

L.L. Stub Stewart State Park Trail Plan

Final Draft



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INTRODUCTION

The purpose of the **L.L. Stub Stewart State Park Trail Plan** is to provide direction for the development of a coherent, workable park trails plan, and includes objectives, policies, and information for Oregon Parks and Recreation Department (OPRD), other agencies, trail oriented groups and the public in general.

The L.L. Stub Stewart State Park Trail Plan is a non-motorized trail system plan that will help coordinate the development of a world class hiking, equestrian and bicycling system. Primarily, this plan is a reference document for guiding the planning of a park-wide shared use path/trail system. It is not intended to set forth strict standards, but to present sound guidelines for policies, location, type, and construction standards for trails.

This plan intends to provide information that will be useful for development, maintenance, and funding. In addition, it provides information regarding implementation priorities and direction on special projects, such as park volunteer projects, park information materials, user information development material, and user conflicts management. The document is divided into several sections:

- Goals and Objectives
- Trail Maps
- Trail Types
- Trail Location and Construction Standards
- Pedestrian Network
- Trail System Benefits and Safety

This document does not address the development or maintenance of any privately owned trails or old/new roads located on private property.

As L.L. Stub Stewart State Park grows and develops there will be an increasing need and demand for park pathways, and trails. The park master plan identifies the trail system as being one of the major features of the park's recreational opportunities. The ultimate result will create a park resource providing transportation alternatives, recreational opportunities, environmental aesthetics, open space preservation, and increased adjacent property values.

L.L. Stub Stewart State Park Non-Motorized Trail Vision Statement

"Non-motorized pathways and trails provide a recreational opportunity to visitors of the park. It improves the outdoor experience, park aesthetic, environment and thus our quality of life."

A coordinated trail system links all of the important destinations within the park. The visitors have access to these trails at Day Use Areas and Campgrounds throughout the park. These trails provide a visible route between destinations. They provide a vital link between the park, its natural areas and educational opportunities. Hiking, horseback riding and mountain biking are convenient, safe and pleasant. L.L. Stub Stewart State Park's trail system is also linked to the Banks-Vernonia State Trail and the neighboring communities.

GOALS AND OBJECTIVES

This vision can be achieved through meeting the following Goals and Objectives:

GOAL 1 Develop a world-class trail system for hiking, mountain biking and horseback riding. This goal can be achieved by providing a friendly trail network that will:

Policy 1) Create a seamless network of non-motorized improvements that allows mountain biking, hiking and horseback riding to reach important destinations easily and safely.

Policy 2) Provide relevant mountain bike, equestrian and hiking elements to all areas of the park.

GOAL 2 Provide the following benefits and opportunities to L.L. Stub Stewart State Park visitors:

Transportation: Trails can provide the visitors access to park facilities, recreational resources, and they can also improve safety and increase ADA access. The trail system should encourage non-motorized travel by connecting park visitors to the park's resources without using the established roadways.

Recreation: Trails provide an easily accessible outdoor resource for many forms of recreation, most notably hiking, mountain biking and horseback riding. Trails greatly increase park visitor access to physical activity and fitness opportunities by providing more miles of safe, attractive, and desirable hiking, mountain biking and horseback riding.

Economic: Park recreational trails can produce income for communities from tourism, special events, and other uses. Improved recreational opportunities improve the quality of life by making an area more attractive for business relocations and in-migration.

Land Use Planning: Trails and other green way corridors promote park and

recreation development, wet land preservation, and buffered environmental protection. Trails preserve undeveloped lands in urban areas and serve to separate and buffer contradicting land uses.

Environment: Possible environmental benefits include wildlife preservation, water quality protection, storm water management, preservation of vegetation, and other benefits, such as firebreaks. They also will promote a healthy forest ecosystem.

Education: A trail corridor often encompasses several different environments along its route and can be thought of as an outdoor classroom full of educational materials. The scientific community, educators and students can realize the value of trails through a wide range of studies, such as biology, geography, history, recreation management, and art.

Historic and Culture: Trails can educate and increase awareness about the history and culture of a region. Preserved historical sites provide unique locations for cultural, local and social events. Methods, such as on site interpretive material and promotional literature, aid in the parks effort to preserve historic sites.

Quality of Life: Increases in the quality of life associated with non-motorized trails are realized through expressions of the parks character and pride, aesthetics of the local environment, economic revitalization of communities, access to the outdoors, opportunities for socialization, and easy increase of mobility.

Disability Access: Provide disabled access to and within the trail system with the level of access provided at posted trailheads. Physical barriers and hazards that obstruct access should be removed from paths and trails designated as part of the trail system. Trails should be ranked by their level of disability access.

Agency Policies

To achieve the above stated goals, agency policy within our current operations office (Planning Department) must support the development of this integrated trail system, just as agency policy has created the park facilities and infrastructure.

As the park grows and changes, and user preferences change, the specific recommendations of these vision policies may also change. However, the more general policies should remain the same providing continuity of the trail system between trails and pathways within the park.

1. The Creation of a Trail System that Increases Recreational Opportunities and is an Asset to L.L. Stub Stewart State Park

As the park grows, trails can mitigate user density and other aspects of park use. Non-motorized travel is non-polluting. The L.L. Stub Stewart State Park trail system should be safe, easily accessible, aesthetically pleasing, and contribute to the general quality of life for the park user.

The L.L. Stub Stewart State Park non-motorized trail plan should connect park facilities, natural areas and connect to the Banks-Vernonia State Trail System.

Where feasible, trails that are separated from vehicle traffic (shared use path) should be provided. General maintenance is less costly for this type of trail, users are generally safer, and the overall experience is enhanced and preferred when traveling on trails that are separate from the roadway. Where traffic separation is not possible then striping of pedestrian lanes, and crossings as well as signage, should be provided. Trails consisting of signage only (See American Association of State Highway and Transportation Officials (AASHTO) 1999 Guide for Development of Bike Facilities) should be provided only after all other options are considered infeasible. As portions of the trail system are developed, uniform materials, surfacing, and signs should be installed.

Pathways: Pathways are short, often informal, links between facilities and use areas. They usually cover short distances connecting park areas and are especially needed in campgrounds and day use areas where through access is limited. In campgrounds, strategically placed paths can link visitors to restrooms, program areas and other facilities so that busy roads can be avoided.

Being a critical element of a non-motorized system, paths should tie facilities together to ensure access for pedestrians and bicyclists. Paths are not intended to be used for equestrian access routes. A path allows people to shorten an otherwise roundabout trip through a maze of use areas and natural areas on their way to access facilities. Their existence and maintenance are critical to provide pedestrian travel routes apart from roadways and reduce user conflicts. Paths should always meet ADA trail standards.

2. Development of a Comprehensive Pedestrian, Equestrian and Bicycle Network

L.L. Stub Stewart State Park will develop a comprehensive trail network for public access. The network will coordinate trail sections, with pedestrian friendly zones. It will ensure a continuous system between developed and natural areas and varying uses.

The L.L. Stub Stewart State Park non-motorized trail plan will provide safe non-motorized access along key corridors, to developed and natural areas and facilities. Trails will be constructed to accommodate maintenance and pedestrian, equestrian and mountain bike access year- round. In order to achieve this goal trail map updates and funding will be necessary for the development and maintenance of a comprehensive trail network.

Trail Plan Map Updates: Future needs may not be anticipated in the Plan. The Trail Plan Map will be updated as major development occurs according to the plan's intention and specified standards.

Funding: L.L. Stub Stewart State Park will explore a variety of local and national funding sources and mechanisms for the development of trails. Grants, transportation funds, joint-funding with other jurisdictions or agencies or organizations, private donations and fund raising events are a few of the funding mechanisms that are available. National funding sources for bicycles and pedestrian projects are available through several programs under the federal Transportation Equity Act for the 21st

Century. Possible funding sources for the development and maintenance of the trail system are listed in Appendix C.

3. Liabilities on Trails or Pathways

A. Oregon Revised Statutes pertaining to Liabilities:

PUBLIC USE OF LANDS

105.672 Definitions for ORS 105.672 to 105.696. As used in ORS 105.672 to 105.696:

- (1) "Charge" means the admission price or fee asked by any owner in return for permission to enter or go upon the owner's land.
- (2) "Harvest" has that meaning given in ORS 164.813.
- (3) "Land" includes all real property, whether publicly or privately owned.
- (4) "Owner" means the possessor of any interest in any land, including but not limited to possession of a fee title. "Owner" includes a tenant, lessee, occupant or other person in possession of the land.
- (5) "Recreational purposes" includes, but is not limited to, outdoor activities such as hunting, fishing, swimming, boating, camping, picnicking, hiking, nature study, outdoor educational activities, waterskiing, winter sports, viewing or enjoying historical, archaeological, scenic or scientific sites or volunteering for any public purpose project.
- (6) "Special forest products" has that meaning given in ORS 164.813.
- (7) "Woodcutting" means the cutting or removal of wood from land by an individual who has obtained permission from the owner of the land to cut or remove wood. [1995 c.456 §1]

105.676 Public policy.

The Legislative Assembly hereby declares it is the public policy of the State of Oregon to encourage owners of land to make their land available to the public for recreational purposes, for woodcutting and for the harvest of special forest products by limiting their liability toward persons entering thereon for such purposes and by protecting their interests in their land from the extinguishment of any such interest or the acquisition by the public of any right to use or continue the use of such land for recreational purposes, woodcutting or the harvest of special forest products. [1995 c.456 §2]

105.682 Liabilities of owner of land used by public for recreational purposes, woodcutting or harvest of special forest products.

(1) Except as provided by subsection (2) of this section, and subject to the provisions of ORS 105.688, an owner of land is not liable in contract or tort for any personal injury, death or property damage that arises out of the use of the land for recreational purposes, woodcutting or the harvest of special forest products when the owner of land either directly or indirectly permits any person to use the land for recreational purposes, woodcutting or the harvest

of special forest products. The limitation on liability provided by this section applies if the principal purpose for entry upon the land is for recreational purposes, woodcutting or the harvest of special forest products, and is not affected if the injury, death or damage occurs while the person entering land is engaging in activities other than the use of the land for recreational purposes, woodcutting or the harvest of special forest products.

(2) This section does not limit the liability of an owner of land for intentional injury or damage to a person coming onto land for recreational purposes, woodcutting or the harvest of special forest products. [1995 c.456 §3]

105.688 Applicability of immunities from liability for owner of land; restrictions.

(1) Except as specifically provided in ORS 105.672 to 105.696, the immunities provided by ORS 105.682 apply to:

(a) All public and private lands, including but not limited to lands adjacent or contiguous to any bodies of water, watercourses or the ocean shore as defined by ORS 390.605;

(b) All roads, bodies of water, watercourses, rights of way, buildings, fixtures and structures on the lands described in paragraph (a) of this subsection; and

(c) All machinery or equipment on the lands described in paragraph (a) of this subsection.

(2) The immunities provided by ORS 105.682 apply only if:

(a) The owner makes no charge for permission to use the land;

(b) The owner transfers an easement to a public body to use the land; or

(c) The owner charges no more than \$75 per cord for permission to use the land for woodcutting. [1995 c.456 §4; 1999 c.872 §7; 2001 c.206 §1]

105.696 No duty of care or liability created; exercise of care still required of person using land. ORS 105.672 to 105.696 do not:

(1) Create a duty of care or basis for liability for personal injury, death or property damage resulting from the use of land for recreational purposes, for woodcutting or for the harvest of special forest products.

(2) Relieve a person using the land of another for recreational purposes, woodcutting or the harvest of special forest products from any obligation that the person has to exercise care in use of the land in the activities of the person or from the legal consequences of failure of the person to exercise that care. [1995 c.456 §6]

4. Development of a Safe Multiple-Use Trail System

The design, development and implementation of the L.L. Stub Stewart State Park non-motorized trail plan will consider safe shared use paths throughout the trail system.

In order to provide a safe shared use trail system, trail construction standards should

include such things as: width, surface materials, slopes, appropriate sight distances, signs, and trail curvatures. Trail use types are identified and different standards for various trail use types are delineated.

Trails will generally be open to bicycles, pedestrians, joggers, hikers and equestrians. However, some trails will be designated as pedestrian trails only, excluding bikes, in-line skaters and equestrian access. (Equestrian trails will be specifically designated.) Signs at trailheads and significant access points should specify allowed uses and define user etiquette. Motorized vehicles except those for emergency or maintenance purposes will be prohibited from using the L.L. Stub Stewart State Park non-motorized trail system.

Safety Within Pedestrian Friendly Zones: The most important factor for pedestrians on the roads is the speed of vehicles. High-speed traffic is intimidating for pedestrians because it increases road noise and shortens reaction times for drivers. Drivers traveling at high speeds are less likely to yield for pedestrians and, when collisions occur, serious pedestrian injuries are more likely to result.

Roads will be designed for slower speeds by having less pavement width. Other methods of reducing driving speeds include adding trees, signage, medians, and other traffic calming devices.

Pedestrian deaths and injuries can be reduced in two ways: 1) Make roadways safer for pedestrians by installing 'pedestrian friendly' design features, especially at intersections. 2) Provide a transportation system where people can find a convenient alternative to driving. By encouraging the development of safe and accessible pedestrian networks, most trips and traffic volumes can be reduced.

5. Environmental Sensitivity

The park-wide trail system will provide opportunities for trail users to observe ecological features, such as stream corridors, riparian areas and wet land edges. Trails will be located to take advantage of L.L. Stub Stewart State Park's positive environmental qualities, such as views, natural vegetation, wildlife, geologic, and water features. The trail system will be aesthetically pleasing and provide a pleasant recreational experience while also protecting environmentally sensitive areas through careful planning.

In visually or environmentally sensitive areas, special location and/or construction methods will be used which protect the site from environmental or visual impact. Examples of visually or environmentally sensitive sites are: wet lands, Threatened and Endangered (T&E) Species habitat, riparian areas, highly visible hillsides, areas with significant vegetation, highly erodible soils, unstable slopes and ridgelines. A survey of threatened and endangered species was conducted in the area and trails were located to avoid any areas where sensitive species were present (~~see Appendix ? for map displaying trails and T&E areas~~). In addition, trails may require relocation or seasonal closures if [threatened and T&E endangered](#) species are found or move into the area. Minimal visual or construction impacts on highly vulnerable sites can be achieved through certain techniques, such as limits of disturbance, fencing, site specific trail routing, erosion control measures, site specific adjustment of construction standards and design guidelines, and site specific construction practices. Use of one or more of these techniques should minimize environmental, visual or construction impacts. (See the *Shared Use Paths* section of this document for specific environmental treatments.)

6. Trail, Pedestrian Friendly Zone Standards and L.L. Stub Stewart State Park Character

L.L. Stub Stewart State Park will develop a trail system that is functional and conforms to national standards, where applicable, while preserving the unique character of the park's environment.

National standards are important when considering trail user safety, and the potential liability to the park, so AASHTO and/or national standards should be followed where practical. Due to the mountainous terrain and dynamic nature of outdoor recreation in L.L. Stub Stewart State Park, national standards are not always practical. No mountainous terrain standards have yet to be established by any nationally recognized organization.

