DESIGN MANUAL

UNIFYING PRINCIPLES

The following principles guide the development and maintenance of City-owned or managed parks with the goal of creating a safe, accessible, sustainable, and long lasting system of parks, trails, and facilities. These principles should be used to ensure the City's capital improvements and decisions about park and facility maintenance align with the goals and vision laid out by the Parks, Recreation, and Active Transportation Plan.

Ecology & Environment

The City should strive to maintain or enhance the ecological function and resiliency of its natural area, trail, and recreation assets.

Accessibility & Inclusivity

City parks, facilities, and trails should strive to exceed requirements for accessibility to engage visitors of differing abilities.

Durability & Efficiency

Materials, furnishings, and landscaping used to construct or improve City assets should be able to withstand frequent and intense use and limited maintenance. Equipment should sourced from sustainable materials and should require typical, easy to access replacement parts.

System-wide Park Standards

The following standards identify important elements and facilities that should be included in the design, construction, and maintenance of parks and natural areas to align with the vision and goals of the PRAT Plan. The standards are broken out into two topics - systemwide requirements, which include investments in physical accessibility, lighting, and landscape elements; and guidance for design and maintenance by park type.

As community needs and trends change, this guidance should continue to provide a relevant and consistent framework for the design and renovation of future parks and natural areas.

Required Facilities

The following amenities and furnishings are important facilities to include in all parks and natural areas to provide clear and cohesive identity, encourage safe access, and enhance park enjoyment.

Barrier free/Accessible paths

Parks should be made accessible to a wide range of visitors, including persons with varying abilities, and they must connect safely and efficiently to surrounding transit stops and neighborhood streets. Accessible routes often result in paved connections, which can increase impervious surfaces, negatively impact stormwater capture, and increase heat island effect. To reduce these negative impacts on accessible paths and parking needs, consider the following:

- Use semipermeable or permeable surfaces that meet or exceed ADA/Universal Design requirements.
- Share parking with neighboring uses, like schools.
- Reduce road and walkway widths to minimum acceptable dimensions.
- Reduce the size/width of parking spaces to NACTO minimums and limit the number of parking stalls.
- If an entrance or route is not accessible, install signage that indicates the next closest accessible entry.

Trees

Trees provide shade and reduce the impacts of urban heat island on hot days. Trees also sequester carbon and help to reduce soil erosion through their root systems. Trees contribute to the natural look and feel of urban parks year round. The City should take care to protect existing trees through proactive monitoring and maintenance. New trees should be planted in communities with low tree coverage and to plan for successful succession of the canopy within older parks and natural areas. The City should ensure diverse species selection in parks and city-owned natural areas. The City should also advocate for more street trees at the perimeter of parks and facilities.

Milwaukee Path - Missoula cross city trail

Signage

Clear, consistent, and accessible signage and wayfinding helps to communicate what parks, trails, and facilities have to offer and reinforce the City's identity and role in maintaining these community spaces. There are many types of signs that should be considered in Bozeman parks and facilities, depending on the park or facility's use.

- Informational signage clearly communicates the City's relationship in owning or maintaining the park or facility.
- Directional signage and wayfinding helps to direct visitors to destinations within parks and facilities, and will set expectations about distances between destinations.
- Interpretive signage can be used as an educational feature to describe the park's historic, cultural, or environmental significance.

Seating

Seating and benches give park users a place to rest, socialize, and enjoy their parks. Benches, picnic tables and other seating should be prioritized along highly trafficked paths and parks, and in natural spaces. Consider age-friendly bench designs that prioritize back support and arm rests as well as benches and picnic tables with adjacent wheelchair spaces.

Trash & Recycling

Placing trash and recycling receptacles along major network paths helps keep pathways, corridors, and their surroundings clean and more enjoyable for their users. Bear proof containers should be used where needed. Consider composting bins where conflicts can be avoided.

Enhancing Amenities

These amenities are not critical for a functional active transportation network but enhance the user experience, safety, and cleanliness, and are often greatly desired by the community.

Lighting

Pedestrian scaled lighting should be considered at entrances and in parking lots or fields of larger parks, many special use facilities, and other parks used throughout the year. Adequate lighting should also be considered along popular pathways and trails through parks and standards should be aimed at avoiding undue impacts on wildlife. Pedestrian scaled lighting increases safety for users throughout the year.

Shade Structures

Shade structures range in size, materiality, cost and purpose. They include arbors, pergolas, gazebos, pavilions, and canvas tensile structures over playgrounds and bleachers at fields. These structures should be used in places where shade trees are limited and where shade trees conflict with the particular park use, e.g. playing field or meadow.

Comfort stations/Restrooms

In larger parks like regional parks and certain special use facilities, permanent, ADA accessible restrooms should be considered. Comfort stations are appropriate as temporary facilities tied to large events, festivals, or other large gathering.

Bike Racks

Bike racks provide reliable bike storage options at parks with access to major trails and pathways. As stated in the Active Transportation section, providing ample bike racks reduces potential issues of bikes being locked inappropriately to trees, park furniture, and private property.

Bike Repair Stations

Bike repair stations can be helpful for bicyclists if they are caught with an unexpected flat tire or need to make an adjustment to their bike during a ride. As noted in the Active Transportation section, bike repair stations should be located along major bike corridors and in major parks that are popular for bike users.

Dog Waste Stations

Dog stations provide pet waste bags and a trash receptacle for dog owners that use parks. Installing dog stations along popular dog walking areas can be beneficial in maintaining clean parks and trails.

Water Fountains

Outdoor public water fountains along pathways are often desired by active users. However, upkeep of these amenities is extensive which reduces their practicality in many situations. Providing public water fountains will be deliberate decisions that will hinge on specific locations and circumstances.

Picnic Tables

Picnic tables can be appropriate along pathways near community hubs. They provide opportunities for a variety of social activities that can be enjoyed outdoors such as picnics, games, and conversations.

Irrigation

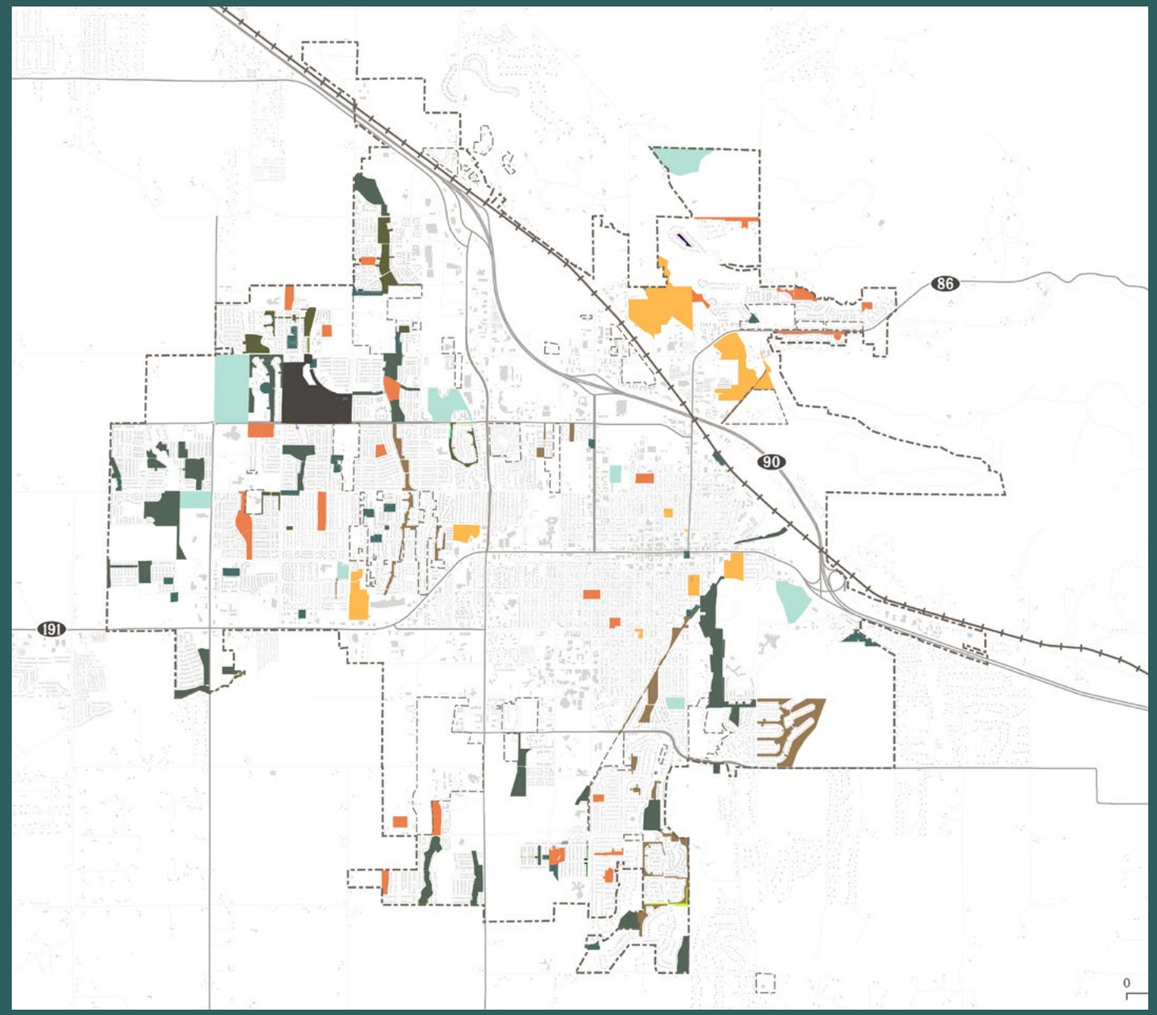
Prioritize simple irrigation systems to reduce unnecessary water waste. Install flexible irrigation systems that are easy to manage, maintain, and replace if needed. Develop an irrigation policy appropriate to the parkland setting. Irrigating planting beds and trees during the vegetation's establishment period will greatly increase the chances of survival for the planting and the planting's lifespan.

