



TRAIL ASSET MANAGEMENT PLAN

BILLINGS, MONTANA

Prepared for:
The City of Billings, Montana
Yellowstone County, Montana



In cooperation with:
Parks, Recreation, & Public Lands Department
Chamber Trails Committee



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LIST OF ACRONYMS

ADA – Americans with Disabilities Act

BPD – Billings Police Department

CTEP – Community Transportation Enhancement Program

FHWA – Federal Highway Administration

GIS – Geographic Information System

MCA – Montana Code Annotated

PILT – Payments in Lieu of Taxes

PMD – Park Maintenance District

PRPL – Parks, Recreation and Public Lands Department (City of Billings)

ROW – Right-of-way

RTP – Recreational Trails Program

TCSP – Transportation, Community and System Preservation Program

YCD – Yellowstone Conservation District

YRPA – Yellowstone River Parks Association

YVCC – Yellowstone Valley Cycling Club

INTRODUCTION

The City of Billings and Yellowstone County began a comprehensive planning process in the early 1990's to provide more transportation options for non-motorized use. This process began with development of the BikeNet Plan in 1995 and continued to gain momentum with the Heritage Trail Plan in 2004. An additional trail plan update is currently underway, titled Billings Area Bikeway and Trail Master Plan.

Along with the development of these planning documents, Billings has successfully implemented over 35 miles of trail in the last 15 years. With this construction and continued demand for even more trails, there is growing concern over how the trails will be maintained, which departments are responsible for maintenance, and how it will be funded. Many potential funding sources for trail construction have become available in recent years. In fact, many trails in Billings have been constructed using federal funding available through the Community Transportation Enhancement Program (CTEP) and other similar programs. Unfortunately, as funding opportunities have developed for trail construction, comparable funding options have not necessarily been available for trail maintenance. The City of Billings and Yellowstone County are therefore left with the task of addressing maintenance concerns and identifying a viable funding source to maintain the trail system and make repairs and replacements as the system ages.

Development of this Trail Asset Management Plan has been a collaborative effort between Sanderson Stewart; the City of Billings Parks, Recreation and Public Lands Department; the Chamber of Commerce Trails Committee; and the City-County Planning Division. Members of the Billings Police Department Volunteer Bike Patrol and the Chamber of Commerce Trails Committee also made significant contributions towards the effort by completing inspections of existing trail corridors. Throughout this process, the project team also met with Alta Planning + Design, the consultant working on the Billings Area Bikeway and Trail Master Plan, to coordinate efforts and determine how the two documents are interrelated.

LITERATURE REVIEW

The process of developing a comprehensive trail asset management plan for Billings and Yellowstone County began with a thorough literature review. This section discusses the relevant findings of trail maintenance procedures from a review of both existing and proposed trail maintenance plans, recommendations provided by various advocacy groups, and published journal articles. Summaries of these findings are incorporated into the following sections: Plan Development Process, Inventory of Existing Conditions, Maintenance Item Checklist, Task Budgeting, and Additional Items. The purpose of this research is to assess these existing documents and determine which components should be incorporated into the plan for Billings and Yellowstone County.

PLAN DEVELOPMENT PROCESS

In addition to the recreational, alternative transportation, and aesthetic value a newly designed trail can provide to a community, it can also supply positive economic value through trail-related spending. The benefits of trails hinge on continued community support of funding allocations. One factor that can greatly influence the public's support of trail funding is the visual condition of trails from regular maintenance and up-keep. Therefore, the maintenance plan becomes a critical component in the quest to gain public approval and support of trails moving forward.

As documented in several different sources, the first step in development and implementation of a trail maintenance plan is proper coordination and management. The state of West Virginia followed a similar process in development of their statewide plan (The West Virginia Statewide Trail Plan, 2002). The three steps proposed for development of a trail plan are creating the plan, addressing trail issues, and developing a plan for action. A trail maintenance plan is mentioned in the second step as an important issue since trail funding is often secured at the beginning of the project. Governing agencies are more likely to support a trail project if current and future maintenance funds are allocated at the start of the venture.

The task of developing a maintenance plan for the design life of a trail can be challenging with respect to determining an appropriate schedule. Proper coordination of responsibilities and maintenance schedules will help to ensure a complete and workable maintenance plan budget. The trails master plan for the City of Encinitas, California recognized the need for progressive

coordination by defining the governing agency and maintenance responsibilities at the beginning of their plan. They continue to describe the management issues involved in maintenance procedures including inspection reporting and coordination of volunteer organizations. This level of organization will help ensure their maintenance plan budget is followed.

A similar plan development approach was evident in the proposed trail maintenance plan for Waterfront Trail in Toronto, Ontario. The proposed maintenance plan alludes to the lack of sufficient funding and the importance of a maintenance program to ensure budget priority. The Waterfront Trail plan proposed the following process for maintenance plan development: analysis, approach, implementation, and evaluation. “Analysis” and “approach” tasks include tabulating trail issues and public concerns relating to maintenance and prioritizing them in regards to frequency and significance. “Implementation” and “evaluation” tasks include scheduling, implementation, and assessment of maintenance procedures.

The process of developing a trail maintenance plan can help ensure maintenance procedures are coordinated and continue to stay on schedule as new trails are constructed. When creating maintenance procedures for existing trails it is imperative to begin by creating an inventory of existing trails and current conditions.

INVENTORY OF EXISTING CONDITIONS

An inventory of existing trail routes is often maintained to ensure proposed trails are connected with existing trail systems using consistent design standards. Trail inventories are also used to chart maintenance work and classify budgetary needs. The Fairfax County (Virginia) Authority Guide to Trail Management is a prime example for inclusion of a trail inventory in their management plan. Their trail inventory includes location, class of trail, size, surface, culvert information, location and type of signs, location of other amenities (e.g., benches, trailheads, and kiosks), and entry locations for maintenance and emergency operations. In addition, the guide includes a maintenance management system which is a database of all maintenance records and recorded work hours. This system allows the users to better schedule and track maintenance work hours for future planning. The Fairfax County Authority uses GIS based maintenance maps together with their trail inventory and maintenance management system to visually illustrate their trail network. Maintenance maps can be used for planning purposes as well as targeting maintenance activities.

In addition to the existing trails, the Lebanon (Oregon) Trails Strategic Plan incorporates proposed trails into their mapping. This supplement aids planners in selecting the best trail route for future proposals. The Strategic Plan also uses trail category classification to create a priority scoring matrix to rank maintenance operations.

An inventory of existing trails can provide information about current maintenance needs and locations, as well as help to identify recommendations for future requirements. Once a corresponding list of needs has been generated, a checklist for maintenance operations can be developed.

MAINTENANCE ITEM CHECKLIST

In general, maintenance items are grouped into two separate categories: Routine (or scheduled) tasks and Non-routine (or as-needed) tasks. The routine tasks are scheduled tasks that can be developed from an existing maintenance management system or a proposed project schedule. Routine tasks will help extend the life of the trail, provide a high-quality trail system, and improve safety. Non-routine tasks are unscheduled tasks that may be the result of routine tasks (i.e., inspection). Non-routine tasks include both major redesign and construction components, as well minor tasks that are not regularly scheduled.

Many county and state plans similarly classify maintenance tasks into these two categories. The frequency of scheduled tasks will vary depending on location. Table 1 summarizes both routine and non-routine maintenance tasks for Fairfax County, Virginia; Bozeman, Montana; the State of Iowa; and the Rails-to-Trails Conservancy.

