Park Asset Management Plan

Missoula Parks and Recreation

January, 2014

Park Asset Management Plan for City of Missoula Parks and Recreation
January, 2014

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CHAPTER 1 - EXECUTIVE SUMMARY

DESCRIPTION

The Park Asset Management Plan catalogs the cyclical maintenance, feature renovations, and replacement needs for a majority of the City's major park assets and recreation service amenities. The plan identifies cyclical renovation needs, projected lifecycles for feature replacement, immediate project needs, and projected costs for capital assets. The purpose of the plan is to:

- Establish an accurate inventory of major park assets and improvements (amenities and features valued at greater than $5,000 and having an ordinary useful life of 10 years or more) maintained by the City's Parks and Recreation Department.
- Identify the current condition of park assets.
- Identify benchmarks for industry accepted cyclical maintenance needs proven to maximize the useful life of assets.
- Provide criteria to prioritize needs for renovation or replacement of assets.
- Provide cost estimates for asset management program operating and capital budgeting processes.
- Forecast budget needs to address identified renovation and replacement needs over a five year period.
- Establish procedures to update the Park Asset Management Plan over time.

This plan covers the primary asset types found throughout the park and conservation lands system. It includes, but is not limited to irrigation systems, parking lots, playgrounds, athletic fields, sport courts, shelters, commuter trails, restrooms, and trailheads.

The plan does not include or specifically address replacement of major assets such as offices, shops, pools and bridges nor does it address equipment, the urban forest, medians, existing Fort Missoula Regional Facilities, or land acquisition. Significant facilities like offices, pools and bridges were excluded as they typically have a 50+ years useful life and should have separate supporting plans and/or operating manuals.

PUBLIC INVOLVEMENT

The Parks and Recreation Department, working with consultants from Morrison-Maierle, offered two public open house meetings on opposite sides of town in March 2013. Those meetings were lightly attended. The City also offered an on-line survey regarding park system needs for renovation and replacement. Use of a questionnaire for this planning project helped provide insights and guidance on what community members might see as priorities for the plan. The questionnaire was available on line and to anyone who attended the public workshops. The information collected is not statistically valid, but is a valuable tool to aid in guiding the plan's program priorities and funding needs.

Survey responses to the 10 most important park system features used or enjoyed by a household reconfirmed the 2010 County-wide Recreation survey findings – Missoulians' value access to trails and open spaces. Other top 10 ranked responses included playgrounds, restrooms, open park turf areas, sidewalks and interior park paths, picnic shelters, and, dog off-leash areas (DOLAs). DOLAs scored as high as athletic fields for the number of respondents. Interestingly, a difference between weighted rankings and raw respondent numbers suggest that picnic shelters are perhaps more important than open park turf areas. Respondents rated the quality of existing park restrooms, sidewalks/interior park paths, athletic fields, and DOLAs as inadequate or poor.

STATEMENT OF NEED

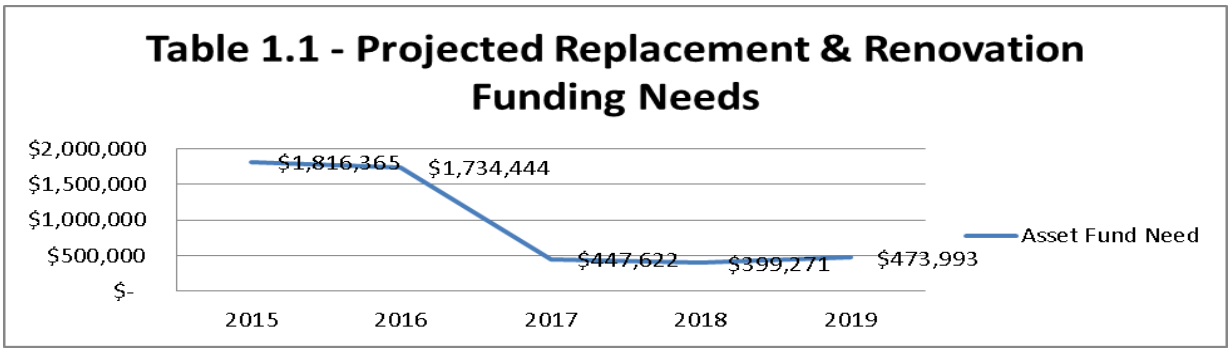
A history of limited and irregular reinvestment for replacement of aging park infrastructure and less than adequate maintenance funding for the Missoula Parks and Recreation system has created a growing number of assets that are in fair to poor condition. Assets in poor condition are costly to maintain, present increased liability risk, and have diminished service value to the community. Park system assets in fair to poor condition require funding for improvement or replacement soon. If adequate funding is not provided, more existing improvements will need to be closed. Recent examples include closure and removal of the Little McCormick Playground as well as the Northside Park Shelter. Both were closed and removed due to unsafe conditions associated with age. Other immediate park asset replacement and renovation needs are listed in the chart below:

Shelters & Restrooms	Playgrounds	Splash Decks	Others
Kiwanis	Kiwanis	Sacajawea	Grant Creek Trail @ Cottonwoods & RMEF
Southside Lions	Bonner	Southside Lions	Marilyn Tennis Courts
Northside	McLeod	Northside (removal)	McCormick Sports Field lighting
Sacajawea	Playfair		Skyview Basketball Court
Greenough			Southside Lions Irrigation system
Westside			McCormick Parking lot

COST SUMMARY

Annualized Maintenance: The cost of preventative maintenance practices that will extend the life of park features was calculated to be $265,000 per year. This reflects cyclical maintenance practices that are currently not performed by MPR due to funding and staffing limitations.

Replacement/Major Renovation: The Park Asset Management plan shows a funding need over the next five (5) years of $4.9 million for replacement and renovation of poor and failing developed park and trail features.



Replacement and renovation costs were calculated for park features that are trending from fair to poor condition and have the probability of degrading over the next five years to poor condition. Table 1.1 suggests future reinvestment to replace park system assets beyond the first five years of the plan, might be handled with a base budget of approximately $500,000 per year.



PRIMARY RECOMMENDATIONS FOR IMPLEMENTATION OF THE PLAN

The Park Asset Management Plan contains (twenty eight (28) recommendations, many of which are specific to Parks Department processes and activities, however, there are a number of recommendations that would affect the City budget, business practices, and partner agencies. These include:

1. Adopt a policy requiring all Capital Improvements that add parklands or develop new parkland amenities include base funding for necessary maintenance staffing.

2. Amend existing City purchasing policies; specifically to increase informal bid limits so they are more in line with those provided for by State law.

3. Increase annual base operating funds by $265,451 for preventative maintenance of features in parks, trails, conservation lands and landscaped rights-of-ways.

4. Increase base staffing levels as follows:
   a. Extend length of current Maintenance Worker's season from 7.5 months to 9 months ($50,000)
   b. Increase intermittent staffing positions, or park attendants (PA) to add 2 per year over 5 year period ($21,000/yr)
   c. Convert intermittent staffing positions (PA) to Maintenance Worker (MW) to maintain a ratio of 4 to 1(minor added cost) as new facilities are added to the system.

   d. **If** purchasing policies are not liberalized, request budget for an Administrative Assistant. The position will be needed to increase the Department's ability to bid and purchase contracted services and supplies for efficient and timely implementation of funds allocated to implement the plan.

5. Prepare detailed CIP project and costing request(s) to request annual funding from Mayor and Council at a level that will fully address the Plan's five year needs.

6. Adopt a policy to regularly fund long-term Park Asset Management Plan replacement needs at a consistent level once the Five Year Projects plan is substantially implemented.

7. Adopt and use the following criteria for prioritizing capital improvement program requests:
   a. Public Safety (risk to persons or property, hazard rating, liability exposure, …)
   b. Legal mandates (ADA, NIPSI, UBC, IBC, ANSI, AASHTO, new laws, adopted rule changes…)
   c. Maintain existing services (replace a feature before the only other choice is to close it)
   d. Geographic and Level of Service equity
   e. Improved maintenance/service efficiency (old and deteriorating systems require more)
   f. Leveraged funding (grants, matching funds, partnerships, donations, etc….)
   g. Add new or expanded services to meet growth & demand.

8. Develop, adopt and require compliance with parks design standards and construction specifications.

9. Establish a clear internal project review and approval process for master plans and park construction projects, including "projects by others" to ensure consistency with standards and to develop a baseline maintenance impact statement.

10. Provide an annual update on progress regarding implementation of the Asset Management Plan. This would be comparable to other adopted plans including the Master Parks Plan, Open Space Plan, and Conservation Lands Management Plan.

11. Maintain and monitor the Park Asset Management Plan. Add new features as they are completed and re-inventory and update conditions and costs for the entire system every 5 years.

12. Work with the State of Montana Department of Transportation and City Public Works Department to fund needed renovations for landscaped ROW's maintained by Parks.

USE OF THE PLAN

Through the regular use of an up-to-date Park Asset Management Plan, elected officials, City administration, and the MPR staff can achieve the following significant results:

- Demonstrate the need for funding of renovations, replacements, and improvements
- Identify the costs and impacts from delayed, reduced, and under-funding of park maintenance.
- Clearly prioritize, reduce, and manage deferred maintenance needs.
- Improve the overall condition of parkland assets.
- Better predict and justify future budget requests and determine the allocation of available resources to existing facilities and new facilities.
- Anticipate maintenance needs (and plan accordingly).
- Identify methods to fix problems before they become expensive emergencies.

- Help managers respond to budget limitations by providing accurate information to appointed and elected decision makers regarding park maintenance.

LIVING DOCUMENT

The plan should be updated every five years to make the best use of the document. Unit costs should be updated to reflect future market conditions and park feature conditions should be reevaluated to account for feature aging, deterioration and development of new parklands and improvements. The City will need to commit to continuous implementation of this plan.

LIMITATIONS

The plan represents an engineering estimate of current and future costs over a wide variety of disciplines. A multitude of assumptions were made in order to group complex feature types into common categories. Morrison-Maierle assessed or provided cost projections which are accurate for today's market though subject to change as materials, contractors and construction methods change with time. Costs projections are also dependent on the breakdown of MPR generated condition ratings.

Costs do not include contingency needs. There are several options for addressing contingency needs that are dependent on funding levels, type of project, and how the City chooses to address and fund its RRI needs.

This plan covers a significant portion of the City's Park assets, though not all improvements could be included due to funding, staffing, and time limitations. Trail lighting systems, surface water control structures (head gates, diversions, weirs, etc…), natural surface trails, decks and overlooks, and specialty features (skate parks, Caras Pavilions, Dog Off Leash Areas, and others) should be added in future updates of the plan. Funds will be needed to include these features in future asset management plan updates, as they will require qualified professional expertise to develop and complete condition ratings, analysis and costing for these types of features.

Common park amenities, such as picnic tables, horseshoe courts, trash can holders, and drinking fountains are not included because they do not meet the definition of a capital improvement. Projections of costs and of timelines for replacement of major facilities such as pools, offices, boulevards/medians and bridges are not included due to the longevity, significant cost, and public planning processes necessary to replace them. Existing Fort Missoula Regional Park assets were not generally included as these assets are owned by the County and a plan is already in place to renovate and replace nearly all the features at this park. Elements of the plan may be applied to existing and future Fort Missoula Regional Park facilities.

CHAPTER 2 - STATEMENT OF NEED

2.1 INTRODUCTION

The physical size, cost and value of a City's park and recreation system increases in the aggregate where growth spawns the need to add new parks and recreational amenities. In contrast, the level of funding for expensive preventative maintenance needs such as asphalt overlays and costs to replace aged, outdated, and worn out elements is variable and rarely sufficient to meet the needs of a growing community. For many western communities, the costs to consistently maintain and renovate parks to defined standards has never been fully appreciated or built into the municipal budget structure. In addition, Cities often do not maintain adequate staffing or funding ratios as their park system is expanded and improved. When funds and personnel are undersupplied, a City's capacity to maintain its park system becomes limited, often to the point where preventative maintenance activities are not and cannot be executed.

2.2 PEER CITY COMPARISON

The following tables and discussions compare the City of Missoula's park system to other western peer cities in terms of size, funding, and staffing:

Table 2.A 2013 Parkland Comparison of Peer Cities

General Features	Great Falls	Idaho Falls ID	Kennewick WA	Billings	Coeur d'Alene ID	Average for peer cities	Missoula
Est. 2013 Population	58,893	57,646	76,224	106,954	45,579	69,059	68,394.0
Land Area (Square Miles)	19.9	17.4	24.3	41.6	16.1	24	23.9
Total Developed Park Acreage Managed	691	1,710	740	595	377	822	568.9
Total Parkland Acreage Managed	1,001	1,844	904	2,596	587	1,386	4,191.6
Dev. Parkland Acreage per 1000 Pop	11.7	29.7	9.7	5.6	8.3	13	8.3
Parkland Acreage per 1000 Population	17.0	32.0	11.9	24.3	12.9	20	61.3
% Parkland Acreage/City Land Area	8%	17%	6%	10%	6%	9%	27%

Though the City of Missoula did not have a definitive comprehensive parks plan or a complete inventory of parklands until 2004, Missoula appears to be reasonably well positioned with parklands, particularly open space lands, to serve current and future residents. The City currently has 254 fewer acres of developed parkland than peer cities. However, the City has acquired 111.5 acres for future active park uses - notably the 100 acre Fort Missoula Regional Park expansion and Silver Park.

Between 2004 and 2013, the City made a number of significant conservation land purchases as well obtaining lands for future active use parks. In addition, the City constructed numerous active park improvements including new neighborhood parks, playgrounds, shelters, trails, and landscaped rights-of-ways. The investment in parklands, trails and recreation amenities did not, however, translate to a proportionate increased maintenance staffing level. This fact indicates the City's budgeting strategy is unbalanced, such that the focus on improvements has resulted in reduced maintenance services and insufficient investment to maintain existing infrastructure.

In 2004 the City's park maintenance staffing levels provided 1 FTE per 151 acres managed, whereas, in 2013 the ratio is 1 FTE per 175 acres – a 15% decrease in the maintenance staffing per managed acre ratio. The following table compares peer cities' maintenance staffing levels.

Table 2.C 2013 Park Maintenance Staffing Comparison of Peer Cities

	Great Falls	Idaho Falls ID	Kennewick WA	Billings	Coeur d'Alene ID	Average for peer cities	Missoula
Staffing Information (2013Budget/ Agency reported data)							
Number of Regular FTE Park Maintenance Staff	16.5	30.0	19.0	21.0	8.8	19	16.1
Number of Seasonal Maintenance Staff	22.0	68.0	15.7	37.0	14.8	32	19.0

Compared to peer cities, Missoula falls short of park maintenance staffing levels as follows:

- Three (3) fewer seasonal maintenance positions (classified and attached), plus
- Thirteen (13) fewer intermittent maintenance positions (summer park attendants or PAs)

Current maintenance staffing ratios for intermittent workers (Park Attendants/PA's) to all other park maintenance staff is approximately 1.2 to 1. The average ratio of peer cities is 1.7 to 1. Park attendants are needed to provide affordable labor for peak season routine tasks such as cleaning, trash removal, string trimming, mowing small areas, fall zone maintenance care, and other daily tasks. In contrast, seasonal park maintenance employees provide knowledgeable and skilled labor to safely operate specialty equipment and competently carryout repairs to features such as playgrounds, irrigation systems, restrooms, shelters, concrete, asphalt, etc. throughout a typical work season (minimally, March through October)

When too few intermittent positions (PAs) are provided, all other maintenance employees must be assigned to perform these tasks thus reducing the ability to complete skilled preventative maintenance projects. Missoula's classified Maintenance Workers currently operate on a 7.5 month schedule, leaving the City critically short of skilled labor on the front and backside of the peak park use season. This is significant because March, April, Sept, and October are prime months to provide cyclical maintenance activities with minimal impact to park uses.

The City's operating and capital budgeting levels must also be examined to understand the full needs of the park system. The following table demonstrates how the City's funding for parks compares to selected peer cities in 2013.

Table 2.B Parkland Maintenance Funding Comparison of Peer Cities

	Great Falls	Idaho Falls ID	Kennewick WA	Billings	Coeur d'Alene ID	Average for peer cities	Missoula
Financial Information (FY2013 Budget)							
City's Total Operating Budget (2013)	$ 94,711,933	$ 185,586,062	$ 251,870,653	$ 262,158,305	$ 72,705,505	$ 173,406,492	$ 108,192,085
Total Parks & Recreation Operating Budget (2013)	$ 2,354,415	$ 9,018,973	$ 9,552,483	$ 7,185,706	$ 2,431,342	$ 6,108,584	$ 3,304,244
Parks & Rec. budget as % of Agency's Total Operating Budget	2%	5%	4%	3%	3%	4%	3%
Total General Fund Parks Maintenance Budget	$ 1,764,039	$ 5,839,054	$ 5,995,511	$ 2,390,065	$ 1,745,088	$ 3,546,751	$ 2,009,032
Total Park Maintenance District(s) Budget (2013)	$ -	$ -	$ -	$ 2,832,597	$ -	$ 566,519	$ 510,788
Total Parks Maintenance Budget	$ 1,764,039	$ 5,839,054	$ 5,995,511	$ 5,222,662	$ 1,745,088	$ 4,113,271	$ 2,519,820

The preceding table demonstrates that Missoula provides $1.6 million less per year in operating funds for parkland maintenance. Compared to the average size of peer city's park system (acres) the level of maintenance funding provided by Missoula is nearly $1,100 less per developed park acre and $2,400 less per total acres managed.

It is important to note that the City has significantly improved funding for parkland maintenance. In 2004, the City's average funding for park maintenance was $2,479, whereas in 2013 it stood

at $4,429 per developed acre which translates into a 79% increase over a nine (9) year period. Funding increases have primarily been consumed by rising costs for utilities, health care, wages and added amenities and parklands.

2.3 CONCLUSION

Missoula's funding and staffing levels for parks and open space maintenance falls short of providing the quality of services desired by residents and is insufficient to maximize the useful life of existing parkland improvements. The data suggests that Missoula's level of funding and staffing for regular and cyclical maintenance has been low for an extended period of time.

Recent adoption of a Park District has significantly improved overall funding which in turn, has ensured the department provides for adequate routine seasonal maintenance needs. Over the long term, however, the level of funding has been insufficient to provide for cyclical maintenance needs and for replacement of aging and outdated infrastructure.

To address the range of identified needs the City will need to adopt a long-term strategy whereby it seeks to increase funding and staffing for preventative maintenance and improvement or renovation of features that are in relatively good to fair condition. In conjunction, the City will also need to provide capital funding to replace or renovate failing and inefficient or "ineffective" park amenities and infrastructure. Lastly, the City's Park Maintenance Units should continue to be tasked to constantly look at ways to increase efficiency, reduce operational costs, and maximize the useful life of existing improvements.

2.4 IMPLEMENTATION RECOMMENDATIONS

1. Adopt a Capital Improvement Plan policy that requires requests for new facilities and services to include a clear estimate of on-going cost for staff and maintenance.

2. Adopt a long-term strategy whereby the City seeks to increase base maintenance funding for necessary preventative maintenance improvements and renovation of parkland features.

3. Seek regular capital funding to replace or renovate failing and inefficient park amenities and infrastructure

4. Increase base staffing levels as follows:

   a. Extend the length of regular seasonal Maintenance Workers schedule from 7.5 months to 9 months ($50,000)
   b. Increase intermittent staffing positions (PAs) to add 2 per year over 5 year period ($21,000)
   c. As new facilities and intermittent staffing is added convert intermittent staffing positions (PA) to Maintenance Workers (MW) to maintain a ratio of 4 to 1(minor added cost)

CHAPTER 3 - CONDITION EVALUATION

3.1 ASSET MANAGEMENT

This asset management plan includes processes and strategies that will enable managers to measure the condition of facilities as well as monitor and prioritize ongoing maintenance and replacement needs, thus better utilizing scarce resources. An integral part of the plan is the tools and strategies that convey the ability to consistently rate conditions and prioritize needs to help efficiently manage the City's parkland assets.

This plan borrows strategies and techniques pioneered by the National Park Service (NPS) who is a recognized leader in creating and utilizing sustainable and green design for park and recreation facilities. NPS facility management techniques and tools are useful for establishing benchmarks against which comparisons can be made. The NPS has adopted the following stewardship goals as part of their mandate for resource preservation:

- Provide for the public enjoyment and visitor experience of parks
- Strengthen and preserve natural and cultural resources and enhance recreation opportunities
- Ensure organizational effectiveness

The NPS defines stewardship as "The recognition and acceptance that the ownership of facilities requires the vision, resolve, experience, and expertise to ensure that resources are allocated effectively to sustain the investment." These are all components of the NPS focus on creating sustainable facilities that are cost effective to own, maintain, operate and provide the best possible experience to the visitor.

The NPS rates their facilities with what is called a Facility Condition Index (FCI), to help provide a snapshot of the relative condition and remaining useful life of major park assets and the probable level of investment needed to sustain the service. The FCI uses a value based numeric rating system to rate assets. The Park Asset Management Plan is based on a similar inventory of major assets and condition ratings specific to each class of features.

3.2 CONDITION ASSESSMENT

Conditions ratings were established by MPR staff to take into consideration multiple aspects of each feature class that affect its safety, longevity, compliance with applicable laws and rules, as well as routine maintenance cost. Depending on the feature, condition ratings consider aspects such as: code compliance (UBC, IBC, ADA, etc…); age; safety standards; material type and durability; visible wear problems and physical damage; inadequate/under capacity presence or lack of curbs & borders; condition of painted surfaces; structural integrity; signage legibility; site grading and drainage; and other conditions based on site and feature. These feature aspect conditions were rated on a score of 1.0 to 3.0, with 1.0 representing a brand new feature and 3.0 representing a failing feature. The ratings were averaged to produce a Feature Score Average (FSA).

Missoula park feature conditions were rated by Missoula Parks and Recreation (MPR) staff with a score ranging from 1.0 to 3.0, with 1.0 representing a new feature and 3.0 representing a failing feature. These feature condition ratings were then averaged to create a Feature Score

Average (FSA), a condition index similar in concept to the NPS's FCI. Once the FSA has been determined for an asset, it may be compared against the following rating scale:

- 1.0 to 1.5 Rating - Good condition rating – routine/baseline maintenance work is required.

- 1.6 to 2.0 Rating - Fair condition rating – cyclical and/or preventative work required to address safety, condition, age, code compliance needs, or maximize useful life.

- 2.1 to 2.5 Rating - Poor condition rating – significant investment and work needed to address safety and/or deficiencies due to age, condition, use, or codes, feature nearing end of useful life.

- 2.5 to 3.0 Rating – Very Poor to Serious condition rating - extensive work or full replacement required. Close or demolish if funds are not available.

Although original dates of construction for some park features were identified and range from 1940 to the present, many park features were of indeterminable age. For this reason, attempts at using the feature's age and expected longevity to help determine the need for replacement were unsuccessful. Some features built decades ago were found to be in fair condition while others built more recently were in poor condition. The condition of existing infrastructure can vary greatly depending on design standards used, maintenance provided, micro environment, and number of retrofits or renovations. Therefore, the decision was made to analyze a feature's need for replacement based not on the feature's age, but based on condition, as calculated by the FSA. An FSA rating was not determined for paved trail segments due to the relatively recent construction of the trail network. The trail network is in fair to good condition overall, and expected to reach typical longevity of paved trails (also see discussion in Chapter 7.2).

Park features of significant size and cost, such as buildings, bridges, pools, and the MOBASH skateboard park were not included for condition rating and analysis. Features of this size and cost typically require specific capital improvement requests to City Council, as discussed in Chapter 4 of this report.

3.3 CONCLUSIONS

Using the described tools, MPR can better ensure resources are cost effectively applied to assets while establishing accurate baselines for measuring progress in improving or maintaining asset conditions over time. The forms for collecting condition rating data are located in the plan's appendices.

Park feature conditions will change with time due to age, type of construction, materials used, building and public safety code amendments, maintenance levels, weathering, and replacement. The Park Asset Management Plan should be updated every five years to reflect these changes through an updated inventory and condition assessment to ensure funds are directed to the features in most need. The list of assets should be updated annually to reflect new improvements, renovations, replacements, and closure of park features. The City, as such, will need to commit to continuous implementation of the plan.

CHAPTER 4 – COST PROJECTIONS

4.1 INTRODUCTION

Renovation, replacement and cyclical preventative maintenance costs were identified by park feature type, using current industry costs and best management practices. These unit costs and underlying assumptions are identified in Chapter 7 and Appendix A of this report. By combining unit costs with specific park features and making documented assumptions regarding park features quantities and maintenance needs, an engineering cost estimate was tabulated for the entirety of the City of Missoula park system. Condition ratings for these features were then used to identify whether preventative maintenance (i.e., inspections, seal coat, striping, crack sealing, grading,); renovations and improvements (i.e., ADA access modifications, retrofit for playground fall zone containment pod, conversion to Engineered Wood Fiber fall zone; asphalt overlay,); or feature replacement was required. This chapter summarizes the results of these findings, both for immediate replacement/renovation costs as well as preventative maintenance costs. Park features were broken down into the following four sub-groups, as determined by Missoula Parks and Recreation Department (MPR).

- Developed Parks
- Paved Commuter Trails
- Landscaped Right-of-Ways (ROW)
- Conservation Lands Trailheads

4.2 PREVENTATIVE MAINTENANCE

Preventative maintenance is defined as maintenance required to extend the lifetime of a feature that the normal park department operations does not cover or provide due to funding and/or staffing constraints. Cyclical or routine maintenance operations that are already funded and being performed by Park Operations, such playground inspection, trash removal, irrigation system winterization, fertilization, snow removal, etc…, were not included in this analysis. Examples of preventative maintenance costs include fog sealing a parking lot or hiring qualified electricians to inspect trail lighting. Both of these examples represent practices that should be conducted periodically for safety, maintenance efficiency, feature longevity, and quality of services reasons. MPR does not have specific budget or staffing capacity for the noted preventative cyclical maintenance activities.

Whether a feature type was in good condition (FSA less than 1.5) or failing (FSA greater than 2.5), it was assumed that preventative maintenance needs would still be required. Preventative maintenance is the best way to extend the longevity of park features and minimize potential liability, regardless of whether they are newly replaced features or older features in fair or very poor condition. Some features in the park system have no preventative maintenance costs associated with them because they have been substantially funded and staffed. It is important to note, however that there are specific examples of the City approving new capital facilities, like parks, shelters, and playgrounds, without providing the annual funding or staffing necessary to maintain them appropriately.

Preventative maintenance is required at various frequencies, depending on the requirement of each improvement. For example, patching of asphalt parking lots and trails is recommended every 2-3 years whereas a fog seal is recommended every 5 years. In order to standardize these frequencies, maintenance costs were annualized by dividing them by their recommended frequency. A fog sealing project that would cost $5,000 every five years was assumed to cost $1000 every year.

Table 4.1 shows the estimated annualized preventative maintenance cost needs by park feature groups and specific feature classes within developed parks.

Table 4.1: Annualized Preventative Maintenance Costs

Park Sub-Group		Cost
Developed Parks		-
	Basketball Courts	$4,200
	Parking Lots	$83,400
	Spray/Splash Decks	$61,500
	Tennis Courts	$34,260
	Playgrounds	$12,821
Paved Trails		$51,640
Trailheads		$17,630
	Total =	**$265,451**

Detailed assumptions, design standards, and best maintenance practices that demonstrate the need, extent, and detail behind these costs are found in Chapter 7. The City should seek to fully fund all cyclical preventative maintenance costs ($265K) to ensure public safety, maximize the longevity of park improvements, minimize routine operating costs for park maintenance, and consistently manage the quality and continuity of park services for citizens.

It must be noted that landscaped right-of-ways (ROW) maintenance activities are substantially under-funded and under staffed at present. Needs for landscaped ROW's are discussed in this report; however, preventative maintenance, project needs and costs are not specifically addressed or prioritized as further study and analysis is needed.

