

APPENDIX G

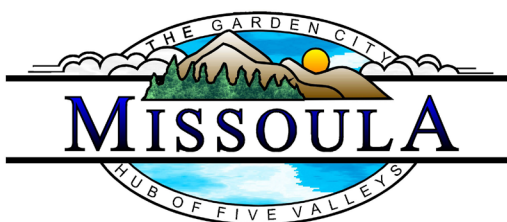
Trail Typology



MISSOULA TRAIL TYPOLOGIES

2025

A framework for the network of active multi-modal trails within the
Missoula valley



Missoula Parks, Recreation, Open Space, & Trails



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OVERVIEW & PURPOSE

This document is supplementary to the 2025 Parks, Recreation, Open Space and Trails Plan (PROST), and provides a framework for the design of multi-modal trails in the greater Missoula area.

Trails connect people to their homes, to their places of employment, to their neighbors, to parks, to commercial centers to regional destinations, and beyond. They encourage active transportation, promote healthy lifestyles, provide corridors for recreation and build community. Trails that are safe, connected, convenient and separate from vehicle traffic are important for meeting the city’s climate goals, protecting the environment, encouraging healthy lifestyles and are integral to the multi-modal transportation system. Trails in and around Missoula help to improve public health and wellness, provide respite from the urban environment, and contribute to regional economic development and tourism.

PURPOSE

This document is intended to create high level guidelines for trails in Missoula, it does no include detailed specifications. Those specifications can be found in the City of Missoula Public Infrastructure Manual.

- Establish a hierarchy of trail types that is intuitive, functional, safe, user friendly, and maintainable
- Provide a consistent framework for the network of active off street multi-modal trails within the Missoula valley
- Establish trail design standards based on best practices for different trail types
- Integrate trail types and design standards with the surrounding land use context, street types and other adopted plans
- Clarify trail development requirements for various development projects

ACKNOWLEDGEMENTS



This plan was prepared by City of Missoula Parks and Recreation department staff with significant support and guidance from the following organizations:

City of Missoula Public Works and Mobility Department
City of Missoula Community Planning Development and Innovation Department
Missoula Metropolitan Planning Organization
Missoula County Lands Culture and Recreation Department
City of Missoula Parks and Recreation Board
Missoula City Council
PROST Community Working Group

CONNECTION TO PLANS AND POLICIES

The Trail Typologies Framework is a component of the Parks Recreation Open Space Trails (PROST), and builds upon a variety of City and County Plans including:

Our Missoula 2045 Land Use Plan

Missoula Street Types

Activate Missoula 2045: Long Range Transportation Plan

2018 Pedestrian Facilities Master Plan, Missoula MT

2017 Bicycle Facilities Master Plan, Missoula MT

2022 Missoula County Pathways and Trails Plan

Missoula's Downtown Master Plan, Midtown Master Plan, North Reserve-Scott Street Master Plan, Sxwtpqyen Master Plan, Envision West Broadway Community Master Plan

RESOURCES

Elements of this plan build upon the following standards and guidelines:

American Association of State Highway and Transportation Officials Manual (AASHTO)

The National Association of City Transportation Officials (NACTO)

Rails To Trails Foundation

Trails for All People: Guidance for Accessibility and inclusive Design

ADA Standards for Accessible Design

Montana Public Works Standards and Specifications Manual (MPWSS)

City of Missoula Public Infrastructure Manual

VALUES & GOALS



VALUES

The Trail Typologies framework is built on a foundation of shared values from the Parks Recreation Open Space and Trails (PROST) plan, Our Missoula 2045 Land Use Plan, Activate Missoula 2045: Long Range Transportation Plan, and other guiding documents.

The core values of the Trail Typologies Plan is:

- The City of Missoula's active trail network is the backbone of the City's multi-modal transportation system. The trail system will prioritize active transportation and recreation users, be intuitive, accessible, efficient, attractive, and safe.
- Trails prioritize people and encourage healthy lifestyles and active transportation.
- A connected, off-street trail system is aligned with Missoula's strategic decision making lenses around Climate, Equity, and Housing.

GOALS



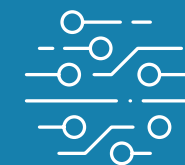
Create a system of active trails that are intuitive, safe, accessible, and comfortable for trail users of all ages and abilities



Design trails considering long-term maintenance needs and implications



Provide trail connections across the city and beyond to connect neighborhoods, commercial centers, and regional destinations



Create a seamless system of trails which connect to, compliment and enhance on-street active transportation facilities such as bike lanes, sidewalks, and neighborhood greenways



Provide active transportation and recreational opportunities that are separate from automobile traffic to increase person mobility and improve public health



Support a thriving local and regional economy by encouraging active transportation and outdoor recreation



Reduce dependence on single occupancy vehicles by creating a connected and efficient year-round active transportation trail network



Provide appropriate amenities that support trail users such as trees, benches, wayfinding, and drinking fountains.

MISSOULA'S TRAIL NETWORK



76% OF MISSOULIANS SUPPORT CONNECTING COMMUNITIES BY A REGIONAL TRAIL SYSTEM

(2024 PROST STATISTICALLY VALID SURVEY)

Missoula's network of trails and shared use pathways function as a system of connected active multi-modal transportation corridors. These trails provide efficient and safe connections between neighborhoods, commercial centers, and regional destinations. They also function as linear park corridors and are used by residents and visitors for walking, running, biking and other recreational uses. In addition to trail infrastructure these corridors often contain trees, landscaping, pedestrian lighting, green infrastructure, wayfinding, as well as other amenities such as benches and drinking fountains.

Sidewalks and bike lanes are an integral component of the multi-modal transportation network. While these on street facilities are not considered trails in this plan, there are instances where a multi-use trail is located within a street right-of-way, and serves as that streets sidewalk and bike lane.

