RIVER FOR ALL

GRAND RIVER CORRIDOR

STRATEGIC ASSET MANAGEMENT PLAN

NOVEMBER 2019

ACKNOWLEDGEMENTS

Developed by ETM Associates, LLC

In consultation with Wenk Associates
and the City of Grand Rapids

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ASSET MANAGEMENT

0.0 EXECUTIVE SUMMARY

CHAPTER 1: INTRODUCTION

Asset management is a method of overseeing an organization's assets to minimize and plan for their life cycle costs within an acceptable level of risk. Organizations often craft asset management plans (AMPs) in order to put these methods into practice and most effectively manage service delivery and risk.

This document, the Strategic Asset Management Plan for the Grand River Corridor (the SAMP) is intended to be a long-range planning document for the City of Grand Rapids (City) and its partners. The SAMP will provide a guide to most effectively maintain and replace the assets specified for the Grand River Corridor (GRC) in the Grand River Corridor Design Guidelines (Design Guidelines) over time.

The SAMP was developed in coordination with the Design Guidelines and with input from the City and the design team. For best success, the SAMP should be continually updated and incorporated into the City's financial planning and budgeting.

CHAPTER 2: THE IMPORTANCE OF MAINTENANCE & MANAGEMENT

Proper maintenance and management are crucial to the long-term success of a project. Effective maintenance provides a clean, safe, and usable site that entices visitors, while effective management facilitates the appropriate maintenance delivery and the ability to adapt maintenance and management practices to best meet changing conditions.

Quality maintenance is essential to protect the long-term capital investment of the GRC. Three primary principles should guide maintenance work in order to achieve the most effective levels of service for maintenance: 1) classifying maintenance standards/ service levels; 2) having an effective maintenance and management process; and 3) ensuring that those performing maintenance and repair have the needed skills and equipment for the tasks.

Management must also consider the potential impact that special events may have on the landscape. Lawn areas are at risk of damage due to overuse, inadequate resting time between events, and improperly managed events. Oversized or poorly managed events and the set-up, break-down, and clean-up of events may damage other landscape areas. Special events also have the potential to damage furnishings, overwhelm restroom capacities and trash receptacles, and dirty hardscape areas. Effective management coordinates events and addresses potential damages to minimize the negative impacts from special events.

CHAPTER 3: DEFINING LEVEL OF SERVICE

Level of service (LOS) refers to the types and frequencies of maintenance tasks performed. LOS is linked with both budgeting and intensity of use. For example, an LOS with tasks performed above recommended best practices will create a pristine landscape but may be too costly to maintain long-term. Conversely, an LOS with minimal maintenance levels will reduce annual budgets but will likely result in high capital costs for repairs and replacements and may create an unsafe environment for users. Spaces that are poorly maintained can be perceived as unsafe, discourage visitors, and often invite vandalism. Well-maintained spaces will attract visitors, but in turn, the greater number of visitors may cause a greater maintenance load.

Determining an effective LOS involves weighing a number of factors. Use, climate, and materiality are three of the most significant, but staff resources, technology, and funding also need to be considered.

The LOS identified in this document are those recommended for the GRC. They are based on the Design Concepts and the City's current LOS standards and were chosen to establish a safe and quality maintained site. The LOS are meant to be followed regardless of which entities will be responsible for the maintenance and management of the GRC. They should be modified as needed to ensure the most effective and efficient maintenance for the GRC. If adequate LOS cannot be provided, it must be acknowledged that this can lead to higher future costs and earlier capital repairs.

CHAPTER 4: PROPOSED ASSETS AND MAINTENANCE

Since the assets recommended in the Design Guidelines are not yet built, a typical AMP inventory and analysis of existing assets cannot be performed. In its place, the SAMP provides an analysis of the maintenance needs for the features proposed for the GRC in the Design Guidelines.

For the analysis, the proposed features were divided into "landscape types" – such as turf lawns, primary paths, and trash receptacles – based on their characteristics and maintenance needs. The maintenance needs represent what is recommended as a general level of service across the GRC – the "GRC Base LOS" (see Figure A). Additional LOS were then developed to address the different levels of use and desired aesthetics across the various areas of the GRC. Generally speaking, the more natural areas near Riverside and Butterworth will require a lower

Grand River Corridor Proposed "Base" Level of Service

High-quality maintenance to ensure a safe, attractive, and functional site and accommodate high levels of visitors.

• TURF CARE	Mowed at least once every five working days in growing season.
• LITTER CONTROL	Minimum of once per day, five days per week.
• RESTROOMS	Open 8-10 hours per day, seven days per week. Cleaned twice per day.
• PLAYGROUNDS	Inspected for safety once per week. Loose surfaces groomed three times per week, solid surfaces cleaned once per week.
• FACILITIES	Kept tidy and clear of debris, and are cleaned prior to and after reservations. Pools treated daily.
• SURFACES	Cleaned regularly. Repaired, repainted or replaced when appearances have noticeably deteriorated.
• FURNISHINGS	Kept clean and functional. Tolerance of minor wear and tear.
• IRRIGATION	Frequency of use follows rainfall, temperature, etc. Inspected once per month.
• FLORAL PLANTINGS	Maximum care (water, fertilizing, weeding, etc.) is done once every two weeks.
• "NATURAL" AREAS	Monthly care during growing season (pruning, invasive species control, etc.). Litter removal 2-3 days per week. Immediate removal of safety hazards.
• DAYLIGHTED STORM-WATER OUTFALLS	Trash and debris removal every two weeks. Monthly plant care during growing season.
• REPAIRS	Done whenever safety, function, or appearance is in question.

Figure A - GRC Base LOS
"Natural" Areas refers to woodlands, wetlands, and other non-manicured planting areas.
Items in blue represent changes or additions to the existing Grand Rapids Parks maintenance standards.

be used where possible for maintenance of the GRC so that staff can become familiar with the site and provide an on-site presence.

If in-house staff are used for maintenance work, they will benefit from having satellite maintenance facilities at a few key locations along the GRC. There are two existing maintenance facilities and two proposed storage facilities, but additional space may be needed if this is not sufficient. In-house staff will also require equipment to perform their work, which will need to be purchased and stored. Because improvements to the GRC will be made over time, hiring staff and purchasing additional equipment should correspond with areas of the GRC coming on-line.

Not all areas of the site will be accessed equally or maintained to the same standard. Some areas, particularly those along the river's edge, may be more difficult to access than others and may require special equipment to access. Additionally, maintenance work may be performed less frequently in these areas or require different tools.

Maintenance work must also be done around flooding, which is typically the most significant for the Grand River in the spring months. Flooding will

limit access to some areas of the GRC and has the potential to damage GRC areas and site features. It is recommended to follow and potentially expand the City's current flood protocols, particularly areas in downtown that will experience high levels of use. As has been done for floods in the past, some parks and trails, or portions thereof, may need to be closed for visitor safety before, during, and after floods. Flooded areas will need to be cleaned, inspected, and potentially repaired once flood waters recede.

Maintenance and repair of GRC assets should be prioritized around their relative importance and the risk of not caring for and/or not replacing the asset.

CHAPTER 6: MAINTENANCE FORECASTS

Because the design of the GRC will be developed in the future based on the Design Guidelines, a total number for annual maintenance of the GRC could not be developed. Instead, the life cycle forecasts in the SAMP should be used as part of asset management planning to help guide future development and budgeting efforts. They were developed based on annual maintenance costs and capital cost estimates for the GRC features. Note that numerous assumptions were used in forecasting the life cycle costs so they should not be taken as definitive estimates due to the many variables involved.

Annual maintenance tasks developed for the proposed GRC features were used to estimate the annual costs required for maintenance. Costs include both fully loaded personnel costs and "Other Than Personnel Services" (representing materials, supplies, equipment, utilities, etc.). Forecasted costs for annual maintenance were divided into routine and non-routine costs. Routine costs represent services that are needed each year, such as cleaning and horticulture care; these costs are expected to remain constant from year to year. Non-routine costs may not be needed each year, and represent maintenance tasks that are seasonal and weather dependent or a result of failure, vandalism, or wear-and-tear. Non-routine costs will vary from year to year, but still need to be accounted for when developing a maintenance plan.

The projected life cycle costs for the proposed GRC features include both installation/replacement (capital) costs and maintenance (operational) costs over the projected lifespan of the asset. The lifespan and capital repairs and replacements for hardscapes, furnishings, and structures are fairly easy to predict, since they are typically replaced when maintenance is more expensive than replacement with a new asset, when they are high risk, or when they reach the end of their useful life. However, lifespans and capital repairs and replacements are much more variable for "soft" features such as turf and plantings. (E.g., Use has a greater impact on soft features; soft features grow and have additional qualitative values.) Figure B shows the forecasted life cycle costs for the GRC

Landscape Type	Unit	Average Lifespan (Years)	Initial Segment Cost			Post-Replanting Segment Costs		
			Installation Cost (2018 USD)	Initial Segment Maintenance Costs*	Total Cost	Major Replanting Cost (2018 USD)	Post-Replanting Segment Maintenance Cost	Total Cost
SOFTSCAPES								
Woodlands (Natural Area Type A)	10,000 sf	10	$50,000	$30,051	$80,051	$2,500	$28,237	$30,737
Wetlands (Natural Area Type B)	10,000 sf	10	$70,000	$33,731	$103,731	$3,500	$31,312	$34,812
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	10	$70,000	$44,269	$114,269	$3,500	$39,336	$42,836
Upland Meadows (Natural Area Type D)	10,000 sf	10	$30,000	$12,822	$42,822	$1,500	$11,726	$13,226

**Assumes 75% of service life is at Routine Costs and 25% of service life is at Non-Routine Costs*

Figure C - Forecasts of Life Segment Costs for Horticultural Landscape Type at GRC Base LOS (in 2018 USD)

Landscape Type	Unit	Average Lifespan (Years)	Installation / Replacement Cost (2018 USD)	Maintenance Cost*	Total Life Cycle Cost	Comments
HARDSCAPES						
Regional Trail	10,000 sf	25	$64,000	$117,002	$181,002	
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	15	$35,000	$36,516	$71,516	Lifespan is for full asphalt layer. Chip and seal top coat will need replacement every 2 to 7 years.
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	10	$35,000	$25,093	$60,093	Lifespan is for full asphalt layer. Chip and seal top coat will need replacement every 1 to 5 years.
Gathering Areas / Plazas - Concrete	10,000 sf	25	$60,000	$122,805	$182,805	
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	10	$40,000	$32,607	$72,607	Lifespan is for gravel top coat. May be shorter with intense flooding. Concrete base expected to last 50+ years.
Unit Pavers (Mortared on Concrete Base)	10,000 sf	20	$140,000	$94,572	$234,572	
Wood Decking	10,000 sf	20	$800,000	$64,967	$864,967	Assumes increased deterioration due to marine conditions.
Metal Decking	10,000 sf	30	$1,500,000	$106,808	$1,606,808	May be deteriorated by marine environment.
Street Crossings	10,000 sf	25	$30,000	$33,707	$63,707	Lifespan is for top course. Lines will need repainting every 5 to 10 years.
SOFTSCAPES						
Turf Lawn	10,000 sf	10	$22,500	$60,229	$82,729	Lifespan highly dependent on level of use.
Ornamental / Floral Plantings	10,000 sf	15	$60,000	$124,514	$184,514	
Woodlands, Wetlands, Stormwater Outfall Wetlands, and Upland Meadows are shown in "Life Segment Costs" table						
Trees (Specimen / Large Caliper)	20 trees	75	$12,000	$213,110	$225,110	Lifespan varies by species.
Trees (Small & Medium Caliper)	20 trees	40	$7,000	$54,360	$61,360	Lifespan varies by species.
FURNISHINGS & AMENITIES						
Trash Receptacle	1 Receptacle	15	$1,100	$19,475	$20,575	
Fixed Bench	100 lf	15	$41,667	$11,068	$52,735	Assumes each bench is $2,500 and 6' in length.
Bicycle Rack	10 racks	10	$8,000	$3,840	$11,840	
Drinking Fountain	1 fountain	10	$7,200	$12,197	$19,397	
Lighting (Pole & Pedestrian)	10 fixtures	30	$85,000	$13,265	$98,265	Driver, surge protector replacement may be needed every 5 to 10 years.
Lighting (Path & Bollard)	10 fixtures	25	$50,000	$5,701	$55,701	Driver, surge protector replacement may be needed every 5 to 10 years.
Signage	10 signs	15	-	$6,678	-	Installation, replacement, and maintenance costs will vary widely by type and size of sign.
Railing with Infill Panels	1,000 lf	20	$80,000	$5,144	$85,144	
Railing in Flood Prone Areas	1,000 lf	10	$80,000	$4,730	$84,730	
Retaining Wall (Concrete)	1,000 lf	30	$500,000	$30,297	$530,297	Assumes some flooding damage.
Reinforced Earth Wall / Vegetated Wall	1,000 lf	20+	$160,000	$41,379	$201,379	Deltalok claims their walls are "permanent"; assuming some damage from flooding for these estimates.
Seat Walls & Terraces	1,000 lf	25	$100,000	$28,425	$128,425	
Restrooms	1 set	20	$100,000	$663,936	$763,936	Components within the restroom may need to be replaced more frequently.

**Assumes 75% of service life is at Routine Costs and 25% of service life is at Non-Routine Costs*

Figure B - Forecasts of Life Cycle Costs by Landscape Type at GRC Base LOS (in 2018 USD)

assets, while Figure C shows the projected "life segment" costs for softscape assets that are not expected to require a full replacement.

While the SAMP recommends using an asset's anticipated life expectancy for planning purposes, the ultimate decision to replace an asset should be based on its observed condition, not just its modeled lifespan.

CHAPTER 7: OPERATING MODELS & MANAGEMENT STRATEGIES

Management – the day-to-day deployment of people, materials, and equipment – determines how well or how poorly parks and public spaces are maintained, and ultimately, how successful asset management will be over the long-term. Focused management is essential to ensuring that operations, maintenance, and programming efforts are coordinated and properly directed in the GRC.

In addition to Parks and Recreation, other organizations currently play a role in operations and management of the Grand River and areas encompassed by the GRC. Many of these organizations have the potential to be involved in future management of the GRC. A table showing how these organizations may potentially work together for managing the GRC is shown in Figure D.

The GRC will also require security. A three-tiered approach is recommended: visitors to provide a site presence and implied security; Grand Rapids police to provide a base level of uniformed security; and off-duty police and contracted security to provide supplemental security.

Effective maintenance and management requires adequate funding. It is important to identify diverse strategies that can be used to obtain suitable revenue to maintain assets at an appropriate level. Strategies may include establishing a life cycle renewal capital program, creating a restricted capital expenditure account, including an operations and maintenance reserve in the initial capital budgets for GRC projects, and providing opportunities for donations to directly go to O+M costs. The SAMP recommends that the management organization(s) also determine what the difference is between their current funding levels and needed funding for adequate maintenance – the Infrastructure Gap – in order to set funding targets.

CHAPTER 8: A LIVING PROCESS

The SAMP is a living document – it is meant to be continuously revised so that it remains up-to-date and best able to serve the GRC. One method that can be used to facilitate continuous improvement for the SAMP is the Plan-Do-Check-Act method (PDCA). Under PDCA, a change is planned ("Plan") and enacted on a small scale ("Do"), then the data gathered from the test is analyzed ("Check") to see if the change should be implemented at a larger scale or if a different change should be tested ("Act").

The success of PDCA, and of the SAMP as a whole, depends on monitoring and record keeping. Making accurate observations and keeping detailed records can reveal trends over time and be used to inform changes to maintenance practices and future material selections.

This SAMP can serve as the first steps toward creating a robust asset management program for the GRC and the City. It is recommended that the City's existing asset register is expanded to include GRC assets and that the City maintains an up-to-date and reliable inventory of GRC assets as they come on-line.

Within the City government, it will be vital to integrate the SAMP with financial planning and budgeting so that some funding is allocated for operations and maintenance and potential capital repairs. Being able to predict the potential costs of capital repairs over the next several budget cycles using the SAMP as well as future maintenance costs of the GRC will be useful in planning future budgets and setting a target for needed funding.

	City of Grand Rapids Parks and Recreation	City of Grand Rapids (other)	Downtown Grand Rapids, Inc.	Friends of Grand Rapids Parks	Grand Rapids Public Museum
Management	*Provide overall oversight of the GRC and coordinates management*	*Flood control and cleanup support*	*Coordinates management with P&R*		*Coordinates management with P&R*
Maintenance	*Provide oversight and overall standards of care for entirety of GRC; responsible for base level of maintenance throughout GRC*	*Support P&R with maintenance work (in-kind)*	*Provide additional maintenance work within downtown to support the higher standards of care in downtown*		*Maintains the property around the museum to GRC standards*
Security		*City police to provide base-line of enforcement*	*Provide support through Downtown Ambassadors program*		*Responsible for security around the museum property*
Permitting	*Coordinate all necessary permits related to retail/ concessions and programs*	*Assist P&R in permitting process as needed*			*Controls permitting of events on museum property*
Programming	*Provide overall oversight and support development of programming along the GRC*		*Develop & coordinate programming within downtown*	*Coordinate any programs with P&R and DGRI*	*Coordinates programs on museum property with P&R and DGRI*
Volunteer Coordination			*Coordinate volunteer activities within DDA and DID boundaries*	*Develop, oversee, and coordinate volunteer activities*	
Communications & Marketing	*Support in communications and marketing efforts*		*Support in communications and marketing efforts*	*Serve as lead for all communications and marketing efforts relating to programming & volunteer efforts*	
Funding	*Responsible for site-wide revenue from commercial agreements, rents, etc.*		*Provide funding through in-kind services*	*Contribute funds to support O+M efforts*	
Revenue	*Identify revenue opportunities and coordinate with existing revenue initiatives*	*Support identification and implementation of revenue opportunities*	*Support identification and implementation of revenue opportunities*	*Support identification and implementation of revenue opportunities*	

Figure D - Potential Roles and Responsibilities for the GRC

1.0 INTRODUCTION

This Strategic Asset Management Plan has been prepared in tandem with two related documents – the *Grand River Corridor Design Guidelines* and the *Conceptual Design for Six Opportunity Sites Along the Grand River* – to guide future improvements along the Grand River Corridor and create a 'River for All.' The design guidelines establish requirements and recommendations for the design of the future river trail and edge improvements of the 7.5-mile Corridor at and above the normal high water level of the Grand River. The opportunity sites document expands on these guidelines to create conceptual designs for six areas along the Corridor. This document examines how the future improvements should be managed and maintained for their long-term success.

1.1. WHAT IS ASSET MANAGEMENT?

Asset management is a method of overseeing an organization's assets in order to manage and plan for their life cycle cost within an acceptable level of risk. Assets can be defined as anything the organization owns – such as roads, pipes, buildings, benches, and trees. Asset management decisions can occur at all levels of an organization, from material selection, to operations, to project and funding prioritization.

An asset management plan (AMP) drafts a strategy for how this oversight can best be accomplished. The AMP typically consists of four main components:

1. Inventory and analysis of current assets
2. Analysis of levels of service
3. Strategy(ies) for managing assets
4. Financial strategy

Through these components, an AMP aims to develop the most cost-effective combination of planned and unplanned maintenance to help manage service delivery and risk.

1.2. AN AMP FOR THE GRAND RIVER CORRIDOR

This Strategic Asset Management Plan for the Grand River Corridor (SAMP) is intended to serve as a long-range planning document to guide how the City of Grand Rapids (City) and its partners can most effectively maintain and replace the assets specified in the Grand River Corridor Design Guidelines (Design Guidelines) over time in the Grand River Corridor (GRC). To achieve this goal, the SAMP includes:

- Recommended maintenance standards for the GRC;
- An overview of the forecasted maintenance for river corridor elements;
- Outlines the life cycle of different park assets and landscapes (to be used for future planning and budgeting efforts); and
- Discusses possible strategies for managing the river corridor to ensure its long-term success.

The SAMP is a living document that is meant to be updated regularly. For best success, it should also be incorporated into the City's financial planning and budgeting.

This document diverges from a traditional AMP in that it examines assets that are mostly unbuilt. These unbuilt assets are detailed in the Design Guidelines. In place of an inventory and analysis of current assets, then, this plan examines the various elements recommended in the Design Guidelines and lays out a roadmap for how these assets should be managed once they come online.

1.3. DEVELOPING THE PLAN

The SAMP was developed through an iterative process of research, discussion, and coordination. Discussions with the design team and the City occurred throughout the entire process to coordinate the SAMP with the Design Guidelines and current practices of the City. In addition, asset management plans and management strategies from other cities were studied for how they could be applied to the SAMP for GRC.