4.3 REPLACEMENT AND RENOVATION NEEDS

Park features with a Feature Condition Average (FSA) greater than 2.0 will generally require major investment in the near term if the City is to maintain efficiency and quality of services. There are 36 park features that are in a state of decline, whose condition is expected to move from fair to poor in short order. Due to current condition, many features already provide marginal play quality and low or no service value to residents.

Renovation is recommended for a variety of feature types including ball-fields, facilities with shake or composite roofs, splash decks, basketball courts, and others. Of particular note are the many older playgrounds that are in fair condition and require renovations to meet ADA and playground fall zone safety requirements. It is also important to note that Sacajawea and Southside Lions splash decks no longer comply with State Health rules and may be subject to closure if not retrofitted for automated chemical controls and other required improvements.

Replacement or renovation of some type is considered necessary if the feature has an FSA score greater than 2.0. The choice to apply either replacement costs or renovation costs was determined based on conversations with MPR staff regarding existing conditions, age, extent of needs, cost of maintenance, and the service value of the feature in question.

Much of Missoula's paved trail system is in good to fair condition, thus relatively few replacement projects are needed. Those paved trail segments that are listed in the plan, however, are in poor shape and need prompt attention or should be slated for closure. FSA scores for trailheads are all less than 2.0, placing them in a similar non-replacement category.

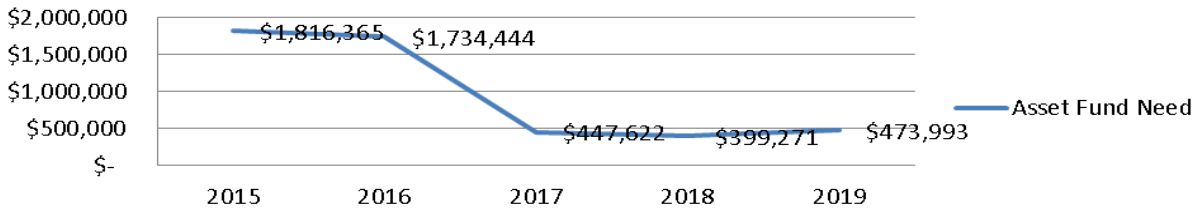
4.4 FORECASTED COSTS AND PROJECTS

Features with an FSA condition rating higher than 1.6 must be considered for future renovation or replacement within the next five years. The estimated total funding need for years 1 – 5 is under $5.0 Million. The figures do not include necessary contingency funds. Costs serve as a general guide for funding targets. Detailed project needs and costs can be developed in conjunction with the City's capital budgeting processes to reflect each park's unique site challenges, constraints and opportunities as well as changes in materials costs, technology, and the time-value of money.

Replacement costs for park features are calculated similar to new construction, assuming demolition of the previous feature and replacement of everything from the sub-grade upwards. Renovation on the other hand is considered a partial replacement and is often required due to safety or compliance reasons.

The figure below shows projected immediate and forecast replacement/renovation funding needs for the next five years. This analysis recommends funding for the most pressing immediate needs be realized in City fiscal years 2015 and 2016. This may not be feasible so costs may need to be spread out over a larger number of budget cycles. The exact timing of replacements and renovations will be determined by the Mayor and City Council given overall revenues, funding needs, sources, and city-wide priorities.

Figure 4.3 - Projected Replacement & Renovation Funding Needs



Landscaped ROW's would be an extraordinary large cost component of the total Asset Management plan, if they were included. The estimated need for immediate renovation of existing landscaped ROWs is just over $1.0 million. Eighteen (18) of fifty-six (56) ornamental ROW's within the city occur on State of Montana Department of Transportation roadways. Ten (10) State route landscaped ROWs have a feature score average of 2.0 or higher. The City should work with the State to fund renovations of ornamental beds on State routes, especially in relationship to projects involving major road work in these areas. Project costs for developed parks and landscape ROWs can be found in Appendix B.

Table 4.4 lists projects, costs and fiscal year for renovation or replacement needs in the Missoula Parks & Recreation System for fiscal years 2015 to 2019. The list is prioritized by year. The list may be further refined and prioritized to reflect actual available funding, changes over time, and community-wide priorities. The listing also shows recommended priority for renovation of select landscaped rights-of-way, however, no costs were projected for these due to the wide range of options available.

If the City is successful in fully funding asset management needs as proposed over the next five years, the City should seek to continue the program by providing a stable, predictable annual budget of +/- $500K for regular replacement and renovation of features over time. It is important to note the annual budget for replacement and renovation must be increased over time to reflect expansion of the park system. Additionally, funding should take into consideration

costs related to more complex features such as lighting systems, major buildings and specialty facilities such as Skate Park, flood control structures, and play waves.

Table 4.4 REPLACEMENT & RENOVATION PROJECTS & FUNDING PLAN 2016 - 2019

Park Name:	Facility Type	Area (SF)	Feature Score Average	Cost Projection	Type	Year
Garland	Playground	840	2.60	$ 75,000	Replacement	2015
Kiwanis	Playground	2,255	2.60	$ 75,000	Replacement	2015
Westside	Basketball Courts	5,253	2.60	$ 19,100	Renovation	2015
McCormick	Basketball Courts	3,207	2.50	$ 11,600	Renovation	2015
McLeod	Basketball Courts	1,890	2.50	$ 6,900	Renovation	2015
River Pine	General Use Turf	31,783	2.50	$ 3,178	Renovation	2015
Greenough	Playground	1,099	2.40	$ 75,000	Replacement	2015
McCormick	Parking Lots (Main)	77,489	2.40	$ 330,700	Replacement	2015
Northside	Spray/Splash Decks	5,694	2.40	$ 25,200	Demo	2015
Playfair	Playground	2,885	2.40	$ 75,000	Replacement	2015
Greenough	Perm. Restrooms	0	2.33	$ 53,120	Replacement	2015
Kiwanis	Ball Fields	8,276	2.33	$ 11,852	Replacement	2015
Kiwanis	Perm. Restrooms	0	2.33	$ 53,120	Replacement	2015
Franklin	Ball Fields	6,534	2.25	$ 11,852	Replacement	2015
Franklin	Basketball Courts	1,755	2.25	$ 6,400	Renovation	2015
Northside	Shelter Picnic	616	2.25	$ 21,602	Replacement	2015
Skyview	Basketball Courts	5,857	2.25	$ 21,300	Renovation	2015
Southside Lions	Shelter Picnic	1,135	2.75	$ 39,802	Replacement	2015
McCormick	Parking Lots (Ops Yard)	66,047	2.20	$ 100,300	Renovation	2015
McLeod	Playground	1,189	2.20	$ 75,000	Replacement	2015
Northside	Basketball Courts	4,309	2.20	$ 15,600	Renovation	2015
Homestead Park - Hillside	Trailhead	N/A	2.00	$ 7,180	Renovation	2015
Kiwanis	Shelter Picnic	1,368	2.00	$ 47,973	Replacement	2015
Sacajawea	Perm. Restrooms		2.00	$ 53,120	Replacement	2015
Hillview @ Moosecan	Trailhead	N/A	1.89	$ 7,180	Renovation	2015
Greenough	Shelter Picnic	1,324	1.25	$ 9,286	Roof Renovation	2015
Grant Creek Trail @ GC Village	Paved Trail	3,285		$ 28,500	Replacement	2015
Grant Creek Trail @RMEF	Paved Trail	14,496		$ 78,500	Replacement	2015

Park Name:	Facility Type	Area (SF)	Feature Score Average	Cost Projection	Type	Year
Greenough Trail	Paved Trail			$ 197,000	Replacement	2015
Mcormick Park Ballfield lights	Ligthing system	0		$ 250,000	Replacement	2015
Rux Trail @ Burger King	Paved Trail	1,637		$ 19,200	Replacement	2015
Rux Trail @ McDonalds	Paved Trail	2,653		$ 11,800	Replacement	2015
Fort Missoula	Playground	2,126	2.60	$ 75,000	Replacement	2016
Ben Hughes	Playground	1,800	2.40	$ 75,000	Replacement	2016
Franklin	Playground	5,005	2.40	$ 75,000	Replacement	2016
Lester	Playground	1,127	2.40	$ 75,000	Replacement	2016
Whitaker	Playground	643	2.40	$ 75,000	Replacement	2016
Southside Lions	Irrigation System	97,378	2.33	$ 41,656	Replacement	2016
Bentley	General use turf	55,783	2.00	$ 5,578	Renovation	2016
Gregory	Parking Lots	2,975	2.00	$ 4,500	Renovation	2016
McCormick	General use turf	704,139	2.00	$ 70,414	Renovation	2016
Playfair	Athletic field	348,155	2.00	$ 177,559	Renovation	2016
Gas Works	Trailhead	N/A	1.86	$ 7,180	Renovation	2016
Hillview @ Tonken	Trailhead	N/A	1.82	$ 7,180	Renovation	2016
Creekside Trail	Paved Trail	17,341		$ 75,100	Replacement	2016
Playfair	Irrigation System	2,268,180	1.67	$ 970,277	Replacement	2016
LW North (West)	Irrigation System	27,657	2.33	$ 27,657	Replacement	2017
Marilyn	Tennis Courts	7,425	2.20	$ 46,000	Replacement	2017
Bonner	Basketball Courts	3,518	2.00	$ 12,800	Renovation	2017
Bonner	Playground	6,534	2.00	$ 150,000	Replacement	2017
Boyd	Basketball Courts	1,741	2.00	$ 6,300	Renovation	2017
Boyd	Irrigation System	82,719	2.00	$ 35,385	Replacement	2017
Goldsmiths	Irrigation System	3,045	2.00	$ 1,303	Renovation	2017
McLeod	Shelter Picnic	410	2.00	$ 2,876	Renovation ADA	2017
Rainbow	Playground	2,782	2.00	$ 10,350	Renovation	2017
Rose Memorial	Playground	2,254	2.00	$ 10,350	Renovation	2017
Westside	Public Restroom	43,120	2.00	$ 53,120	Replacement	2017
Westside	Shelter Picnic	620	2.00	$ 3,535	Replacement	2017
Pineridge	Trailhead	N/A	1.78	$ 7,180	Renovation	2017
Landons Way	Trailhead	N/A	1.73	$ 7,180	Renovation	2017

Park Name:	Facility Type	Area (SF)	Feature Score Average	Cost Projection	Type	Year
Ben Hogan	Trailhead	N/A	1.73	$ 7,180	Renovation	2017
Chipalotto & Sunlight	Trailhead	N/A	1.73	$ 7,180	Renovation	2017
LW North (East)	Irrigation System	110,744	1.67	$ 47,374	Replacement	2017
Bonner	Ball Fields	6,534	1.60	$ 11,852	Renovation	2017
Bess Reed	General use turf	137,779	2.00	$ 13,778	Renovation	2018
Franklin	General use turf	147,728	2.00	$ 14,773	Renovation	2018
Jacob's Isle	General use turf	66,640	2.00	$ 6,664	Renovation	2018
Kiwanis	Basketball Courts	3,491	2.00	$ 12,700	Renovation	2018
Nicole	Playground	2,595	2.00	$ 75,000	Renovation	2018
Pheasant Run	Playground	2,372	2.00	$ 10,350	Renovation	2018
Playfair	Ball Fields East LL 11	47,045	2.00	$ 11,852	Renovation	2018
Playfair	Ball Fields East LL 12	47,916	2.00	$ 11,852	Renovation	2018
Playfair	Ball Fields East LL 13	48,352	2.00	$ 11,852	Renovation	2018
Playfair	Ball Fields West LL 14	48,352	2.00	$ 11,852	Renovation	2018
Wapikia	Playground	3,914	2.00	$ 10,350	Renovation	2018
Kiwanis	Tennis Courts	14,515	1.80	$ 46,300	Renovation	2018
N. Duncan	Trailhead	N/A	1.70	$ 7,180	Renovation	2018
Bess Reed	Irrigation System	137,779	1.67	$ 58,939	Replacement	2018
Elms	Irrigation System	100,950	1.67	$ 43,184	Replacement	2018
McLeod	Irrigation System	106,279	1.67	$ 45,464	Replacement	2018
Tower St	Trailhead	N/A	1.67	$ 7,180	Renovation	2018
LW Creek Crossing	Irrigation System	18,892	2.00	$ 8,082	Replacement	2019
LW Fox Farm North	Irrigation System	18,892	2.00	$ 8,082	Replacement	2019
LW Heritage	General use turf	148,436	2.00	$ 14,844	Renovation	2019
McCormick	Parking Lots (101 Hickory)	8,009	2.00	$ 12,200	Renovation	2019
Pleasant View	General use turf	233,560	2.00	$ 23,356	Renovation	2019
McCormick	Ball Field1	83,635	1.83	$ 11,852	Renovation	2019
McCormick	Ball Field2	84,942	1.83	$ 11,852	Renovation	2019
Playfair	Ball Field South LL 7	40,946	1.80	$ 11,852	Renovation	2019
Playfair	Ball Field South LL 8	41,818	1.80	$ 11,852	Renovation	2019
Playfair	Ball Field South LL 9	41,818	1.80	$ 11,852	Renovation	2019
Playfair	Ball Field South LL 10	43,124	1.80	$ 11,852	Renovation	2019

Park Name:	Facility Type	Area (SF)	Feature Score Average	Cost Projection	Type	Year
Playfair	Ball Fields Senior LL 3	44,867	1.80	$ 11,852	Renovation	2019
Playfair	Ball Fields Senior 4	91,476	1.80	$ 11,852	Renovation	2019
Playfair	Ball Fields Senior 5	92,347	1.80	$ 11,852	Renovation	2019
Playfair	Ball Fields Senior 6	101,059	1.80	$ 11,852	Renovation	2019
Hart Triangle	Irrigation System	8,488	1.67	$ 3,631	Replacement	2019
LW Entry	Irrigation System	11,981	1.67	$ 5,125	Renovation	2019
LW Old Orchard	Irrigation System	4,708	1.67	$ 2,014	Replacement	2019
LW Timberlane	Irrigation System	25,189	1.67	$ 10,775	Replacement	2019
Waterworks	Trailhead	N/A	1.67	$ 7,180	Renovation	2019
Golf Course	Trailhead	N/A	1.61	$ 7,180	Renovation	2019
Playfair	Tennis Courts	79,394	1.60	$ 253,000	Replacement	2019
Orange St. Underpass	Landscaped ROW		2.86	$ -	Renovation	TBD
Hillview Medians	Landscaped ROW		2.50	$ -	Renovation	TBD
Madison St	Landscaped ROW		2.33	$ -	Renovation	TBD
Van Buren Medians	Landscaped ROW		2.33	$ -	Renovation	TBD
Brooks St	Landscaped ROW		2.20	$ -	Renovation	TBD
South & Holborn	Landscaped ROW		2.17	$ -	Renovation	TBD
Van Buren INT	Landscaped ROW		2.15	$ -	Renovation	TBD
South & Garfield	Landscaped ROW		2.13	$ -	Renovation	TBD
39th St	Landscaped ROW		2.08	$ -	Replacement	TBD
Broadway & Russell_BlVD ROW	Landscaped ROW		2.00	$ -	Renovation	TBD
			Total =	**$ 4,871,695**		

CHAPTER 5 – IMPLEMENTATION

5.1 STRATEGIC PLANNING

The Asset Management Plan is designed to provide clear understanding and expectations regarding existing conditions; the longevity and useful life of park amenities; optimal standards of care; and the costs and types of cyclical and preventative maintenance needed. In addition, the plan provides information on the level of reinvestment funding needed to maximize the safe and useful life of existing park system assets through improvements or renovations; as well as the projected cost for asset replacement. The plan demonstrates that many of Missoula's park system amenities are nearing the end of their useful life due to age and/or under funded maintenance. The plan also demonstrates the areas where the City has not been able to adequately fund park operations and maintenance (O&M) for cyclical and preventative maintenance needs. As such, the extent and costs to replace or renovate existing park assets has grown to +/- $5.0 million.

This plan recommends a three part approach be used to reduce the replacement and renovation cost bubble, stabilize park maintenance costs, and optimize continued service delivery to existing and new residents. The first recommendation is to prioritize and fund feature replacements and renovations. The second is to increase park maintenance base funding to a level that provides for annualized cyclical preventative maintenance needs. The third is to establish a policy and process to ensure the maintenance funding needs for all new park development is identified in the capital improvement planning program funding request. This last provision requires the Department to develop a projected and final Maintenance Impact Statement. The projected cost will be included with CIP planning, and a final, actual cost will reflect what was built.

Funding requests for higher cost renovations and replacements such as asphalt overlays, parking lot reconstruction, replacement or upgrade of restrooms, shelters, trailheads, tennis courts, playgrounds, and irrigation systems, will be addressed according to the City's funding capacity, financial processes, and the Mayor and City Council desires. If the City is able to consistently fund an annual Parks & Recreation Asset Management program at or above $500K, then it may be appropriate to specify most medium scale projects in a primary and ongoing CIP funding request. If the City's funding capacity is lower, or is highly variable from year to year, then it may be better to utilize a Capital Improvement Planning (CIP) process to identify individual project funding needs and costs. Calling out individual projects in the CIP processes is especially useful, and most appropriate when it is necessary to replace large and high-cost features like buildings, bridges, pools, splash decks, sports fields, or other elements that have a long service life and/or are highly valued and used by the community.

5.2 GENERAL GUIDANCE

To be an effective tool, the Park Asset Management Plan for Missoula Parks & Recreation must be treated as a living document. It must be applied annually and updated every two years to record changes and additions in the systems (i.e., feature removals, facility closures, replacements, renovations, retrofits, upgrades, and new features). System-wide inventory and re-scoring efforts should be done every 5 years. Rescoring ensures the plan accurately reflects the sum of minor repairs and improvements to features that are performed over the years. Inventory and re-scoring also ensures the plan best reflects the effects of age, wear and tear, codes and laws, and inefficiencies associated with new technology or changes in practices.
Most public buildings and bridges in Missoula's park system are designed and built to last 50 years or longer given regular and cyclical maintenance and prompt repair. As a major public

structure, bridge or recreation facility nears the end of its useful life, the City should seek to fund and initiate specific engineering and design studies, public involvement, and capital improvement planning to determine the appropriate timing, options, preferred design solutions, funding needs and mechanisms to replace or renovate the feature. Projecting costs and scheduling for replacement of significant structures like bridges and specialty buildings, particularly those valued at $250,000 or greater, warrant careful study and consideration of factors that include a municipality's needs, priorities and funding capacity.

5.3 ESTABLISHING PRIORITIES

Every City must consider funding priorities for services and infrastructure needs based on citizen demands, legal obligations, and revenue. Most Parks & Recreation Systems must also compete for limited available funds against all other City departments and needs, such as police, fire, and public works infrastructure. Accordingly, it is important Parks and Recreation Department's and their Board's put forth their most important funding needs so that elected officials may weigh the costs and benefits of a recommended project against all other requests.

Criteria for selecting Parks & Recreation projects to advance for funding consideration are necessary for medium to large parks systems that have diverse, feature-rich recreation amenities. Defined, adopted criteria helps departments and their citizen boards to advance the most important projects by advocating for funding. The following criteria (in order of importance), will help the Parks & Recreation Department and Board to identify and advance priority needs for park system and capital improvement funding requests:

1) Public Safety (risk to persons or property, hazard rating, liability exposure)
2) Legal mandates (ADA, NIPSI, UBC, IBC, new laws, adopted rule changes)
3) Maintain existing services (replace a feature before the only other choice is to close it)
4) Geographic equity (Level of Service per capita – see Master Parks Plan)
5) Improved maintenance/service efficiency (old and deteriorating systems require more)
6) Leveraged funding (grants, matching funds, partnerships, donations)
7) Add new or expanded services to meet growth & demand.

Potential projects may often meet multiple criteria. Except for critical public safety needs, projects meeting three or more of the above criteria should be considered a higher potential priority above those that meet fewer. The aim is to protect and invest in the City's diverse public park & recreation infrastructure to responsibly meet all citizen needs for safety, health, economic stability, clean air & water, while maintaining and improving quality of life for the entire community.

5.4 FUNDING OPTIONS

The current level of general fund revenue (taxes) available to the City of Missoula is unlikely to be adequate to address the short-term funding needs identified in the plan. Additional funding mechanisms will likely be needed to leverage available general fund revenues to flatten the maintenance bubble until a sustainable financial balance is achieved between routine and preventative maintenance, renovation, and adding new Public Park and recreation infrastructure needed due to growth.

Taxing Options:

General Obligation Bonds

- Dedicated Mill Levy

- Local Improvement Districts: This funding mechanism was used to renovate Pineview Park.

- Special Purpose Districts: Park District (as opposed to LID/SID): The City already uses this funding for parks, trails, and open space and forestry maintenance activities.

Alternative Funding Options

- Impact Fees (pro-rata for adding capacity only): Impact fees may be leveraged with renovation and replacement funding to expand service capacity, e.g., add a tennis court, provide a larger shelter, and expand a playground to service both age-class users.

- Partnerships: Public-public (inter departmental, inter-agency, Schools & Parks); Public-private (Kiwanis, Youth sports, special interest, etc). The Department has a number of programs and procedures in place to promote, support and successfully execute partnerships.

- Donation Programs: round up fees, gift catalog, Friends of Parks, Naming rights, capital campaigns, private fund raising, Bequests/Life estates, etc.

- Grants: CDBG, DNRC, Alternative transportation, LWCF, private foundations, public health, and others. The Department has a good track record of winning and leveraging grant funds.

- Governmental sources are not generally stable or predictable and competition is stiff. (Recent TIGER award is an example.)

- License Fees: vehicle plates, dogs, bikes, logos.

- Rentals and leasing: including billboard ads in parks or similar, farm and grazing leases, commercial vending services; or parkland for private commercial ventures.

- User Fees/surcharges: Team sports, shelter rentals, facility rentals, and user permits. Continue to build upon the special funds and enterprise accounts by adding or increasing a facility surcharge dedicated to funding improvements or replacements related to the program or adding surcharge to more programs.

- Revenue Anticipation Bonds: Successfully used by municipalities where user fee revenue and participation in programmed activities is stable or growing (softball, picnic shelters, pools).

- Internal Savings – Changes in park operations, facility improvements, technology or laws can provide costs or time savings (e.g., redistricting, route planning, auto locking restrooms; automated irrigation system). Where such savings are found, the dollars and staff time should be directed to other priority services and maintenance activities.

5.5 STAFFING

The Department's ability and capacity to provide for the timely expenditure of approved funds for project needs is important to examine. Inability to expend a majority of capital and/or funds in a timely manner may result for a variety of reasons such as inconsistent or missing design standards; inefficient purchasing processes or limits; staff time capacity limitations; challenges with budget, financial processes, or site conditions; weak local design and/or construction contracting capabilities, lack of control and communications in fiscal and project processes; organizational or work plan deficiencies or insufficient staffing support.

Two areas of staffing are examined in this report – Operation staff who are responsible for managing and executing routine and cyclical maintenance activities such as mowing, restroom cleaning, playground fall zone upkeep, sign replacements, re-roofing, painting, etc; and Parks' Project staff who are typically responsible for planning, design and construction of capital projects over $50K in value including partnerships, grants, and inter-agency projects such as landscaped roadways, redevelopment agency projects, and shared/joint use lands or facilities. It should be noted that individual projects managed by Operations staff will generally not exceed $25K in value, although the total of several small projects may well exceed $100K.

As noted in Chapter 2, Missoula's operational staffing levels (for maintenance of parks, open space, trails, and rights of ways) are, on average, lower than peer cities. The City has three (3) fewer full-time staff and thirteen (13) fewer seasonal maintenance staff than the average for selected peer cities. Even with low staffing levels, Missoula residents have a favorable view of parks. This is likely because core and daily maintenance needs (safety, cleanliness, mowing, watering), are generally being met, along with access to a variety of trails, parks and open spaces. The 2010 Missoula County Parks & Trails Survey showed, however, that 80% of City residents desire improvements to the park system. The community's level of support for improvements is likely attributable to the age and condition of existing parks and amenities.

Park's Projects staff consists of 2.0 FTE's that, over the last six (6) years, have managed an annual average capital budget of just over $1.8 million (Table 5.1). Projects staff generally manage individual capital improvement projects with a budget of over $50K - especially those requiring specialized skills; contracted services; permitting and regulatory compliance matters; partnerships; and inter-agency coordination. The project list does not include park related improvements by others such as Public Works/Engineering, MRA, Neighborhood grants or private developers.

Table 5.1: Summary of Approved CIP Budget by Fiscal Year

Year	2007	2008	2009	2010	2011	2012
General Fund	$ 581,166	$ 546,849	$ 349,663	$ 272,486	$ 259,627	$ 157,105
Impact Fees	$ 177,500	$ 210,000	$ 122,082	$ 360,657	$ 123,053	$ 94,607
Open Space Funds/Bond	$ 1,257,672		$ 340,000	$ 170,000	$ 254,581	$ 120,959
Grants		$ 40,000	$ 216,852	$ 40,000	$ 320,171	$ 440,582
Stimulus Grants				$ 586,341		
Partnerships		$ 150,852	$ 308,964	$ 68,730	$ 256,844	$ 46,086
Cash in Lieu	$ 19,500	$ 10,000	$ 132,820	$ 15,000		
ADA	$ 45,000	$ 45,000	$ 45,000			
SID		$ 556,000	$ 750,000	$ 710,000	$ 38,974	$ 70,974
CTEP				$ 475,000	$ 160,490	
TOTAL	**$ 2,080,838**	**$ 1,558,701**	**$ 2,265,381**	**$ 2,698,214**	**$ 1,413,740**	**$ 930,313**

Projects staff have been assigned an average of seventeen (17) funded projects in each fiscal year between FY10 and FY13. A review of CIP purchasing information indicates many projects are broken into small units, often to maximize funds by not using a general contractor. This approach requires considerable staff time be spent on the administrative aspects of bidding and contracting processes.

The information presented above suggests the Department's staff would generally be capable of handling up to $2.0 million annually to implement the Asset Management Plan recommendations regarding replacement and renovation projects. Factors that will influence the effectiveness and efficiency of completing the total number of projects contemplated and efficient expenditure of funds include:

Pros:

- Projects staff are substantially involved in developing CIP proposals;
- Projects staff are qualified and experienced in parks and recreation construction and maintenance needs;
- Regular communications and updates occur regarding project status, budget, and timelines;
- Purchasing processes (policies, procedures, timelines, and contracting resources) are well established, clearly defined, and easy to follow;
- The City has a number of important public-public partnerships including the Missoula Redevelopment Agency, County Parks, Missoula Downtown Association, Montana Department of Transportation, and others.
- The Department values, fosters and supports numerous public-private partnerships and donation programs including, but not limited to Partners In Parks, Trees for Missoula (Friends of the Urban Forest), All Abilities Playground, Montana Skate Park, and numerous volunteer projects.
- The Department is adept at leveraging City funding sources for private donations, agency partnerships, in-kind labor and materials, grants, and service club projects.
- Use of cooperative bidding services and internal-cross departmental services is allowed

Cons:

- Lack of adopted design standards and specifications slows design processes and increases time needed for internal review and approval of construction plans and bid documents;
- Project prioritization, work plans, and scheduling have not been optimized to take fullest advantage of the contractor bid environment and construction season.

- Project staff is not directly supported by a dedicated administrative staff for preparation of pro-forma bid documents, bid processing and tabulation, tracking project payments, filing, daily communications and coordination, or handling of customer service inquiries.

- The two Projects staff positions and duties are separated. Staff productivity/workload is reduced by the time required to coordinate and hand-off projects from the Project Planning and Design staff to the Construction Management staff.

- Internal project review processes/benchmarks are not strictly followed resulting in change orders and reworking of construction plans and bid specs prior to bidding;

- The City requires formal bid procedures (public notice advertisement) for all construction purchases $25K and above. The City's formal bid threshold is 2/3 lower than State purchasing requirements ($75K). The result is added effort, costs and process time to secure construction services for all projects over $25K in value.