The 5 classifications of trails are: **regional, community, neighborhood, connector, and recreational.**

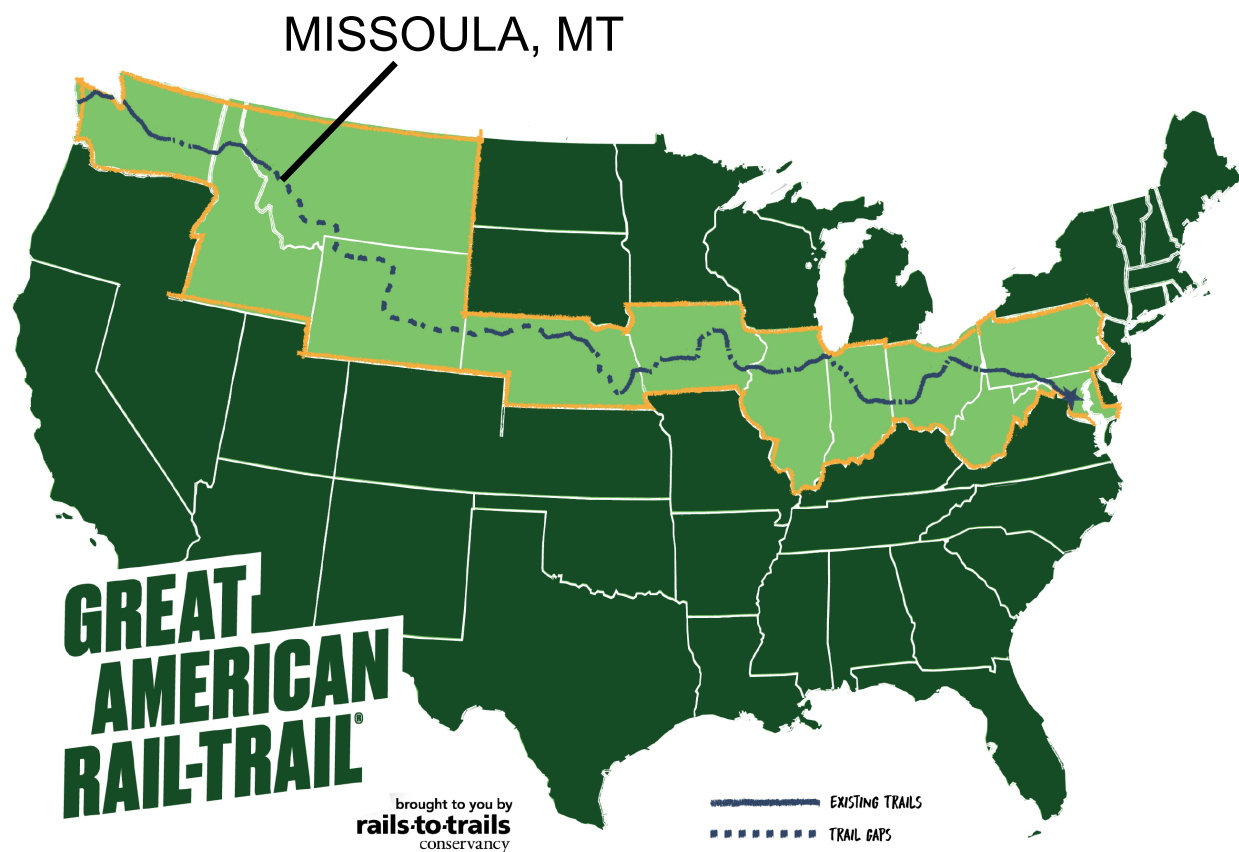
Each trail type is organized by its primary function within the trail network, and the design criteria is established to support that primary function (as well as other functions). For example, regional and community trails connect through multiple neighborhoods and destinations. Regional trails are designed to facilitate active transportation and commuting across longer distances with heavy use, however these trails must still support recreational and other more localized uses. Recreational trails however are not designed with active commuting as the priority function, and instead are intended to be used primarily for recreation, therefore the design standards reflect that function.








MISSOULA'S TRAIL NETWORK

GREAT AMERICAN RAIL TRAIL

The Milwaukee Trail is the preferred route of the Great American Rail Trail (GRT) which stretches more than 3,700 miles between Washington, D.C., and Washington State. Eventually this trail will bring people through Missoula on cross country journeys and is a unique feature of Missoula’s trail network.



Allowed Use					
	 Human Powered Transportation	 Class 1 & 2	 Class 3	 Motorized Scooters Motorcycles Automobiles	 Motorized ADA Mobility Device
Regional	✓	✓	Not Currently	✗	✓
Community	✓	Varies	Not Currently	✗	✓
Neighborhood	✓	Varies	Not Currently	✗	✓
Connector	✓	Varies	Not Currently	✗	✓
Recreational	✓	Varies	Not Currently	✗	✓

WHAT IS A “MOTORIZED” VEHICLE?

Currently the City does not manage any trails where traditional “motorized” vehicles (4-wheelers, motorcycles or other vehicles with internal combustion engines) are allowed. However, this plan does address electric “motorized” vehicles such as e-bikes.

On many of Missoula’s trails Class 1 or 2 motorized electric assist bicycles, scooters and skateboards are allowed. Because these are considered motorized vehicles the term “non-motorized” is not appropriate for many of Missoula’s trails. Instead, the term “active transportation” is used in this document, which encompasses a broader range of transportation modes. See the definitions section of this document for more specific information on what is considered a motorized or non-motorized vehicle.



- Class 1 e-bikes:** motor assists while pedalling up to 20 mph, no throttle
- Class 2 e-bikes:** motor assists while pedalling up to 20 mph, also has a throttle
- Class 3 e-bikes:** motor assists while pedalling up to 28 mph

MISSOULA'S TRAIL NETWORK



MISSOULA'S TRAIL NETWORK IS PUBLICLY ACCESSIBLE, AND TRAILS ARE LOCATED ON LANDS OWNED BY PUBLIC ENTITIES, WITHIN THE PUBLIC RIGHT-OF-WAY, OR ON PRIVATE LANDS WITHIN PUBLIC ACCESS EASEMENTS OR OTHER LONG-TERM USE AGREEMENTS.