L.L. Stub Stewart State Park's unique character is a valued quality and trails should reflect that character in setting and materials. When possible, materials indigenous to the site should be used in construction. When the use of indigenous materials is not possible, use of historic looking materials should be considered. Structures such as bridges, boardwalks, culverts and sign structures may require modern materials but should be constructed of sustainable materials where possible.

Pathways: Informal park pathways may be constructed out of crushed gravel, pervious concrete, native dirt or asphalt. Pathways should be built to 'fit' with the surrounding materials and match the feel of the adjacent area. The sense of place of an area should be preserved through the choice and treatment of materials and setting of the path.

Pedestrian Friendly Zones: Creating more accessible and safe park areas often involves landscaping, traffic calming, use area design and/or mixed use signing. Preservation or restoration of natural areas contributes both to the visitor experience and to the park's character.

7. Hikers, Bikers, Equestrian and Park Needs

L.L. Stub Stewart State Park intends to develop a trail network providing for the needs of park visitors for recreating on foot, bicycle, horse or other non-motorized means.

The L.L. Stub Stewart State Park non-motorized trail system will consist of five zones for the Hikers, Bikers, Equestrian and Camper needs. These zones will be developed with input from stakeholders. The primary focus will be for multi-use trails. The other zones will be developed based on development of the park and use levels. The five zones will be:

Pathways: These will be limited to pedestrian and limited bike traffic.

Multi-Use Trails: These will be open to pedestrian, bike and equestrian traffic.

Single-Track Trails: These will be open to pedestrian and bike traffic. [However, pedestrians should be aware of the presence of mountain bikers which may be traveling at fast speeds and be prepared to clear the trail if necessary.](#)

Equestrian Backcountry Trails: These will be open to pedestrian and equestrian traffic.

Banks-Vernonia State Trail: Access and connections to the State Trail will be provided.

The development of high quality guides and maps is critical to the completion of a world-class trail system. Trail maps will provide information about access to non-motorized trails for visitors to the park and will enrich the recreational and educational experiences for all.

Maps and guides will contain information concerning the trail including: trailhead locations, description of trail route, trail difficulty, use limitations and wheel chair accessibility. Connections, locations of facilities, such as parking lots, drinking water, rest rooms, and benches will also be identified.

The ideal non-motorized network should connect developments with important destinations, such as park facilities and natural areas. As trails are developed fencing, signing, landscaping and physical separations are reasonable measures that need be taken to assure adjacent landowner privacy and to protect users from hazards.

Signage: As trails are completed, signing will be installed along the major corridors of the trail system with information on direction, safety and trail policy. Specific location of signs is evaluated on a case-by-case basis. Placement guidelines are listed in the Construction Standards section of this document. These guidelines are intended to provide general direction for signs and their placement. Final signing may not be possible until certain trails are completed.

Needs Within the Pedestrian-Friendly Zone: The encouragement of pedestrian and bicycle travel within developed areas should be established and designed for safe, non-motorized travel. This requires road designs that give people as much, or more, consideration than cars. Landscaping, building design and traffic calming methods should be incorporated.

8. Encouraging Positive Trail Use

L.L. Stub Stewart State Park will work to reduce conflicts between user groups by developing a well-planned multi-use [trail](#) system.

User conflicts may arise if users have opposing beliefs, attitudes, expectations, or safety concerns. L.L. Stub Stewart State Park will work to educate users of different types on trail rules and regulations, appropriate trail behavior and etiquette towards other users, and minimizing environmental impacts. Appropriate signage at trailheads and throughout the park will inform users of prohibited activities and how to interact with other user groups. Education regarding this issue will reduce user conflicts that may arise on multi-use trails. Information should be provided to all users regarding the difficulty level and intent of each trail, specific rules and limitations, and reasons for the rules. In addition, the user should be informed as to how to report any conflicts that may occur on the trail and what the penalties are for certain actions.

It is also important that users respect land owners of the surrounding land. Trail users need to be informed where the park boundaries are so that surrounding land owners will

not have conflicts with trail users. Trail users of all types should be encouraged to stay on the trails to reduce the chance of entering private property.

9. Long-Term Maintenance Policies and Standard

The long-term maintenance of trails is integral to the ultimate success of the trail system.

The maintenance of the trail system is the responsibility of the park. Trail maintenance levels are dependent on trail type, funding and volunteer recruitment. Maintenance should be coordinated for the entire trail network for efficiency. When park improvements are made, it is recommended that trails be installed at the same time in order to reduce costs and inconvenience. When possible native materials should be used in construction. It is also recommended that higher volume, shared use trail corridors be given priority over lower volume, single use trails, unless specific conditions warrant otherwise. Several maintenance guidelines are described in detail for each type of trail and pathway included in this plan.

L.L. Stub Stewart State Park will establish an operational element in their Maintenance Management Plan for the maintenance of trails in the L.L. Stub Stewart State Park Trail System, including an appropriate budget. Issues that should be considered are snow removal, litter pick-up, removal of roots and installation of root barriers, resurfacing of trails, installation of signs, crosswalks, bollards, vegetation trimming, invasive removal, and trail sweeping/blowing.

L.L. STUB STEWART'S TRAIL MAPS

Mapping includes the multiple use path/trail system, the trailheads and use areas. These systems will be connected so that people have access to and from trails to major use areas and facilities. Specific roads and proposed pedestrian friendly areas will be shown.

Full-sized, Trail Maps can be obtained from both the park welcome center and Oregon Parks and Recreation Department headquarters in Salem. For more information call (503) 222-2222, 800-551-6949 or go to www.oregonstateparks.org.

TRAIL TYPES

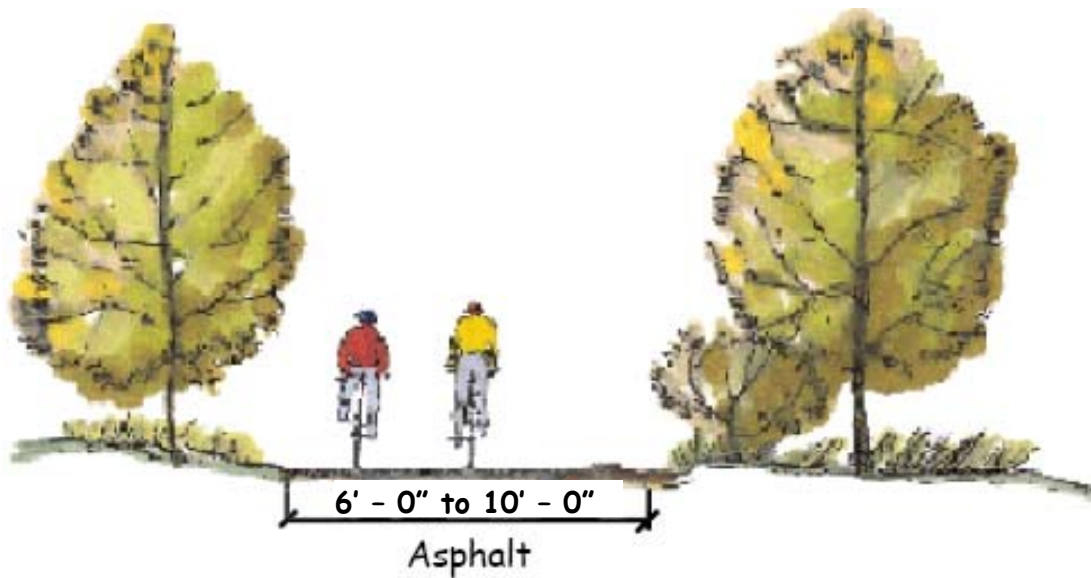
A. Shared Use Path

Generally, shared use paths will be used to serve as access to facilities, use areas, and natural areas in the park. Shared use paths will offer opportunities separate from the road system. They provide a recreational opportunity or, in many instances, serve as direct access routes to outlying park facilities. The most common applications are within camp loops, day use areas and between facilities and use areas. There may also be situations where such facilities can be provided as part of new recreational sites.

Another common application of shared use paths is to close gaps in bicycle travel caused by roadways or to circumvent natural barriers (rivers, mountains, etc.) While shared use paths should be designed with the bicyclist's safety in mind, other users, such as pedestrians, joggers, dog walkers, people pushing baby carriages, persons in wheelchairs, skate boarders, and in-line skaters are also likely to use such paths.

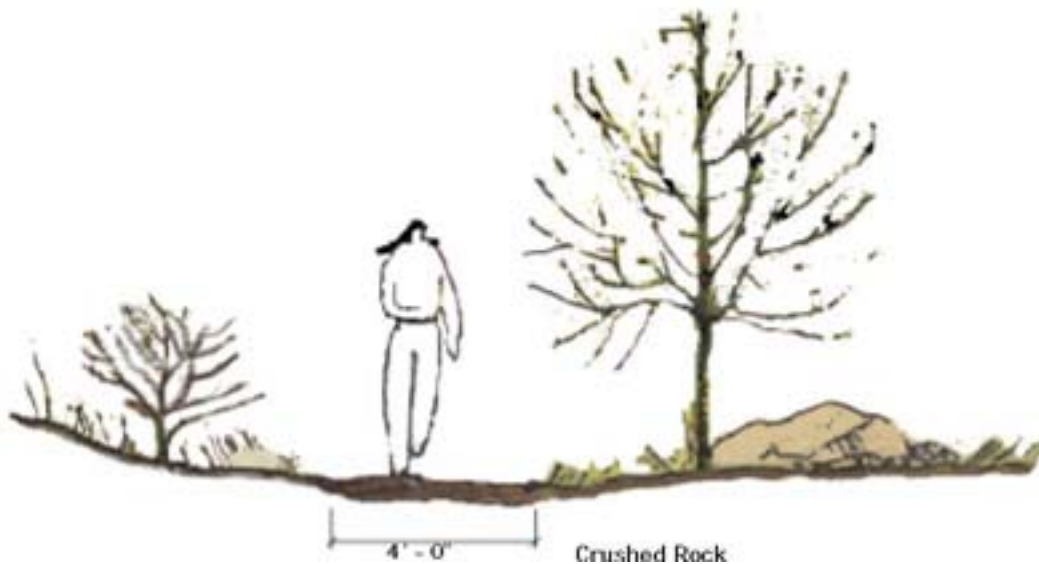
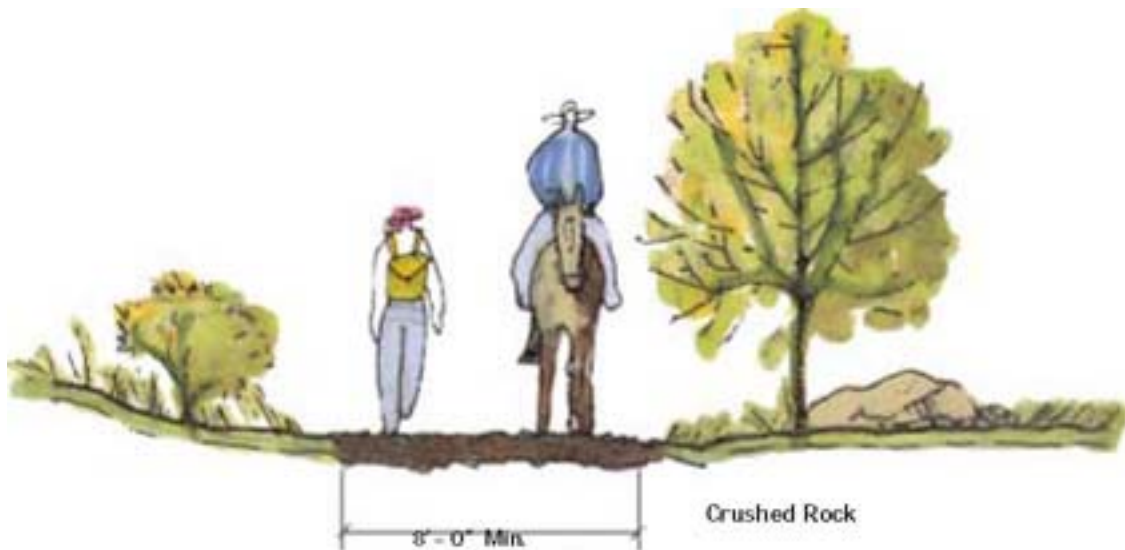
In selecting the proper facility, an overriding concern is to assure that the proposed facility will not encourage or require bicyclists or motorists to operate in a manner that is inconsistent with the rules of the road. The needs of both motorists and bicyclists must be considered in selecting the appropriate type of facility.

An important consideration in selecting the type of facility is continuity. Alternating segments of shared use paths and roadways along a route are generally inappropriate and inconvenient because road crossings by bicyclists and pedestrians may be required when the route changes character. Also, wrong-way bicycle travel with the higher potential for crashes may occur on the roadway beyond the ends of shared use paths because of the inconvenience of having to cross the road.



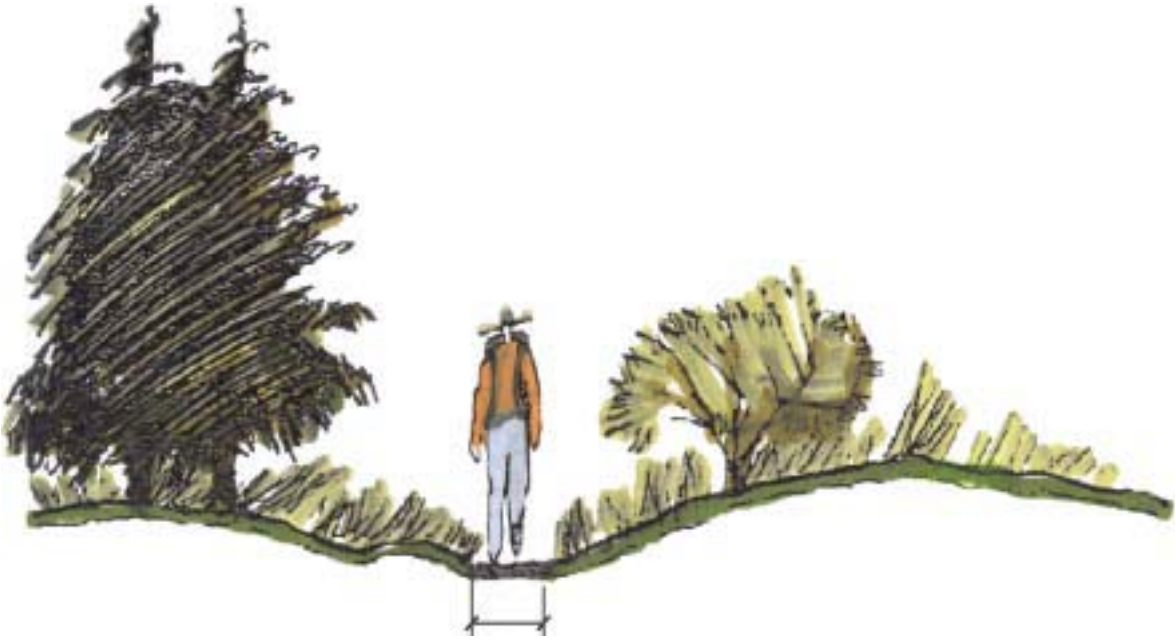
B. Multi-Use Trail

Anticipated uses along multi-use trails include mountain bikes, pedestrians and horses (where specifically designated). Trail width and surface material will vary with anticipated intensity of use and user type. Trail width will generally be 8' but may be less in low-use ~~areas or~~ areas, areas where the terrain does not permit trails of this width, or where users may prefer more of a natural trail experience. Some trails may require a width of more than 8' to be maintained if the trail is designated as an emergency access route. Trail surfaces may include crushed rock, wood chips, or dirt depending on the intensity and type of use. Trails that are anticipated to have a high intensity of use may require a crushed rock surface in order to minimize erosion. Surface drainage across soft-surfaced trails should be designed to minimize erosion of the trail surface and edges.



