

Regional Trail & Bikeway
Systems Plan
2006

SECTION VII
DESIGN GUIDELINES



Proud Past, Promising Future

SECTION VII. DESIGN GUIDELINES

A) Terminology: Trail and Path Design Types

Clark County's walking and bicycling network is organized into ten standard design types. This Paths & Trails Plan proposes primarily two design types including the shared-use path and walking path, which are also referred to as trails throughout this plan. The overarching Walking & Bicycling Master Plan considers more specifically pedestrian and bicycling connections including sidewalks, bicycle lanes and bicycle routes. Although, the Regional Trails & Bikeway Systems Plan recommends primarily shared-use and walking paths, each of the design types is outlined below to provide understanding of the entire network. The table on Page 7-11 provides a brief explanation of each design type's dimensions, surface material, treatment and function.

A successful trail and bikeway plan will include a full range of trail types designed to the human scale. A trail designed to the human scale focuses on the human senses, sight, smells, and sounds. The typical trail hierarchy will range from sidewalks and on-street bikeways, to soft surface neighborhood pathways and regional shared-use trails, to boardwalks and equestrian routes. The planning team recognizes that the science of trail construction and transportation engineering changes over time and that design standards will continue to evolve. As the city popularity of specific recreational activities shift and as new modes of travel develop, trail standards will need to adapt. Figure 7A on Page 7-2 is a matrix of trail design parameters.

Design Type A1: Regional Shared-use Paths

The 1999 American Association of State Highway and Transportation Officials' (AASHTO) *Guide for the Development of Bicycle Facilities* uses the term "new, shared-use path" to refer to facilities on exclusive rights-of-way and with minimal cross-flow by motor vehicles. Shared-use paths are distinctly different from on-street striped bicycle lanes and signed, shared roadways described above, which serve useful and complementary facilities.

Shared-use paths provide opportunities for a wide range of users that AASHTO notes, includes but is not limited to: bicyclists, in-line skaters, roller skater, wheelchair users (both non-motorized and motorized) and pedestrians, including walkers, runner, people with baby strollers, people walking dogs, etc. . . "Shared-



use paths are sometimes referred to as trails. In many states, however, the term "trail" means an unimproved recreational facility. AASHTO notes, "When shared-use paths are called trails, they should meet all design criteria for shared-use paths to be designated as bicycle facilities." Additionally, shared-use paths should meet or exceed the Americans with Disabilities Act standards.

Shared-use paths represent the majority of recommended improvements in the Clark County Bikeway Systems Trails Plan as they serve as major connections in the regional trail system linking important features, land uses and areas of interest. They can provide recreational opportunities, learning ground for new cyclists, and utilitarian routes, depending on their locations. Shared-use paths can take on a variety of different treatments that both enhance the surrounding landscape and meet the needs of users. The following trail cross sections illustrate shared-use path treatments for trail design opportunities in Clark County. These treatments include designs for a standard shared-use trail, a power line trail, and a waterside trail.

Design Type A2: Local Shared-use Paths

Local shared use paths are similar to regional but differing by providing local connections to areas of special interest and to regional trails, and providing shared use trail loops within parks and neighborhoods.

Design Type A3: Primitive Trail

The primitive trail usually is a dedicated pathway through parks, natural areas, or rustic sites. The users may include pedestrians, mountain bikers and equestrians.



Design Type A4: Rails and Trails

Rails and trails are shared use linear routes adjacent to active rail lines with safety measures to protect trail user.

Design Type B1: Bike Lanes

A bicycle lane is the portion of the roadway designated by striping and bicycle pavement markings for the one-way, exclusive or preferential use of bicycles. Per the arterial atlas, classification bike lanes should be provided on most collectors and arterials with traffic greater than 3,000 vehicles per day. Bike lanes can help increase the total capacity of the roadway by removing bicycles from the vehicle lanes, provide for more predictable movements, and encourage



cycling. Clark County is committed to providing bicycle lanes to create an interconnected system of facilities available to the widest possible variety of users.