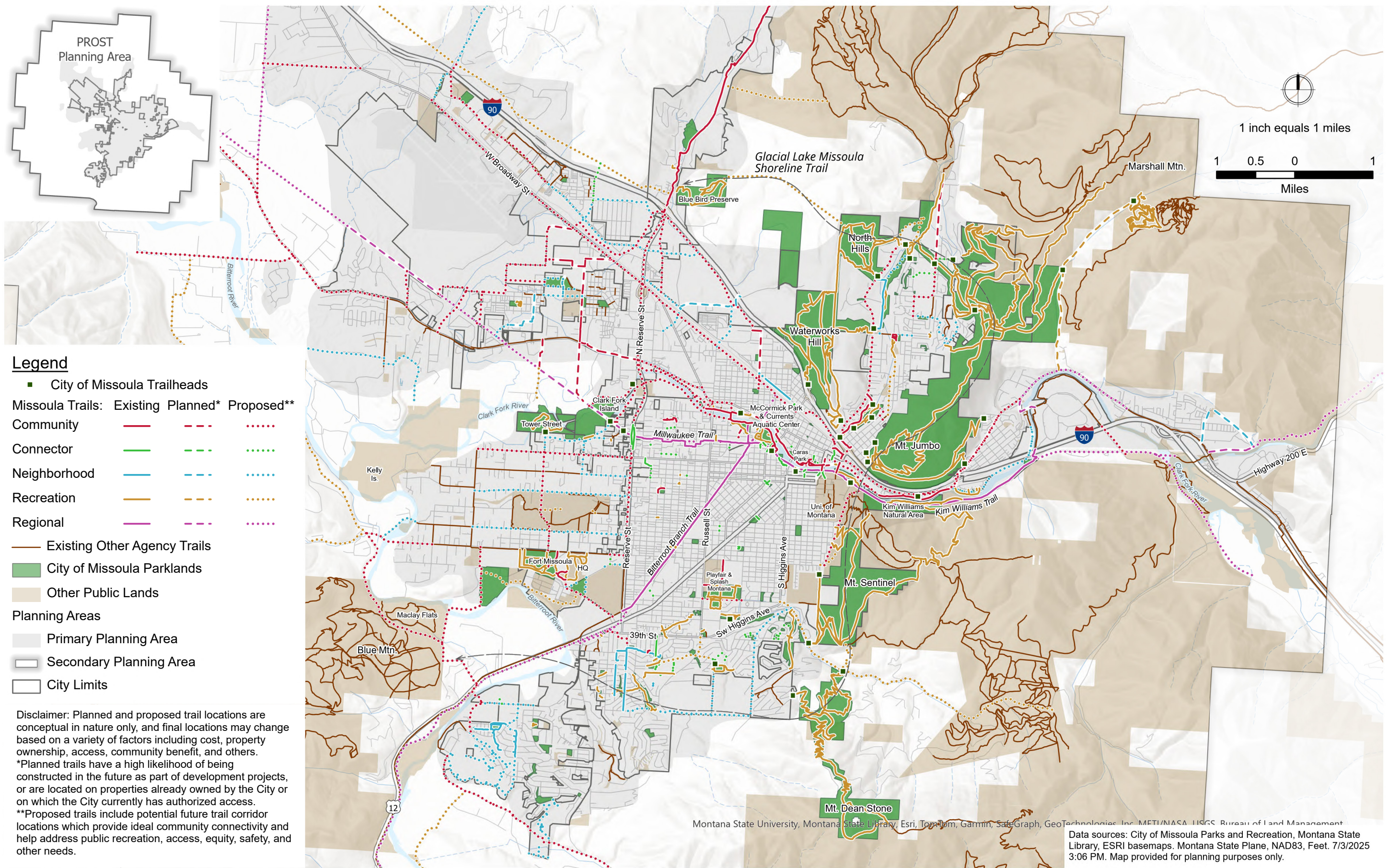
The Trail Typologies framework applies to new development and reconstruction of existing infrastructure and will therefore be implemented by government agencies and the private sector. The City's development code specifies when trails must be implemented. The City of Missoula Public Infrastructure Manual provides guidance on design and construction requirements for trails. This document, by laying out goals and objectives for the entire network and each trail within, sets the foundation from which the code and Public Infrastructure Manual are built.

ACQUIRING TRAIL CONNECTIONS

Land acquisition for trails can come in several forms, fee simple acquisition or public access easements can be donated by the landowner or purchased by the city.

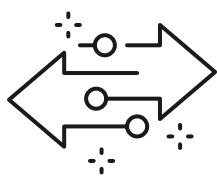
- When a private property develops, the city has several tools towards requiring trail connections be created.
- If a property subdivides there is typically a parkland dedication requirement, trails and the corridors they are within can be used to meet the parkland dedication requirement.
- Trails are part of the transportation system, and are required in a new subdivision, just as roads and sidewalks are required.
- When a new utility connection or annexation is requested, the city can condition that a trail easement or connection be made.
- "Activity Area" is required in Multi-Family projects over 10 units. Trails and trail connections can count towards this requirement.
- Finally, condemnation (immanent domain) may be an option, however the city of Missoula has not, and does not intend to use this as a tool for trail acquisition.

MISSOULA'S TRAIL NETWORK

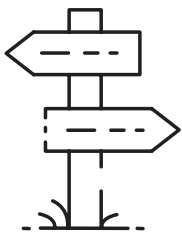


TRAIL CLASSIFICATIONS

The following is a hierarchy of trail classifications. The standards exist in order to support the desired function; however, each trail classification must be flexible in order to create a trail network that is connected, maintainable, feasible to construct, and adaptable.



A trail may change classifications over time, for example a trail that is designated “neighborhood” today, may one day be more connected across the city, and be re-classified as a “community” trail. When planning and acquiring new trails, the corridor width should be wide enough to allow for future trail tread widening, and/or separation of uses as population and trail use increases.



Sometimes existing street rights-of-way are the only available location for trails. When trails are located adjacent to a street, trails should be separated from vehicle traffic by the maximum distance that is feasible. While this distance is often dictated by the existing right-of-way width, the minimum is determined by AASHTO standards.