C. Back Country / Single Track Trails

Back Country trail types are generally used when a low volume recreational use is anticipated and to access natural areas.



2'-0" Dirt



2'-0" Dirt

D. Banks-Vernonia State Trail

The Banks-Vernonia State Trail is a 21-mile Rails-to-Trails conversion. This trail system runs through L.L. Sub Stewart State Park and is an integral part of the parks trail system. Access and connections to the State Trail will be provided, allowing access from the parks campgrounds and day use areas. Segments of the State Trail will also be used to create travel routes and loops for the State Parks trail system. Design of the Banks-Vernonia State Trail is outlined in its own master plan.

TRAIL LOCATION AND CONSTRUCTION STANDARDS

The following guidelines provide specific recommendations for how trails should be routed and/or constructed to reduce maintenance and environmental impacts and should be followed in the construction of trails.

A. General Guidelines

Trails should be located and constructed in such a manner as to minimize maintenance and maximize access.

Trails should follow natural contours where possible and respect surrounding land forms. For example, trails crossing steep sites should flow with the landform.

Drainage features, such as water bars, rolling grade dips or culverts should be constructed where appropriate to improve drainage and reduce erosion. Where possible rolling grade dips should be used instead of water bars or culverts to minimize impact on the local hydrology and maintain the aesthetics of the trail.

Trail cross slope should be between 5-8% for natural surfaced trails and 1-2% for paved and concrete surfaced trails. Where trails contour hillsides, the downhill or outer edge of the trail should be slightly lower than the uphill or inner edge. This allows water to drain naturally across the trail and reduce erosion.

Trail running slope should be less than 8% as allowed by natural contours. In some areas the terrain may require the trail to have steeper sections, but long sustained grades should be avoided to create sustainable trails. In general, the trail grade should never exceed 15 to 20% although this may vary with soil type, amount of rainfall, and the intensity and type of use.

The grade of the trail should be less than half of the grade of the side slope. This encourages water to run across the trail rather than flowing down the trail and causing erosion.

Trail slopes should match expected user volumes and types.

[Trails should be built according to guidelines set by credible sources The U.S. Forest Service, the Student Conservation Association \(SCA\), and the International Mountain](#)

[Biking Association \(IMBA\) have publications providing detailed information on trail building and maintenance guidelines.](#) Refer to AASHTO Guide For The Development of Bicycle Facilities for further guidance [on Shared Use Pathways.](#)

All trails and trail facilities should be constructed in accordance with local regulations. Information on Washington County's development permits and regulations can be obtained from the following address:

Permits/Land Use Regulations:
Washington County
Land Use and Transportation Department
Development Services/Building Division
155 N. First Avenue, Suite 350, MS 12
Hillsboro, OR 97124
Development Services: 503-846-8761
fax: 503-846-2908

~~Washington County requires XXXX when trails are constructed.~~
~~Washington County requires XXXX when a bridge is constructed for non-motorized trail use.~~
[Some trail construction activities will require review and approval by Washington County. As such, the schedule for trail construction should include adequate time for the County's permitting process. The following are key sections of the County's Development Code that are applicable to trail construction.](#)

Section 410 "Grading & Drainage"

[A grading plan and permit are required where new trails are constructed or improvements are made to existing trails.](#)

Section 426 "Erosion Control"

[An erosion control plan and permit are required for activities related to new trail construction or improvements to existing trails. This includes trail surfacing, vegetation removal down to duff or bare soil, excavation or grading.](#)

Section 422 "Significant Natural Resources"

[Applicants are required to determine locations of riparian corridors that encompass the streams and associated wetlands and identify areas of significant natural resources.](#)

Section 426 "Floodplain and Drainage Hazard Area Development"

[Applicants are required to determine the location of floodplain and drainage hazard areas along stream corridors. Review and approval are required for trail construction activities including trail surfacing, vegetation removal down to duff or bare soil, excavation, grading, and structural development.](#)

B. Trail Separation From Vehicle Traffic

Where feasible, trails should be separated from vehicle traffic. Snow removal and general maintenance are less costly when trails are separated from roads and parking lots. Users are generally safer on separated trails and travel experiences are enhanced on separated trails.

C. Phasing of Trail Improvements: When trails are part of a phased project, the phasing of various trail segments will follow a logical sequence for trail users. For example, some trail construction may be required through an entire project to provide completed trail connections at an early phase in the project. Further improvements can be made as funding/resources becomes available.

D. Recommendations for Environmentally Sensitive Sites

Special location or construction methods may be necessary to reduce impacts and minimize disturbance in environmentally sensitive areas. Examples of visually or environmentally sensitive sites include: wetlands, highly visible hillsides, significant vegetation areas, threatened and endangered species habitat, highly erodible soils, unstable slopes, and ridgelines.

Techniques, such as site specific trail routing, erosion control measures, site specific adjustment of construction standards, and site specific construction practices should be implemented to minimize environmental, visual or construction impacts. Construction methods that should reduce impacts include installing retaining walls to reduce cut and fill slopes on a visually prominent hillside, hand construction of the trail, stabilizing a hazard that is located within or adjacent to a trail corridor or installing a tree well around a significant tree to be preserved.

Special care should be taken in areas close to streams or wetlands. Decommission unnecessary trails to minimize erosion of sediment into streams. Survey existing logging roads for areas with high risk of erosion from cutslopes, fillslopes and road treads. Minimize such hazards, using methods such as outsliping and endhauling sidecast materials. In order to reduce erosion and stream sediment contribution to streams, drainage ditches should maintain a vegetative cover. Locate culverts or drainage dips to avoid excess accumulation of water on trails. Minimize connectivity between drainage ditches and streams to reduce sediment delivery potential. These recommendations are particularly applicable to the Williams Creek sub-watershed.

Existing culverts should be surveyed and removed if drainage-related erosion exists. Decaying culverts should be replaced and downspouts installed on culverts that have outfalls at a substantial distance above the hillslope. Any culverts that are installed should be designed to withstand the 100-year flood event.

Each environmentally sensitive site is unique, specific trail proposals through such locations need to be considered on a case-by-case basis.

E. Guidelines for Sensitive Sites

Construction Practices For Sensitive Sites: Disturbance fencing limits should be implemented to minimize construction impacts. Construction limits should be as small as practical to construct the trail. Significant vegetation root zones should be considered when locating the trail and establishing construction limits.

Erosion Control: Methods should be employed to protect areas adjacent to the trail from impacts both during and after construction. (See Drainage Planning and Slope Management Guidelines sections)

Indigenous Materials: Indigenous construction materials should be used for retaining walls, bridges, and barriers wherever possible.

Existing Vegetation: Existing significant vegetation should be preserved wherever possible. Trees, riparian vegetation and rare plants are considered significant. Root zones, as well as above ground vegetation require protection when preserving plants. In general, the area within the drip line of trees, especially on the down slope side of the vegetation, is sensitive to disturbance. If root zones are impacted or grades are changed significantly, temporary irrigation may be necessary.

Re-Vegetation: Native and/or self-sustaining plant materials such as sword fern, Oregon grape, and salal should be used for re-vegetation of all disturbed areas where trails pass through native or non-irrigated sites. Re-vegetation can be used to provide screening and help to stabilize slopes. Construction techniques to preserve vegetation and trail routing techniques should be used to minimize visual intrusion. Where possible, plants that are removed from the trail corridor for clearance should be transplanted to other locations where re-vegetation is necessary.

Natural Considerations: Where significant wildlife or other natural features exist, special trail routing, construction methods and trail use should be considered.

Wetlands: Trails that cross or are located adjacent to wetlands should be designed for minimal impact. Wooden boardwalks or other techniques may be necessary to impose minimal construction impacts. Wildlife needs should also be considered when setting trails near wetlands.

Visually Sensitive Areas: Locations that are visually sensitive, such as talus slopes, may require reduced cut and fill slopes, hand-construction, and low retaining walls to minimize site disturbance and visual intrusion.

Environmentally Hazardous Areas: Where environmental hazards are present, special trail construction techniques or locations should be used to mitigate the hazard. Hazardous areas, such as steep slopes, lightening prone areas and rockslide areas should either be avoided or be closed seasonally when hazardous conditions are a problem.

Micro Climatic Trail Use Opportunities: Locate the trails for both summer and winter activities, where possible, given the terrain and climatic considerations. Identify snow retention areas for possible cross-country ski trails. In open areas, place trail alignment to take advantage of wind protection and shaded canyon areas.

F. Utilities

The routing of utilities within trail corridors is generally encouraged. Many trail managers have allowed co-location of utilities in consideration for appropriate fee payments by the utility company. Locations that are visually or environmentally sensitive may restrict or preclude sharing utilities with trails. The following guidelines for placement, site disturbance and access should be followed.

Placement: Utility lines that run parallel to the trail should be placed under the trail bed where possible to minimize site disturbance. Utility lines that are perpendicular to the

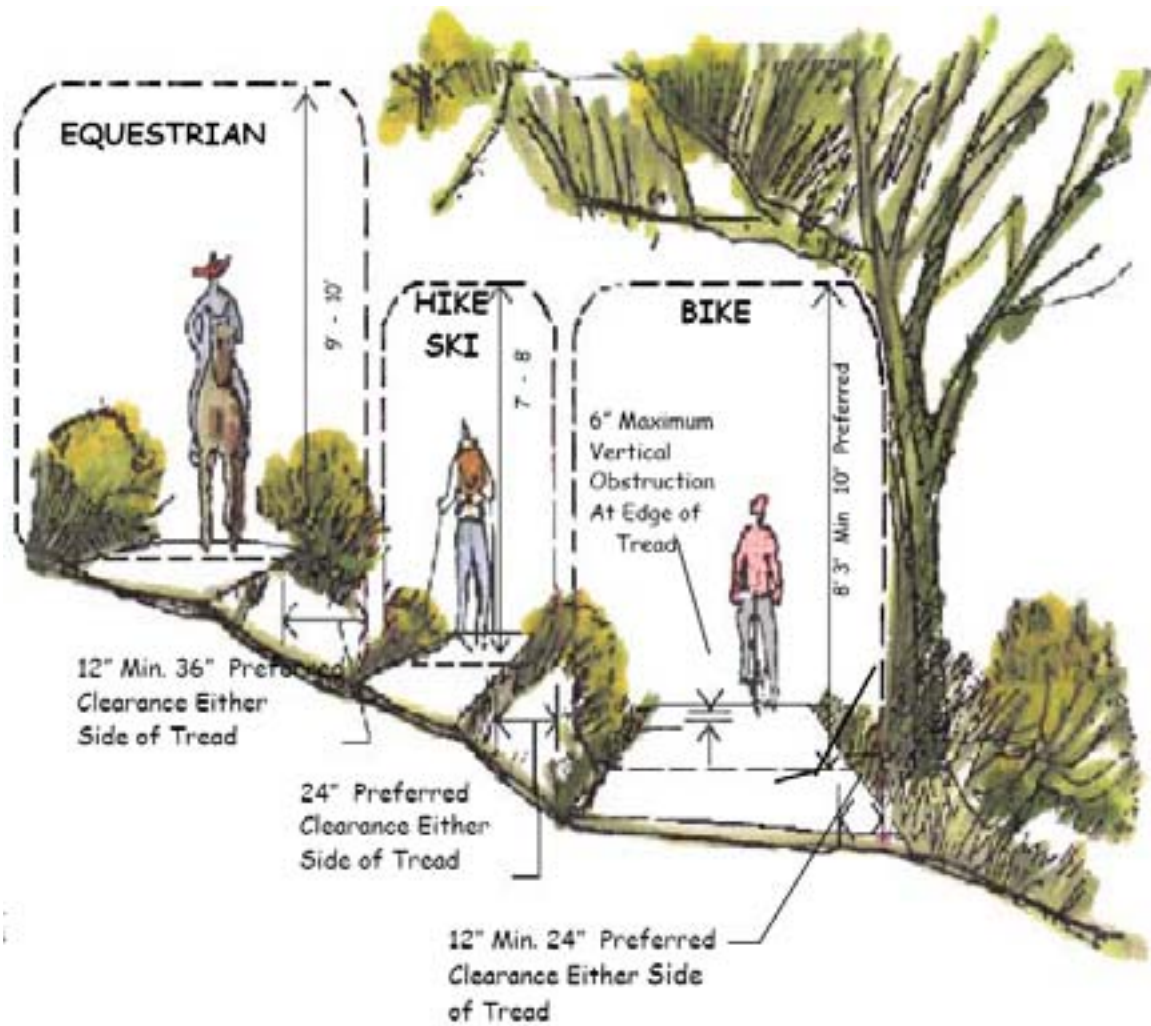
trail and lateral lines should be located to minimize site disturbance and removal of significant vegetation. Physical obstructions, such as utility pedestals, transformers and the like should be located out of the clear zone so they are not hazards to trail users. Access points which are not a physical obstruction, such as manhole covers should be located flush with the trail surface and where they do not pose a hazard to trail users.

Site Disturbance: Construction of utility lines within naturally vegetated areas should minimize site disturbance wherever possible. All disturbances should be re-vegetated according to the requirements for trail construction. Bonding for this work should be required.

Utility Access: Access for utility maintenance vehicles will be evaluated on a case-by-case basis and provided for as part of the trail construction. Visually or environmentally sensitive sites may preclude full access to trail/utility corridors.