Based on the research and discussions, work on the SAMP began with defining the levels of service that would be used for maintenance (Chapters 3 and 4) and the types of landscapes and materials that would need to be maintained (Chapter 4) throughout the corridor. These standards and materials were used to develop maintenance strategies (Chapter 5) and maintenance and life cycle forecasts (Chapter 6) for the GRC. Potential operating models and management structures were then identified for the corridor, taking into account the current organizations working within the span of the GRC (Chapter 7). Lastly, the plan names strategies for keeping the SAMP up-to-date and adaptable (Chapter 8), two important components of any asset management plan.

1.4. HOW TO USE THE SAMP

To help with reading and understanding the SAMP, the chapters are broken down as follows:

Chapter 1 Introduces asset management and its implication for the GRC

Chapter 2 Discusses why having effective maintenance and management is crucial to ensuring the long-term success of the GRC project

Chapter 3 Discusses the significance of defining maintenance standards, identifies the City's current standards, and recommends a new base level of service for the GRC

Chapter 4 Identifies the maintenance needs of the materials and features proposed in the Design Guidelines and describes how the recommended base level of service identified in Chapter 3 should be adjusted based on the different characteristics and expected use for the Character Areas defined in the Design Guidelines

Chapter 5 Outlines general strategies that should be used to guide maintenance work along the GRC, including staffing and addressing seasonal conditions such as flooding and ice flows

Chapter 6 Forecasts the potential annual maintenance hours and costs in detail for the recommended base level of service and in general for the other recommended levels of service, and also forecasts life cycle costs for proposed GRC assets using the recommended base level of service

Chapter 7 Offers strategies for how the GRC can be managed and by whom

Chapter 8 Discusses why and how maintenance practices should be monitored and updated, as well as updating and integrating the SAMP into City practices so that it can be a "living document."

2.0 THE IMPORTANCE OF MAINTENANCE & MANAGEMENT

Proper maintenance and management are crucial for the long-term success of a project. Effective maintenance provides a clean, safe, and usable site that attracts visitors. Effective management ensures that the right maintenance and level of service are delivered and allows for the ability to adapt maintenance and management practices to changing conditions. Quality maintenance is essential to protecting the long-term capital investment. To the best extent possible, the City (and any other future management entity) should support a strong maintenance initiative and appropriate standards for the GRC to insure its vitality and sustainability for years to come.

2.1. MAINTENANCE & MANAGEMENT PRINCIPLES

The goal of park maintenance is to provide a high quality of service to ensure that the site is clean, attractive, and usable for visitors, while also maintaining any special function or features of the site, e.g. ecological habitat, stormwater management, etc. To achieve the highest levels of service for maintenance, a number of principles should guide maintenance work: classifying maintenance standards (the levels of service); having an effective management and maintenance process; and ensuring that those performing maintenance and repair have the needed skills and equipment for the tasks.

Levels of service may be consistent across the site, but more than likely, different areas of the site will require different maintenance service levels based on their desired aesthetics, expected use, and type of landscapes. For example, some areas that are more urban and receive high levels of use may have higher levels of service, i.e. have more frequent maintenance and use more resources. More natural and less frequently used areas may have lower levels of service, i.e. less frequent litter removal and horticulture care, and utilize less resources. Maintenance standards can also be created based on the available level of resources, with lower (but still effective) levels of service when fewer resources are available and more robust levels of service when more resources are available.

Although most organizations operate on the basis of a fiscal or calendar year broken down into four equal quarters, this structure is not as meaningful for park maintenance work. Experience has shown that organization of maintenance around the seasons is the most effective approach, quite simply because some of the most important factors shaping the pattern of work are tied to seasons. These factors include level of park use, growing conditions, and weather. Seasons around which to structure maintenance should be defined by the management entity (or entities) for the GRC.

Maintenance work should be performed when most appropriate. For example, low impact maintenance tasks, such as litter removal, may take place throughout the day. When possible, disruptive maintenance tasks, such as power washing, should be performed during early morning or off-hours when there are fewer visitors. Similarly, maintenance work that will affect the use of or limit access to site features, such as lawn renovation, should be announced prior to scheduled work whenever possible. Notification may be done through postings on bulletin boards, social media, or temporary signage.

Some landscapes and site features proposed for the GRC are expected to require skills beyond the skill level of current City employees. Additional staff may need to be hired, contracted out, or provided to by other stakeholders. (Staffing options are discussed in greater detail in Chapter 5.)

IMPLICATIONS FOR THE GRC & SAMP

- *Quality maintenance protects the long-term capital investment of the GRC*
- *Effective management facilitates appropriate service delivery and the ability to adapt practices to best meet changing conditions*
- *Effective management coordinates special events and address potential damages to minimize negative impacts from special events*

2.2 SPECIAL EVENT MAINTENANCE IMPACTS

Special events are an important component for parks and public spaces, as they have the potential to attract a great number of visitors and generate revenue. Precisely because these types of events draw substantial users, it is essential that they are carefully planned, scheduled and operated. Even with excellent planning, special events can cause damage to landscapes, and this damage must be addressed quickly in order to maintain the desired aesthetics and function.

For the purposes of this plan, special events are defined as:

- One-time or annual events whose primary purpose is to entertain
- Events that primarily use the park/public space as a venue
- Events that typically have little or no connection to the park/public space beyond the use of it as a venue
- Events that can impact the park/public space landscape

Typically, the primary impact of special events is damage to lawn areas due to overuse and inadequate resting time between events. Continual use of lawns can place undue stress on turf, particularly if events are held back-to-back. Overuse results in compacted soil, which will in turn lead to spotty turf as well as a lowered resistance to pests and disease. Compacted soil also prevents the absorption of rainwater, deprives roots of oxygen, and limits root growth. All of this causes turf to lose its durability and anchoring capacity, thus becoming more and more vulnerable to wear and tear. As the turf becomes sparse, the likelihood of severe runoff and erosion increases and further diminishes the possibility of turf recovery. Concurrently, the damaged turf is more likely to require full replacement.

Special events that are not managed properly, or are too large for the area to adequately accommodate, can contribute to additional turf deterioration and increased maintenance costs. Oversized or poorly managed special events damage other landscape areas. For example, if path systems leading to the event venue do not have the capacity to handle the influx of event crowds, pedestrians may spill over onto adjacent landscape areas and trample plant material and compact additional soil. Damage to the landscape also occurs during the set-up, breakdown and clean-up of special events. The use of large vehicles, such as vans, trucks and trailers on site for set-up and removal of stages, sound systems, barricades, vendor tents and general deliveries often entails driving on lawn areas, which further compacts soil and damages turf. Heavy venue schedules with back-to-back events mean that it is virtually impossible to maintain an adequate turf management plan because lawns cannot be regularly fertilized, irrigated, aerated, over-seeded and rested.

A secondary impact of special events is on site furnishings, restroom facilities, and hardscape areas. Site furnishings at can be damaged through overuse. Restroom capacities and supplies can be overwhelmed by large influxes of event goers, and these facilities may need to be supplemented with portable options. Hardscape areas are commonly dirtied with litter, food residue and other waste, and additional trash/recycling collection will be necessary. Pedestrian areas must be inspected, cleaned and repaired promptly after special events in order to prevent undue deterioration to park amenities.

3.0 DEFINING LEVEL OF SERVICE

Level of service (LOS; also called standards of care) refers to the types and frequencies of maintenance tasks performed. As mentioned in Chapter 2, LOS may be consistent or vary across a site based on differing uses and desired appearances. Varying LOS are recommended for the GRC and are identified in this document. They are based on the Design Concepts and the City's current LOS standards and were chosen to establish a safe and quality site. The LOS are meant to be followed by the City and any other entities providing maintenance and management of the GRC.

3.1. THE IMPACTS OF LOS

The LOS for maintenance of any public space directly affect maintenance budgets and influence perceptions of safety and use. For example, a maintenance plan with an intensive LOS, in which all tasks are carried out at or above recommended best maintenance practices, may create a pristine landscape but may ultimately prove to be financially unsustainable. Alternatively, a maintenance plan in which tasks and repairs are carried out at minimal levels may reduce annual budgets, but will likely result in high capital costs required sooner for replacement or repairs that could have been prevented with regular care. Low standards of care can also create the perception of an unsafe environment for users.

Intensity of use and LOS are intimately linked. In general, the greater number of visitors a public space receives, the greater the maintenance load. Similarly, areas with intensive use and higher concentrations of visitors, such as play areas and lawns, typically require greater maintenance and higher LOS than areas with limited public access. Directly related to this is the fact that the level of maintenance impacts park use: a well-maintained park attracts visitors, whereas a poorly maintained site discourages positive park visitorship and often invites misuse and vandalism.

Given this relationship between maintenance and use, it is important to develop a maintenance plan – often one with multiple LOS across the site – that balances fiscal considerations with maintenance needs in order to provide a sustainable, high-quality visitor experience.

3.2. DETERMINING LOS

Four significant factors influencing LOS are location, use, climate, and materiality. Location influences how many visitors the area will receive and the degree of access for maintenance staff. As previously mentioned, high levels of use will require higher LOS. Climate and weather will affect when and what maintenance work will be performed as well as how many visitors the site will receive. Materiality will determine what maintenance work will be needed for an asset and how often work will need to be performed.

Several other factors also affect LOS:

- Internal factors
  - ~ Knowledge retention (skill set of current staff versus retiring staff)
  - ~ The ability to attract and retain staff
- External factors
  - ~ New legislation
  - ~ Environmental changes (e.g. climate change)
  - ~ Social changes (demographics and use)
  - ~ Technological changes
- Combination factors
  - ~ Funding and economic changes (e.g. lower funding levels than projected, funding not allocated to AMP initiatives, construction/ inflation prices not as assumed)

Based on these factors, organizations can ask themselves a list of questions to help determine an appropriate LOS:

- What LOS are currently provided?
- What LOS would be most appropriate to maintain the current assets? Are these different for assets in different areas?
- What is the service gap between the current LOS and the target LOS?
- Are there adequate resources to provide and sustain the target LOS?
- What other factors may affect the target LOS? (e.g. staff, climate, technology, facility, equipment)
- How can the asset data be used to better facilitate maintenance practices and service levels?

It is crucial to define LOS for the GRC that will be appropriate for maintaining the assets – poorly maintained assets may fail earlier and need to be replaced sooner compared to well-maintained assets. If adequate LOS cannot be provided, it must be acknowledged that this may lead to higher capital costs in the future.

3.3. LOS FOR GRC

The City currently has four levels of service for City parks and public spaces, as shown in Figure 3.1. Because there are new features proposed for the GRC that are not included in the current standards and because the best LOS for some areas of the GRC fall between current standards, new standards are recommended for the GRC. However, the current standards were used as the basis for the recommended GRC LOS.

Overall, the GRC is expected to require a high LOS to ensure a safe and functioning site, accommodate the anticipated high volume of users, and protect the project's capital investment. The LOS recommended in this plan have been initially selected to balance fiscal considerations with maintenance needs in order to ensure a high-quality, well-maintained and financially sustainable site. Generally speaking, the site should be kept free of litter, plantings should be kept in good health (and ecological function as appropriate), furnishings and amenities should be clean and usable, and all repairs carried out promptly as needed. Figure 3.2 shows the "GRC Base LOS" – the LOS recommended as the general level of service throughout the GRC to maintain assets in good condition and prevent undue deterioration over time. The GRC Base LOS is based on the City's current "Level B – Comprehensive Stewardship" service standard.

The GRC Base LOS is meant as a general standard across the site. Different areas will need higher or lower standards based on levels of use and location along the River. More specific details on the recommended LOS adjustments are discussed in Chapter 4.

GRC's LOS can, and should, be modified as needed based on an assessment of then-current maintenance practices (see Chapter 8). Care must be taken to not lower the LOS to the point where it will affect the safety and use of the GRC.

Grand Rapids Current Maintenance Standards

LEVEL OF SERVICE STANDARDS*

A - SHOWPIECE FACILITY

State-of-the-art maintenance applied to a high-quality diverse landscape, associated with high-traffic urban areas.

- TURF CARE — Mowed at least once every five working days.
- LITTER CONTROL — Minimum of once per day, seven days per week.
- RESTROOMS — Open 12 hours per day, seven days per week. Cleaned 2 times per day.
- PLAYGROUNDS — Groomed three times per week. Inspected for safety once per week.
- FACILITIES — Gyms and shelters are cleaned prior to and after reservations. Pools treated daily.
- SURFACES — At no time does an accumulation of dirt or leaves distract from looks or safety of area.
- IRRIGATION — Frequency of use follows rainfall, temperature, etc. Inspected once per month.
- FLORAL PLANTINGS — Maximum care, including water, fertilizing, and weeding is done at min. once per week.
- REPAIRS — Immediate response to all elements of design when problems are discovered.

B - COMPREHENSIVE STEWARDSHIP

High-level maintenance associated with well-developed park areas with higher visitation rates. Recommended level for most organizations.

- TURF CARE — Mowed at least once every five working days.
- LITTER CONTROL — Minimum of once per day, five days per week.
- RESTROOMS — Open 8-10 hours per day, seven days per week. Cleaned once per day
- PLAYGROUNDS — Groomed two times per week. Inspected for safety every other week.
- FACILITIES — Gyms and shelters are cleaned prior to and after reservations. Pools treated daily.
- SURFACES — Cleaned, repaired, repainted or replaced when appearances have noticeably deteriorated.
- IRRIGATION — Frequency of use follows rainfall, temperature, etc. Inspected once per month.
- REPAIRS — Done whenever safety, function, or appearance is in question.

C - MANAGED CARE

Moderate level of maintenance associated with locations of moderate to low levels of development, or with operations that, because of budget restrictions, cannot afford a higher level of maintenance.

- TURF CARE — Mowed at once every ten working days.
- LITTER CONTROL — Minimum of two to three times per week.
- RESTROOMS — Open 6-8 hours per day, seven days per week. Cleaned once per day.
- PLAYGROUNDS — Groomed weekly.
- SURFACES — Cleaned on complaint basis. Repaired or replaced as budget allows.
- REPAIRS — Done whenever safety or function is in question.

D - REACTIVE MANAGEMENT/ CRISIS RESPONSE

- TURF CARE — Low-frequency mowing scheduled based on species.
- LITTER CONTROL — Once per week or less.
- SURFACES — Replaced or repaired when safety is a concern and when budget is available.
- REPAIRS — Done whenever safety or function is in question.

**Based on APPA Grounds Standards and Oakland County Maintenance Management Plan.*

Figure 3.1 - Current Maintenance Standards for the City of Grand Rapids

Grand River Corridor Proposed "Base" Level of Service

High-quality maintenance to ensure a safe, attractive, and functional site and accommodate high levels of visitors.

- TURF CARE — Mowed at least once every five working days in growing season.
- LITTER CONTROL — Minimum of once per day, five days per week.
- RESTROOMS — Open 8-10 hours per day, seven days per week. Cleaned twice per day.
- PLAYGROUNDS — Inspected for safety once per week. Loose surfaces groomed three times per week, solid surfaces cleaned once per week.
- FACILITIES — Kept tidy and clear of debris, and are cleaned prior to and after reservations. Pools treated daily.
- SURFACES — Cleaned regularly. Repaired, repainted or replaced when appearances have noticeably deteriorated.
- FURNISHINGS — Kept clean and functional. Tolerance of minor wear and tear.
- IRRIGATION — Frequency of use follows rainfall, temperature, etc. Inspected once per month.
- FLORAL PLANTINGS — Maximum care (water, fertilizing, weeding, etc.) is done once every two weeks.
- "NATURAL" AREAS — Monthly care during growing season (pruning, invasive species control, etc.). Litter removal 2-3 days per week. Immediate removal of safety hazards.
- DAYLIGHTED STORM-WATER OUTFALLS — Trash and debris removal every two weeks. Monthly plant care during growing season.
- REPAIRS — Done whenever safety, function, or appearance is in question.

Figure 3.2 - GRC Base LOS
"Natural" Areas refers to woodlands, wetlands, and other non-manicured planting areas.
Items in blue represent changes or additions to the existing Grand Rapids Parks maintenance standards.

ASSET MANAGEMENT

4.0 PROPOSED ASSETS & MAINTENANCE

Since the assets recommended in the Design Guidelines are not yet built, the typical inventory and analysis component of an AMP cannot be performed. This section is intended to take the place of that step by providing an analysis of maintenance needs for the proposed GRC features and how maintenance standards vary across the corridor.

4.1. METHODOLOGY & ASSUMPTIONS

The first critical step in defining a maintenance plan is to create a framework tailored specifically to the project design and intent. For the purposes of the SAMP, ETM defined several general categories of landscape areas and site features proposed for the GRC in the Design Guidelines (such as softscapes, hardscapes, and furnishings). Each category was sub-divided into specific landscape or feature types (e.g. turf lawn, wood decking, trash receptacles, etc.). Each landscape type has distinct characteristics and maintenance needs which are discussed in Section 4.2 and which were used as the basis for estimating annual maintenance hours and costs (see Chapter 6). The maintenance needs represent what is recommended as a general level of service for the assets under the GRC Base LOS standard. As mentioned in Section 3.3, the GRC Base LOS will need to be fine-tuned across areas of the GRC based on the areas' level of use and desired aesthetics and functions. The "Character Areas" from the Design Guidelines were used in this plan as the areas for defining general LOS adjustments across the GRC (see Section 4.3).

The following assumptions were used in this SAMP:

- The City will follow the recommended materials and requirements set forth in the Design Guidelines.
- Because Grand Rapids experiences a long, cold winter, water features will be winterized in October and started up again in April.
- The Grand River rises with snow and ice melt in early spring. The river typically rises to the highest level (near 100 year flood event) once per year and lasts several weeks. Lower trails will need to be closed from public access and park use may be affected during this time. Maintenance and potentially repairs will need to be done after the water recedes.
- Other rain events throughout the year could bring the river's flow rate to between 5,000 and 7,500 cubic feet per second (cfs), producing smaller but still notable flooding. These events are typically shorter in duration and occur 2 to 3 times per year. (Refer to Section 5.4. for more information on flooding.)
- The Grand River will experience ice flows in the winter, which affect use and maintenance access across some areas of the GRC. A few repairs will be needed due to damage from ice flows.

4.2. LANDSCAPE TYPES

Three broad categories of landscape areas and site features are proposed for the GRC: hardscapes/paving, soft-scapes/horticulture, and furnishing and amenities. Specific landscape and feature types are listed below based on the materials listed in the Design Guidelines. Given the amount and breadth of the proposed materials, not all materials are included in the SAMP. Rather, those materials that are expected to be most common and found throughout the Corridor, as well as a few materials with unique maintenance needs, were included. Additional landscape and feature types unique to the Opportunity Sites were also identified.

The following subsections describe the general maintenance for the landscape and feature types. Detailed maintenance tasks have been included in Appendix A for the GRC-wide features and Appendix B for the Opportunity Sites features.

DESIGN GUIDELINES PROPOSED GRC-WIDE LANDSCAPE TYPES

HARDSCAPES

- Regional trail / primary trail
- Secondary and tertiary trails (chip-sealed asphalt)
- Flood prone secondary and tertiary trails (chip-sealed asphalt)
- Plaza/Gathering spaces – concrete
- Plaza/Gathering spaces – crushed gravel
- Unit pavers (mortared)
- Wood decking (walks & overlooks)
- Metal decking
- Street crossings (mid-block and underpass)

SOFTSCAPES

- Turf lawn
- Ornamental plantings
- Woodlands
- Wetlands
- Stormwater outfall wetlands (daylighted stormwater outfalls)
- Upland meadows
- Trees (specimen/large caliper and small/medium caliper)

FURNISHINGS & AMENITIES

- Litter/Recycling receptacles
- Benches
- Bike racks
- Drinking fountains
- Signage
- Railings with infill panels
- Railings in flood prone areas
- Lighting (pole & pedestrian; path & bollard)
- Retaining walls
- Reinforced earth walls
- Seat walls & terraces
- Restrooms

OPPORTUNITY SITE ONE-OFFS

WATER STORAGE YARD

- Elevated canopy walk
- Log jam inspired playground
- Winter Lodge
- Repurposed water tank
- Anishinaabe Fire Circle

COLDBROOK SITE

- Sculptural play elements

NORTH MONROE SITE

- River edge rapids viewing
- Event pavilion
- Skate park

FISH LADDER

- Fish Ladder
- Fish cleaning station

MUSEUM SITE

- Flume water feature
- Outdoor classroom
- Wood adventure play
- Amphitheater
- Treehouse deck

Hardscapes

The GRC will feature a variety of hardscapes, including a concrete primary trail with pavers in key locations, concrete and gravel gathering areas, chip-sealed asphalt trails, wood and metal decking, and pavers (refer to the Design Guidelines for all proposed materials). All hardscapes and paving areas will require frequent litter removal and regular cleaning. Cleaning will include blowing debris with a hand or backpack blower (concrete, asphalt, stabilized aggregates, decking, wet-laid pavers), sweeping (dry-laid pavers), and power washing (concrete, asphalt, decking, wet-laid pavers). Additional debris may need to be removed after rain and floods. As a best practice it is recommended that all power washing should be performed without chemicals (due to the adjacency of the Grand River) and with a fan-tipped nozzle (to avoid overexposing aggregates and joints). Care should be taken not to blow or wash debris into the river. Graffiti should be removed as needed, ideally within 24 hours of detection.