Table 1: Maintenance Checklist Compiled from Other Community Plans

<i>Routine (Scheduled) Maintenance Tasks</i>				
Task	Notes	Frequency	Man-hours (per 1000 lft)	Source
Trail Inspection	Walking	Monthly	.2 hr	1
	Driving	Monthly	.1 hr	1
	Surface Investigation	Yearly	NA	2
		2X Monthly	NA	4
Mowing	Hard Surfaces	3X Annually	.5 hr	1
	Natural Trails	Monthly	.25 hr	1
	--	2X Monthly	NA	3
Tree & Brush Pruning	--	2X Annually	.5 hr	1
	--	4X Annually	NA	3
Leaf & Debris Removal	--	1X Annually	.25 hr	1
	--	4X Annually	NA	3
Surface Cleaning	Asphalt Trail	Monthly	NA	3
<i>Planned (Scheduled) Maintenance Tasks</i>				
Task	Notes	Frequency	Man-hours (per 1000 lft)	Source
Painting and Repair of Amenities	--	Every 5 years	NA	2
Sealcoat Asphalt Trails	--	Every 5 years	NA	2
Resurface/regrade/restripe Trail	--	Every 10 years	NA	2
Replace/reconstruct Trail	--	Every 20 years	NA	2
<i>Irregular (As-Needed) Maintenance Tasks</i>				
Task	Notes	Frequency	Man-hours (per 1000 lft)	Source
Snow & Ice Removal	--	As Needed	.5 hr	1
	--	As Needed	NA	3
Clean and Replacement of Culverts	Cleaning	As Needed	1 hr	1
	Repair	As Needed	1.5 hr	1
	Cleaning	As Needed	NA	3
Maintenance of Water Crossings	--	As Needed	1 hr	1
Repairs to Signs & Other Amenities	--	As Needed	.5 hr	1
	Pavement Markings	As Needed	NA	3
	Trailheads	As Needed	NA	3
Repaving/Sealing of Asphalt Trail	Asphalt Trail	As Needed	NA	3
Pothole Repair	--	As Needed	NA	3

Sources: 1. Fairfax County Authority Guide to Trail Management
 2. Iowa Trails 2000
 3. Rail-Trail Maintenance & Operation
 4. Bozeman Parks, Recreation, Open Space and Trails Plan

A few maintenance items are described in different categories (e.g., painting, resurfacing, trail replacement, etc.) by different sources. These specific items can all be classified as non-routine tasks since they occur less than once per year.

The St. John's County (Florida) Trail Operation, Maintenance and Management report also separates its maintenance tasks into routine (scheduled), minor repairs (every 5 years), and major

reconstruction (unscheduled). Their routine maintenance tasks include: facility evaluation, tree/brush clearing, mowing, map/signage updates, trash removal/ litter clean-up, flood damage repair, minor road repairs, planting/pruning, and seasonal signage installation/removal. Minor repairs include replacement of trail amenities, replacement of small trail segments, trail restriping, and seal coating asphalt trails. Major reconstructions include resurfacing an entire asphalt trail and complete replacement of a concrete trail.

National Trails Training Partnership's Trail Maintenance and Management report recommends similar scheduled and irregular maintenance tasks for greenways and urban trails. Their scheduled tasks include: trail inspection, trail sweeping, trash removal, tree/shrub pruning, mowing of vegetation, and scheduling of maintenance tasks. The irregular maintenance tasks include: trail repair, trail replacement, snow/ice removal, weed control, trail edging, trail drainage control, trail signage, re-vegetation, and habitat enhancement/control.

The frequency of these maintenance tasks will vary on the location of the trail system. In addition, the project or maintenance budget can also limit the maintenance task frequency.

TASK BUDGETING

Although only a portion of maintenance tasks need to be routinely scheduled, the entire budget for both routine and non-routine tasks needs to be developed at the beginning of the project. Non-routine maintenance tasks occur at unscheduled times and often need to be completed immediately. Therefore, funding needs to be set aside and made readily available for these tasks. Table 2 shows the average annual maintenance costs per mile for several different jurisdictions evaluated during this literature review.

Table 2: Maintenance Budgeting

<i>Average Maintenance Budget</i>	
Location/ Organization	Yearly Rate (\$/mile)
Encinitas, CA	2617
Lebanon, OR	1819
State of Iowa	1500
National Trails Training Partnership	2525
Rails-to-Trails	1200*
<i>Average</i>	1932.20

*Recommended minimal value

The Rails-to-Trails Conservancy provided an absolute minimum value that should be set aside for maintenance operations. The other values provided in Table 2 are an average of different trail types for several different regional locations. Trail locations will greatly affect the amount of required maintenance, as well as maintenance costs. Therefore, the average maintenance budget value provided in Table 2 should be used as a general estimate for comparison purposes and not necessarily as a recommended absolute value.

ADDITIONAL ITEMS

As portrayed in the task budgeting section, maintenance costs can become very elevated as the amount or length of trail increases. This is a common problem for many cities and counties that can cause major budget concerns. One strategy to help remedy this problem is preventative maintenance methods. The Minnesota Local Road Research Board published an article (Preventative Maintenance for Recreation Trails, 2009) about different methods that can be taken to minimize the time and effort taken for maintenance to lower overall costs. The preventative maintenance methods generally preserve the life of the trail material with seal coats, surface treatments, and crack treatments to asphalt trails. The article investigated several different products to find the ones that performed best for different asphalt designs. These methods help extend the life of the trail and therefore reduce the maintenance costs for trail replacement.

The Federal Highway Administration (FHWA) published an article (Lesson 21: Bicycle Facility Maintenance) including implementation strategies for bicycle facilities. Their strategies include maintenance-minded design and user inspection. Maintenance-minded design includes using edge and shoulder treatments and limiting access to minimize the amount of debris, and using materials

that will extend the life of the trail. Implementing user inspection will lower the costs for routine maintenance by placing the responsibility on the direct users of the facility.

Other jurisdictions have embraced additional user-based funding strategies to help lower maintenance costs. Adopt-a-Trail is a similar program to Adopt-a-Highway, where users and volunteers agree to pick up trash and litter and report any obvious problems with the facility. The state of West Virginia (Mount Vernon Parks and Recreation) has embraced an Adopt-a-Trail program for their state where volunteers are asked to pick up litter four times a year for their trail segment. They give their volunteers additional responsibility with mowing and trimming and require several safety and instructional meetings. The greater Cheyenne, Wyoming area has implemented a similar program called Adopt-a-Spot, where businesses and volunteer organizations from across the community have adopted anywhere from 0.25 to 1 mile segments of trail.

It is evident from this literature review that there is a great deal of planning and strategy that goes into the development and implementation of a trail maintenance plan. Several other elements have been discussed that will help keep a maintenance budget on track and design strategies to minimize maintenance requirements. As the city of Billings and Yellowstone County complete the initial phases of implementing a trail maintenance plan, it is recommended that additional research be completed on progressive strategies for future maintenance plan updates.

INVENTORY OF EXISTING TRAILS

TRAIL TYPES

For the purposes of this trail asset management plan, the Billings-area trails have been separated into hard surface multi-use trails and soft-surface trails. The following paragraphs describe each type of trail.

Hard Surface Multi-Use Trails

Hard surface multi-use trails are generally 8 to 10 feet wide with an asphalt or concrete surface, which provide opportunities for multiple uses (bikes, pedestrians, roller blades, strollers, etc.) and are

generally considered to be ADA accessible. These include trails located within City parkland, trail corridor easements, private subdivisions, and along roadways within City rights-of-way.

Soft Surface Trails

There are also numerous soft-surface trails in City parks and around Billings, most of which are located along the Rims and the Yellowstone River. Soft-surface trails are generally considered to include all trails that do not have a paved surface. They may be constructed with gravel, fines, wood chips, or compacted native soils. Soft-surface trail locations include Phipps Park, Two Moon Park, Earl Guss Park, Pow Wow Park, Swords Park, and many others. Limited maintenance for soft-surface trails is currently being provided by PRPL, the Yellowstone River Parks Association (YRPA), and other volunteer organizations. Although soft surface trails may be added in the future, this plan will focus primarily on the maintenance of hard-surface multi-use trails.

TRAIL INSPECTION

As a basis for analysis, a comprehensive inventory of existing trails was conducted as part of the development of this plan. It was completed largely by volunteers from the Chamber of Commerce Trails Committee and the Billings Police Department Volunteer Bike Patrol. Each volunteer was assigned a trail segment for inspection and given a checklist of items to review. A copy of the checklist that was used, along with a summary of the inspection results, is provided in Appendix A.