- Funding is irregular and often projects rely on staff ability to secure adequate grants, in-kind matching, donations and other funds to begin or complete a project.

- The City does not track CIP encumbrances resulting in staff time being spent on budget administration by both projects and administrative support staff.

- Project planning and schedules are significantly impacted by projects by partner agencies often causing delays in the Departments own projects.

In addition to the above opportunities and constraints, it is important to note that Projects staff time is utilized and consumed when they must act as the Department's representative on projects funded or sponsored by other agencies such as Public Works Engineering and the Missoula Redevelopment Agency or by Developers. These projects are not reflected in Table 5.1's CIP figures as they are attributed to the sponsoring agency. While the sponsoring agency may provide outstanding park or park related improvements to the community, the agencies have limited knowledge, skill, or responsibilities related to design, construction, and maintenance specific to parks. This is evident in light of recent inter-agency projects where Parks Projects staff time was disproportionately spent working with the project sponsor team in the "owners representative" position as opposed to if the project and funding had been assigned to the department.

In the last four fiscal years MRA and Public Works have sponsored significant and community valued projects worth millions of dollars that were turned over to the Parks and Recreation Department for maintenance. Parks Department staff time was inordinately consumed by these projects. A review of Parks project staff time on Silver Park phase III; and Miller Creek Roundabout reveals that during certain months, Projects and other Department staff spent up to half their available work time on meetings involving scoping, design, plan reviews, construction challenges, and communications aimed at resolution of challenges that had a direct bearing on parks and recreation values, on-going maintenance costs, durability, liability, or safety. In each of the noted cases, the results could have been positively impacted by directly placing the Parks and Recreation Department in charge of the project. This action would result in improved sustainability and maintenance of park infrastructure.

The source of funds and processes related to their use and administration also affects staff time. Projects that use Federal grant sources or that are funded through donations and partnerships generally take more staff effort and time to execute. Many Federal grants, depending on the project scope, complexity of design issues, and administrative obligations can demand between 25% and 35% more staff time than a project funded from municipal taxes and fees. Table 5.3 summarizes the funding sources and amounts that have been approved for use by the City's Parks & Recreation Department over the last six years. The data shows that 29% of funding comes from grants and partnerships.

Table 5.3: Parks & Recreation Capital Improvement Projects Funding Sources from FY2007 to FY2013

Funding Source	Funding Amount	Percent
General Fund	$ 2,166,896	20%
Impact Fees	$ 1,087,899	10%
Open Space Funds/bond	$ 2,143,212	20%
Grants	$ 1,057,605	10%
Stimulus Grants	$ 586,341	5%
Partnerships	$ 831,476	8%
Cash in Lieu	$ 177,320	2%
ADA	$ 135,000	1%
SID	$ 2,125,948	19%
CTEP	$ 635,490	6%
TOTAL	$10,947,187	100%

5.6 RECOMMENDATIONS

The data and analysis noted above suggests a range of recommendations be considered to grow the Department's capacity and ability to implement the Park Asset Management Plan while better ensuring prompt and cost effective utilization of funds. These include the following:

- Work with the Mayor and Council to prioritize and fund Park Asset replacement and renovations.

- Update annual maintenance work plans and performance measures of Park Operations Managers and District Maintenance Crew Leaders to implement increases in funded cyclical and preventative maintenance activities.

- Request the Mayor and Council adopt a policy whereby the City Council will not approve CIP's that add new parks, landscape ROW's, Trails, or CLM trailheads or feature improvements unless the maintenance needs are adequately funded.

- Work with Finance Department and elected officials to establish and increase funding program to a level that optimizes useful life of features, minimizes operating costs, provides for timely replacement of features to ensure minimal disruption of services and that park system amenities best meet the needs and demands of the community.

- Develop a standardized policy with procedures and a clear costing basis to develop Maintenance Impact Statements for all proposed CIP projects and each completed CIP project before funds are transferred to the Department.

- Request increased funding to purchase supplies, materials and services needed for cyclical and preventative maintenance priorities including but not limited to playground fall zone material, asphalt patching, trailhead features, shrub bed renovations, and irrigation system upgrades

- Request funds to increase regular and seasonal maintenance staffing levels, especially to address and implement cyclical and preventative maintenance priorities for playgrounds, asphalt, trailheads and irrigation.

- Develop, adopt and require compliance with park design standards and construction specifications

- Establish a clear internal project review and approval process for master plans and park construction projects, including for "projects by others."

- Standardize project prioritization, staff work plans, and bid scheduling to take fullest advantage of the contractor bid environment; construction season, and City budgeting cycles.

- Reduce the use/number of team projects.

- Work with the new Central Services and Development Services Directors, plus MRA to better ensure timely communications regarding approved CIP and operating, budget tracking and encumbrances.

- Seek Mayor and Council authorization to increase bid limits to more closely match State purchasing requirements.

- If City purchasing limits are not liberalized, seek funding to provide an Administrative Assistant to support the Project team and Park Operations Manager's purchasing and contracting needs.

- The Department should provide an annual update on progress regarding implementation of the Park Asset Management Plan. This would be comparable to other adopted plans including the Master Parks Plan, Open Space Plan, and Conservation Lands Management Plan.

- This plan should be updated every year to reflect replacements, renovations, removals, closures and the addition of new infrastructure.

- The plan should include a complete inventory and full condition rating assessment every 5 years to ensure accuracy of inventory and conditions and to reflect changes in standards, materials and technology, and to update costs.

CHAPTER 6 - ADA Transition Plan

6.1 Background

The Americans with Disabilities Act is civil rights legislation passed in 1990 that has been in effect since July 1992. The ADA sets design guidelines for accessibility to public facilities, including sidewalks and trails, by individuals with disabilities. The ADA has been updated, amended, and expanded several times in the decade after its initial adoption. The City of Missoula has an adopted ADA transition plan that is maintained by the City's Human Resource Department. The Park Asset Management Plan provides opportunity to update the portion of the City's transition plan related to parks, park amenities, trailheads, and open spaces.

ADA and its Relationship to Other Laws
Title II of ADA is companion legislation to two previous federal statutes and regulations: the Architectural Barriers Acts of 1968 and Section 504 of the Rehabilitation Act of 1973.

The Architectural Barriers Act of 1968 is a Federal law that requires facilities designed, built, altered or leased with Federal funds to be accessible. The Architectural Barriers Act marks one of the first efforts to ensure access to the built environment.

Section 504 of the Rehabilitation Act of 1973 is a Federal law that protects qualified individuals from discrimination based on their disability. The nondiscrimination requirements of the law apply to employers and organizations that receive financial assistance from any Federal department or agency. Title II of ADA extended this coverage to all state and local government entities, regardless of whether they receive federal funding or not. When addressing accessibility needs and requirements, it is important to note that ADA and Title II do not supersede or preempt state or local laws that may offer equivalent or greater protections.

Over the last ten years the City has made substantial progress to make its park system more accessible. A significant amount of investment has gone into ADA ramp improvements at intersections that adjoin developed parks. In addition, all new park development, feature alterations, and replacements are required to meet ADA standards. The City Council has been generally consistent in approving $50K or more for ADA improvements in parks over the last five fiscal years (FY08 – FY14). ADA capital funds are most often leveraged with larger projects, such as a playground or tennis court replacement, to maximize the extent of ADA improvements for a site.

The City has more work to do to fully implement its ADA transition plan within the park system. The focus to date has been on improving access and accommodations at community parks like McCormick Park. In 2012, Park's Operations staff conducted an inventory and condition assessment that included a review of ADA accessibility for all major park improvements. The results of the inventory and condition assessment process are found in the appendices. The following information summarizes City's park system relative to ADA accessibility of built features:

General Park Features (designated parking spot with stabilized ramp and paths for access to park, internal pathways, restroom, playground, splash deck, ball fields, etc…) One hundred eighty-three (183) or 64% of parks and major recreational feature amenities are accessible and 105 (36%) are not. Notably, playgrounds, baseball, and softball fields are the features least likely to be compliant with ADA accessibility requirements. A number of

the City's parks utilize on-street parking. At these sites, relatively few have an appropriately designated ADA parking space.

CLM Trailheads (designated parking spot with stabilized ramp and paths for access to vistas, natural landscapes, trail(s), interpretive signage, trash can, restroom, etc…) Nineteen (19) or 48% of trailheads are accessible and 21 (52%) are not. Most trailheads provide access to trails located and crossing steep open space areas. The principles associated the ADA's reasonable accommodation provisions need to be evaluated and applied throughout the CLM trails and trailhead system to ensure equity in access to nature, open spaces, and interpretive information.

Specialty buildings and park features (designated parking spot with stabilized ramp and paths for access to buildings and developed special use features and areas (memorial features, skate rink, Dog Off Leash Areas, public art, storage buildings, pump houses, etc…) Twenty-two (22) or (50%) features are accessible and the other 22 (50%) are not.

As ADA accessibility improves, the City will need to pay equal attention to funding and effecting necessary ADA accommodations for its buildings, recreational features, fixtures and other modifications needed provide and promote access for all. As the City funds replacement of old, out-of-date and non-compliant park features it will continue to apply ADA standards to provide a system that is available to serve people of all abilities.

6.2 Correction Program

The Parks & Recreation Department is committed to addressing the barriers identified in both the original self-evaluation and its 2012 facility inventory and condition rating project. Existing parks and recreation facilities that are inaccessible due to built-environment deficiencies will continue to be prioritized for removal of identified barriers and retrofitting of needed accommodations. Facilities that do not meet all ADA standards will continue to be improved as funds for replacement and modification are provided through the City's Park Asset Management Plan and capital improvement program. The funding and scheduling of accessibility improvements that are to be made by of the Department's construction projects are determined by the Mayor and Council through the City's annual budget approval process.

6.3 Training

The City's Parks & Recreation Department is committed to identifying and promoting awareness of ADA rules and removal of barriers. To advance this goal, the Department will continue to provide annual training to staff on ADA design; identification and removal of barriers; and, on its policy of inclusion for people of all abilities. Opportunities for additional training on topical ADA matters will be offered to appropriate staff as funds are made available

ADA related training needs for Park Operations and Projects staff identified for 2013 and beyond include:

- ADA and Title II overview and requirements
- Inventory Collection
- Technical Training
    - Curb Ramps
    - Parking facilities
    - Barrier awareness and field fixes
    - Site and Facility Inspections

    - Maintenance, e.g., Inventory, Snow & Ice, Faulting, Maintenance Agreements
- Project Development
    - Parks Project Design and ADA standards
    - Bicycle & Pedestrian Facility Planning
    - Accessible interpretive signage
    - Policy & Procedure
        - Complaint Procedures

6.4 Recommendations:

The City should continue to provide funding to implement its ADA Transition Plan for park facilities, recreational features, fixtures and other modifications within the Park System to provide access for all.

Each funded project for renovation or replacement of park features should include project elements to ensure an ADA compliant accessible route is provided including the removal or retrofit of identified barriers to access specific to the feature as part of the project.

CHAPTER 7 – FEATURE TYPE ANALYSIS

The feature types shown in Table 6.1 were analyzed to identify best management practices, expected longevities, annual maintenance costs, and replacement or renovation alternatives. The following sub-sections of this chapter detail the assumptions and results of this analysis.

Table 6.1 - Feature Type Breakdown

Feature Type	Report Sub-Section	Appendix Table #
Parking Lots	7.1	A.1
Paved Trails	7.2	A.2
Basketball Courts	7.3	A.3
Tennis Courts	7.4	A.4
Volleyball Courts	7.5	A.5
Ball Fields	7.6	A.6
Athletic Fields	7.7	A.7
Irrigation	7.7	A.8
Playgrounds	7.8	A.9
Splash Decks	7.9	A.10
Landscape Bed Renovations	7.10	A.11
Trailheads	7.11	A.12
Bridges	7.12	A.13
General Buildings	7.13	A.14
Trail Lighting	7.14.1	A.15
Field Lighting	7.14.2	A.15
Well Pumps	7.14.3	A.15
ADA Pads	7.15.1	A.16
Pavers/Stamped Concrete	7.15.2	A.17
Root Damage	7.15.3	A.18
Specialty Concrete	7.15.4	A.19
General Asphalt	7.15.5	N/A

7.1 Parking Lots

7.1.1 Introduction

Parking lots are an important element present in many parks in the City of Missoula. The City of Missoula has 23 parking lots at various parks; these parking lots vary in size and shape, but they all require routine maintenance to ensure ADA accessibility.

Once problems develop with the asphalt in a parking lot, they need to be taken care of as soon as possible to prevent further degradation and to minimize future reconstruction costs. Cracks tend to spread, and low spots, also known as “bird baths,” can lead to larger more complex problems with the parking lot surface and below.

Properly maintained parking lots provide ADA accessibility and allow water to efficiently drain off of the paved surface. Parking lots that receive routine maintenance last longer and look better than parking lots where maintenance is ignored. Unsightly cracks, potholes, and birdbaths are eradicated from the asphalt, resulting in a better experience for drivers.

7.1.2 Preventative Maintenance

Currently the City of Missoula maintains parking lots based on user feedback. If there are complaints about the condition of parking lots, the city evaluates the problem, and takes action. Snow plowing and sweeping are maintenance activities that the city currently performs on an as-needed basis. Preventative maintenance should be on a schedule rather than an as-needed situation. Scheduling preventative maintenance helps keep the parking lot in great shape, and helps avoid costly problems that can arise from under maintained lots. The following table illustrates some of the probable causes to common parking lot issues.

Problem	Probable Causes
Random Cracking	Overstressed Slabs, Slab Lost Support, Subgrade Settlement
Spalling	Improper Finishing
Surface Irregularities (Rutting, Washboarding, Birdbaths, Undulations)	Non-Uniform Settlement from Inadequate Compaction of Pavement Components or Fill, Unstable Mix (Poor Aggregate Gradation, Too Rich, Etc.), Poor Laying Control
Potholes	Water Entering Pavement Structures, Segregation in Base Course Material

Preventative maintenance is an important step in making sure parking lots reach their useful life. Parking lots that are properly maintained are more aesthetically pleasing, and function at a higher level of service. ADA accessibility is maintained, and drainage problems are mitigated if regular maintenance is performed. The following maintenance procedures can ensure that the useful life of the parking lot can be extended to its maximum potential.

Periodic Inspection – Parking lots need to be inspected about once a year to ensure that small problems in structural integrity can be identified early, and ADA accessibility can be maintained. The inspector should be looking for a few key issues that compromise the

accessibility, safety, and overall appeal of the parking lot. Key issues include, but are not limited to: cracking, spalling, birdbaths (low spots), and potholes. Improper drainage and poor base material are the most common major causes of the aforementioned failures. Poor base material is typically a result of insufficient geotechnical investigations prior to construction of these parking lots. A geotechnical investigation is recommended for all future parking lots greater than 3000 square feet. For the purpose of this report, periodic inspection of parking lots is considered a part of the Park Department's normal operations and as such does not have a preventative maintenance cost associated with it.

Sweeping - Sweeping the surface from built up debris is also a known key factor in extending the life expectancy of an asphalt surface. This built-up debris can cause undesirable ponding of water and/or mold build up, and will eventually lead to pavement distress. Allowing all the debris from a parking lot to drain to the sump can lead to sump failure. Active sweeping and washing helps prevent sumps from failing due to excess debris buildup. Power washing should be completed on a biannual schedule to remove debris from the surface. Sweeping should be completed on an as-needed basis, which can be more frequent during the fall when leaves are falling. Currently, City of Missoula Parks department staff sweep parking lots only as necessary. Although sweeping is important for preventative maintenance, it falls into a regular operations category and will not be considered for preventative maintenance costs.

Snow Plowing - Snow allows for freeze-thaw to occur on a regular basis in the colder months. Snow plowing is an important operational practice that must be completed to prevent freeze-thaw cycles from having a detrimental effect on the parking lot. If snow and ice is left on the surface; subsurface issues can begin to take shape. Potholes are a major issue that arise from freeze-thaw cycles, and can be a costly repair if not addressed immediately. Removing snow throughout the winter also helps to ensure usability and safe access. Snow and ice should be removed on an as-needed basis. Currently, City of Missoula Parks department staff perform their own snow removal operations as necessary. Although snow removal is important for preventative maintenance, it falls into a regular operations category and will not be considered for preventative maintenance costs.

Striping - Parking lot striping is a practice that needs to be completed on a regular basis. With frequent plowing and changes of weather, striping will need to be completed every 3 years, or as inspections or practice necessitate. Striping allows for more organized parking and traffic patterns, and also allows for designated handicapped parking stalls. Typical stall density is around 20 stalls per 10,000 square feet of parking surface.

Fog Seals - Fog seals are a proven method of preventing unwanted moisture from penetrating the asphalt surface and damaging the integrity of the base course. Double coat fog seals have been used effectively for parking lots with light vehicular use in the past typically lasting between 3-5 years.

Chip Seals - Chip sealing, also known as slurry sealing, offers another viable option when it comes to sealing an asphalt surface from the elements. Chip seals are a more durable option than fog seals due to the added compact aggregate layer. Chip seals remain effective for 4-6 years. However, due to limited traffic flow, chip sealing is not appropriate for parking lots and will not be considered in further cost analysis.

Crack Sealing – Crack sealing needs to be done in parking lots to ensure that water is not allowed to penetrate the asphalt and damage the base material. It is not as important in

parking lots to maintain smoothness as it is in pedestrian trails, as long as the rougher edge is not taking place in an ADA accessible route. This report assumes 500 linear feet of crack will be sealed every 5 years per 10,000 square foot parking area.

Patching – Sometimes an asphalt surface needs to be removed, the base layer needs to be re-compacted, and new asphalt needs to be applied and compacted. Patching is usually required in areas where potholes or large crack networks are prevalent, and crack seals will not be a sufficient repair to the surface. This report assumes that 3% of each parking lot will require patching every 2.5 years.

Mill and Overlay – Asphalt overlays are a renovation item that can be completed when the parking lot inspections indicate that the structural integrity of the parking lot is still satisfactory. The surface needs to have major cracks and potholes repaired prior to milling and overlaying the surface. Repair costs can be minimized by reducing the thickness of overlay if conditions allow. Although mill and overlay renovations are common for asphalted areas, most parking lots fail due to poor subbase, which mill and overlays will not resolve. Therefore, complete replacement is recommended instead of mill and overlays where practical. For the sake of this report, mill and overlay pricing is provided as an alternative and is not included in the cost projections.

Curb & Gutter Maintenance – Structural curb and gutter problems normally arise from under-compacted base material or poor site drainage practices. Replacement is the typical remedy for curb and gutter that is in poor conditions. The replacement can usually be localized to the problem area, and may need to be hand-replaced. Other issues can arise from vehicles and users. Vehicles driving into curbs with the rims of their tires, and parking on them for extended periods of time can lead to minor chips, and birdbaths that can be patched with a cement-based finish. Curb and gutter's primary purpose in a parking lot is to provide drainage. Sweeping should focus on curbs to ensure that the curb and gutter is free from debris, allowing drainage to occur per the original design.

Storm Drain Sump Maintenance – Storm drain sumps require regular maintenance to ensure that they are effectively draining water out of the site. If maintenance is not performed on storm drain sumps, water can back up, resulting in standing water. This water leads to many issues as stated in the general asphalt section of this report, as well as general safety. Storm drain sumps should have debris removed on a regular as-needed basis to prevent flooding. In cases where sweeping and washing operations do not succeed in preventing the entry of debris and sediment into the sump, and the sump fails; the sump and gravel cobble will need to be excavated and replaced. Currently, park staff perform their own sump maintenance as necessary. Although sump maintenance is important, it falls into a regular operations category and will not be considered for preventative maintenance costs.

Sidewalk Maintenance – Sidewalks can fail in a couple of different ways. Insufficient base design can lead to settling, and poor finish work can lead to spalling. Sidewalks should be inspected by a qualified individual who is looking for signs of settling, or surface flaking. Settlement usually requires the problem section of sidewalk to be replaced. Spalling can be fixed by removing loose material, grinding to maintain a smooth finish, and cleaning and refinishing the surface with a cement-based finish.

7.1.3 Alternatives

There are many different practices that can be used to fix issues with parking lots before a total replacement is needed. Parking lots can be crack sealed, patched, milled and overlaid, and chip or slurry sealed. All of these practices besides the complete reconstruct can be considered maintenance. At some point the decision needs to be made if continually reactive maintenance is needed or if the reconstruction of the lot is a more economical decision. The included cost-estimate spreadsheet can be used to compare maintenance costs to replacement costs in order to assist with that decision.

7.1.4 Replacement Costs

Table A.1 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with parking lot. Unit costs are provided for reference only as the exact cost of replacing a parking lot varies depending on site specifics and owner requirements.

Conversations with City of Missoula parks staff led to more specific replacement costs based on Missoula standards and the following assumptions:

Sidewalk Replacement – Not all parking lots within Missoula park system have sidewalks. For the purpose of this report, sidewalk replacement costs will not be considered.

Curb and Gutter Replacement – Not all parking lots within the Missoula park system have curb and gutters along their periphery. Many parking areas border against grass, vegetation, or the street. For this reason, a lower estimate of 200 linear feet per 10,000 square feet of parking area was assuming for the purpose of this report.

Asphalt Replacement – Cost for several asphalt thicknesses are included in Table A.1. Typical asphalt thickness for a low traffic area with good subgrade is 3-inches. Similar to City of Missoula street department standards, 6-inches of ¾-inch subbase will be required beneath all asphalt.

Striping - Research of Missoula's existing parking lots shows a density of one parking stall per 500 square feet. This report assumes an average length of 10 feet of striping per stall. A single handicapped stall was assumed per 5,000 square feet of parking area.

Storm Drain Sump – City of Missoula street department standards require a single storm drain sump for every 10,000 square feet of impervious area. In many parks department parking areas, no sumps are present as the parking area is small enough to drain back to the adjacent street.

7.1.5 Estimated Longevity

The longevity of a parking lot can vary due to different factors associated with the parking lot. Proper design and construction can add years to the lifespan of a parking lot. Parking lots can usually last 20-30 years before they need to be replaced or significantly repaired, but with preventative maintenance the parking lot could last well beyond that.

7.1.6 Replacement Standards

The City of Missoula has numerous standards for the construction of parking lots, and the drainage structures associated with a parking lot. For the replacement of old parking lots, these standards would ensure that the parking lot is built to last. No additional standards specific to Parks and Recreation are anticipated to be necessary.

7.2 - Multi-Use Paved Trails

7.2.1 Introduction

There are approximately 23 miles of multi-use paved trails in Missoula that are maintained by the Missoula Parks and Recreation Department. Multi-use paved trails in the City of Missoula are either asphalt or concrete, and each surface has its own benefits that will be discussed in the alternatives section of this report. These trails can be used for pedestrian use only, or a mixture of pedestrian and bicyclists. With the volume of trails currently located in Missoula, deciding when each trail needs maintenance or replacement can be a very challenging task.

Unmaintained trails pose many safety hazards to users. Surface degradation can lead to tripping hazards, and result in a surface that does not meet ADA standards. Root growth, tree overhangs, and vegetation on the edges of trails can be problematic as well.

Trails that are well kept make parks more enjoyable for users of all ages. Trails in good condition will have proper drainage, a smooth surface, and they will be free from obstacles on the edges of trails. Signs should be in readable condition, any pavement striping should be renewed when needed, and any debris or hazards should be promptly removed.

7.2.2 Preventative Maintenance

Paved trails can benefit from preventative maintenance in a number of ways. Proper design is a major factor in the longevity of a paved trail. Asphalt trails makes up most of the trails in the City Parks and Recreation Department. One technique that is beneficial in preventing erosion of asphalt trails is to provide a gravel shoulder on the edges of the trail to prevent the trail from crumbling on the edges due to exposure to the environment and lawn maintenance equipment. The following maintenance activities, specific to paved multi-use trails, should be completed on a regular basis:

Periodic Inspection – In addition to those items described in the Asphalt Surfacing section, inspections should also focus on obstructions that could be on the side of the trail. Overall smoothness can also be a factor that reduces the surface's effectiveness as a trail. As the mineral fillers and fine aggregates are weathered from around the course aggregate particles, the surface becomes rougher, and less ideal for pedestrian traffic associated with multi-use paved trails. Trail-side vegetation should be inspected to ensure that roots are not growing under the paved surface causing a tripping hazard, and to ensure that overhanging obstacles are not a hazard for pedestrians using the trail. Inspectors should also look for vandalism, as unattended vandalism often encourages others to disrespect the property. Trail waste management practices should ensure that garbage cans are not overflowing, and it should be noted during inspection if more frequent removal practices are needed. For the purpose of this report, periodic inspection of parking lots is considered a part of the Park Department's normal operations and as such does not have a preventative maintenance cost associated with it.

Fog Seals – Due to the lack of heavy vehicular traffic, and the need for a smoother surface, chip seal is generally not recommended. Users can vary on the city's trails, and a smooth surface makes the trail more enjoyable for wheeled users including, but not limited to: bicyclists, stroller users, skateboarders, etc. It is recommended that the asphalt surface be single-coat fog sealed every 3 years, or as inspections indicate. Concrete-surfaced trails would not require this maintenance.

Crack Sealing – Any surface cracks that develop should be addressed as soon as possible to minimize potential future problems that can develop. Uneven surfaces created by the crack should be ground smooth, cleaned, and sealed. Periodic inspections should identify cracks that appear. For the purpose of this report, it was assumed that 500 linear feet of crack sealing is required per 1000 linear feet of trail every 3 years.

Local Patching – Local patching of trails may be necessary to rectify pot holes, and bird baths. These areas need to be identified during inspection, and addressed as soon as possible to maintain a safe surface for users. Fog seal may be considered after patching an area to restore a smooth surface.

Sweeping – Sweeping paved trails can have a very positive affect on trails. Sweeping debris off of the trail ensures that there is no tripping hazards, and can also make sure dirt and other materials do not harm the trails surface. Built up soil causes undesirable ponding of water, and will lead to eventual pavement distress. The shoulders and ditches should be routinely maintained to prevent erosion. For the purpose of this report, sweeping of paved trails is considered a part of the Park Department's normal operations and as such does not have a preventative maintenance cost associated with it.

Snow Plowing – In Montana's harsh climate, freeze-thaw is another obstacle that must be accounted for in the winter time. Snow allows for freeze-thaw to occur on a regular basis in the colder months. Snow removal is an important preventative maintenance practice that must be done to prevent freeze-thaw cycles from having a detrimental effect on the paved trails. If snow and ice is left on the surface; subsurface issues begin to take shape. Potholes are a major issue that arise from freeze-thaw cycles, and can be a costly fix. Snow and ice should be removed on a regular as-needed basis. For the purpose of this report, snow removal is considered a part of the Park Department's normal operations and as such does not have a preventative maintenance cost associated with it.

Mowing and Tree/Brush Pruning – Mowing should be done on a regular basis to ensure that vegetation is not overgrowing the trail at the ground level. One way to help prevent this from being an issue is to construct a gravel shoulder on the side of the trail creating a buffer zone from the vegetation. Tree and brush pruning needs to be done on a regular basis to ensure overhanging hazards will not be a cause of injury for trail users.

Park Structures – Maintenance of park structures along trails include: signs, park benches, picnic tables, and any other structures that may be placed alongside a multi-use paved trail. These items should be maintained or replaced to ensure user safety and make sure they do not become an eye-sore for users which would discourage use.

7.2.3 Alternatives

For the purpose of this report, the alternatives for multi-use paved trails include asphalt, concrete, and stabilized gravel. Asphalt trails will have significantly lower installation cost, but a well-built concrete trail will last longer than an asphalt trail and have lower annual maintenance costs. Concrete trails can last up to 10-15 years longer than asphalt trails and require significantly less maintenance. The less annual maintenance and extended longevity of concrete can help to offset the initial higher cost of construction.