All hardscapes should be inspected when performing maintenance tasks for any damage, vandalism, or needed repairs. Hardscape repairs may not be needed every year, but should be addressed as soon as the need arises. It is expected that some repairs will be needed annually in areas that flood and in areas that are affected by heavy ice flows.

Specialized maintenance needs for specific hardscape types include the following:

- Chip-sealed asphalt: The chip and seal may require regular patching to fill in bare or worn spots, and may need to be completely replaced every 2 to 7 years depending on level of use and flooding.
- Dry-laid pavers: The joint material should be swept between pavers, particularly as needed after storm events.
- Gravel and loose aggregate surfaces: The surface should be raked and releveled throughout the year. Misting can be done to reduce dustiness in dry weather. Additional material/aggregate may need to be brought in for spot repairs and replacements. Major renovations will be needed every 3 to 10 years depending on level of use and impact from flood events. (Note: gravel is not permitted below normal high water level.)
- Wood decking: Ipe is proposed for the wood decking. Due to its density, Ipe (as well as other tropical hardwoods) can be difficult to work with, especially with hand tools. Premium carbide tipped blades and high-quality drills are necessary to make smooth cuts, and predrilling is necessary for installing bolts or screws. When cut, some hardwoods such as Ipe have a fine dust that may cause dermatitis in individuals who have skin sensitivities and/or cause allergic reactions in those who breathe it in. Wearing dust masks is recommended when cutting or sanding Ipe. For the wood deck, it is not necessary to perform an annual sealing or oil treatment but doing so can extend the lifespan of the wood deck by maintaining consistent moisture levels throughout the decking. However, given the proximity to the water and the potential for VOCs in oil treatments, an annual sealing or oil treatment is not recommended. Annual treatments will need to be continued once they start.
- Street crossings: roadways and parking areas can be cleaned with a street sweeper quarterly. Pavement markings will fade over time and should be repainted when they have noticeably deteriorated (typically after five to ten years). Any curbs should be inspected regularly, and cleaned and maintained as needed.

Seasonal Maintenance

Some secondary and tertiary trails may need to be closed seasonally due to ice flows and/or flooding. They should be inspected prior to re-opening and any repairs made as needed.

It is assumed that the primary/regional trail and main gathering areas will receive snow and ice management in the winter months , though only minor accumulations of snow will be removed from gravel gathering areas. As a best practice, it is recommended that any de-icers used should be environmentally-friendly due to the adjacency of the river.

Softscapes

Plantings within the GRC can be divided into two broad categories: “manicured areas” and “natural areas.” Manicured area plantings are those in high-profile areas and are expected to have a neat and maintained appearance, such as turf and ornamental plantings. Natural area plantings are those in lower-profile areas, will experience less direct use, and have a more wild, natural aesthetic. These include woodlands, meadows, and wetlands.

Manicured area plantings should be maintained at a high level of care. Tasks such as trimming/pruning, fertilizing, and irrigation (where installed) should be done on a regular schedule that adjusts for changes in weather and seasonality/growing season, and that is appropriate for the selected plant species. Plantings should be kept free of disease, pests, and dead or dying branches. Planting areas should be kept free of weeds and litter. Dead or dying plants should be removed and replaced promptly.

Natural area plantings should receive regular care to maintain their appearance and function, but typically require less intensive hands-on care than manicured areas. Litter should be removed weekly, with a greater focus on removing litter along the edges of pathways and visible areas. Debris should be removed selectively: some debris may remain to provide ecological value while debris on or near pathways or that poses a safety hazard should be removed.

Temporary fencing should be used to fence off areas undergoing renovation and/or restoration. As much as possible, maintenance work should be performed when landscapes are dry to avoid unnecessary compaction and damage to wet soils.

Additional maintenance needs specific to each softscape type include the following:

- Turf areas will require weekly mowing, regular fertilization (based on soil tests), weed and pest control, and seasonal top dressing and renovations. In the case of heavy use, some turf areas may need to be temporarily closed for overseeding, top dressing, or major renovation.
- Ornamental planting beds will require regular weed and pest control, spot watering, seasonal preparation and cleanup, and in-season maintenance (such as trimming, deadheading, mulch-ing, and fertilizing).
- Woodlands will require pest and invasive species control, trimming, clearing, and replacement for understory and trees as needed.
- Wetlands will require pest and invasive species control, trimming, erosion control and post-flood inspections and cleaning.
- Stormwater wetlands have the same needs as traditional wetlands but with more frequent litter and debris removal, and will also need inspection of the stormwater outfall.
- Meadows will require seasonal cutbacks and cleanups, weed and pest control, and reseeding. Reseeding may involve adding compost and establishment watering/irrigation.
- Establishing plants will require higher levels of care to ensure successful establishment.

Furnishings and Amenities

All furnishings and amenities should be kept clean, safe, and functional. Cleaning and inspections should be conducted regularly. Trash and recycling stations should be emptied on a regular schedule, adjusted for levels of use. Movable furnishings may be moved by park users to unwanted locations and should be relocated as needed. Unsecured furnishings in flood-prone areas should be secured or moved prior to floods. Additional maintenance for furnishings may include tightening or replacing connections, touching-up paint, and repairing or replacing damaged materials and components. Restrooms within the GRC should be kept clean, stocked, and well-maintained. This may require daily or more frequent restocking and cleaning in peak seasons to accommodate the levels of use.

Furnishings and amenities in flood prone areas will require additional inspections and cleaning after floods.

4.3. CHARACTER AREAS & LOS

Eleven Character Areas have been defined in the Design Guidelines:

- Riverside Park
- US 131 Buffer Preserve
- North Riverfront Park
- North Promenade
- The Heart of the River
- Downtown Promenade
- The Front Lawn
- Market Avenue Promenade
- Front Avenue Passage
- South Market Promenade
- Butterworth Area Open Space

The Character Areas reflect the different aesthetics and materials proposed for each area of the GRC to create a unifying, yet distinct identity along the corridor. Different levels of service (LOS) are recommended for each area based on these desired aesthetics, materials/features, and varying levels of visitors each area would receive. Four distinct LOS are suggested, listed from highest to lowest standards: Heart of Downtown, GRC Base LOS, Higher Profile Natural Areas, and Natural Areas and Preserves. The locations of each Character Area and their recommended LOS are shown in the map in Figure 4.2. Note that LOS abbreviations were given as A to D, as each Asset Management Plan in the City uses those abbreviations.

The specific standards for the recommended GRC LOS can be found in Figure 4.3. Changes from current City standards are noted in blue. Note that smaller zones and features within each of the Character Areas may have higher or lower LOS than the parent area if they experience differing levels of use. Entire Character Areas may also shift to different LOS if they experience more or less use than predicted.

Heart of Downtown (A)

Character Areas located in the heart of the City will require the highest LOS, as they are expected to see the highest levels of use. These areas include the Heart of the River, Downtown Promenade, and the Front Lawn. Visitors to this area will expect a well-maintained landscape and it is important that management will have the resources to provide this experience. Note that some areas initially projected to fall under the GRC Base LOS may need to be raised to this standard if they become highly popular.

GRC Base LOS (B)

The GRC Base LOS is recommended for Character Areas that are mainly urban in character, located adjacent to downtown, and are expected to see considerable (but not consistently intense) use throughout the year. These include North Riverfront Park, North Promenade, Market Avenue Promenade, and the South Market Promenade.

Higher Profile Natural Areas (C)

A LOS lower than the GRC base is recommended for areas that exhibit a more natural environment compared to the urban downtown but are still expected to see consistent use. These include Riverside Park, Front Avenue Passage, South Market Promenade, and Butterworth Area Open Space. Since these are more natural areas, visitors will be more willing to tolerate some “chaos” and “messiness” in the landscapes, such as fallen trees in the woods, less frequently cut lawns, and some fallen leaves on trails. Maintenance will still need to ensure visitor safety and site function, but will not need to provide for a pristine site.

Natural Areas and Preserves (D)

As its name implies, this LOS covers natural preserves and trails that are not expected to experience as consistent use and/or that are in more remote areas of the GRC. Only the US-131 Buffer Preserve Character Area is fully included in this LOS, however the Butterworth Area Open Space may be maintained at this level until it is more developed and used. Like the High Profile Natural Areas, it is expected to see less use overall, with visitors tolerating more “chaos” than within the downtown environs.

Character Areas	Recommended LOS
NATURAL RIVERFRONT PARKS	
1 Riverside Park	C
2 US 131 Buffer Preserve	D
3 South Market Promenade	C
4 Butterworth Area Open Space	C/D
INDUSTRIAL REDEVELOPMENT AREAS	
5 North Promenade	B
6 Market Avenue Promenade	B
7 Front Avenue Passage	C
PUBLIC RIVERFRONT PARKS	
8 North Riverfront Park	B
9 The Front Lawn	A
URBAN RIVERFRONT PARKS	
10 The Heart of the River	A
11 The Downtown Promenade	A

Figure 4.2 - Site Types and Character Areas Key Map (from Design Guidelines)

Grand River Corridor Proposed Maintenance Standards

*Items in **blue** represent changes or additions to Grand Rapids current maintenance standards*

A - HEART OF DOWNTOWN

Maximum maintenance applied to a high-quality diverse landscape, associated with high levels of use in Downtown.

• TURF CARE	Mowed at least once every five working days in growing season.
• LITTER CONTROL	Minimum of once per day, seven days per week.
• RESTROOMS	Open 12 hours per day, seven days per week. Cleaned 2 times per day.
• PLAYGROUNDS	Inspected for safety once per week. Loose surfaces groomed three times per week, solid surfaces cleaned once per week.
• FACILITIES	Kept tidy and clear of debris, and are cleaned prior to and after reservations.
• SURFACES	At no time does an accumulation of dirt or leaves distract from looks or safety of area.
• FURNISHINGS	Kept clean and functional. Minimal tolerance of visible wear and tear.
• IRRIGATION	Frequency of use follows rainfall, temperature, etc. Inspected once per month.
• FLORAL PLANTINGS	Maximum care (water, fertilizing, weeding, etc.) is done at min. once per week in growing season.
• "NATURAL" AREAS	Care every two weeks during the growing season (pruning, invasive species control, etc.). Litter removal 4-5 days per week. Immediate removal of safety hazards.
• DAYLIGHTED STORM-WATER OUTFALLS	Trash and debris removal weekly. Plant care done every two weeks during growing season.
• REPAIRS	Immediate response to all elements of design when problems are discovered.

B - GRC BASE LOS

High-quality maintenance to ensure a safe, attractive, and functional site and accommodate high levels of visitors.

• TURF CARE	Mowed at least once every five working days in growing season.
• LITTER CONTROL	Minimum of once per day, five days per week.
• RESTROOMS	Open 8-10 hours per day, seven days per week. Cleaned twice per day.
• PLAYGROUNDS	Inspected for safety once per week. Loose surfaces groomed three times per week, solid surfaces cleaned once per week.
• FACILITIES	Kept tidy and clear of debris, and are cleaned prior to and after reservations. Pools treated daily.
• SURFACES	Cleaned regularly. Repaired, repainted or replaced when appearances have noticeably deteriorated.
• FURNISHINGS	Kept clean and functional. Tolerance of minor wear and tear.
• IRRIGATION	Frequency of use follows rainfall, temperature, etc. Inspected once per month.
• FLORAL PLANTINGS	Maximum care (water, fertilizing, weeding, etc.) is done once every two weeks in growing season.
• "NATURAL" AREAS	Monthly care during growing season (pruning, invasive species control, etc.). Litter removal 2-3 days per week. Immediate removal of safety hazards.
• DAYLIGHTED STORM-WATER OUTFALLS	Trash and debris removal every two weeks. Monthly plant care during growing season.
• REPAIRS	Done whenever safety, function, or appearance is in question.

Figure 4.3(a). - Recommended GRC Maintenance Standards

C - HIGHER PROFILE NATURAL AREAS

Moderate level of maintenance associated with the more natural areas and trails around Riverside Park and Butterworth that will experience lower but consistent levels of use.

• TURF CARE	Mowed at least once every ten working days in growing season.
• LITTER CONTROL	Minimum of two to three times per week.
• RESTROOMS	Open 6-8 hours per day, seven days per week. Cleaned once per day.
• PLAYGROUNDS	Inspected for safety monthly. Loose surfaces groomed weekly, solid surfaces cleaned monthly.
• SURFACES	Cleaned on complaint basis. Repaired or replaced as budget allows.
• FURNISHINGS	Kept clean and functional. Tolerance of moderate wear and tear.
• NATURAL AREAS	Seasonal care (pruning, invasive species control, etc.). Weekly litter removal. Immediate removal of safety hazards.
• DAYLIGHTED STORM-WATER OUTFALLS	Monthly trash and debris removal. Seasonal plant care.
• REPAIRS	Done whenever safety or function is in question.

D - NATURAL AREAS & PRESERVES

Lower level of maintenance associated with preserve and trail areas experiencing limited use.

• TURF CARE	Mowed at least once every ten working days in growing season.
• LITTER CONTROL	Minimum of once per week.
• RESTROOMS	Open 6-8 hours per day, seven days per week. Cleaned at least once every two days.
• PLAYGROUNDS	Inspected for safety monthly. Loose surfaces groomed weekly, solid surfaces cleaned monthly.
• SURFACES	Cleaned on complaint basis. Repaired or replaced as budget allows.
• FURNISHINGS	Kept clean and functional. Tolerance of moderate wear and tear.
• NATURAL AREAS	Seasonal care (pruning, invasive species control, etc.). Immediate removal of safety hazards.
• REPAIRS	Done whenever safety or function is in question.

Figure 4.3(b). - Recommended GRC Maintenance Standards

4.4. OPPORTUNITY SITES

Six "opportunity sites" have been identified along the GRC (see Figure 4.4). Conceptual designs have been developed for each of the sites and are described in the Schematic Design for Six Opportunity Sites Along the Grand River Corridor (Six Opportunity Sites report).

The opportunity sites contain features proposed for the entirely of the GRC as well as additional features unique to each site. Maintenance needs for the opportunity sites are discussed below and were used to develop the six sites' maintenance estimates (see Section 6.4). Note that maintenance for boat passages, the adjustable hydraulic structure (AHS) maintenance, and other in-river restoration work were not included in our estimates.

Leonard to Ann Street Trail

This opportunity site is a crucial trail connecting Leonard and Ann Streets along the river. The trail is divided into north and south halves by the Water Department Storage Yard, another opportunity site. Maintenance for the trail will be straightforward. The trail should be kept clean and free of litter and debris, with repairs performed as needed. The lower secondary trails may need to be closed seasonally due to flooding. Planting around the trail is expected to be woodland, wetland, and meadow, and should be maintained according to the softscape guidelines found in Section 4.2.

Opportunity Sites

1. **Leonard to Ann Street Trail**
2. **Water Department Storage Yard**
3. **Coldbrook Site and Canal Street Boat Launch**
4. **North Monroe Site**
5. **Fish Ladder Site**
6. **Grand Rapids Public Museum Site**

Figure 4.4 - GRC Opportunity Sites

Water Department Storage Yard

The Water Storage Yard (WSY) is located along the Leonard to Ann Street Trail and will feature a playground, canopy walk, and several structures. Features and maintenance needs not already described in Section 4.2 include the following:

- The tree canopy trail will be wood with railings. It should be cleaned an average of twice weekly to remove litter, debris, and fallen branches and ensure a safe walking surface. The trail and its support structures should be inspected regularly and after storm events for signs of damage and need maintenance (with visual inspections done during routine maintenance and more thorough physical inspections done weekly to every two weeks). Repairs should be done as needed, and notices posted about any trail closures resulting from maintenance work.
- The lower boardwalk will be marine grade decking; refer to 4.2 for maintenance needs. The lower trail is expected to need seasonal closures due to flooding, and post-flood inspection, cleaning, and repairs.
- The log jam inspired playground will require a certified playground inspection annually or twice per year. The playground should also receive a daily visual inspection with other maintenance tasks and a weekly physical inspection to check for safety, damage, loose connections, etc. Keep a record of all inspections and repairs. Play features should be cleaned regularly and maintained as needed (tightening nuts and bolts, repainting, etc.). The play surface will be either engineered wood fiber (EWF) or poured in place rubber (PIP) and should be maintained to provide a clean and safe play surface. For EWF, this will include raking and leveling the surface, shallow cleanings, minor refilling and regrading to ensure proper depth, and major replacements every 3 to 5 years. PIP maintenance will entail sweeping and scrubbing/washing to remove debris and dirt and as needed repairs (such as rebinding, patching, and replacing worn out areas).
- Maintenance for repurposed water tank will ultimately depend on how its repurposed and its use. The current design assumes the paving within the tank will be DG. The wall surfaces will remain concrete and have some interior electrical connections for lighting, projections, and event use. The interior and exterior walls should be spot cleaned as needed throughout the year, with a major cleaning performed annually. Any AV and lighting systems should be maintained and pest control done as needed. Maintenance will become more time-intensive and skill-specific if more specialized features are incorporated into the water tank.
- Special furnishing and amenities for the WSY include Anishinaabe fire rings, public fire pits, grills, and picnic tables. The Anishinaabe fire rings will be built and maintained by the Anishinaabe. The public fire pits will be metal and should be cleaned before and after use. It is assumed that visitors will not always clean out grills, and that staff will need to clean them throughout the year.

Coldbrook Site and Canal Street Boat Launch

The Coldbrook site will feature a flexible gathering lawn, river overlooks, sculptural play elements, a reinforced earth green wall, and the daylighted Coldbrook Creek. Except for the sculptural play, the other elements maintenance needs are covered in Section

4.2. The sculptural play will require regular inspections like the log-jam inspired playground at the WSY. Additional tasks will include cleaning and maintaining the play features and play surface to ensure a clean and safe play environment.

North Monroe Site

North Monroe will be a high-use, highly visible site along the GRC. It should receive a high level of care to present a well-maintained appearance for both residents and visitors of Grand Rapids. Maintenance needs for features unique to North Monroe include the following:

- A stepped river edge is located along the river for rapids viewing. It should be inspected and cleaned every week to two weeks to remove dirt, debris, and biological growth that may accumulate on the steps. Take care not to direct debris and litter into the river when cleaning. The river edge may need to be closed for floods. Inspect and clean the edge after every flood, and perform repairs as needed.
- The event lawns in North Monroe will require regular care similar to the recommendations in Section 4.2. However, some additional fertilization and renovation will be needed due to the higher level of use. Ensure the event schedule allows for resting periods for the lawn to recover and minimize event impacts. Volleyball courts are intended to be one-offs for events and not on the south lawn year-round.
- The event pavilion will be a mostly open-air structure, with a year-round restroom and an enclosed space for boat storage. The pavilion should be inspected before and after events; clean and repair as needed. The boat storage area should be thoroughly cleaned seasonally and spot cleaned as needed. Restroom maintenance is described in Section 4.2.
- The river landings are gravel/sand areas along the coast of the Grand River. They should be raked and releveled regularly and particularly after flood events. They may need to be replenished annually and after some flood events depending on erosion and deposition. Areas would benefit from a deep cleaning once or twice per year to remove buried debris and littler. Marine life and aquatic vegetation should be managed as needed, but is not expected to be a challenge due to the flow of the river.
- The skate park should be cleaned regularly to remove litter/debris and provide a smooth, safe skating surface. Inspect the park twice annually for any surface cracks, chips, broken rails, or other damage; repair as needed. Remove any graffiti ideally within 24 hours of detection.
- Trees in grates may require additional maintenance, such as removing debris and leaves trapped in the grates, cleaning grates, and repairing grates.

Fish Ladder Site

Fish Ladder is an existing park along the Grand River; improvements are proposed as part of the GRC Opportunity Sites. These improvements will include a changing room and restroom, a fish cleaning station, viewing terraces, new paving, and enhanced river access. Their maintenance will include the following:

- Manual retractable bollards will limit site access except for emergency vehicles. Routine maintenance includes inspecting and cleaning three times per year, and oiling annually if needed. The sheath of the bollard should also be inspected and cleaned. The bollards may need to be secured or lowered before and after floods, and should be cleaned, inspected, and repaired (if needed) after floods.
- The changing room/restroom will have similar maintenance needs as typical restrooms (described in Section 4.2), with additional time for cleaning and repairing the changing room area.
- Maintenance for the fish cleaning station will depend on the type of station installed. For this report, the station is assumed to have a spigot, grinder, fillet table, and AC outlet. The surfaces, grinder, drains, and outlet should be inspected regularly to ensure functionality and cleaned/disinfected as needed. Pipes should be inspected seasonally and cleared as needed.