EXISTING MAINTENANCE ACTIVITIES

PARKS RECREATION AND PUBLIC LANDS DEPARTMENT

The City of Billings Parks, Recreation and Public Lands Department (PRPL) currently maintains all of the trails located within City parkland. Maintenance of hard-surface trails that overlap City and County jurisdictions (such as the MetraPark Trail and those along the river) have been maintained by the PRPL, although there is no formal agreement for this service nor money paid to PRPL. They also maintain trails that were constructed within private subdivisions that have been granted to the City within public access easements or rights-of-way. Examples of these types of trails include the trail through Transtech Center Subdivision and the Midland Trail along Midland Subdivision south of Home Depot.

PRPL also provides trail maintenance within subdivisions through existing park maintenance districts. Park maintenance districts have been in place since the early 1980's, but they do not cover parks and subdivisions developed before that time. To date, the majority of trails that have been constructed in the Billings area have not been tied to an existing park maintenance district, so there have not been a significant amount of new funds available for maintenance of the expanding trail system.

Most of the park maintenance districts have come about because new subdivisions are required, as a condition of annexation into the City, to develop the park areas within them and to create a corresponding maintenance district. They're also required to file a waiver of protest for the properties within the subdivision for future park improvements and maintenance districts that they may be included in. It is difficult to track the exact dollar amount spent on trails through this program because many of the maintenance activities overlap with routine maintenance activities for the parks themselves. Common tasks include snow removal, weed control, graffiti removal, sweeping, trash removal and mowing.

Funded through the City General Fund, PRPL is also responsible for the maintenance of all parks and trails that do not fall within a specific park maintenance district. This budget is vulnerable and in the past has not been able to keep up with the growing demand. In addition, as the City continues to grow, the number of park maintenance districts increases with each new subdivision. By having separate districts, there is considerably more paperwork and man hours involved in tracking the budgets for each.

PUBLIC WORKS DEPARTMENT

The City of Billings Public Works Department is currently responsible for the maintenance of all hard-surface multi-use trails located within the City's public rights-of-way. This includes trails along Alkali Creek Road, Zimmerman Trail, South Billings Boulevard, Shiloh Road, Aronson Avenue, and King Avenue West, among others. The Public Works Department currently has a working agreement with PRPL for the routine maintenance of many of these trails, including snow removal, mowing and general landscape care along the trail corridors. Any actual repair or replacement of

trails along City roadways is conducted by the Public Works Department through their Street-Traffic Division.

COUNTY PARK BOARD

The County Park Board oversees all County-owned parkland located outside of the City limits and within Yellowstone County. The Park Board consists of a ten-member volunteer board appointed by the Yellowstone County Commissioners. One of the Commissioners sits on the County Park Board and serves as a liaison to the County Commissioners.

The County does not have an official parks department, but the County Parks Director provides staff time to the County Parks Board. They hold regular monthly meetings and oversee any contracted park maintenance. Funding for the Parks Director position and contracted park maintenance is currently provided through the Park Board and County Commissioners. Other sources of maintenance funding include the proceeds from leasing County parkland and up to 50% of cash in lieu of subdivision parkland dedications. State law requires a developer to provide a parkland dedication or cash with the size/dollar amount being dependant on lot size and density of the subdivision. Cash in lieu monies are earmarked for park development in or near the subdivision from which the monies were collected. Yellowstone County, through the Parks Director and Parks Board, also maintains a caretaker at Two Moon Park who performs minimal tasks and oversees the use of the park.

At the present time, no specific trail maintenance dollars are expended through the County, except for weed control that occurs through the County Weed Department. Maintenance of the hard-surface trails that overlap City and County jurisdictions (such as the MetraPark Trail and those along the river) have been maintained by the City of Billings PRPL. However, there is no formal agreement in place for this service or money that changes hands.

COUNTY WEED DEPARTMENT

The County Weed Department oversees weed control within the County, including the control of noxious weeds within City limits. Through an existing informal agreement with the City, the County Weed Department performs noxious weed control via herbicide applications and bio-control releases along selected portions of the trail system. The costs of weed control can vary greatly by

the type of existing vegetation, level of re-vegetation and the amount of time that has passed since construction of the particular trail corridor was completed. Newly constructed trails require heavier treatments for the first two to three years until new vegetation is established.

The County Weed Department has estimated the total cost of weed control along trail corridors to be approximately \$2,640 in 2009 and \$4,650 in 2010. The City currently pays the County Weed Department for these costs. The cost of weed control will continue to increase as additional trails are constructed. Limited funding only allows for treatment of trouble spots. However, in order to adequately deal with weed control, emphasis needs to be placed on the establishment of desirable plant communities when the trails are first constructed. Therefore, all new trail projects should provide a vegetation/weed management plan, along with maintenance and associated funding plans, to effectively address the future maintenance of these systems.

COUNTY PUBLIC WORKS DEPARTMENT

The County Public Works Department currently does not participate in any regular maintenance activities involving trails.

VOLUNTEER ORGANIZATIONS

Yellowstone River Parks Association

The Yellowstone River Parks Association (YRPA) is a non-profit organization that has worked with PRPL to build and maintain various soft-surface trails at Riverfront Park, Norm Schoenthal Island, the Conservation Education Center (owned by YRPA), Mystic Park, Earl Guss Park, and Two Moon Park. YRPA uses supervised personnel from the County jail, as well as volunteers from the community to perform maintenance tasks. They also solicit funds for materials, landscaping and maintenance from grants and private contributions.

Billings Police Department Volunteer Bike Patrol

The Billings Police Department (BPD) Crime Prevention Center regularly coordinates many different groups of volunteers, including the recently established Volunteer Bike Patrol. This is a group of approximately fifty avid cyclists that act as ambassadors for the BPD by regularly riding the trails throughout the Billings area to inspect their condition and deter criminal and suspicious

activities. The Volunteer Bike Patrol played a key role in completing the trail inspections that were conducted as a part of the development of this plan and can be effectively utilized for ongoing trail inspections and other activities.

Other Volunteer Organizations

The Yellowstone Valley Cycling Club (YVCC) and the Yellowstone Conservation District (YCD) are two additional volunteer organizations that have shown great interest in helping to build and maintain trails in Billings and Yellowstone County. YVCC has constructed approximately 3.75 miles of soft surface mountain bike trails in Phipps Park. YCD has contributed to the installation of landscaping and amenities along several trail corridors. They planted a pocket area of natural vegetation and built a picnic shelter along the Kiwanis Trail. They also provided an additional picnic table at the Swords Park trailhead and have expressed a desire to apply for grant funding to establish natural vegetation in the area as an educational tool for the public.

PRPL values these partnerships with local clubs and service organizations to make improvements and maintain park facilities. PRPL has a major responsibility to manage the parks and public lands in Billings and to protect the health, safety and welfare of citizens while they utilize trails and other park facilities. To that end, PRPL encourages open communication and agreements with these organizations to ensure park improvements and maintenance are done properly.

RECOMMENDED MAINTENANCE ACTIVITIES

The following paragraphs address recommended maintenance activities, primarily for the hard-surface multi-use trails. This asset management plan will ideally address soft-surface trails at some point in the future, but hard-surface trails are the focus of this current effort. Trail user safety is of primary importance for all trails and necessary maintenance operations should be scheduled accordingly.

All maintenance activities will be designated as either routine or non-routine. Routine maintenance activities must be performed on a continuous, scheduled basis. Many are seasonal in nature, but are still considered routine activities. Non-routine maintenance activities are performed on an as-

needed basis in response to a particular problem that needs repair or replacement. These activities will often arise through the result of periodic trail inspections or comments received from trail users.

