be provided along with the appropriate bank stabilization and safe footing to prevent erosion and slippery or hazardous conditions.

Overcrossings

- The preferred width of overcrossings is 16 feet clear and 8 foot minimum width only when constrained. If overcrossing has any scenic vistas, additional width should be provided to allow for stopping. A separate 5 foot pedestrian area may be provided for facilities with high bicycle and pedestrian use.
- The overcrossing should have a centerline stripe even if the rest of the trail does not have one.
Boardwalks

- Generally, boardwalks are used when traversing wetland areas or wet soils to protect the surroundings from erosion. Boardwalks are to be constructed of solid wood or other planking set on concrete footers. Though railings are not necessary on boardwalks, less than 30 inches high, a wooden kick plate will add security for users in wheelchairs.

Materials, Maintenance, and Safety

- High quality prefabricated bicycle and pedestrian bridges are available.

Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings at 400 foot intervals, or 8.33% (1:12) with landings every 30 feet. Bridges have been included in the recommended alignment over fish bearing streams and one long span over Moon Creek ravine.
4.6 TUNNELS & UNDERCROSSINGS

Undercrossings can provide critical trail system links in areas separated by barriers such as railroads and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. There are no minimum roadway characteristics for considering grade separation.

The undercrossing should have a centerline stripe, even if the rest of the path does not have one, to discourage passing movements. Safety is a major concern with undercrossings as path users may be temporarily out of sight from public view and may experience poor visibility. To mitigate safety concerns, an undercrossing should be designed to be spacious, well-lit, equipped with emergency phones at each end and completely visible for its entire length from end to end. Potential problems of undercrossings include conflicts with utilities, drainage, flood control, and vandalism.

Guidance

• Undercrossings must be a minimum of 14 feet wide, and greater widths are preferred for undercrossing lengths of over 60 feet.
• For maintenance vehicles, there must be a 10 foot minimum vertical clearance.
TRAIL AMENITIES
5.1 PARKING AREA

Any successful multi-use trail will attract local residents and visitors to drive and park near the trail for recreation and use. A feasibility study should be completed when assessing the need for a parking area, and should include a full analysis of access to the trail from local communities, along with a projection of future annual and peak day usage and modal split. If the analysis reveals that a significant number of vehicles will be parking near the trail, then a trailhead parking scheme should be developed.

Guidance

• Parking should be located at trailheads and be accompanied by additional amenities including bicycle parking, restrooms, drinking fountains, and wayfinding signage.
• Locate parking areas on the same side of the road as the trail, eliminating the need for people to cross the road.
• Equestrian users are best served by dedicated segments of trailhead parking suitable for truck and trailer circulation, and should include water, toilets, wayfinding and trail etiquette signing, hitching posts and horse-friendly fencing with gates.
• Parking lots should be made accessible according to the Americans with Disabilities Act (ADA). Specific guidance regarding the number of accessible spaces, signage, striping, etc. required can be found on the ADA website. Accessible access points from the parking lot to the trailhead are also necessary.

Materials, Maintenance, and Safety

Parking lots should follow CPTED policies for safety. Wheel stops, where used, could be made from local timber to create a more rustic aesthetic.

Figure 23: Example of multi-use trail parking lot configuration.
Source: FHWA Equestrian Design Guidebook
5.2 BICYCLE PARKING

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that:

- Supports the bicycle in at least two places, preventing it from falling over.
- Allows locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to the ground.
- Resists cutting, rusting and bending or deformation.

Guidance

- Close to destinations; 50 feet maximum distance from main building entrance.
- Minimum clear distance of 6 feet should be provided between the bicycle rack and the property line.
- Should be highly visible from adjacent bicycle routes and pedestrian traffic.
- Locate racks in areas that cyclists are most likely to travel.

Materials, Maintenance, and Safety

Use of proper anchors will prevent vandalism and theft. Racks and anchors should be regularly inspected for damage.

Discussion

Some types of bicycle racks may meet design criteria, but are discouraged. This includes undulating “wave” racks, schoolyard “wheel bender” racks, and spiral racks.

Figure 24: Example of bicycle parking and dimensions.
5.3 EQUESTRIAN PARKING

Equestrian parking areas should be designed to be separate from other types of parking, where possible. Turning radii, entrance widths and grades should take into account the limitations of loaded trailers.

Guidance

- Equestrian trailer parking spaces should be a minimum of 18 feet to 28 feet wide by 55 feet to 78 feet long. Extra width and length are preferred for staging areas as stock are unloaded, groomed, and saddled in those areas.

- In situations where space for parking trailers is constrained, the width and length left for staging can be replaced with ample hitching rails on the periphery of the parking area.

- Where parking stalls are not delineated, such as an open parking configuration, sufficient space for a 15 foot drive isle and undefined parking spaces 28 feet by 78 feet.

- Parking areas designated for stock should be as level as possible, with positive drainage and shade provided. Aggregate or compacted natural surface are preferred for parking and unloading areas.
5.4 EQUESTRIAN AMENITIES

**Hitch Rails**

- Equestrian hitch rails commonly are constructed of wood or steel. Wood rails are suitable for low and moderate levels of development—however, stock may chew on them, causing damage.