Grand Rapids Public Museum Site

All of the proposed features for the Grand Rapids Public Museum (Museum) will be the responsibility of the Museum (the City's responsibilities end at the south end of the Pearl Street tunnel at the edge of the Museum property). As such, maintenance for these features were not included in the estimates for the SAMP, but their needs are described below as reference for the Museum:

- Maintenance for the regional trail is described in Section 4.2.
- The flume water feature is intended to be a recirculating, play-type water feature using potable water. It should be cleaned regularly to remove litter and debris. Check components at least weekly during operation for proper function and clean as needed. The pump system should have routine testing and servicing. Repair and/or replace components as needed. The water feature should be winterized in the fall and started up in spring.
- The river classroom should be inspected and cleaned if needed before and after each use. Stones may shift over time and need to be adjusted. Additional maintenance (cleaning and repairs) may be needed after flooding.
- The observatory should be cleaned regularly and repaired as needed; the external structure may only receive an annual or twice annual cleaning, but the interior should be cleaned at least weekly based on the level of use. Electrical and mechanical systems should be routinely inspected to ensure proper operation.
- Like the other play areas proposed in the Opportunity Sites, the woods adventure play will need regular visual and physical inspections, and an annual or twice annual inspection by a certified playground inspector. Since the adventure play is located below the normal high water level, the play surface will be PIP. The surface and play features should be cleaned regularly to ensure a safe and clean play area. The play area may need to be closed for flooding, and should be inspected, cleaned, and repaired as needed after floods.
- The treehouse deck will be ipe wood; refer to Section 4.2 for maintenance needs. The seats on the deck will also require inspection, cleaning, repairs, and routine maintenance (tightening connections, vandalism repair, etc.).
- The amphitheater should be inspected before and after events, and cleaned as needed. Mowing will need to be done with a walking mower and string trimmer due to the narrower widths between the steps/seats.
- The Museum's event lawn will need similar maintenance to general lawns as described in Section 4.2, but with additional fertilization, weed control, and renovation due to heavier use.

5.0 MAINTENANCE STRATEGIES

The City is assumed to provide primary responsibility and resources for the maintenance of the GRC and should employ several maintenance strategies to guide their work. These include providing appropriate staffing, facilities, and equipment and planning maintenance work around site access and seasonal conditions such as flooding and ice flows.

5.1. DEFINING MAINTENANCE SKILLS

The level of skills required for maintenance tasks can be divided into five general categories: unskilled, semi-skilled, skilled (trades), ecological/natural resource management, and horticultural:

- Unskilled labor represents those tasks that can be done without training, such as litter removal.
- Semi-skilled labor includes maintenance tasks that can be done with limited training or can be done under supervision. Semi-skilled staff will be limited by the skills and equipment they have, and therefore skilled staff would be needed to fill in the service gap (e.g. semi-skilled staff could replace a light bulb but would not be able to remove and install a full lighting fixture).
- Skilled labor refers to tasks that need specialized equipment and training, namely trades work. Electricians, plumbers, carpenters, and masons fit into this category.
- Ecological/natural resource management and horticultural labor both denote specialized plant and landscape care.
  - ~ Ecological and natural resource management skills focus more on the function of landscapes and their connection to other organisms and systems on the site.
  - ~ Horticultural skills focus more on garden and plant cultivation and management.

A variety of skill sets will be needed to effectively maintain the features proposed in the Design Guidelines. As mentioned in Section 2.1, it is crucial that those performing maintenance work have the proper skills needed for the task. While general grounds care, such as little removal and cleaning signs, can be done by unskilled or semi-skilled staff, a number of other tasks will need to be performed by people with specific skill sets. For example, wetland plantings will need to be cared for by someone with horticultural or ecological skills while seasonal maintenance on an irrigation system will need to be carried out by a trained specialist. Some unskilled and semi-skilled tasks can also be done by volunteers with limited training and/or supervision.

5.2. CURRENT CAPABILITIES OF CITY STAFF

According to the 2017 Grand Rapids Parks and Recreation Strategic Master Plan, the Parks and Recreation Department (PRD) is currently in a state of growth. At the time of the Plan, they had 35 full-time staff (eight operations and maintenance, nine forestry, three cemeteries and golf courses, and two recreation and programming staff) and a large number of seasonal staff (117 parks maintenance, seven urban forestry, six cemeteries, and 135 recreation staff). In total PRD has 29 full-time equivalents (FTEs) for park maintenance. The Department does not have any full-time staff dedicated to marketing, and is limited in terms of community stewardship and volunteer support.

Planting maintenance is contracted out for some areas of the City. Trades work is mostly contracted out, with minor repairs typically done by in-house City staff.

As of the time of this report, the City is undergoing a study on their organizational efficiency and the gap between their current capabilities/resources and the services they expect to provide. The results of this study should be used to help guide the City in best meeting current demands and future GRC demands. In their current condition, PRD will need additional staffing and resources in order to meet the maintenance needs associated with increases in park acreage and the proposed improvements that are part of the GRC.

5.3. IN-HOUSE VERSUS CONTRACTED STAFF

Maintenance work can be performed by in-house staff, contracted staff, or a combination of both. Each strategy has benefits and drawbacks, as outlined in Figure 5.1.

This SAMP recommends in-house staff for maintenance of the GRC as much as possible so that they can become familiar with the site and provide an on-site presence. Staff hired by the City can also be used throughout the City in addition to the GRC. In-house staff will be supplemented by contracted staff where needed. The City can also look to partner with organizations within Grand Rapids for some maintenance services, e.g., having one private entity be responsible for horticultural care if this is not a skill set the City has or wants to develop internally.

When determining whether to hire staff or contract out labor, the City should consider if there is enough work to sustain a staff member of a particular skill set, e.g., having enough projects involving masonry to hire a mason instead of contracting out the service. The City should prioritize hiring staff that possess the skill sets current City staff do not have or have in a limited capacity in coordination with the implementation and maintenance needs of projects along the GRC.

All In-House Scenario	All Contracted Scenario	Mixed Scenario
Pros:	Pros:	Pros:
• *Staff presence at all times - provide user contacts & security* • *Sense of ownership* • *Familiarity & knowledge of the site*	• *Limited equipment and material purchases* • *Smallest facility space needed*	• *Some staff presence* • *Smaller facility space needed* • *Fewer equipment & materials needed and to maintain*
Cons:	Cons:	Cons:
• *Equipment & material purchases* • *More equipment upkeep costs* • *Larger facility space(s) needed*	• *Limited or no site staff presence* • *Need more staff presence through "supplemental" staffing* • *Might not always have the same staff - less familiarity with the site* • *May not have knowledge of plants on the site* • *Lack of sense of ownership*	• *Need more oversight/ coordination* • *Need more staff presence through "supplemental" staffing* • *Might not always have the same staff - less familiarity with the site* • *Limited sense of ownership*

Figure 5.1 - Benefits and Drawbacks of Different Staffing Scenarios

5.4. FURTHER MAINTENANCE CONSIDERATIONS

Maintenance Facilities & Equipment

If in-house staff will be used for maintenance along the GRC, they would benefit from having satellite maintenance facilities at a few key locations along the GRC to store materials and equipment and to provide a place for staff to gather and work out of. (This will decrease mobilization time compared to staff coming to the site from a central maintenance facility that is further away.) There are existing maintenance facilities at Canal Park and Ah-Nab-Awen, and some operations storage space is proposed at Fish Ladder and as part of the adjustable structure at the Storage Yard Opportunity Site. Additional tertiary maintenance facilities should be considered in the southern portion of the GRC and potentially around the Storage Yard Site if the proposed storage space is not sufficient (see Figure 5.2). If the City will not be the ones performing the maintenance work, the tertiary facilities could be used by the entity/entities performing the work.

The new maintenance facilities in the corridor could be 30-foot containers for storage which include charging stations. (Assume approximately 250 square feet in area for planning purposes.) A new facility for the Storage Yard Opportunity Site could be combined with the building.

The City may already own some equipment needed for maintenance of the GRC. They may look to purchase additional equipment depending on if and how many additional staff are hired. Because improvements to the GRC will be made over time, hiring staff and purchasing additional equipment should correspond with areas of the GRC coming on-line.

Figure 5.2 - Maintenance Facility Locations

Maintenance Access

Some areas of the corridor may be more difficult to access than others, particularly those along the river's edge. Special equipment may be needed to access these areas, such as a boat, and maintenance work may be performed less frequently in these areas. Additionally, different tools may be needed for maintenance in areas that can only be reached by boat or foot, rather than by truck or small maintenance vehicle. Using different tools may increase the time needed to perform maintenance work.

Addressing Floods

The most significant flooding for Grand Rapids along the Grand River historically occurs with snow and ice melt in early spring, with the least amount of flooding occurring in the summer (see Figure 5.3). Typically once per year, the river rises to its highest level for several weeks. Other flood events occur two to three times per year and are typically shorter in duration and less intense.

Flooding will limit access to some areas of the GRC and will affect the maintenance work that needs to be performed. Figure 5.4 shows areas of the GRC that are approximately 10 feet below the 100-year flood elevation – an approximation of the 2 to 5 year frequency event and thus represent areas most likely to flood. Currently, Riverside, Ah-Nab-Awen, and Fish Ladder Parks are prone to flooding. As has been done for floods in the past, some parks and trails, or portions thereof, may need to be closed for visitor safety before, during, and after floods. Depending on the location and degree of the flooding, closures may be only a few days or may last a few months (e.g., portions of Coldbrook seasonally flood for two months during the spring). Floods also have the potential to damage spaces along the GRC (trees, hardscapes, etc.) and carry away lighter, unsecured items. Flooded areas will need to be cleaned and inspected once flood waters recede.

It is recommended that the City's current flood protocols for preparing for and cleaning up after floods are followed and potentially expanded, particularly in downtown areas that will experience high levels of use.

Pre-flood protocols:

- Monitor river levels when flooding is expected
- Close or barricade areas that are expected to flood prior to the anticipated flooding; post closures to City website and social media
- Secure or relocate site furnishing and other loose items that may get carried away by floodwaters prior to flood conditions
- For more severe floods, coordinate with County agencies as needed

River Flow	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Avg CFS	*3,920*	*4,470*	*7,620*	*7,150*	*5,120*	*3,610*	*2,280*	*1,820*	*1,980*	*2,440*	*2,970*	*3,490*
Low CFS	*1,069*	*1,079*	*1,858*	*1,759*	*1,459*	*930*	*650*	*617*	*949*	*906*	*1,104*	*1,080*
High CFS	*12,020*	*14,720*	*21,580*	*17,900*	*15,650*	*15,670*	*7,885*	*5,423*	*7,600*	*13,630*	*7,966*	*8,794*
Over 5k CFS (#)	*19*	*21*	*27*	*37*	*23*	*12*	*4*	*2*	*2*	*2*	*3*	*12*
Over 7.5k CFS (#)	*6*	*9*	*24*	*13*	*10*	*3*	*1*	–	*1*	*1*	*4*	*3*
Over 10k CFS (#)	*1*	*3*	*19*	*16*	*4*	*1*	–	–	–	*1*	–	–

Figure 5.3 - USGS Surface-Water Monthly Statistics for the Grand River in Grand Rapids, MI (1901-2017)
Note: CFS = cubic feet per second; k = 1,000

Post-flood protocols:

- Cleanup crew comes to the flooded site once the floodwaters have receded to inspect the area for damage and unsafe conditions, documenting any damage found.
- Repair and/or replace any damaged components of the site according to the maintenance standards for that area; repairs to correct unsafe elements are prioritized over cosmetic repairs.
- Clean up the site so that it will be usable by visitors; areas with significant damage may remained closed for longer while repairs are being performed.

Routine maintenance practices can also help reduce the impact of flooding across GRC sites:

- Seasonally flooded areas should be inspected in late fall for any damage, loose components or broken tree limbs that could pose a hazard during winter ice flows and spring floods.
- Areas should be inspected again after winter ice flows and prior to spring floods for potential hazards, and again in early summer once the spring flood season is over.

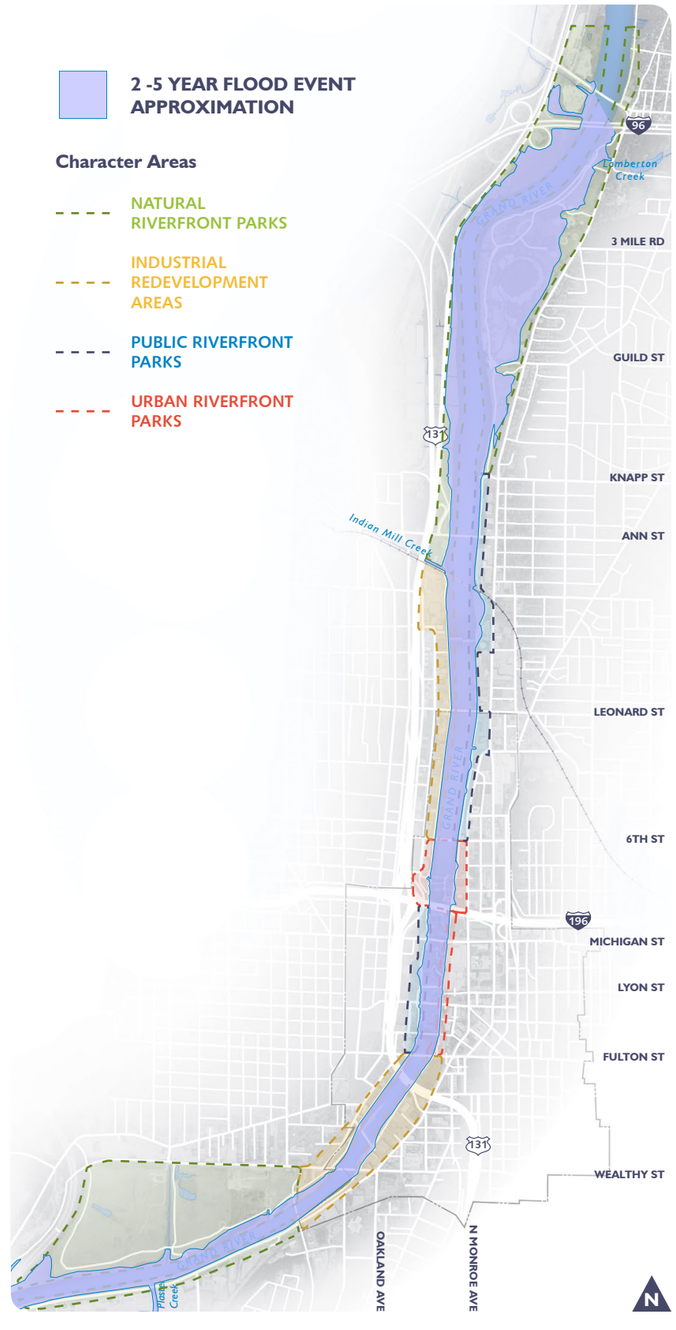

Figure 5.4 - Flood Prone Areas Along the GRC (based on approximation of a 2 to 5 year flood event, using 10' below the 100-year flood elevation)

5.5. PRIORITIZATION

Because the GRC will contain numerous assets but have finite resources for care and operations, it is critical that there are methods to prioritize maintenance and repair. Prioritization commonly revolves around two factors: the relative importance of an asset and the risk of not caring for and/or not replacing the asset.

For example, the National Park Service (NPS) uses an Asset Priority Index (API) as one component of its asset management strategy. The API compares the relative importance of assets in relation to each other by evaluating the asset's importance relative to the mission of the NPS and the site the asset is located in. Five criteria are analyzed as part of the API – cultural resource preservation, natural resource preservation, visitor use, park operations, and suitability – and a score is produced for each asset. Comparing the scores of the assets helps the NPS determine which assets to retain, which assets to replace, and at what level the assets should be maintained at. In conjunction with other criteria, the API serves as a prioritization tool for NPS to most effectively allocate resources and optimize use.

Risk analysis helps prioritize asset management and replacement by evaluating the likelihood the asset will fail (the "Probability of Failure" or PoF) and the impact of the failure (the "Consequence of Failure or CoF). The PoF and CoF are arbitrary to the organization performing the asset management. The City currently assigns a PoF rating based on the asset's percentage of effective life consumed. CoF is based on the type and location of the asset and the amount of use it receives. For example, a small playground in a little-used park would have a lower consequence of failure than if a large playground in a popular park would fail.

In their AMP, the City of Chula Vista developed a risk assessment matrix, which is shown in Figure 5.5. PoF was determined by the condition and age of the asset and assigned a value between 0 and 1. CoF was assigned a 0 to 5 rating based on each asset's importance to its park/location relative to other assets located there and on the relative use of the park the asset is located in. When the values are plotted together, the resulting matrix shows the total level of risk for the assets and can be used to prioritize high risk assets in capital planning.

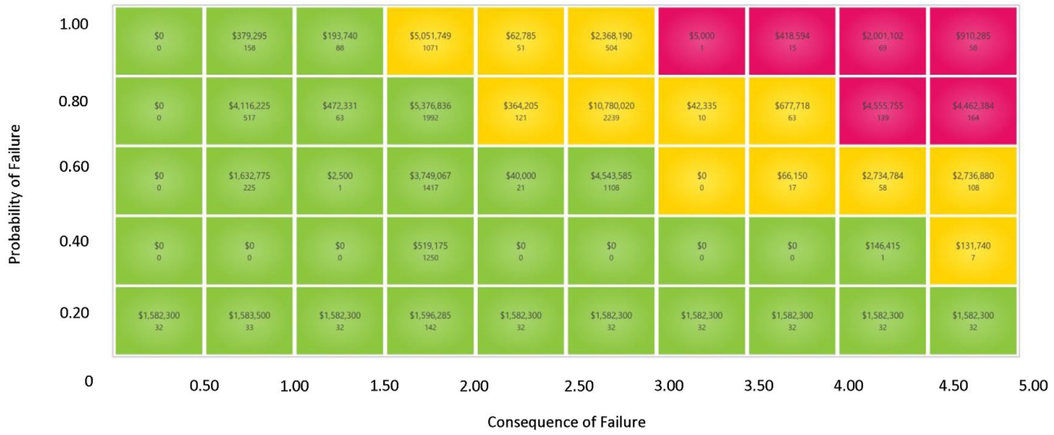

Figure 5.5 - Chula Vista AMP Risk Assessment Matrix

Applying these methods to the GRC, those assets identified as high importance will have a high priority for being consistently maintained and repaired or replaced once they are damaged or fail. Assets at a high risk of failure are high priority candidates for repair and replacement, as well as maintenance in the interim to ensure they do not fail. High risk assets that would have a significant impact if they failed are a high priority for consistent maintenance to meet or extend their life expectancies. Assets scoring high on all three criteria should be given top priority. The City already has a rating system in place for determining the PoF and CoF of assets, but should consider developing a rating system for evaluating the relative importance of assets to the GRC.

6.0 MAINTENANCE FORECASTS

Before implementing a project, it is important to be aware of what resources will be needed to effectively care for it and how long it is supposed to last. This chapter uses the recommended maintenance tasks identified in Chapter 4 as the basis for forecasting annual maintenance and life cycle costs for the proposed landscape and feature types of the GRC. Because the design of the GRC will be developed in the future based on the Design Guidelines recommendations, a total number for annual maintenance of the GRC could not be developed. Instead, these forecasts should be used as part of asset management planning to help guide future development and budgeting efforts. Note that the forecasts have been made according to the assumptions outlined in this plan and should not be taken as definitive estimates due to the high number of variables involved.

6.1. HOUR & COST FORECASTS

6.1.1. Forecasted Annual Maintenance Hours

Annual maintenance tasks were developed for each landscape/feature type defined in Chapter 4 along with an estimated number of hours needed to maintain one (1) unit of each type at the GRC Base LOS. The chart in Figure 6.1 summarizes the hours by unit, while the specific maintenance tasks used to arrive at these hours can be found in Appendix A. Annual hours for maintenance were also forecasted for each landscape/feature type at the other proposed GRC levels of service. These are summarized in Figure 6.2, with the calculations described in Appendix A.

Operational maintenance forecasts have been broken down into routine and non-routine hours for the GRC Base LOS hours. Routine tasks are those that will always need to be done each year, such as cleaning and horticulture care. Non-routine tasks are those that may not always need to be performed each year – they may be seasonal and weather dependent (e.g., flood cleanup), time dependent (e.g., additional maintenance for establishing plants) or a result of failure, vandalism, or wear-and-tear (e.g., pavement and furnishing repairs, or the replacement of LED lights). The total routine hours represent the minimal maintenance that must regularly be performed, while the non-routine hours represent additional maintenance that, while not regularly scheduled and performed, must still be accounted for in developing an overall maintenance plan.