TRAILS MAY LOOK DIFFERENT IN VARIOUS PARTS OF THE COMMUNITY, AND SUPPORT DIFFERENT INTENSITY OF USE. THIS IS ESPECIALLY TRUE FOR LONGER TRAILS THAT RUN FROM MORE RURAL AREAS OUTSIDE THE CITY, INTO THE CITY CENTER. FOR EXAMPLE, TREAD WIDTH MAY NEED TO BE 12’ IN RURAL PLACETYPES, 14’ IN LIMITED OR SUBURBAN PLACETYPES, AND 16’ IN URBAN PLACETYPES.



	Corridor Width	Shoulder	Tread Width ⁽¹⁾	Shoulder	
Regional	30’-50’	2’	14’-20’	2’	
Community	30’-40’	2’	10’-14’	2’	
Neighborhood	10’ min	2’	8’-12’	2’	
Connector	10’ min	Varies	6’+	Varies	
Recreational ⁽²⁾	10’ min	Varies	Varies	Varies	

(1) Separated bike and walking lanes may require additional tread width
(2) See the recreational design guide for more details

REGIONAL TRAILS

- Spans across multiple placetypes, & neighborhoods
- Connects to multiple regional destinations
- Planned route extends beyond the Missoula planning area boundaries

Regional trails connect across multiple neighborhoods and regional destinations within the city and beyond. Regional trails are the “spine” or arterial of the trail system and typically experience the highest use of any trail within the system. Regional trails are designed to be safe and efficient, with trail widths determined by frequency of use. Regional trails are separated from automobile traffic by the greatest extent possible to provide a safe and comfortable experience for trail users. Regional trail users typically have the right-of-way at road crossings, and significant investment is made at crossings to improve safety, visibility, and uninterrupted flow on the trail. Regional trails are typically paved, are open 24 hours a day year-round and include trail lighting, intuitive signage and other amenities to support heavy use.



Trails in larger cities often have directional lanes, or separate pedestrian and bicycle lanes. As Missoula’s population grows and trail use increases similar improvements may be warranted.

CORRIDOR WIDTH: 30’- 50’

TREAD WIDTH: Desired tread width is 14’ but may be wider or narrower depending on need and use. Very high use areas may need additional tread width and separate “lanes” for cyclists and pedestrians.

TREAD SURFACE: Typically Paved: Asphalt or Concrete. Regional Trails in rural or limited placetypes near the fringe of the city may be packed gravel or another natural surface

STRIPING: Paved sections typically include 4” solid white stripe along trail edges. High use or constrained sections of trail may include separate lanes for use type, or center stripe to designate direction of travel

SHOULDERS: Stabilized shoulders (compacted sub-grade) 2’ minimum clear zone

CONSTRUCTION DETAILS: Construction specifications and methods can be found in the Public Infrastructure Manual

CROSSINGS: Special treatment of trail at roadway crossings such as raised Table Crossings. Separated grade crossings (tunnel or bridge) at Regional roadways. Trail users typically have priority (vehicles stop) *see crossings section for more details

LIGHTING: Designed for year round, 24/7 use. Specifications found in the Missoula Public Infrastructure Manual

SIGNAGE: Trail bollards every .1 miles wayfinding at intersections and beginning/ending points. Specifications found in the Missoula Public Infrastructure Manual

DESIGN SPEED: 18mph (AASHTO), may be lower in congested or constrained areas

TREES & LANDSCAPING: Trees, turf and landscaping should be included along community trails to reduce urban heat, and create a more pleasant experience for trail users

AMENITIES: Amenities such as benches, water fountains, rest stops etc. are important components in creating a trail network that works for people.

COMMUNITY TRAILS

- Typically spans multiple neighborhoods, or placetypes
- Connects to the broader trail network
- Connects to community destinations (community park, significant trailhead, civic or community placetype...)
- Typically more than 1/2 mile long (some shorter high-use critical connections may be designated as community trails)

Community Trails feed into the regional trail network. They are the “tributaries” of the regional routes, connecting users from individual neighborhoods into the larger regional trail network. Trail crossings are designed to improve safety, visibility, and flow of trail users, however trail flow may be slowed at these crossings. Community trails are typically paved, may include trail lighting, signage and other amenities to support trail use. As trail use increases community trails may need to be widened, or even re-classified as a regional trail, anticipating this transition is important when acquiring lands/easements and initial trail routing.



CORRIDOR WIDTH: 30'-40'

TREAD WIDTH: Desired tread width is 10-14' but may vary by placetype and use.

TREAD SURFACE: Asphalt, concrete, or natural surface

STRIPING: May include striping in high use or constrained areas

SHOULDERS: Stabilized shoulders (compacted sub-grade) 2' minimum clear zone

CONSTRUCTION DETAILS: Construction specifications and methods can be found in the Public Infrastructure Manual

CROSSINGS: Trail users typically have priority (vehicles stop), specialized crossings may be warranted on high use trails *see crossings section for more details

LIGHTING: Designed for year round, 24/7 use. Specifications found in the Missoula Public Infrastructure Manual

SIGNAGE: Wayfinding at trailheads, beginning/ending points

DESIGN SPEED: 18mph (AASHTO), may be lower in congested or constrained areas

TREES & LANDSCAPING: Trees, turf and landscaping should be included along community trails to reduce urban heat, and create a more pleasant experience for trail users

AMENITIES: Amenities such as benches, water fountains, rest stops etc. are important components in creating a trail network that works for people.

NEIGHBORHOOD TRAILS

- Located within a distinct neighborhood or placetype
- May or may not connect to the broader trail network
- Typically more than ¼ mile long

Neighborhood trails typically connect within or between individual neighborhoods. Neighborhood trails can be, but are not always connected to the broader community and regional trail network. Users are primarily residents of the neighborhood, or nearby neighborhoods, in which the trail is contained, and they are used mostly for local commuting and recreation. Neighborhood trails may be within their own trail corridor, a park, or a street right of way. Road crossings are designed to improve safety and visibility however trail users should yield to vehicles.