Management of Trail Maintenance

The long term success of the trail system in Billings and Yellowstone County is contingent on the community's ability to maintain the existing and expanded system. Trails and on-street bike lanes within the City of Billings are maintained by the departments of Parks & Recreation and Public Works. With the City's current financial resources, the recommended maintenance activities outlined in the "Trail Asset Management Plan" would be an optimal maintenance program. Current resources available for trail and on-street bike lane maintenance do not allow the responsible departments to provide these levels of maintenance. While these recommended maintenance activities are desirable, they are lofty recognizing the City and County's existing financial situation. The City of Billings is committed to the Billings Area Bikeway and Trail Master Plan and has committed to providing maintenance of the trails and on-street bike lane system. Trails and on-street bike lanes within the City right-of-way (ROW) will be cleared of snow along arterial and collector streets. Trails within the ROW will be annually swept and repaired as needed. All trails within City parks will be maintained and repaired for seasonal use. Trails within City parks will be prioritized through a cooperative effort of Parks & Recreation Department and Planning Division, and the highest priority trails will be maintained year-round. If funding becomes available for trail maintenance, the City will strive for the maintenance levels recommended in the "Trail Asset Management Plan."

ROUTINE MAINTENANCE ACTIVITIES

Trail Inspection

Trail inspection is an integral task to all trail maintenance operations, especially as they relate to ensuring user safety. Inspections should occur on a regularly scheduled basis with the overall frequency depending on location, type and age of the trail. PRPL staff currently performs trail inspections in conjunction with other routine maintenance activities. They may also be conducted in response to user complaints. All trail inspections and complaints regarding the physical appearance

of the trails should be documented. Routine inspections and documentation can remain relatively simple and should include inspection of bridges, tunnels, railing, fencing and retaining walls. More detailed and thorough inspection of bridges, tunnels, railing, and retaining walls should be conducted on a less frequent basis. Trail inspections should also include seasonally checking for tree hazards using accepted hazard assessment practices. Whenever public safety is in question, a certified professional should be consulted.

As discussed previously, initial trail inspections were conducted as part of the development of this plan to establish a baseline for the study and provide an example of the minimum level of inspection that should be conducted on a regular basis moving forward. The results of this effort are summarized in Appendix A.

Trail Sweeping

Trail sweeping is an important aspect of trail maintenance that helps to ensure trail user safety. The type and frequency of sweeping required will depend on trail design and location. Trail sweeping should be done on an as needed basis and may tend to be limited to localized situations at street crossings, where the trail runs through a storm drainage area, or around construction sites. Trails that require sweeping of the whole corridor should be swept by machine, but trails that only require spot sweeping can be swept by hand or with blowers. Some trails may require a combination of methods.

Snow and Ice Removal

Snow removal on hard-surface trails should occur as soon as possible after a snowfall. PRPL should be responsible for snow removal on all hard-surface trails in order to avoid duplication of services and equipment. Ice on trails is not typically removed or treated with de-icer because it only occurs on an infrequent basis and usually only for a short duration.

Mowing

Mowing along trails in developed parks should typically be done on a weekly basis throughout the active growing season, estimated to be approximately 26 weeks by PRPL. Mowing height should be set at 3.5 inches for optimal soil moisture conservation and to enhance turf health.

Vegetation management along trails through natural areas should also consist of mowing on a regularly scheduled basis. Typically a strip 2 to 5 feet wide is mowed along the edges of the trail. This should be done to prevent weed encroachment onto the trail surface, improve site distance and provide a clear run out zone. Consideration should be given to the different grass species and their biological and cultural needs when determining mowing frequency and height.

Trash Removal

Trash removal from trail corridors is important from both a safety and an aesthetic viewpoint. It includes removing ground debris and emptying trash containers. Trash removal should take place on a regularly scheduled basis, the frequency of which may depend on trail use and location. Because litter is a year-round problem, trash containers should be located near street crossings or parking areas where they are easily accessible by maintenance vehicles. Pet litter bag dispensers and signage should also be located near trash containers. The ongoing maintenance costs associated with pet litter stations (including the cost of refill bags) should eventually be included in the annual budget for all trails.

Irrigation

Due to the fact that Billings lies in the semiarid west, it is important to plant vegetation along the trails that can endure fairly extreme environmental conditions. Native landscaping practices should integrate the principles of several conservation initiatives such as reduced water and chemical use, wildlife habitat enhancement, and invasive weed management. Even by following native landscaping principles, water is still a necessary component to establish many types of landscaping. Where supplemental watering may be needed, provisions must be made during trail construction for the use of either truck mounted watering tanks or drip or spray irrigation systems.

Tree and Shrub Management

Trees and shrubs along the trails should be managed to keep them from interfering with trail use, eliminate hazards, prevent trail damage and ensure a healthy plant structure. These types of activities should be performed on a scheduled basis, but may also be completed as needed.

Weed Management

Weed control along trails should be performed to target problematic vegetation (such as the Puncturevine “goathead” thorns along trail edges) in addition to the species that are identified as noxious weeds under the statutes of Montana and Yellowstone County. Environmentally safe weed removal methods should be used, especially along waterways. Trails provide an opportunity to help educate the public about the local environment, including the invasive species of noxious and nuisance weeds.

Weed management requires a continuous effort because noxious weed species are hardy plants that are often times difficult to eradicate. Weed seeds can easily be spread by trail users on their clothing or shoes, as well as by animals and birds. Many of the trails are along riparian areas, and the river and waterways provide a constant and increasing amount of weed seeds that can work their way up the stream banks and inland. Informational material on noxious weeds should be made available to trail users at kiosks, trailheads or specific infestation sites. Information on what to do if they find a noxious weed should also be provided at these sites, including contact information for the County Weed Department. The BPD Volunteer Bike Patrol could also be educated on how to identify noxious weeds and notify the County Weed Department when they find them. These volunteers, as well as other service organizations, could also be taught how to properly remove and dispose of noxious weeds.

Newly constructed trails require heavier treatments for the first two to three years until new vegetation is established. Current funding allocations only allow for treatment of trouble spots, but in order to deal adequately with weed control, emphasis needs to be placed on the establishment of desirable plant communities when the trails are first constructed. Therefore, all new trail projects should provide a vegetation/weed management plan, along with maintenance and associated funding plans, to effectively address the future maintenance of these systems.

NON-ROUTINE MAINTENANCE ACTIVITIES

Graffiti Removal

Graffiti is an unfortunate and costly occurrence in parks and public lands, and trails and their associated amenities are no exception. The key to graffiti control is constant observation and

prompt removal. When graffiti is observed during scheduled trail inspections or when it is reported by the public, it should be brought to the immediate attention of maintenance crews for removal. Graffiti is a main focus area of the BPD Volunteer Bike Patrol and they have been a great help to PRPL in identifying problem areas. PRPL's response time for graffiti removal is typically 24-48 hours.

Trail Signage Repair/Replacement

Trail signage includes direction, location and interpretive information, as well as trail safety information. Signs related to safety are most important and should be considered a high priority for replacement when they become unreadable due to age or damage. Informational and interpretive signage can enhance the trail users' experience, but are not critical to user safety. In trail areas where visibility is limited due to horizontal or vertical curves, center lane striping may be desirable to help divide two-way traffic. If used, center lane striping should be refreshed on an annual basis or as needed.

Trailheads

As the trail system expands, there will be more need to identify new trailhead locations serving as access points to the trail system and to improve existing trailheads. These trailheads should include amenities such as vehicular parking, public restrooms and drinking fountains, and kiosks with trail maps, location and emergency information. As these facilities are installed, consideration should be given to material types, durability and location for ease of maintenance and repair. Standardization of these facilities is important to reduce required maintenance operations and costs.

Trail Amenity Repair/Replacement

Various other amenities have been constructed along the trail system, many of which were provided and constructed by volunteer organizations. These amenities include tables, benches, kiosks and picnic shelters. These structures along with the trailhead amenities noted above need continuous inspection to make sure they are in good repair and safe for use. Consideration should be given to material types, durability and location for ease of use, maintenance and repair. Standardization of these amenities is important to reduce required maintenance operations and costs.