Based on the annual hour estimates by unit and level of service, the total hours (and costs) needed for annual maintenance were also developed for the six opportunity sites along the GRC. These estimates can be found in Section 6.4.

Landscape Type	Unit	Routine Hours per Unit	Non-Routine Hours per Unit	Total Potential Annual Hours per Unit
HARDSCAPES				
Regional Trail	10,000 sf	94	5	99
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	36	28	64
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	36	30	66
Gathering Areas / Plazas - Concrete	10,000 sf	99	4	103
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	62	7	69
Unit Pavers (Mortared on Concrete Base)	10,000 sf	92	4	96
Wood Decking	10,000 sf	63	10	73
Metal Decking	10,000 sf	66	6	72
Street Crossings	10,000 sf	24	6	30
SOFTSCAPES				
Turf Lawn	10,000 sf	101	10	111
Ornamental / Floral Plantings	10,000 sf	152	10	162
Woodlands (Natural Area Type A)	10,000 sf	56	15	71
Wetlands (Natural Area Type B)	10,000 sf	60	20	80
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	71	35	106
Upland Meadows (Natural Area Type D)	10,000 sf	23	10	33
Trees (Specimen / Large Caliper)	20 trees	38	42	80
Trees (Small & Medium Caliper)	20 trees	19	21	40
FURNISHINGS & AMENITIES				
Trash Receptacle	1 receptacle	23	2	25
Fixed Bench	100 lf	15	2	17
Bicycle Rack	10 racks	8	2	9
Drinking Fountain	1 fountain	20	8	28
Lighting (Pole & Pedestrian)	10 fixtures	8	4	12
Lighting (Path & Bollard)	10 fixtures	4	1	5
Signage	10 signs	9	1	10
Railing with Infill Panels	1,000 lf	4	3	7
Railing in Flood Prone Areas	1,000 lf	6	10	16
Retaining Wall (Concrete)	1,000 lf	20	3	23
Reinforced Earth Wall / Vegetated Wall	1,000 lf	36	4	40
Seat Walls & Terraces	1,000 lf	23	2	25
Restrooms	1 set	570	48	618

Note: Non-routine tasks include establishment & plant replacement for softscapes, and repairs & replacements for hardscapes, furnishings, & amenities.

Figure 6.1 - Forecasts of GRC Base LOS Annual Maintenance Hours Per Unit

Landscape Type	Unit	Annual Hours per Unit by LOS			
		A - Heart of Downtown	B - GRC Base LOS	C - Higher Profile Natural Areas	D - Natural Areas & Preserves
HARDSCAPES					
Regional Trail	10,000 sf	119	99	69	40
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	77	64	45	26
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	79	66	46	26
Gathering Areas / Plazas - Concrete	10,000 sf	124	103	72	41
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	83	69	48	28
Unit Pavers (Mortared on Concrete Base)	10,000 sf	115	96	67	38
Wood Decking	10,000 sf	87	73	51	29
Metal Decking	10,000 sf	86	72	50	29
Street Crossings	10,000 sf	35	30	21	12
SOFTSCAPES					
Turf Lawn	10,000 sf	133	111	77	44
Ornamental / Floral Plantings	10,000 sf	194	162	113	65
Woodlands (Natural Area Type A)	10,000 sf	85	71	50	28
Wetlands (Natural Area Type B)	10,000 sf	96	80	56	32
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	127	106	74	42
Upland Meadows (Natural Area Type D)	10,000 sf	39	33	23	13
Trees (Specimen / Large Caliper)	20 trees	96	80	56	32
Trees (Small & Medium Caliper)	20 trees	48	40	28	16
FURNISHINGS & AMENITIES					
Trash Receptacle	1 receptacle	29	25	17	10
Fixed Bench	100 lf	20	17	12	7
Bicycle Rack	10 racks	11	9	6	4
Drinking Fountain	1 fountain	33	28	19	11
Lighting (Pole & Pedestrian)	10 fixtures	14	12	8	5
Lighting (Path & Bollard)	10 fixtures	6	5	4	2
Signage	10 signs	12	10	7	4
Railing with Infill Panels	1,000 lf	9	7	5	3
Railing in Flood Prone Areas	1,000 lf	19	16	11	6
Retaining Wall (Concrete)	1,000 lf	28	23	16	9
Reinforced Earth Wall / Vegetated Wall	1,000 lf	48	40	28	16
Seat Walls & Terraces	1,000 lf	30	25	18	10
Restrooms	1 set	742	618	433	247

Note: Non-routine tasks include establishment & plant replacement for softscapes, and repairs & replacements for hardscapes, furnishings, & amenities.

Figure 6.2 - Forecasts of GRC Annual Maintenance Hours Per Unit by Proposed LOS

6.1.2. Forecasted Annual Maintenance Costs

Based on the forecasted annual maintenance hours, annual maintenance costs were developed for each landscape type by unit. The costs include both fully-loaded personnel costs (with benefits) and "Other Than Personnel Services" (OTPS; includes materials, supplies, equipment, utilities, etc.). Fully-loaded personnel costs are based on hourly rates and fringe benefits for staff provided by the City. Forecasted annual maintenance costs by unit at GRC Base LOS are summarized in Figure 6.3 and costs by unit based on the proposed GRC levels of service are summarized in Figure 6.4. The methodology for calculating these costs is detailed in Appendix A.

Like the forecasted hours, annual costs were separated into routine and non-routine costs for the GRC Base LOS estimates. The total costs per unit represent the cost of performing all anticipated maintenance services, while the routine costs represent the minimal estimated maintenance costs if no non-routine work is performed, i.e. if no repairs, replacements, etc. are done. The costs for routine maintenance services are expected to remain constant from year to year, as these services (e.g. cleaning and horticulture care) will always be needed. On the other hand, the cost for non-routine maintenance services are expected to fluctuate from year to year, since the amount of repairs, replacements, and weather events will vary each year.

Note that all of the above costs are for maintenance only, and do not include programming, security, or administration costs which will be an additional expense for the management entity/entities for the GRC.

For the ongoing maintenance and repair of the GRC and its amenities and site features, both annual maintenance replacement costs and capital replacement costs should be considered. Annual maintenance replacement includes costs for items that need to be regularly replaced due to vandalism or use. Costs for these items - such as lightbulbs, plants and mulch - are included in the annual maintenance costs through the OTPS allowance. Capital replacement costs are those costs associated with replacement or repair of park features due to life-cycle replacement of such features and amenities, e.g. benches, structures, and pavement. They have not been included in the costs above since they are not typical recurring costs.

A more detailed look into replacement and life cycle costs for the materials from the Design Guidelines is presented in the following subsections.

Landscape Type	Unit	Routine Costs per Unit	Non-Routine Costs per Unit	Total Potential Annual Costs per Unit
HARDSCAPES				
Regional Trail	10,000 sf	$4,588	$369	$4,957
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	$1,879	$2,223	$4,102
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	$1,884	$2,501	$4,385
Gathering Areas / Plazas - Concrete	10,000 sf	$4,841	$287	$5,127
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	$3,138	$491	$3,629
Unit Pavers (Mortared on Concrete Base)	10,000 sf	$4,657	$287	$4,943
Wood Decking	10,000 sf	$3,064	$738	$3,802
Metal Decking	10,000 sf	$3,458	$408	$3,866
Street Crossings	10,000 sf	$1,246	$408	$1,654
SOFTSCAPES				
Turf Lawn	10,000 sf	$5,881	$567	$6,448
Ornamental / Floral Plantings	10,000 sf	$8,159	$567	$8,726
Woodlands (Natural Area Type A)	10,000 sf	$2,778	$907	$3,686
Wetlands (Natural Area Type B)	10,000 sf	$3,071	$1,210	$4,280
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	$3,810	$2,467	$6,277
Upland Meadows (Natural Area Type D)	10,000 sf	$1,145	$548	$1,693
Trees (Specimen / Large Caliper)	20 trees	$2,197	$2,577	$4,775
Trees (Small & Medium Caliper)	20 trees	$1,033	$1,305	$2,338
FURNISHINGS & AMENITIES				
Trash Receptacle	1 Receptacle	$1,266	$131	$1,396
Fixed Bench	100 lf	$702	$145	$847
Bicycle Rack	10 racks	$357	$109	$466
Drinking Fountain	1 fountain	$1,065	$620	$1,685
Lighting (Pole & Pedestrian)	10 fixtures	$365	$310	$675
Lighting (Path & Bollard)	10 fixtures	$209	$78	$286
Signage	10 signs	$427	$73	$500
Railing with Infill Panels	1,000 lf	$203	$218	$420
Railing in Flood Prone Areas	1,000 lf	$300	$693	$993
Retaining Wall (Concrete)	1,000 lf	$942	$272	$1,214
Reinforced Earth Wall / Vegetated Wall	1,000 lf	$1,978	$363	$2,341
Seat Walls & Terraces	1,000 lf	$1,092	$182	$1,273
Restrooms	1 set	$32,327	$3,480	$35,807

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.

Figure 6.3 - Forecasts of GRC Base LOS Annual Maintenance Cost Per Unit (in 2018 US dollars)

Landscape Type	Unit	Annual Costs per Unit by LOS			
		A - Heart of Downtown	B - GRC Base LOS	C - Higher Profile Natural Areas	D - Natural Areas & Preserves
HARDSCAPES					
Regional Trail	10,000 sf	$5,948	$4,957	$3,470	$1,983
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	$4,922	$4,102	$2,871	$1,641
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	$5,262	$4,385	$3,069	$1,754
Gathering Areas / Plazas - Concrete	10,000 sf	$6,152	$5,127	$3,589	$2,051
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	$4,354	$3,629	$2,540	$1,451
Unit Pavers (Mortared on Concrete Base)	10,000 sf	$5,932	$4,943	$3,460	$1,977
Wood Decking	10,000 sf	$4,562	$3,802	$2,661	$1,521
Metal Decking	10,000 sf	$4,640	$3,866	$2,706	$1,547
Street Crossings	10,000 sf	$1,985	$1,654	$1,158	$662
SOFTSCAPES					
Turf Lawn	10,000 sf	$7,738	$6,448	$4,514	$2,579
Ornamental / Floral Plantings	10,000 sf	$10,471	$8,726	$6,108	$3,490
Woodlands (Natural Area Type A)	10,000 sf	$4,423	$3,686	$2,580	$1,474
Wetlands (Natural Area Type B)	10,000 sf	$5,136	$4,280	$2,996	$1,712
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	$7,532	$6,277	$4,394	$2,511
Upland Meadows (Natural Area Type D)	10,000 sf	$2,032	$1,693	$1,185	$677
Trees (Specimen / Large Caliper)	20 trees	$5,729	$4,775	$3,342	$1,910
Trees (Small & Medium Caliper)	20 trees	$2,805	$2,338	$1,636	$935
FURNISHINGS & AMENITIES					
Trash Receptacle	1 Receptacle	$1,675	$1,396	$977	$558
Fixed Bench	100 lf	$1,016	$847	$593	$339
Bicycle Rack	10 racks	$559	$466	$326	$186
Drinking Fountain	1 fountain	$2,022	$1,685	$1,179	$674
Lighting (Pole & Pedestrian)	10 fixtures	$810	$675	$472	$270
Lighting (Path & Bollard)	10 fixtures	$343	$286	$200	$114
Signage	10 signs	$599	$500	$350	$200
Railing with Infill Panels	1,000 lf	$504	$420	$294	$168
Railing in Flood Prone Areas	1,000 lf	$1,191	$993	$695	$397
Retaining Wall (Concrete)	1,000 lf	$1,457	$1,214	$850	$486
Reinforced Earth Wall / Vegetated Wall	1,000 lf	$2,809	$2,341	$1,639	$936
Seat Walls & Terraces	1,000 lf	$1,528	$1,273	$891	$509
Restrooms	1 set	$742	$618	$433	$247

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.

Figure 6.4 - Forecasts of GRC Annual Maintenance Cost Per Unit by Proposed LOS (in 2018 US dollars)

6.2. LIFE CYCLE ANALYSIS

6.2.1. Defining the Life Cycle

The life cycle of an asset refers to its total "life" from initial procurement and installation to eventual removal, disposal and replacement. The typical life cycle of an asset is represented by the diagram in Figure 6.5.

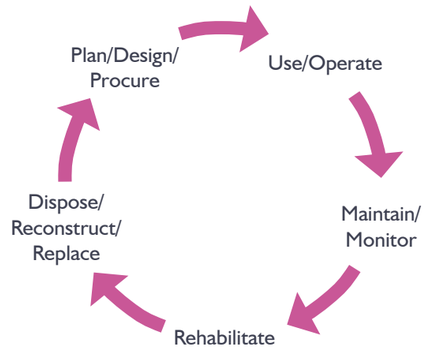

Figure 6.5 - Typical Asset Life Cycle

Hardscapes and site furnishings depreciate over time, and as such, they follow the typical life cycle timeline. In contrast, the "soft" assets that are being examined in the SAMP – trees and the various types of landscape plantings – appreciate over time (their value increases as they mature). They follow a non-traditional asset life cycle, as shown in Figure 6.6.

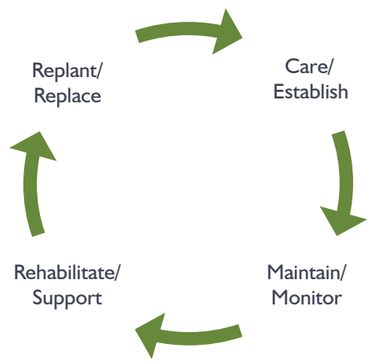

Figure 6.6 - Non-Traditional Asset Life Cycle for Landscapes & Trees

Comparing the general life cycle of hardscapes, furnishings, landscapes, and trees over a relative period of time best illustrates their differences (Figure 6.7). Hardscapes and furnishings begin with stable, routine maintenance needs, develop increasing needs as they age and deteriorate, and ultimately need to be replaced. The life cycle is then repeated with the new asset. Landscape plantings and trees, however, require more maintenance work at the outset (during the establishment period), but then require less maintenance over the course of their lives. Trees will again need more maintenance near the end of their lives until they are replaced. Landscape plantings may never be replaced in full; rather a portion of the landscape is replaced over time, whether by replanting or reseeding some plantings or by the landscapes self-seeding. Note however that landscape plantings which experience heavy use may require full replacement regularly, such as turf event lawns.

6.2.2. Determining Asset Life Cycle and Asset Replacement

With assets that depreciate over time (hardscapes, furnishings, and structures), determining when to replace these assets is relatively straightforward: they will typically be replaced when maintenance is more expensive than replacing it with a new asset, when it is a high risk, or when it has reached the end of its life cycle. For example, the National Park Service (NPS) uses a Facility Condition Index (FCI) to determine when to replace structures they maintain. The FCI compares the projected cost of facility repairs to the current replacement value of the asset. The higher the FCI value, the greater the need for restoration or replacement. Important cultural assets such as heritage sites are also given an FCI value, but high values correspond to stabilization and/or restoration rather than replacement. The NPS uses the FCI in conjunction with the API (see Section 5.5) to determine how

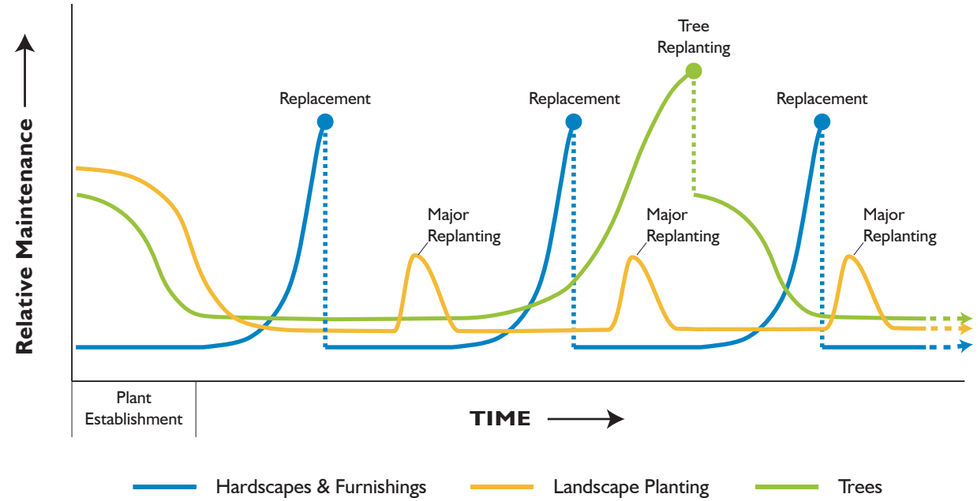

Figure 6.7 - Life Cycle Needs by Asset Type

it manages and replaces its assets. Many organizations also utilize risk analysis to help determine when an asset should be replaced, replacing assets that have the highest risk of failure and/or that would have a significant negative impact if they were to fail. (Risk analysis is discussed in more detail in Section 5.5).

However, a different model for replacement is needed for assets that will increase in value over time (landscape plantings and trees). The principle is the same – evaluating the point at which the maintenance/management would become too burdensome that replacement of the asset would be justified, or the point at which the risk of keeping the asset is too great – but is complicated by the qualitative values often placed on these assets (think of the ecological value of a wetland, stormwater management provided by a rain garden, the social value of trees lining a street, etc.). Furthermore, only some plantings are ever completed replaced; heavy-use lawns, trees, and annual planting beds are a few examples. Other landscapes require a more intensive plant removal and replacement every several years (in contrast to minor removal and replacement done annually), rather than having a complete replacement. (Refer to the "Major Replanting" spikes in Figure 6.7.)

It is crucial to remember that the lifespans of assets are highly dependent on their maintenance and level of use. Assets that are poorly built and/or poorly maintained may fail earlier than their age would suggest, while assets that are well-built and well-maintained may outlast their predicted life span. Even well-maintained assets may fail before their life expectancy if they are impacted by intense levels of use or vandalism. While this SAMP recommends using the anticipated life expectancy of an asset for planning purposes, **the ultimate decision to replace the asset should be based on its observed condition** – not just its modelled lifespan.

6.3. FORECASTED LIFE CYCLE COSTS

Capital repairs and replacements for hardscapes and structures are fairly easy to predict, however, capital repairs and replacements for "soft" features such as turf and plantings are much more variable. The reason is two-fold. Firstly, use has a much greater impact on soft features. For example, an event lawn that is constantly used with inadequate resting between events will deteriorate quickly and likely need to be replaced at the end of the event season. That same event space as a paved surface will require more cleaning and repairs, but the high level of use will not have as drastic of an impact on the life of the surface. Secondly, soft features are alive: they have the ability to recover from some types of damage but they also may not show stress from a disturbance until months or even years afterwards.

For this SAMP, projected life cycle costs for the landscape types include both the installation/replacement (capital) costs and maintenance (operational) costs over the projected lifespan of the asset. Installation/replacement costs are based on the costs used in cost estimates for the GRC project. Maintenance costs assume that the asset will receive routine maintenance over 75% of their lives and both routine and non-routine maintenance over 25% of their lives.

Figure 6.8 shows the forecasted life cycle costs for most of the GRC assets, while Figure 6.9 shows the projected "life segment" costs for softscape assets that are not expected to require a full replacement. The life segment cost forecasts show the estimated costs between major replantings of the landscapes (refer to Figure 6.7); the major replantings are assumed to occur at regular intervals and account for approximately 5% of the overall landscape. Following the major replanting, additional maintenance will be needed for the establishing plants.

All in, life cycle cost projections should be taken with a grain of realism. For one, replacement costs should be viewed with some caution, as an asset may not be replaced with the exact same asset and costs can vary from the initial installation costs in the projections. Additionally, as mentioned in Section 6.2.2, expecting to replace an asset based solely on age can also be misleading because assets that are poorly built and/or poorly maintained may fail early, while assets that are well-built and well-maintained may outlast their estimated useful life. Finally, while proper maintenance will help extend the life span of most assets, unforeseen conditions may adversely affect assets (such as higher levels of use than what was designed for, unusually intense floods or ice flows, operator error, vandalism, tolerating more "wear-and-tear" on assets due to available funding etc.) and cause the lifespan to drastically decrease. As a general estimate, it is wise to set aside approximately 2 to 3% of the annual operating budget for future capital repairs and replacements.