G. Vertical Clearance Guidelines --Also see *Trail Types for Specific Requirements*

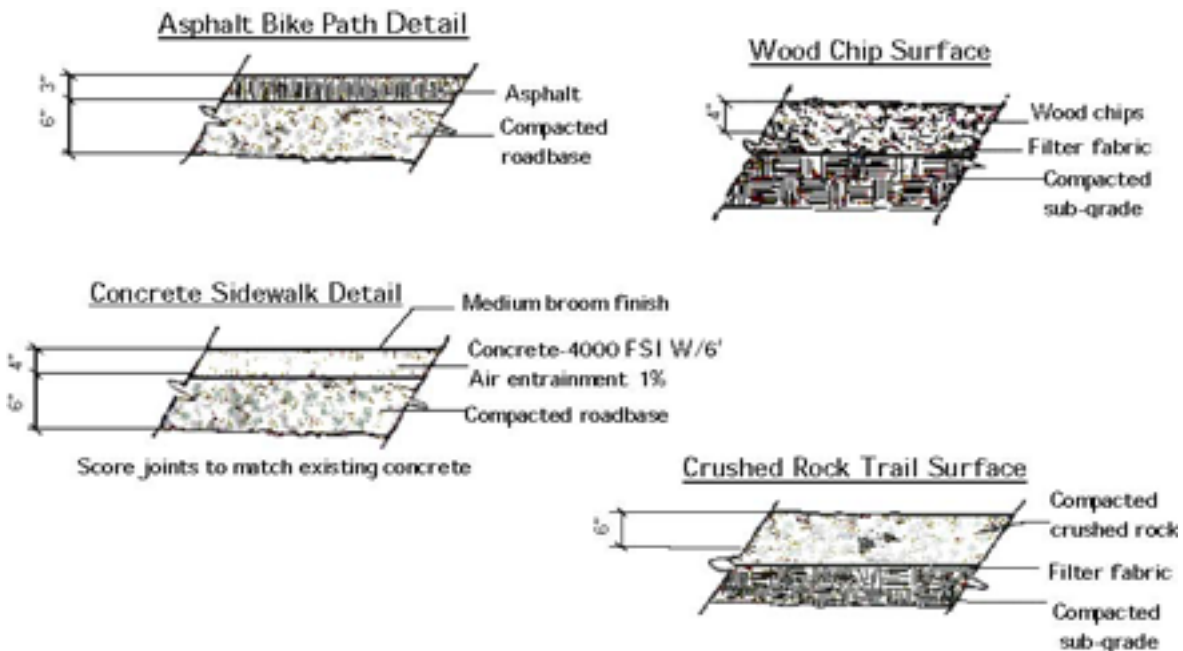
A 10' vertical clearance from the trail surface is required for multi-use trails or trails where equestrians are permitted. The vertical clearance to obstructions will be a minimum of 8 feet across the clear width of the path in areas where high traffic is expected.



H. Trail Surfacing Guidelines

Multiple surface types are available for trails. Multi-use trails generally undergo heavy use and require hard materials to reduce damage and maintenance. Crushed stone may be used as a trail surface in areas where heavy use is anticipated. This type of trail surface accommodates all trail users, improves drainage in wet areas, and reduces the amount of maintenance required. For trails where less use is anticipated, trails may be composed of soft surfaces such as wood chips or natural surface. These surfaces require less preparation and cost but require more maintenance. Wood chips should have a minimum thickness of 3" and require replacement every couple of years. Shared use pathways in highly developed areas may be paved with asphalt or concrete due to the high level of use. Asphalt, concrete and base specifications will meet those set forth in this document.

A 6" compacted road base sub grade should be placed under the dirt surface in areas with a high water table or with poor drainage conditions. If a wood or other edging material is used along any of the trail surfaces, care will be taken to assure trail surface drainage. Edging is not recommended along soft surface trails because the soft surface changes over time causing the hard edge to impede drainage. Weed or root barriers also may be necessary.'



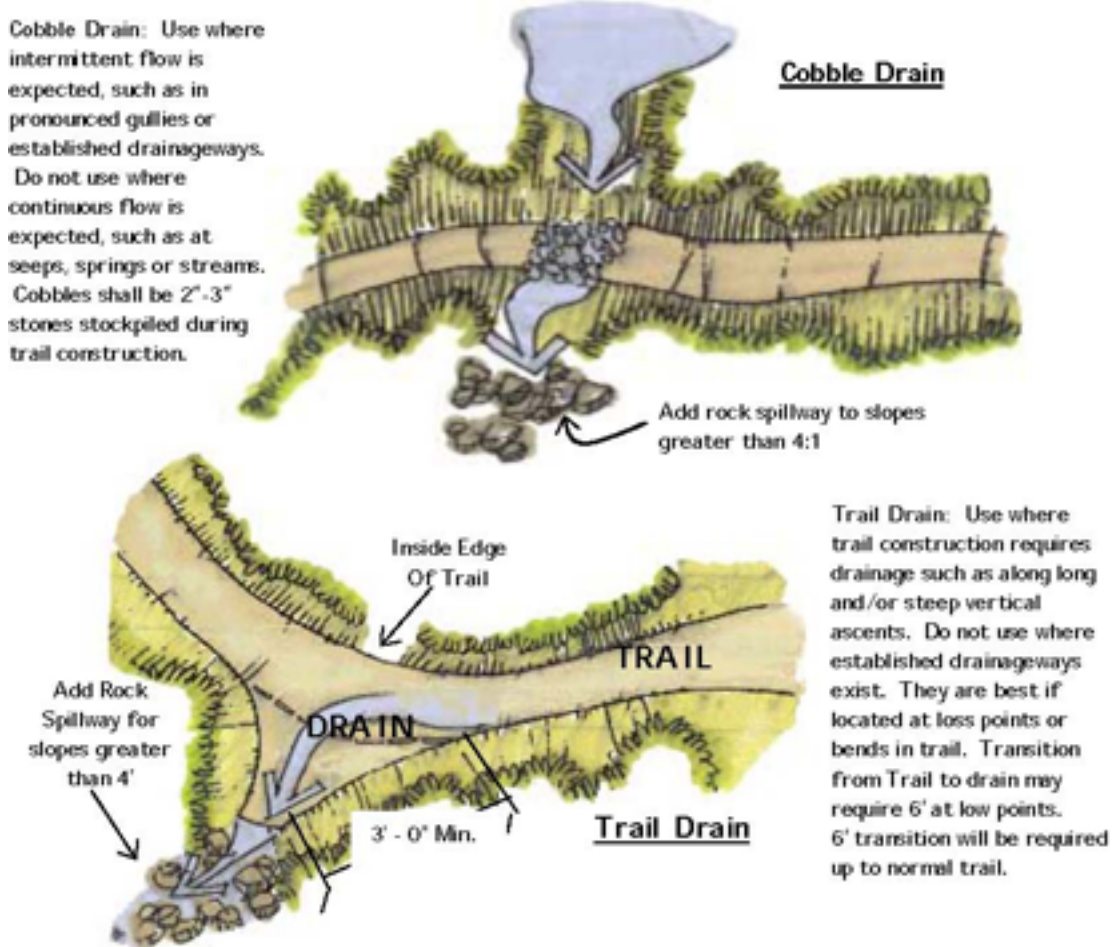
I. Drainage Planning

Careful initial construction of trails will minimize the number of drainage features necessary for the trail. Outsloping of the tread will significantly reduce the amount of running water on the trail. Other features such as rolling grade dips, swells, culverts, and waterbars can also be used to minimize the amount of running water on the trail. Careful study of topography adjacent to the trail may yield insight to maximize protection of the trail, while minimizing trail structures. General drainage should be studied at 50' stations with provisions made to protect the trail.

Rolling Grade Dips: Rolling grade dips should be used over culverts and water bars because they force water off the trail without the need for any other structure. Rolling grade dips create a short reversal in the trail grade causing running water to flow off the trail because it cannot climb over the short rise. Rolling grade dips will likely need to be installed at regular intervals on soft surface trails that are steeper than a 5% gradient for more than five vertical feet.

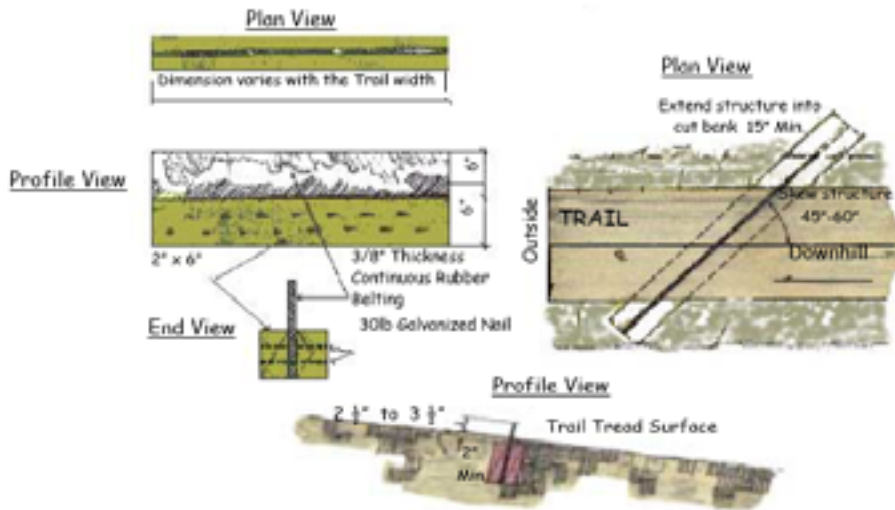
Swells and Culverts: Drainage swells or culverts should be installed on trails at locations where the normal cross slope will not allow for adequate drainage. Drainage swells are not allowed on paved trails. Drains are best located at low points or bends in the trail along existing natural drainage ways.

Wherever water is concentrated into new locations or in heavier concentrations, erosion protection needs to be evaluated and installed if necessary. Native stone is the preferred material.



Water Bars: Water bars are installed to push water off the lower edge of the trail. Proper installation is necessary so that the waterbar does not become clogged. On trails

with grades between 15 and 20 percent, a water bar needs to be placed at an angle of at least 45 degrees to the trail to prevent clogging. In addition, the water bar needs to be anchored 12 inches into the cut slope and extend 12 inches into the fill slope. If a water bar is put in it should be a rubber water bar since they are the safest for bikes on multiple use trails.



J. Slope Management Guidelines

When sloped areas are disturbed, the area needs to be stabilized and re-vegetated as part of the trail construction process to prevent subsequent soil erosion and frequent maintenance problems.

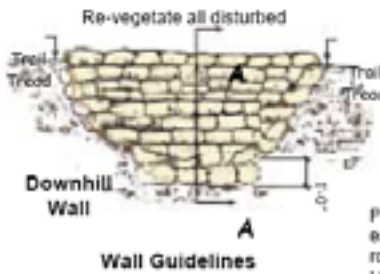
Permanent Slope Stabilization

Retaining Walls: Permanent slope stabilization includes native stacked rock or wood retaining walls, rock filled gabions, wire baskets, wattling, planting or placing plant materials, and slope serration.

Where necessary for safety, retaining walls should be installed to prevent erosion of cut or fill slopes, to reduce cut and fill slopes or to minimize disturbance on environmentally or aesthetically sensitive sites. Retaining walls should be constructed of indigenous or natural materials. Walls located on visually sensitive sites should be designed to blend with the natural surroundings. Materials, texture, color, and height all affect the visual prominence of a retaining wall. Walls exceeding a height of 4 feet must conform to the requirements set forth in the Uniform Building Code.

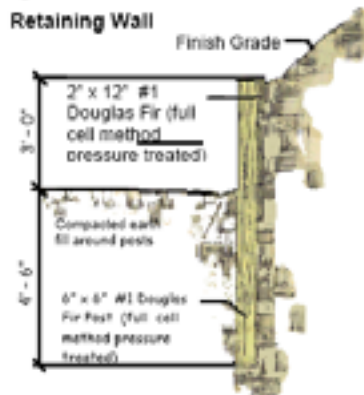
Following are some guidelines for various techniques. All uninterrupted cut or fill slopes will not exceed six vertical feet unless a site-specific analysis is performed to justify otherwise. Some method of permanent slope stabilization should be required for all slopes in excess of 2:1 vertical unless a site-specific soils analysis is performed.

NOTES: Wall shall be 2' wide or 1/3 the wall height, whichever is greater



- Use stone which is native to the site wherever possible.
- To stabilize the trail in less than adequate situations.
- To widen a trail that otherwise would be too narrow.
- To taper up or down in areas where typical tread construction will not work.
- Walls should be built in areas where adequate footings can be dug.
- All stones should be angular free, free from defects, projections and impressions.
- Approximately 25-33% of wall should be tie stones.
- Maximum height of wall should be 4'-0"

Retaining Wall



Prepare footing in earth or solid rock. Use largest rocks

- Use wherever natural trees or otherwise significant vegetation can be saved with the use of walls.
- Uniformly distribute sizes and shapes over the entire face of the wall.
- Shape stones for best fit. Use a 4" hammer if available.
- All walls must be battered: 3 in 12 through 12 in 12 are acceptable.
- Trench should slope inward as shown and drain to daylight. The stones shall completely penetrate wall. Miscellaneous backfill must be free from organic matter. Select backfill less than 1/2" maximum dimension, 4" depth optimum.
- Walls which are greater than 4'-0" in heights shall be engineered.
- Use where either cut or fill slopes for trail construction exceeds 4 vertical feet.

- Cut and fill slopes should be a maximum of 2:1 unless site specific soil analysis is performed to justify stability of steeper slopes.
- A maximum of 4 vertical feet of cut or fill is allowed environmentally or visually sensitive areas may be less.
- Areas which require steeper cut or fill slopes than the allowable shall use retaining walls as shown in these details.
- All disturbed areas shall be re-vegetated. Species for re-vegetation shall be appropriate and wherever possible shall match the surrounding species.

Cut and Fill Slopes: Construction of sidehill trails is dependent on the grade of the side slope. Trails along hills with a side slope of greater than 50% should use a full bench with the full width of the tread cut into the hillside. This creates a stable tread because the entire tread is composed of compacted mineral soil. A backslope of full bench trails should be cut to create more stable slopes. Partial bench trails can be used on less steep slopes but provide a less durable tread because part of the tread is composed of fill soil.

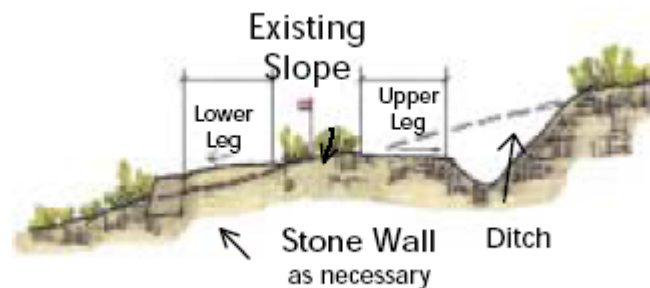
Combined cut and fill slopes should not exceed twelve vertical feet and individual cut or fill slopes should not exceed six vertical feet (less in environmentally and visually sensitive areas). Slopes that exceed these parameters should consider low retaining walls or alternate routing of the trail to a more acceptable location.

Cut or fill finish grades should not exceed a 2:1 vertical unless a site specific soil analysis is performed to justify the stability of steeper slopes. All cut and fill slopes will be stabilized and re-vegetated as per the re-vegetation and slope stabilization guidelines.

Existing Vegetation Protection: Existing significant vegetation that is to be saved will be protected with temporary fencing along the limits of disturbance. Trees that are to be saved should not be disturbed within the drip line of the tree, if possible, and the protective limits of disturbance fencing should extend to the drip line. Where this is not possible, all work within the drip line should be done by hand and mechanical equipment should not be allowed within the drip line. If filling is necessary above the root zone, perforated pipe along the drip line and vertical air wells should be installed. If cutting of roots or interception of natural drainage to the root zone is necessary, temporary irrigation may be required to compensate for the disturbance.

Wattling: Bundles of branches are used to both stabilize and re-vegetate slopes that are nearly stable but continue to erode. Wattling is only recommended after initial methods have failed and where the unstable areas are minor.

Slope Serration: Small steps or indentations are cut in the slope face and are useful for providing small favorable sites for vegetation establishment. This technique should be used only on soils that are fairly cohesive. Sites that have severe exposure to heat, sun or wind and have slopes that are excessively steep benefit most from this method.