Concrete trails require less preventative maintenance. Aside from the aforementioned sweeping and snow removal, concrete trails need to be inspected to ensure that settlement is not

occurring. Settlement of a concrete trail will result in cracks, and the surface will be more dangerous for its pedestrian users. Areas where settlement has occurred need to be replaced to ensure a safe and ADA accessible trail.

Beyond cost and longevity, sometimes the terrain and use dictates the best trail alternative. Asphalt trails are typically a better option in sloped areas, because the asphalt mix allows for better flexibility of the trail. Concrete trails are a better option when flooding is a concern as the concrete will withstand the exposure to water more efficiently. Concrete trails can also be hard on the joints of runners because of rigidity, whereas asphalt trails can be more forgiving due to their flexibility. Asphalt trails tend to be used more often than concrete trails due to the much lower initial cost, and flexibility to both terrain and users.

Soil stabilizing additives for trail surfacing applications have been used all across the country with results that vary from extremely poor to very satisfactory stabilization. A promising stabilization product for the Missoula area is made from ground psyllium seeds - a sustainable, natural plant product native to India. Psyllium stabilized trails are being tested in Missoula to determine suitability regards durability, maintainability, and longevity. Cured, psyllium stabilized trail surfaces are porous and therefore present excellent potential for use in applications were enhanced drainage or a natural looking tread surface is desired. Psyllium stabilized trail construction costs depend on method of application and the type of tread surface materials used. In general costs will be between asphalt and concrete for urban trail development. Psyllium stabilized trails generally perform well in arid and semi-arid environments; as such, it has excellent potential for use with conservation lands trails.

7.2.4 Replacement Costs

Table A.2 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with paved trails. Unit costs are provided for reference only as the exact cost of replacing an individual paved trail varies depending on site specifics and owner requirements. Conversations with City of Missoula parks staff led to more specific replacement costs based on Missoula standards and the following assumptions. All trails are assumed to be 10 feet in width.

Demolition – No sidewalk replacement or curb and gutter replacement was assumed as part of this analysis.

Asphalt Replacement – Cost for several asphalt thicknesses are included in the above table. Typical asphalt thickness for a low traffic area with good subgrade is 3-inches. Similar to City of Missoula street department standards, 6-inches of ¾-inch subbase will be required beneath all asphalt and is included in these cost evaluations.

Concrete Replacement – Some trail systems in Missoula utilize a concrete surface. A separate replacement cost was calculated for these areas assuming a 4-inch concrete thickness.

Root Damage Prevention Material – Refer to the root damage prevention section of this report for details. This report assumes 15 linear feet of Biobarrier is required every 100 feet of trail length.

Signs – A single sign was assumed for every 1500 linear feet of trail.

7.2.5 Estimated Longevity

The estimated longevity of a paved trail depends on the type of slab initially installed (asphalt, concrete, and the amount of routine preventative maintenance performed on the surface. Multi-use paved trails can last in excess of 30 years if proper preventative maintenance is implemented, with concrete trails lasting 40+ years in some instances. The majority of Missoula's trail network has been paved in the last 20 years and remains in good condition.

7.2.6 Replacement Standards

Construction standards for multi-use paved trails are established by Montana Public Works Standard Specifications (MPW) and American Association of State Highway and Transportation Officials (AASHTO).

7.3 - Basketball Courts

7.3.1 Introduction

Basketball courts have many similar features to tennis courts. Concrete or asphalt is constructed with a finished surface, and then the playing lines are painted onto the court. As a majority of existing basketball courts within the City of Missoula are constructed of asphalt pavement, reference should be made to the Asphalt Surfacing section of this report for more in-depth descriptions of the various maintenance procedures.

Major degradation of a basketball court can be cause for safety concern, with an uneven surface due to differential surface settlement, loose material on the court surface, and/or unmaintained surrounding areas.

A good condition basketball court will consist of a smooth playing surface free from irregularities, debris, vegetation, and ponding water. No major structural failures of the pavement should be apparent. Playing lines should be readily visible, and poles, backboards, and nets should be in operating condition. Surrounding areas should be well maintained, with no ponding water, weed patches, or dangerous obstacles.

7.3.2 Preventative Maintenance

Basketball courts can benefit from preventative maintenance in a number of ways. As with all hardscape surfaces, proper design is a major factor in the longevity of a basketball court. Though very similar to general asphalt in maintenance procedures, basketball courts have some unique elements due to the lack of vehicular traffic, and the nature of the use of the courts. The following maintenance activities, as more completely described in the Asphalt Surfacing section of this report, should be completed on a regular basis:

Periodic Inspection – In addition to those items described in the Asphalt Surfacing section, inspections should also focus on minor surface deterioration that will lead to spalling and loose material being released from the surface. Overall smoothness can also be a factor that reduces the surface's effectiveness as a playing surface. As the mineral fillers and fine aggregates are weathered from around the course aggregate particles, the surface becomes rougher, and less ideal for the foot traffic associated with basketball or other court games. Poles, backboards, and nets should also be inspected for operating function, as well as for safety concerns. A loosened or rotted backboard or rim that could fall off during play, causing personal injury or damage to other components of the court. For the purpose

of this report, periodic inspection is considered a part of the Park Department's normal operations and as such does not have a preventative maintenance cost associated with it.

Fog Seals – Due to the lack of heavy vehicular traffic, and the need for a smoother playing surface, chip seal is generally not recommended. It is recommended that the asphalt surface be single-coat fog sealed every 5 years, or as inspections indicate. Concrete-surfaced courts would not require this maintenance.

Crack Sealing – Any surface cracks that develop should be addressed as soon as possible to minimize potential future problems that can develop. Uneven surfaces created by the crack should be ground smooth, cleaned, and sealed. Periodic inspections should identify cracks that appear.

Local Patching – Similar to cracks, any deteriorating areas of asphalt or concrete should be identified during inspection, and addressed as soon as possible to maintain a usable surface. Great care must be taken in failed asphalt removal and new asphalt placement in order to maintain a smooth, flat surface transition at the patch edges. Any unevenness present after patching should be ground smooth. Fog seal and restriping may be considered for courts that experience a large affected area of crack and fog seal application.

Sweeping – Debris buildup on basketball courts can lead to tripping hazards and also deteriorate the surfacing material. Basketball courts should be swept of debris frequently to prevent tripping hazards, and unnecessary costs associated with dirt and mildew build-up on the court. All court surfaces should also be power-washed at least once a year to ensure that dirt and other materials are not building up on the playing surface.

Snow Plowing – Generally, it is understood that basketball courts may not need to be accessible during winter months. If other maintenance procedures are followed and access is not required, snow plowing may be omitted from court maintenance. However, clearing of snow during winter months can assist in preventing degradation of the surface material by minimizing the effects of freeze-thaw action.

Striping – Re-application of court marking should be completed following fog seal, major patching or crack seal, or as identified during periodic inspections.

7.3.3 Alternatives

There are a few alternative playing surfaces for basketball courts. Basketball courts can have a slab that is constructed of asphalt, concrete or post tensioned concrete. These courts can then be sealed and painted. Another option that has become more popular recently is a modular tile system that can be placed on top of the slab. Each of the surfaces has certain benefits whether it is cost or longevity. The following text indicates some basic advantages and disadvantages of the differing material surfacing:

Concrete Pros

- Longer Life-Expectancy
- Smoother finished surface
- Repairs are less noticeable
- Lower maintenance costs

Asphalt Pros

- Lower installation cost
- "Flexible" surface that results in less impact to user joints.
- Lower repair cost

Concrete Cons

- Higher installation cost
- Concern with effect of hard surface on user joints.
- More expensive repairs

Asphalt Cons

- Shorter Life-Expectancy
- Rougher finished surface over time
- Higher maintenance costs
- Repairs are noticeable

Another surfacing alternative is post-tensioned concrete, which involves a higher expense than regular reinforced concrete as discussed above. Post-tensioned concrete courts have many notable advantages over typical asphalt or concrete playing surfaces, but can cost twice as much or more. Post-tensioned concrete courts have a better uniformity of play, lower maintenance costs, and a longer design life. Because of the relatively good subgrade materials found within the City of Missoula, PT concrete is not typically used due to the additional cost, and minimal benefit achieved from the additional cost. If areas of poor existing subgrade are encountered, it may be considered as a site-specific alternative.

Modular tile playing surfaces have become more readily available recently, and can last longer than an asphalt or concrete playing surface. Modular tile courts are a safer option as the court is more forgiving on athlete's joints than typical asphalt or concrete surfaces, and also better protects users against falls. Tile surfaces have little to no yearly maintenance, and can last up to 25 years, with some products such as VersaCourt™ coming with 15-year limited warranties.

Other basketball court items are the backboard, standard, rim, net, and any perimeter fencing or surfacing. Backboard alternative materials are fiberglass or plastic and wood. Many older backboards are likely constructed with painted wood. To eliminate the maintenance costs associated with wood backboards, it is recommended that they be replaced with plastic or fiberglass boards at end-of-life. Nets can be constructed of chain or other long-lasting material as opposed to standard nylon cord, which has a very short lifespan, and has a very low resistance to vandalism. Standard rims are constructed of steel. No alternative material is discussed here, as steel rims have a low installation cost, and long life span.

7.3.4 Replacement Costs

Table A.3 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with basketball courts. The unit costs are provided for reference only as the exact cost of replacing basketball courts varies depending on site specifics and owner requirements. Conversations with City of Missoula parks staff led to more specific replacement costs based on recent projects along with the following assumptions:

Asphalt Replacement: Typical asphalt thickness for a low traffic area with good subgrade is 2-inches. Similar to City of Missoula street department standards, 6-inches of ¾-inch

subbase will be required beneath all asphalt and is included in these cost evaluations.

Concrete costs were provided for reference only but not included in this analysis as the City of Missoula prefers asphalt courts over concrete courts.

Line Paint: Each court is assumed to be 4000 square feet in size.

Fences: Each court is assumed to require 1 linear feet of 10-foot high fencing per 25 square feet of court.

7.3.5 Estimated Longevity

The estimated longevity of a basketball court depends on the type of slab initially installed (asphalt, concrete, post-tensioned concrete). Slabs can typically last 30 years with proper yearly maintenance including crack sealing and patching of low areas. Post-tension concrete slabs need less yearly maintenance and can last significantly longer than typical asphalt/concrete playing surfaces.

7.3.6 Replacement Standards

Construction standards for basketball courts are established by the American Sports Builders Association (ASBA).

7.4 - Tennis Courts

7.4.1 Introduction

Tennis courts are a major expense for parks and recreation departments. Most parks consist of open areas, playgrounds, and tennis/basketball courts. Tennis courts require routine preventative maintenance, and proper design to ensure a long, useful life. When properly maintained, tennis courts can be an aesthetically pleasing feature in a park, however, if they are left to deteriorate, they can be a large eye sore and hazard for park goers.

7.4.2 Preventative Maintenance

Tennis courts need regular maintenance to ensure a safe and appealing playing surface. Tennis courts should be maintained regularly if there is debris that comes into contact with the court on a regular basis. Leaves and other debris can stain the court and present tripping hazards and should be swept off of the court prior to playing. A hard tennis court should be pressure cleaned every 2 years to remove built up dirt, mildew, etc.

Tennis courts should be resurfaced every 4-5 years to ensure that court conditions are playable. Resurfacing a tennis court consists of a couple of different steps. First, any cracks in the concrete or asphalt surface should be patched with a crack-seal. Next, any bird baths (low areas that hold more than 1/16” of water after flooding) should be patched. After the hard surface has been patched, 1-2 coats of acrylic playing surface should be added to the court with 2 coats of acrylic court paint on top of the new playing surface. Lastly, the new surface needs new line paint.

7.4.3 Alternatives

There are a few alternative playing surfaces for tennis courts. Tennis courts can have a slab that is constructed of asphalt, concrete or post tensioned concrete. These courts can then be covered with an acrylic playing surface, and acrylic paint. Another option that has become more

popular recently is a modular tile system that can be placed on top of the slab. Each of the surfaces has certain benefits whether it is cost or longevity.

Asphalt courts appear to be the most economical court. Most existing courts in Montana are asphalt courts. Asphalt courts have a tendency to crack more quickly than concrete courts. Concrete courts are a little more expensive than asphalt courts and tend to last longer than asphalt courts. Concrete courts have a tendency to peal quicker than concrete courts due to moisture content and the chemicals in the concrete mix. Concrete courts will crack also, but tend to take longer to crack than asphalt courts if they are constructed correctly. Post-tensioned concrete courts are the most expensive alternative for tennis courts. Post-tensioned concrete courts have many notable advantages over typical asphalt or concrete playing surfaces, but can cost twice as much or more. Post-tensioned concrete courts have a better uniformity of play, lower maintenance costs, and a longer design life.

Acrylic playing surfaces and modular tile design are the two main finishes when looking at tennis courts in Montana. Acrylic playing surfaces compose the majority of tennis courts in Montana. These surfaces need to be replaced every 4-5 years and maintained yearly to ensure no cracks are present on the surface causing a tripping hazard. Modular tile playing surfaces have become more readily available recently, and can last much longer than an acrylic playing surface. Tile surfaces have little to no yearly maintenance, and can last up to 25 years, with some products such as VersaCourt™ coming with 15-year limited warranties.

7.4.4 Replacement Costs

Table A.4 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with tennis courts. Costs can vary whether the slab needs to be completely replaced, or if the playing surface is the only aspect that needs replacement. Unit costs are provided for reference only as the exact cost of replacing tennis courts varies depending on site specifics and owner requirements. Conversations with City of Missoula parks staff led to more specific replacement costs based on recent projects at Pineview Park along with the following assumptions:

Asphalt Replacement: Typical asphalt thickness for low traffic areas with good subgrade is 2-inches. Similar to City of Missoula street department standards, 6-inches of ¾-inch subbase will be required beneath all asphalt and is included in these cost evaluations.

Line Paint: Each court is assumed to be 7000 square feet in size.

Fences: Each court is assumed to require 135 linear feet of 10-foot high fencing.

7.4.5 Estimated Longevity

The estimated longevity of a tennis court depends on the type of slab initially installed (asphalt, concrete, post-tensioned concrete) and the playing surface used (acrylic playing surface, modular tiles). Slabs can typically last 30 years with proper yearly maintenance including crack

sealing and patching of low areas. Post-tension concrete slabs need less yearly maintenance and can last significantly longer than typical asphalt/concrete playing surfaces.
Acrylic playing surfaces need to be replaced every 4-5 years to ensure a safe playing surface. Modular tile surfaces can last up to 25 years, and come with a warranty that usually lasts around 15 years. Both playing surfaces need to be pressure washed yearly to prevent debris (dirt, mildew, etc.) from shortening the life span.

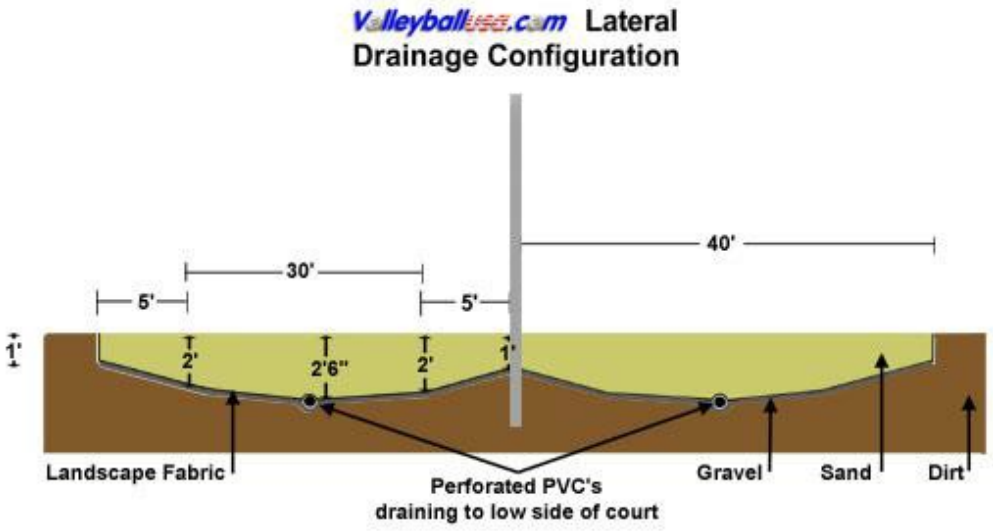
7.4.6 Replacement Standards

Construction standards for tennis courts are established by the United States Tennis Association (USTA) and the American Sports Builders Association (ASBA).

7.5 - Volleyball Courts

7.5.1 Introduction

Outdoor volleyball courts are present at seven parks in the City of Missoula. Construction consists of a few basic elements to ensure longevity of the court. First, a layer of gravel approximately 6" deep should be placed on top of the existing surface with low point on each side of the net to allow proper drainage. Next, a layer of landscape fabric should be placed on top of the gravel to prevent the sand from filling the voids between the gravel, and to prevent vegetation from growing up through the sand playing surface. A layer of sand with depths varying between 1-3 feet deep should be the last material added to make up the playing surface. See detailed diagram below.



An unmaintained playing surface can lead to an unpleasant playing surface for users. Low spots in the sand can lead to injuries due to abrasions that result from diving for a ball. Sand that is not routinely raked can collect garbage, which can be unsightly and even dangerous.

A volleyball court in good condition will consist of a smooth playing surface free from irregularities, debris, vegetation, and ponding water. The sand will be evenly distributed, the net will be taut, and the poles will be sturdy in place. The border shall be in place, and prevent vegetation from growing into the sand, and also prevent the sand from leaving the playing area.

7.5.2 Preventative Maintenance

Currently, the City of Missoula inspects the volleyball courts and maintains them on an as needed basis. A more regular inspection schedule could aide in finding unsafe conditions in a volleyball court resulting in a better experience for park goers.

Volleyball courts can benefit from preventative maintenance in a number of ways. Like most aspects of parks, proper design is a major factor in the longevity of a volleyball court. Volleyball courts that are properly maintained are safer for the end user, and tend to be an attractive piece

of any park. The following maintenance procedures can ensure that the useful life of the volleyball court can be extended to its maximum potential.

Periodic Inspection – Outdoor volleyball courts need to be inspected on a regular basis to provide a safe playing surface for users. The inspector should be looking for debris in the sand, integrity of the border, structural stability of the net posts, and overall condition of the net.

Raking, Debris and Vegetation Removal – The sand needs to be raked to clean any debris out of the sand, and to level the playing surface. Raking will bring the debris, which can be unsightly or even dangerous, to the top of the sand and allow for the maintenance worker to remove and properly dispose of the debris. Regular raking will keep the sand dry and soft. During raking, the low spots should be filled in with sand from the high spots. Any vegetation should be removed at this time.

Maintenance of City volleyball courts is currently routinely performed by Parks department staff and as such is not included in the cost analysis of this report.

7.5.3 Alternatives

There are several different alternatives to be used as court borders. Borders are typically made out of concrete. Concrete borders are typically similar to curbs used in parking lots, and can last a very long time. The downside of concrete borders is that many players use outdoor volleyball courts barefoot, and the concrete can be a hazard to someone not wearing shoes. Another option is provided by VolleyballUSA.com and consists of placing treated 2x12's around the border and then covering with EDGE GUARD™, a product constructed of high density polyethylene plastic. EDGE GUARD™ provides a nice edge between sand and grass, and provides users with a softer border than concrete.
Currently, none of the City's volleyball courts have borders of any time. A lack of border material allows vegetation and sand to mix increasing the maintenance costs.

7.5.4 Replacement Costs

Table A.5 in Appendix A provides unit price estimate of material replacements associated with volleyball courts. Renovation costs are not provided as complete replacement of the volleyball court is more practical than partial renovations.

7.5.5 Estimated Longevity

The estimated longevity of a volleyball court depends on the amount of maintenance that is provided to the court. If the court is left unmaintained, vegetation can take over and the net and

borders can rot resulting in a much shorter useful life. If the court is regularly maintained volleyball courts should not need to be replaced as a whole, rather each component of the court should be replaced when it shows signs of failure. A volleyball court can be expected to last 50 years with regular maintenance.

7.5.6 Replacement Standards

Volleyball courts should be constructed to regulation size as determined by the Association of Volleyball Professionals (AVP).

7.6 - Ball Fields: Dugouts, Bleachers, and Fencing

7.6.1 Introduction

The City of Missoula owns and manages a total of nineteen youth and adult ball fields that are primarily used for softball or baseball. These numbers do not include existing Fort Missoula Regional Park ball field facilities, as they are owned by the County, though the site is managed by the City Parks & Recreation Department. Each complete ball field includes a back stop, two dugouts, an average of 870 linear feet of fence lines, and a variable number of portable and/or fixed bleachers.

Ball field renovation, replacement, and improvement costs vary depending on the level of use as well as development (i.e. whether a field is sized for youth or adults; metal versus wood frame dugouts; use of wood and netting versus steel and metal fence fabric; and concrete floors versus no flooring). Wear and tear issues such as vandalism and age also greatly influence needs and costs. Infield and pitching mound renovations are not considered here, as these features are primarily addressed through daily and weekly maintenance activities necessary throughout the playing season to sustain competitive sports use.

The most common reason for renovation, repair or replacement needs on ball field facilities are associated with age and the materials used to build the facility's components. Construction and materials that significantly add to costs include: wood-framed dugouts, backstops with wood posts or cloth netting, light gauge field fencing, wood bleachers, and dirt versus concrete floors. The extensive use of wood materials also presents a greater challenge to ensure user safety and avoid issues such as breakage, collapse, slivers from exposed or ragged edges, and uneven surfaces that may present trip hazards.

7.6.2 Preventative Maintenance

To mitigate normal wear and tear in ball field facilities, regularly scheduled preventative maintenance is needed. These schedules are annual and include such services as: 1) Inspection; 2) Replacement of fascia, joists and support legs for dugouts made primarily of wood; 3) Minor roof repairs to wood underlayment or the roofing itself; 4) Fence poles/gates/fabric repairs to enclosures and fence lines; and, 5) Painting of exposed bare wood. It is noted that the most used and abused ball field feature is the dugout.

Dugout benches and spectator bleachers must also be inspected and maintained. Wooden components need to be checked for splinters, cracks and rot. Wood boards must be replaced occasionally and painted every few years. Bench and bleacher hardware must also be inspected. Bench and bleacher components such as stanchions, posts, braces, nuts and bolts must be replaced when they are found to be missing, damaged, worn, or rusted. Aluminum dugout benches require no maintenance.

Moveable wood bleachers present a special challenge to park maintenance and require more time to inspect and repair. Movable bleachers are often placed under trees within irrigation turf zones by spectators to take advantage of the shade. Movable bleachers wear out faster and are subject to a greater likelihood of user complaints and failure because of water damage, rusted components, rot, split boards, splinters or damage from being dragged or pushed to accommodate mowing.

Ball field fence lines are generally quite durable and will provide acceptable service and protection over many years, despite regular abuse and frequent but minor fabric and pole damage. The top rail of outfield fences should be covered with a tubular plastic sleeve for player safety.

7.6.3 Alternatives

Retrofitting or replacing older dugouts and benches is necessary to maintaining and mitigating potential safety concerns and service demands. Replacing failing portions of ball field components, such as the dugout structure is sometimes possible; however, in many cases retrofitting isn't feasible from a structural and budgetary standpoint. If replacing a composition or bare/painted wood roof for a standing seam metal roof requires changing the roof frame and the pole or post supports, the costs make it prohibitive to retrofit. However, replacing sections of dugout fencing is typically cost effective. Replacing and retrofitting benches and bleacher components is normally cost effective as well. Benches can be repaired or retrofitted as individual pieces or can be reasonably purchased from several manufacturers and replaced using staff resources.

Manufactured aluminum bleachers and dug out benches generally require little maintenance. Typical maintenance for these items is just an annual inspection for broken and loose structural components. When placed on and fixed to a concrete pad that is not subject to irrigation spray, aluminum bleachers will last anywhere from ten to fifteen years and often longer.

For new ball field construction and major field retrofits, the bottom of field fences should be held about three inches above the sod and a heavy fixed bottom wire installed to minimize fabric damage and to facilitate weed control treatment. High-end outfield fences may incorporate a warning track or one foot wide concrete mow strip to eliminate need for chemical treatment or string trimming on either side of the fence line. Movable fence panels may also be used as an option. Movable fence panels are placed for the season, then removed and stored to accommodate soccer, lacrosse, football and other sports. Movable fence panels are impractical system-wide, given the City's nearly four miles of ball field fence lines.

Maintenance and replacement costs for fences, bleachers, and dugouts are provided in Table A.6 in Appendix A.

7.6.4 Estimated Longevity

New and properly constructed galvanized fence enclosures with wooden roofed dugouts will have a lifespan of 10-15 years. Newly constructed dugouts of CMU block will have a lifespan of 30-40 years on the structure and 20-30 on a metal roof. Wooden benches and bleachers under normal, everyday use will have a useful lifespan of 5-10 years, while aluminum and composite benches and bleachers will have a lifespan of 10-15. While metal benches and bleachers are an option, they are not always appropriate in full sun or warm conditions. Metal benches under proper application will have a lifespan of 15-20 years under normal conditions. Metal benches

are the most durable with regards vandalism and exposure to the elements. New 9 gauge, galvanized chain link fences will typically last 25 to 30 years.

7.7 - Irrigation

7.7.1 Introduction

Irrigation systems are essential to sustain a wide range of northern turf grasses that are thick, not too weedy, and act as a cushion, particularly for competitive sports such as soccer, football, rugby, baseball and softball. When irrigation is properly applied, it is applied at a rate that allows the plant's root zone to take water in at about the rate equal to its needs given temperature, sun exposure, soil type, species, and usage. These conditions make up what is referred to as Evapotranspiration or ET data.

Older irrigation systems simply do not have the ability to maintain these requirements efficiently. Dependence on older irrigation systems most often results in continual over-watering. The negative effects of over-watering result in safety concerns to the users, reduced quality of play value, water waste, increased operational costs and additional stress on both the irrigation system and turf.

A properly designed and efficient park irrigation system, particularly in sports field applications, utilizes matched precipitation rates and proper sprinkler head radius/nozzles to result in a desired condition commonly referred to as Distribution Uniformity. When an irrigation system is performing optimally, the end result will be matched precipitation and distribution uniformity providing optimally healthy turf grasses, fewer weeds, maximum cost efficiency and efficient water use and consumption.

7.7.2 Preventative Maintenance

Missoula Parks & Recreation's irrigation system maintenance activities generally conform to industry best practice standards and guidelines. Systems are checked twice a year, at start-up and winter shut down, for major leaks. Mow crews are trained to spot signs of potential leaks as well as broken heads, broken valve boxes, browning turf and other problems related to damaged or poorly functioning irrigation systems. Irrigation systems installed prior to the 1980's are more likely to fail due to the age of glued joints and the past practice of utilizing thin wall PVC pipe or poly pipe which increases the likelihood of failure with age.

Many park irrigation systems utilize impact heads, which are prone to siphoning rain and snow melt back into the lines after they have been winterized, resulting in pipe breakage due to ice expansion. Conversion to modern rotor heads reduces this potential. Another associated challenge with impact heads, and some types of pop-ups is the ability for sand and grit to partially or fully clog nozzles or valves – resulting in compromising the living turf. This can be a particularly significant challenge if a well pump begins to pump sand through the system. This often requires every head and valve in the affected system or zones to be manually inspected, cleaned and reinstalled. Lack of modern controllers with ET sensors, leak protection sensors, and remote station and zone controls means reporting and manual adjustments to run times must constantly be made throughout the growing season.

Annual maintenance of irrigation systems is considered a routine maintenance item performed by parks department staff. As such, a yearly maintenance cost is not included in this analysis.

7.7.3 Alternatives

Retrofitting or replacing older irrigation systems is essential to achieving and maintaining the highest possible efficiency; lowest possible costs; and maximum user satisfaction regardless of turf type. Advances in sprinkler-head design; controller hardware and software, and sensor/controller communication have enabled distribution uniformities to increase efficiency from the 60-percent range to more than 90 percent. Better uniformity combined with more responsive scheduling are two critically important aspects of any park irrigation management program.