Design Type B2: Bike Route Shared Roadway

When designated by appropriate signing and stenciling, shared roadways provide for new, shared-use path with pedestrian or motor vehicle traffic, preferably on lower volume roadways. On higher volume roadways, an extra wide (12 to 14 feet) curb lane is recommended.

Design Type C1: Sidewalks

The existing pedestrian system in Clark County consists of on-again/off-again sidewalk networks. The city has no specified pedestrian districts or designated pedestrian malls. In several Clark County locations, the pedestrian system is comprehensive, such as in some areas of downtown Vancouver and the Fort Vancouver area. However, some areas of Clark County are characterized by a relatively piecemeal system, with high-quality sidewalks and pedestrian crossings adjacent to new developments connecting to inadequate or nonexistent systems adjacent to older developments. It should be noted that, in most cases, a traditional sidewalk is not an ideal substitute for either bicycle lanes or a separated path, as sidewalk bicycle riding has been found to be a significant



safety hazard nationwide. In fact, 26 percent of reported bicycle-motor vehicle related crashes in Clark County involve sidewalk bicycle riding. These sidewalk/paths are intended to be primarily used by pedestrians, with the corresponding bike lanes intended for bicycle use.

Design Type C2: Walking Trails



The design of walking trails is highly dependent on the intended use. When building walking paths, there are several design elements to take into account like drainage, erosion, slope, presence of waterways, vegetation, riparian and habitat areas, environmental requirements and regulations, and others. Trails can vary in width from 4'-12 feet. In addition, walking trails can also accommodate bicyclists if there is adequate space and safety concerns are met.

Design Type D1: Equestrian Trail

Equestrian trails are dedicated to equestrian use only and consist of an earthen surface.



Design Type E1: Water trails

Trails in rivers and other waterways offer a unique view of the nature of the region. Developing water trails means providing access points for canoes, kayaks, boats and rafts. Paddling and rowing are great ways to get exercise and experience and appreciate the natural and urban areas along waterfronts.



Some design guidelines for water trails include:

- A. Water access points every five miles along navigable rivers
 - B. Average of three miles per hour
 - C. Boat racks can help facilitate a visit to a restaurant or store at a landing site.
 - D. Camping is an amenity that's useful along water trails
- Maps are also important to know when they can get on or off the water trails

A good source of information: *Logical Lasting Launches* by National Park Service Rivers & Trails Program, 2004.

http://www.nps.gov/nrcr/programs/rtca/helpfultools/ht_launch_guide.html

**Columbia River / Clark County
Launch and Landing Sites**



<u>Name</u>	<u>River Mile</u>
Capt. William Clark Park at Cottonwood Beach	124
Steamboat Landing Park	123
Port of Camas-Washougal Boat Ramp & Marina	122
Fisher's Landing	115
Wintler Community Park	110
Vancouver Marine Park	108
Fort Vancouver Beach Launch	106.5
Vancouver Public Dock	106
Frenchman's Bar Park Beach Launch	99
Blurock Landing	100
Langsdorf Landing Boat Ramp	98
Ridgefield Boat Ramp	91
Ridgefield Kayak Launch	90
Paradise Point State Park	84

B) Trail-Roadway Crossings

Like most trails in built urban areas, Clark County's trails must cross roadways at certain points. These roadway crossings may be designed at-grade or below-grade. At-grade crossings create a potentially high level of conflict between trail users and motorists. However, well-designed crossings have not historically posed a safety problem, as evidenced by the thousands of successful trails around the United States with at-grade crossings. Designing safe grade crossings is a key component of the safe implementation of this plan.

When considering a proposed separated trail and its required crossings of roadways, it is important to remember two items: (1) trail users will enjoy a largely auto-free experience and may

enter into an intersection unexpectedly, and (2) motorists will not expect to see bicyclists shooting out from an unmarked intersection into the roadway. In some cases, a required trail crossing may be unable to meet safety standards or will be expensive (e.g., to build an undercrossing or overcrossing) as to affect the feasibility of the entire alignment. In most cases, trail crossings at-grade can be properly designed to an acceptable degree of safety and to meet existing traffic and safety standards.