DESIGN + MAINTENANCE GUIDANCE BY PARK TYPE

The following principles guide the development and maintenance of City-owned or managed parks with the goal of creating a safe, accessible, sustainable, and long lasting system of parks, trails, and facilities. These principles should be used to ensure the City's capital improvements and decisions about park and facility maintenance align with the goals and vision laid out by the Parks, Recreation, and Active Transportation Plan.

Pocket Parks
Neighborhood Parks
Community Parks
Special Use Parks
Natural Area Parks and Natural Areas within Parks
Linear Parks

Note: Future park types (regional parks) will be added at the time of creation; the City doesn't currently have any regional parks under its management.



Park Types

- Special Use
- Natural Area
- Community
- Neighborhood
- Pocket
- Linear
- Roads
- Buildings
- City Boundary
- Railroad
- Streams
- Lakes & Reservoirs

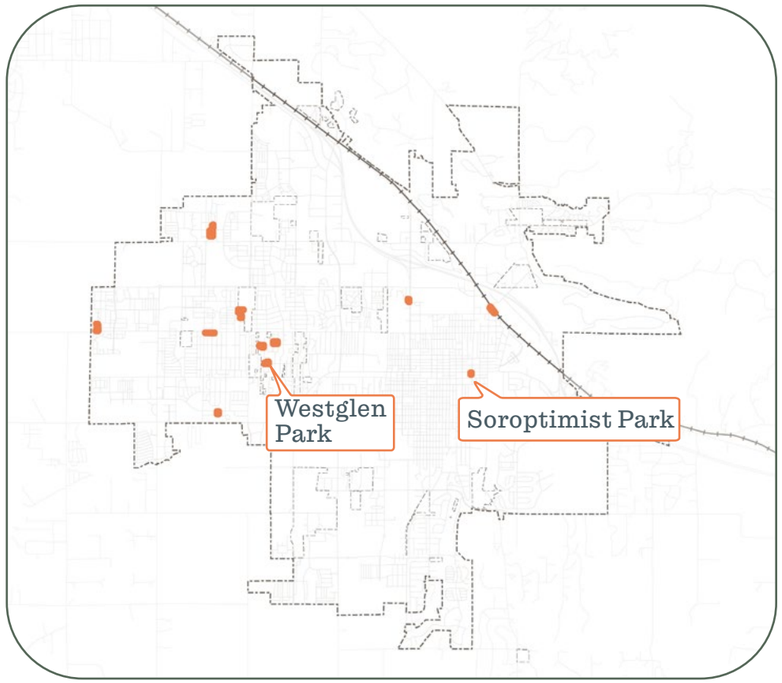
Pocket Parks

10 Acres | 20 Parks

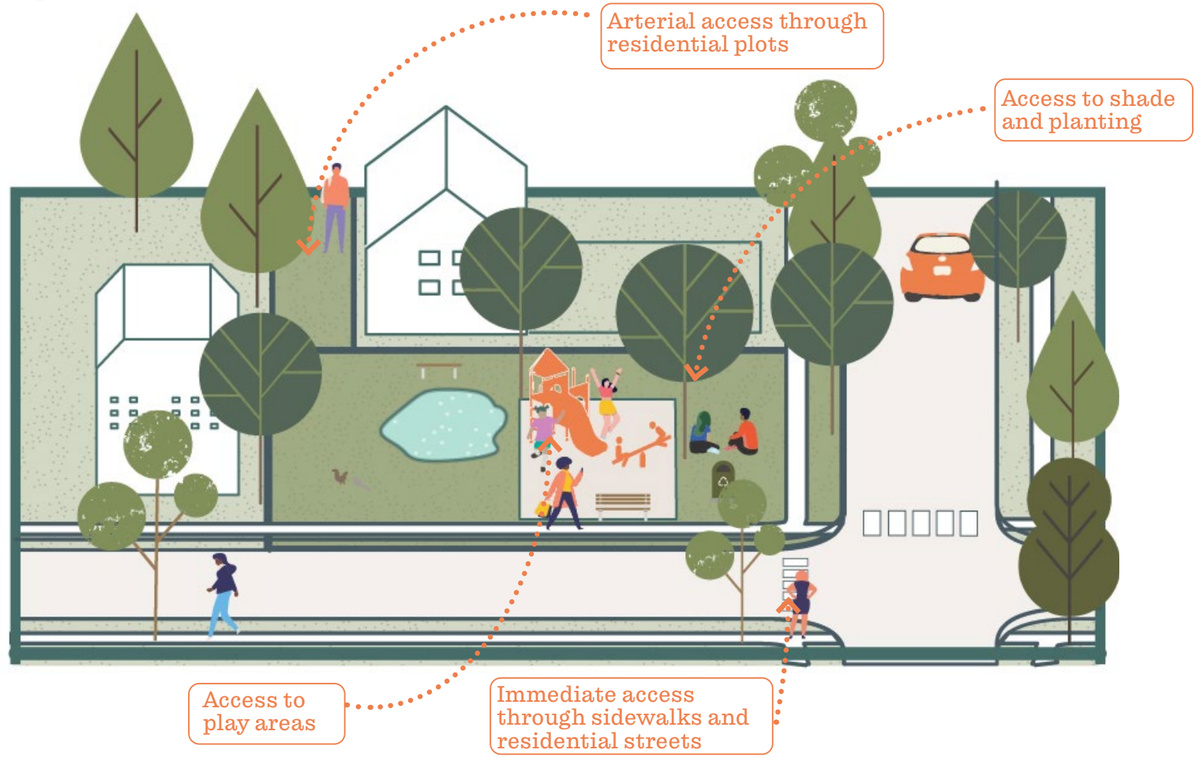
Relevant Parks

Annie St & Cottage Park Ln
Baxter Square
Black Ave Pocket Park
Bosel Park
Childrens Memorial Gardens
Cotton Park Ln
Creekside Park
Equestrian Park
Farmhouse Ln & Little Cottage Ln
Lewis and Bark Dog Park
Milkhouse N Pocket Park
Milkhouse S Pocket Park
North Meadows Park
Northeast Neighborhood Park
Norton East Ranch Subdivision Park
Pinnacle Star Street
Sacajawea Park
Sanders Park
Soroptomist Park
Valley Commons Park
Valley Meadows
Westglen Park
Westlake Community Garden

Pocket Parks are used to address limited, isolated or unique recreational needs. They are typically 1 acre or less in size and contain small features. They may also function as landscaped public use areas in commercialized parts of town, and serve as a destination within a 5 minute walk of a neighborhood. The service area for a pocket park is a ¼-mile radius around the park in a residential setting.



Typical Assets and Design Considerations



Program & Use

Pocket Parks typically contain amenities such as recreational opportunities for young children with slides, swings, spring toys and the like. Temporary amenities like movable tables and chairs support social activities and gatherings that tie into the daily activities of move active parts of the city. Accommodations for off-leash recreation should be provided where feasible.

Environmental Benefits

Design grading to direct stormwater into planted areas and mitigate the need for regular irrigation. It is important to evaluate the quality of the soils on site in more dense, urban pocket parks to ensure the soil can support increased stormwater volumes. Plant native, hardier plants that can serve as windbreaks that break up wind tunnel effects and to support sensitive low lying plants. Limit paved surfaces and cluster plantings throughout the site to reduce urban heat island effect.

Siting & Access

Accessibility by way of interconnecting trails, sidewalks, or low-volume residential streets increases use opportunities. Recognizable public access should be provided with at least 50 feet of frontage on a public or approved private street. In terms of size, they are generally between 2,500 square feet and one acre in size.

Connections and relationships to the surrounding context are also key to providing an accessible and visually cohesive connection to surrounding buildings, paths, and streets. Connections within and to the park from nearby bike lanes and greenways should be prioritized, especially those that connect into city anchor routes. Curb cuts at street crossings and wayfinding to direct visitors to surrounding amenities, especially downtown, will help orient visitors to various destinations.