- Common steel hitch rails range from 4 to 10 feet long. A hitch rail that is 4 feet long generally has space for one animal tied on each side. A hitch rail that is 10 feet long accommodates three animals—two animals on one side and the third animal tied to the opposite side in the middle of the rail. This allows a comfortable distance between the three animals.

- Use of proper anchors will prevent vandalism and theft. Hitch rails and anchors should be regularly inspected for damage. Educate snow removal crews to avoid burying hitch rails during winter months.

- Hitch rails should be 42 inches high and located in a level area free of grade changes or obstructions including curbs, signage and vegetation.

- Hitch rails should be at least 25 feet from water sources.

- Good places for hitch rails are near toilet facilities and water access facilities.

**Water facilities for equestrians**

- To meet the needs of all riders, provide both water hydrants and troughs. At a minimum, provide a water trough and hydrant at each toilet building and at trail access points.

- Use an ADA/ABAAG approved controls that can be operated by riders with disabilities, along with appropriate wheelchair clearance zones.

**Gates for equestrian parking area**

- Road gates are normally 16 feet to 20 feet wide and two-lane roads typically require a pair of gates that open in the center.

- Gates intended to contain horses from escaping should be between 48 inches and 60 inches in height.
5.5 BICYCLE REPAIR STATIONS

Bicycle fix-it stations are small kiosks designed to offer a complete set of tools necessary for routine bicycle maintenance. Popular locations for these stations include trailheads or public areas that are centers for activity, easily accessible by foot or bicycle.

Guidance

Potential locations for bicycle fix-it stations include:
- Trailheads and parking lots
- Intersection of two trails
- Public gathering spaces and lookout points along the trail

![Figure 26: Example of a bicycle repair station with tire pump.](image-source: traillink.com/trail-photos/snohomish-county-centennial-trail)

Materials, Maintenance, and Safety

Similar to bicycle racks, the use of proper anchors will prevent vandalism and theft. Repair stations should be inspected periodically for damage and vandalism.

Discussion

Bicycle repair station tools are secured by high security cables, but will still be an attractive target for theft. Proper placement of kiosks in areas of high activity is one key strategy to reduce vandalism.
5.6 TRAILHEADS

Good access to a trail is a key element for its success. Trailheads serve the local and regional population arriving to the trail by car, transit, bicycle or other modes. Trailheads provide essential access to the trail and include amenities like parking for vehicles and bicycles, restrooms (at major trailheads), and posted maps.

Guidance

- Trailheads could include automobile and bicycle parking, trail information (maps, user guidelines, wildlife information, etc.), garbage receptacles and restrooms.
- Separate areas are often provided for equestrian trailheads.

Materials, Maintenance, and Safety

Trailhead signage will require regular maintenance. Major trailheads will require regular servicing.

Discussion

Trailheads with a small motor vehicle parking area should additionally include bicycle parking and accessible parking. Neighborhood access should be achieved from all local streets crossing the trail. No parking needs to be provided, and in some situations “No Parking” signs will be desirable to minimize impact on the neighborhood. See Spur Trails (section 3.6) for neighborhood connection guidance.
5.7 WATER

Access to potable water provides a more enjoyable trail experience and protects the health of two and four-legged trail users.

Guidance

- Locate potable water spigots at least 5 feet from trail edge.
- Locate potable water spigots near restrooms, at trailheads, parks and other public gathering places along the trail.
- Trail signing should identify where potable water can be found.
- Spigots should be placed on a well-drained surface (i.e. 2% sloped concrete slab).
- Water access for equestrian needs should be conveniently accessible at trailheads as animals require a significant amount of water. Both spigots for filling buckets and water troughs are suitable.
- Water troughs must be at least 2 feet tall and can be constructed of metal, plastic or concrete and sit on the ground. The water does not need to be more than a couple of inches deep inside the trough. A clear area with appropriate wearing surface should be provided around water troughs.
- Water spigots, where provided, should be ADA compliant (refer to current ADA guidance).

Materials, Maintenance, and Safety

Include hose bib connections for maintenance purposes.
5.8 SEATED REST AREAS & VIEWPOINTS

Seating along trails provide places for trail users to rest, congregate, contemplate views, or people-watch along the trail. Benches can be designed to create identity in a place or along the trail or be strictly utilitarian. Picnic tables provide places for trail users to congregate for meals or to just relax.

Guidance

- Locate benches (and other site furniture) a minimum of 5 feet from the edge of the paved tread.
- Provide a minimum 4 feet level area adjacent to the bench(es) for a wheelchair to participate.
- Locate benches at all trailheads, picnic areas and at regular intervals along the trail.
- Locate benches and picnic tables in all areas that provide interesting views, are close to an educational or historical trail element, and offer shade or shelter from seasonal winds.
- Drainage should slope away from the bench and the trail.
- Locate benches a minimum of 4 feet from restrooms, phone booths and drinking fountains and a minimum of 2 feet from trash receptacles, light poles and sign posts.
- Locate picnic tables far enough back from the trail to avoid interfering with traffic (minimum of 3 feet).