7.7.4 Replacement & Retrofitting Costs

The following data represents a typical "older" retrofitted sports turf system:

Park example:	Playfair fields
Condition:	1970's older/dated style irrigation system
Sprinkler head type:	Rain Bird impact/41
Flow per head:	20 gpm
Spacing:	Poor
Coverage:	Poor
Matched precipitation rates:	No
Total Square Footage:	22,500
Retrofit Cost per square foot:	$2.08

While conditions at Playfair Park have improved to some degree, there is still a fair amount of "flood" irrigating or over-watering to make up for poor coverage. The end result is extensive runoff and standing water throughout the fields. This results from the lack of matched precipitation rates and proper head spacing, in addition to the inability to match nozzles. Conversely, when rotor type heads are used the flow per head will commonly be lower; however, the precipitation rates will be matched through appropriate nozzle sizing and equal radius spacing. This results in much lower water use, proper appropriation of water to select zones/turf areas, and healthier turf.

New irrigation systems have many components, each of which has a different expected useful life, anticipated repair costs, and different estimates for labor for installation, normal operation and maintenance. Component costs, service life, maintenance repair, and energy costs all can differ under the same operating conditions depending on the design choices made.

Irrigation systems may be broken down into three categories for the purpose of this report - sports turf, general use turf, and drip bed. It is particularly important to understand the differences and application between sports turf and general use turf, particularly the difference in design, usage/ gallons and replacement costs.

Sports turf is primarily designed for organized use/sports and by virtue of this will consist of one or several combined fields ranging from a one acre little league field to several soccer fields or multipurpose fields utilizing several acres of turf area. Likewise, the irrigation zones and components are much larger and costlier than that of a smaller park with general use turf areas - which can utilize smaller, and more numerous zones and hence less expensive components. All athletic fields and ball fields that can be reserved are considered sports turf and should be irrigated as such.

The following are typical components related to sports turf versus general turf irrigation systems:

- Large capacity, high volume (GPM) impact/rotor type sprinkler heads-Sports turf
- Small capacity, low volume pop-up/spray/rotor heads - General turf
- Schedule 40 PVC main line/lateral lines
- Control valves
- Controller
- Water source

A typical sports turf irrigation system zone will consist of 4-6 heads or more depending on available water pressure and flow, throwing an average 50-60 foot radius. The system will use approximately 15-18 gallons of water per minute per head. In contrast, a typical general turf irrigation system will have 6-8 heads per zone depending on available pressure and flow, throwing an average 12-15 foot radius. The system will use 1-4 gallons per minute per head.
The following information illustrates typical irrigation system zone replacement costs for sports turf versus general turf areas:

Typical Sports Turf Zone Description

For the purpose of classification, Sports Turf zones shall only consist of larger, sports fields measured in acres or larger square footages. The zone sizes may vary depending on available pressure and flow, however all zones are irrigated with larger rotor type heads delivering much higher GPM and precipitation rates.

Typical Sports Turf Zone Materials for 22,500 SF Area:

(3) Minimum 2" valves
(12) Large capacity rotor type heads
(12) Swing joint assemblies
Schedule 40 PVC pipe size +3 inch main and +1.5 inch or larger lateral lines
(1) 20 station or larger controller

Typical Sports Turf Zone Replacement Costs:

- Materials: $1,635
- (32 hours) Labor at $40 per hour: $1,280
- Total labor/materials: $2,915

Cost per square foot: $0.13

Typical General Turf Zone Description

For purposes of classification, General turf zones shall only consist of planter beds or smaller common areas irrigated with popup type heads and smaller zones. The GPM or precipitation rate of these zones is much less than that for larger rotors and sports fields. The reference data below reflects the smaller zones, resulting in a much smaller square footage or total area.
Typical General Turf Zone Materials for 3,600 SF Area:

(2) Minimum 1" valves
(16) Medium capacity rotor, spray or pop-up heads
(16) Swing joint assemblies
Schedule 40 PVC pipe size <3 inch main and 1 inch or smaller lateral lines

(1) 6 station or larger controller

Typical General Turf Zone Replacement Costs:

- Materials: $900
- (16 hours) labor at $40 per hour: $640
- Total labor/materials: $1540

Cost per square foot: $0.43

Typical Drip or Planter Bed Irrigation Zone Description

Drip irrigation is the slow, precise application of water directly to the plants' root zones in a predetermined pattern using a point source. A drip or micro irrigation design can be customized to meet specific needs while maintaining an optimum moisture level within the root zones, efficiently conserving water that might otherwise be lost to non-growth areas, runoff or sun and wind. These systems are an alternative to pop up spray heads by providing the proper balance of water needed for successful plant growth in tree wells, shrub beds and the like.

The Typical Drip Zone shown below will use 36 gallons per hour or 0.6 GPM. This is roughly a 1/2 GPM to water 6 trees-*half the rate of a spray head in a similar layout.*

Typical Drip Zone Materials for 400 SF Area:

(1) Minimum 1" drip valve and filter assembly
(18) 2 GPH emitters
100' poly tubing
20' 1/4" tubing
(1) 6 station controller

Typical Drip Zone Totals:

- Materials:$180
- (8 hours) labor at $40 per hour: $320
- Total labor/materials: $500

Cost per square foot: $1.25

7.7.5 Conclusion

Retrofitting an existing irrigation system to improve efficiency, reduce costs and conserve water is possible in some situations. This is generally not the case with old and outdated sports field turf irrigation systems because they are typically undersized to start with. While some improvements can be made, retrofitting can often times be challenging due to existing sprinkler head spacing, pipe sizing, valve sizing and other related existing conditions. Consideration to costs and benefit must be strongly evaluated when any retrofit is being considered. The return on a new system can often yield big dividends and be most appropriate when future maintenance practices and costs are considered. Proactive sports field maintenance programs are critical to mitigating user injury and turf recovery. Proper irrigation coverage and efficiency is the key to achieving this balance.

7.8 - Playgrounds

7.8.1 Introduction

A well designed and appointed playground is an important feature in a community's active use parks that provides a great number of benefits, including but not limited to: physical play and activity, gross and fine motor skill development, social interaction, imaginative play, cooperation, and community building. Playgrounds are typically designed to serve children between the ages of two (2) and twelve (12) years. Playgrounds do provide an equally important service for parents – a safe place for children to burn off energy by playing outdoors and developing physical and social skills.

A majority of the City's neighborhood park playgrounds are small in size and provide limited play equipment and play value. Fewer than 8 of the City's existing 35 playgrounds are designed to serve the community's 2 to 6 year old population - a group that arguably derives the most direct benefit from having access to a safe and complete playground. The other 27 playgrounds contain play features designed for children ages six (6) to twelve (12) years old. The size of existing playgrounds is generally too small to provide space for swings, a highly desirable park play feature. The following table shows Missoula's neighborhood playground sizes compared to other communities:

Average playground sizes by city

City	Sq. Feet.
Billings	7,508
Boise	6,865
Coeur d'Alene	4,557
Missoula	2,907
Bozeman	1,251

Public playgrounds are subject to a variety of national safety standards. The standards are commonly updated, modified or changed as new materials, equipment, regulatory issues, and public safety values change. As such, playgrounds present a range of routine and specialized maintenance responsibilities that must be regularly attended to and documented by trained and qualified staff to ensure public safety and services while minimizing potential liability exposure. As playgrounds age, wear out, or need to be retrofitted; they become more costly and time consuming to maintain for safety and serviceability.

Many of Missoula's 35 playgrounds are generally out of compliance with one or more applicable code provisions and appear to under-serve the community. Out of 35 existing playgrounds, 27 utilize sand fall zones; 25 have toys that are designed to serve only 6 to 12 year olds; 23 are not ADA compliant with regards to an accessible path; 18 have a condition rating of fair to poor; 18 provide swings; and, 9 have no fall zone containment border to keep out rocks and other hazardous or contaminating debris.

7.8.2 Preventative Maintenance

Routine and specialized playground maintenance responsibilities include: checking fall zones for proper depth (min. 12") and potential hazardous materials (e.g. glass and rocks); leveling of fall zone material; low-level inspection of play equipment and connection points; annual refreshment of fall zone materials; upkeep of signage; prompt repair, replacement or removal of broken, vandalized, and out of compliance equipment; and conducting an annual audit for safety

standards compliance and repairs. Playground inspection, maintenance, and repair is performed and documented under the direction and guidance of staff who are Certified Playground Safety Inspectors.

Safety inspections and fall zone leveling need to be performed at least once a week throughout the primary use season, April through September. Off-season inspections can be performed monthly and no leveling needs to be done due to the materials being frozen. Due to staffing limitations and lack of operating funds, fall zone replenishment and major equipment repair/replacement is not performed on a regular basis.

Since 2007, the City has installed six (6) new playgrounds that meet all current standards. These newer playgrounds are designed to provide a fall zone depth of twelve inches (12") which is the minimum fall zone depth for play structures over 48" in height. When a minimum fall zone depth is provided, it increases the playground maintenance burden with regards to frequency, time, and costs to ensure a uniform depth of fall zone protection under each play feature. In addition, lost material must be replaced annually for moderate use playgrounds and bi-annually for higher use playgrounds as opposed to being refreshed every three to four years.

7.8.3 Alternatives

Renovating, retrofitting or replacing old playgrounds is necessary to ensure public safety, manage liability, comply with applicable codes and laws, and meet the community's service expectations and demands. This is particularly the case with older playgrounds and playgrounds that still utilize sand fall zone material. The Missoula Park Operations Unit has limited staff capacity to perform playground retrofits and renovations.

Any playground project done with in-house staff should be carefully selected based on the playground's remaining years of service, project scope and costs, and compliance issues. Minor renovations such as achieving ADA access requirements; replacing sand pits and installing engineered wood fiber fall zone material and containment curbs; and/or, installing replacement equipment would help the City maintain service levels and minimize liability exposure until all non-compliant and obsolete playgrounds can be replaced. Expansion or complete replacement of a playground requires knowledgeable, qualified and certified contractors to perform the work.

The City can reduce its playground maintenance costs and staff time, and minimize potential liability and future replacement costs by designing play pods to provide a uniform eighteen inches (18") of fall zone material depth. This significantly reduces the maintenance frequency for which the fall zone must be raked level and refreshed. In addition, the added depth presents a more consistent level of fall zone cushion for users throughout the play pod and ensures maximum flexibility and minimal cost when replacing an entire playground, or a single feature with another in regards to meeting fall zone standards or retrofitting the existing pod for increased depth.

7.8.4 Renovation and Replacement Costs

Table A.9 in Appendix A shows a unit-price estimate of material replacements and renovations associated with playgrounds. Other than regular routine maintenance, there are no cyclical maintenance items associated with playgrounds. Unit costs are provided for reference only as the exact cost of replacing playgrounds varies depending on site specifics

7.8.5 Estimated Longevity

A modern "plastic and powder coated steel" playground should provide safe and satisfactory service to a community for a minimum of 15 years with regular inspections, quality maintenance, and prompt repairs. A sealed wood playground can also last approximately 15 years in Missoula's climate, however, it requires a higher level of maintenance to preserve, address code needs, and effect repairs. After 15 years in service, most playground toys will begin to wear out; lose play value due to age, social, and technological changes; become non-compliant due to code changes; or, become obsolete due to an inability to secure replacement parts. The useful life of some 15+ year old playgrounds, can be extended five (5) to seven (7) years by salvaging and re-using parts from other comparable playgrounds and toys that are being replaced.

7.9 - Splash Decks

7.9.1 Introduction

Splash decks are a type of water playground that utilizes features similar to swimming pools but as the decks have no standing water, the risk of drowning is virtually nil. Splash decks provide play value and relief from the heat of the mid to late summer days. A park with a splash deck provides a unique experience to the overall facility, and adds a character and level of use that makes the park stand out from others.

Missoula's splash decks are composed of two types, a newer and an older model. The newer models, of which there are four, consist of a cement pad with various splay toys or features. The water from the features flows into two drains at the center of the slab and is collected in a underground tank. The newer splash decks use a recirculation pump to circulate the used water to a pump house to be continuously filtered and treated then returned to the holding tank. A second pump and motor, known as the feature pump,) is used to pump water from the holding tank into various lines and sprayed out through the toys located on the cement slab.

In accordance with *ARM 37.115.1003 Operation of Circulation System*, the recirculation pump operates 24/7 during the summer season while a spray deck is open. A chemical control unit automatically maintains the pH and sanitizer levels of the water. The feature pump is tied to a timer control that is activated by patrons by use of a touch sensitive bollard located on the cement slab. Touching the bollard turns the feature pump on, causing the toys to spray water. Timer controls are typically set to function from 11am to 9pm. Outside of this time frame, the bollard does not respond to touch.

The second type of splash deck is the older model, known around town as the Turtle decks, of which there are two. These splash decks utilize a similar plumbing system to the newer decks model, however they do not have patron control to turn them on. A staff member must drive to the park and start up the pump each day and then turn it off at the end of the day. The older spray decks do not have the same types of features as the newer ones, though they do recirculate water. There is no automatic chemical control equipment on these spray decks. Staff must test the water, then feed the sanitizer and maintain the pH manually. These spray decks are turned on when the weather is expected to be above a certain temperature. These splash decks run whether they are in use or not until staff turns them off.

7.9.2 Preventative Maintenance

All spray decks and swimming pools are required by the State Health Code to be visited and tested every four hours during operation. Aquatics staff visit the four newer splash decks three times per day based on established start and close times. Each splash deck "run" takes an average of two hours, primarily because of drive time. The two older Turtle decks are similarly monitored by Parks Maintenance District staff with the monitoring "run" for the older splash decks taking staff time away from other maintenance activities.

Regular splash deck maintenance includes adjusting the readings on the automatic controller to match the manual test; cleaning the catch baskets of debris; backwashing the filters, and balancing the water chemistry - usually through the manual addition of sodium bicarbonate (baking soda). Minor maintenance is required on the various pumps used by the automatic systems to keep them functioning correctly, as well as refilling acid drums and chlorine tablet feeder systems.

Each fall the facilities need to be winterized. This involves draining pipes, emptying the tank, and removing any equipment that cannot be left in the cold. The Department also removes certain pieces of the features from the cement slab, to keep them from being vandalized or exposed to freeze/thaw cycles. Each spring everything is put back in place and water is added to fill the tank.

The two pumps in each system are the most expensive pieces of equipment to service. Pump motors are designed to run continuously. The 9 months of inactivity during the fall/winter/spring season stresses the components of the pumps/motors. Spindles can freeze up, bearings can go bad, and the seals may deteriorate and spring leaks.

Repairing these pieces of equipment can be costly and take time as each pump is sized differently. As such, there is often no repair kit stocked by the motor repair shops. Damage to a pump and motor can be significant enough to require replacement of the entire motor at a cost of several thousand dollars.

Maintenance to other portions of the splash deck system include: filling cracks in the cement, replacing broken or vandalized features such as tumble buckets and spray nozzles. There is also some need to monitor and maintain the vegetation around the spray decks as it can become marshy or swampy from splash out from the deck by kids dumping buckets of water or overspray when the wind blows enough to carry the water off the deck.

Significant maintenance of any type to these older splash deck systems will most likely trigger a complete renovation to bring them into compliance with regulations.

7.9.3 Alternatives

Pool pumps and motors are made to be efficient, effective and run continuously. Certain activities shorten their normal, expected lifespan: 1) Starting them up and turning them off frequently, 2) Running them dry, 3) Letting them sit inactive for long periods of time. In short, the nature of splash deck operations is hard on the pumps and motors.

The most effective solution for maximizing the longevity of the pumps and motors is the use of Variable Frequency Drives (VFD). At start up, when there is no VFD in place, a pump motor goes from zero to full speed instantly. This puts tremendous torque on the pump spindle and the diffuser. A motor with a VFD ramps up to full speed slowly, easing the motor up to speed, in

this way protecting the critical parts of a pump and motor. Consider that a feature motor is set to turn off every 15 minutes, so on a hot day, during the operating period, the motor turns off and back on as many as 36 times a day, or an average of 3,780 times per season.

VFD's can also provide significant energy savings. Most motors are engineered to be able to handle more than the load that they are required to do. Thus when they are operated without a VFD, they run at full speed, even though that volume of water is not required to meet codes. The operator will use a valve located after the motor to slow down the water flow so it is within required specifications. Thus the motor moves more water than it needs to and energy is wasted. A VFD allows the pump and motor to run at slower speeds, thus reducing the need to restrict water flow after the pump. The increased efficiency can mean thousands of dollars in energy savings over a season.

Installing a VFD on a recirculation motor provides increased energy savings by scheduling the motor to run at ½ speed during periods where the splash deck is not being used (nights). Use of VFD for conversion of the older splash desks would also provide staff time savings and wear and tear on pump motors from not having to perform daily turn on and shut down service.

Currently the water quality is maintained through the use of chlorine in tablet form, hydrochloric acid in large drums (for pH balance) and sodium bicarbonate as a pH buffer. The hydrochloric acid drums are very heavy and the use of acid to balance pH requires the use of sodium bicarbonate. Moving heavy acid drums on a dolly through park grass is a hazardous job for staff, as is loading and unloading the drums off the back of a pickup truck.

An alternative to using hydrochloric acid is to use carbon dioxide. CO2 comes in tanks that are much smaller than the big acid drums and can be refilled by contract with a local company such as Norco. Using CO2 instead of acid will reduce the need to continually add sodium bicarbonate, and there is no damage from acid laden fumes on metals such as equipment and pipes. At this time, Currents Spa and Pool water are both utilizing CO2 for pH control and demonstrating good results in the pool water chemistry. Plans are to install similar systems at Splash Montana. Converting to CO2 water treatment for spray decks would reduce the potential for injury due to moving heavy weights (700 lbs for 1 drum of acid) and/or the potential exposure to hazards associated with spills.

The turtle splash decks are more of a challenge. They operate with one pump/motor that does double duty both as the recirculation pump and as the feature pump. They are far older than the other four splash decks, and the equipment that is utilized to operate them is outdated. There is a good chance that without retrofit, they may not pass the health code and could end up being unlicensed for operation – possibly very soon. Issues that will need to be addressed in order to keep them in operation are as follows:

1. Installation of a sand filtration system.
2. Installation of an automatic chemical feeder and assorted pumps and motors.
3. Installation of a secondary feature pump/motor system with assorted timers and controls.
4. Installation of a chlorination system to eliminate the need to hand feed.

It may be possible to upgrade splash deck systems to provide for automation of daily start up and shut down, as well as monitoring reporting.

7.9.4 Replacement, Renovation, and Cyclical Maintenance Costs

Costs for cyclical maintenance, one time renovations, and complete replacements are provided in Table A.10 in Appendix A. Renovation of the two older turtle splash decks will most likely be necessary in the near future to remain in compliance with the health code. Unit costs are provided for reference only as the exact cost of renovating or replacing a splash deck varies depending on site specifics.

7.9.5 Estimated Longevity

Given care and no serious upheaval of the earth that might crack the underground piping or storage tank, the seven year old splash decks should be able to easily see another eight or nine years, probably more like another 20. Changes in the health codes or aesthetic changes may necessitate a shortened longevity for some features within the splashdeck.

7.10 - Landscape Bed Renovations

7.10.1 Introduction

Developed landscape beds provide a range of values and functions in the community including, but not limited to: aesthetics, traffic calming, community entry statement, storm water treatment, property value enhancement, and habitat.

Missoula's Parks & Recreation Department maintains approximately 44 acres of landscaped beds, broken down as follows:

- Public Right-of-Ways (ROWs) ~ 30 acres; Contain irrigated ornamental plantings including turf grasses, shrubs, trees, and annuals.
- Xeriscaped™ ~ 13 acres; Utilize native and naturalized drought tolerant plantings - often un-irrigated.
- Hard Surfaced Medians ~ 3 acres.

City maintained ROWs landscape beds occurs along a number of the major high-volume public ROWs including: I-90 at Van Buren, I-90 at Reserve, Reserve St and Broadway, 39th St, Higgins, Stevens, Brooks, etc.

All landscape beds, particularly those in ROWs, are challenging to maintain. ROW plantings are exposed to especially tough conditions including: road salts and sands, constant wind (from traffic), radiant heat from adjoining asphalt lanes, trash accumulation, and damage from traffic. Drip, spray and bubbler irrigation systems are generally most suitable for landscape beds. They are, however, exposed to greater risks for being damaged. In addition, maintenance crews must be trained and equipped to safely contend with traffic hazards particularly when loading and unloading equipment, weeding, planting, fixing irrigation systems and mowing turf areas. On State ROW's median maintenance also requires implementation of a traffic control plan.

7.10.2 Preventative Maintenance

The Department's landscape bed maintenance activities are funded below industry best practice standards and guidelines. As such, landscaped ROW areas receive a lower level of regular maintenance in regard to weed treatment, plant replacement, winterization, fertilization, pruning, mulching, and trash removal.

Landscaped beds are checked several times a season for potential irrigation and plant health problems. ROW sites with grass medians are mowed, watered and the trash picked up each week during the approximately 23 week growing season. In comparison, ROW shrub beds are typically only treated for weeds and trash once a year due to staffing and funding constraints. Chemical control of weeds is necessary for cost efficiency, minimizing staff exposure to traffic safety concerns, and to keep landscaped medians generally looking good until the next maintenance cycle. Public comment suggests the current frequency of maintenance for ornamental shrub beds is marginally sufficient – particularly for the Higgins, 39th, and Reserve St medians.

7.10.3 Alternatives

Renovating, retrofitting or replacing older, mature landscape beds is necessary to achieving and maintaining the landscape's desired effect and for controlling costs. Replacement plantings are frequently needed for dead material and in all cases replacement plants are selected for hardiness, ease of maintenance, and drought tolerance in addition to aesthetic and site considerations. As shrubs age it is sometimes possible to perform rejuvenation pruning, which requires significant removal of top growth to stimulate new growth and promote rooting.

Rejuvenation pruning can provide an additional 3 to 10 years of growth, however, it is not always successful or desirable depending on the plants and site challenges. In some cases it is necessary to consider removing living landscape materials and replace them with mulch or hardscape. This is particularly appropriate to consider where traffic speed or volumes are very high, and where worker safety provisions are missing or cannot be provided for e.g., level 18" hardscape work zones; not having a protected load/unload area; medians less than five feet (5') in width, or where slopes exceed 5:1. Landscaped ROW medians should not be installed in situations where traffic volume and speed require significant traffic control measures to be used every time routine maintenance activities need to be conducted.

7.10.4 Replacement, Renovation, and Maintenance Costs

For the purpose of this report, costs will be provided for renovation of the ROW medians covered with ornamental plantings only, as shown in Table A.11 of Appendix A. Replacement of hard-scape ROW's is performed by the City Streets Department and replacement of Xeriscape ROW's is not anticipated. In addition, renovation of an ornamental ROW for this report involves replacing vegetation and modifying the irrigation system, not completely replacing the street median or concrete curbs. Finally, maintenance of ornamental ROW's is considered routine rather than cyclical and is not covered in this analysis.

The most costly component of a successful shrub bed renovation is the purchase of plant stock. Plant stock for ROWs needs to be vigorous and mature enough to withstand the impacts of traffic, wind, snow, salt, sand, and heat. Smaller plant stock provides a much lower establishment success rate. The most important components of a successful shrub bed renovation are the lowest cost: soil amendments, irrigation modifications, weed fabric installation, and mulch. These latter four elements are critical to creating an affordable, water wise, and sustainable landscape bed that is capable of thriving and surviving for up to 15 years or longer.

7.10.5 Estimated Longevity

A well design, water wise, shrub bed should perform well and provide desired values for approximately 15 years given thoughtful and site-appropriate plant selections, good soil, combined with regular maintenance and watering, plus regular weed control. After 15 years, many shrubs will begin to outgrow their available space or will lose vigor, and begin to fail due to age, condition, depleted soils, or disease.

7.11 - Conservation Lands Trailheads

7.11.1 Introduction

Missoula manages just less than 4,000 acres of public lands for open space conservation. Trailheads provide the principal access for a majority of residents and are the most important element for communicating with the public, managing and dispersing the impact of people and pets on the environment and wildlife. The Parks & Recreation Department maintains 41 trailheads and distinguishes those as primary (8), secondary (10), and local (23) based on the level of services provided and volume of use.

Primary trailheads provide larger parking areas for cars and bikes and are popular community destinations for hikers and bikers. Nearly all primary trailheads have appropriate style trash cans; a park sign; fences & gates to prevent improper/unauthorized access and volunteer paths. None of the city's primary trailheads provide restroom services. Six (6) of the eight (8) primary trailheads provide management signage or interpretive signage. Two (2) of the eight (8) have informational kiosks with educational materials trail maps and space for posting temporary signage. Most of the permanent signage is in poor condition and none of it meets ADA standards.

Secondary trailheads generally have a good number of off or on-street parking spaces and are generally well marked by park access signs. The provision of support facilities and services such as trash, mutt mitts, user rules, fencing, educational signage, and trail maps are limited and variable. Only four secondary trailheads have a full complement of support facilities and services. Some secondary trailheads should be upgraded to primary trailheads to help disperse people and their impacts.

Local trailheads provide neighborhood access to the trail system. These trailheads are minimally appointed and maintained. Most have a park access sign with including park rules, 12 sites provide a trash can and mutt mitt dispenser, and 8 local trailheads have off-street parking spaces. Most trails that can be accessed from local trailheads cross lands too steep to meet or comply with ADA rules.

Missoula's primary and secondary trailheads likely under serve the community's needs due to limited capacity, lack of features and aging features. The City's Conservation Lands program and infrastructure is relatively young compared to the developed park system. Most trailheads and trails were establish prior to the inception of the Conservations Lands Program and were developed haphazardly by multiple public and private entities. As such, the City's Conservation Land trailheads lack a standard design theme and most trails and trailheads show signs of age, accelerated wear, and increased use.

7.11.2 Preventative Maintenance

Trailheads managed by the City should require relatively minor maintenance needs: trash removal, vegetation management, updating and replacing signage, resupply of mutt mitts, resetting parking blocks, occasional fence repairs, biennial refreshment and leveling of gravel parking lots, plus tread maintenance on the principal trails served by the trailhead. These maintenance activities should be sufficient to deliver services expected by the community and adopted by city council in the Conservation Lands Management Plan. Missoula's Conservation Land trailheads are generally in good to fair condition. Certain trailhead features are, however, beginning to show signs of wear and tear from usage, design, or infrequent preventative maintenance due to lack of operating funds.

Very few Primary trailheads are equipped with a locked, enclosed covered kiosk where park rules, trail information, user notices, and interpretive information can be posted without being exposed to weather and vandalism. Most trailheads do not have a trail map and only one trailhead has an accurate trail map. Trail maps are widely recognized an essential tool for minimizing negative recreational impacts. Often there are insufficient numbers of trash cans located in or near the trailhead to improve and prompt compliance with the City's dog feces pick-up rules. Of those trailheads which do have trash cans, 12 trailheads lack a required bear-resistant can as insufficient funding was provided by the City for park's implementation of the City's 2011 wildlife & garbage ordinance. None of the City's trailheads provide seasonal restroom facilities or potable water, despite relatively high usage. Most interpretive and management signs are aging and fading due to lack of funding for replacement.

7.11.3 Alternatives

Missoula's network of unpaved trails and trailheads see year round use, with the exception of those trails closed for protection of wintering wildlife on Mt. Jumbo. In primary and secondary trailheads, there is increasing deterioration of parking lot conditions with resulting ruts, potholes, and poor drainage. Maintenance could be reduced and service conditions improved for high use trailheads by regrading and, in some cases, using asphalt millings rather than gravel for parking areas and principal trails.

None of the City's trailheads utilize parking blocks to demarcate parking spaces; manage traffic patterns; discourage vehicles from using pedestrian/biking areas; or hitting trailhead appurtenances. Additionally, the City has miles of unmaintained and obsolete fences and gates - many still strung with three strands of barb wire that should be removed to protect people, pets and wildlife. Fences around trailheads should be upgraded to wood jack leg, two rail, or post and smooth wire to enhance safety; improve the ability to manage people and prevent volunteer trails; and, present less potential risk to wildlife.