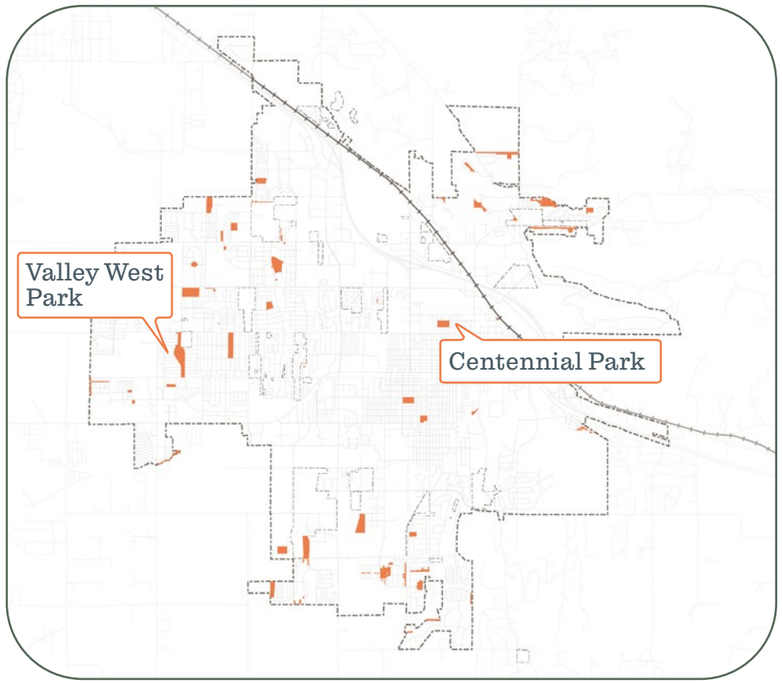
Neighborhood Parks

223 Acres | 34 Parks

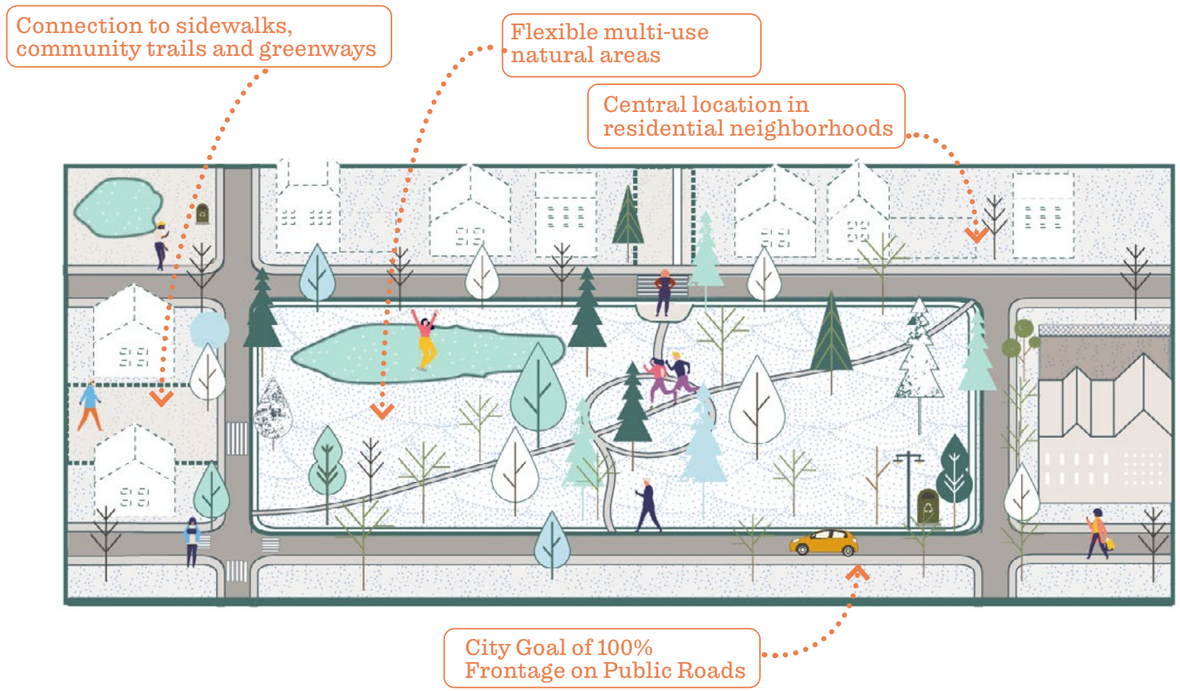
Relevant Parks

Alder Creek
Centennial Park
Cooper Park
Creekwood Subdivision Park
Diamond Park
Enterprise Park
Flanders Creek Subdivision Park
Four Points Minor Subd. Park
Gran Cielo
Headlands Park
HRDC (West Babcock Park)
Icon Park
Jarrett Park
Legends At Bridger Creek Park
M Anderson Park
Matthew Matsen Park
Meadow Creek Park
NE Corner & N Laurel Pkwy
New Hyalite View Park
Sandan Park
South University Distict
Southside Park
The Lakes At Valley West Park
Traditions Subdivision Park
Valley Unit Park
Valley West Park
Walton Homestead Park
West Winds Park
Westbrook
Westfield Park

Neighborhood parks are the basic unit of the park system, and serve as the recreational and social focus of the neighborhood. Focus is on informal recreation for all age groups and geared towards those living within the service area. Neighborhood parks should be centrally located within their service area, with access uninterrupted by non-residential roads and other physical barriers. The service area of a neighborhood park has a ¼- to ½-mile radius.



Typical Assets and Design Considerations



Program & Use

Facilities include playgrounds (including adult and senior playground equipment); informal playfields or natural areas; basketball, tennis and volleyball courts; ice skating; trails; and picnic and sitting areas. Accommodations for off-leash recreation should be provided where feasible.

Environmental Benefits

Similar to the pocket parks and plazas typology, it is imperative to design grading to direct stormwater into planted areas and mitigate the need for regular irrigation. In these active, neighborhood serving parks, investments in low maintenance plantings and shade trees will support community use on hot days and reduce urban heat island effect from surrounding areas.

Siting/Access

The site should be accessible from throughout its service area by way of interconnecting trails, sidewalks, or low-volume residential streets. Ease of access and walking distance are critical factors in locating a neighborhood park. A neighborhood park should have a minimum of 50 percent frontage on a public or approved private street. Neighborhood parks are generally 3 to 10 acres in size. Leftover parcels of land that are undesirable for development are also generally undesirable for neighborhood parks and should be avoided. It is more cost-effective to select a site with inherent aesthetic qualities, rather than trying to recreate them through extensive development.

Connections and relationships within the neighborhood will help to provide accessible and visually cohesive relationships to surrounding community destinations. Connections within and to the park from nearby bike lanes and greenways should be prioritized, especially those that connect into city anchor routes. Curb cuts at street crossings and wayfinding to direct visitors to surrounding amenities, especially downtown, will help orient visitors to various destinations.

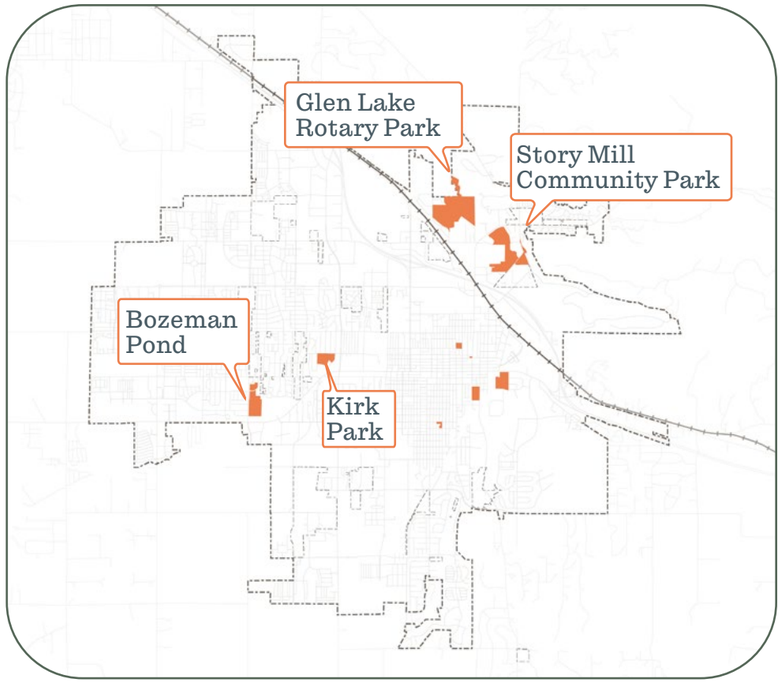
Community Parks

199 Acres | 8 Parks

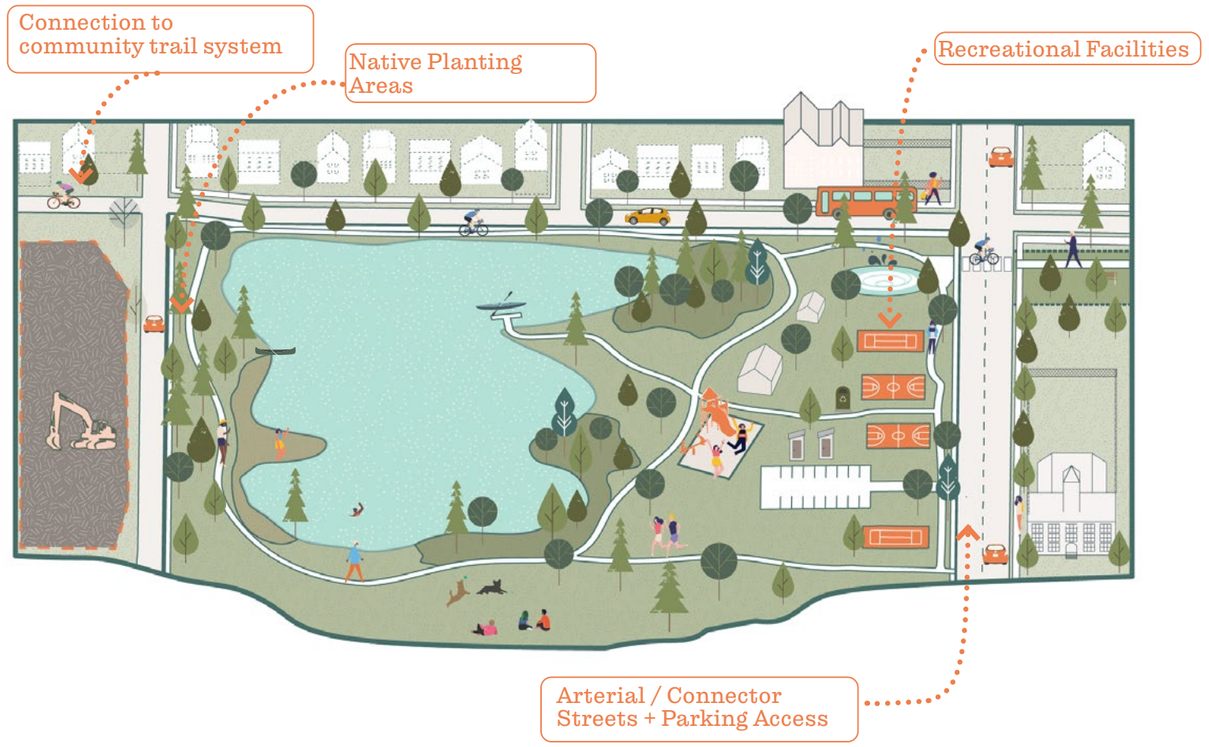
Relevant Parks

Beall Park
Bogert Park
Bozeman Pond
Glen Lake Rotary Park
Kirk Park
Lindley Park
Story Mansion Park
Story Mill Community Park

Community parks are larger in size and serve a broader purpose than neighborhood parks. Their focus is on meeting the recreational needs of the entire community. They allow for group activities and offer other recreational opportunities not feasible – nor perhaps desirable – in a neighborhood park.