CORRIDOR WIDTH: Varies, 10' minimum

TREAD WIDTH: Typically 8'-12'

TREAD SURFACE: Asphalt, concrete, or natural surface

STRIPING: Typically N/A

SHOULDERS: Varies, 2' clear zone

CONSTRUCTION DETAILS: Construction specifications and methods can be found in the Public Infrastructure Manual

CROSSINGS: Trail users yield to vehicle traffic, specialized crossings may be warranted on high use trails *see crossings section for more details

LIGHTING: May be required on certain high-use sections or sections with significant public safety concerns

SIGNAGE: Wayfinding at trailheads, beginning/ending points

DESIGN SPEED: Varies, follows AASHTO design guidelines

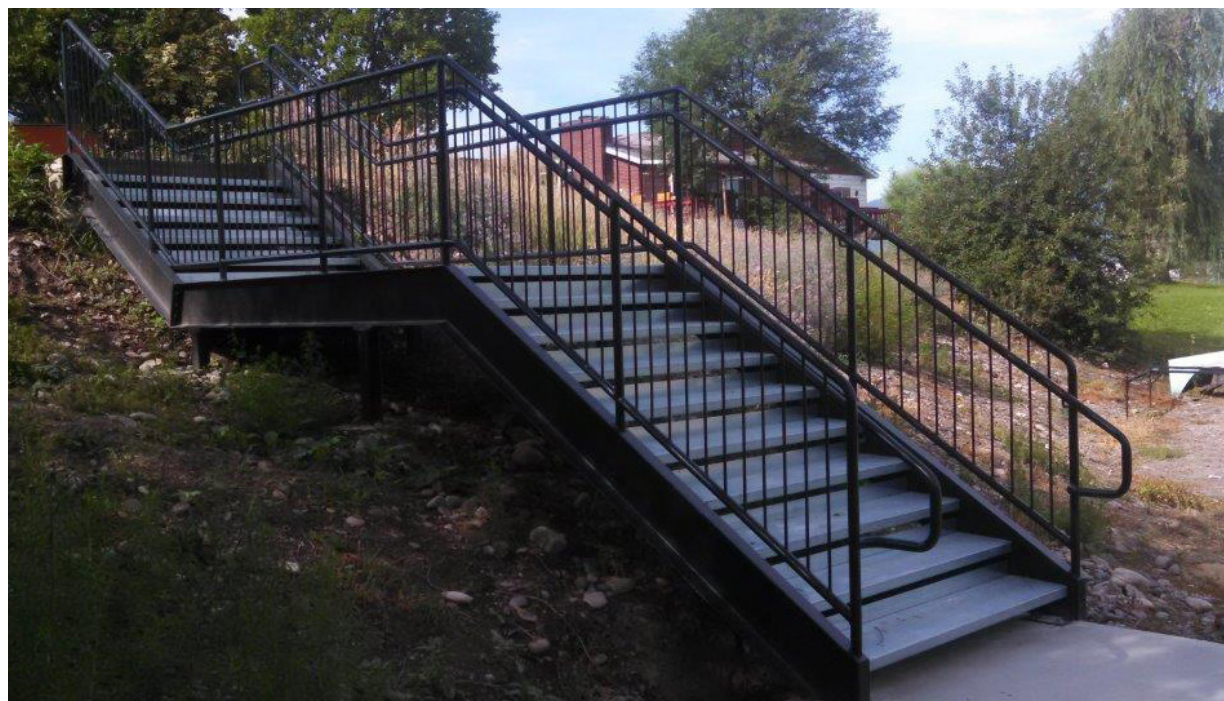
TREES & LANDSCAPING: Trees, turf and landscaping should be included along community trails to reduce urban heat, and create a more pleasant experience for trail users

AMENITIES: Amenities such as benches, water fountains, rest stops etc. are important components in creating a trail network that works for people.

CONNECTOR TRAILS

- Typically very short sections of trail between sidewalks, trails, streets, parks etc.
- Located within a distinct neighborhood or placetype
- May connect another active transportation facility (trail, sidewalk etc.)
- May be public or privately owned (ex: HOA) with public access allowed
- Less than ¼ mile long

Connector trails are very short trail segments of trail that allow for better pedestrian circulation within a neighborhood, between blocks, or to other trails and public facilities. Often these connectors are used to offset long block lengths or to provide better pedestrian connectivity in neighborhoods with cul-de-sacs. Connector trails are sometimes owned and maintained by the subdivision's homeowners association but include public access. Some connector trails are short segments of trail that provide a connection to other larger community or regional trails. In some circumstances, high use connector trails may be a priority for maintenance and snow removal.



CORRIDOR WIDTH: Varies

TREAD WIDTH: Varies

TREAD SURFACE: Asphalt, concrete, or natural surface

STRIPING: Varies

SHOULDERS: Varies

CONSTRUCTION DETAILS: Construction specifications and methods can be found in the Public Infrastructure Manual

CROSSINGS: Varies, typically trail users yield to vehicle traffic *see crossings section for more details

LIGHTING: May be required on certain high-use sections or sections with significant public safety concerns

SIGNAGE: May include signage, typically wayfinding at trailheads, beginning/ending points

DESIGN SPEED: Varies, follows AASHTO design guidelines

TREES & LANDSCAPING: Depending on the corridor width Trees, turf and landscaping may be included to reduce urban heat, and create a more pleasant experience for trail users

AMENITIES: Connector trails typically do not include other amenities

RECREATIONAL TRAILS

- May or may not connect to the broader trail network
- Intended use is primarily for recreation, not commuting
- May be public or privately owned (ex: HOA) with public access allowed

Recreational trails are typically located within developed parks, conservation lands, common areas, or other open space properties, but can be distinct trails located within or adjacent to road rights of way. Recreational trails often connect to state, federal, and other non-City trail networks. Recreational trails are intended to be used for walking, skating, running, horseback riding, biking or other recreational purposes. Trail design is based on designation, intended use and site characteristics. Currently all city maintained recreational trails are designated “non-motorized” meaning no electric motors allowed (e-bikes), however in the future this may change. Trail use restrictions may be utilized in order to create a trail system that reduces user conflict and protects natural resources. A difficulty rating may be applied to trails within certain areas to help aid users in assessing their ability related to the trail difficulty. Difficulty ratings typically relate to topography and obstacles/features on the trail.