7.11.4 Maintenance and Replacement Costs

Table A.12 in Appendix A shows a unit-price estimate of material replacements and cyclical maintenance needs associated with trailheads. Unit costs are provided for reference only as the exact cost of replacing a trailhead varies depending on site specifics. The replacement lifetime of the various features at a trailhead, including such items as fencing, signage, bear cans, and wheel stops, is assumed to be 50 years. Cyclical maintenance, involving regarding the gravel parking areas is assumed to be required every 5 years.

7.11.5 Estimated Longevity

With adequate annual and biennial maintenance and funding combined with regular monitoring

of trailhead usage, most primary trailheads should only require replacements or upgraded appurtenances as they wear out; signs fade or are damaged; and/or the facility needs added capacity to meet use demands. More significant upgrades may be needed to convert existing secondary trailheads to primary w/ appropriate signage to disperse users, or provided added capacity to serve community growth. If and where equestrian use is permitted, then additional features and maintenance dollars would be needed due to the added wear and waste. Equestrian use would also stimulate demand for ADA features such as paved parking lots, mounting platforms, and better parking lot.

7.12 – Miscellaneous Features

7.12.1 - ADA Tactile Pads

7.12.2 Alternatives

There are two commonly-used options for ADA tactile pad installation within the City of Missoula. Panels can be installed by stamping concrete to create a detectable surface, or by installing cast-iron truncated domes. Currently, the City of Missoula Public Works Department is requiring installation of cast-iron detectable warning panels in public right-of-way situations, and therefore it is recommended that Parks and Recreation follow that standard in areas that currently do not have the required detectable warning.

Maintenance

Maintaining cast-iron truncated domes requires little to no effort. They must be kept free of debris and snow cover to allow the visually impaired to use them effectively. The iron has excellent adhesive properties to concrete, and is highly resistant to damage from snow plows. Replacement standards can be found in the City of Missoula's Standard Drawings.

Replacement Costs

Replacement or installation of detectable warning panels should be completed during access ramp reconstruction, and should include installation of new concrete immediately surrounding the panel. Replacement costs should be calculated by including the unit cost for the warning panel, as well as any additional quantity of concrete or other surfacing material planned surrounding the panel. In some situations, it is necessary to install detectable warning panels in areas of existing asphalt. Installation cost in this case should include provision for saw-cutting of the asphalt, and installation of the panel with a concrete collar that is finished flush to the existing asphalt surface.

The following table includes a unit price estimate form for material installation or replacement associated with tactile pad installation.

Description	Estimated Quantity	Unit	Unit Price	Total Cost
ADA Tactile Pad/Detectable Warning Panels				
Demolition of Existing Infrastructure (10% of total)		LS		$0.00
Gravel Base		CY	$28.00	$0.00
Concrete Collar		SF	$10.00	$0.00
Detectable Warning Panel		SF	$500.00	$0.00

Estimated Longevity

Cast-iron has a very long design life, and under most conditions will outlast the concrete that it is placed in. The design life for cast-iron truncated domes could be 50+ years. Some factors can shorten the design life. If the warning panel is consistently exposed to snow plows, the effective use life could be shortened significantly, however, in most cases heavy duty snow plows are not used at ramp locations.

7.12.3 - Pavers & Stamped Concrete

Preventative Maintenance

Preventative maintenance is a key factor in the useful life of pavers and stamped concrete. Pavers are set with polymeric sand that locks them into place. Weeds and other vegetation can grow through the cracks of pavers, and need to be removed. Polymeric sand needs to be added back into the cracks of pavers as needed to ensure a stable surface. Most contractors will apply several coats of protective sealer to stamped concrete to block the penetration of dirt, deicing chemicals, oil and grease stains, and other substances. A good-quality sealer not only makes the concrete easier to clean, it offers other benefits, such as enhancing the color and preventing fading from UV exposure. Stamped concrete should be sealed as needed, which could be about every 4-5 years, and the surface needs to have dirt and other built up materials pressure washed as needed.

Alternatives

Pavers and stamped concrete are eye catching alternatives to standard concrete and asphalt slabs. These alternatives have their benefits, but can need a lot of maintenance to keep up the appealing qualities. Cracks are common in stamped concrete due to the lack of finish work that can be applied to the finished surface. Pavers are easier to repair if problems with the finished product do arise.

Replacement Costs

The following table includes an estimate of the materials required to replace pavers and stamped concrete.

Pavers and Stamped Concrete

Description	Estimated Quantity	Unit	Unit Price	Total Cost
Pavers and Stamped Concrete				
Base Materials				
2" Minus Subbase		CY	$41.00	$0.00
3/4" Minus Base		CY	$45.00	$0.00
Polymeric Sand (40 lb Bag)		EA	$20.00	$0.00
Pavers		SY	$9.81	$0.00
Stamped Concrete Placement		SF	$9.87	$0.00
Seal/Pressure Wash of Stamped Concrete		SF	$1.19	$0.00

Estimated Longevity

Stamped concrete and pavers can last 25-30+ years with proper preventative maintenance practices. Replacement of pavers and stamped concrete should be completed by a landscape contractor, or a concrete contractor.

7.12.4 - Root Damage Prevention

Preventative Maintenance

There is no maintenance in root damage prevention materials. Materials are subsurface, and if root damage occurs; it is most likely time to replace the current system.

Alternatives

Root damage is normally mitigated by the installation of a protective barrier, but can also be accomplished by injecting chemicals into the soil. There are different types of barriers to prevent damage that could otherwise be created due to roots growing into areas with high moisture content. Installing a fabric around a trench where a water or sewer line was installed can prevent roots from penetrating week spots in the line. Trees that are planted near sidewalks or building foundations can be planted in a root barrier. This is a cone shaped barrier made out of a plastic material that prevents the roots from growing out; instead encourages the roots to grow deeper. These barriers can also be purchased in linear sheets to line the edges of buildings and sidewalks. Chemicals that are injected into the soil are normally used once a problem has already developed, and are used to stop root growth.

Replacement Costs

The following table includes an estimate of common root damage prevention materials.

Root Damage Prevention					
Description		Estimated Quantity	Unit	Unit Price	Total Cost
Root Damage Prevention					
	Chemical Barrier		EA	$0.00	$0.00
	Fabric Barrier		EA	$0.00	$0.00
	Plastic Barrier		EA	$0.00	$0.00

Estimated Longevity

The estimated longevity of root damage prevention materials can last a very long time. The chemical barriers effectively end root growth in the particular tree that they were injected. Plastic barriers and fabric barriers if installed correctly can keep root damage at bay for the life of the tree.

7.12.5 - Concrete Pads & Specialty Features

Introduction

Concrete pads and specialty features require little preventative maintenance. The City of Missoula is responsible for specialty features such as MOBASH Skatepark, Caras Plaza, and the Depot Plaza. Specialty features require the same preventative maintenance of the individual components that make up these features.

Preventative Maintenance

Concrete slabs and structures should be inspected by a qualified individual who is looking for signs of settling, or surface flaking. Caras Plaza and The Depot Plaza have features that are covered in other sections of this report. The concrete structures at these locations require little to no maintenance.

Concrete skateparks fail in the same manner that concrete slabs fail. Settlement usually requires the problem section of concrete to be replaced. Spalling can be fixed by getting rid of the loose material, grinding to maintain a smooth finish, cleaning and refinishing the surface with a cement-based finish. The skateparks should be inspected for areas where heavy use has worn down the concrete surface. Small patches and localized resurfacing are common maintenance practices needed for the repair of skatepark surfaces.

Alternatives

Fiber mesh concrete is an alternative to conventional concrete, and can help prevent minor problems from developing into larger, costlier problems. The fiber mesh is uniformly distributed throughout the concrete mix. When small cracks begin to develop, they quickly intersect with fibers which prevent their growth. Fiber mesh could be used for skateparks to prevent cracks from spreading.

Replacement Costs

Due to the variability of the materials present at the specialty structures, replacement costs should be evaluated on a case-by-case basis.

Estimated Longevity

Concrete features can last up to 50 years with little maintenance.

7.12.6 - General Asphalt Surfacing

Introduction

Asphalt surfacing is a major infrastructure component of the Missoula Parks and Recreation System. Asphalt pavement is used for parking lots, trails, basketball and tennis courts, and many other areas that require a cost-effective hardscape surface. Because asphalt is a common surfacing material used in many different parks and recreation components, this section is intended to generally discuss preventative maintenance, alternatives/options, and estimated longevity for asphalt surfaces. Specific hardscape sections within this report will reference this section in order to limit restatement of common practices and materials.

An asphalt surface can provide many years of effective use. However, even with proper design and preventative maintenance, the surface will degrade over time. Aged surfacing in parks and recreation facility raises concern with general user safety, adequacy of the surface for its intended use, ADA compliance, etc. In order to maximize the investment in the City's asphalt surfacing, preventative maintenance procedures must be balanced with replacement costs while addressing these concerns. Eventually, maintenance and repair costs over time exceed the cost of complete replacement.

A properly designed, installed, and maintained asphalt pavement surface will provide adequate drainage with no standing water, be free of accumulated debris and obstructions, and provide a smooth travel surface for the intended use.

Preventative Maintenance
Current Missoula Parks and Recreation procedures for the maintenance of asphalt surfacing are discussed more specifically in the respective sections of this report discussing the various uses of asphalt. This section will discuss generally-recommended preventative procedures.

Preventative maintenance begins with good design. Realistic base material specifications and proper drainage will greatly increase the life expectancy of parking lot materials. Water is a key cause of parking lot failures. A well thought-out design causes water to drain from the asphalt surface, and be collected into a storm drain system before it is allowed to pool and penetrate the asphalt surface to the base material causing more significant damage. Most issues with parking lots that cause costly repairs can be avoided or minimized with proper design and a planned preventative maintenance schedule.

Once problems develop with asphalt, they need to be addressed as soon as possible to prevent further degradation and to minimize reconstruction costs. Cracks tend to spread, and low spots can lead to larger more complex problems with the asphalt surface and below. Some of the more common causes of structural failure are:

Inadequate Drainage – poor drainage results in standing water in travel locations. Freeze-thaw cycles in areas of standing water can quickly degrade the surface, and allow water to penetrate to the base course material, causing differential settlement and larger structural concerns.

Poor Construction Methods – less than adequate compaction of either the base materials or the asphalt pavement can result in rapid settlement, poor drainage, and structural failure. Conversely, over-compaction of the surfacing material can also lead to rapid cracking, spalling, and overall deterioration of the surface.

Deficient Design – Most often the intended use and structural loading, along with the ability of existing subgrade soils to support the loading, define the required thickness of base gravels and asphalt pavement, or the pavement "section." If the section cannot support the design uses, failure occurs. Poor drainage can also be attributed to design deficiencies.

Time – The raw materials that comprise asphalt become less flexible and resistant to stress over time. Exposure to extreme heat and cold, water, and sunlight degrade the materials and cause them to fade and become brittle over time. Cracks develop, and water enters the asphalt and the base materials, causing differential settlement,

cracking, potholes, etc. Water remaining within the pavement during a freeze cycle breaks the material apart.

Asphalt is a material that requires consistent care in order to provide a long-lasting surface adequate for its planned use. The following activities can be implemented within a preventative and reactive maintenance program to extend the useful life of pavement infrastructure:

Periodic Inspection by qualified individuals to identify early warning signs of problems that can be inexpensively corrected before major issues arise. Issues with asphalt can progress to be more problematic if the small problems are not rectified. Periodic inspections looking for signs of future deterioration are a very cost-effective way to ensure that proper maintenance procedures can be implemented to maintain a surface that serves the intended purpose while avoiding expensive repairs and/or reconstruction. These inspections can also be used to determine

Fog Seals are a proven method of preventing unwanted materials from penetrating the asphalt surface and damaging the integrity of the surface course. Fog seals create a moisture barrier, and along with proper drainage can result in a surface that resists many damaging elements. Single-coat fog seal applications are recommended every 1-3 years, whereas double coats can last 4-5 years before re-application is recommended. Installation generally consists of an asphalt emulsion with or without a sand cover (heavier applications of fog seals with a sand cover are called slurry seals). They work best when covering a coarse aggregate because the coarse aggregate gives the mixture area to creep into the spaces and bond between the particles.

Chip Seals offer another viable option when it comes to sealing an asphalt surface from the elements. Chips seals are a surface treatment that consist of a compacted aggregate layer with emulsified asphalt, water, and additives that are rolled onto the surface. Chip seals result in a rougher surface because of the exposed aggregate, and are recommended for reapplication every 4-6 years in order to maintain maximum protection of the asphalt surface and base materials.

Crack Sealing can be a very important step in maintaining the structural integrity of an asphalt surface, and can be identified early during preventative inspections. Cracks are more than just an unsightly nuisance; they allow water to infiltrate to the base material, which can lead to major structural failures. All vegetation, dirt, and debris should be removed prior to sealing. Cracks should be sealed before any surface treatment or overlay is applied to the pavement. Cracks are filled with an asphalt concrete sealant to make sure that they do not appear in the respective treatment.

Local Patching may be necessary in areas where potholes or large crack networks are prevalent, crack seals will not be a sufficient repair to the surface. In these cases, the entire problem area will be saw cut and removed down to the base material. The base material then needs to be sufficiently repaired or compacted, and new asphalt placed and compacted to match the existing edges. Chips seals or fog seals are commonly applied after the patch to further protect the area. Chip seals also can provide an even color and texture that will mask a pavement surface with many sealed cracks and patched potholes, providing a more uniformly colored surface.

Sweeping the surface from built up debris is also a known key factor in extending the life expectancy of an asphalt surface. This built up debris can cause undesirable ponding

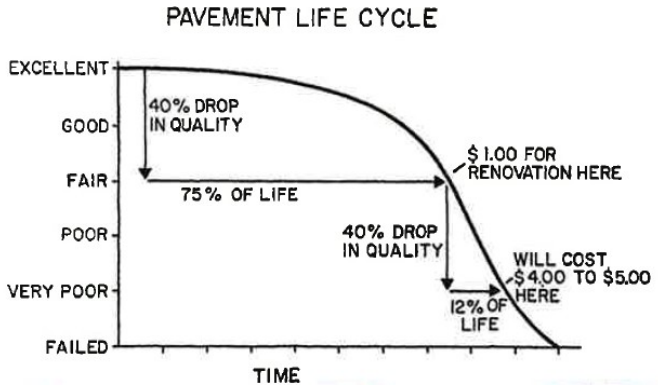
of water and/or mold build up, and will eventually lead to pavement distress. Sweeping should be performed on an as-needed basis to remove the debris that has built up on the surface. Sweeping will also be necessary prior to any patching, crack or surface sealing, or painting operations.

Snow Plowing is an important maintenance practice that must be completed to prevent freeze-thaw cycles from having a detrimental effect on the parking lot. If snow and ice is left on the surface; subsurface issues can begin to take shape. Potholes are a major issue that arise from freeze-thaw cycles, and can be a costly repair if not addressed immediately. Snow and ice should be removed on an as-needed basis.

Striping may need to be completed on a regular basis in order to maintain pavement markings that are visible for the intended purpose. In high traffic areas, striping may need to be completed every 2-3 years or as identified during periodic inspections. Striping will also be necessary following any surface treatments such as chip/fog seal, major patching, or crack repairs.

Alternatives

At some point the decision needs to be made if continually reactive maintenance is justified or if major renovation or complete reconstruction of the lot is a more economical decision. Typically, asphalt pavements deteriorate slowly following construction for a period of time. At some point, the rate of deterioration increases, resulting in significantly increased maintenance costs. Many organizations apply the Critical PCI (Pavement Condition Index) Method in order to determine the optimal point during an asphalt pavement life cycle for major renovation and to delay the need for complete replacement. The basic premise behind this method is that the cost of a major repair to an asphalt surface near the end of the pavement life span will exceed 4 times that of a repair made prior to the increase of rate of deterioration.



While implementation of the Critical PCI Method is outside the scope of this discussion, the concepts remain valid. Significant economic savings can be gained by the completion of preventative maintenance as described above, and when increased deterioration rates can be identified during periodic inspections, repair costs can be minimized by initiating major repairs prior to further pavement degradation.

These major repairs can be completed with a mill and overlay project. When inspections reveal that the major asphalt structural integrity is still satisfactory, but historic maintenance costs are rising to keep the feature in service, a mill and overlay may be necessitated. Major substructure problems such as potholes and settlement areas will need to be repaired prior to an overlay or they will remain a problem in the new overlaid surface. Cracks should also be repaired prior to

asphalt overlays to ensure that the cracks are not visible in the new surface. Repair costs can be minimized by reducing the thickness of overlay if conditions allow.

When reactive maintenance and repairs are extensive, wide-spread cracking is apparent, and/or it becomes obvious that the base layer is failing in larger areas, a reconstruction of the parking lot must be considered. The problem is no longer in the asphalt itself, but that the base layer has been compromised, causing major structural failures in the asphalt surfacing. The existing surfacing should be removed, new base material imported (or existing base repaired) and sufficiently compacted, and new asphalt installed.

Cost estimating spreadsheets that include maintenance, repair, and replacement costs are included within each respective feature type in order to assist with the financial determination of maintenance/repair vs. replacement on a case-by-case basis. Alternate surfacing materials are discussed within specific hardscape feature sections in this report.

Estimated Longevity
As discussed above, preventative and reactive maintenance and repair can substantially extend the expected life span of an asphalt pavement surface. If adequate design, construction, and maintenance procedures are followed, an asphalt surface can be expected to last for up to 30 years before significant repair is required. For forecasting purposes, it is recommended that a typical asphalt feature be assumed to accumulate maintenance costs for a period of 30 years before major repair costs are applied to that feature.

7.13 BRIDGES

Introduction

Missoula's Parks and Recreation Department provides a wide array of trails and paths for recreationalists to enjoy the City of Missoula. These trails often cross waterways or other obstacles thus necessitating the use of bridges. Bridges are pivotal in providing continuous access to these trail systems and furthermore add an aesthetic component to the parks landscape.

Unmaintained or neglected bridges pose as safety hazards to users which in some severe cases may be life threatening. Bridges need to be well maintained in order to serve the purpose they were designed for and be repaired and replaced as necessary to ensure safe passage.

Bridges that are well kept make parks more enjoyable for users of all ages. Bridges in good condition will have proper drainage, a solid uniform surface, and they will be free from obstacles and vegetation. Bridges should be ADA compliant and free of hazards.

Preventative Maintenance

The bridges in Missoula's Parks and Recreation Department make up a broad inventory. The larger bridges (ie Madison Street Underbridge, California Street, Duncan Street etc.) need their own specific inspection and maintenance plans and are outside the scope of this report. Large concrete culverts require periodic inspection to ensure adequate passage and structural integrity of the culvert. All other smaller pedestrian bridges should be grouped together as the focus of this report.

Bridges can benefit from preventative maintenance in a number of ways. Proper cleaning and upkeep will not only increase the longevity of any bridge material, but also help to ensure that structural integrity is upheld. Neglect of maintenance on bridges is not economical and is a dangerous risk to the public. The following maintenance activities should be completed on a regular basis:

Periodic Inspection – Bridges need to be inspected by a qualified professional to verify the condition of their components. The deck, superstructure, substructure, and channel conditions if applicable should be evaluated and scheduled for repair if necessary. Timber components should be checked for severe splits and checks, rot, and loose connections. Concrete components should be checked for cracks, spalls, and efflorescence. Steel components should be checked for corrosion, distortion, and fracture. Stream channels should be checked for scour problems and abutment protection. Bearings and joints should be checked to verify functionality and cleanliness.

Structure – Bridges may be composed of steel, concrete, or timber. Each component may be repaired locally depending on the material or replaced in sections as dictated by the inspection. Decks generally wear out faster than the rest of the bridge structure especially in the case of timber decks.

Approach Conditions – Debris and hazards should be removed from the approach of all bridges to allow for safe usage of the structure. Approach rail systems should be implemented to protect pedestrians and bicyclists from veering off of the trail utilizing the bridge.

Channel Scour – Channel scour is a serious condition that can compromise the ability of the bridge abutment to carry the superstructure. The abutment needs to be protected and riprap may be necessary to ensure that this protection is provided.

Concrete and steel bridges require less preventative maintenance than timber. Furthermore, aside from the aforementioned preventative measures all bridges should be inspected to verify overall rideability and ADA compliance.

Alternatives

For the purpose of this report new bridges are split into two categories; steel/concrete and timber. Timber bridges are easier to construct in that more contractors are equipped to deal with timber and are familiar with its construction. Timber may be a more aesthetic option as well and may fit into the specific park landscape more naturally than steel or concrete.

On the other hand, steel and concrete provide bridge solutions that have more longevity and less preventative maintenance. Timber decks may need to be replaced up to three times during the life of the bridge where steel or concrete decks would span the duration of bridge life. Steel and concrete bridges are more expensive up-front and often even with the added maintenance and replacements of the timber bridges are still more expensive in the overall life of the bridge.

Replacement and Maintenance Costs

The following table shows a unit price estimate of material replacements and maintenance items associated with bridges.

Bridges

Description	Estimated Quantity	Unit	Unit Price	Total Cost
Bridges				
REPLACEMENT				
Demolition				
Remove Superstructure		LS	$7,250.00	$0.00
Remove Wearing Surface		SF	$3.75	$0.00
Remove Substructure		LS	$6,500.00	$0.00
Superstructure and Deck				
Concrete Bridge		SF	$200.00	$0.00
Steel Bridge		SF	$200.00	$0.00
Timber Bridge		SF	$120.00	$0.00
Substructure				
Concrete Abutment		LS	$15,000.00	$0.00
Timber Abutment		LS	$8,000.00	$0.00
Approach				
Rail		LF	$150.00	$0.00
MAINTENANCE				
Inspect Bridge		LS	$575.00	$0.00
Clean Graffiti		SF	$2.10	$0.00
Repair Timber Running Planks		SF	$8.10	$0.00
Repair Asphalt Wearing Surface		SF	$22.00	$0.00
Crack Seal Concrete Deck		SF	$4.50	$0.00
Epoxy Crack Repair Concrete		LF	$73.00	$0.00
Patch Concrete Deck		SF	$70.00	$0.00
Repair Timber Bridge Rail		LF	$112.00	$0.00
Repair Steel Bridge Rail		LF	$244.00	$0.00
Sandblast Steel w/ Containment and Paint		SF	$14.50	$0.00
Clean Superstructure & Substructure		HR	$122.00	$0.00
Install Riprap		CY	$100.00	$0.00
Remove Debris from Channel		HR	$235.00	$0.00
Brush Bridge Approach		LS	$491.00	$0.00
Clean Bridge Drains		HR	$122.00	$0.00
PROJECT SUB-TOTAL				$0.00
CONTINGINCY		15.00%		
PROJECT TOTAL				**$0.00**

Estimated Longevity

The estimated longevity of a bridge depends on its material composition. New steel and concrete construction will have a general lifespan of 75 years. New timber superstructures and

substructures generally have a lifespan of 50 years. New timber decks have a general lifespan of 25 years.

Replacement Standards

Construction and design standards for pedestrian bridges are dictated by AASHTO's LRFD Guide Specifications for Design of Pedestrian Bridges.

7.14 BUILDINGS

Introduction

Missoula's Parks and Recreation Department facilities include a wide array of minor buildings typical of a well-developed park system including: restrooms, picnic shelters, offices, pump houses, and storage spaces. The Department also has a number of specialty buildings located in the park system including: band shell, pools, event pavilion, carousel, historic residence, operations buildings, concessions, and even a barn.

Public buildings are generally designed and built to last 50 to 75 years. Many public buildings will provide a useful life of over 100 years given sound design, quality materials, and regular maintenance. Preventative, cyclical maintenance, renovations and minor improvement of minor buildings such as restrooms, shelters, and storage buildings are generally accommodated within this RRI Plan. Building replacement is not comprehensively addressed by the plan due to the costs, and likely changes in codes, materials, technology and public needs that will occur over such long periods of time. The focus of this section is, accordingly, placed on ADA code compliance, inspection, roofing, plumbing, paint, resource conservation, and weather proofing.

The Department applies the principles of Crime Prevention Through Environmental Design (CPTED) in the design and siting of new buildings. These principles are proven to help reduce vandalism to buildings and other crimes as well as promote a greater sense of safety and security for park users. CPTED should be utilized anytime a building must be replaced or undergo a major retrofitted.

Replacement and Maintenance

ADA code compliance – Many of the park system's facilities are not ADA compliant due to their age and condition. ADA codes apply anytime a government agency makes major renovations to, or replaces, a structure. Some of the City's buildings and facilities cannot be made ADA compliant except by complete replacement – Sacajawea and Greenough restrooms are cases in point. Many other park buildings and facilities are not ADA compliant simply because the site lacks for: accessible parking, ramps, and stabilized or paved trails needed to access the feature when using a wheel chair or other mobility assisting device. Anytime a feature is being renovated, improved or replaced, funds should be allocated to ensure the parking, access path, facility entry(ies) and related features are made fully ADA compliant.

Periodic Inspection – Buildings need to be inspected routinely to monitor the condition of their components. The foundation, siding, roof, plumbing, floors, electrical, doors and window systems should be evaluated several times a season and scheduled for repair as necessary. Timber components should be checked for rot and loose connections. Concrete components should be checked for cracks, spalls, and efflorescence. Plumbing components should be

checked for small leaks, corrosion, sluggish drains and proper operation. Floors, windows, and doors should be checked for proper operation, working locks, trip and pinch hazards and fit. Damage, excessive wear, and code compliance issues should be addressed as quickly as possible. Electrical systems should be checked for proper and safe operation including replacement of lights, breakers, and any exposed or frayed wiring. Fuse panels should be secured – either locked, or in a chase not accessible to the general public. Exterior building materials should have a permanent or sacrificial coating to dissuade vandalism and speed graffiti removal. Roofs should be checked for damage, debris, and drainage problems.

Structure – Buildings may be composed of steel, concrete, brick, wood, plastics, and composite materials. Each component can typically be repaired locally depending on the material or replaced in sections as dictated by the facility and needs. Exterior elements generally wear faster than the interior of a building structure; however, high use buildings like restrooms, pools, and picnic shelters require equal attention to interior and exterior upkeep and replacement of worn features. Trees and shrubs should be planted far enough from the foundation to protect its structural integrity. Trees and most woody shrubs should never be permitted to grow into, onto or over a structure, particularly when a building is located in the urban-wild land interface.

Roofs – Roof debris should be removed and the roofing inspected for damage. Damaged areas should be repaired as quickly as possible, regardless of the type of roofing material used. Standing seam metal roofing systems provide the greatest longevity and least maintenance needs for park systems that must weather all four seasons and extreme conditions such as hail, cyclonic winds, and large freeze-thaw temperature swings. Thirty (30) year composite tabs, or tiles, are generally more expensive and may require more repairs. Cedar shakes, light composite tabs, rubber membranes, and cloth roofing systems require greater maintenance and a more frequent replacement cycle.

Plumbing – Heavily used features, such as restroom fixtures will generally need to be replaced multiple times over the life of the facility. When fixtures are replaced en mass, it is often necessary to also address Building and/or ADA codes to make the facility compliant. Features made of ceramics, light metals, and plastics are more subject to failure and damage from use, freeze-thaw cycles, cracking, material failure and vandalism. The sturdiest, longest lasting plumbing fixture systems are made of stainless steel. All exposed valves, working pipes, and vents should be contained in a separated, secure plumbing chase. Floor drains should be installed in all plumbed facilities to reduce potential damage from flooding and to help facilitate efficient cleaning. Materials for high use public facilities, particularly restrooms, should avoid or greatly limitthe use of wood, tile, vinyl, plastics and other breakable and flammable materials.