Evaluation of trail crossings involves analysis of traffic patterns of vehicles as well as trail users. This includes traffic speeds, street width, traffic volumes (average daily traffic, peak hour traffic), line of sight, and trail user profile (age, distribution, destinations). This study identifies the most appropriate crossing options given available information, which must be verified and/or refined through the actual engineering and construction document stage.

Basic Crossing Prototypes

The proposed intersection approach in this report is based on established standards, published technical reports, and the experiences on existing facilities. Virtually all crossings fit into one of four basic categories, described below.

Type 1: Marked Crossings – Marked crossings include mid-block crossings of residential, collector, and sometimes major arterial streets.

- Type 2: Divert Users to Existing Intersection – Bikeways which emerge near existing intersections may be routed to these locations.
- Type 3: Signalized/Controlled – Bikeway crossings which require signals or other control measures due to traffic volumes, speeds, and trail usage.
- Type 4: Grade-separated – Bridges or under crossings provide the maximum level of safety but also generally are the most expensive and have right of way, maintenance, and other public safety considerations.

other safety issues such as the proximity of schools. The following general thresholds outline where unmarked crossings may be acceptable. Install crosswalks at all locations.

- A. Maximum Traffic Volumes:
10,000-15,000 average daily traffic (ADT)
1,000-1,500 peak hours
- B. Maximum 85th percentile speeds:
35-45 mph
- C. Maximum street width:
60 feet (no median)
- D. Minimum line of sight:
25 mph zone: 100 feet
35 mph zone: 200 feet
45 mph zone: 300 feet

Type 1 and 1+ Unmarked/Marked Crossings



A Type 1 crossing consists of a crosswalk, signing, and often no other controls to slow or stop traffic. The approach to designing crossings as mid-block locations depends on an evaluation of vehicular traffic,

line of sight, trail traffic, use patterns, road type and width, and

On residential and collector streets below 10,000 ADT, crosswalks and warning signs (“Bike Xing”) should be provided for motorists, and STOP signs and slowing techniques (bollards/geometry) used on the trail approach. Care should be taken to keep vegetation and other obstacles out of the view line for motorists and trail users. Collector streets up to 15,000 ADT require a higher level of treatment for crossings than residential streets. These are referred to as “Type 1+” in the recommended treatments. In addition to the features described for residential streets, signing locations may need to be moved further upstream and made more visible for

motorists. A flashing yellow beacon costing between \$15,000 and \$30,000, may be used, preferable one that is activated by the trail user rather than operating continuously. Some jurisdictions have successfully used a flashing beacon activated by motion detectors on the trail, triggering the beacon as trail users approach the intersection. This equipment, while slightly more expensive, helps keep motorists alert.

Crossings of higher volume arterials over 15,000 ADT may be unmarked in some circumstances – for example, if they are located near a signalized intersection, a median island is present, and there are substantial gaps in traffic. Such crossings would not be appropriate; however, if a significant number of school children used the trail.

Type 2: Divert Users to Existing Intersection



Crossings within 250 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection for safety purposes. For this option to be effective, barriers and signing would be needed to direct trail users to the signalized crossings. In many cases the intersections are directly adjacent to the crossings and are not a significant problem for trail users. Several crossings do fall into this category in Clark County.

Type 3: Signalized/Controlled Crossings

New signalized crossings are recommended for crossings more than 250 feet from an existing signalized intersection and where

85th percentile travels speeds are 45 mph and above and/or ADT's exceed 15,000 vehicles.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer

to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.



Trail signals are normally activated by push buttons, but also may be triggered by motion detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street and trail volumes. The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advanced warning signs. Typical costs for a signalized crossing range from \$75,000 to \$150,000.