RECREATIONAL-SHARED USE



Shared use recreational trails are designed to provide for a variety of activities such as hiking and running, mountain biking, and horseback riding. Trail design is based on the intended use and site characteristics. Shared use trails may have restrictions such as directional use (for example bicycle uphill only) and may be closed to certain uses or have other restrictions.

RECREATIONAL-SINGLE USE

Single use recreational trails are restricted to a single mode of transport, for example bike only, or pedestrian only. These trail restrictions are intended to reduce user conflicts, preserve the trail character, protect natural resources, or for other reasons such as legal restrictions, corridor width, tread width or topography.



BIKE ONLY: Bike only trails are designed to reduce user conflict by creating routes for cyclists only. Trail design is based on intended use and site characteristics. Bike only trails may be directional, and contain features to enhance the experience for biking. Bike only trails can be designed for mountain biking, or more casual biking.



PEDESTRIAN ONLY: Pedestrian only trails are designed to provide for foot traffic only, this designation could be determined to reduce user conflicts, improve safety, adhere to land restrictions, or to protect environmental site conditions. Trail design is based on intended use and site characteristics.

**Design standards for Recreational Trails can be found on pages 38-43
“Recreational Trails Design Guide”**

TRAIL DESIGN GUIDE

This design guide is intended to provide high level guidance for key components of a successful trail design. Additional details and specifications can be found in the City of Missoula public infrastructure manual.

TREAD SURFACE

The trail surface material (asphalt, concrete, or natural surface) has a significant impact on long term maintenance, as well as user experience and expectations. While up front costs are typically higher, concrete has a significantly longer lifespan with less cyclical maintenance than asphalt. Maintenance, intended use, and budget are important considerations in trail tread surface material selection.

“NATURAL SURFACE” TRAILS CAN CREATE A MORE LEISURELY EXPERIENCE, ARE LESS COSTLY TO INSTALL THAN PAVEMENT, AND MAY BE PREFERRED FOR RECREATIONAL TRAILS IN NATURAL SETTINGS. HOWEVER, SNOW CANNOT BE CLEARED FROM NATURAL SURFACE TRAILS AS READILY AS PAVED TRAILS, THEREFORE THEY MAY NOT BE APPROPRIATE FOR TRAILS USED HEAVILY YEAR ROUND.



Priority for snow removal is based on several factors including: location, level of use, connectedness, budget etc. and is not linked to classification. Snow removal is managed by the Parks and Recreation maintenance division and outlined in management policies.

TRAIL CORRIDORS

Many trail corridors are classified in the PROST plan as “Linear Parks”. How the space adjacent to the trail tread is designed is important for creating a trail that is pleasant to travel along. Trees, landscaping, and other park like amenities should be included along trails. While corridor widths vary by trail classification, generally wider trail corridors are safer and more enjoyable for trail users.

SEPARATION BETWEEN TRAILS AND STREETS IS CRITICAL FOR THE SAFETY AND COMFORT OF TRAIL USERS. TRAILS THAT SHARE THE RIGHT-OF-WAY WITH STREETS SHOULD BE DESIGNED WITH THE MOST SEPARATION FROM AUTOMOBILES AS IS POSSIBLE.



The South Ave trail next to Fort Missoula Regional Park has ample separation from South Ave that it feels more like it’s in the park rather than next to a street

TRAIL DESIGN GUIDE

TRAIL CROSSINGS

Although safety of trail users is an important consideration at all locations along a trail, users are especially vulnerable at crossings of roadways.

SEPARATE GRADE CROSSINGS SHOULD BE THE PRIORITY FOR HIGH USE REGIONAL OR COMMUNITY TRAILS CROSSING STREETS WITH MULTIPLE LANES, HIGH VOLUMES AND SPEEDS ABOVE 30 MPH. NEIGHBORHOOD, CONNECTOR, AND RECREATIONAL TRAILS TYPICALLY UTILIZE ONE OR MORE OF THE AT-GRADE CROSSING TECHNIQUES TO INCREASE SAFETY AND VISIBILITY OF TRAIL USERS.



The following are several options for increasing safety and visibility of trail users at roadway crossings. Not all of these options are appropriate at every intersection and factors such as trail classification, crossing distance, street volume and speed must be considered when designing intersections. Organizations such as AASHTO or NACTO publish guidelines for trail and roadway design, but there is no one size fits all approach to roadway crossings.

SEPARATE GRADE CROSSINGS

Separate Grade Crossings are preferred for regional trails, and high use community trails at multi lane, high volume streets with speeds above 25 mph.



Russell Street Underpass

SEPARATE GRADE CROSSINGS ARE THE SAFEST CROSSING TYPE AVAILABLE, BUT COME WITH THE TRADE OFF OF BEING THE MOST COSTLY.

Separate grade crossings keep trail users and motorists completely separate, increasing safety and allowing continuous flow of traffic on the trail and roadway.

Examples of Separate Grade crossings along the Milwaukee Trail are the tunnels under Reserve, Russell and Orange streets. The Bitterroot Trail crosses over Reserve Street on the South Reserve Pedestrian Bridge.

Trails and streets are long term (50+ year) improvements. Predicted future conditions must be considered when planning trail routes and road crossings.

TRAIL DESIGN GUIDE

AT-GRADE CROSSINGS

At-grade roadway crossings present a variety of safety concerns to trail users and proper design and control of trail crossings is essential to user safety and experience.



Painted Crossings can be used on lower volume, and slower speed roadways.



Raised Table Crossings can increase safety for pedestrians because most drivers feel they have to slow down for these type of features. Raised crossings have a flat top which is usually level with the trail, and tactile paving is used at each end of the crossing.



Pedestrian Refuge Islands are medians with a refuge area that is intended to help protect pedestrians who are crossing a multi-lane road. The presence of a pedestrian refuge island at a mid-block location or intersection allows pedestrians to focus on one direction of traffic at a time as they cross, and gives them a place to wait for oncoming traffic before finishing the second phase of a crossing.



Rectangular Rapid Flashing Beacon (RRFB) is a pedestrian-activated device that uses flashing lights to warn drivers of pedestrians in crosswalks. RRFB's may be used at any of the at grade crossings to increase safety and visibility of trail users. There are other signalized crossing options such as the Bitterroot trail at South Ave, or the signalized crossing of Reserve Street at CS Porter Middle School.