Weather Proofing – Keeping out moisture, dust and pests is vital to maintaining the health, longevity and usefulness of a public building. A common problem with park buildings is with the irrigation system not being amended or adjusted to avoid hitting a building. To maximize the useful life of any building, It should be a priority to address water problems, wherever it occurs, as soon as they are noticed, regardless of the building materials or use. Maintaining and/or installing gutters is also critical for enclosed buildings. Missing and poorly maintained gutters are the primary cause of damage to a building's soffit, fascia, siding, and roofs. Positive foundation drainage must be checked and addressed as necessary.

An interior ceiling of open-air structures such as picnic shelters, band shells, and dugouts should not use exposed rafters or beams/logs that provide projections, ledges or holes on which to perch or construct a nest. Architecturally clean ceilings and soffits vastly reduce the attractiveness of open air buildings to pests such as rodents, birds, and stinging insects. Ship

lapped board ceilings present a balance between aesthetics, sound attenuation, and pest resistance in picnic shelters and other open air facilities.

Paint - Many park buildings and structures require painting and/or sealing to preserve and protect the structure and connection points (nails, screws, nuts, rivets) from rust, rot, wear, and tear associated with exposure to the elements and the public use setting. Cyclical painting and sealing is necessary to maintain sanitation, facility quality, public perception of security, and maximize longevity. The walls and concrete floors of most buildings must be routinely painted or sealed on a seven (7) to ten (10) year cycle. This is particularly important when wood siding products are involved. High quality, low and no VOC paints and sealants should be favored over oil based products.

Vandalism, particularly graffiti, is expensive and difficult to cover or remove from textured and painted surfaces. Use of a graffiti sealant, or sacrificial coating product, should be the Department's standard for use on the exterior of public buildings, retaining walls, tunnels and public art. Generally, there are two types of graffiti sealant – permanent or sacrificial coating. The kind of graffiti coating to use is dictated by the building material, location, function and porosity of the surface to be coated.

Energy/Resource Conservation - Passive solar heating and lighting should be integrated into all new buildings as should use of water and energy efficient fixtures. Labor saving design, reuse of building materials, and other LEEDS principals should be considered for all new buildings and when retrofitting. Retrofitting plumbing and electrical systems for many buildings is relatively simple and cost effective. Energy and resource conservation projects should only be undertaken subject to a review of available technology and development of an estimate of the costs and payback associated with the retrofit. Retrofitting to convert to LED lighting, low volume flush toilets, motion-activated flush and faucet valves, and use of automated magnetic locking doors, typically yield favorable reductions in operating costs and increase the efficiency of maintenance and service delivery.

Alternatives

Traditional construction techniques, materials and practices are generally acceptable for large public recreation facilities and buildings. In contrast, modular and prefabricated buildings such as restrooms, shelters, storage buildings, and pump houses often provide a more durable, affordable, vandal resistant, and longer lasting facility that will better withstand the use occurring in a public park setting.

In many cases, local contractors can competitively manufacture and deliver a similar, comparable modular or prefabricated restroom, storage, or shelter building product. Use of wood as a primary material for buildings such as shelters, restrooms, dugouts, storage buildings, should be avoided, or greatly limited, due to the higher costs associated with fire code compliance, vandalism repair, maintenance, and longevity.

Estimated Longevity

The estimated longevity of a public building depends on its material composition and usage. New concrete or steel construction will have a design lifespan of +75 years. New stick-built structures generally have a lifespan of +50 years.

Replacement Standards

Construction and design standards for buildings are dictated by Montana State Public Works Code, and the municipality's adopted building code(s), typically the Uniform Building Code (UBC) or International Building Codes (IBC) as well as specific modifications or alternate code sections tailored to better fit the community's needs.

7.15 ELECTRICAL

7.15.1 - Field Lighting

Introduction

The field lighting at Missoula Parks sports fields plays an important role in increasing the number of games the fields can house by increasing the hours of play. Proper lighting can help Missoula host more State and Regional tournaments as well as increase the safety of the players by increasing the visibility of the ball and minimizing glare on the field. A well-lit field also provides comfortable viewing by spectators,

Unmaintained lighting can cause a safety concern if the luminaire is not grounded properly or is defective in some way. It is also important to maintain proper light levels on the fields. Below are the typical light levels recommended by The Illuminating Engineering Society of North America (IESNA) and Amateur Softball Association.

Generally Accepted Levels for Amateur Leagues with spectators:

- Infield: 50 fc (footcandle)
- Outfield: 30 fc
- Uniformity: 2:1 (the highest light level is no more than 2 times any other measured level)

Generally Accepted Levels for Recreational Play with no spectators:

- Infield: 30 fc
- Outfield: 20 fc
- Uniformity: 2.5:1

Current Lighting Levels at Northside & McCormick Fields:

Northside:

• Infield Average: 13.3 fc	• Outfield Average: 7.85 fc
• Infield Minimum: 5 fc	• Outfield Minimum: 0.8 fc
• Infield Maximum: 22.8 fc	• Outfield Maximum: 24.6 fc

McCormick Field #1:

• Infield Average: 24.1 fc	• Outfield Average: 9.7 fc
• Infield Minimum: 5.5 fc	• Outfield Minimum: 1.1 fc
• Infield Maximum: 49.7 fc	• Outfield Maximum: 33.3 fc

McCormick Field #2:

• Infield Average: 18.3 fc	• Outfield Average: 8.1 fc
• Infield Minimum: 5.3 fc	• Outfield Minimum: 0.7 fc
• Infield Maximum: 38 fc	• Outfield Maximum: 26.9 fc

The average lighting is well below recommended levels. In some areas the fields are lacking 20 foot candles (fc) compared to recommended levels. The outfield lighting is extremely non-uniform, ranging from approximately 1 fc to 30 fc. Uniformity provides increased safety for the players. The ball is lit evenly from all directions which makes it more visible. Changes in light levels can make the ball appear to jump as it moves in/out of dark spots making it harder for players to track the ball. A key component to uniformity is pole height. The existing wood poles are short of the recommended 60-70 ft pole height. The infield lighting is more uniform but still outside recommended levels. Short pole height contributes to increased glare.

Taller poles with an engineered lighting layout would significantly increase the quantity and quality of lighting at these fields.

Preventative Maintenance

Field lighting can benefit from preventative maintenance in a number of ways. Proper design is a major factor in the longevity of field lighting. Proper pole bases, pole and lighting finishes, proper grounding, and proper light levels can all increase the expected life. Designing to a proper light level for field lighting can help maintain performance for many years reducing the need for a new luminaire. Light levels should also be measured every other year to verify the lamp is performing properly. The equipment in place has not been maintained on a scheduled basis. Because of this, it is recommended a qualified electrician performs a thorough review of all equipment immediately. Faulty wiring and breakers may pose life safety issues if not inspected regularly.

The following maintenance activities, specific to Field Lighting, should be completed on an annual basis:

Service Entrance and Pole Distribution Boxes – Check service panel for proper markings. Warning stickers, wiring diagrams, and circuit labels should be located on the panel. These items will help with future servicing and reduce overhead of a contractor tracing circuits. Test reset action on all service breakers. Snap all breakers on and off several times to ensure proper contact. If fuses are in place, check fuses continuity. Ensure no live parts are exposed. Have a qualified electrician evaluate service gear and circuitry annually. Contractor should measure current draw at each breaker and check for signs of overheating. Field lighting should be controlled by an HOA switch. The breaker should not be used to switch lighting on and off.

Check All Wiring – Check wiring at the service panel, distribution boxes, and at the hand holes inside the pole base. Insulation around the wiring should show no signs of deterioration. Wiring insulation should also be free of heat discoloration. All taped connections should be checked and replaced with proper NEC approved connections. Ensure no live wires are accessible to the public. Have a qualified electrician evaluate circuitry annually. Contractor should perform an insulation test, or Megger test, to determine condition of wiring. It is recommended to install all new wiring in conduit for easy replacement.

Poles – Check all poles to see that they are not leaning. Leaning poles should be replaced or reinstalled to reduce risk of falling in the path. Check the baseplate and anchor bolts for deterioration/corrosion. Check for all pole access covers and replace any missing covers. If the pole base is a decorative cover, remove and verify there is proper drainage and all conduit, fittings, and wire are not loose or damaged. Check all

wood poles for decay and or twisting. Twisting of the pole may require re-aiming of the fixtures.

Luminaires – Verify fixture housing has no cracks or signs of water leakage. Water leaking into the housing should be repaired right away to prevent more severe damage. Clean all lenses and replace damaged lenses. Check all luminaire fuses. Replace blown fuses.

Lamp and Ballast – Lamps should be checked and replaced as needed. Monitor lamp usage and replace all lamps near end of life. Replacing lamps as a group is more efficient and saves labor/equipment costs.

Grounding and Lightning Protection– Proper grounding should be installed and checked on an annual basis. Damaged or corroded grounds should be replaced. Improper grounding can result in a shock hazard and not properly mitigate a lighting strike.

Alternatives

The existing field lighting is at or beyond its useful life. New service entrance, conduit and wire, and luminaires are recommended. New steel poles will increase life expectancy and reduce twisting of the pole.

For the purpose of this report, there are two alternatives for lamp choices: metal halide or LED. Metal halide High Intensity Discharge (HID) lamps are more traditional and a large variety of manufacturers that can meet the standards required for a well-lit field using this type of luminaire.

As LED technology increases, it may be possible to explore an LED lamp in a new fixture. Beyond cost and longevity, LED lamps provide a light source that requires a significant reduction in energy consumption. LED lamps should reduce the energy use and in some cases reduce trail lighting annual energy costs by 50%. LED field lighting is a new technology and should be reviewed more prior to ordering.

Replacement Costs

Table A.15 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with Park Lighting.

Service Entrance– A electrical service entrance with a meter, panel, and lighting controls is required for each section of lighting. If the fields are close by they should be fed from the same service. Fields 1 and 2 are fed from the same service.

Underground Conduit and Conductors – An estimated distance of 100 feet was used in costing. Costs include trenching, PVC conduit, and Conductors.

Grounding and Lightening Protection - Costs should be included with wiring and conductors.

Field Pole and Base – A new trail pole and base should be installed with all new luminaires. The base should be concrete and have anchor bolts to secure the pole.

Ballasts and Lamps – Ballast and lamps should all be replaced on average, every 5 years. Costs are a lower estimate. For a top performing field, lighting may double in cost. Current costs would supply new lighting with better performance than the fields currently have.

Estimated Longevity

The estimated longevity of field lighting can vary depending on how well maintained they are. A typical pole and housing has an estimated life of 25 years. The lamp within the housing can vary. HID lamps will need replaced every 2 years and ballasts every 5 years. Where LED lamps and drivers are well over 5 years.

Replacement Standards

It is recommended to have a qualified electrician inspect all existing service entrance, conductors, and lighting/Poles. Some equipment on site now is beyond its useful life. After a full review is completed, a schedule of replacement should be put into place. Each field could be replaced at different times. A new field design should be performed with new steel poles and recommended luminaires to meet lighting needs. An engineer should perform a lighting calculation to create a standard lamp size and type. At this time HID and LED lamp sources should be investigated.

7.15.2 - Trail Lighting

Introduction

There are approximately 23 miles of multi-use paved trails in Missoula that are maintained by the Missoula Parks and Recreation Department. Many of these trail miles have lighting. The lighting not only provides an aesthetic feel, but also an increased level of safety while traveling in off hours. These trails can be used for pedestrian use only, or a mixture of pedestrian and bicyclists. The trails currently have a mix of older non-cutoff lighting and newer LED lighting. Increasing the number of trail miles with lighting and providing more modern lighting is an important part of maintaining the Missoula trail system. Full Cutoff fixtures are defined as an outdoor lighting fixture that emits 0% of its light above 90 degrees and 10% above 80 degrees from horizontal.

Unmaintained lighting can cause a safety concern if the luminaire is not grounded properly or is defective in some way. It is also important to maintain the Missoula Outdoor Lighting Ordinance, Title 8, Chapter 8.64 by retrofitting all existing lighting to become full cutoff to reduce light pollution.

Trail lighting that is well maintained will increase trail safety and make parks more enjoyable for users of all ages. Trail lighting in good condition will provide well illuminated trails and provide an aesthetically pleasing uniformed look. Upgrades to existing luminaires and maintenance of new and old should be performed annually. Lamp replacement can be performed by the manufactures recommendations for end of life expectancy.

Preventative Maintenance

Trail lighting can benefit from preventative maintenance in a number of ways. Proper design is a major factor in the longevity of trail lighting. Proper pole bases, pole and lighting finishes, proper grounding, and proper light levels can all increase the expected life. Designing to a proper light level for trail lighting can help maintain performance for many years reducing the need for a new luminaire. Light levels should also be measured every other year to verify the lamp is performing properly. The equipment in place has not been maintained on a scheduled basis. Because of this, it is recommended a qualified electrician performs a thorough review of all equipment immediately. Faulty wiring and breakers may pose life safety issues if not inspected regularly, especially if the direct buried lines have been cut and not spliced together properly. The following maintenance activities, specific to trail lighting, should be completed on an annual basis:

Service Entrance and Pole Distribution Boxes – Check service panel for proper markings. Warning stickers, wiring diagrams, and circuit labels should be located on the panel. These items will help with future servicing and reduce overhead of a contractor tracing circuits. Test reset action on all service breakers. Snap all breakers on and off several times to ensure proper contact. If fuses are in place, check fuses continuity. Ensure no live parts are exposed. Have a qualified electrician evaluate service gear and circuitry annually. Contractor should measure current draw at each breaker and check for signs of overheating.

Check All Wiring – Check wiring at the service panel, distribution boxes, and at the hand holes inside the pole base. Insulation around the wiring should show no signs of deterioration. Wiring insulation should also be free of heat discoloration. All taped connections should be checked and replaced with proper NEC approved connections. Ensure no live wires are accessible to the public. Have a qualified electrician evaluate circuitry annually. Contractor should perform an insulation test, or Megger test, to determine condition of wiring. It is recommended to install all new wiring in conduit for easy replacement.

Poles – Check all poles to see that they are not leaning. Leaning poles should be replaced or reinstalled to reduce risk of falling in the path. Check the baseplate and anchor bolts for deterioration/corrosion. Check for all pole access covers and replace any missing covers. If the pole base is a decorative cover, remove and verify there is proper drainage and all conduit, fittings, and wire are not lose or damaged.

Luminaires – Verify fixture housing has no cracks or signs of water leakage. Water leaking into the housing should be repaired right away to prevent more severe damage. Clean all lenses and replace damaged lenses. Check all luminaire fuses. Replace blown fuses.

Lamp and Ballast – Lamps should be checked and replaced as needed. Monitor lamp usage and replace all lamps near end of life. Replacing lamps as a group is more efficient and saves labor/equipment costs.

Grounding – Proper grounding should be installed and checked on an annual basis. Damaged or corroded grounds should be replaced. Improper grounding can result in a shock hazard and not properly mitigate a lighting strike.

Alternatives

For the purpose of this report, the two alternatives for trail lighting luminaires are to install new LED standard luminaires that have been established previously by the City of Missoula or retrofit existing globe style luminaires. The efficiency of the existing globe style luminaires compared to new LED lamps should be further analyzed to confirm the best lamp type. It is recommended adding a retrofit LED lamp with a cut off reflector inside the globe to meet Missoula lighting standards and to extend lamp life.

Per the lighting ordinance, post top fixtures can be semi-cutoff. Semi-cutoff is defined as an outdoor lighting fixture that emits no more than 5% of its light above 90 degrees and 20% above 80 degrees from horizontal. Currently the globe style trail lights have been retrofit with LED screw in lamps with integral ballasts. The screw-in LED lamp directs light out at 90 degrees, which limits illumination on the trail surface and makes it difficult to get a full cutoff on the light. The LED lamp and a cutoff shroud may reduce the up light to 5% above 90 degrees, but a new fixture is the only way to meet the full cutoff requirement. Some globes have been spray painted black on the top to reduce up light; this does not meet the intent of the ordinance.

LED lamps and drivers last well past the 5 year warranty, significantly reducing the maintenance cost of replacing an HID lamp every other year. Beyond cost and longevity, LED lamps provide a light source that requires a significant reduction in energy consumption. LED lamps should reduce the energy use and in some cases reduce trail lighting annual energy costs by more than 50%.

Replacement Costs

Table A.15 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with trail lighting.

Service Entrance– A service entrance with a meter, panel, and lighting controls is required for each section of lighting.

Underground Conduit and Conductors including Grounding – An estimated distance of 100 feet was used in costing. Costs include trenching, PVC conduit, and Conductors.

Trail Pole and Base – A new trail pole and base should be installed with all new luminaires. The base should be concrete and have anchor bolts to secure the pole.

Ballasts and Lamps – Ballast and lamps should all be replaced and upgraded to an LED driver and LED lamp. The cost for the retrofit kit with full cutoff is provided separately. New luminaire housing should have the LED driver and lamp included.

Estimated Longevity

The estimated longevity of trail light can vary depending on how well maintained they are. A typical pole and housing has an estimated life of 25 years. The lamp within the housing can vary. HID lamps will need to be replaced every 2 years and ballasts every 5 years. Where LED lamps are used, lamps and drivers will last well over 5 years.

2

Replacement Standards

The replacement trail light standards have been established previously by the City of Missoula and all new lighting should match this style. For existing globe style luminaires, screw in LED lamps and cutoff shrouds should be used until a completely new fixture can be installed.

7.15.3 - Well Pumps

Introduction

The City of Missoula Parks and Recreation (MPR) Department currently irrigates its developed parks and athletic fields from either the local utility water company or local irrigation wells. Where local irrigation wells are used, MPR must maintain and replace irrigation pumps as needed. This section discusses the maintenance and replacement requirements of these pumps. Information on the remainder of the irrigation system is provided separately in the irrigation section of this report.

Preventative Maintenance

Maintenance for well pumps comes primarily in the form of periodic inspections. Qualified electricians should inspect them on an annual basis to check connections and motors.

Alternatives

Installation of variable frequency drives (VFDs) have been considered in order to improve the efficiency of well pumps and reduce electrical demand. Most well pumps within the MPR system are less than 7.5 horsepower. In general, VFDs are not considered economical for motors of less than 5 horsepower in size. Therefore, although some well pumps might benefit from VFDs, the majority are likely to be too small to save very much energy through VFD installation. For the smaller pumps, soft starts could be considered as a more economical option. Soft Starts can minimize the startup peak demand on the motor reducing peak demand charges from the utility.

Replacement Costs

Table A.15 in Appendix A shows a unit-price estimate of material replacements and maintenance associated with well pumps. Actual well pump sizes were not determined as part of this study and these costs therefore represent an assumed standard pump size of 7.5 horsepower and flow of 150 gpm. More precise cost information could be obtained if the existing well pump sizes were verified. Replacement costs include the motor and control panel.

Estimated Longevity

The estimated longevity of well pumps can vary depending on how well maintained they are. A typical well pump has an estimated life of 25 years.

Appendix A - Feature Type Cost Assumptions

Feature Type	Report Section	Table #	Generated By	Unit	Maintenance Cost	Replacement Cost	Renovation Cost	Notes
Parking Lots	6.1	A.1	MMI	SF	$0.81	$4.27	$1.52	
Paved Trails	6.2	A.2	MMI	LF	$3.02	$43.33	N/A	Replacement cost shown is for asphalt, not concrete.
Basketball Courts	6.3	A.3	MMI	SF	$0.31	$3.63	N/A	
Tennis Courts	6.4	A.4	MMI	SF	$0.93	$3.19	N/A	
Volleyball Courts	6.5	A.5	MMI	SF	N/A	$3.79	N/A	
Ballfields	6.6	A.6	City	SF	N/A	$1.63	#REF!	
Athletic Fields	6.7	A.7	City/MMI	SF	N/A	$0.64	N/A	Grade & Replace Irrigation
Irrigation - Shrubbeds/ROWs	6.8	A.8	City	SF	N/A	$0.13	N/A	drip/spray systems, demo, plants, import soil
Irrigation - General Turf	6.8	A.8	City	SF	N/A	$0.00	N/A	Replacement cost is for general use turf.
Irrigation - Athletic Fields	6.8	A.8	City	SF	N/A	$0.13	N/A	Replacement cost is for athletic turf zones.
Playgrounds	6.9	A.9	City	SF	N/A	$0.00	$0.00	
Splash Decks	6.10	A.10	City	SF	$2.54	$84.29	$4.43	
Shrubbeds	7.11	A.11	City	SF	$5.09	$0.00	Assume 4000 SF (8'x398' plantable)	Replacement is done by streets department, no maintenance.
Trailheads	7.12	A.12	City	Per Trailhead	$2,150	$7,980	N/A	
Bridges	6.13	A.13	MMI	N/A	N/A	N/A	N/A	
General Buildings	6.14	A.14	City	SF	N/A	N/A	N/A	Costs are provided for picnic shelters and restrooms
Trail Lighting	6.15	A.15	MMI	LF	$1.89	$66	$5.00	
Field Lighting	6.15	A.15	MMI	SF	$0.07	$0.99	N/A	
Well Pumps	6.15	A.15	MMI	Per Pump	$125	$4,500	N/A	
Pavers/Stamped Concrete	6.16	A.18	MMI	SF	N/A	N/A	N/A	
Root Damage	6.16	A.19	MMI	SF	N/A	N/A	N/A	Costs included with trail replacement
Specialty Concrete	6.16	A.20	MMI	SF	N/A	N/A	N/A	
ADA	6.16	A.21	MMI	SF	N/A	N/A	N/A	

Table 6.1 - Feature Type Breakdown

Feature Type	Report Sub-Section	Table #
Parking Lots	6.1	A.1
Paved Trails	6.2	A.2
Basketball Courts	6.3	A.3
Tennis Courts	6.4	A.4
Volleyball Courts	6.5	A.5
Ballfields	6.6	A.6
Athletic Fields	6.7	A.7
Irrigation	6.8	A.8
Playgrounds	6.9	A.9
Splash Decks	6.10	A.10
Shrubbeds	6.11	A.11
Trailheads	6.12	A.12
Bridges	6.13	A.13
General Buildings	6.14	A.14
Trail Lighting	6.15	A.15
Field Lighting	7.15	A.15
Well Pumps	6.15	A.15
Pavers/Stamped Concrete	6.16	A.18
Root Damage	6.16	A.19
Specialty Concrete	6.16	A.20
ADA	6.16	A.21

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ENGINEER'S ESTIMATE
OF PROBABLE CONSTRUCTION COST

Date: 1/9/2014
Project #: 1657.024
Project Name: Parks RRI
Engineer: C. Schaeffer

A.1 - Parking Lots

Description	Estimated Quantity	Unit	Unit Price	Square Foot Price	Notes
Replacement					
Demolition					
Asphalt		SF	$0.75	$0.75	
Sidewalk		SF	$2.15	$0.00	Assume no sidewalk replacement.
Curb and Gutter		LF	$9.00	$0.18	Assume 200 LF per 10,000 SF.
Gravel Base					
2" Minus Subbase		CY	$41.00	$0.00	Subbase is included in cost of asphalt. Assume 6" of 3/4" road base.
3/4" Minus Base		CY	$45.00	$0.00	Subbase is included in cost of asphalt. Assume 6" of 3/4" road base.
Asphalt					
Mill and Overlay (1.5" Pad)		SF	$1.50	$0.00	
2" Asphalt		SF	$1.35	$0.00	
3" Asphalt		SF	$2.75	$2.75	
4" Asphalt		SF	$3.75	$0.00	
Concrete Curb & Gutter		LF	$19.00	$0.38	Assume 200 LF per 10,000 SF.
Concrete Sidewalk					
4" Concrete		SF	$6.00	$0.00	
6" Concrete		SF	$6.50	$0.00	
8" Concrete		SF	$7.00	$0.00	
Striping		LF	$0.25	$0.01	Assume 20 stalls per 10,000 sf, assume 10' of striping per stall
Striping Handicap Logo		EA	$65.00	$0.01	Assume 1 per 5,000 sf
Strom Drain Sump		EA	$1,900.00	$0.19	Assume 1 per 10,000 sf
Total Replacement Cost Per Square Foot of Parking Area =				**$4.27**	Replacement life = 30 years
Renovation					
Asphalt					
Mill and Overlay (1.5" Pad)		SF	$1.50	$1.50	
Striping		LF	$0.25	$0.01	Assume 20 stalls per 10,000 sf, assume 10' of striping per stall
Striping Handicap Logo		EA	$65.00	$0.01	Assume 1 per 5,000 sf
Total Renovation Cost Per Square Foot of Parking Area =				**$1.52**	Renovation life = 30 years
Maintenance					
Seal Coat (Fog Seal)		SY	$4.89	$0.54	Double coat, Assume 100% of parking lot gets fog sealed every 5 years.
Crack Seal		LF	$0.50	$0.03	Assume 500 LF per 10,000 SF parking lot every 5 years
Patching		SF	$4.00	$0.24	Assumes 3% of area needs patching ever 2.5 years
Striping		LF	$0.25	$0.01	Assume 20 stalls per 10,000 sf, assume 10' of striping per stall every 5 years
Total Preventative Maintenance Cost Per Square Foot of Parking Area =				**$0.81**	Maintenance required every 5 years
PROJECT SUB-TOTAL					
CONTINGINCY	15.00%				
PROJECT TOTAL				**$0.00**	

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Date: 1/9/2014
Project 1657.024
Project Parks RRI
Engine C. Schaeffer

A.2 - Multi-Use Paved Trails

Description	Estimated Quantity	Unit	Unit Price	Linear Foot Price	Notes
Replacement					
Demolition					
Asphalt		SF	$1.50	$15.00	Assume trail width = ten feet
Sidewalk		SF	$2.15	$0.00	Assume no sidewalk replacement
Curb and Gutter		LF	$9.00	$0.00	Assume no curb and gutter on trails
Gravel Base					
2" Minus Subbase		CY	$41.00	$0.00	Assume subbase price is included in asphalt price
3/4" Minus Base		CY	$45.00	$0.00	Assume 6" of 3/4" road base
Asphalt					
2" Asphalt		SF	$1.35	0	
3" Asphalt		SF	$2.75	$27.50	Assume 3" of asphalt with subbase included.
4" Asphalt		SF	$3.75	$0.00	
Concrete Sidewalk					
4" Concrete		SF	$6.00	$60.00	
6" Concrete		SF	$6.50	0	
8" Concrete		SF	$7.00	0	
Root Damage Prevention Material		LF	$3.30	$0.50	Assumes 15 feet of biobarrier is required for 100 feet of trail length.
12" HDPE Culvert		LF	$4.45	$0.33	Assumes 15 feet of culvert is required every 200 feet of trail length.
			Recycle & Overlay =		
			Total Replacement Cost Per Linear Foot (Asphalt) =	**$43.33**	Replacement life = 30 years
			Total Replacement Cost Per Linear Foot (Concrete) =	**$75.83**	Replacement life = 30 years
Maintenance					
Fog Seal		SY	$2.49	$2.77	Single coat
Crack Seal		LF	$0.50	$0.25	Assume 500 LF of cracks per 1,000 LF of trail
			Total Preventative Maintenance Cost Per Linear Foot =	**$3.02**	Maintenance required every 5 years
PROJECT SUB-TOTAL					
CONTINGINCY	15.00%				
PROJECT TOTAL				**$0.00**	

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Project Name: Parks RRI
Engineer: C. Schaeffer

A.3 - Basketball Courts

Description	Estimated Quantity	Unit	Unit Price	Square Foot Price	Notes
Replacement					
Demolition - Asphalt		SF	$0.75	$0.75	
Gravel Base		CY	$45.00	$0.00	Assumes cost of base is included in asphalt
Asphalt - 1.5" Mill and Overlay		SF	$1.50	$1.50	
Concrete		SF	$6.00	$0.00	Assumes no concrete courts
Post-Tensioned Concrete		SF	$15.00	$0.00	Assumes no concrete courts
Line Paint		EA	$400.00	$0.10	Assumes each court is 4000 square feet
Fences		LF	$32.00	$1.28	Assumes 25 SF of court per 1 LF of fence
VersaCourt™ (Modular Tile)		SF	$3.45	$0.00	Assumes no tile courts
	Total Replacement Cost Per Square Foot =			**$3.63**	Replacement life = 30 years
Maintenance					
Seal Coat - Fog Seal, Single Coat		SY	$2.49	$0.28	Double coat, Assume 100% of parking lot gets fog sealed every 5 years.
Crack Seal		LF	$0.50	$0.03	Assume 500 LF per 10,000 SF
Striping		LF	$0.25	$0.01	Assume 200 LF per 10000 square feet
	Total Preventative Maintenance Cost Per Square Foot =			**$0.31**	Maintenance required every 5 years