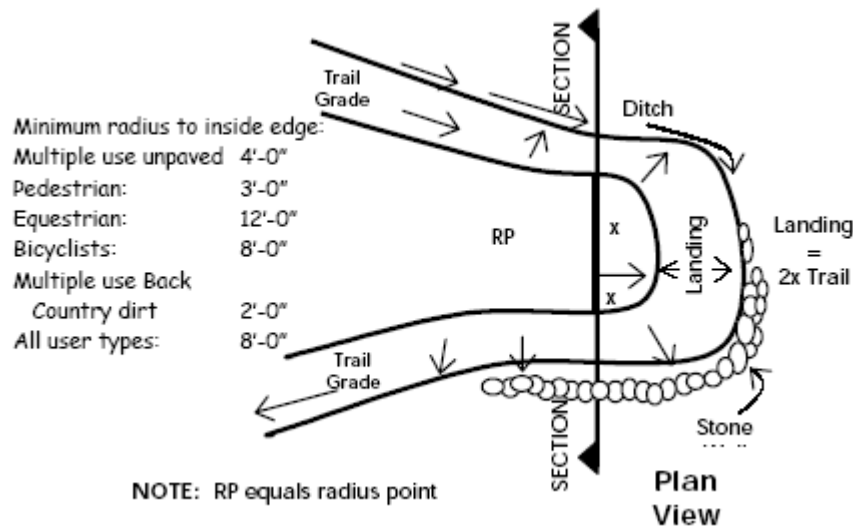


Switchbacks: Switchbacks are expensive to construct but are necessary when steep grades are encountered. When switchbacks are required, they should be designed to prevent crosscutting and subsequent erosion.

Locate switchbacks where natural barriers exist: installing physical or visual barriers or providing sufficient separation between the switchbacks all help to discourage crosscutting.

If crosscutting cannot be discouraged through design or construction then the

installation of stairs or relocation of the trail should be considered.



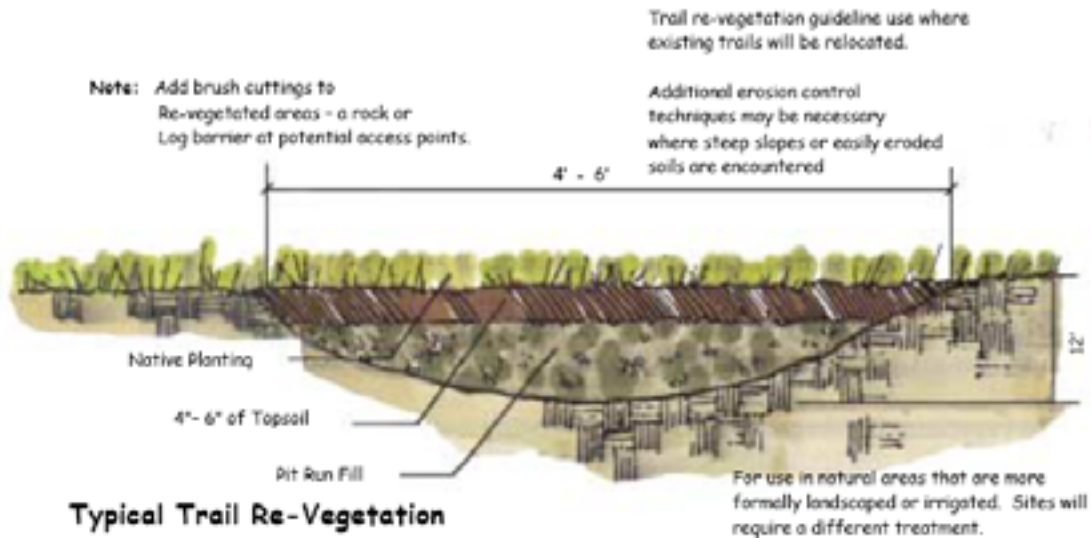
Re-vegetation: Re-vegetation consists of seeding and planting operations. In general the re-vegetation of natural sites will match that of the undisturbed areas in species, density and vegetation patterns. Re-vegetation will be accomplished as soon as grading work is completed and weather permits. Unless the site is irrigated, native plant species indigenous to the site should be used. All re-vegetation work on non-irrigated sites will be done between October 15th and April 15th. Sites that are re-vegetated between June 1st and September 1st will require temporary irrigation.

Seedbed Preparation: Sub-grade soils should be scarified to a depth of 3-4" and topsoil placed to a minimum depth of 4 inches.

Seeding: Seeds will be broadcast or hydro seeded and raked into topsoil before the application of mulch, matting or other surface stabilization materials. Seeding can be used for grasses and Forbs, but container stock should be used for all trees and shrubs.

Planting: Planting of container grown materials on non-irrigated sites will be confined to tubling stock unless there is sufficient natural moisture present to sustain larger plants.

Maintenance: Re-vegetated sites will be maintained until sufficient establishment has occurred to reasonably stabilize the site.



Temporary Slope Stabilization

During construction and establishment of re-vegetation, techniques, such as temporary erosion control, runoff measures, and slope stabilization may be necessary. The following treatment guidelines provide some direction for the use of these measures. All are temporary measures and are intended to last from one to two years until permanent stabilization techniques are effective.

Hydro mulching: This is a mechanized, rapid method for mulching large areas and is generally used with seeding to re-vegetate disturbed areas. Use may be limited on sites where equipment access is limited. Only 100% wood fiber mulch will be used and applied at a rate of 3000 pounds per acre.

Straw Mulching: This method can be used over small areas where it is applied by hand or on large sites where it is installed mechanically. Straw mulching is generally used in combination with seeding to re-vegetate disturbed sites. Straw must be held in place by matting, crimping or other method. Apply at a rate of 2 tons per acre or a uniform depth of 2-3".

Jute Matting: Jute Matting can be used alone or in combination with hydro mulching or straw mulching for erosion control and slope stabilization. It is generally used in combination with seeding to re-vegetate disturbed areas. Apply up and down the slope, never along the slope. Overlap edges a minimum of 4" and use wire staples that are a minimum of 6" long and spaced approximately 5" apart down the sides and middle of the role. Extend the mat a minimum of 3" beyond the top and bottom of the slope and bury the mat end in an 8" deep trench at the top of the slope. Uniform contact of the mat to the slope underneath is critical.

Wood Excelsior Matting: This type of matting is used for erosion control generally in combination with re-vegetation. Care must be taken during installation to prevent concentrated flows under the mat. Apply up and down the slope, never along the slope. Edges should butt snugly together and held down with wire staples, a minimum of 8" long spaced approximately 2" along the edges and four down the center. Extend the

mat a minimum of 3" beyond the top and bottom of the slope and bury the mat end in an 8" deep trench at the top of the slope.

Tackifiers: Generally, tackifiers are mixed with mulches to provide better adhesion to steep and/or windy slopes. Tackifiers should be applied at a rate of 80 pounds dry ingredients per acre or 200 gallons wet ingredients per acre.

Straw Bales: Straw bales can be used in a variety of ways to protect areas from impact; straw bales reduce uninterrupted flow in low and intermittent flow channels. Straw bales also provide a siltation device for slopes or gullies until re-vegetation can be established. When installing, anchor bales in place with steel re-bar stakes, driven a minimum of 12" into the sub-grade, in a 6" deep trench which has soil tamped firmly along the uphill side.

Siltation Fences: Siltation fences are used to protect undisturbed down slope areas from up slope erosion.

Matting in Drainage Channels: Jute matting or fiberglass roving are typically installed in open drainage channels for temporary erosion control. Use this technique only where flow velocities do not exceed 2 feet per second. Apply from the top and overlap edged a minimum of 4 inches. Secure the top and bottom ends in an 8" deep trench secured with steel staples every 12 inches. Edges should be stapled every 2 inches.

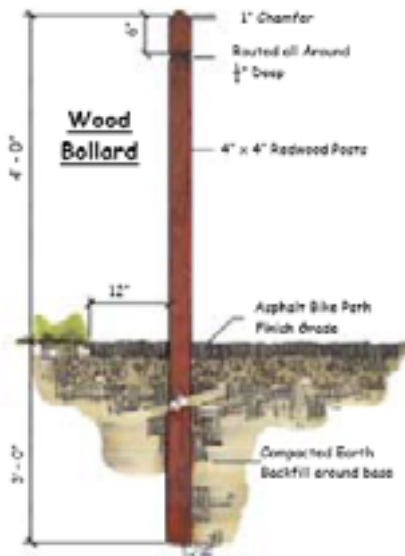
Stone Mulching: May be used during construction to control erosion, mud or dust.

Gabions: Gabions are rock filled wire baskets used to retain steep slopes or stabilize drainage ways and may be preferable to stacked rock walls where the native rock is too small or too rounded for effective stacking. They are particularly effective when seepage is anticipated. Empty gabions are placed in position, wired together and filled with rock that is a minimum of 4" to 6" in diameter. When used as a retaining wall the bottom basket should be buried a minimum of 6" at the toe. Gabions should be keyed into the slope and laid back at a maximum of 6" vertical to 1" horizontal.

K. Special Trail Structures

Bollards and Barriers: Barriers should be installed at trailheads to control access of motor vehicle traffic and to direct and/or protect trail users from steep or hazardous areas along the trail.

BARRIER AND BOLLARD GUIDELINES:



Use where motorized access could be a problem, such as at trailheads, where trails intersect or cross streets and where trails parallel roads at points where access is likely.

Bollards are used within the trail surface to prohibit or limit access.

Use along trail where downslope grades are steep and hazardous.

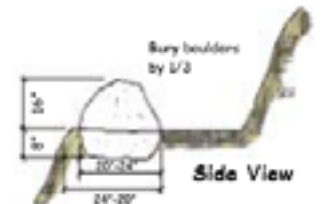
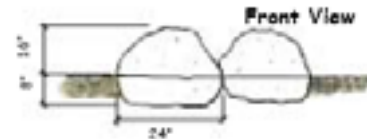
Use along outside edge of trail curves where slopes are steep and exposed.

Use where switchback cutting could be a problem.

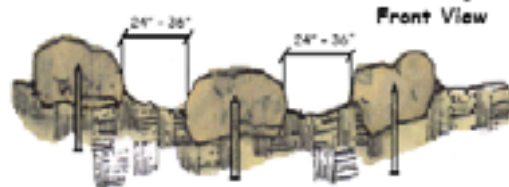
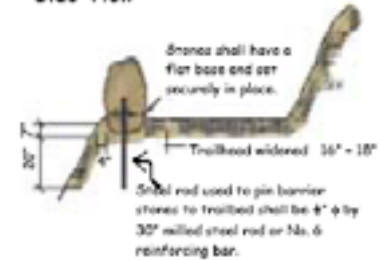
Use at trailheads or road crossings to discourage or prohibit motorized access.

Use to direct trail users to stay on the trail.

Rock Barriers



Side View

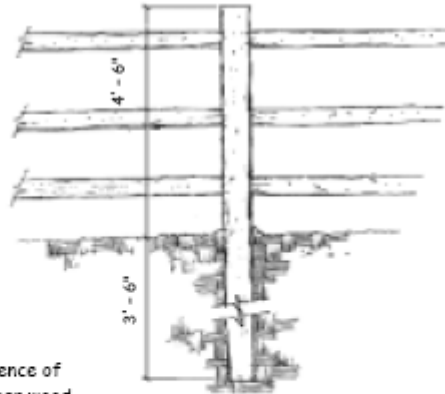


Note: Size of barrier stones shall be approximately 14"-24" in height, width and length. Minimum dimensions shall not be less than 12" for height and width and 18" for length.

Three types of barriers are generally used: large boulders, timber barriers and wood bollards. All three types of barriers are effective in stopping motorized access when placed at the trailhead. The location of such barriers is usually where trails intersect with cross streets and where trails parallel roads at points where access is likely. Rock barriers can also be used along portions of a trail where the down slope grades are hazardous, where switchback cutting can be a problem and when outside edges are exposed to steep slopes. The placement and spacing of barriers are dependent upon unique trail site characteristics and use requirements.

Fencing: Fencing should be installed only where physical separation is necessary for safety and/or to preserve adjacent landowner privacy. Fences should not create a narrow corridor effect for long stretches along the trail. Where possible, fencing should be located only on one side of the trail at a time.

Fences should be no closer than 5' from the trail edge. Where fences are necessary along both sides of a trail, the minimum width should be 20'.



3 rail split fence of Cedar or other wood suitable for below grade installation

Posts to have a minimum dimension of 6"

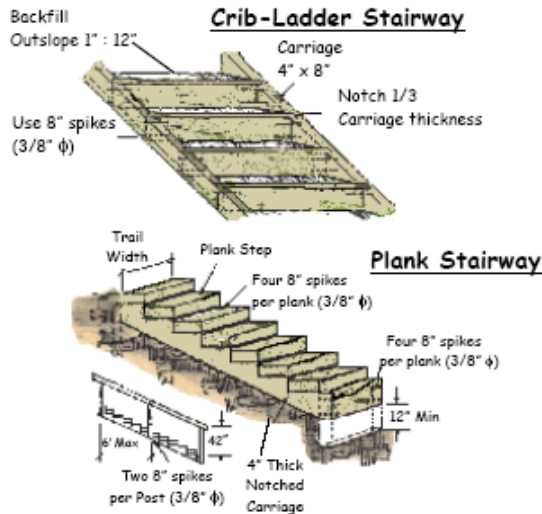
Rails to have a minimum dimension of 4"

GUIDELINES FOR USE
This is the typical fence along the U224 corridor

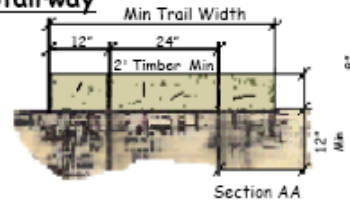
Any new developments the entry should use this same design.

Stairways: Stairways may be considered for trails that gain high amounts of elevation in a short distance. Stairways may be required to conform to the requirements set forth in the Uniform Building Code. Stairs should not be used on trails that are used by horses, road bikes or the disabled.

Wooden Stairs--will be constructed of pressure treated or approved rot resistant timber.



Pinned Stairway

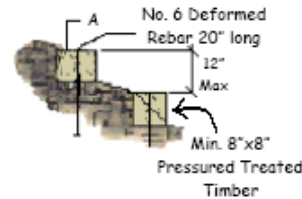


NOTE: Where stairs are located in developed areas of the community, compliance with the uniform building code is required.

Treads to be dug into the slope and set into place.

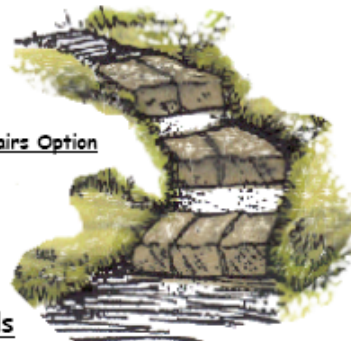
Drill holes through each tread for each rebar stake.

Drive rebar stakes through treads and into ground below.



Stone Stairs--can be used where trail grades exceed the maximum allowable slopes and where the grade must be gained quickly. Stone stairs should be built with the intent that intensive use should not impact the stairs in the slightest.