Signalized Crossings can be automated such as the Bitterroot Trail crossing at South ave which is equipped with bicycle triggered inductive loops under the pavement, and bicycle signal heads. Or the signalized crossing of Reserve Street at CS Porter Middle School which is user activated.

TRAIL DESIGN GUIDE

TRAILHEADS:



Trailheads are an integral part of the trail network. Design of trailheads vary from simply a trail sign at the beginning of a trail, to a large off-street parking lot with toilets, lighting, signage and gathering areas. Trailheads are often the first opportunity to notify users of rules, trail etiquette, closures etc. Trailheads also require a high level of maintenance in order to service trash cans, toilets etc. and should be designed with this in mind.

LIGHTING:



Trail lighting is an important consideration to ensure user safety, and accessibility. Many trails are intended for year round, 24 hour use. The Public Infrastructure Manual includes standards and specifications for trail lighting.

TO INCREASE PUBLIC SAFETY AND COMFORT, TRAILS SHOULD FOLLOW CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) GUIDELINES.

AMENITIES:

A trail is not complete without amenities that enhance the experience of trail users. Benches, landscaping, trash receptacles, water fountains etc. are important components of a complete trail system. The City of Missoula has standards for various amenities, these standards are found in the Public Infrastructure Manual.



TRAIL DESIGN GUIDE

SIGNAGE:

Signs are important components of a properly designed trail system. They make trails more interactive, convey important information, create safer environments, and help users find their way.

There are three primary types of signs:

Identification

Wayfinding

Interpretive

IDENTIFICATION SIGNS:

Regional and high use community trails contain identification bollards every .1 miles. These bollards identify the trail name, mile marker and include 911 safety code for emergencies.

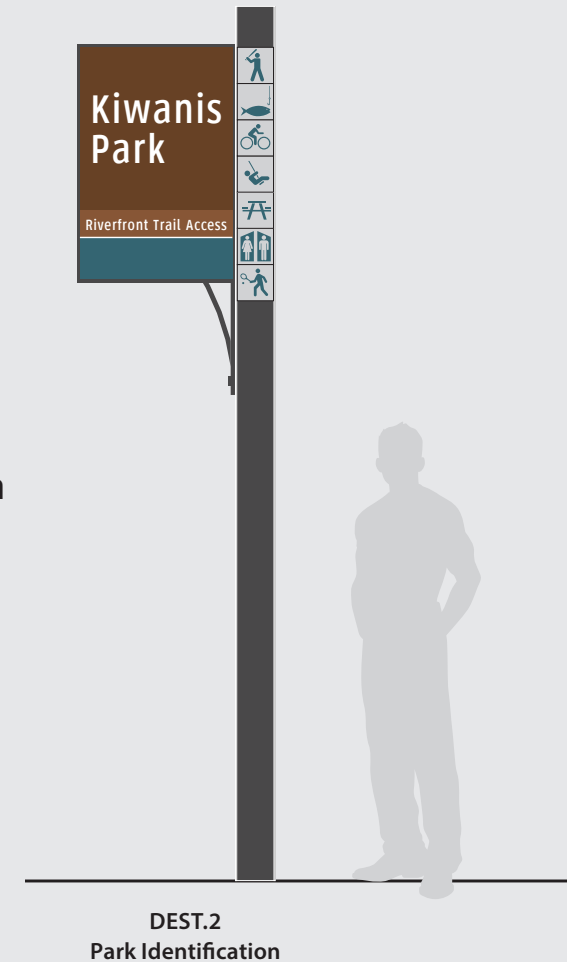
Trail identification bollards or other signs should also be located at informal trailheads, intersections or other locations where trail identification may be important.



WAYFINDING SIGNS:

Wayfinding signs are intended to help users navigate and find their way around. Kiosks at trailheads typically include trail maps, and wayfinding along the way is important.

Missoula has an adopted wayfinding sign plan which provides guidance on wayfinding sign styles for different users and locations.



INTERPRETIVE SIGNS:

Good interpretive signs can open peoples eyes to things they may not have known before, making visitors excited about something new. They typically relate directly to the surrounding and encourages visitors to look more closely. Interpretive signs follow a variety of themes and educational topics. Where

applicable, Interpretive signs should follow adopted plans in order to be consistent with themes styles and locations.



RECREATIONAL TRAIL DESIGN GUIDE

Recreational trails take many forms, they can be re-purposed dirt or gravel double track roads, single track hiker and mountain biking trails, compacted gravel trails with varying width, or may be paved with concrete or asphalt. Many of the current system trails were inherited from user made trails or roads and often do not meet the standards found in this design guide. New trails or retrofits to existing trails should follow the standards found in this design guide.

Trail surfacing is an important consideration as not all native soils can support year-round trail use. As the climate changes and the freeze thaw season (“mud season”) lengthens, trail surfacing material becomes a more important consideration. Some critical, high use recreational trails may need to be surfaced with an “all-weather” surfacing material in order to support year round use and reduce damage to the landscape by users walking adjacent to muddy and slippery trail treads.



Recreational trails on sensitive lands may be seasonally closed for resource protection.

THE FOLLOWING OUTLINES SOME OF THE MOST COMMON WAYS TO BUILD RECREATIONAL TRAILS WITHIN MISSOULA:



NARROW SINGLE TRACK:

TREAD WIDTH: 18"-36"

TREAD SURFACE: natural surface using existing on-site soils

DESIRED AVERAGE SLOPE: 0-10% depending on desired use

MAX SLOPE: 25%

CROSS SLOPE: 2-4%

SIGNAGE: Wayfinding at trailheads and major intersections

CONSTRUCTION SPECS: See the Public Infrastructure Manual



WIDE SINGLE TRACK:

TREAD WIDTH: 36"-72"

TREAD SURFACE: packed gravel or on-site soils, occasionally paved

DESIRED AVERAGE SLOPE: 0-10% depending on desired use

MAX SLOPE: 20%

CROSS SLOPE: 2-4%

SIGNAGE: Wayfinding at trailheads and major intersections

CONSTRUCTION SPECS: See the Public Infrastructure Manual

RECREATIONAL TRAIL

DESIGN GUIDE



DOUBLE TRACK TRAILS OFTEN MUST ACCOMMODATE MAINTENANCE AND EMERGENCY VEHICLES. CONSIDERATION FOR VEHICLE ACCESS SHOULD BE MADE WHEN DESIGNING THE TRAIL.