Typical Assets and Design Considerations



Program & Use

Potential recreation facilities include playgrounds (including adult and senior playground equipment); basketball, tennis and volleyball courts; informal ballfields for youth play; ice skating rinks (temporary); swimming pools or swimming beaches; trails, including cross-country ski trails; individual and group picnic/sitting areas; general open area; unique landscapes and features; nature study areas; and ornamental or native plant gardens. Accommodations for off-leash recreation should be provided where feasible.

Environmental Benefits

Similar to the pocket parks and plazas typology, it is imperative to design grading to direct stormwater into planted areas and mitigate the need for regular irrigation. These larger parks can also direct runoff towards designed bioretention systems (e.g., swales and rain gardens). Wherever possible, these parks should increase planting areas that can capture stormwater and support water conservation measures citywide, through low irrigation, native plantings.

Siting/Access

Optimally, the site should be between 20 and 50 acres in size; however the actual size should be based on the land area needed to accommodate desired uses. The site should be serviced by arterial and collector streets, as well as the community trail system. Parking lots should be provided as necessary to accommodate user access. The site's natural character should play a very significant role in site selection, with emphasis on sites that preserve unique landscapes within the community and/or provide recreational opportunities not otherwise available.

Special Use Parks

201 Acres | 9 Parks

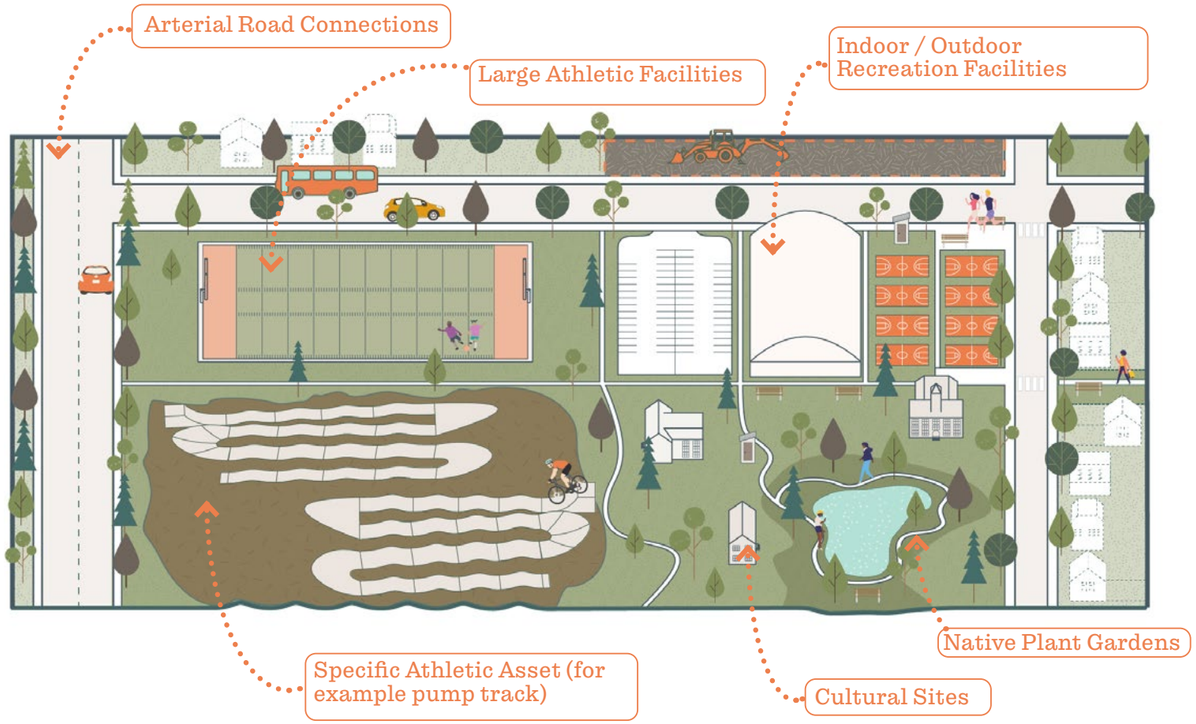
Relevant Parks

Bozeman Sports Park
Bronken Park - Soccer Complex
Christie Fields
North Grand Field
Rose Park
Snowfill
Softball Complex
West Babcock Park
Westlake BMX Park

The Special Use classification covers a broad range of parks and recreation facilities oriented toward single-purpose or specialized use. Special uses generally fall into three categories:

- Historic/Cultural/Social Sites – Unique local resources offering historical, educational, and cultural opportunities. Examples include historic downtown areas, performing arts facilities, arboretums, ornamental/native plant gardens, sculpture gardens, indoor theaters, public buildings, and amphitheaters.
- Indoor Recreation Facilities – Examples include community centers, senior centers, sports stadiums, community theaters, indoor hockey arenas, and indoor swimming pools.
- Outdoor Recreation Facilities – Examples include tennis centers, sports complexes, golf courses, disc golf courses, hockey arenas, BMX parks and skate parks.

Typical Assets and Design Considerations



Program & Use

Among the most active recreation places within the City's park system, these parks and facilities support a range of activities and should be designed to address the desires of community members, national and local recreation trends, and the need for flexibility.

Opportunities for active recreation should be expanded to support intended audiences as well as their caregivers, spouses, and spectators. To support extended use of the facilities, these places should support the comfort of all visitors through water fountains, bathrooms, shade trees, benches and accommodations for persons who have physical disabilities or are neurologically diverse.

Accommodations for off-leash recreation should be provided where feasible.

Siting/Access

Recreation need, community interests, the type of facility, and land availability are the primary factors influencing location and size. Special use facilities should be viewed as strategically located community-wide facilities rather than as serving well-defined neighborhoods or areas. The site should be accessible from arterial and collector streets where feasible.

Natural Area Parks
and Natural Areas within Parks

184 Acres | 27 Parks/Areas

Natural Areas within Parks

Alder Creek Natural Space
Allison Park
Bridger Creek Park
Bronken Park - Natural Space
Burke Park
Cattail Lake Subdivision Public Park
Flanders Creek Subdivision Park Natural Space
Grafs East Park
Hauser Park
Ice House Park
Josephine Park
Laurel Glen Park
Loyal Gardens Subdivision Park
Mcleod Park
Meadow Creek Subd Public Park
Norton East Ranch Sub Park Natural Space
Oak Springs Park Access Corridor
Peets Hill
Shady Lane Public Park
Traditions Subdivision Park Natural Space
Tuckerman Park
Valley West Park Natural Space
West Winds Park Natural Space
Willow Park

Natural resource areas are lands set aside for the preservation of natural resources, remnant landscapes, and visual aesthetics or buffering. Oftentimes, these areas are contained within existing parks, and require a different management approach from more isolated natural areas.

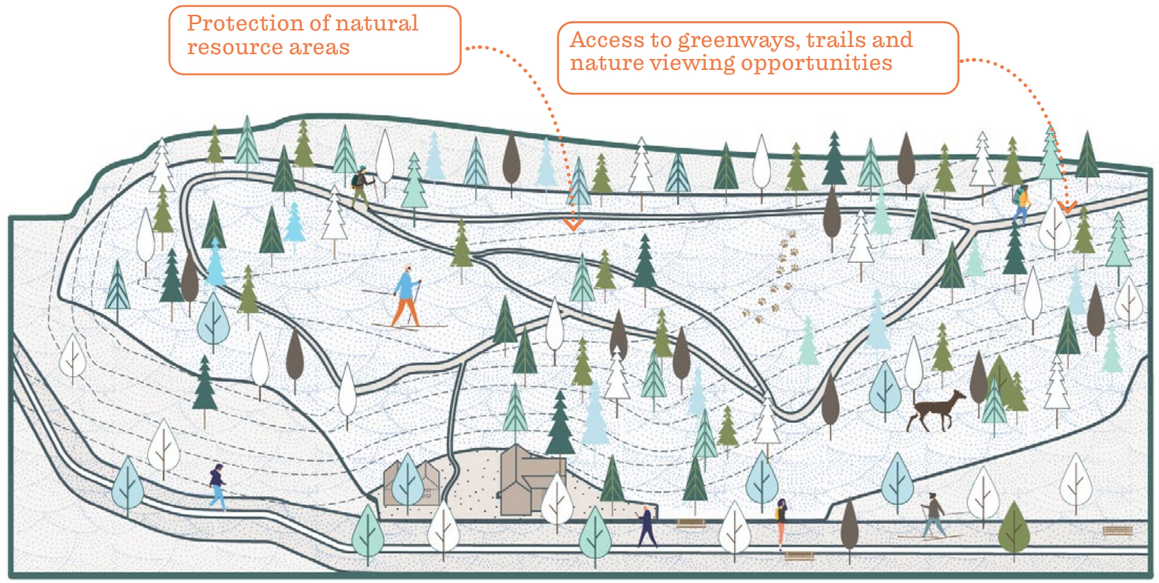
For example, Mcleod Park is a neighborhood park with natural areas that have to be well designed and integrated into the park to work alongside existing recreational uses. There are similar examples in West Winds Park and Bronken Park. These lands typically consist of:

- Individual sites exhibiting natural resources;
- Lands that are unsuitable for development but offer natural resource potential. Examples include parcels with steep slopes and natural vegetation, drainage ways and ravines; and
- Protected lands, such as wetlands, riparian areas and ponds.