Type 4: Grade-separated Crossings

Grade-separated crossings are needed where ADT's exceed 25,000 vehicles, and 85th percentile speeds exceed 45 mph. Safety is a major concern with both over crossings and under crossings. In both cases, trail users may be temporarily out of sight from public view and may have poor visibility themselves.

Under crossings, like parking garages, have the reputation of being places where crimes occur. Most crime on trails, however, appears to have more in common with the general crime rate of the community and the overall usage of the trail than any specific design feature.



Design and operation measures are available which can address trail user concerns. For, example, an under crossing can be designed to be spacious, well-lit, equipped with emergency cell phones at each end, and completely visible for its entire length prior to entering.

Other potential problems with under crossings include conflicts with utilities, drainage, flood control, and maintenance requirements. Over crossings pose potential concerns about visual impact and functional appeal.

Signing and Striping



Crossing features for all roadways including warning signs for both vehicles for all roadways include warning signs both for vehicles and trail users. The type, location, and other criteria are identified in the Manual for Uniform Traffic Control Devices (MUTCD).

Consideration must be given for adequate warning distance based on vehicle speeds and line of sight, with visibility of any signing absolutely critical. Catching the attention of motorists jaded to roadway signs may require additional alerting devices such as a flashing light, roadway striping, or changes in pavement texture. Signing for trail users must include a standard "STOP" sign and pavement marking, sometimes combined with other features such as bollards or a kink in the trail to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their impact.



Directional signing may be useful for trail users and motorists alike. For motorists, a sign reading "Trail Xing" along with a Clark County trail emblem or logo helps both warn and promote use of the trail itself. For trail users, directional signs and street names at crossings help direct people to their destinations. For equestrians, striping may not be useful but signing will provide sufficient direction.

C) Trailheads

Clark County's share-use paths attract pedestrians, cyclists and equestrians. Trailheads and trailhead amenities must therefore be designed to meet the needs of this diverse set of users.

Trail Amenities Photo Gallery



Clark County has already established distinctive designs for certain trail amenities and design details. Use of this common aesthetic in developing Clark County's trails will



be a valuable tool in creating a cohesive trail network, although for certain trails an individually distinctive design aesthetic may be more appropriate.

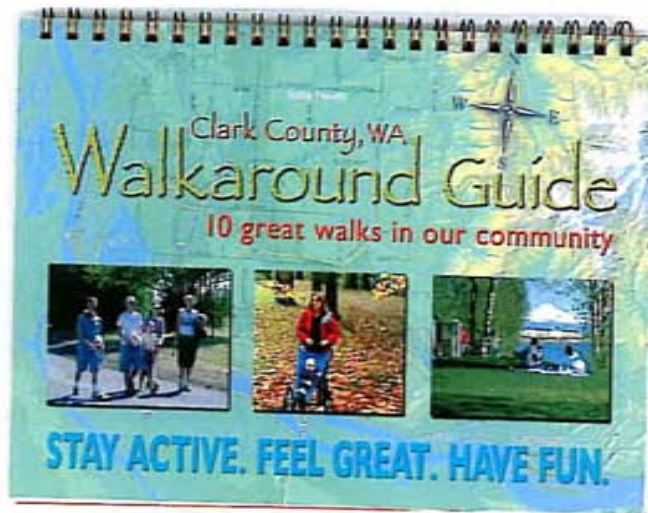
- A. Develop a trail bollard / signpost standard that can be used for demarcation of trailheads and interim mileage marks or points of interest. This could be the current square concrete bollards that have been installed on previous projects or a new style could be based on the old City of Vancouver City Limits posts that were tapered concrete. Either style could be fitted with a standard brass survey monument that could be stamped with the trail name, mileage,

or other pertinent information as well as an emblem or icon that is representative of the specific area of stream basin that the trail is located within.

- B. Develop a graphic or icon representing Lewis & Clark that could be included on all trail signage throughout the county and tie into the theme for the Lewis & Clark Centennial celebration, the Confluence project, and the Discovery Greenway project.