Landscape Type	Unit	Average Lifespan (Years)	Initial Segment Cost			Post-Replanting Segment Costs		
			Installation Cost (2018 USD)	Initial Segment Maintenance Costs*	Total Cost	Major Replanting Cost (2018 USD)	Post-Replanting Segment Maintenance Cost	Total Cost
SOFTSCAPES								
Woodlands (Natural Area Type A)	10,000 sf	10	$50,000	$30,051	$80,051	$2,500	$28,237	$30,737
Wetlands (Natural Area Type B)	10,000 sf	10	$70,000	$33,731	$103,731	$3,500	$31,312	$34,812
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	10	$70,000	$44,269	$114,269	$3,500	$39,336	$42,836
Upland Meadows (Natural Area Type D)	10,000 sf	10	$30,000	$12,822	$42,822	$1,500	$11,726	$13,226

*Assumes 75% of service life is at Routine Costs and 25% of service life is at Non-Routine Costs

Figure 6.9 - Forecasts of Life Segment Costs for Horticultural Landscape Type at GRC Base LOS (in 2018 USD)

Landscape Type	Unit	Average Lifespan (Years)	Installation / Replacement Cost (2018 USD)	Maintenance Cost*	Total Life Cycle Cost	Comments
HARDSCAPES						
Regional Trail	10,000 sf	25	$64,000	$117,002	$181,002	
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	15	$35,000	$36,516	$71,516	Lifespan is for full asphalt layer. Chip and seal top coat will need replacement every 2 to 7 years.
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	10	$35,000	$25,093	$60,093	Lifespan is for full asphalt layer. Chip and seal top coat will need replacement every 1 to 5 years.
Gathering Areas / Plazas - Concrete	10,000 sf	25	$60,000	$122,805	$182,805	
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	10	$40,000	$32,607	$72,607	Lifespan is for gravel top coat. May be shorter with intense flooding. Concrete base expected to last 50+ years.
Unit Pavers (Mortared on Concrete Base)	10,000 sf	20	$140,000	$94,572	$234,572	
Wood Decking	10,000 sf	20	$800,000	$64,967	$864,967	Assumes increased deterioration due to marine conditions.
Metal Decking	10,000 sf	30	$1,500,000	$106,808	$1,606,808	May be deteriorated by marine environment.
Street Crossings	10,000 sf	25	$30,000	$33,707	$63,707	Lifespan is for top course. Lines will need repainting every 5 to 10 years.
SOFTSCAPES						
Turf Lawn	10,000 sf	10	$22,500	$60,229	$82,729	Lifespan highly dependent on level of use.
Ornamental / Floral Plantings	10,000 sf	15	$60,000	$124,514	$184,514	
Woodlands, Wetlands, Stormwater Outfall Wetlands, and Upland Meadows are shown in "Life Segment Costs" table						
Trees (Specimen / Large Caliper)	20 trees	75	$12,000	$213,110	$225,110	Lifespan varies by species.
Trees (Small & Medium Caliper)	20 trees	40	$7,000	$54,360	$61,360	Lifespan varies by species.
FURNISHINGS & AMENITIES						
Trash Receptacle	1 Receptacle	15	$1,100	$19,475	$20,575	
Fixed Bench	100 lf	15	$41,667	$11,068	$52,735	Assumes each bench is $2,500 and 6' in length.
Bicycle Rack	10 racks	10	$8,000	$3,840	$11,840	
Drinking Fountain	1 fountain	10	$7,200	$12,197	$19,397	
Lighting (Pole & Pedestrian)	10 fixtures	30	$85,000	$13,265	$98,265	Driver, surge protector replacement may be needed every 5 to 10 years.
Lighting (Path & Bollard)	10 fixtures	25	$50,000	$5,701	$55,701	Driver, surge protector replacement may be needed every 5 to 10 years.
Signage	10 signs	15	-	$6,678	-	Installation, replacement, and maintenance costs will vary widely by type and size of sign.
Railing with Infill Panels	1,000 lf	20	$80,000	$5,144	$85,144	
Railing in Flood Prone Areas	1,000 lf	10	$80,000	$4,730	$84,730	
Retaining Wall (Concrete)	1,000 lf	30	$500,000	$30,297	$530,297	Assumes some flooding damage.
Reinforced Earth Wall / Vegetated Wall	1,000 lf	20+	$160,000	$41,379	$201,379	Deltalok claims their walls are "permanent"; assuming some damage from flooding for these estimates.
Seat Walls & Terraces	1,000 lf	25	$100,000	$28,425	$128,425	
Restrooms	1 set	20	$100,000	$663,936	$763,936	Components within the restroom may need to be replaced more frequently.

*Assumes 75% of service life is at Routine Costs and 25% of service life is at Non-Routine Costs

Figure 6.8 - Forecasts of Life Cycle Costs by Landscape Type at GRC Base LOS (in 2018 USD)

6.4. OPPORTUNITY SITES MAINTENANCE ESTIMATES

The hour and cost estimates for the Opportunity Sites are based on their schematic level designs. They should be taken as order of magnitude estimates only, since the designs are expected to change between concept and construction. The hour estimates use the hours defined for the corridor-wide landscape types at the recommended LOS for the opportunity site, as well as estimated hours for new landscape and feature types only found within the opportunity sites. Cost estimates are based on the hour estimates.

Note that estimates were not done for the Public Museum site, as maintenance for the site will be the responsibility of the Museum and not the City. The estimates also do not include maintenance for the in-river restoration improvements nor the interior of the Winter Lodge used for programs and events.

Maintenance tasks for the opportunity sites and the expanded hour and cost calculations can be found in Appendix B.

Leonard to Ann Street Trail - Estimated Annual Maintenance Hours

Landscape Category	Routine Hours	Non-Routine Hours	Total Hours
Hardscapes	590	45	635
Softscapes	1019	320	1338
Furnishings & Amenities	55	23	78
Special Features	0	0	0
Total Annual Hours	**1,663**	**388**	**2,051**

Water Department Storage Yard - Estimated Annual Maintenance Hours

Landscape Category	Routine Hours	Non-Routine Hours	Total Hours
Hardscapes	573	42	615
Softscapes	2082	452	2534
Furnishings & Amenities	238	44	282
Special Features	1,736	232	1,968
Total Annual Hours	**4,628**	**770**	**5,398**

O&M of the Winter Lodge's event/classroom space not included.

Coldbrook Site - Estimated Annual Maintenance Hours

Landscape Category	Routine Hours	Non-Routine Hours	Total Hours
Hardscapes	789	43	831
Softscapes	1087	216	1304
Furnishings & Amenities	376	56	432
Special Features	74	23	97
Total Annual Hours	**2,326**	**337**	**2,664**

North Monroe - Estimated Annual Maintenance Hours

Landscape Category	Routine Hours	Non-Routine Hours	Total Hours
Hardscapes	853	38	891
Softscapes	1628	349	1977
Furnishings & Amenities	887	111	997
Special Features	916	178	1094
Total Annual Hours	**4,283**	**676**	**4,960**

Fish Ladder - Estimated Annual Maintenance Hours

Landscape Category	Routine Hours	Non-Routine Hours	Total Hours
Hardscapes	274	17	291
Softscapes	406	148	554
Furnishings & Amenities	207	37	244
Special Features	994	93	1087
Total Annual Hours	**1,881**	**296**	**2,177**

Public Museum Site - Estimated Annual Maintenance Hours

Landscape Category	Routine Hours	Non-Routine Hours	Total Hours
Hardscapes	-	-	-
Softscapes	-	-	-
Furnishings & Amenities	-	-	-
Special Features	-	-	-
Total Annual Hours	**-**	**-**	**-**

Note: Museum will be responsible for maintenance.

Figure 6.9 - Estimated Annual Maintenance Hours for the Six Opportunity Sites

Leonard to Ann Street Trail - Estimated Annual Maintenance Costs

Landscape Category	Routine Costs	Non-Routine Costs	Total Costs
Hardscapes	$28,774	$3,345	$32,118
Softscapes	$51,345	$19,157	$70,502
Furnishings & Amenities	$2,617	$1,777	$4,394
Special Features	$0	$0	$0
Total Annual Costs	**$82,735**	**$24,278**	**$107,014**

Water Department Storage Yard - Estimated Annual Maintenance Costs

Landscape Category	Routine Costs	Non-Routine Costs	Total Costs
Hardscapes	$28,634	$2,984	$31,618
Softscapes	$112,817	$26,788	$139,605
Furnishings & Amenities	$12,612	$3,234	$15,847
Special Features	$106,406	$19,152	$125,558
Total Annual Costs	**$260,469**	**$52,158**	**$312,626**

O&M of the Winter Lodge's event/classroom space not included.

Coldbrook Site - Estimated Annual Maintenance Costs

Landscape Category	Routine Costs	Non-Routine Costs	Total Costs
Hardscapes	$39,257	$3,100	$42,357
Softscapes	$60,951	$13,339	$74,290
Furnishings & Amenities	$20,100	$4,198	$24,299
Special Features	$3,810	$1,748	$5,558
Total Annual Costs	**$124,119**	**$22,385**	**$146,503**

North Monroe - Estimated Annual Maintenance Costs

Landscape Category	Routine Costs	Non-Routine Costs	Total Costs
Hardscapes	$42,099	$2,782	$44,881
Softscapes	$92,154	$21,998	$114,152
Furnishings & Amenities	$47,654	$8,711	$56,365
Special Features	$50,714	$13,948	$64,662
Total Annual Costs	**$232,621**	**$47,438**	**$280,059**

Fish Ladder - Estimated Annual Maintenance Costs

Landscape Category	Routine Costs	Non-Routine Costs	Total Costs
Hardscapes	$13,480	$1,257	$14,737
Softscapes	$21,901	$8,745	$30,647
Furnishings & Amenities	$10,924	$2,708	$13,631
Special Features	$49,224	$6,725	$55,949
Total Annual Costs	**$95,530**	**$19,435**	**$114,965**

Public Museum Site - Estimated Annual Maintenance Costs

Landscape Category	Routine Costs	Non-Routine Costs	Total Costs
Hardscapes	-	-	-
Softscapes	-	-	-
Furnishings & Amenities	-	-	-
Special Features	-	-	-
Total Annual Costs	**-**	**-**	**-**

Note: Museum will be responsible for maintenance.

Figure 6.10 - Estimated Annual Maintenance Costs for the Six Opportunity Sites (in 2018 USD)

7.0 OPERATING MODELS & MANAGEMENT STRATEGIES

Management – the day-to-day deployment of people, materials, and equipment – determines how well or how poorly parks and public spaces are maintained, and ultimately, how successful asset management will be over the long-term. Parks and public spaces are complex management entities. For effective maintenance, there must be creative, capable, and flexible management that can respond to new uses as well as changing landscape maintenance needs. In addition, having visitors mean that a high level of resources must be committed to simple daily cleaning.

The long-term success of the GRC will not only rely on capital improvements, but on effective maintenance, appropriate programming, consistent operational funding, and focused management. While adequate funding plays a key role, focused management is essential to ensuring that operations, maintenance, and programming efforts are coordinated and properly directed.

7.1. TYPES OF OPERATING MODELS

Like all questions of municipal governance and management, operating in the public realm raises issues of public versus private control and ultimately of accountability, effectiveness and equity. Today, imaginative options exist throughout the U.S. for new management initiatives, many having been in operation for a number of years. These models maintain public accountability while at the same time attempting to broaden possible funding sources, increase citizen involvement, raise standards of service, and deliver an entrepreneurial management spirit.

Typically, there are three types of operating models: Public Sector Management; Public/Private Partnership; and Private Sector Management. Each model has benefits and drawbacks, as shown in Figure 7.1.

Operating Models	Pros	Cons
Public Sector Management	• *Access to public capital funds* • *Access to public operating funds* • *Access to public sector resources*	• *Risk of lack of long-term sustainability* • *Affected by changing political ideas* • *Cumbersome public sector procedures* • *Availability of public funding changes* • *Overlapping jurisdictional responsibilities with differing objectives*
Private Sector Management	• *Committed and focused* • *Access to private funds* • *Flexible* • *Not subject to election-year cycles* • *Capacity to negotiate beneficial relationships*	• *Start-up costs* • *Need long-term commitment for operating funding* • *Requires private funding base* • *Requires other sources of revenue*
Public/Private Partnership	• *Flexible* • *Can leverage public and private funding* • *Single focused vision* • *Capacity to negotiate beneficial relationships* • *Able to take long-term view*	• *Diminished public control* • *May have limited access to public agencies and staff* • *Subject to changing economic and financial realities*

Figure 7.1 - Types of Operating Models

7.2. POTENTIAL MANAGEMENT STRUCTURES

In addition to Parks and Recreation, other City departments and organizations currently play a role in operations and management of the Grand River and areas encompassed by the GRC. These organizations and their roles are shown in the table below.

The jurisdictional boundaries of the Downtown Development Authority (DDA), Downtown Improvement District (DID), and Monroe North Tax Increment Financing Authority (TIFA) encompass only part of the GRC (see Figure 7.3). Because of this, any potential services or funding they contribute to the maintenance and operations of the GRC will likely be limited to their boundaries, such as the existing Downtown Ambassadors program.

Organization	Current Role
City of Grand Rapids	*various tasks across numerous City departments, including Parks & Recreation, Environmental Services (stormwater), and Public Services (waste & streets)*
Friends of Grand Rapids Parks	*long-standing community organization (founded 2008) with a strong volunteer base that advocates for parks and recreation within Grand Rapids; currently undergoing their own strategic planning process and may take on new roles in the community; current partner of the City*
Grand Rapids Whitewater	*nonprofit organization that championed the initiative to restore & revitalize the River; focus is on reintroducing the rapids to the river*
Downtown Grand Rapids, Inc.	*supports public arts and cultural programming in downtown public parks; is the management entity for the DDA, DID and TIFA; manages the Downtown Ambassadors program (cleaning, beautification, and hospitality services)*
Downtown Development Authority	*uses incremental property taxes to finance improvements and maintenance of public amenities in the downtown area, as well as some programming*
Downtown Improvement District	*uses a special assessment on real property value to finance maintenance and programming*
Monroe North Tax Increment Financing Authority	*uses funding generated through increased property values within the boundary to support property improvements, build infrastructure, and maintain and expand parks & public amenities*
Urban Forest Committee	*support Grand Rapid's urban forest program, help provide adequate personnel and budget resources to ensure effective functioning of the Forestry Division*
Grand Action	*nonprofit organization to identify, get support, and implement funding strategies for downtown building and revitalization projects*
Grand Rapids Public Schools	*has a Joint Use agreement with the City over the sharing of school-park spaces, as well as public school swimming pools, gymnasiums, and recreation spaces*
Grand Rapids Public Museum	*located along the Grand River; currently maintains the grounds*
Kent County	*Emergency Management: coordination of flood response and point of contact* *Roads: maintenance of county roads*
Michigan Department of Transportation	*provides maintenance for some rights-of-way and trees*
Michigan Department of Environmental Quality	*monitors the state's water resources, including the Grand River*

Figure 7.2 - Current Grand River Corridor Organizations

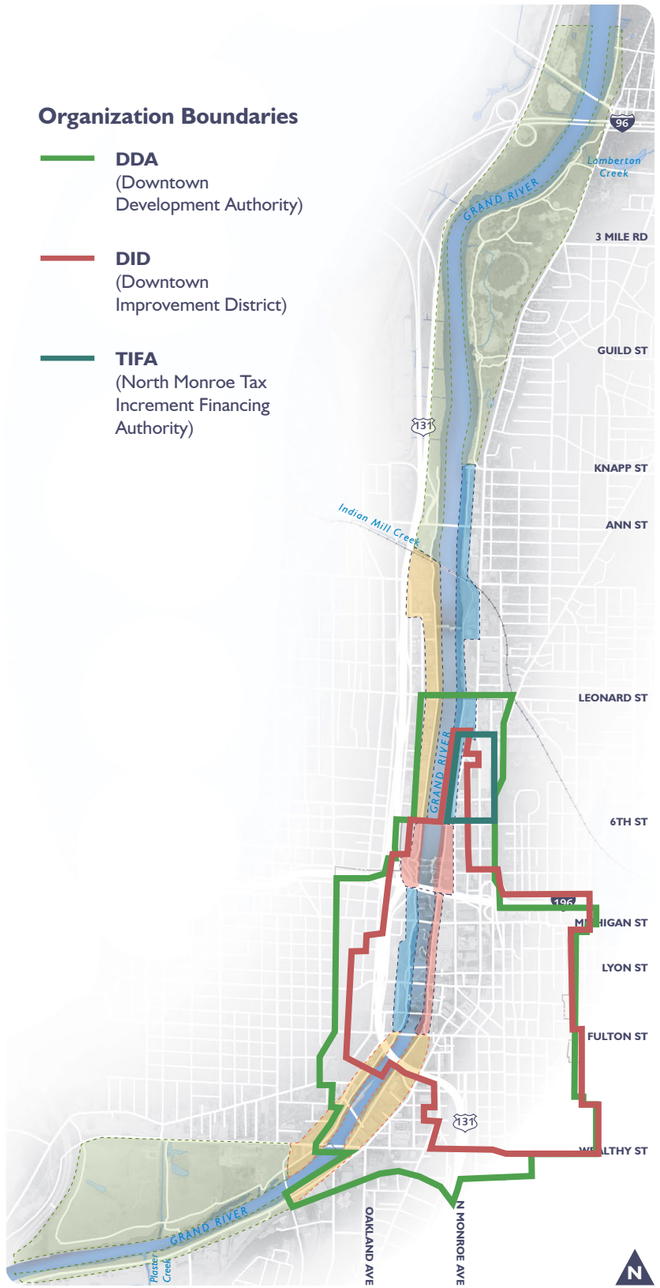

Figure 7.3 - Organizational Boundaries Compared to GRC Extent

Many of the organizations currently involved in the areas included in the GRC have the potential to be involved in its future management. An example of how these organizations may work together for managing the GRC is shown in Figure 7.4.

To better coordinate operations across the GRC, a "Management Cabinet" with the major organizations in the GRC could be formed. The Cabinet would be headed by the City and would meet monthly to every two months to coordinate management and discuss challenges and opportunities along the GRC.

	City of Grand Rapids Parks and Recreation	City of Grand Rapids (other)	Downtown Grand Rapids, Inc.	Friends of Grand Rapids Parks	Grand Rapids Public Museum
Management	*Provide overall oversight of the GRC and coordinates management*	*Flood control and cleanup support*	*Coordinates management with P&R*		*Coordinates management with P&R*
Maintenance	*Provide oversight and overall standards of care for entirety of GRC; responsible for base level of maintenance throughout GRC*	*Support P&R with maintenance work (in-kind)*	*Provide additional maintenance work within downtown to support the higher standards of care in downtown*		*Maintains the property around the museum to GRC standards*
Security		*City police to provide base-line of enforcement*	*Provide support through Downtown Ambassadors program*		*Responsible for security around the museum property*
Permitting	*Coordinate all necessary permits related to retail/ concessions and programs*	*Assist P&R in permitting process as needed*			*Controls permitting of events on museum property*
Programming	*Provide overall oversight and support development of programming along the GRC*		*Develop & coordinate programming within downtown*	*Coordinate any programs with P&R and DGRI*	*Coordinates programs on museum property with P&R and DGRI*
Volunteer Coordination			*Coordinate volunteer activities within DDA and DID boundaries*	*Develop, oversee, and coordinate volunteer activities*	
Communications & Marketing	*Support in communications and marketing efforts*		*Support in communications and marketing efforts*	*Serve as lead for all communications and marketing efforts relating to programming & volunteer efforts*	
Funding	*Responsible for site-wide revenue from commercial agreements, rents, etc.*		*Provide funding through in-kind services*	*Contribute funds to support O+M efforts*	
Revenue	*Identify revenue opportunities and coordinate with existing revenue initiatives*	*Support identification and implementation of revenue opportunities*	*Support identification and implementation of revenue opportunities*	*Support identification and implementation of revenue opportunities*	

Figure 7.4 - Potential Roles and Responsibilities for the GRC

7.3. SECURITY STRATEGIES

A three-tiered approach to day-to-day park security is recommended for the GRC:

- visitors/consistent use to provide a site presence and implied security;
- Grand Rapids Police Department (GRPD) to provide a base level of security; and
- off-duty police and contracted security to provide supplemental security.

Special events should have their own security independent of typical day-to-day security. Special event security is expected to be the responsibility of the event host.

The level of day-to-day security will vary across the GRC based on levels of use along the corridor. Aside from additional security for events, the GRPD and everyday users should provide sufficient security for the natural areas, nature trails, and preserves. However, a dedicated presence is recommended for higher use public spaces. Within downtown, this security can be provided through the Downtown Ambassadors program. Contracted security, or a new River Corridor Ambassador force, could be used to provide security in higher use areas outside of the Downtown Ambassadors' boundary.

It is important that appropriate security is provided at the outset to show that the site will be cared for and to deter potential vandals. (It is typically harder to stop vandalism from reoccurring than it is to prevent it from starting.)

Rates for various security personnel are shown in the table below.