Natural Area Parks

Baxter Meadows Natural Space
Baxter Square Natural Space
Cattail Creek Natural Space
Ferguson Meadows Natural Space

Typical Assets and Design Considerations



Program & Use

Although natural areas are resource rather than user based, they can provide some recreation opportunities such as trails, and nature viewing and study. They can also function as greenways. Development should be kept to a level that preserves the integrity of the resource.

Environmental Benefits

Natural Area Parks should be protected, restored, maintained, and considered for expansion. To do this, clear communication and barriers to prevent dumping, walking, or vehicle access to the site should be incorporated into the design of these spaces.

Minimize development of hard surfaces, including bike trails and boardwalks, and strategically place them to avoid dissecting, diminishing, or disturbing natural areas within parks.

Use the existing types of vegetation community present in natural areas, whether forest, shrubland, meadow, stream, or wetland to guide the restoration design for adjacent sites and for site expansion within existing parks.

These places should include educational information (e.g. signage) that will help visitors understand natural system functions and increase aware of ecosystem benefits. Bozeman's Community Plan 2020 names birds as compatible with development and encourages habitat protection

Siting/Access

Resource availability and opportunity are the primary factors determining location and size. Typically, when siting a natural area, underutilized areas of parks and areas with vegetation or animal species of concern are ideal places for natural area investment.

Access points should be limited and well-signed, and should connect into existing trail networks.

Linear Parks

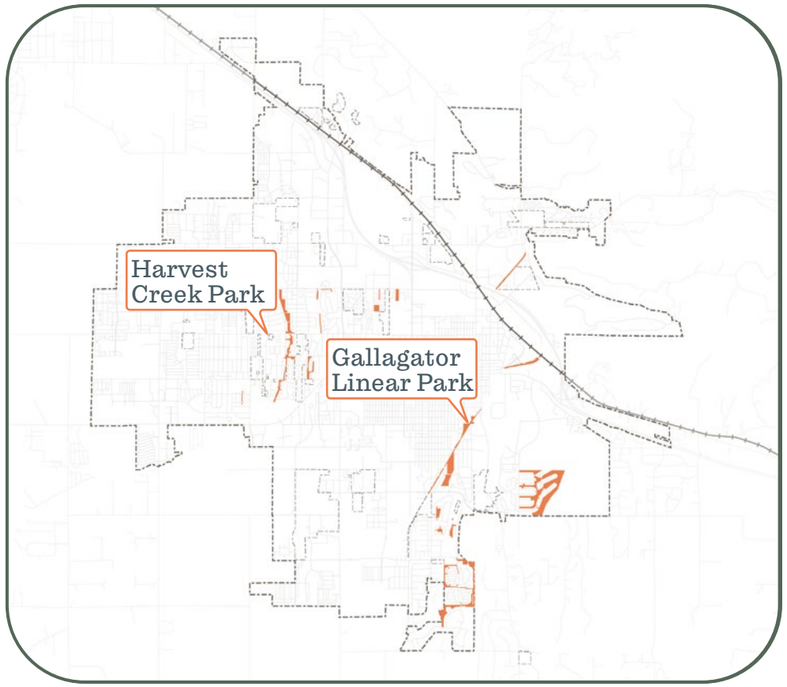
62 Acres | 24 Parks

Relevant Parks

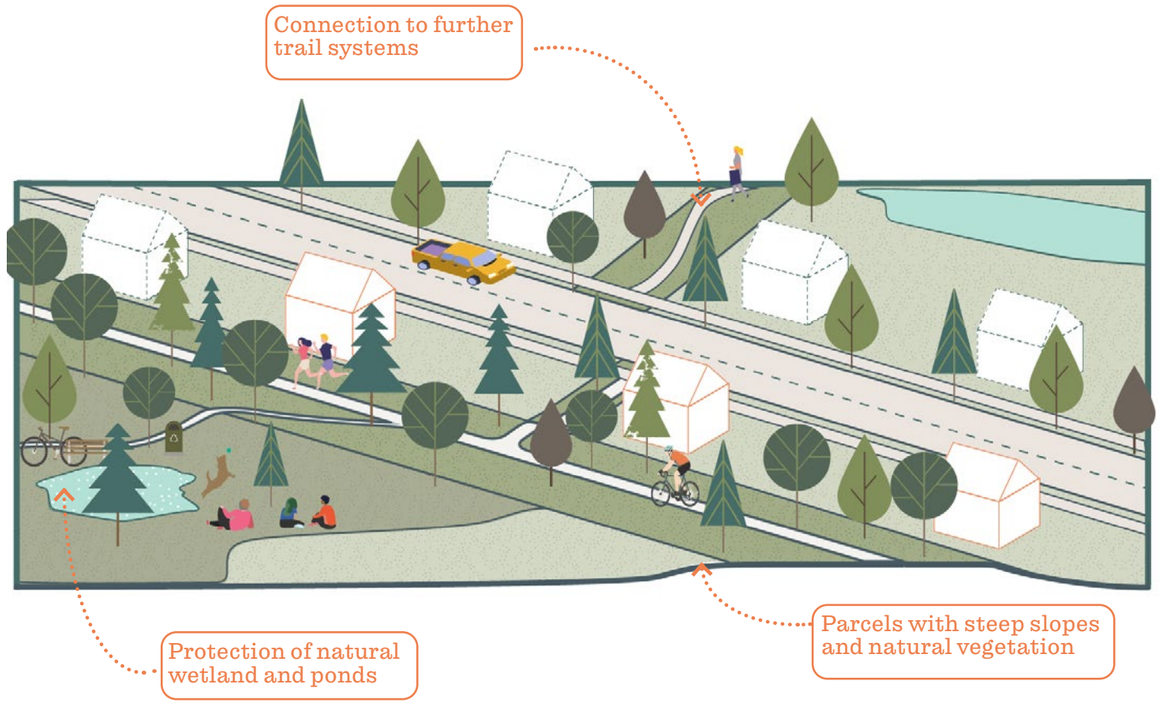
Babcock Meadows
Brookside Park
Diamond Estates Public Park
Gallagator Linear Park
Greenway/Westgate
Harvest Creek
Langohr Gardens Park
North 9th
Northern Pacific Addition To Bozeman
Oak Meadows Subdivision Park
Sourdough Trail Park
Spring Meadows Park
Sundance Springs Park
The Knolls At Hillcrest Park
The Knolls At Hillcrest Park
Valley Creek Park
Village Downtown Park
West Meadows Park
Westridge East Park
Westridge North Park
Westridge South Park

Linear parks contain pathways that serve a number of important functions:

- They tie park components together to form a cohesive park, recreation, and active transportation system;
- They allow for uninterrupted and safe pedestrian and bicycle movement between parks and throughout the community
- They contain clear signage that visually connects park components and trails to better wayfinding
- They provide an opportunity for resource-based outdoor recreation.



Typical Assets and Design Considerations



Program & Use

Linear parks can be developed for a variety of different recreational activities. Most notable are hiking, walking, jogging, bicycling and cross-country skiing.

Environmental Benefits

The environmental benefits of linear parks include reduced emissions from vehicular transportation and an opportunity to create longer stretches of contiguous native vegetation, habitat and wildlife corridors. Special care should be taken to avoid the spread of weeds within linear parks.

Since these habitat corridors will also naturally support non- native species expansion, it is important to create barriers for the spread of those species.

Many linear parks exist along water courses, which presents an opportunity to improve riparian edges. Plantings and naturalized landscapes along the water's edge could support increased fish and other amphibious species habitat. Education signage regarding "rewilding" of these riparian edges should also be considered to raise awareness of these investments.

Siting/Access

Land availability and opportunity are the primary factors determining location. Many linear parks will follow natural features such as watercourses, while others will follow man-made features such as abandoned railways. Linear parks should be at least 25 feet wide for general trail use, with additional width required for parks used for cross-country skiing. In addition to this minimum width, which linear parks can extend beyond, linear parks should also have requirements to provide specific amenities. Linear parks should be designed to increase connectivity for wildlife and eliminate barriers to their movement.