Figure 28: Section diagram of seating dimensions along a multi-use trail.
Materials, Maintenance, and Safety

Benches should be securely anchored to the ground.

Discussion

Wheelchair access should be possible at picnic tables and alongside benches and safely off the trail tread. Provide access with a solid surface trail such as concrete or asphalt. Where possible rest areas should be located at a viewpoint, such as overlooking Discovery Bay.
5.9 PUBLIC ART & SCULPTURE

Public art engages the community through artist’s work and creates a memorable experience for trail users. Art and sculpture can create an identity for the trail and strengthen the emotional connection between the trail and its users. Depending on the scale and form, it can become an “event” in itself and serve as a public attraction.

Public art can be aesthetic and/or functional, and double as sitting or congregational areas. Memorable installations can act as landmarks and serve as valuable wayfinding tools. Public art can be a device for telling a compelling and memorable story about the trail and area history.

Guidance

• Local artists, architects and landscape architects can be commissioned to provide art for the trail, trailheads and points of interest making it distinctly “local.”
• Local artists should be encouraged to produce artwork in a variety of materials for sites along the corridor.
• Considerations for public art installations include placement, longevity, maintenance, interactivity, and possible copyright restrictions.

Materials, Maintenance, and Safety

Public art installations should be inspected periodically for damage, vandalism, and litter.

Discussion

Public art can be used to create trail identity. Continuity of style and repetition along the trail in benches, drinking fountains and signage serve to “brand” the trail. Transitions like street crossings, turns or landscape changes can be illustrated with trail markers. Consider how to provide continuity between elements while maintaining the unique styles of multiple artists.
SIGNAGE

Image source: Alta Planning + Design
6.1 REGULATORY & DIRECTIONAL

Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle, bicycle, and pedestrian movement and parking. They are usually rectangular or square with a white background and black, white or colored letters. Regulatory signs with a red background are reserved for STOP, YIELD, DO NOT ENTER or WRONG WAY messages. Red text indicates restricted parking conditions, and a circle with a line through it means the activity shown is not allowed.

Guidance

- Small-sized signs or plaques may be used for bicycle-only traffic applications, such as along multi-use trails.
- See the MUTCD 9B for a detailed list of regulatory sign application and guidance.

Materials, Maintenance, and Safety

Maintenance needs for regulatory signs are similar to other signs and will need periodic replacement due to wear.

Discussion

Signs for the exclusive use by bicyclists should be located so that other road users are not confused by them.

Figure 30: Examples of regulatory signs.

* A fluorescent yellow-green background color may be used for this sign or plaque. The background color of the plaque should match the color of the warning sign that it supplements.
6.2 ETIQUETTE

Informing trail users of acceptable trail etiquette is a common issue when multiple user types are anticipated. Yielding the right-of-way is a courtesy and yet a necessary part of a safe trail experience involving multiple trail users. The message must be clear and easy to understand. For example, a clear etiquette sign may say: *Keep right except to pass.*

Guidance

- Trail right-of-way information should be posted at trail access points and along the trail.

Materials, Maintenance, and Safety

Trail signs will need periodic replacement due to wear.

Discussion

In addition to etiquette signs along the trail, more detailed educational information may be provided at kiosks. Education curriculum’s, similar to “Safe Routes to Schools” programs, could be used to encourage safe practices of various trail users on the trail.

Figure 31: Examples of etiquette signs.

Figure 32: Example emergency locator sign.

Image source: Alta Planning + Design
6.3 WAYFINDING

Wayfinding is a coordinated system of signage, pavement markings, and other elements to guide and orient trail users both on the trail, and to nearby destinations. Wayfinding also provides a sense of place and identity, and can reflect the unique character of the trail and/or surrounding community through consistent sign construction, materials, and branding (such as shapes, colors and typefaces, symbols and logos). Typical wayfinding elements for trails may include trailhead map kiosks, mile markers, directional signs or fingerboards, gateways, pavement markings, or name identifying signage. Wayfinding elements may vary depending on the directional and orientation needs of a particular trail. There are six core principles which guide the design and placement of a wayfinding system:

1. Connect Places: Facilitate travel to and from destinations and provide guidance for seamless connections.
2. Promote Active Travel: Encourage active transportation by helping people realize they can walk, bike, or roll to the places they want to go.
3. Maintain Motion: Be legible and visible for people moving so that they can interpret information without stopping.
4. Keep Information Simple: Organize and present information simply, use clear fonts and simple designs, so that it can be understood quickly.
5. Be Predictable: Standardize the placement and design of signs so that patterns are established and wayfinding elements are anticipated.
6. Be Inclusive: Signage should be accessible and designed to be understood by a wide range of users, including people of all ages, ability levels, and languages.

6.4 EMERGENCY LOCATORS

Emergency locators are signage and wayfinding elements that include mileposts and other types of location assistance markers that can be used to direct maintenance activities, help users measure their travel times/distances and to direct emergency response. Examples include vertical mile markers and pavement mounted markers.

Guidance

- Frequent spacing should be considered, at regular intervals.
- Legends, where provided, should include distances to logical locations, trail name and a unique location identifier coordinated with local emergency services.