Stairs Option

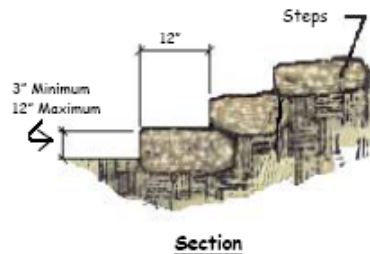
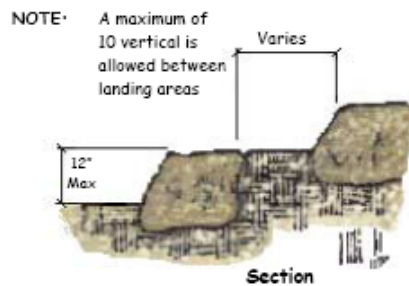


Stone Stairs:

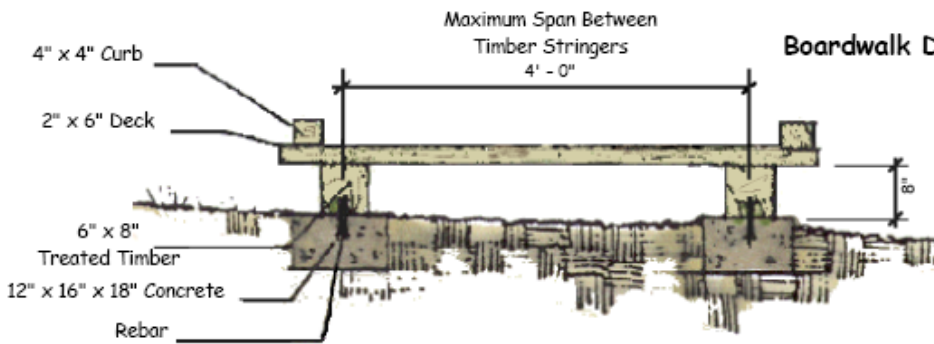
Details are included for reference only. Choose stones with a good shape for stairs. Minimum sizes are shown, start at the bottom and work up. Use the biggest stones possible to span the trail. One stone would be the best, two are fine and three is maximum.

Completely cross the trail. Route the trail so people will stay on the trail and stairs. Build to the dimensions shown and make each set of stairs are uniform. Keep the height of each step and the distance between steps as uniform as possible within each set of stairs. Maximum grade at top and bottom of stairs as well as between stairs should be 8%. Walk your staircase to ensure it is smooth and uniform.

Stone Stairs for Back Country Trails



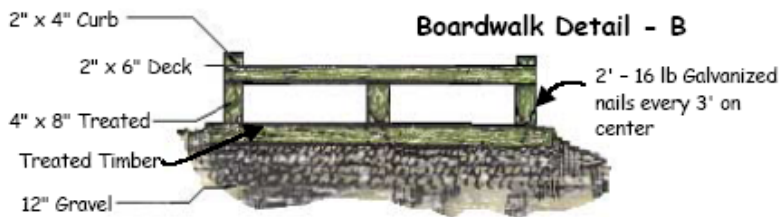
Boardwalks: All wood used in boardwalk construction will be pressure treated or approved rot resistant timber.



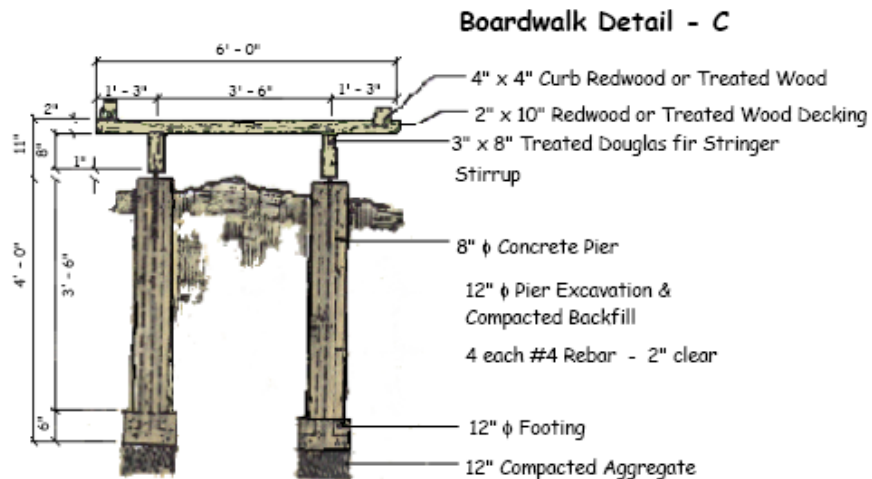
Boardwalk Detail - A

Guidelines For Use
For use in wetlands or other locations where conventional pavement is not practical or appropriate.

Do not use where motorized vehicles or horses are expected.



Boardwalk Detail - B



Boardwalk Detail - C

Weed & Root Barriers: Root barriers should be installed along the edges of trails where riparian or vegetation that aggressively seeks out water is present. Willows, Devils Club, Vine Maple, Red Alder and Cottonwoods are examples of aggressively spreading plants.

AMERICANS WITH DISABILITIES ACT

In 1990, Congress passed the Americans With Disabilities Act. Among other provisions, the act prohibits state and local governments from discriminating on the basis of disability and requires government services, programs, and activities to be accessible to people with disabilities. ~~Technical assistance concerning the law's~~

~~application is available by calling 1-800-USA-ABLE.~~

~~Where potential use and/or ADA access needs warrant, provide trail access through, around, over or under major barriers. For pedestrians, add or improve sidewalks, create safe crossings, add ADA-compliant ramps, and modify intersections where needed.~~

This act attempts to remove the physical and social barriers facing over 43 million Americans with disabilities. Almost 15 years ago, William Whyte wrote, "If circulation and amenities are planned with (the disabled) in mind, the place is apt to function more easily for everyone."

For the purposes of the L.L. Stub Stewart State Park, it is necessary to distinguish what types of vehicles meet the qualifications to use the ADA accessible trails. ORS 811.440(4) states that "A person may operate a motorized wheelchair on a bicycle lane or path." According to section 504 of the Rehabilitation Act and the ADA, a person who relies on a powered wheelchair as part of their essential life function has the right of access by that powered wheelchair.

Definition: For purposes of this policy, the term "wheelchair" means a device designed solely for use by a mobility-impaired person for locomotion, that is suitable for use in an indoor pedestrian area (federal regulation 42 USC 12207.SEC.507). Under this definition an electric powered wheelchair or electric powered 3-wheel type scooter are commonly used safely in pedestrian settings and would qualify for means of access to persons with disabilities to the L.L. Stub Stewart State Park. A device such as electric golf cart, sport racing equipment, electric bicycle, specialty equipment, and any gas, diesel, natural gas, or propane vehicle is prohibited.

Where potential use and/or ADA access needs warrant it will be necessary to provide trail access through, around, over or under major barriers. For pedestrians, add or improve sidewalks, create safe crossings, add ADA-compliant ramps, and modify intersections where needed. Modifications to achieve accessibility may not be required if they would change the fundamental nature of the activity.

Crosswalk areas can be raised to the level of the sidewalk. Such a raised crosswalk will have additional traffic calming benefits, serving as 'speed tables' that will slow traffic speed at intersections.

Access for the Disabled: While it is clearly not practical for all types of trails in a mountainous environment to be fully accessible to the disabled, where reasonably appropriate, the trail system should comply with the standards set forth in this law. Until such time as more definitive standards are set forth, this section of the trail plan will provide direction as to what trails are required to comply with this law and how L.L. Stub Stewart State Park will approach the improvement of trails.

All trails that provide access between parking lots and public facilities, such as recreation areas or park facilities are required to comply with ADA.

A trail is considered ADA accessible if it meets the following criteria:

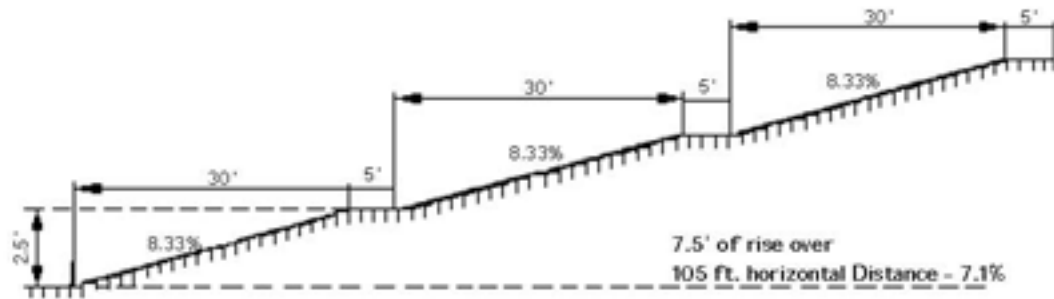
- a. ~~Tread~~a. Tread Width: 36 inch minimum width.
- b. Trail Surface: Asphalt and concrete are the most accessible. Compacted crushed stone also works well, provided that the stones' diameter is less than 3/8 inches. Loose gravel is not recommended.
- c. Tread Obstacles: Where tread obstacles exist, they shall not exceed 2 inches (50 mm) high maximum.
- d. Passing Space: Where the clear tread width of the trail is less than 60 inches (1525 mm), passing spaces shall be provided at intervals of 1000 feet (300 m) maximum. Passing spaces shall be either a 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum space, or an intersection of two walking surfaces which provide a T-shaped space complying with ADAAG 4.2.3 provided that the arms and stem of the T-shaped space extend at least 48 inches (1220 mm) beyond the intersection.
- e. Cross Slope: The cross slope shall not exceed 1:20 maximum.
EXCEPTIONS : For open drainage structures, a running slope of 14 percent is permitted for 5 feet maximum (1525 mm) with a cross slope of 1:20 maximum. Cross slope is permitted to be 1:10 at the bottom of the open drain, where clear tread width is 42 inches (1065 mm) minimum.
- c. Running slope of trail segments shall comply with one or more of the provisions of this section. No more than 30 percent of the total trail length shall exceed a running slope of 1:12.
 - a. Running slope shall be 1:20 or less for any distance.
 - b. Running slope shall be 1:12 maximum for 200 feet (61 m) maximum. Resting intervals complying shall be provided at distances no greater than 200 feet (61 m) apart.
 - c. Running slope shall be 1:10 maximum for 30 feet (9150 mm) maximum. Resting intervals complying shall be provided at distances no greater than 30 feet (9150 mm) apart.
 - d. Running slope shall be 1:8 maximum for 10 feet (3050 mm) maximum. Resting intervals complying shall be provided at distances no greater than 10 feet (3050 mm) apart.
 - e. *EXCEPTION*: Where the surface conditions require slopes greater than 1:33 for proper drainage, a 1:20 slope is permitted.
- d. Ramps, not stairs, should be provided for grades exceeding the 5% maximum at a trailhead.
- e. Ramp grades should not exceed 8% and have a level landing for every 30 inches of vertical rise and have a slip resistant surface.
- f. 32 inch high handrails should be installed on all ramps and bridges.
- g. Fully accessible trails should have a rest area every 1000 feet, preferably cleared with a bench outside of the trail path with the distance between rest areas posted at the trailhead.
- h. One or more accessible parking space should be provided at trail parking lots.

- i. If gate or bollards are planned to prevent motorized vehicle access to the trail, maintain 32-inch clearance to ensure or provide wheelchair access.

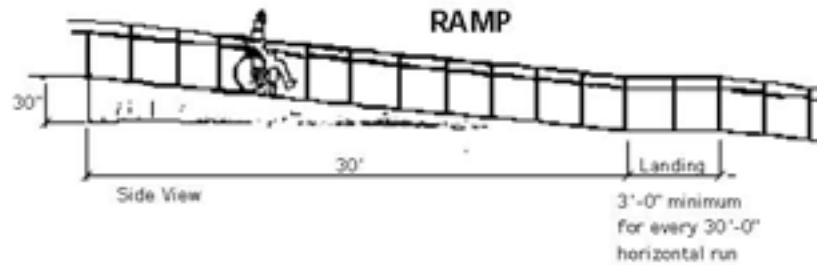
In addition, not all ADA accessible trails will be of the same difficulty. Information on trail grade, cross-slope, width, and surface will allow individuals with disabilities to decide if they have the ability and interest to use that segment of the trail.

Technical assistance concerning the law's application is available by calling 1-800-USA-ABLE.

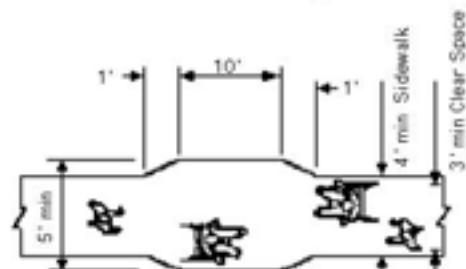
Accessible Ramped Pathway With Landings



NOTE: If designing an accessible route of travel, handrails are required on both sides
 Source: Adapted from Oregon Bicycle and Pedestrian Plan



Accessible Passing Area



NOTE: Dimensions of passing area shown are desirable. 5' by 5' is the minimum dimension.

SIGNS AND PUBLIC MAPS

Locations for signs need to be evaluated on a case-by-case basis and signs should only be posted where necessary to avoid visual pollution. These guidelines provide general direction for signs and their placement.

A. Regulatory Signs

Requirements for the use and placement of signs, including regulatory signs at intersections, will follow the standards set forth in the *Manual on Uniform Traffic Control Devices (MUTCD)* section on 'Traffic Control Devices for Bicycle Facilities' and will apply to all multi-use paved trails. Bicycle Crossing Signs near a road approaching a crossing will conform to MUTCD standards. The following information lists the types of regulatory signs and describes where they should be located:



Stop Signs: Stop signs will be installed wherever paved multiple use trails cross public roads, unless traffic is required to stop at trail intersections or at other potentially hazardous locations.

Speed Limit, Steep Grade, Danger Warning, and Slow Signs: These signs should be installed where trails approach maximum slopes, areas with limited sight distance and areas with dangerous conditions ahead, such as 'Moose Crossings.'

Curve Signs: Trail users should be cautioned by signs when a curve has a smaller than recommended travel radius and/or limited sight distance. Curve signs should be posted at points along the trail where travel at a moderate rate would cause a trail user to leave their lane.

Dismount Signs: Such signs should be posted in areas where slope exceeds

recommended standard and where trail width or vertical clearance is less than the recommended standard.

Private Property Signs: Signs identifying private property should be located on an 'as needed' basis.

All regulatory signs should have engineer grade reflective coating and be graffiti proof. Sign size and letter height should conform to the speed of traffic along the trail.

B. Informational Signs

- Signs indicating allowed uses should be posted at trailheads.
- At high volume multiple-use trailheads, informational signs indicating user etiquette should be posted.

Trail User Information Sign: This sign should be placed at all major trailhead facilities where trails are accessed. It should be located where it is clearly visible and where it does not impede trail use or present a hazard to trail users.

WELCOME TO L.L. STUB STEWART STATE PARK TRAIL SYSTEM

TRAIL USER INFORMATION:

ALL VISITORS:

- Respect the Privacy of landowners along the trail system.
- Please leave no trace of your passage, pack out all trash.
- Respect trail closures implemented to protect visitors and natural resources.