PRIMITIVE DOUBLE TRACK:

- TREAD WIDTH: 6'-14'
- TREAD SURFACE: packed gravel or on-site soils
- DESIRED AVERAGE SLOPE: 0-10% depending on desired use
- MAX SLOPE: 15%
- CROSS SLOPE: 2-4%
- SIGNAGE: Wayfinding at trailheads and major intersections
- CONSTRUCTION SPECS: see the Public Infrastructure Manual



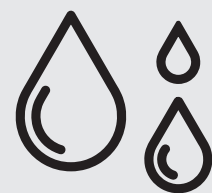
IMPROVED DOUBLE TRACK OR DIRT ROAD:

- TREAD WIDTH: 6'-14'
- TREAD SURFACE: packed gravel or on-site soils, occasionally paved
- DESIRED AVERAGE SLOPE: 0-10% depending on desired use
- MAX SLOPE: 15%
- CROSS SLOPE: 2-4%
- SIGNAGE: Wayfinding at trailheads and major intersections
- CONSTRUCTION SPECS: see the Public Infrastructure Manual



Many trails within the Missoula Valley are re-purposed access roads. The Term “double track” refers to the two tracks created by the wheels of automobiles.

RECREATIONAL TRAIL DESIGN GUIDE



FOR ALL NATURAL SURFACE TRAILS DRAINAGE IS AN IMPORTANT CONSIDERATION. UTILIZING GRADE REVERSALS IS PREFERRED OVER WATER BARS, HOWEVER SITE CONSTRAINTS WILL DICTATE THE BEST APPROACH.

SPECIALTY TRAILS:

Specialty trails are designed to accommodate specific uses, abilities, or experiences. Specialty trails may not meet the typical standards found within this design guide.

For example mountain bike optimized trails often require steeper cross slopes at corners, and include specialized features built into the trail to add a challenge or enhance the experience of biking.

Universal access trails are another example where a separate set of design guidelines should be followed for ease of access by the widest range of people and abilities.

Specialty trails should be designed according to industry best practices. See the “resources” section for some examples of guidelines for some specialty trails.



CONSERVATION LANDS MANAGEMENT PLAN

This guide pertains to trails managed by the City of Missoula Parks and Recreation Department, most of these trails are on city owned conservation lands. The Conservation Lands Management Plan outlines how these lands are to be managed; primarily for environmental and wildlife habitat protection, with recreation uses as a secondary use, including trail and trailhead uses.

DEFINITIONS

Accessible Trail: ADA accessible trails are paths that are designed to be accessible to people with all abilities. The Americans with Disabilities Act (ADA) provides guidelines and requirements for making outdoor spaces accessible.

Active Transportation: Human-powered mobility, such as biking, walking, skating etc. Typically, active transportation is via non-motorized means, however electric assist vehicles (e-assist) are considered active transportation as they still require human power to move.

All-weather trail surface: A special topsoil/gravel mix that helps prevent mud and damage from wet weather

Commuter Trail: A commuter trail is a shared use path used for active transportation (walking, biking etc.) such as commuting to work or running errands. Commuter trails can also be used for recreation, exercise, and other activities.

Motorized Vehicle: Any vehicle that is self-propelled that is not a wheelchair or mobility device. Electrically-powered bicycles (E-Bikes) and other powered wheeled vehicles are considered motorized vehicles. E-bikes and other electric assist vehicles are allowed on certain Missoula trails.

Multi-Modal Transportation: Is an approach to transport that incorporates all modes people use to get around. These may include: Automobiles, Commuter railways, Buses, Bicycles, Walking, Micro-mobility modes such as e-bikes and scooters. A fully multi-modal transportation system features not only roadways that can support a variety of transport methods, but also a well-integrated shared use paths, sidewalks, bike lanes, and transit systems.

Non-Motorized Transportation: Any form of transportation that does not rely on an engine or motor to move, meaning it is powered solely by human or animal power such as walking, cycling, or skating.

Recreational Use: the use of a trail for activities such as walking, biking, skating, socializing, exercising etc.

Shared Use Path: A trail or pathway physically separated from roads with automobile traffic. Shared Use Paths are designed for travel by a variety active transportation users, including bicyclists, pedestrians, skaters, joggers, wheelchair users, and others. Shared use paths may be strictly non-motorized, or allow for electric vehicles such as e-bikes, e-scooters etc. Shared Use Path's can be paved or be a natural surface and the width varies depending on the location, amount of traffic, and other considerations. Shoulder:

Trail: as defined by the National Recreation Trails Program: A trail is a travel way established either through construction or use and is passable by at least one or more of the following, including but not limited to: foot traffic, stock, watercraft, bicycles, in-line skates, wheelchairs, cross-country skis, off-road recreation vehicles such as motorcycles, snowmobiles, ATVs and 4-wheel drive vehicles.

Trail Corridor: a zone that includes the trail tread and the area above and to the sides of it. Trail corridors often include landscaping, benches, lighting and other amenities that support trail users. Trail corridors can be contained within the public street Right-of-Way, or public access easement across private property, or be owned by a public agency.

Trail Tread: The part of a trail where a person's foot or shoe makes contact with the ground. Trail treads can be paved (typically concrete or asphalt), or be a natural surface (packed gravel, decomposed granite, or soil)

Trailhead: The place where a trail begins. Trailheads can be improved with a variety of amenities such as parking, toilets, lighting, signage and gathering areas, or may simply be a trail with a sign.

Universal Trail: A universal trail is a trail that is designed to be accessible to all people to the greatest extent possible. Universal trail guidelines differ from ADA regulations and can be found in the publication: Trails for All People: Guidance for Accessibility and inclusive Design