Trail Surface Repair/Replacement

Prioritization of trail surface repairs should be a component of the trail inspection process. The time between observation and repair of a trail should depend on whether the needed repair is deemed a hazard and to what degree the needed repair affects the safety of trail users. Another important consideration will be whether the needed repair can be performed by the responsible maintenance crew or if it should be contracted out to another agency or a qualified contractor.

Since many of the trails are located in areas where they are adjacent to or cross sewer lines, gas pipelines, canals or ditches, PRPL should coordinate with the appropriate utility company or agency to make them aware of anticipated trail repairs. Also utility companies and agencies should contact PRPL when they need access to their infrastructure to coordinate any detours or trail closures during repairs and to coordinate trail restoration.

The decision to replace a trail surface, the type of replacement, and the responsible agency will all depend on many factors. These factors should include the age of the trail and money available for replacement. Replacement involves either completely overlaying an asphalt trail with a new asphalt surface or a complete replacement with a new concrete or asphalt surface. Trail replacement, except for trails within the public right of way, should be coordinated by PRPL.

COST SUMMARY AND BUDGET RECOMMENDATIONS

ROUTINE MAINTENANCE COSTS

Routine maintenance activities are performed on a continuous, scheduled basis. Therefore, the cost of such tasks can be determined using the number of hours PRPL and other maintenance crews are currently spending on the various maintenance tasks for each particular trail corridor. The number of hours per year can be multiplied by the hourly maintenance crew rate to determine the approximate cost per year for routine maintenance activities. The table provided in Appendix B presents a summary of these calculations for three different trail types in the Billings area trail system. The crew hours and rates used in these calculations are based on information provided by PRPL.

- **Park/Corridor Trails.** These are approximately 20 foot trail corridors that run through developed and undeveloped parklands. Maintenance costs per mile averages \$2,596.50. Maintenance funding for these trail segments comes from the City's General Fund.
- **Subdivision Trails.** These trails are typically located in linear, narrow tracts of parkland and are an integral part of the subdivision. These tracts are fully landscaped with turfgrass, irrigation and trees and shrubs and fence line. Many of these trails serve the pedestrian circulation needs of the subdivision in lieu of traditional sidewalks. Maintenance costs per mile averages \$4,618.72. Funding to maintain these trails is allocated through a Park Maintenance District assessed to the property owners of the subdivision.
- **Roadway Trails.** These trails run along side roads within the street right of way. Many of these trail segments are fully landscaped with turfgrass, irrigation and trees and shrubs. Included in these trail segments are 6 lighted tunnels. The costs per mile averages \$5,869.67 and the majority of these funded through a maintenance agreement between PRPL and the City of Billings Public Works Department.

Results of these calculations show that the City of Billings currently spends approximately \$171,000 per year on routine maintenance activities, which is equivalent to approximately \$4,100 per mile of trail. These figures should be used by the City and County to determine a reasonable budget for maintenance activities on an annual basis. These calculations should be continuously updated based on actual hours spent maintaining each trail and to account for new trails that are constructed each year. To begin with, the average cost per mile can be used for budgeting purposes for new trails with minor adjustments made for anticipated site specific conditions. Actual budget numbers for each new trail can then be determined within one year after construction is complete using the same method described above.

NON-ROUTINE MAINTENANCE COSTS

Non-routine maintenance activities are performed on an as-needed basis in response to a particular problem that needs repair or replacement. These activities will often arise through the result of periodic trail inspections and/or comments received from trail users. Because these tasks are completed on an irregular basis, the cost of such activities cannot be calculated in the same manner as routine maintenance activities.

In addition, the amount of funding for non-routine tasks can vary greatly depending on the type of maintenance required. For example, graffiti removal would be much less expensive than replacement of a trail section. Therefore, it is recommended that a pool of funding for smaller non-routine maintenance activities be set aside each year as part of the City and County budgeting processes. It is anticipated that approximately \$10,000 per year would cover costs of smaller non-routine projects for the existing trail system, including graffiti removal, signage replacement, amenity repair and minor surface improvements. This figure should be evaluated annually and necessary adjustments should be made as actual dollars spent are tracked from year to year. It is recommended that any unused funds at the end of the year be rolled over to the next year, and as they build up over time, these funds could be used to fund slightly larger projects.

Larger surface improvement projects and complete replacement projects should be funded through the more traditional methods currently being used to fund new trail construction projects. Because of the size of these projects and the estimated life cycle of existing trails (20-40 years, depending on surface type), it is not practical for the City of Billings or Yellowstone County to try to begin budgeting for these replacements on an annual basis. Alternatively, it is recommended that the federal funding options available for trail construction be pursued to fund these projects when the need arises at some point in the future. These funding sources may include the Community Transportation Enhancement Program (CTEP), Recreational Trails Program (RTP), and the Transportation, Community, and System Preservation Program (TCSP).

The table included in Appendix C provides a summary of estimated replacement costs for the existing trails in Billings and Yellowstone County. These calculations are based on an assumed construction cost inflation rate of 4% per year and assumed facility life cycles of 20 years for asphalt trails, 40 years for concrete trails, and 50 years for the concrete structures that support the pedestrian underpasses. Each of these assumptions is consistent with current industry standards. To date, Billings and Yellowstone County have made a \$12.3 million investment in constructing the existing trail system. It should be noted that construction cost information was not readily available for all trail segments listed in Appendix C, so the actual dollar figure would likely be much higher.

Results of the calculations in Appendix C show that the ultimate replacement cost of these facilities may be over \$100 million, if replaced all at once, at the end of the life cycle. However it's

unreasonable to assume that replacement would actually take place in this manner. It should also be noted that these replacement cost estimates do not account for the one-time fees associated with the original trail construction that would not necessarily be required for the replacement project, such as the cost of utility relocations or right-of-way acquisition. Because these one-time fees can be difficult to approximate on an individual project basis, and in order to add a measure of conservatism to these estimates, no attempt was made to adjust for these fees.

ADMINISTRATIVE AND ADDITIONAL STAFFING NEEDS

PRPL has traditionally assumed the maintenance responsibilities for the trail system. As the system has grown in size maintenance and administrative costs have been absorbed into the existing operations. With over 35 miles of trails currently in use, these costs have become significant. It is recommended that PRPL track these costs to be considered during the annual budgeting process. Along with covering administrative costs, additional staffing needs should include an individual that would be responsible for trail maintenance, as discussed in greater detail in the Implementation Strategies section of this report. It is recommended that this new position be a full-time staff person supervised by the Parks Division Superintendent. A reasonable funding level for this position would be \$45,000 per year, including benefits.

FUNDING OPPORTUNITIES

There are several funding sources available for trail construction, improvements and maintenance, through Federal and State agencies. The Billings Area Bikeway and Trail Master Plan provides a listing of the available sources and their application to trails in parks and rights-of-way. More detailed discussion of those programs specifically providing maintenance funding opportunities is provided in the following sections.

Adopt-A-Trail

Adopt-a-Trail programs assign the responsibility for cleaning and maintaining segments of trails to interested organizations or individuals. As part of the Billings Area Bikeway and Trail Master Plan, the Planning Division and their consultant team are considering options for a multi-tiered adopt-a-mile program where individuals or organizations would have the opportunity to adopt a mile of trail and contribute towards the annual maintenance costs of that particular piece of trail, as well as be

recognized for their contribution in some fashion along the trail corridor. Refer to the Billings Area Bikeway and Trail Master for additional information regarding this program.

Recreational Trails Program

A grant application for Recreational Trails Program funding can be submitted for trail maintenance. This is a reimbursement program so the money would need to be expended first and then reimbursed by the State after the project is completed. The application must be for a specific trail and maintenance activity, such as weed control along Swords Park Trail. This is not an ongoing, dependable source of funding as the applicant needs to reapply each year and the most that can be granted for a particular project is \$35,000. There is a significant demand for this funding across the state, so very few projects receive the full application amount.