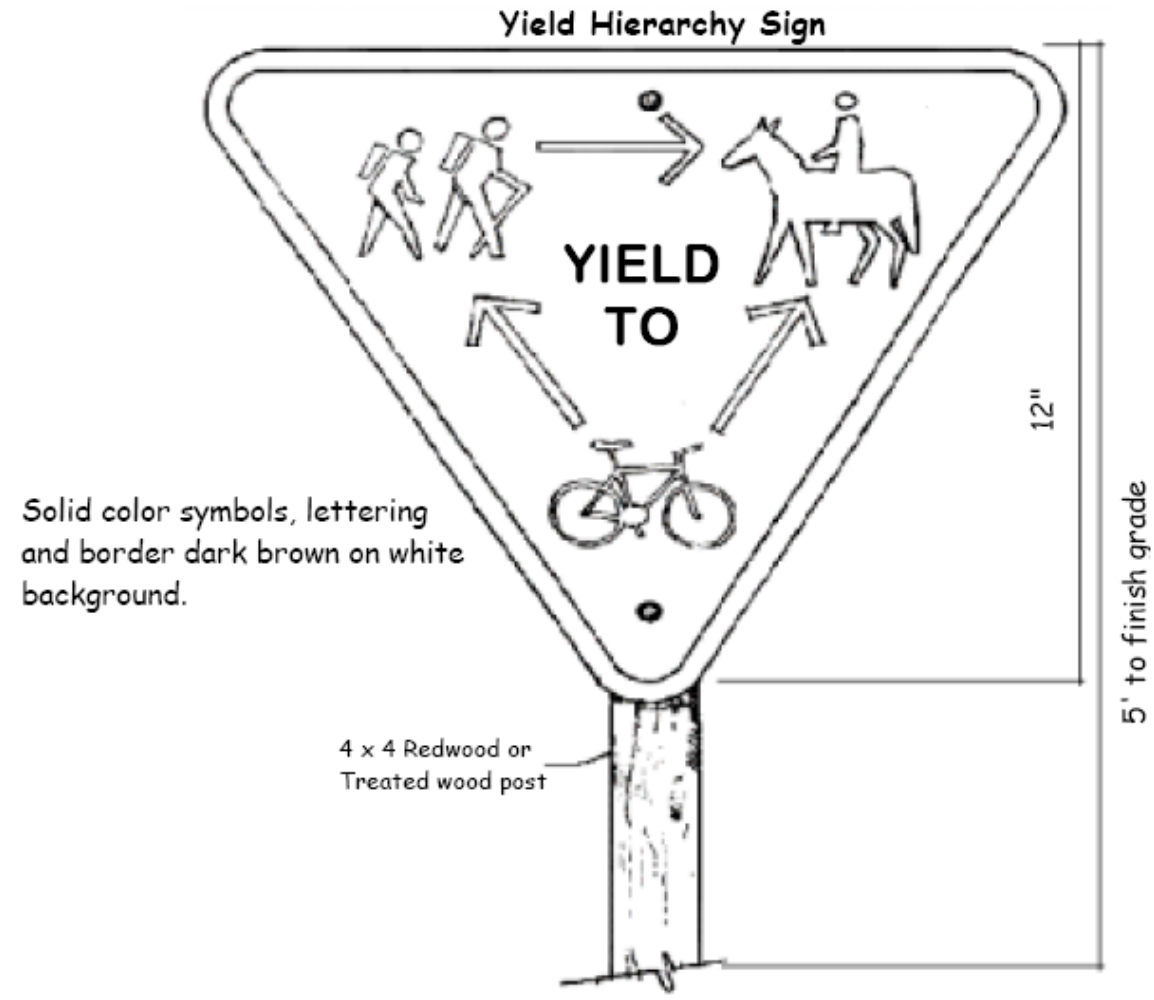
HIKERS AND PEDESTRIANS:

- Be aware that you are sharing the trails with cyclists and equestrians.
- Please yield to equestrians, and allow ample space for their passage.

CYCLISTS AND OTHER FORMS OF HUMAN-POWERED TRANSPORTATION

- Please use a helmet and gloves.
- Ride at a safe and controlled speed.
- Yield to hikers and equestrians.
- Alert other trail users with a bell, or other audible signal when approaching from behind.

Yield Hierarchy Sign: This sign should be placed at all major access points of multiple use trails. It should be located where it is clearly visible and where it does not impede trail use or present a hazard to trail users.



Trail Courtesy Sign: Trail courtesy signs should be posted at all trailheads. A shortened user courtesy sign should be installed at trail access points. This sign can be placed on the same post as the 'Yield Hierarchy Sign,' wherever the Trail User Information sign is not located. The Trail Courtesy sign should also be located on 'Stop' and 'Private Property Signs'.

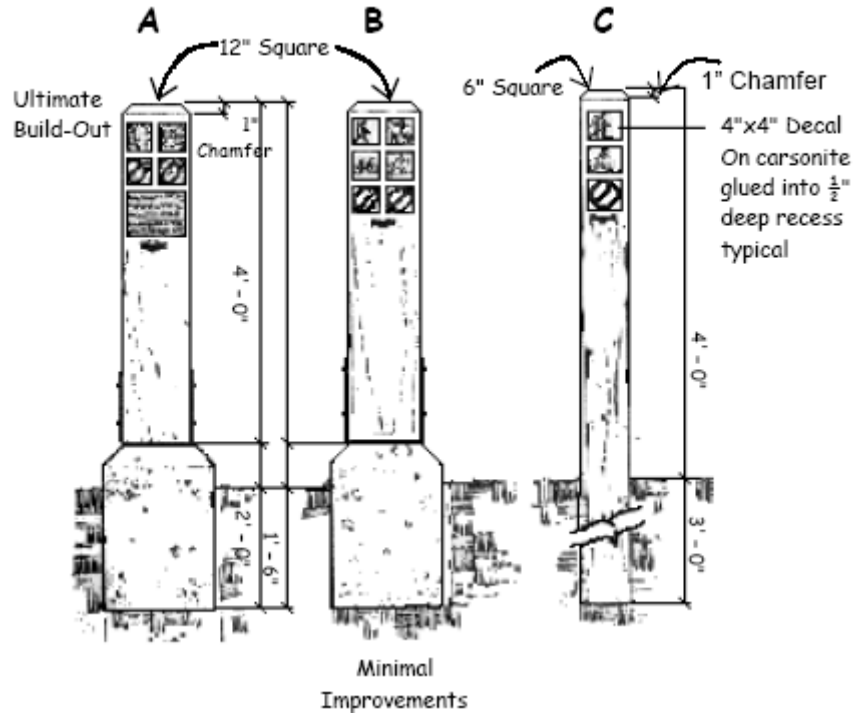
REMEMBER TRAIL COURTESY

1. IF IN DOUBT YIELD
2. RESPECT HORSES
3. RIDE SAFELY AND AWARE
4. ALERT OTHERS WHEN APPROACHING
5. LEAVE NO TRACE

C. Sign Construction Features (Sample Bollards and Mile Markers)

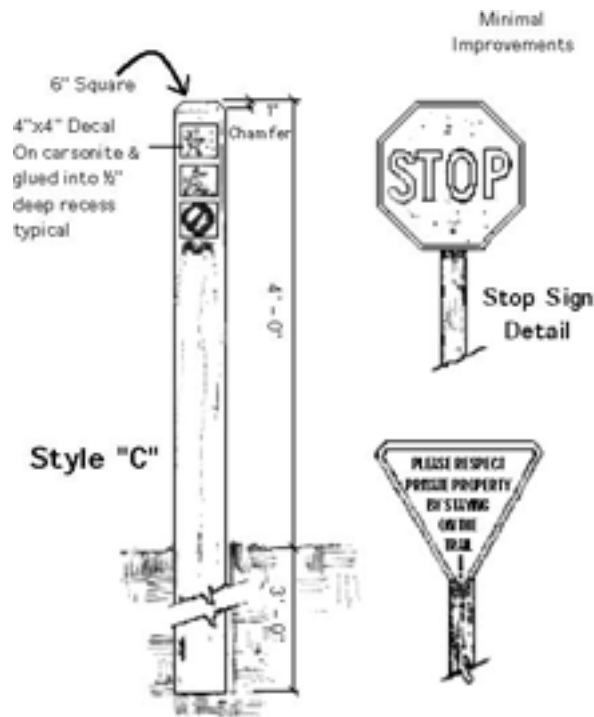
Sign Posts: There are many design solutions to signage along a trail; below is one commonly used design.

Post location will conform to the standards set forth in the *Manual on Uniform Traffic Control Devices* section on 'Traffic Control Devices for Bicycle Facilities.' Sign posts will be 4x4 pressure-treated Douglas Fir, embedded into the ground a minimum of 24" unless other materials are specifically approved.



Attachment Systems: Signs should be attached to wood posts with 2" galvanized carriage bolts in a minimum of two locations per post.

Sign Bollards: These should be located at all trail access points. (See Bollards and Barriers, Trail Location and Construction Standard Section).



Different styles for sign bollards are depicted in the figures for "A", "B", and "C". Style 'A' and 'B' should be located at trailhead facilities. Style 'A' is for all named trails or designated access points. Style 'C' is for all other access points and can be used in conjunction with plain bollards where motorized access is restricted, or modified for use as trail mile markers. The individual symbols are 3" square reflective decals that can be ordered from Carsonite International. They should be mounted on heavy gauge aluminum plate routed into the post a minimum of 1/2" and epoxy or screw into place. All types of bollards should be constructed of redwood or pressure treated Douglas Fir.

D. Trail Courtesy Brochures

A Trail Courtesy Brochure can be an effective tool in encouraging safe and courteous trails use. Any maps, guides, other trail related literature or trail user education or orientation programs should contain similar information.

EQUESTRIANS	BICYCLISTS
<ul style="list-style-type: none">• Travel at a safe speed. Slow to a walk when approaching or overtaking other users.• Walking, trotting and slow cantering are appropriate on horse trails,• Horses have the right-of-way over bikes.• Do not ride on the trail when it is muddy. Deep hoof ruts are difficult to repair and make the trail hazardous to other users.• Stay on the trail.	<ul style="list-style-type: none">• Ride single file when passing or being passed.• Yield right-of-way to all other users.• Use of a helmet is advised.• Control your speed. Have your bike under control at all times.• Stay on the trail and maintain traction. Skidding damages trails.• Do not ride in the mud or on trails where ruts are created by your tires.
HIKERS/JOGGERS	
<ul style="list-style-type: none">• Be alert and aware of the needs of other users. Pass equestrians with caution.• Stay on the trail.	For more info on South Suburban's Trail System, Call 795-6531

This information made available by Metro Trail System Committee.



E. Trail Guides and Maps

Trail guides and maps provide greater access to non-motorized travel for visitors to the park as well as enriching the transportation, recreational and educational experiences of all. Maps and guides should contain the following information:

- Locations of trails, trailheads and a description of trail route, steepness and accessibility. Accessibility ratings, including the presence of staircases or barriers should be noted and fully accessible trails should be clearly marked.
- Pedestrian/bicycle corridors with wheel chair access, cross walks, and trail connections clearly shown.
- Location of facilities, such as parking lots, drinking water, rest rooms and benches should be marked.

F. Trail Difficulty Rating

Trails will be rated according to a categorized system in order to ensure a safe and enjoyable experience for the users of the trail. A trail difficulty rating system can ensure that users are informed and allow them to use trails that match their skill level. In addition, risk of conflicts or injuries can be reduced by preventing inexperienced users from using trails that exceed their skill level. A rating system also allows planners to assess whether or not they have provided a variety of difficulty levels for the wide range of potential users.

This system was adapted from the International Trail Marking System used at ski areas throughout the world. Many trail networks use this type of system, most notably resort-based mountain biking trail networks. The system best applies to mountain bikers, but is also applicable to other visitors such as hikers and equestrians. These criteria should be combined with personal judgment and trail-user input to reach the final rating.

Difficulty rating criteria

Tread Width: Generally, the wider the tread, the easier the trail is rated due to increased space for maneuvering and increased line of sight.

Tread Surface: Generally, the more stable and smooth the surface, the easier the trail is rated. Hardened trails that are paved or surfaced require less skill than trails that have loose and unpredictable surfaces.

Trail Grade (maximum and average): Maximum grade is defined as the steepest section of trail that is more than approximately 10 feet in length. Average grade is the total elevation gain divided by the total distance of the trail and multiplied by 100. Generally, the greater the grade (maximum and average), the more difficult the trail is rated.

Trail Obstacles: Trail obstacles may be natural or manmade and include objects that impede regular travel along the trail. Single track mountain biking trails often have objects such as jumps, teeter-totters, and elevated logs that have been intentionally placed to add a technical challenge. The larger an object is or the more difficult it is to clear or go over an object, the more difficult the trail is rated.




Trail Rating Guidelines

1. Collect trail measurements for each criteria in addition to trail length. Trails should be rated independently of trail length. For example, a 15 mile trail that is wide, flat, and smooth should not be rated difficult because it requires a large amount of energy to complete the 15 miles.
2. Use judgment when rating the trails. If a trail is rated easy in some criteria and difficult in other criteria, choose a difficulty rating somewhere in between. Also take into account that there will be variation along a single trail.
3. Use other local trails as a reference for difficulty rating. Trail ratings will vary significantly from region to region but the ratings should be consistent locally to reflect the types of users most likely to use the trails.

4. Consider other trail qualities in the rating. For example, trails located along cliffsides should be rated more difficult than trails in the middle of the woods because of the psychological challenge. Likewise, trails in extremely remote areas may seem more challenging to users than trails in highly traveled areas.

5. Use input from others to make final decisions on the difficulty rating of a trail.

Below is an example trail difficulty rating system for singletrack mountain biking courses developed by the International Mountain Biking Association (IMBA).

Trail Difficulty Rating System					
	Easiest White Circle 	Easy Green Circle 	More Difficult Blue Square 	Very Difficult Black Diamond 	Extremely Difficult Dbl. Black Diamond 
Trail Width	72" or more	36" or more	24" or more	12" or more	6" or more
Tread Surface	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
Average Trail Grade	Less than 5%	5% or less	10% or less	15% or less	20% or more
Maximum Trail Grade	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
Natural Obstacles and Technical Trail Features (TTF)	None	Unavoidable obstacles 2" tall or less Avoidable obstacles may be present Unavoidable bridges 36" or wider	Unavoidable obstacles 8" tall or less Avoidable obstacles may be present Unavoidable bridges 24" or wider TTF's 2' high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or wider TTF's 4' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or greater Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or narrower TTF's 4' high or greater, width of deck is unpredictable Many sections may exceed criteria

TRAIL SYSTEM BENEFITS AND SAFETY

There are two purposes of this section: first, to present some concluding evidence that trails, and other parts of the non-motorized trail system, will benefit the overall recreational experience of L.L. Stub Stewart State Park; and second, to address the issues of safety and community/user involvement.

A. Ten Economic Benefits of Greenways and Trails

There are many ways in which a trail system, designed with easy accessibility, can benefit a community. The following information discusses ten different economical benefits a community can enjoy from a trail system.