- C. Develop kiosks that host a large map of the trails system in key locations. The kiosk may also contain small maps users can take with them.



Regional Trail and Bikeway Systems Plan

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Clark County Trail Classifications

Standard Design Types

Classification	Trail Type	Trail Width	Surface	Const. Cost Per Mile	Users	Function	R.O.W.	Clearances	Treatment	Amenities
A1	Regional Shared-use Path	12'-16'	Asphalt or Concrete	\$220,000	Pedestrians, bicycles, etc. Equestrians where feasible, parallel and separate.	Provides major connections between other regional trails, land uses, and areas of special interest, including schools, parks, employment centers, etc. Optional adjacent 4' equestrian trail	25' to 50'	Side 2'-0", Vertical 10'-0"	Separated right of way from motor vehicles with exclusive use for pedestrians and bicycles. Includes grade separated and signalized crossing points.	Trailhead, parking, comfort amenities, furnishings, lighting, and signage.
A2	Local Shared-use Path	10'-12'	Asphalt, concrete, or gravel	\$190,000	Pedestrians, bicycles, etc. Equestrians where feasible	Provides local connections to areas of special interest and regional trails, and provides shared use trail loops within parks and neighborhoods. Optional adjacent 4' equestrian trail (D1). Includes community feeder trails	25'	Side 2'-0", Vertical 10'-0"	Separated right of way from motor vehicles, includes internal circulation within park, recreation sites, and residential areas.	Site furnishings, lighting, and signage. May include additional amenities adjacent to trail corridor.
A3	Primitive Trail	2'-5' (Ded.) 5'-12' (Shared)	Earthen, gravel, or wood chips	\$5,000	Varies, may include pedestrians, mountain bikes, and equestrians	Primarily dedicated and shared-use trails through parks, natural areas, or rustic sites.	N/A	N/A	Vary in width depending on site and use, typically exceed ADA design guidelines.	Minimal signage and amenities
A4	Rails and Trails	12'-16'	Asphalt, concrete, or gravel	\$220,000	Pedestrians, bicycles, etc. Equestrians where feasible	Provides shared use linear routes adjacent to active rail lines. Optional adjacent 4' equestrian trail (D1)	Varies	Side 2'-0", Vertical 10'-0"	Located adjacent to existing rail lines with safety measures to protect trail user. May include full rails to trails.	Trailhead, parking, comfort amenities, furnishings, and signage.
B1	On Street Bike Lane	4'-6'	Roadway		Bicyclist	Bicyclists on roadways	N/A	N/A	Striped for one-way bike travel on street or highway	Signage and striping
B2	Bike Route on Roadway	N/A	Roadway		Bicyclist	Accommodates bicyclists typically on lower volume roadways	N/A	N/A	Proper signage allows for shared use between bicyclists and motor vehicles.	Signage
C1	Sidewalk	6'-16'	Concrete	\$182,000	Pedestrians	Provides local access to homes, businesses, and other local features for pedestrians.	N/A	Per County Codes	Located along streets and are separated by curb and/or planting strip	Signage, striping, and curb ramps
C2	Walking Path	4'-10'	Asphalt, concrete, or gravel	\$110,000	Pedestrians	Provides less intensive connections or routes within parks and natural areas. May include bicyclists.		Side 2'-0", Vertical 6'-0"	Vary in width depending on intended users. Careful considerations to topographic and environmental considerations.	Site furnishings and signage. May include additional amenities adjacent to trail.
D1	Equestrian Trail	4'	Earthen		Equestrians	Point to point travel and local challenged course elements	N/A	Side 2'-0", Vertical 10'-0"	Stand alone trail elements or secondary to other trail classification.	Equestrian trailer parking, comfort amenities, and signage
E1	Water Trail	N/A	Water	NA	Non-motorized boaters	Routes along water bodies for people using small beachable boats like kayaks, canoes, day sailers or rowboats.	N/A	N/A	Water trails are most often identified by the land facilities that support water travel.	Launch and landing sites, campsites, rest areas, and other points of interest