Park Maintenance Districts

The existing subdivision policy requires new subdivisions to create a park maintenance district to maintain new public parks and trails created within the subdivision. This mechanism can only be used for parks and trails located in new subdivisions. It cannot be used for new trails created within existing parks. Individual park maintenance districts create a fragmented system and an incomplete mechanism for maintaining the entire system of parks and trails. A city-wide or county-wide maintenance district would provide a more comprehensive approach to system-wide funding for park and trail maintenance.

Park maintenance districts generally fund maintenance of landscaping, trees, irrigation systems, trails, sidewalks, lighting and park equipment. The purpose of the district is to provide perpetual maintenance of the improvements. Maintenance costs are estimated and approved by the City Council on an annual basis and each lot within the district is assessed an equal amount.

Special District by Assessment

Trail maintenance and improvements could be funded through the creation of a city-wide special assessment district. State law (MCA Section 7-11-1001 et. Seq.) grants Montana cities the authority to establish special assessment districts. A district can be formed if less than 50% of property

owners protest. The assessments can also be adjusted annually by City Council to meet changing needs.

Gas Tax

Gas tax revenues are generated through State gasoline taxes. These funds can be used for construction, reconstruction, repair and maintenance of streets. Half of the City's allocation is based on population, while the other half is based on miles of streets and alleys located within the City. Gas taxes have traditionally been used primarily for roadway maintenance within the City of Billings and Yellowstone County. However, state code also allows gas taxes to be used for trail maintenance within public rights-of-way.

PILT Funds

Payments in Lieu of Taxes (PILT) are Federal payments to local governments that help offset losses in property taxes due to nontaxable Federal lands within their boundaries. Yellowstone County receives an annual payment from the Federal Government based on the number of acres of qualified Federal land located within Yellowstone County. These funds may be used at the County's discretion for any governmental purpose.

Public Utility Bill Donations

City residences and businesses receiving water and sewer services are invoiced monthly. The invoice could include a voluntary option for the customer to donate money for the development and maintenance of the trail network. The money received from this program would be transferred to an account established for these purposes. In addition to trail development and maintenance, the money could also be used to match grant funds.

Private Funding Sources

Private funding could be solicited through the PRPL Foundation or through advocacy groups like BikeNet that have a 501(c)(3) designation to establish an endowment fund for trail maintenance.

IMPLEMENTATION STRATEGIES

Establish a Public Comment System

As discussed previously, a common factor that often influences the public's support of trail funding is the visual condition of the trails. Regular trail users are often times the first to notice trail deficiencies or safety issues. Therefore, it is recommended that the City of Billings and Yellowstone County implement a user feedback system that will give the public the opportunity to provide comments related to trail condition directly to the agency responsible for the maintenance of that particular trail. This can be done by posting a sign or kiosk at each trailhead with the necessary contact information. Self-addressed comment cards could also be provided in these locations.

Require a Maintenance Plan for All New Trails

In order to ensure that each new trail is evaluated for future maintenance needs, it is recommended that a new policy be established in the City of Billings and Yellowstone County that requires preparation of a maintenance plan for each new trail that comes on line. The plan should include all standard trail characteristics (surface type, width, location and length) as identify which agency will be responsible for maintenance and any special requirements for the particular trail. The plan should also include cost information that can be incorporated into the annual budgeting process. An example worksheet that could be used for this process is included in Appendix D. Maintenance plans should be completed during the design process for new trails to ensure that responsibility and necessary funding for trail maintenance has been addressed before the trail is even constructed.

Implement a Maintenance Management System

It is recommended that the City of Billings and Yellowstone County eventually implement a trail maintenance management system, similar to what has been implemented in Fairfax County, Virginia. The system can provide an inventory of existing trail conditions and amenities, as well as provide a central location for tracking all maintenance records and recorded work hours. As this database is continuously updated, it can be used for determining required budget adjustments on an annual basis. It is recommended that the system be integrated into the City and County GIS system, so trail maintenance maps can easily be developed for planning purposes.

Establish a Volunteer Coordinator Position

As service organizations and volunteer groups continue to step forward to offer assistance with maintenance of the trail system, a Volunteer Coordinator position should be established to provide direction and consistency in coordinating the available service hours with the maintenance operations needed. In order to reduce exposure to liability issues, the Volunteer Coordinator would also be responsible for coordinating which maintenance operations will be best suited to the capabilities of the particular volunteer group. Other potential responsibilities of this staff position include implementation of the maintenance management system (as noted above) and administration of the Adopt-a-Trail program and other recognition programs outlined in the Billings Area Bikeway and Trail Master Plan.

Further Define Agency Roles and Responsibilities

As the trail system in Billings and Yellowstone County continues to expand, it will become even more critical that the roles and responsibilities of each agency be clearly defined. It is also recommended that a point person be identified as the individual responsible for coordination between agencies and continually updating the recommended maintenance management system. These tasks could fall within the duties of the Volunteer Coordinator position noted above or an existing PRPL staff position.

Establish Specific Agency Agreements

There are numerous formal and informal agreements in place between City and County agencies for trail maintenance. This provides for a cost effective use of available resources and should be continued in the future. However, consideration should be given to the type of equipment and staff available to each agency to ensure that duplication of expensive equipment is avoided. PRPL has most of the equipment required for trail maintenance and can arrange for seasonal staff, but a consistent budget needs to be in place for the department to be able to continue to fund this operation. The same is true for the County Weed Department. It has the equipment, staff and knowledge to effectively treat noxious and nuisance weeds, but they need a consistent budget to adequately provide this service for the entire trail system. Written maintenance agreements should be established between City and County agencies to identify responsibilities, and, when responsibilities for departments overlap jurisdictions, inter-local agreements should be written to clearly define the funding, staffing and equipment obligations of the responsible party.

APPENDIX A
**TRAIL INSPECTION CHECKLIST
AND SUMMARY**



TRAIL INSPECTION FORM
CITY OF BILLINGS TRAIL MAINTENANCE PLAN

TRAIL SEGMENT: FROM: TO:

SURFACE TYPE: ASPHALT CONCRETE SOFT SURFACE

APPROXIMATE LENGTH: APPROXIMATE WIDTH:

LANDSCAPE TYPE: TURF NATIVE GRASSES TREES/SHRUBS OTHER

ARE CRACKS OR SIGNIFICANT DETERIORATION PRESENT IN THE TRAIL SURFACE? YES NO
IF SO, PLEASE NOTE APPROXIMATE LOCATIONS AND/OR NUMBER OF CRACKS

ARE ANY OF THE CRACKS SEVERE ENOUGH THAT THEY HAVE RESULTED IN VERTICAL DISPLACEMENT OF THE TRAIL SURFACE? YES NO
IF SO, PLEASE NOTE APPROXIMATE LOCATIONS

IS THERE ANY TREE ROOT DAMAGE VISIBLE ALONG THE TRAIL? YES NO
IF SO, PLEASE NOTE APPROXIMATE LOCATIONS

IS THE TRAIL & ADJACENT LANDSCAPE AREAS RELATIVELY CLEAR OF LITTER & DEBRIS? YES NO
IF NOT, PLEASE NOTE AREAS THAT NEED ATTENTION

WAS ANY GRAFFITI OBSERVED ALONG THE TRAIL? YES NO
IF SO, WHERE?