DESIGN + MAINTENANCE GUIDANCE FOR ACTIVE TRANSPORTATION

Establishing clear dimensional specifications and construction standards for each path and trail typology is fundamental to building out a highly functioning active transportation network. Below is a basic summary of the key standards for each network typology. The 'Implementation' section below provides a detailed breakdown of the recommended dimensional and construction standards. This section of the Design Manual will identify and describe design and maintenance considerations for the following three Active Transportation route types:

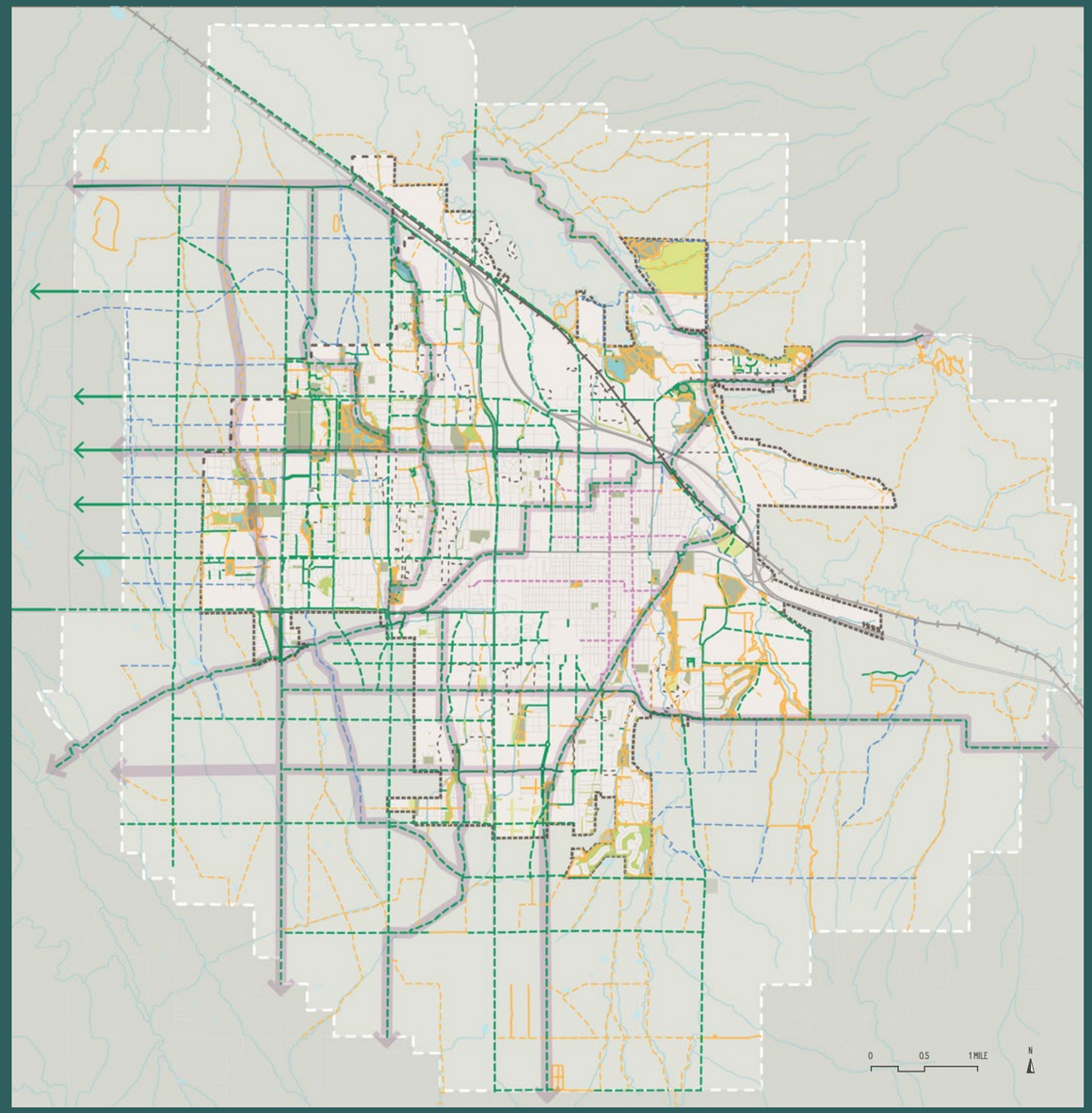
System-wide Standards

Anchor Routes & Shared Use Paths

Bike Boulevards

Connector Paths

Neighborhood Trails



Proposed Active Transportation Network

- Proposed Anchor Route
- Proposed Shared Use Paths
- Proposed Commuter Paths
- Proposed Neighborhood Trails
- Proposed Bike Boulevards
- Existing Shared Use Paths
- Existing Trails
- City Boundary
- Growth Boundary
- Roads
- Railroad
- Streams
- Lakes & Reservoirs
- Future Parks
- Parks

System-wide AT Standards

Standards for the design and construction of all active transportation typologies is critical to successful implementation of the PRAT Plan. The City has existing paved path standards within the Public Work and the PROST Plan contains some standards for natural trails. The existing standards should be reviewed against best practices and guidelines, including guidance by National Association of City Transportation Officials (NACTO), referenced below, revised to create comprehensive standards for each path and trail type, and collocated within a single source such as the Public Works Standards.

The recommended standards for construction are divided into three classes based on location, intended use, and preferred maintenance. As uses or intensity change, a route may be upgraded in classification. The standards align with those in the Triangle Trails Plan and reflect similar parameters previous outlined in the Bozeman PROST Plan and the Gallatin County Trails Report and Plan.

Paths and trails consist of a central walkable/ridable surface, known as a tread. They have a shoulder located on each side. The tread plus the shoulder is known as the clear width. The height above the route with no obstacles like tree branches is known as the clear height.

The following standards are applicable to all city path and trail classifications:

- Adequate visibility must be provided for safety.
- The minimum acceptable path and trail easement width is 25 feet.
- Path and trail entrances will be signed describing the degree of ADA access.
- A minimum of 5-foot separation between edge of path to top of slope that is greater than 1V:3H, if not met, a railing must be implemented

Required Elements

These associated elements, adjacent to physical path networks, are essential for the success of a functional and safe active transportation network.

Wayfinding

The most critical adjacent network facility is wayfinding. Wayfinding is essential to a robust, highly functioning community active transportation network. A comprehensive wayfinding plan should be adopted and implemented by the City of Bozeman. One, unified wayfinding plan for the entire City of Bozeman will standardize and integrate consistent signage and information across the entire network to allow for intuitive and streamlined user navigation.

Lighting on Shared Use Paths

For shared use paths to be viable and reliable transportation and recreation corridors throughout the year, appropriate lighting should be considered on all shared use paths and standards should be aimed at avoiding undo impacts on wildlife.Adequate lighting increases safety for users and allows the paths to be functional throughout the entire day, including commuting hours, during Montana's dark winter months.

Benches

Benches are a highly desired facility in public spaces and in corridors along pathways. They give path users a place to rest, socialize, and enjoy the many beautiful environments Bozeman has to offer. Benches should be prioritized along highly trafficked paths and in natural spaces.

Bike Racks

Bike racks provide reliable bike storage options at network hubs for commuting and recreational bikers alike to securely leave their bike for period of time. Providing ample bike racks reduces potential issues of bikes being locked inappropriately to trees, park furniture, and private property.

Bike Repair Stations

Bike repair stations can be helpful for bicyclists if they are caught with an unexpected flat tire or need to make an adjustment to their bike during a ride. Bike repair stations should be located along major bike corridors and at major network intersections.

Dog Waste Stations

Dog stations provide pet waste bags and a trash receptacle for dog owners that use the network. Installing dog stations along popular dog walking areas can be beneficial in maintaining a clean path and trail environment.

Trash & Recycling

Placing trash and recycling receptacles along major network paths helps keep pathways, corridors, and their surroundings clean and more enjoyable for their users. Bear proof containers should be used where necessary.

Enhancing Elements

These amenities are not critical for a functional active transportation network but enhance the user experience, safety, and cleanliness, and are often greatly desired by the community.

Lighting on other Facilities

Some connector paths and trails may benefit from lighting installations as well if they are highly trafficked, are used as a frequent commuter route, or need added visibility. The need for lighting on these facilities will be addressed on a situational basis.

Water Fountains

Outdoor public water fountains along pathways are often desired by active users. However, upkeep of these amenities is extensive which reduces their practicality in many situations. Providing public water fountains will be deliberate decisions that will hinge on specific locations and circumstances.

Picnic Tables

Picnic tables can be appropriate along pathways near community hubs. They provide opportunities for a variety of social activities that can be enjoyed outdoors such as picnics, games, and conversations.

Anchor Routes & Shared Use Paths

These pathways connect larger community nodes. They are heavily used with full access and are typically constructed along major transportation corridors but can also be located outside of rights-of-way. These routes are designed to permit two-way traffic using an impervious surface material such as asphalt or concrete. Certain settings may not be conducive to impervious surfaces.

Width and Clearance

The preferred tread minimum width is 12 feet wide but can be decreased to 10 feet in interior subdivision settings.

All paths should have a 1-foot gravel shoulder and 2-foot minimum total shoulder graded away from tread at a 2% maximum slope.

A minimum vertical clearance of 10 feet should be provided. Branches that could reduce clearance when weighted with snow or rain should also be removed.

Grade

The maximum tread cross slope shall be 2%, sloping one direction, not crowned. The cross slopes on corners and curves shall be towards the inside where drainage permits.

The maximum tread cross slope should be 5%, the cross slopes on corners and curves shall be towards the inside where drainage permits. If there is a segment that has a cross slope of more than 5%, the segment should be as short as possible.