PROJECT SUB-TOTAL		
CONTINGINCY	15.00%	
PROJECT TOTAL		**$0.00**

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Engineer: C. Schaeffer

A.4 - Tennis Courts

Description	Estimated Quantity	Unit	Unit Price	Square Foot Price	Notes
Replacement					
Demolition - Asphalt		SF	$0.75	$0.75	Cost comes from Pineview
Gravel Base		CY	$45.00	$0.00	
Asphalt - 1.5" Mill and Overlay		SY	$1.50	$1.50	
Concrete		SF	$9.00	$0.00	No concrete courts
Post-Tensioned Concrete		SF	$15.00	$0.00	No concrete courts
Acrylic Surface Coating and Court Paint		SF	$0.26	$0.26	
Line Paint		EA	$400.00	$0.06	Assumes each court is 7000 square feet.
Fences		LF	$32.00	$0.62	Assumes average tennis facility is 31,000 sf. Average perimeter is 600 LF.
VersaCourt™ (Modular Tile)		SF	$3.45	$0.00	No tile courts
	Total Replacement Cost Per Square Foot =			**$3.19**	Replacement life = 30 years
Maintenance					
Yearly Maintenance (Crack, cleaning, etc.)		EA	$750.00	$0.00	Assumed to be routine maintenance.
Resurface Court (Every 4-5 years)		EA	$6,500.00	$0.93	Assumes each court is 7000 sf.
	Total Preventative Maintenance Cost Per Square Foot =			**$0.93**	Maintenance required every 5 years

PROJECT SUB-TOTAL		
CONTINGINCY	15.00%	
PROJECT TOTAL		**$0.00**

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A.5 - Volley Ball Courts

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Replacement					Volleyball court w/ ten foot extra = 50'x80'
Gravel	75	CY	$45.00	$3,375	Assumes @ 6" depth
Sand	222	CY	$45.00	$9,990	Assumes 18" depth
Nets	1	EA	$250.00	$250	
Border - Concrete Curb	260	LF	$6.00	$1,560	
EDGE GUARD™ and Treated 2" X 12"	260	LF	$5.00	$0	Included as an alternative only. Not included in total cost. Assumes no annual maintenance costs
			Total Replacement Cost =	**$15,175**	Assumes replacement is needed every 50 years.
			Total Replacement Cost per Square Foot =	**$3.79**	Assume 4000 sf

PROJECT SUB-TOTAL		
CONTINGINCY	15.00%	
PROJECT TOTAL		**$0.00**

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A.6 - Ball Fields

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
REPLACEMENT (Assume 40,000 SF per ballfield)					
Fence					
9 Gauge 6' Chain Link Fence	870	LF	$32.00	$27,840	Fencing cost comes from Pineview bid tab.
Dugouts					2 per ball field, 8x20, 160sf
Steel Standing Seam Roof with Support	2	EA	$1,033.00	$2,066	Contractor provided and installed
9 Gauge Chain Link Fence	112	LF	$22.00	$2,464	56 lf each dugout
Concrete Pad & Ramp	320	SF	$6.00	$1,920	160 sf each dugout
15' Long Aluminum Bench w/ Back	2	EA	$680.00	$1,360	Includes install labor
15'x12' 3 Row Aluminum Bleacher					2 per ball field
Concrete Pad	640	SF	$6.00	$3,840	20' x 16' per bleacher.
3 Row Aluminum Bench	2	EA	$940.00	$1,880	Includes labor and transport
Irrigation					
Irrigation Sports Turf System	30,000	SF	$0.13	$7,773	Assumes 3/4 of field needs irrigation. Assumes irrigation is replaced every 25 years
Regrading	40,000	SF	$0.20	$16,000	
Total Replacement Cost per Ballfield =				**$65,143**	Assume replacement life every 50 years
Total Replacement Cost per Square Foot =				**$1.63**	
RENOVATION (Assume 40,000 SF per ballfield)					
Fence					
9 Gauge 6' Chain Link Fence	100	LF	$32.00	$3,200	
Backstop				$3,000	
Dugouts					160 sf ea dugout (8x20)
Composite Roof	320	SF	$3.37	$1,078	Assumes replacement of roof
9 Gauge Chain Link Fence	112	LF	$22.00	$2,464	56 lf each dugout
4'x4' Galvanized Chain Link Gate	4	EA	$110.00	$440	
Aluminum Dugout Bench	2	EA	$680.00	$1,360	Includes bench labor
Wood Bleacher Repair Costs					
2"x12"x16' Pine Board	2	EA	$25.00	$50	
1/4" x 3" Carriage Bolt w/ Nut (8 pairs)	2	EA	$25.00	$50	
Green Latex Paint	2	EA	$25.00	$50	
Labor	2	EA	$80.00	$160	
Total Renovation Cost per Ballfield				**$11,852**	Assumes renovation is needed only once.
PROJECT SUB-TOTAL					
CONTINGINCY	15.00%				
PROJECT TOTAL				**$0.00**	

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A.7 - Athletic Fields

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
REPLACEMENT (Assume 75,000 SF)					
Fence					
9 Gauge 6' Chain Link Fence	500	LF	$20.00	$10,000.00	Assumes 500 lf of fence per 75000 sf of field
Irrigation					
Irrigation Sports Turf System	75,000	SF	$0.13	$9,716.67	Assumes irrigation is replaced every 25 years
Regrading	75,000	SF	$0.10	$7,500.00	
Sod	75,000	SF	$0.28	$21,000.00	
	Total Replacement Cost per Atheltic Field =			**$48,216.67**	Assume replacement life every 25 years
	Total Replacement Cost per Square Foot =			**$0.64**	Assumes 75,000 sf field

PROJECT SUB-TOTAL		
CONTINGINCY	15.00%	
PROJECT TOTAL		**$0.00**

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A.8 - Irrigation Systems

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Typical Sports Turf Zone (22,500 sf)					
Materials		EA	$1,635.00		3 minimum 2" valves, 12 large capacity rotor type heads, 12 swing join assemblies,
Labor (32 Hours @ $40/hr)		EA	$1,280.00		sch 40 pvc pipe size + 3 inch main and +1.5 inch or larger lateral lines, 1 20 station or
Total Replacement Cost per Zone =			**$2,915**		
Total Replacement Cost per Square Foot =			**$0.13**		Assumes irrigation zone is 22,500 sf in size.
Typical General Turf Zone (3,600 sf)					
Materials		EA	$900.00		2 minimum 1" valves, 16 medium capacity rotor type heads, 16 swing join assemblies,
Labor (16 Hours @ $40/hr)		EA	$640.00		sch 40 pvc pipe size <3 inch main and 1 inch or smaller lateral lines, 1 6 station or larger controller.
Total Replacement Cost per Zone =			**$1,540**		
Total Replacement Cost per Square Foot =			**$0.43**		Assumes irrigation zone is 3,600 sf in size.
Typical Drip or Planter Bed Irrigation Zone (400 sf)					
Materials		EA	$180.00		1 minimum 1" drip valve, 18 2 GPH emitters, 100' poly tubing, 20' 1/4" tubing, 1 6 station controller
Labor (8 Hours @ $40/hr)		EA	$320.00		
Total Replacement Cost per Zone =			**$500**		Assumes irrigation (all 3 types) has a replacement life of 30 years
Total Replacement Cost per Square Foot =			**$1.25**		Assumes irrigation zone is 400 sf in size.
PROJECT SUB-TOTAL					
CONTINGINCY			15.00%		
PROJECT TOTAL					**$0.00**

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A.9 - Playgrounds

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Typical Playground Replacement (4000 SF)					
Salvage and Demo, Haul Waste & Dispos		EA	$1,200		
Excavation and Fall Zone Construction		EA	$20,000		18"x6" concrete curb 64'x64'
ADA Concrete Path		EA	$1,200		
Drainage and Engineered Wood Fiber		EA	$6,000		
Toys - 2-5 year olds		EA	$45,000		
Toys - 6-12 year olds		EA	$55,000		
Swings, Containment Curb, Fall Zone		EA	$16,000		
Irrigation System Modifications		EA	$500		
Site Repairs		EA	$5,000		
Total Replacement Cost per Playground =			**$75,000**		Per age group (2-5 or 6-12) Assumes replacement is required every 50 years
Typical Playground Renovation (2900 SF)					
Excavate, Haul & Dispose		EA	$1,200		
Temp. Trex® Fall Zone		EA	$3,000		260 LF
ADA Concrete Path		EA	$1,000		80 sf ($12.50/sf seems high)
Filter Fabric & Engineered Wood Fiber		EA	$2,700		Includes bench labor
Install Toy Replacement/Salvage Feature		EA	$800		
Irrigation System Modifications		EA	$50		
40 Hours Labor ($40/hr)		EA	$1,600		
Total Renovation Cost per Playground =			**$10,350**		Per age group (2-5 or 6-12) Assumes renovation is required once.
Annual Preventative Maintenance					
Inspections					No added cost
Top off EWF @ 20% of total volume	21.48	CY	$25	$537.04	Assumes replenishment of 20% EWF for annual maintenance to convert existing sand sites. Frequency reduced 1/3 if PG pod is 18" deep
PROJECT SUB-TOTAL					
CONTINGINCY		15.00%			
PROJECT TOTAL				**$0.00**	

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ENGINEER'S ESTIMATE
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Date: 1/9/2014
Project #: 1657.024
Project Name: Parks RRI
Engineer: C. Schaeffer

A.10 - Splash Decks

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Replacement					
Cement Slab Replacement		LS	$20,000		
New Tank with Piping		LS	$60,000		
Motors/Pumps/Various Equipment		LS	$60,000		
Play Features		LS	$75,000		
Demolition of Existing		LS	$50,000		
Fencing		LS	$15,000		
UV Disinfection System		LS	$15,000		
Total Replacement Cost per Splash Deck =			**$295,000**		Assumes replacment is required every 50 years
Total Replacement Cost per Square Foot =			**$84.29**		Assume 3500 SF splashdeck
Renovation					
VFD - Circulation Pump		EA	$3,000		
VFD - Feature Pump		EA	$3,000		
Acid to CO_2 Switch		EA	$1,500		
New Motor		EA	$3,000		Delivered and Installed
New Chemical Controller		EA	$5,000		
Total Renovation Cost per Splashdeck =			**$15,500**		Assumes renovation is needed only once.
Total Renovation Cost per Square Foot =			**$4.43**		Assume 3500 SF splashdeck
Maintenance					
Periodic Inspection		EA	$1,200		
Sodium Bicarbonate		EA	$3,000		
Chlorine Tablet		EA	$1,000		
UV bulbs		EA	$1,000		
Winterization		EA	$2,700		
Total Maintenance Cost per Splashdeck =			**$8,900**		Assumes maintenance costs are every year.
Total Maintenance Cost per Square Foot =			**$2.54**		Assume 3500 SF splashdeck

PROJECT SUB-TOTAL		
CONTINGINCY	15.00%	
PROJECT TOTAL		**$0.00**

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A.11 - Shrub Beds

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Hardscape replacement					
Demo, haul & dispose		SF	$3.78		
Stamped colored concrete		SF	$10.35		
Traffic Control		LS	$3,000		
Total Replacement Cost per Shrub Bed =			**NA**		
Total Replacement Cost per Square Foot =			**$14.13**		
Ornamental Bed Replacement					
Traffic Control		LS	$4,000		
Demolition		LS	$5,200		Clear, grub, remove & haul off 2' depth of existing soils
Irrigation System Modifications		LS	$5,000		Convert to Drip
Stamped Colored Concrete		LS	$8,000		812 LF x 1' wide perimeter strip
Import clean topsoil		LS	$8,000		2' depth = 296 CY @ $27/yard
150 Container Plants		LS	$3,375		2.5 gal min @ $22.50/ea
12 Replacement Trees		LS	$3,000		
Soil Amendments		LS	$800		
Mulch		LS	$1,160		Decomposed Granite
Weed Fabric & Staples		LS	$400		
Labor		LS	$3,440		160 hours @ $21.50/hr
Total Replacement Cost per Shrub Bed =			**$42,375**		Assumes renovation occurs every 15 years
Total Replacement Cost per Square Foot =			**$10.59**		Assume 4000 SF (8'x398' plantable)
Renovation					
Traffic Control		LS	$2,000		
Demolition		LS	$1,200		Clear and grub existing veg.
Irrigation System Modifications		LS	$5,000		Convert to drip in most cases
150 Container Plants		LS	$3,375		2.5 gal min @ $22.50/ea
12 Replacement Trees		LS	$3,000		
Soil Amendments		LS	$800		
Mulch		LS	$1,160		Decomposed Granite
Weed Fabric & Staples		LS	$400		High quality, closed weave fabric
Labor		LS	$3,440		160 hours @ $21.50/hr
Total Renovation Cost per Shrub Bed =			**$20,375**		Assumes renovation occurs every 15 years
Total Renovation Cost per Square Foot =			**$5.09**		Assume 4000 SF (8'x398' plantable)
					Assumes no median or concrete replacment costs as this will be done by streets department.
PROJECT SUB-TOTAL					
CONTINGINCY	15.00%				
PROJECT TOTAL				**$0.00**	

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A.12 - Trailheads

Description	Estimated Quantity	Unit	Unit Price	Total Price	Notes
Replacement/Renovation					
Regrading	4,000	SF	$0.20	$800.00	assumes 4,000 sf ave
Access Control Fencing	140	LF	$32.00	$4,480.00	Assume round pole, two rail
Park Entry Sign	1	EA	$300.00	$300.00	Cost comes from Pineview bid
Sign Kiosk	1	EA	$300.00	$300.00	Cost comes from Pineview bid
Interpretive Signs	3	EA	$300.00	$900.00	Cost comes from Pineview bid
Bear Can	2	EA	$200.00	$400.00	Cost comes from Pineview bid
Wheel stops	8	EA	$100.00	$800.00	Cost comes from Pineview bid
	Total Replacement Cost =			**$7,980.00**	Replacement life = 50 years
Maintenance					
Road Mix	30	CY	$45.00	$1,350.00	Assumes 3/4" minus
Regrading	4000	SF	$0.20	$800.00	
	Total Preventative Maintenance Cost =			**$2,150.00**	Maintenance required every 5 years

PROJECT SUB-TOTAL		
CONTINGINCY	15.00%	
PROJECT TOTAL		**$0.00**

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Date: 12/17/2012
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A.13 - Bridges

Description	Estimated Quantity	Unit	Unit Price	Total Cost
Bridges				
REPLACEMENT				
Demolition				
Remove Superstructure		LS	$7,250.00	$0.00
Remove Wearing Surface		SF	$3.75	$0.00
Remove Substructure		LS	$6,500.00	$0.00
Superstructure and Deck				
Concrete Bridge		SF	$200.00	$0.00
Steel Bridge		SF	$200.00	$0.00
Timber Bridge		SF	$120.00	$0.00
Substructure				
Concrete Abutment		LS	$15,000.00	$0.00
Timber Abutment		LS	$8,000.00	$0.00
Approach				
Rail		LF	$150.00	$0.00
MAINTENANCE				
Inspect Bridge		LS	$575.00	$0.00
Clean Graffiti		SF	$2.10	$0.00
Repair Timber Running Planks		SF	$8.10	$0.00
Repair Asphalt Wearing Surface		SF	$22.00	$0.00
Crack Seal Concrete Deck		SF	$4.50	$0.00
Epoxy Crack Repair Concrete		LF	$73.00	$0.00
Patch Concrete Deck		SF	$70.00	$0.00
Repair Timber Bridge Rail		LF	$112.00	$0.00
Repair Steel Bridge Rail		LF	$244.00	$0.00
Sandblast Steel w/ Containment and Paint		SF	$14.50	$0.00
Clean Superstructure & Substructure		HR	$122.00	$0.00
Install Riprap		CY	$100.00	$0.00
Remove Debris from Channel		HR	$235.00	$0.00
Brush Bridge Approach		LS	$491.00	$0.00
Clean Bridge Drains		HR	$122.00	$0.00
Maintenance PROJECT SUB-TOTAL			$2,195.20	$0.00
CONTINGINCY	15.00%			
PROJECT TOTAL				**$0.00**

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A.14 - Buildings

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Permanent Restrooms					Costs includes freight, installation, and all fixtures
CXT Concrete Building	1	LS	$40,000	$40,000	Assumes a 16' x 14' "Cortez" style, CXT double flush building.
Concrete Pad and Subbase	480	SF	$6.50	$3,120	Assumes a 20' x 24' x 6" concrete pad.
Plumbing, Electrical, ADA, site repair	1	LS	$10,000.00	$10,000	
Total Replacement Cost per Restroom =				**$53,120**	
Picnic Shelters					
Poligon Square 24x24MR	576	SF	$28.57	16,455	Assumes a Poligon 24 x 24 metal roof structure costs $16,455
Concrete Pad and Subbase	900	SF	$6.50	5,850	Assumes a 30 x 30 concrete pad
Electrical, ADA, site repair	1	LS	$7,500.00	7,500	
Total Replacement Cost per SF of Shelter =			**$35.07**	**$29,805**	
Total Renovation Cost per SF of Shelter =			**$7.01**		Assumes a roof renovation from composite to metal costs 20% of complete replacement.
PROJECT SUB-TOTAL					
CONTINGINCY		15.00%			
PROJECT TOTAL				**0**	

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A.15 - Electrical Systems

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Field Lighting:					
Replacement Costs:					
Service Entrance Equipment		LS	$3,500.00		Replacement lifetime of field lighting = 25 years
Underground Conduit and Conductor		LS	$2,100.00		Replacement lifetime of field lighting = 25 years
Grounding and Lightning Protection		LS	$2,500.00		Replacement lifetime of field lighting = 25 years
Field Pole		EA	$6,500		Replacement lifetime of field lighting = 25 years
Ballast, Lamp, Housing		EA	$25,000		Per field, Replacement lifetime = 25 years
	Total Replacement Cost =		**$39,600**		Per field Price
	Total Replacement Cost Per SF of Field =		**$0.99**		Per SF. Assumes 40,000 SF per ballfield.
Maintenance Costs:					Maintenance costs are per field
Periodic Inspection by Qualified Electrician		EA	$2,500		Yearly
Replace Lamp or Ballast		EA	$280		Assumed to be 1400 every 5 years
	Total Maintenance Cost =		**$2,780**		
	Total Maintenance Cost Per SF of Field =		**$0.07**		Assumes 40,000 sf per field.
Trail Lighting:					
Replacement Costs:					
					Replacement lifetime of field lighting = 25 years.
Service Entrance Equipment		LS	$3,500.00		One service entrance per half mile of trail.
Underground Conduit and Conductor		EA	$1,500		Replacement lifetime of field lighting = 25 years
Trail Pole		EA	$1,250		Replacement lifetime of field lighting = 25 years
Luminaire Housing, LED Driver, and Lamp		EA	$3,100		Replacement lifetime of field lighting = 25 years
	Total Replacement Cost =		**$9,350**		
	Total Replacement Cost per LF of Trail =		**$66**		Assume 90 feet between poles.
Renovation Cost					
Full Cut Off Housing, LED Driver, and Lamp		EA	$450		One time only
	Total Replacement Cost =		**$450**		Per pole price
	Total Renovation Cost per LF of Trail =		**$5**		Assume 90 feet between poles.
Maintenance Costs:					
Replace Lamp or Ballast		EA	$45		225 every 5 years
Periodic Inspection by Qualified Electrician		EA	$125		Per service entrance or pole, per year.
	Total Maintenance Cost =		**$170**		
	Total Maintenance Cost per LF of Trail =		**$1.89**		Assume 90 feet between poles.
Well Pumps:					
Replacement Costs:					
Well Pump Replacement		LS	$4,500		Assumes < 7.5 hp, 150 gpm pump. Cost includes motor and control panel.
	Total Replacement Cost =		**$4,500**		
Maintenance Costs:					
Periodic Inspection by Qualified Electrician		EA	$125		Per pump
	Total Maintenance Cost =		**$125**		
CONTINGINCY	15.00%				
PROJECT TOTAL				**$0.00**	

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Engine C. Schaeffer

A.16 ADA Tactile Pad/Detectable Warning Panels

Description	Estimated Quantity	Unit	Unit Price	Total Cost
ADA Tactile Pad/Detectable Warning Panels				
Demolition of Existing Infrastructure (10% of total)		LS		$0.00
Gravel Base		CY	$28.00	$0.00
Concrete Collar		SF	$10.00	$0.00
Detectable Warning Panel		SF	$500.00	$0.00
PROJECT SUB-TOTAL				$0.00
CONTINGINCY		15.00%		
PROJECT TOTAL				**$0.00**

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Engine C. Schaeffer

A.17 - Pavers and Stamped Concrete

Description	Estimated Quantity	Unit	Unit Price	Total Cost
Pavers and Stamped Concrete				
Base Materials				
2" Minus Subbase		CY	$41.00	$0.00
3/4" Minus Base		CY	$45.00	$0.00
Polymeric Sand (40 lb Bag)		EA	$20.00	$0.00
Pavers		SY	$9.81	$0.00
Stamped Concrete Placement		SF	$9.87	$0.00
Seal/Pressure Wash of Stamped Concrete		SF	$1.19	$0.00
PROJECT SUB-TOTAL				$0.00
CONTINGINCY	15.00%			
PROJECT TOTAL				**$0.00**

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A.18 - Root Damage Prevention

Description	Estimated Quantity	Unit	Unit Price	Total Cost	Notes
Root Damage Prevention					
Chemical Barrier		SF	$0.21	$0.00	Assumes a $252 per 12' x 100' area
Fabric Barrier		LF	$3.30	$0.00	Fabric barrier is a vertical wall installed in a trench along asphalt adjacent to trees, assume 19.5" deep, biobarrier.
Plastic Barrier		EA	$65.00	$0.00	Per 48 x 48 panel
PROJECT SUB-TOTAL				$0.00	
CONTINGINCY		15.00%			
PROJECT TOTAL				**$0.00**	

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A.19 - Concrete Pads/Walks & Specialty Features

Description	Estimated Quantity	Unit	Unit Price	Total Cost
Concrete Pads/Walks & Specialty Features				
Gravel Base		CY	$45.00	$0.00
Concrete		SF	$6.00	$0.00
Park Bench		EA	$300.00	$0.00
Paint		SF	$0.25	$0.00
Polymeric Sand (40 lb bag)		EA	$20.00	$0.00
Stamped Concrete		SF	$9.87	$0.00
Signs		EA	$300.00	
Picnic Tables		EA	$850.00	
Park Benches		EA	$723.00	
PROJECT SUB-TOTAL				$0.00
CONTINGINCY		15.00%		
PROJECT TOTAL				**$0.00**

Date: March 21, 2013

To: Parks & Recreation Board

From: David Selvage, Parks Services & Systems Manager

Re: Analysis of Park Asset Management Plan questionnaire returns

Use of a questionnaire for the Park Asset Management Plan project helps provide insights and guidance on what community members might see as priorities for the plan. The questionnaire was available to anyone who attended one of the two public workshops and was available to complete on-line from the Department's home page. The information collected is not statistically valid, but is a valuable tool for helping guide plan priorities and funding needs. The analysis considers statistical data returns separately from the responses to open ended questions.

An urban park system ideally provides a diversity of developed parklands, open spaces, trails and recreational amenities to serve the varied interests and needs of residents. Skate parks, amphitheatres, fishing ponds, playgrounds, and ball fields are examples of features that generally serve small segments of the community's total population. Such features, however, also serve as important social meeting points, or anchors, for their users or a surrounding neighborhood. This review, as such, looks at the data for elements that are likely to reflect community-wide needs as well as data for elements of the park system and services that may be of great importance to subsets of the population - such as a specific age group or people with a special recreational interest like team sports, dogs, or gardening.

2010 Census Data Quick Facts For Missoula, Montana

Population	66,788	Total Housing Units	30,682
Female	50.1%	Total Households	29.081
Under 5 Years	5.7%	Home Ownership	49.3%
5 To 14 Years	9.3%	Housing Units In Multi-Unit Structures	39.4%
15 To 19 Years	7.6%	Persons Per Household	2.22
Over 65 Years	10.7%	Persons Below Poverty Level	22.2%

Question 3. Rank the 10 most important park system features used or enjoyed by a respondent's household.
The top ten ranked responses, whether weighted or unweighted, confirm the 2010 County-wide Recreation survey findings – Missoulians' value access to trails and open spaces. The other top 10 ranked responses were: playgrounds, restrooms, open park turf areas, sidewalks and interior park paths, picnic shelters; and, Dog Off-Leash Areas (DOLAs) which scored as high as athletic fields for the number of respondents. Interestingly, there is a difference between weighted rankings and raw respondent numbers that suggest picnic shelters are perhaps more important that open park turf areas.

Question 5. Please rate the quality of park and recreation amenities you use or enjoy.
This questions helps gauge community satisfaction with existing facilities. It also begins to help identify possible funding and priority strategies for the plan. In general respondents indicate the trails, trailheads and conservation lands are generally good to adequate for their use. In contrast, respondents rated the quality of restrooms, sidewalks/interior park paths, athletic fields, and DOLAs as inadequate or poor. It is interesting that responses to this section, when aggregated, suggest disparity in opinions regards perceived quality. The widest differences in quality rating of amenities occurred for athletic fields, restrooms, DOLAs, and landscaped medians.

The information suggests that the perceived quality and/or appointments of trails and conservation lands is probably close to the mark for meeting community expectations. It is probable that reinvestment in restrooms,

sidewalks/park paths, athletic fields and DOLA's would be well received, provided a portion of any funding is directed to CLM and trail facility improvements.

Question 6. What are 3 ways the paved trail system can be made more enjoyable for you?
Developing missing gaps in the paved trail system was supported by 83% of respondents as the top need for that system. Adding support facilities followed in importance with 50% of the responses. Lighting and increased maintenance filled out the 3rd and 4th most important improvements for the paved trail system

Question 7. How important are feature maintenance needs to your households use and enjoyment?
Responses to this question affirm the findings of the 2010 County-wide Recreation survey which found 80% of city residents recognize the importance of maintenance and have desire to see it improved. Sanitation, not surprisingly, heads the list of maintenance activities that are most important. It was followed by management of conservation lands, riparian zones, and tree care. There appears to be less agreement on the importance of maintaining sports field lighting, ball fields, sport courts, splash decks and parking lots. The data appears to suggest households that regularly use these features may have strong opinions about their condition and adequacy of maintenance.

Question 8. Rank the 5 most important recreation facilities needed in Missoula.
The top ten weighted and unweighted rankings, again, confirm the 2010 County-wide Recreation survey findings – Missoulians' value access to trails, open spaces, water, and wildlife. The other top 10 ranked responses for recreational needs were: community gardens, youth and adult sports fields, playgrounds, Dog Off-Leash Areas (DOLAs), and Environmental Education. Interestingly, the raw number of response to this question rated DOLAs ahead of sports fields.

Summary
The project questionnaire provides information that mirrors prior statistically valid survey work regarding City resident needs and desires for reinvestment in parks and recreation facilities and funding for enhanced maintenance. The questionnaire's statistical information suggests that maintenance funding for CLM maintenance activities is close to desired levels. Selective reinvestment in trails and trailhead improvements would likely be important to garnering broad community support for more costly developed parkland improvements and preventative maintenance activities. This information may be useful to help advance alternative funding requests such as a general obligation bond or dedicated mill levy.