DO BENCHES, SHELTERS, & OTHER AMENITIES APPEAR TO BE IN GOOD CONDITION? YES NO
PLEASE NOTE ANY DEFICIENCIES

DOES THE LANDSCAPING APPEAR TO BE ADEQUATELY MAINTAINED? YES NO
PLEASE NOTE ANY DEFICIENCIES

Trail Inspection Summary

12/3/2010

Trail Corridor	Trail Characteristics				Observed Problems (Yes/No)								Observed Conditions (Good/Poor)												
	Surface Type	Approx. Length (Miles)	Approx. Width (Feet)	Landscape Type	Surface Deterioration		Vertical Displacement		Root Damage	Litter & Debris		Graffiti		Drainage		Amenities		Landscape		Trail Signage		Shoulder Transition	Other Concerns		
Park/Corridor/Subdivision Trails	Mary to Mystic	C	NR	NR	NR	Yes	--	Yes	West of Hemingway Cr	No	No	--	Yes	South of Colson Park	Yes	--	Good	--	Good	--	Good	--	Good	--	N/A
	Descro Park Trail	C	0.5	10	T/N	Yes	North of Central Ave, at Cook Ave	Yes	At Custer Ave	No	NR	--	Yes	On trail, sign, bench, shelter	No	--	Poor	--	Good	--	Poor	--	Good	--	N/A
	Swords Park	A/C	2.2	10	N/TR	Yes	Cracks in trail	No	--	No	No	--	Yes	Painted over	Yes	Water runs over trail	Good	--	Good	--	Good	--	Good	--	Some Pot Holes
	Stewart Park Trail	C	0.5	10	T/N	No	--	No	--	No	No	--	No	--	NR	--	Good	--	Good	--	Poor	Near Phyllis Ln	NR	--	N/A
	Big Ditch Trail	A/C	1.4	8	T/N/TR/O	Yes	Cracks & Surface rises	Yes	--	No	Yes	Nearby grass clippings	Yes	Several Locations	Yes	Some puddles in low spots	Poor	Light, concrete broken in tunnel	Good	--	Good	--	Good	--	N/A
	Trans Tech Trail	C	0.25	6	TR	Yes	Small cracks near pond	No	--	No	No	--	No	--	No	--	Good	--	Good	--	Good	--	Good	--	N/A
	King's Green Sub Trail	C	0.5	10	NR	No	--	No	--	No	No	--	No	--	Yes	--	Good	--	Good	--	Good	--	Good	--	N/A
	Lampman Strip Park	C	0.5	10	T/N/TR	No	--	No	--	No	No	--	Yes	Graffiti painted over	Yes	Dirt & sand across trail	N/A	--	Poor	Tall weeds	Good	Crossing markings at Monad	Poor	1" drop	Poor Landscaping
	Bannister Drain Trail	C	0.6	8	T/N/TR/O	No	--	No	--	No	Yes	Low hanging trees, gravel & dirt	No	--	Yes	On McCall Trail, near retaining wall	Good	--	Poor	Tall weeds & grass	Good	--	Poor	Rail needed	Rail Missing
Roadway Trails	Broadwater Crossing	A	NR	NR	O	No	--	No	--	No	Yes	Gravel & broken glass	No	--	No	--	N/A	--	Poor	--	Good	Crossing markings deteriorating	Good	--	N/A
	Alkali Creek Road Trail	A/C/S	2.0	8	N/TR	No	--	No	--	No	No	--	No	--	No	--	Good	--	Good	--	Poor	Little or no signage	Good	Not finished	Weeds in Cracks
	Zimmerman Road Trail	A/C	1.0	8	R/N/TR	No	--	No	--	No	No	--	No	--	No	--	Good	--	Good	--	Good	--	Good	--	N/A
	South Billings Blvd. Trail	A/C	2.0	6	T/N	No	--	No	--	No	Yes	Broken glass	No	--	No	--	Good	--	Poor	--	Poor	--	Good	--	N/A
	Shiloh Road Trail	A/C	4.0	8	T/N/TR/O	No	--	No	--	No	Yes	Mud on trail	Yes	Graffiti in Shiloh underpass	Yes	--	Good	--	Poor	Encroaching weeds/mud	Good	--	Good	--	N/A

Note:
 A = Asphalt
 C = Concrete
 N = Native Grasses
 NR = Not Recorded
 O = Other
 S = Soft Surface
 T = Turf
 TR = Tress/Shrubs