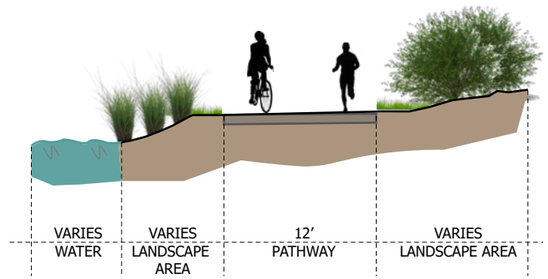
Maximum grade segments:

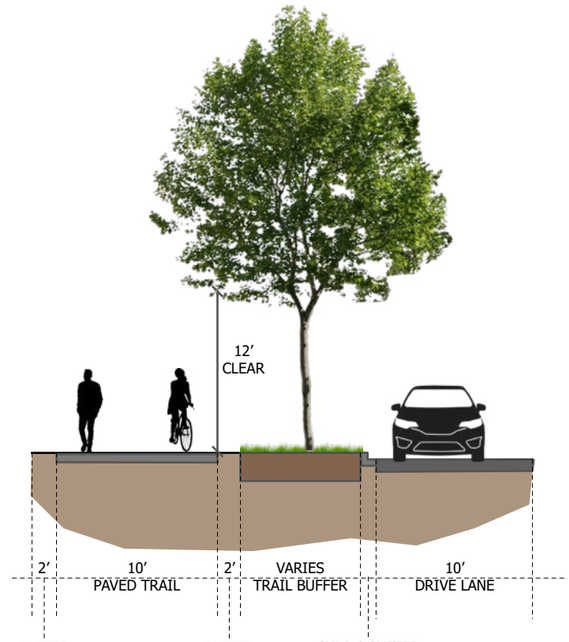
- 8.3% for a maximum of 15.24m (50ft)
- 10% for a maximum of 9.14m (30ft)
- 12.5% for a maximum of 3.05m (10ft)

Near the top and bottom of the maximum grade segments, the grade should transition to less than 5%. Rest intervals should be provided within 7.6m (25ft) of the max grade segment.

There can be no abrupt change in surface level greater than ½ inch.

Typical Assets and Design Considerations





Cross Section

Concrete - The tread base shall consist of a minimum of 3 inches of crushed gravel compacted to 95 percent of maximum density as determined by AASHTO T99. Concrete shall be a minimum of 6 inches of M4000.

Asphalt -Excavate 11.5 inches of material. Install a minimum of 9 inches of crushed gravel compacted to 95 percent of maximum density as determined by AASHTO T99, unless otherwise dictated by sub-soil type materials being compacted to road standard. The overlay shall consist of 2.5 inches of asphalt compacted to 93 percent of maximum density, as determined by ASTMD 2041. Construction seal shall be applied at 0.08 gallon/square yard after installation.

Material

To decrease long term maintenance, tread surface must predominately be impervious material such as asphalt, concrete, pavers set on concrete, or wood decking.

Porous surfaces (permeable pavers, porous asphalt, porous rubber) should be a priority in sensitive areas.

The tread material including any base course will have a total minimum thickness of 6 inches.

Wood deck planks must be run perpendicular to the direction of travel and joints must not exceed 36 inches. Planks must be securely fastened so they do not warp.

Bike Boulevards

Bike boulevards are an integrated part of the street network. Streets designated as bike boulevards should adhere to standards within the Transportation Master Plan and other adopted documents. In addition to those standards, bike boulevards should include at least one element from each of the following categories:

Signs and Pavement Markings

- Identification signage
- Sharrow pavement markings
- Wayfinding signage

Speed management tools:

- Speed humps, bumps, tables and cushions
- Chicanes
- Neighborhood traffic circles
- Median islands
- Curb bulb outs
- Pinch points

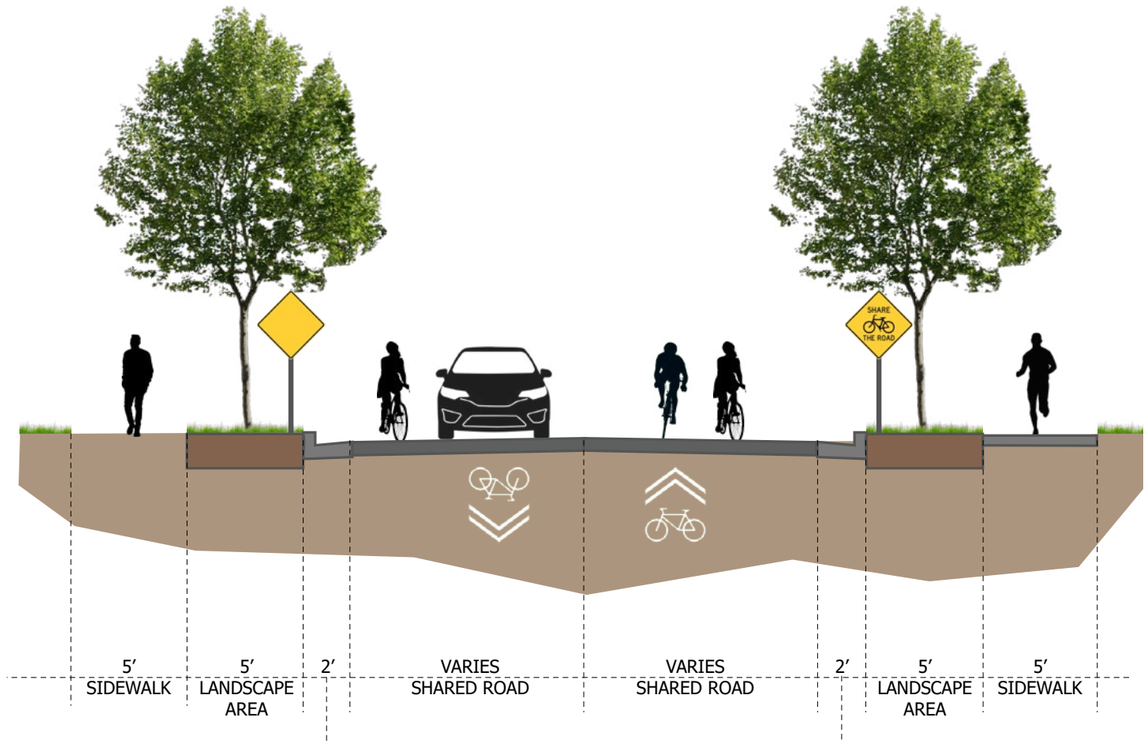
Volume management tools:

- Regulatory signage
- Partial physical closure
- Full physical closure
- Channelized right in/right out
- Diagonal or median diverter

Crossings:

- Crossing signage
- Pedestrian signals (Rapid flash beacons, HAWK signals)
- Median refuge islands
- Curb bulb outs

Typical Assets and Design Considerations



Connector Paths

These paths receive moderate use intended for a variety non-motorized, recreational, and commuter users. These paths connect meaningful destinations, such as neighborhoods, schools, and hubs of commercial activity. Connector paths are constructed with an ADA accessible surface of natural fines, or potentially pavement, and are 6 to 8 feet in width. For paved connector paths the Class 1 standards shall be utilized. Even if paved, connector paths are not expected to be maintained during the winter. However, if the route provides important community connections, year round maintenance should be provided. For natural surface connector paths apply the standards below.

Width and Clearance

Single surfaced tread with a minimum width of six feet.

Tread width may be reduced to 36 inches for a maximum distance of 30 feet to pass or preserve significant features such as rock formations, important vegetation, or cross watercourses. Signs should be used to warn about such constrictions.

The minimum cleared zone will be the tread width plus 2 feet to either side of the tread and 10 feet vertical. In no instance may the overhead clear height be less than 8 feet.

Grade

A cross-slope of no less than 2 percent and no more than 5 percent to provide for water drainage is allowed.

Maximum sustained running grade is 8%. A 10% maximum grade is allowed for a maximum distance of 30 feet, and a 14% maximum grade is allowed when resting intervals are provided every 5 feet.

Tread will be raised above the adjacent surfaces and have a 4-inch crown. Where this requirement is not possible the tread will have a 1:20 cross slope and/or side ditches outside the cleared zone.

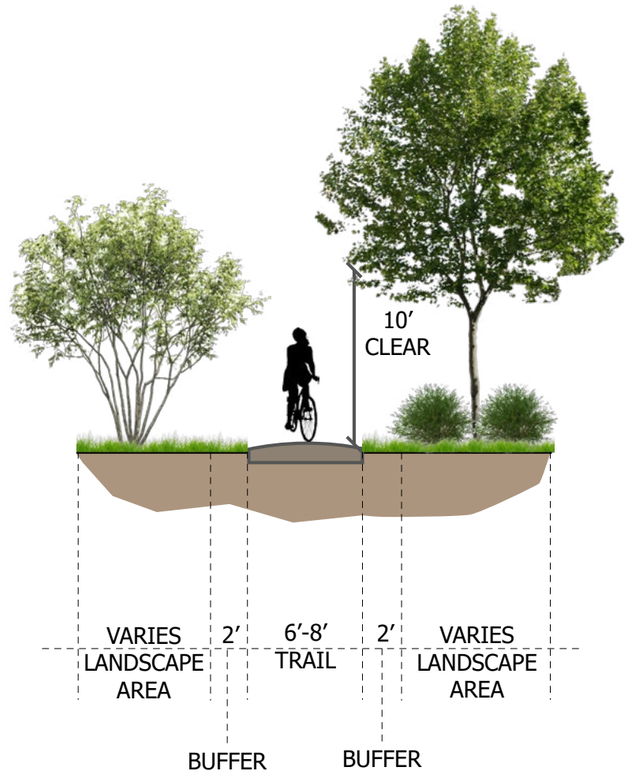
Changes in level:

- Should not exceed 51mm (2 in)
- May be up to a maximum of 76mm (3 in) in areas where 51mm cannot be attained and the slope of the trail is less than 5% in any direction.
- Obstacles over 51mm (2 in) in height should be removed

Stream crossings will be over culverts or bridges.