Security Staff Type	Rates
DGRI Ambassadors	*Ambassadors: $13.77 per hour* *Team Leader: $18.16 per hour* *Operations Manager: $34.18 per hour* *Note: All rates are fully-loaded*
Contracted Security	*$15 to $26 per hour depending on firm and type of service*
Grand Rapids Police Department	*$47.42 to $94.84 per hour for off-duty police depending on the level of the officer*

Figure 7.5 - Security Rates for GRC

7.4. REVENUE STRATEGIES

Planning for appropriate asset management is one thing – finding the funding for its ongoing care is another. It is critical to determine a variety of strategies that can be used to obtain adequate revenue to maintain assets at an appropriate level. Beneficial to this process is to determine what the "Infrastructure Gap" is – "the difference between the amounts of funding required to maintain our assets in a reasonable state of repair, compared with the currently available capital funding [for life cycle renewal] over the next ten years" (from City of Windsor, Ontario, AMP and Strategy).

One strategy to ensure some level of funding for asset management is to establish life cycle renewal capital programs. These are specific capital programs that raise funds for replacing assets at the end of their useable lives. Similarly, an amount can be allocated annually to a restricted capital expenditure account to help pay for future replacements and major repairs of park assets as they reach the end of their lives. This amount is recommended to be 2% to 3% of the annual operating budget.

Capital projects are typically "sexier" than picking up litter, painting benches, and other annual maintenance needs since they often involve ribbon cuttings and donor recognition. Consequently, they may be relatively easier to obtain funding for. To address this, an operations and maintenance reserve can be included in the initial capital budget for GRC projects. The reserve would provide funding for ideally two to five years of maintenance costs and offer a small cushion of time for the management entity to secure adequate funding for O+M costs. Note, however, that City bonds will likely not be able to be used to create an operating reserve, but private money can be used. Increasing the millage fee could also provide additional maintenance funds (though much of the current millage is restricted to capital improvements with some going toward deferred maintenance).

Donations that directly fund operations and maintenance are another possibility. Some organizations provide the option for donors to "buy" a bench, tree, or planting bed for the year, with the price being the approximate cost to annually maintain the feature. Donors are typically recognized via a plaque at the location, in an annual report, or online.

A range of additional funding strategies are identified in Chapter 3 and the Appendix of *Your City, Your Parks: City of Grand Rapids Parks and Recreation Strategic Master Plan*.

8.0 A LIVING PROCESS

The SAMP is a living document that is meant to be continually updated. The Plan-Do-Check-Act method, coupled with monitoring and integration into City practices, can encompass a living process to ensure the SAMP remains up-to-date and best able to serve the GRC.

8.1. WHAT IS PLAN-DO-CHECK-ACT? - THE IMPORTANCE OF PDCA

Plan-Do-Check-Act (also called Plan-Do-Study-Act, the Deming Wheel, and the Shewhart Cycle) is an iterative four step model for continuous improvement. It focuses implementing and analyzing change and allows for improvements to be built into the work process.

There are four steps to PDCA:

1. Plan – assess the current process or project and plan an action/change (typically to address a problem or exploit an opportunity)
2. Do – test/enact the action/change (usually on a smaller scale or as a pilot project) and gather data
3. Check/Study – analyze and study the results of the test
4. Act – act based on the analysis, and use what was learned to plan future actions

To show how PDCA can be applied to the SAMP, take the example of adjusting maintenance standards for the GRC. First, the current maintenance standards are examined and adjustments are identified ("Plan"). The adjustments are then implemented as a test in parts of the GRC ("Do"). After a period of time, the data and results from the adjusted standards are compared to data from the previous standards ("Check"). If the results were positive (such as the quality and/or efficiency of maintenance services have improved, maintenance work better addresses the quantity of visitors, etc.), then the adjusted standards are implemented across the GRC and become the new baseline. If the results are negative, the current standards remain in place and what was learned in the process is used to inform future actions ("Act"). The cycle continues as further adjustments to the maintenance practices are planned.

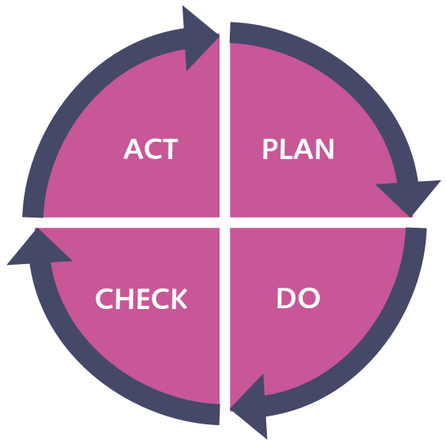

Figure 8.1 - PDCA Cycle

8.2. MONITORING & RECORD KEEPING

Monitoring is a key component of successful operations. It can identify areas of challenge and successes and reveal where maintenance standards are too much or not enough. Keeping accurate and detailed records can reveal trends over time and be used to inform changes to maintenance practices and future material selections. Good record keeping is also important for a successful PDCA cycle.

Monitoring and record keeping should include tracking assets at different scales, from the individual asset to the park/area it is located in, to the larger Character Areas. The collected information can reveal what assets or areas may need more or less maintenance and if there are any recurring issues. The data can also be used to analyze how much an asset has been repaired and help determine when the asset would be better off replaced than continually repaired. Eventually, historical trends can be used to perform more efficient and effective maintenance.

8.3. IMPLEMENTATION & INTEGRATION

One of the first steps to implementing the SAMP for the GRC is to develop and maintain an up-to-date, thorough and reliable inventory, beginning when the first components of the GRC are built and continuing with updates as additional parts of the GRC come on-line. The City currently has an asset register for some of its assets following an Asset Management Inventory in 2014, but otherwise is in the beginning stages of implementing an asset management program. This SAMP can serve as the first steps toward creating a robust asset management program for the GRC and the City. The City should consider expanding the existing register to include GRC assets to record and track their conditions over time. The asset register can be used to see how changes to maintenance practices and visitor use affect the state of the assets, and can inform future replacement schedules. If one does not already exist, the City should develop a standard checklist, information sheet, or online form that can be filled out by staff when they are evaluating the condition of assets. In addition, the City can consider investing in a dedicated asset management program and/or incorporating geotags into the asset registry to better oversee and coordinate asset management and service delivery.

City maintenance staff will need to be made aware of the SAMP and of any new requirements and tasks associated with asset management such as record keeping. Within the City government, it will be vital to integrate the SAMP with financial planning and budgeting so that some funding is allocated for operations and maintenance and potential capital repairs. Being able to predict the potential costs of GRC capital repairs as well as future maintenance costs over the next several budget cycles using the SAMP will be useful in planning future budgets and setting a target for needed funding.

ASSET MANAGEMENT

APPENDIX A: MAINTENANCE FORECASTS REFERENCE

CONTENTS

A.1. GRC BASE LOS ANNUAL MAINTENANCE TASKS

Below is a summary of the methodology behind determining the necessary task hours to annually maintain of unit of each landscape category (see Sections 4.2 and 6.1.1). The standards of care in the task hour tables have been developed to reflect the proposed GRC Base Level of Service as well as the climate and anticipated usage of the site. The frequencies represent an average to be performed over the course of the year. Actual maintenance will ultimately be based on usage, weather, season, and available resources.

To aid in cost estimates, tasks were assigned to three different levels of staff. W-1 is semi-skilled labor, W-2 is skilled labor, and W-3 is trades labor.

The task hour charts on the following pages include the following terms and abbreviations:

TASK – The specific maintenance task

QTY – The estimated quantity over which a task is performed (Many of the tasks are estimated as a percentage of the total quantity.)

UNIT – A unit is a commonly accepted unit of measurement for each landscape type and its associated tasks. The unit abbreviations used throughout this project include:

- ACRE - 43,560 Square Feet
- MSF - 1,000 Square Feet
- CSF - 100 Square Feet
- CLF - 100 Linear Feet
- XSF - 10 Square Feet
- XLF - 10 LF
- Each or EA - 1 of a particular item
- Allow – Allowance of time for a particular task

UNIT (MIN) – Time standard necessary to complete 1 UNIT of a task in minutes (These time standards are based on the "Park Maintenance Standards" published by the National Recreation and Park Association (NRPA) and adjusted for the project's location and management goals.)

ONCE (MIN) – The quantity of the task multiplied by the time standard and shown in minutes

ONCE (HOURS) – The time in minutes converted into hours

ANNUAL FREQUENCY – Number of times the task is performed annually

TOTAL HOURS – The annual frequency multiplied by the time in hours for performing the task once

QTY X UNIT = ONCE (MIN) → ONCE (HOURS) X ANNUAL FREQUENCY = TOTAL HOURS/UNIT/YEAR

As an example of how to read the task hours, the sample line item below is for mowing turf (open area). The task's units are 1,000 sf (msf). The quantity for each time the task is performed is 28,000 square feet (28 x 1,000 sf), which is approximately 65% of an acre (see comments). It is estimated that doing this task once for 1,000 sf would be three minutes, so doing the task once for 28,000 sf would take 84 minutes (or approximately 1.4 hours). If the task would be done 28 times per year, it would require about 39 hours per year.

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS
Mow turf (open area)	28	msf	3	84	1.4	28	39	65% of an acre with ride-on mower; 1x/week during growing season

TASK HOURS FOR GRAND RIVER CORRIDOR - GRC BASE MAINTENANCE STANDARD

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
HARDSCAPES											
Regional Trail (12' Main Concrete Trail w/ Tectura Pavers in Key Locations)							**99**	**Hours per 10,000 sf**	**94**	**2**	**3**
Routine Tasks							94	Hours per 10,000 sf	93	1	0
Litter removal	1	msf	3	3	0	260	13	10% of an area, 5x per week	13		
Blow debris	1	msf	6	6	0	104	10	10% of area, average 2x per week with hand or backpack blower	10		
Power washing	2	msf	30	60	1	4	4	20% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle	4		
Debris removal from drain inlets		allow					2	Done every two weeks to remove debris and sediment	2		
Graffiti removal		allow					2	Includes both gum & graffiti removal	1	1	
Snow/ice removal by snow blower	9	msf	15	135	2	15	34	Paved surfaces accessible by blower; assumes 90% of paved areas	34		
Snow/ice removal by hand	1	msf	80	80	1	15	20	Paved surfaces not accessible by blower; assumes 10% of paved areas	20		
Minor snow removal		allow					5	Snow removal done for minor accumulations as needed	5		
Spread de-icer	2	msf	5	10	0	24	4	Paved surfaces as needed, using a calcium chloride de-icer	4		
Non-Routine Tasks							*5*	*Hours per 10,000 sf*	*1*	*1*	*3*
Flood prep and clean-up		*allow*					2	*Trail closures as needed, post-flood inspection, cleaning, and repairs*	*1*	*1*	
Paving repair		*allow*					*3*	*Repair pavement markings, cracks, spalling, settling, shifted or damaged pavers, etc.*			3
Secondary & Tertiary Chip-Sealed Asphalt Trails							**64**	**Hours per 10,000 sf**	**32**	**8**	**24**
Routine Tasks							36	Hours per 10,000 sf	30	6	0
Litter removal	1	msf	3	2	0	260	7	5% of an area, 5x per week	7		
Blow debris	1	msf	6	6	0	104	10	10% of area, average 2x per week with hand or backpack blower	10		
Power washing	2	msf	30	60	1	4	4	20% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle to avoid overexposing the chip & seal aggregate	4		
Patching		allow					9	Fill in bare/worn patches of chip & seal surface	4.5	4.5	
Graffiti removal		allow					2	Includes both gum and graffiti removal	1	1	
Spread de-icer	2	msf	5	10	0	24	4	Paved surfaces as needed	4		
Snow management		allow					0	Assumes secondary and tertiary trails receive no snow management	0		
Non-Routine Tasks							*28*	*Hours per 10,000 sf*	*2*	*2*	*24*
Flood prep and clean-up		*allow*					*4*	*Trail closures as needed, post-flood inspection, cleaning, and repairs*	*2*	*2*	
Paving repair		*allow*					*24*	*Replacement of chip & seal surface every 2 to 7 years*			*24*
Flood Prone Secondary & Tertiary Chip-Sealed Asphalt Trails							**66**	**Hours per 10,000 sf**	**32**	**10**	**24**
**assumes two months of closures annually due to flooding*											
Routine Tasks							36	Hours per 10,000 sf	29	7	0
Litter removal	1	msf	3	2	0	220	6	5% of an area, 5x per week	6		
Blow debris	1	msf	6	6	0	88	9	10% of area, 2x per week with hand or backpack blower	9		
Power washing	2	msf	30	60	1	4	4	20% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle to avoid overexposing the chip & seal aggregate	4		
Patching		allow					12	Fill in bare/worn patches of chip & seal surface	6	6	
Graffiti removal		allow					2	Includes both gum and graffiti removal	1	1	
Spread de-icer	2	msf	5	10	0	20	3	Paved surfaces as needed	3		
Snow management		allow					0	Assumes secondary and tertiary trails receive no snow management	0		
Non-Routine Tasks							*30*	*Hours per 10,000 sf*	*3*	*3*	*24*
Flood prep and clean-up		*allow*					*6*	*Trail closures as needed, post-flood inspection, cleaning, and repairs*	*3*	*3*	
Paving repair		*allow*					*24*	*Replacement of chip & seal surface every 1 to 5 years*			*24*

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Gathering Areas / Plazas - Concrete							**103**	**Hours per 10,000 sf**	**99**	**2**	**2**
Routine Tasks							99	Hours per 10,000 sf	98	1	0
Litter removal	1	msf	3	3	0	260	13	10% of an area, 5x per week	13		
Blow debris	1	msf	6	6	0	156	16	10% of area, 3x per week with hand or backpack blower	16		
Power washing	2	msf	30	60	1	4	4	20% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle	4		
Debris removal from drain inlets		allow					2	Done every two weeks to remove debris and sediment	2		
Graffiti removal		allow					2	Includes both gum & graffiti removal	1	1	
Snow/ice removal by snow blower	9	msf	15	135	2	15	34	Paved surfaces accessible by blower; assumes 90% of paved areas	34		
Snow/ice removal by hand	1	msf	80	80	1	15	20	Paved surfaces not accessible by blower; assumes 10% of paved areas	20		
Minor snow removal		allow					5	Snow removal done for minor accumulations as needed	5		
Spread de-icer	2	msf	5	10	0	24	4	Paved surfaces as needed	4		
Non-Routine Tasks							*4*	*Hours per 10,000 sf*	*1*	*1*	2
Flood prep and clean-up		*allow*					2	*Closures as needed, post-flood inspection, cleaning, and repairs*	*1*	*1*	
Paving repair		*allow*					2	*Repair pavement markings, cracks, spalling, settling, etc.*			2
Gathering Areas / Plazas - Crushed Gravel							**69**	**Hours per 10,000 sf**	**64**	**2**	**4**
Routine Tasks							62	Hours per 10,000 sf	62	0	1
Litter removal	1	msf	5	5	0	260	22	5% of an area, 5x per week	22		
Misting	5	msf	20	100	2	8	13	50% of area, to prevent dusting during dry seasons	13		
Minor maintenance & repairs	3	msf	30	90	2	12	18	30% of area; raking, spot leveling, and refilling as needed and after storm events	18		
Minor snow removal		allow					5	Snow removal done for minor accumulations as needed; no removal done for larger accumulations	5		
Edging		allow					1	Maintenance & repair as needed	0.5		0.5
Non-Routine Tasks							*7*	*Hours per 10,000 sf*	*2*	*2*	*3*
Flood prep and clean-up		*allow*					*4*	*Post-flood inspection, refilling, replacement; note that crushed gravel is not permitted below normal high water level*	2	2	
Major renovations	*2*	*msf*	*90*	*180*	*3*	*1*	*3*	*20% of area; filling and leveling; may require bringing in new materia; inspect concrete base during repairs*			*3*
Unit Pavers (Mortared on Concrete Base)							**96**	**Hours per 10,000 sf**	**92**	**2**	**2**
Routine Tasks							92	Hours per 10,000 sf	91	1	0
Litter removal	1	msf	3	3	0	260	13	5% of an area, 5x per week	13		
Blow debris	1	msf	6	6	0	104	10	10% of area, 2x per week with hand or backpack blower	10		
Power washing	2	msf	30	60	1	4	4	20% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle	4		
Graffiti removal		allow					2	Includes both gum and graffiti removal	1.0	1	
Snow/ice removal by snow blower	9	msf	15	135	2	15	34	Paved surfaces accessible by blower; assumes 90% of paved areas	34		
Snow/ice removal by hand	1	msf	80	80	1	15	20	Paved surfaces not accessible by blower; assumes 10% of paved areas	20		
Minor snow removal		allow					5	Snow removal done for minor accumulations as needed	5		
Spread de-icer	2	msf	5	10	0	24	4	Paved surfaces as needed	4		
Non-Routine Tasks							*4*	*Hours per 10,000 sf*	*1*	*1*	*2*
Flood prep and clean-up		*allow*					2	*Closures as needed, post-flood inspection, cleaning, and repairs*	*1*	*1*	
Pavers maintenance & repair		*allow*					2	*Level any pavers that have shifted, replace damaged pavers, remortar, etc.*			2

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Wood Decking							**73**	**Hours per 10,000 sf**	**63**	**4**	**6**
Routine Tasks							63	Hours per 10,000 sf	61	2	0
Litter removal	1	msf	3	3	0	260	13	5% of an area, 5x per week	13		
Clean paved surface	2	msf	10	20	0	104	35	20% of area, sweeping 2x per week, backpack blower only if needed	35		
Power washing	2	msf	30	60	1	12	12	20% monthly; clean stained/dirty areas with power washer; avoid using harsh chemicals by water, and use only biodegradable cleaners when necessary	12		
Graffiti removal		allow					3	Includes both gum and graffiti removal	1.5	1.5	
Non-Routine Tasks							*10*	*Hours per 10,000 sf*	*2*	*2*	*6*
Flood prep and clean-up		*allow*					*4*	*Trail closures as needed, post-flood inspection, cleaning, and repairs*	*2*	*2*	
Wood deck maintenance & repair		*allow*					*6*	*Repair and maintain wood decking and support structure*			*6*
Metal Decking							**72**	**Hours per 10,000 sf**	**67**	**3**	**2**
Routine Tasks							66	Hours per 10,000 sf	65	1	0
Litter removal	1	msf	4	4	0	260	17	5% of an area, 5x per week; litter may be trapped in grating	17		
Clean paved surface	2	msf	10	20	0	104	35	20% of area, sweeping 2x per week, backpack blower only if needed	35		
Power washing	2	msf	30	60	1	12	12	20% monthly; clean stained/dirty areas with power washer; avoid using harsh chemicals by water, and use only biodegradable cleaners when necessary	12		
Graffiti removal		allow					2	Includes both gum and graffiti removal	1.0	1	
Non-Routine Tasks							*6*	*Hours per 10,000 sf*	*2*	*2*	*2*
Flood prep and clean-up		*allow*					*4*	*Trail closures as needed, post-flood inspection, cleaning, and repairs*	*2*	*2*	
Metal deck maintenance & repair		*allow*					*2*	*Repair and maintain metal decking and support structure*			*2*
Street Crossings							**30**	**Hours per 10,000 sf**	**24**	**4**	**2**
Routine Tasks							24	Hours per 10,000 sf	22	2	0
Litter removal	1	msf	3	3	0	260	13	5% of an area, 5x per week	13		
Clean paved surface - street sweeper	10	msf	3	30	1	3	2	100% of area, done every 4 months with street sweeper	2		
Power washing	1	msf	30	30	1	12	6	10% monthly; spot cleaning clean stained/dirty areas with power washer	6		
Graffiti removal		allow					3	Includes both gum and graffiti removal	1.5	1.5	
Non-Routine Tasks							*6*	*Hours per 10,000 sf*	*2*	*2*	*2*
Flood prep and clean-up		*allow*					2	*As needed, post-flood inspection, cleaning, and repairs*	*1*	*1*	
Repaint markings		*allow*					2	*Touch-up and/or repaint crossway markings*	*1*	*1*	
Paving repair		*allow*					2	*Repair cracks, spalling, settling, etc.*			2
SOFTSCAPES											
Turf Lawn							**111**	**Hours per 10,000 sf**	**67**	**24**	**20**
Routine Tasks							101	Hours per 10,000 sf	59	22	20
Remove litter	0.5	msf	3	1.5	0	260	7	5% of area; 5x/week	7		
Fall leaf removal	3	msf	12	36	1	6	4	30% of turf area	4		
Mow turf (open area)	7	msf	3	21	0	32	11	70% of open turf with ride-on mower; once every 5 working days during growing season	11		
Mow walking/trim	3	msf	10	30	1	32	16	30% of open turf, with walking mower and string trimmer	16		
Soil Test/Evaluation		allow					1	Done prior to fertilization		1	
Turf fertilizer/weed preventer appl.	10	msf	10	100	2	2	3	100% of area; fertilizer and pre-emergent applications	3		
Horticultural pest control	2	msf	10	20	0	6	2	20% of area; monitor/control grubs, moles, rodents, etc.	1	1	
Top dress soil	5	msf	15	75	1	2	3	50% of turf area	3		
Seasonal turf renovation	5	msf	75	375	6	2	13	50% of area; dethatch, aerate, seed	13		
Temporary fencing	2	mlf	15	30	1	4	2	Install/maintain temporary fencing, assumes 2,000 lf	2		
Irrigation maintenance		allow					40	Monitor to ensure adequate coverage and functionality; check for damage; repair & replace above-grade components as needed; repair & clean out system; winterization & spring startup		20	20
Non-Routine Tasks							*10*	*Hours per 10,000 sf*	*8*	*2*	*0*
Establishment tasks		*allow*					*10*	*Applied to establishment years; includes erosion control, additional temporary fencing, spot watering and weed control*	*8*	*2*	