N/A = Not Applicable

APPENDIX B
ROUTINE MAINTENANCE COST SUMMARY



APPENDIX C
REPLACEMENT COST SUMMARY



Replacement Cost Summary

2/9/2011

Trail Corridor		Trail Segment	Description	Project Number	Distance (miles)	Year Constructed	Surface Type	Estimated Life Cycle	Initial Construction Cost	Estimated Replacement Cost	Estimated Replacement Year
Park/Corridor Trails	Kiwanis Trail	Heights Kiwanis	Mary St. to Yellowstone River Road		2.00	1996	Concrete	40	\$ 170,000.00	\$ 816,173.51	2036
		Hawthorne Lane Connector	Connection from Kiwanis Trail to Hawthorne Lane and Subdivision		0.24	2002	Concrete	40		\$ -	2042
		Emma Jean Heights Connector	Connection from Bitterroot thru Emma Jean towards Kiwanis Trail		0.19	2008	Concrete	40		\$ -	2048
		Hoven Subdivision Connector	Connection from Kiwanis Trail to Hoven Subdivision		0.03		Concrete	40		\$ -	
		So. Heights Subdivision Connector	Connection from Kiwanis Trail to So. Heights Subdivision		0.04		Concrete	40		\$ -	
		Kale Subdivision Connector	Connection from Kiwanis Trail to Kale Subdivision		0.01		Concrete	40		\$ -	
	Jim Dutcher Trail	MetraPark	Kiwanis Trail by Yellowstone River Road to northeast end of Coulson Park		2.00	1998	Concrete	40	\$ 1,111,440.00	\$ 5,336,046.37	2038
		Metra Parking Lot Connector	Connection from MetraPark Trail to the Metra Parking lot by Alkali Creek Bridge		0.08		Asphalt A	20		\$ -	
		Lake Elmo Dr.-Bench Blvd Connector	Connection from MetraPark Trail to Lake Elmo Dr./Bench Blvd. Intersection		0.01		Concrete	40		\$ -	
		Downtown Bike Connector	Through Coulson Park to Mystic Park with bike lanes on So. 25th St.	WO 02-09, STPE 1099(30)	2.93	2002	Concrete	40	\$ 916,823.80	\$ 4,401,689.98	2042
		Riverfront Park	Asphalt trail through Riverfront Park		1.30		Asphalt A	20		\$ -	
		Riverfront Park Connector	Connection from parking lot by shelter & restroom to trail		0.05		Asphalt A	20		\$ -	
	BBWA Canal Trail	Josephine Crossing Trail	Connection from Norm's Island to Josephine Subdivision		0.24	2006	Soft Surface			\$ -	
		Descro Park Trail	Through Descro Park from Broadwater to Central	WO 02-20	0.50	2003	Concrete	40	\$ 214,364.80	\$ 1,029,169.83	2043
		Descro Park Trail Connector	Connections to Meadowlark School and Central Court Village		0.06	2003	Concrete	40		\$ -	2043
		Stewart Park Trail	Central south thru Stewart Park to Monad Road	WO 05-10, STPE 1099(40)	0.50	2006	Concrete	40	\$ 317,750.00	\$ 1,525,524.30	2046
		Famous Dave's Trail	Connection between Lampman Strip Park Trail and King Ave. W.		0.01	2005	Concrete	40		\$ -	2045
		Lampman Strip Park Trail	Across Monad thru Lampman Strip to Famous Dave's Trail	WO 08-15, STPE 1099 (59)	0.40	2009	Concrete	40	\$ 294,432.62	\$ 1,413,577.08	2049
		Bannister Drain Trail	Trail linking across King Ave. south to McCall's Trail and east to Midland Trail	WO 06-10, STPE 1099 (55)	0.60	2009	Concrete	40	\$ 465,407.00	\$ 2,234,428.61	2049
		Broadwater Crossing	Connection from Lillis Park to Descro Park Trail	WO 08-24, STPE 1099(63)	0.01	2009		50	\$ 103,930.04	\$ 738,597.88	2059
	Elmo Lake Trail	Midland Trail (24th Street Connector)	Connection through Midland Subdivision to 24th Street W. with link to S.25th St.		0.43	2005	Concrete	40		\$ -	2045
		Elmo Lake Trail	Trail along the north side of Lake Elmo		0.48		Soft Surface			\$ -	
	Pioneer Park Trail	Pioneer Park Trail	Trail through Pioneer Park		0.30		Asphalt A	20		\$ -	
	Big Ditch Trail	East of Shiloh Underpass	Trail east of Shiloh underpass to 38th St. W.		0.25	2002	Concrete	40	\$ 39,281.00	\$ 188,588.89	2042
		Shiloh Underpass	Shiloh pedestrian underpass by Big Ditch (near Colton)	WO 00-06	0.02	2002	Concrete	50	\$ 647,172.00	\$ 4,599,246.47	2052
		Big Ditch Trail, Phase 1	Shiloh underpass west to Larchwood Lane	WO 05-12, STPE 1099(49)	0.25	2006	Concrete	40	\$ 144,973.88	\$ 696,022.59	2046
		Big Ditch Trail, Phase 2	Larchwood Lane to Rimrock West Park (46th St W)	WO 06-09, STPE 1099 (54)	0.90	2007	Concrete	40	\$ 193,672.14	\$ 929,823.94	2047
	Gabel Road Corridor	TransTech Trail	Trail through west end of TransTech out to Gabel along Hogan's Slough	WO 04-29, STPE 1099(38)	0.33	2005	Concrete	40	\$ 187,464.49	\$ 900,020.88	2045
Gabel Road Connector		Trail through east end of TransTech to 32nd and Gabel	WO 05-19, STPE 1099(45)	0.33	2007	Concrete	40	\$ 109,551.58	\$ 525,959.40	2047	
Swords Park Airport Road Corridor	Swords Park Trail Phase 1	Trail from west end of Swords Park to Black Otter Trail split towards the East	WO 03-06	2.00	2005	Asphalt A	20	\$ 855,183.01	\$ 1,873,811.28	2025	
	Swords Park Trail Phase 2 (TBC)	Continuation of the trail to the east to connections under Airport Road		1.60	2011	Asphalt A	20	\$ 949,504.00	\$ 2,080,480.19	2031	
	Airport Road Underpasses with Trail Connectors	Underpasses at 27th St., Airport Rd. & Alkali Creek Rd. with trail connectors		0.76	2009	Concrete	40	\$ 1,000,000.00	\$ 4,801,020.63	2049	
Sub-total					18.85				\$ 7,720,950.36	\$ 34,090,181.83	
Average Cost Per Mile											
Subdivision Trails	Harvest & Olympic Subdivision Trails	Trails through Harvest and Olympic Subdivisions		5.35		Concrete	40		\$ -		
	Ironwood Estates Subdivision Trail	Trails through Ironwood Subdivision		2.30		Asphalt A	20		\$ -		
	Rehberg Ranch Estates Subdivision Trail	Trail along Iron Horse Trail		1.17		Asphalt A	20		\$ -		
	Kings Green Subdivision Trail	Trail as buffer between King's Green Sub and Interstate 90		0.19	2006	Concrete	40	\$ 57,820.00	\$ 277,595.01	2046	
	Cove Ditch Trail	Trails through Falcon Ridge, Copper Ridge and Reflections of Copper Ridge		0.18		Concrete	40		\$ -		
	Sub-total					9.19				\$ 57,820.00	\$ 62,305,738.80
Average Cost Per Mile											
Roadway Trails	Alkali Creek Trail Corridor	Alkali Creek Road Trail	Trail along Alkali Creek Road from Black Pine to Senators	WO 04-12, STPE 1099 (46)	1.34	2005	Asphalt A	20	\$ 290,376.00	\$ 636,249.57	2025
		Main Street Underpass & Earl Guss Park Trail	Ped. underpass (Alkali Creek) with link thru Earl Guss Pk and to sidewalk on west side	WO 03-07, STPE1099 (CN6396)	0.24	2010	Concrete	50	\$ 2,002,150.00	\$ 14,228,646.06	2060
		Alkali Creek Road Trail, Phase 3	Continuation of trail along Alkali Creek Road, Black Pine to Swords Pk. North	WO 10-18	0.47	2010	Asphalt A	20		\$ -	2030
		Airport Rd., Alkali Creek Rd., 27th Street Underpasses	Underpasses built as part of the Airport Rd. with trail links		0.76	2009	Concrete	40	\$ 1,000,000.00	\$ 4,801,020.63	2049
	Zimmerman Road Trail	Trail along Zimmerman from Poly to Broadwater		1.28	2006	Asphalt A	20	\$ 90,505.25	\$ 198,308.15	2026	
	So. Billings Blvd. Trail	Trail along So. Billings Blvd. from Underpass Ave. to King Ave. East		0.65	2006	Asphalt A	20	\$ 52,472.67	\$ 114,974.08	2026	
	Rimrock Road Trail	Trail along Rimrock Road from Shiloh to 54th St. W.		1.65	2008	Asphalt A	20		\$ -	2028	
	Aronson Ave. Trail	Trail from Alkali Creek Rd. to Camel Place	WO 05-20	0.56	2009	Asphalt A	20		\$ -	2029	
	King Avenue West Trail	Trail along King Ave. W. from S.32nd W. to S. 44th St. W.		1.47	2009	Asphalt A	20		\$ -	2029	
	King Ave E	Miller Crossing Sub Trail	Trail along King Ave. E. by Cabela's and Sam's from Orchard to So. Billings Blvd.		0.50	2008	Concrete	40		\$ -	2048
	Shiloh Road Corridor	Shiloh Road Trail	Rimrock to ZooMontana	ARRA 1031(##)	4.60	2010	Conc./Asph.	40	\$ 591,140.31	\$ 2,838,076.82	2050
		Yegen Underpass	Underpass on Shiloh between Grand and Broadwater	MT-STPU-CM 1031(8)	0.03	2009	Concrete	50	\$ 468,000.00	\$ 3,325,927.81	2059
	Sub-total					13.55				\$ 4,494,644.23	\$ 26,143,203.12
Average Cost Per Mile											
Total					41.59				\$ 12,273,414.59	\$ 122,539,123.75	
Average Cost Per Mile											

APPENDIX D
EXAMPLE MAINTENANCE PLAN FOR NEW TRAILS





NEW TRAIL MAINTENANCE PLAN

TRAIL SEGMENT: _____ FROM: _____ TO: _____

SURFACE TYPE: ASPHALT CONCRETE SOFT SURFACE

APPROXIMATE LENGTH: _____ APPROXIMATE WIDTH: _____

LANDSCAPE TYPE: TURF NATIVE GRASSES TREES/SHRUBS OTHER

TRAIL AMENITIES: _____

ANTICIPATED CONSTRUCTION COST: _____

ANTICIPATED TIMEFRAME FOR CONSTRUCTION: _____

IS THE NEW TRAIL LOCATED WITHIN CITY LIMITS? YES NO PARTIALLY

WHICH CITY/COUNTY AGENCY WILL BE RESPONSIBLE FOR TRAIL MAINTENANCE?

(CHECK ALL THAT APPLY)

- CITY OF BILLINGS PARKS, RECREATION AND PUBLIC LANDS DEPARTMENT
- CITY OF BILLINGS PUBLIC WORKS DEPARTMENT
- YELLOWSTONE COUNTY PARK BOARD
- COUNTY PUBLIC WORKS DEPARTMENT
- VOLUNTEER ORGANIZATION – PLEASE SPECIFY: _____

ANTICIPATED MAINTENANCE FUNDING SOURCE: _____

ANTICIPATED FREQUENCY OF ROUTINE MAINTENANCE ACTIVITIES:

TRAIL INSPECTION: _____ IRRIGATION: _____

TRAIL SWEEPING: _____ TREE TRIMMING: _____

SNOW/ICE REMOVAL: _____ WEED MANAGEMENT: _____

MOWING: _____ TRASH REMOVAL: _____

ESTIMATED ANNUAL MAINTENANCE COST (BASED ON AVERAGE COST INFORMATION PROVIDED FOR EXISTING TRAILS WITH ADJUSTMENTS MADE FOR SITE SPECIFIC CONDITIONS): \$ _____

ESTIMATED LIFE CYCLE: _____ YEARS

ESTIMATED REPLACEMENT YEAR: _____

ESTIMATED REPLACEMENT COST: \$ _____