- 1. Real Property Values**--*Many studies demonstrate that parks, greenways and trails increase nearby property values. In turn, increased property values can increase local tax revenues.*

In a survey of adjacent landowners along the Luce Line Rail-Trail in Minnesota, the majority of owners (87%) believed the trail increased or had no effect on the value of their property. New owners felt that the trail had a more positive effect on adjacent property values than continuing owners.

Furthermore, a survey of Denver residential neighborhoods shows the public's increasing interest in greenways and trails. From 1980 to 1990, those who said they would pay extra for such amenities in their neighborhood rose from 16% to 48%.

- 2. Increased Property Tax Revenues**--*An increase in property values generally results in increased property tax revenues for local governments.*

Many arguments made for investments in trails, parks and open spaces claim that these acquisitions pay for themselves in a short period of time, due in part to increased property tax revenues from higher values of nearby property. Locally and nationally, bicycle and pedestrian facilities have proven to be a cost effective use of public funds. Maryland's Northern Central Rail-Trail found that while the trail's cost to the public in 1993 was \$191,893, it generated State tax revenue of \$303,750 in the same year. This revenue was a direct result of a growing economy's sales, property and income taxes.

- 3. Construction/Development Perspectives**--*Proximity to greenways, rivers and trails can increase sales price, increase the marketability of adjacent properties, and promote faster sales. Clustering the residential development to allow for establishment of a trail corridor or greenway can also decrease overall development costs and result in greater profits for the developer.*

For example, a land developer from Front Royal, Virginia, donated a 50-foot wide, seven-mile easement, for the Big Blue Trail in Northern Virginia. This easement provided a critical trail link along the perimeter of his subdivision. The developer recognized the amenity value of the trail and advertised that the trail would cross approximately 50 parcels. All tracts were sold within four months.

- 4. Expenditures by Residents**--*Spending by local residents on greenway related*

activities helps support recreation oriented businesses and employment, as well as other businesses that are patronized by greenway and trail users.

- 5. Commercial Uses--***Greenways and trails often provide business opportunities, locations and resources for commercial activities, such as recreation equipment rentals and sales, lessons, and other related businesses.*

The following two examples are how trails have helped local commercial areas across the nation:

- a. The downtown area of Dunedin, Florida was suffering a 35 percent storefront vacancy rate in the early 1990's until the Pinellas Trail came into town. Now, storefront occupancy is 100 percent and business is booming.
- b. A study of the Oil Creek Bike Trail, in Pennsylvania (Pennsylvania State University, 1992) revealed that the average visitor spends \$25.85 per day. This was broken down into \$9.09 for food, \$6.27 for transportation, \$2.56 for lodging (many visitors camp) and \$7.94 for equipment and other activities.

- 5. Tourism--***Trails are often major tourist attractions that generate expenditures on lodging, food, and recreation oriented services. Greenways along trails can also help improve the overall appeal of a community to perspective tourists and new residents.*

Many Americans prefer to visit places, such as greenways and trails that offer safe, scenic recreation and transportation for the whole family. The U.S. Department of Transportation, in its *National Bicycling and Walking Study (NBWS)* final report, estimates that 131 million Americans regularly bicycle, walk, skate or jog for exercise, sport or recreation.

For example, peak-season hotel rooms along Wisconsin's Elroy-Sparta State Park Trail are booked up to one year in advance. A study revealed that the average visitor travels 228 miles to experience the trail.

- 7. Agency Expenditures--***The agency responsible for managing a trail can help support local businesses by purchasing supplies and services. Jobs created by the managing agency may also help increase local employment opportunities.*

- 8. Corporate Relocation--***Evidence shows that the quality of life of a community is an increasingly important factor in corporate relocation decisions. Greenways and trails are often cited as important contributors to quality of life.*

In a June 8, 1989 article, the *San Francisco Chronicle* noted that when corporations are relocating, the number one factor was a location that would attract and retain key personnel. Corporate real estate executives now say that employee 'quality of life' issues are as important as cost when deciding where to locate a new factory or office.

Furthermore, natural open space, greenways, and trails are prime attractions for potential home buyers. According to research conducted in 1995 by *American Lives, Inc.* for the real estate industry, 77.7 % of all homebuyers and shoppers in the study rated natural open space as either 'essential' or 'very important' in planned communities.

Walking or biking paths ranked third.

- 9. Public Cost Reduction**--*The conservation of rivers, trails, and greenways can help local government and other public agencies reduce costs resulting from congested roadways, environmental degradation, and other natural hazards, such as flooding.*

The construction of multi-use trails allows more Americans to replace automobile trips with non-motorized trips. According to the *NBWS* report, the American public saves from 5 to 22 cents for every automobile mile replaced by walking and bicycling, due to reduced pollution, oil import costs, and costs due to congestion, such as lost wages and lost time on the job.

- 10. Intrinsic Value**--*With all of the previously mentioned benefits of trails it is important to remember the intrinsic environmental value of preserving rivers, trails, parks and other open space corridors.*

B. Four Social Benefits of Trails

- 1. Community Character**--Not only do bicycle and pedestrian facilities enhance the quality of life for many individuals, but trails and pathways can also be an expression of community pride and character. In many cases it means preserving the natural and historical resources of a region.
- 2. Close to Home Recreation**--An explosion in the number of people who participate in outdoor recreation has led to an increased demand for bicycle and pedestrian facilities.

Participation in trail uses, such as hiking, walking, mountain biking, and in-line skating have experienced phenomenal growth in recent years. Multi-use trails provide convenient access to the outdoors while promoting health and fitness activities. These trails are becoming especially popular among people living in cities and suburban areas, where recreation opportunities close to home are scarce.

- 3. Convenient Transportation**--Nearly half of all trips people make within their communities can be made easily on foot or bicycle. Fifty percent of all personal travel trips are less than 3 miles long. Personal business trips, like doctor visits, household errands, and visits to friends account for 41.5% of all trips. Such personal short distance trips are well suited to travel by walking or bicycling. Public rail-trails, multi-use trails, and on-road bicycle facilities offer communities a means of safe convenient transportation and keep the essential links within a community open to all. They can connect neighborhoods to schools, work places, commercial and cultural centers, historic sights, and transit stations.
- 4. Health and Fitness**--The health benefits of exercise derived from recreational activities, such as bicycling and walking lessen health-related problems and reduce health care costs. Trails, spacious sidewalks, and greenway trails offer adults and children alike the opportunity to integrate moderate, individualized exercise with their daily trips to work, school, the library or shopping.

Regular, moderate exercise has been proven to reduce the risks of many health

problems, such as coronary heart disease, diabetes, certain kinds of cancers, and obesity. Regular exercise can also protect against injury and disability because it builds muscular strength and flexibility.

In addition to the health benefits that bicycling and walking offer, consider also the improvement of physical health reduces health care costs. People who exercise regularly have 14% lower claims against their medical insurance and spend 30% fewer days in the hospital than people who do not exercise regularly.

C. Park Safety

Parks can take several steps in reducing accidents that can occur between automobiles, pedestrians, and bicyclists. The following are suggestions on how to create a safer environment for all modes of travel:

Encourage parks, schools, safety organizations, and law enforcement agencies to deal with bicycle and pedestrian safety issues and to focus on the most important safety problems. The development of public education campaigns should be keyed to the most important causes of accidents, injuries, and deaths. For example, the leading cause of bicycle accidents occurs when cyclists ride on the wrong (left) side of the road. By educating bicyclists to obey traffic rules and to ride safely with motor vehicles most accidents can be prevented.

Promote the use of safety equipment among bicyclists (e.g., lights, helmets, reflectors) and encourage safety groups to develop programs promoting the purchase and use of safety equipment among the bicycling public. Ideas for public involvement include community 'safety days' centered on trails or group presentations to local clubs and schools. It is recommended that safety presentations are more effective when the information is tailored to the particular audience. A good example, for school-aged children is to set up a mock street or trail on the school grounds with lines, obstructions and signs. Children who make up a large percentage of bicycle traffic can then practice safe bike riding habits on the course.

D. Crime Control and Emergency Vehicle Access

A well-designed trail prevents many security problems. Although crime is a common concern many studies have proven that crime does not increase at trail locations or on adjacent properties.

If problems will occur they will most likely happen in parking lots. Parking Lot Design (fencing, lighting, one entrance point to trail) can solve most safety concerns. Park staff patrols at trailheads and other activity areas can also solve many problems at these locations. Lighting along the entire trail is not recommended.

Trails should always be planned to accommodate security, safety and emergency equipment (fire engines and ambulances). Construct Bollards at access points that can be removed or folded over in the event an emergency vehicle needs to enter onto the trail.

Other safety considerations should include emergency telephones and landscaping. Emergency telephones or call box systems with direct connections to 911 are a worthwhile consideration--especially along remote sections of a trail. Landscaping along trails should consist of low shrubs and tree branches should be 'cropped close to the trunk, at least 10 feet from the ground,' so that potential offenders will not have an easy place to hide.

E. Community Involvement

The following are ideas adapted from *Trails in the Twenty-First Century*, by the Rails-to-Trails Conservancy (1993):

To maintain and develop relationships with adjacent landowners:

1. Adjacent Landowners need to know who to contact about specific problems.
2. Maintain trail on a regular basis and consider involving citizens in trail upkeep with volunteer work groups and 'adopt-a-trail' programs.
3. Promptly respond to problems, such as unauthorized motorized vehicles use, vandalism, theft of trail signs, and graffiti. Consistent quality upkeep of the trail will build community confidence in the ability to manage the trail.
4. Consider scheduling regular meetings to receive input from users, residents and landowners.
5. Invite landowners on a trail tour led by a park ranger or someone who is involved with trail management or planning.
6. To win support of landowners, consider writing personal letters testifying of the benefits of trails.
7. Make sure adequate facilities, such as restrooms and drinking fountains are provided so that adjacent landowners are assured that trail users will stay on the trail.

F. Park Trail Events and Publicity

1. Trail Tours
2. Trail Work Day
3. Photo Competition
4. Trail-athon' or Walk-a-thon
5. Poster/Logo Contests
"Name the Trail"
6. Decorative Bicycle Parade
7. Nature Walks
8. Newspaper Column

APPENDIX A: Trail Map(s)

APPENDIX B: List of Sources

Blaine City Recreation District. Path and Trail System Map for Wood River and Sun City Trails, 1992.

[Birkby, Robert. Lightly on the Land: The SCA Trail-Building and Maintenance Manual, 1996.](#)

Colorado State Parks. The Effect of Greenways on Property Values and Public Safety, 1995.

C-Tran (Clark City, WA). A New Way to Grow, 1995.

Florida Department of Transportation. Walkable and Bicycle Friendly Communities, 1996.

[International Mountain Biking Association. Trail Solutions: IMBA's Guide to Building Sweet Singletrack, 2001.](#)

Lawley Publications. "Doubling of Bicycle and Walking Trips Recommended," Urban Transportation Monitor, April 1994.

~~Oregon Chapter American Planning Association. Recommendations for Pedestrian, Bicycle and Transit Friendly Development Ordinances, February 1993--working draft.~~

National Bicycle and Pedestrian Clearinghouse. NBPC Technical Brief No. 2-6, Sept. 1995. National Park Service. Economic Impacts of Protecting Rivers, Trails and Greenway Corridors, 1995.

Nelessen, Anton Clarence. Visions For a New American Dream, 1994.

[Oregon Chapter American Planning Association. Recommendations for Pedestrian, Bicycle and Transit Friendly Development Ordinances, February 1993--working draft.](#)

Rails-to-Trails Conservancy. Trails for the Twenty-First Century, 1993.

Sacramento City. Transit-Oriented Development Concept Statement, 1992.

Summit City. Non-Motorized Trails Master Plan Update, 1993.

Untermann, Richard K. "Streets are for Sharing," Landscape Architecture, July 1990.

U.S. Department of Transportation, Federal Highway Administration. Improving Bicycle and Pedestrian Safety, March 1996.

U.S. Department of Transportation, Federal Highway Administration. The National Walking and Bicycling Study No.2-6, September 1994.

Utah City: Utah City Non-Motorized Transportation System, 1997.

APPENDIX C: Potential funding sources for trail construction and maintenance:

FUNDING SOURCE	PROGRAM NAME	WEB ADDRESS	USES					
			Plan	Program	Develop	Acquire	Education	Equipment
Americorps	-	http://www.americorps.org/joining/direct/direct_or.html	-	-	X	-	X	-
Bikes Belong Coalition	Bikes Belong Grants Program	http://bikesbelong.org/site/page.cfm?PageID=21	-	-	X	-	-	-
Center for Disease Control (CDC)	Preventive Health & Health Services Block Grant Program	http://www.cdc.gov/nccdphp/aag/aag_blockgrant.htm	-	X	X	-	-	-
Eastman Kodak Company	Kodak American Greenways Program	www.conservatoinfund.org	X	-	-	-	-	-
Federal Highway Admin. (DOT)	Bicycle Transportation & Pedestrian Walkways (TEA-21)	http://www.fhwa.dot.gov/tea21/factsheets/bped.htm	-	-	-	-	-	-
Federal Highway Admin. (DOT)	Recreational Trails Program (TEA-21)	http://www.fhwa.dot.gov/environment/recretrails/index.htm	-	-	X	X	-	-
National Fish & Wildlife Foundation	-	www.nfwf.org	-	-	-	-	-	-
National Tree Trust	Multiple Programs	www.nationaltreetrust.org	-	X	X	-	-	-
Oregon Parks & Recreation Dept.	ATV Fund	http://atv.prd.state.or.us/grant	X	X	X	X	X	X
Oregon Parks & Recreation Dept.	Recreation Trails Program	www.prd.state.or.us/grants-recretrails.php	-	-	X	X	X	X
Oregon Parks & Recreation Dept.	Land & Water Conservation Fund	www.prd.state.or.us/grants_lwcf.php	-	-	X	X	-	-

Oregon Parks & Recreation Dept.	Local Government Grant Programs	www.prd.state.or.us/grants-localgov.php	-	-	X	X	-	-
Oregon Watershed Enhancement Board	Small Grant Program	http://www.oweb.state.or.us/SmallGrant/smallgrant.shtml	-	-	X	-	-	-
SOLV	Project Oregon	http://www.solv.org/programs/project_oregon.asp	X	X	X	-	-	X
Surdna Foundation	-	www.surdna.org	-	X	X	-	-	-
The Oregon Community Foundation	Oregon Historic Trails Fund	http://www.ocf1.org/grant_programs/grant_programs_fr.htm	-	X	X	X	X	-
The Trust for Public Land	-	http://www.tpl.org/tier2_sa.cfm?folder_id=1825	-	-	-	-	-	-
Tread Lightly!	Restoration For Recreation	http://www.treadlightly.org/restore_mv	-	X	-	-	X	-
U.S. Dept. of Transportation	Transportation & Community & System Preservation Pilot Program	http://www.fhwa.dot.gov/tcsp/	X	-	X	-	-	-
U.S. Fish & Wildlife Service	Partnership for Wildlife	http://federalaid.fws.gov/pw/partwid.html	-	-	X	-	-	-