Only dips or slot-entrance drainpipe will be used for cross tread water stops for natural surface treads.

Typical Assets and Design Considerations



Cross Section

The path bed must be excavated 6 inches deep, prior to installation of tread mix.

Tread mix shall be installed in two parts. The first 3-inch lift shall be of ¾ inch Road mix, compacted to 95%, and then 3/8th inch minus gravel (natural fines) compacted to 95%. If moisture content is not adequate for compaction, water should be added prior to rolling and compacting.

Natural fines used for these paths shall consist of 80 percent sand, 10 percent silt and 10 percent clay. If the natural fines tread mix does not contain enough clay or soil binder, additional binder must be mixed in.

Geo-textile material will be placed beneath and gravel or particulate tread material in poorly drained, boggy, or marshy areas, or wet meadows and on any of the following soil types: clays, clayey loams, silts, silty. The preferred material is non-woven needle-punched engineering geo-fabric, but woven is acceptable. Fabric should be selected for use and durability.

Material

Commuter paths shall be designed for ADA access and year-round maintenance. Those that are not paved will be surfaced with a minimum of wood decking, natural fines, or with a well maintained compacted crushed gravel.

Neighborhood Trails

Neighborhood trails are narrower soft surface trails that connect locally to parks and natural areas. These trails receive moderate to low use and are typically 4-6 feet in width. They are either natural trails developed by use over time or constructed with natural fines. ADA accessibility may be limited as trails typically follow the natural contours, however nearby sidewalk spurs can provide ADA connections to areas along the corridor.

Width and Clearance

Tread width minimum is four feet. The minimum clear zone will be the tread width horizontally and seven feet vertically.

Grade

Grades typically follow the natural topography therefore ADA access is extremely limited. Blending the trail into the setting is emphasized in trail routing.

Provide positive drainage for the tread utilizing grade dips, cross sloping, and water bars to minimize erosion.

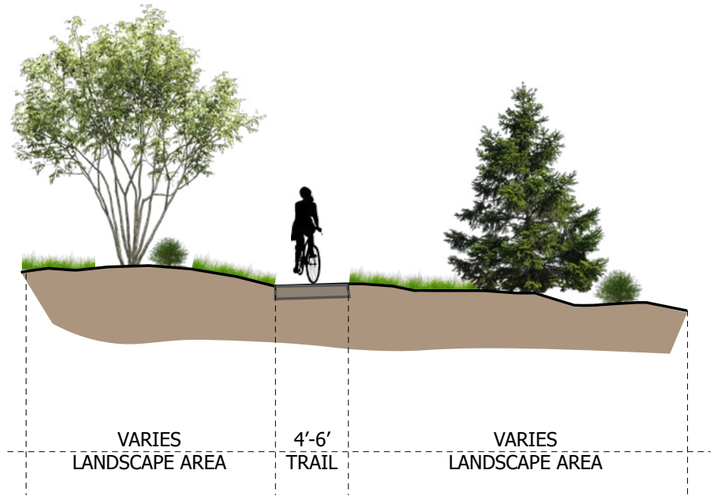
Cross Section

No trail bed excavation is required except to eliminate extreme cross grades.

Material

Preparation varies from machine-worked surfaces to those worn only by usage. No surfacing is required except in erosion prone poorly drained, marshy areas, or wet meadows.

Typical Assets and Design Considerations



AT Maintenance

Maintaining active transportation routes that are safe and accessible for users of all ages and abilities is a high priority. In addition, adequate maintenance is critical to maximizing year-round utilization. The City needs to establish annual and long-term maintenance plans that includes a deferred maintenance analysis.

There are three essential elements to properly maintaining an active transportation network. First, establish minimum standards for maintenance. Next, determine maintenance responsibility for each segment of the network. Lastly, identify the various sources to finance the necessary maintenance.

Methods

Developing a comprehensive maintenance strategy will require considering various surface types, locations, responsible parties, and available funding.

Anchor Routes and Shared Use Paths

Share use paths located within street rights-of-way are typically maintained by the corresponding jurisdiction. One challenge is achieving consistent maintenance expectations and standards between the City, County, and State.

Connector Paths

The maintenance of Connectors not only depends on the responsible party but also on the surface type each route.

Neighborhood Trails

Despite being smaller, trails require a considerable amount of maintenance depending on location, the quality of construction, and the amount of use. Neighborhood trails are typically maintained by neighborhood associations, HOAs, the City, or GVLT.

Regulations

The ability of the City to regulate maintenance of active transportation routes is limited. The City should consider ways to require routes owned or managed by private parties to be maintained according to established standards.

The following actions are recommended.

- Strengthen requirements for residential subdivisions, commercial developments, and other privately held routes to be adequately maintained according to standards adopted by the City.

Policies

Maintenance of active transportation routes in Bozeman is currently managed through a variety of resources, including private property owners, homeowner associations, community groups, non-profit partners, the City, and the Montana Department of Transportation. Clarifying responsibilities for maintenance and establishing standards will help ensure the financial investment developing a complete network is protected and enhanced in future years.

The following actions are recommended.

- Establish a comprehensive maintenance plan that includes minimum standards for upkeep, repairs, and replacement
- Conduct a comprehensive deferred maintenance analysis of each route identifying the current condition, upkeep and repair needs, and sections needing to be rebuilt
- Establish a maintenance template for the City, property owners, and partners to develop schedule tasks and estimate costs
- Review and clarify how the Bozeman Parks Maintenance District can support the maintenance of the network

Maintenance Standards

General maintenance standards for evaluating needs for surface care, repairs, safety precautions, and managing adjacent landscaping should be developed for and consistently applied to all network typologies. In addition to annual and long-term tasks, seasonal maintenance of shared use paths is essential to accommodating year-round active transportation. Paved paths must have the snow removed frequently during the winter and be swept of grit and debris each spring.

Maintenance Actions

The following actions are recommended.

- Develop a comprehensive maintenance plan including detailed standards by typology that ensure a high-level of safety, accessibility, and utilization.

Below are recommended routine and periodic maintenance tasks based on surface type.

Paved Surfaces—Routine maintenance activities:

- Regular sweeping to remove debris, gravel, and other hazardous items
- Regular snow removal during winter months
- Inspect and repair pavement surface problems (seal cracks, grind down ridges, cut back tree roots, repair pavement)
- Prune adjacent and overhanging vegetation to reduce encroachment or cause sight distance problems
- Treating noxious weeds along corridor
- Mowing trail edges if applicable (keep vegetation height low along trail)
- Clearing drainage features to ensure proper function

Paved Surfaces—Periodic maintenance activities:

- Coordinate and schedule pavement overlays as part of adjacent road maintenance
- Addition of surfacing material depending on condition (2-3 years)

- Re-grading to improve cross-slope or out-slope for improved drainage
- Improvement of transitions with sidewalks or streets, restripe crosswalks and other markers
- Repair or replace wayfinding, stop control signs and other elements
- Restripe crosswalks and other markers

Natural Surfaces—Routine maintenance activities:

- Removing encroaching vegetation from trail tread (grading, chemical treatment)
- Prune adjacent and overhanging vegetation to reduce encroachment or cause sight distance problems
- Treating noxious weeds along corridor
- Mowing trail edges if applicable (keep vegetation height low along trail)
- Clearing drainage features to ensure proper function
- Flood or rain damage repair: silt clean up, culvert clean out, etc.
- Bridge/culvert inspection, clearing and repair
- Map/signage post condition inspection, and vandalism repair
- Assessing need for sign/map updates or replacement

Natural Surfaces—Periodic maintenance activities:

- Yearly trail evaluation to determine the need for minor repairs, identification of erosion damage, need for improved drainage
- Addition of surfacing material depending on condition (2-3 years)
- Re-grading to improve cross-slope or out-slope for improved drainage
- Improvement of transitions with sidewalks or streets, restripe crosswalks and other markers
- Repair or replace wayfinding, stop control signs and other elements
- Restripe crosswalks and other markers

Funding

Like construction, the maintenance of Bozeman's active transportation is funded by a variety of entities including the City, Montana Department of Transportation, non-profit partners, and private property owners. There are more maintenance needs than committed funding which leads to a backlog of repairs and overall degradation of accessibility and utilization.

According to the Rails to Trail Conservancy, annual maintenance costs on average range from $1,000 to $2,000 per trail mile, depending upon the surface. Therefore, average annual funding required to maintain Bozeman's 178 miles of paths and trails is approximately $267,000.

The funding needed to adequately maintain the network will only increase as new extensions and routes are constructed. To meet this financial commitment, the City and its partners must proactively account for the necessary funding to execute the annual and long-term maintenance plans and aggressively commit the dollars.

The following actions are recommended.

- Ensure that a significant portion of the Parks and Trails Maintenance District funds are dedicated to path and trail maintenance
- Allocate an annual portion of the City's street maintenance budget to repair shared use paths and paved connector paths
- Include Bozeman's active transportation network and plan into the future Metropolitan Planning Organization budget

Prioritization

Addressing the maintenance backlog of existing active transportation network will take years and considerable funding. Therefore, it is important to develop and utilize a method to prioritize the needed upkeep and repair projects. This plan includes a weighted prioritization matrix template utilizing the criteria listed below.

The following actions are recommended.

Develop a methodology for prioritizing potential maintenance projects based on the following criteria:

- Area of deferred maintenance that poses a public safety risk
- Area of deferred maintenance that restricts equitable access
- Area of deferred maintenance that reduces utilization
- Highly utilized routes
- Ability to partner and/or leverage creative funding opportunities