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Ornamental / Floral Plantings							**162**	**Hours per 10,000 sf**	**134**	**16**	**13**
Routine Tasks							152	Hours per 10,000 sf	126	14	13
Litter removal	0.5	msf	5	3	0	260	11	5% of planting areas, 5x/week	11		
Weeding	3	msf	15	45	1	15	11	30% of planting areas, 1x every two weeks, April-October	11		
Seasonal prep	5	msf	120	600	10	2	20	Spring clean-up and winter prep	20		
Planting areas maintenance	3	msf	90	270	5	15	68	30% of planting areas, once every two weeks, April-October; deadheading, trimming, minor cutbacks, pruning, inspection for invasive species, fertilizing, etc.	68		
Spot watering	2	msf	30	60	1	8	8	20% of planting areas, as needed to supplement irrigation	8		
Leaf removal	3	msf	15	45	1	5	4	30% of planting areas	4		
Pest control	2	msf	30	60	1	4	4	20% of planting areas	3	1	
Plant replacement	1	msf	90	90	2	1	2	10% of planting areas, spring or fall	2		
Irrigation maintenance		allow					25	Monitor to ensure adequate coverage and functionality; check for damage; repair & replace above-grade components as needed; repair & clean out system; winterization & spring startup		12.5	12.5
Non-Routine Tasks							*10*	*Hours per 10,000 sf*	*8*	*2*	*0*
Establishment tasks		*allow*					*10*	*Tasks for the first 4 years of establishment, including spot watering, temporary fencing, plant replacement, and weed control*	*8*	*2*	
Woodlands (Natural Area Type A)							**71**	**Hours per 10,000 sf**	**63**	**8**	**0**
Routine Tasks							56	Hours per 10,000 sf	51	5	0
Remove litter	0.5	msf	5	3	0	260	11	5% of area; 5x/week, focusing primarily on edges and pathways	11		
Debris removal		allow					4	Removal of fallen branches, large trees, etc. on pathways and visible areas for safety and aesthetics; some debris may be left on site for ecological value	4		
Horticultural pest monitoring & control	1	msf	15	15	0	4	1	10% of area; monitoring with other maintenance tasks, control as needed	0.7	0.3	
Seasonal cleanup & pruning	3	msf	75	225	4	2	8	30% of area; pruning, dead plant removal, etc.	8		
Tree maintenance	4	each	75	300	5	2	10	Assume maintenance for 2-4 trees per year; includes pruning, clearing, and pest control	5.0	5.0	
Understory maintenance		allow					18	Monthly weeding, cleaning, trimming, pruning, monitoring, invasive species removal, etc.	18		
Spot Watering		allow					1	As needed, assume 2 waterings/yr for shrubs during extreme heat, drought	1		
Plant replacement (understory/herbaceous)	1	msf	90	90	2	1	2	10% of area, includes understory and herbaceous plantings	2		
Temporary fencing		allow					2	Install or maintain temporary fencing, primarily used for renovation	2		
Non-Routine Tasks							*15*	*Hours per 10,000 sf*	*12*	*3*	*0*
Establishment tasks		*allow*					*15*	*Additional tasks including more frequent weed & invasives control, mulching, fertilizing and spot watering*	*12*	*3*	
Wetlands (Natural Area Type B)							**80**	**Hours per 10,000 sf**	**65**	**15**	**0**
Routine Tasks							60	Hours per 10,000 sf	49	11	0
Remove litter	0.5	msf	6	3	0	208	10	5% of area; 4x per week (by hand and with skimmer)	10		
Litter removal by boat	1	msf	30	30	1	6	3	10% of area; every two months with skimmer net from boat	3		
Debris removal & sediment control		allow					5	Inspection during other maintenance tasks; removal of large debris and built-up sediment as needed in the wetland	5		
Horticultural pest monitoring & control		allow					1	Monitoring with other maintenance tasks, control as needed	0.7	0.3	
Annual cutback (by hand)	1	msf	120	120	2	2	4	10% of area, includes cleanup and removal	4		
Planting maintenance	2	msf	60	120	2	12	24	20% of area, monthly; monitoring, minor erosion control, invasive control and removal, cutbacks, etc.	19	5	
Plant replacement	1	msf	60	60	1	1	1	10% of area, spring or fall	1		
Post-flood cleaning	0.5	msf	240	120	2	6	12	5% of area; assume 6 flood events annually	6	6	

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Non-Routine Tasks							*20*	*Hours per 10,000 sf*	*16*	*4*	*0*
Establishment Tasks		*allow*					*20*	*Additional tasks required during establishment, including more frequent weed & invasives control, inspection, erosion control, planting, spot watering, temporary fencing, etc.*	*16*	*4*	
Stormwater Outfall Wetlands (Natural Area Type C)							**106**	**Hours per 10,000 sf**	**77**	**16**	**13**
Routine Tasks							71	Hours per 10,000 sf	57	11	3
Remove litter	1	msf	6	6	0	104	10	10% of area; 2x per week (by hand and with skimmer)	10		
Outfall inspection and debris removal	1	msf	25	25	0	26	11	Done every two weeks; may need boat to access	11		
Debris removal & sediment control		allow					5	Inspection during other maintenance tasks; removal of large debris and built-up sediment as needed in the wetland	5		
Horticultural pest monitoring & control		allow					1	Monitoring with other maintenance tasks, control as needed	0.7	0.3	
Annual cutback (by hand)	1	msf	120	120	2	2	4	10% of area, includes cleanup and removal	4		
Planting maintenance	2	msf	60	120	2	12	24	20% of area, monthly; monitoring, minor erosion control, invasive control and removal, cutbacks, etc.	19	5	
Plant replacement	1	msf	60	60	1	1	1	10% of area, spring or fall	1		
Post-flood cleaning		allow					15	Allowance; includes both plantings and outfall	6.0	6	3
Non-Routine Tasks							*35*	*Hours per 10,000 sf*	*20*	*5*	*10*
Outfall repair & maintenance		*allow*					*10*	*As needed*			*10*
Establishment Tasks		*allow*					*25*	*Additional tasks required during establishment, including more frequent weed & invasives control, inspection, erosion control, planting, spot watering, temporary fencing, etc.*	*20*	*5*	
Upland Meadows (Natural Area Type D)							**33**	**Hours per 10,000 sf**	**30**	**3**	**0**
Routine Tasks							23	Hours per 10,000 sf	22	1	0
Remove litter	1	msf	5	5	0	104	9	10% of area, twice per week	9		
Weed/pest control	2	msf	20	40	1	4	3	20% of area, includes invasive species control and removal	1.8	0.9	
Annual cutback	10	msf	15	150	3	1	3	100% of area	3		
Annual cleanup & dethatching after cutback	8	msf	40	320	5	1	5	80% of area, can collect debris for composting	5.3		
Over-seeding & plant replacement	2	msf	20	40	1	2	1	20% of area; overseeding for flowering species and grasses, replacement for some perennials	1		
Temporary fencing		allow					2	Install or maintain temporary fencing, primarily used for renovation	2		
Non-Routine Tasks							*10*	*Hours per 10,000 sf*	*8*	*2*	*0*
Establishment Tasks		*allow*					*10*	*Additional tasks required during establishment, including more frequent weed/pest control, overseeding, etc.*	*8*	*2*	
Trees (Specimen / Large Caliper)							**80**	**Hours per 20 Trees**	**21**	**59**	**0**
Routine Tasks							38	Hours per 20 Trees	11	28	0
Monitoring & inspection	20	each	15	300	5	4	20	Quarterly visual inspection and analysis of tree and soil moisture levels performed by a certified arborist; check for pests & diseases		20	
Tree maintenance	5	each	90	450	8	2	15	25% of trees on site; prune, restake/remove stakes, fertilize, mulch, control pests as needed	7.5	7.5	
Spot watering	5	allow	10	50	1	4	3	25% of trees	3		
Non-Routine Tasks							*42*	*Hours per 20 Trees*	*10*	*32*	*0*
Establishment tasks		*allow*					*40*	*Additional 2 hours per tree; Includes additional spot watering, weed control, adjusting tree stakes/ protection, plant replacement/ removal & thinning*	*10*	*30*	
Tree replanting		*only if needed*					*2*	*Tree removal ~300 to 500 man hours; planting is ~90 minutes*		2	

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Trees (Small & Medium Caliper)							**40**	**Hours per 20 Trees**	**13**	**26**	**0**
Routine Tasks							19	Hours per 20 Trees	8	10	0
Monitoring & inspection	20	each	8	160	3	2	5	Bi-annual visual inspection and analysis of tree and soil moisture levels performed by a certified arborist; check for pests & diseases		5	
Tree maintenance	5	each	60	300	5	2	10	25% of trees on site; prune, restake/remove stakes, fertilize, mulch, control pests as needed	5	5	
Spot watering	5	allow	10	50	1	4	3	25% of trees	3		
Non-Routine Tasks							*21*	*Hours per 20 Trees*	*5*	*16*	*0*
Establishment tasks		*allow*					*20*	*Additional hour per tree; includes additional spot watering, weed control, adjusting tree stakes/ protection, plant replacement/ removal & thinning*	*5*	*15*	
Tree replanting		*only if needed*					*1*	*Tree removal ~200 to 350 man hours; planting is ~45 to 90 minutes*		*1*	
FURNISHING & AMENITIES											
Trash Receptacle							**25**	**Hours per Receptacle**	**22**	**3**	**0**
Routine Tasks							23	Hours per Receptacle	22	1	0
Empty trash can - Peak	1	each	4	4	0	168	11	7x/week for 24 weeks	11		
Empty trash can - Shoulder	1	each	4	4	0	60	4	5x/week for 12 weeks	4		
Empty trash can - Off-season	1	each	4	4	0	32	2	2x/Week for 16 weeks	2		
Clean trash can	1	each	8	8	0	24	3	2x/Month	3		
Rodent and pest control		allow					2	2x/Month	1.4	0.6	
Non-Routine Tasks							*2*	*Hours per Receptacle*	*0*	*2*	*0*
Basic maintenance		*allow*					2	*Replace can liners/lid, resecure cans, etc.*		2	
Fixed Bench							**17**	**Hours per 100 lf**	**14**	**2**	**1**
Routine Tasks							15	Hours per 100 lf	14	1	0
Clean and inspect	2	xlf	8	16	0	52	14	20% weekly	14		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							2	*Hours per 100 lf*	*0*	*1*	*1*
Repair & maintenance	*1*	*xlf*	*120*	*120*	2	*1*	2	*10% of benches, includes material repair/replacement, tightening mechanical connections, vandalism repair, paint touch-up, etc.*		*1*	*1*
Bicycle Rack							**9**	**Hours per 10 Racks**	**7**	**1**	**1**
Routine Tasks							8	Hours per 10 Racks	7	1	0
Clean and inspect	5	each	3	15	0	26	7	50% every two weeks	7		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							2	*Hours per 10 Racks*	*0*	*1*	*1*
Repair & maintenance	*1*	*each*	*90*	*90*	2	*1*	2	*10% of racks, includes tightening connnections, vandalism repair, etc.*		*0.75*	*0.75*
Drinking Fountain							**28**	**Hours per Drinking Fountain**	**13**	**11**	**4**
Routine Tasks							20	Hours per Drinking Fountain	13	7	0
Cleaning	1	each	3	3	0	210	11	Daily during operation, ensuring drains are clear and spouts are working	11		
System check and clean	1	each	20	20	0	12	4	Monthly inspection of water quality, system lines, drains, etc.; clean and maintain as needed		4	
Seasonal prep		allow					5	Spring startup and winterization	2.5	2.5	
Non-Routine Tasks							*8*	*Hours per Drinking Fountain*	*0*	*4*	*4*
Repair & maintenance		*allow*					*8*	*As needed*		*4*	*4*
Lighting (Pole & Pedestrian)							**12**	**Hours per 10 Fixtures**	**7**	**3**	**2**
Routine Tasks							8	Hours per 10 Fixtures	7	1	0
Clean and inspect	10	each	10	100	2	4	7	4x/year; inspect for proper function and potential damage; clean as needed	7		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*4*	*Hours per 10 Fixtures*	*0*	*2*	*2*
Repair & maintenance	*1*	*each*	*120*	*120*	2	*2*	*4*	*As needed*		2	2
Lighting (Path & Bollard)							**5**	**Hours per 10 Fixtures**	**4**	**1**	**1**
Routine Tasks							4	Hours per 1,000 lf	4	1	0
Clean and inspect	10	each	5	50	1	4	3	4x/year; inspect for proper function and potential damage; clean as needed	3		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*1*	*Hours per 1,000 lf*	*0*	*1*	*1*
Repair & maintenance	*1*	*each*	*60*	*60*	*1*	*1*	*1*	*As needed*		*0.5*	*0.5*

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Signage							**10**	**Hours per 10 Avg. Sized Signs**	**9**	**1**	**1**
Routine Tasks							9	Hours per 10 Avg. Sized Signs	9	1	0
Clean and inspect	10	each	4	40	1	12	8	20% weekly	8		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*1*	*Hours per 10 Avg. Sized Signs*	*0*	*1*	*1*
Repair & maintenance	*1*	*each*	*60*	*60*	*1*	*1*	*1*	*As needed; may include tightening connections, repainting, or replacement*		*0.5*	*0.5*
Railing with Infill Panels							**7**	**Hours per 1,000 lf**	**4**	**2**	**2**
Routine Tasks							*4*	Hours per 1,000 lf	4	0	0
Clean and inspect	1	clf	5	5	0	52	4	10% weekly	4		
Non-Routine Tasks							*3*	*Hours per 1,000 lf*	*0*	*2*	*2*
Maintenance and repair	*3*	*xlf*	*30*	*90*	*2*	*2*	*3*	*3% of railing, includes repair and touch-up*		*1.5*	*1.5*
Railing in Flood Prone Areas							**16**	**Hours per 1,000 lf**	**8**	**5**	**3**
Routine Tasks							6	Hours per 1,000 lf	6	0	0
Clean and inspect	1	clf	5	5	0	30	3	10% weekly, 30 weeks per year	3		
Clean and inspect	2	clf	5	10	0	22	4	20% weekly, 22 weeks per year	4		
Non-Routine Tasks							*10*	*Hours per 1,000 lf*	*2*	*5*	*3*
Maintenance and repair	*6*	*xlf*	*30*	*180*	*3*	*2*	*6*	*6% of railing, includes repair and touch-up*		*3*	*3*
Flood prep and clean-up		*allow*					*4*	*Post-flood inspection, cleaning, and repairs*	*2.0*	*2*	
Retaining Wall (Concrete)							**23**	**Hours per 1,000 lf**	**20**	**1**	**3**
Routine Tasks							20	Hours per 1,000 lf	20	1	0
Clean and inspect	3	clf	20	60	1	15	15	30% monthly or as needed after storm events	15		
Post-flood cleaning & inspection		allow					4	Check for integrity, safety hazards, etc.	4		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*3*	*Hours per 1,000 lf*	*0*	*0*	*3*
Repair & maintenance		*allow*					*3*	*Spot repairs, patching cracks, etc.*			*3*
Reinforced Earth Wall / Vegetated Wall							**40**	**Hours per 1,000 lf**	**23**	**13**	**4**
Routine Tasks							36	Hours per 1,000 lf	23	13	0
Inspect wall	10	clf	10	100	2	12	20	Check for structural integrity, gaps, bare spots, potential damage, etc. monthly	10	10	
Vegetation management		allow					10	Ensure vegetation is healthy to maximize wall strength and integrity; may include weeding, pruning, trimming, etc.	10		
Post-flood inspection & maintenance		allow					6	Check for integrity, safety hazards, etc.; maintenance as needed	3	3	
Non-Routine Tasks							*4*	*Hours per 1,000 lf*	*0*	*0*	*4*
Repair & maintenance		*allow*					*4*	*As needed; includes plant replacement*			*4*
Seat Walls & Terraces							**25**	**Hours per 1,000 lf**	**23**	**1**	**2**
Routine Tasks							23	Hours per 1,000 lf	23	1	0
Clean and inspect	2	clf	15	30	1	26	13	20% every two weeks (power washing)	13		
Litter and debris removal	1	clf	3	3	0	104	5	10% of footage, 2x per week	5		
Post-flood cleaning & inspection		allow					4	Check for integrity, safety hazards, etc.	4		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*2*	*Hours per 1,000 lf*	*0*	*0*	*2*
Repair & maintenance		*allow*					*2*	*Spot repairs, removing sharp edges, etc.*			*2*
Restrooms							**618**	**Hours per Facility**	**546**	**36**	**36**
Routine Tasks							570	Hours per Facility	546	12	12
Clean & Restock	2	each	30	60	1	546	546	2x daily cleaning from May - Oct. (26 weeks) and 1x daily cleaning from Oct. - Apr. (26 weeks); includes interior cleaning, trash removal, and restocking toiletries	546		
Restroom maintenance		allow					24	Assumes 2 hours of maintenance/repair per month; Includes material replacement, amenity repairs and replacement, etc.		12	12
Non-Routine Tasks							*48*	*Hours per Facility*	*0*	*24*	*24*
Major maintenance & repair		*allow*					*48*	*Assumes 4 hours of maintenance & repair per month when restrooms are at a later stage in their life cycle*		*24*	*24*

A.2. LEVEL OF SERVICE ADJUSTMENTS

Taking the GRC Base LOS as the standard level of service, the forecasted hours were calculated for the three other service levels using the following:

- Heart of Downtown – 120% of the GRC Base LOS
- Higher Profile Natural Areas – 70% of GRC Base LOS
- Natural Areas and Preserves – 40% of GRC Base LOS

A.3. ANNUAL MAINTENANCE COST FORECASTS BY LANDSCAPE TYPE

Forecasted annual maintenance costs include both personnel costs and Other Than Personnel Services (OTPS) costs as described in Section 6.1.2. Personnel costs are fully-loaded and are based on hourly rates and fringe benefits for staff provided by the City. The fully loaded rates used for estimating personnel costs are as follows:

- W-1: $36 per hour
- W-2: $45 per hour
- W-3: $55 per hour

These hourly rates were multiplied by the number of annual maintenance hours assigned to each type of staff for each landscape type at both routine and non-routine tasks, and these sums were then added together to arrive at the total personnel costs for routine and non-routine tasks.

Personnel costs were multiplied by a percentage, adjusted by each landscape type based on previous project experience, to calculate the OTPS costs.

Landscape Type	Unit	Routine Costs per Unit (2018 USD)				Non-Routine Costs per Unit (2018 USD)				Total Potential Annual Costs per Unit
		Personnel Costs	OTPS%	OTPS Costs	Total Routine Costs	Personnel Costs	OTPS%	OTPS Costs	Total Non-Routine Costs	
HARDSCAPES										
Regional Trail	10,000 sf	$3,398	35%	$1,189	$4,588	$246	50%	$123	$369	$4,957
Secondary & Tertiary Chip-Sealed Asphalt Trails	10,000 sf	$1,342	40%	$537	$1,879	$1,482	50%	$741	$2,223	$4,102
Flood Prone Chip-Sealed Asphalt Trails	10,000 sf	$1,346	40%	$538	$1,884	$1,563	60%	$938	$2,501	$4,385
Gathering Areas / Plazas - Concrete	10,000 sf	$3,586	35%	$1,255	$4,841	$191	50%	$96	$287	$5,127
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	$2,242	40%	$897	$3,138	$327	50%	$164	$491	$3,629
Unit Pavers (Mortared on Concrete Base)	10,000 sf	$3,326	40%	$1,331	$4,657	$191	50%	$96	$287	$4,943
Wood Decking	10,000 sf	$2,270	35%	$794	$3,064	$492	50%	$246	$738	$3,802
Metal Decking	10,000 sf	$2,385	45%	$1,073	$3,458	$272	50%	$136	$408	$3,866
Street Crossings	10,000 sf	$860	45%	$387	$1,246	$272	50%	$136	$408	$1,654
SOFTSCAPES										
Turf Lawn	10,000 sf	$4,201	40%	$1,680	$5,881	$378	50%	$189	$567	$6,448
Ornamental / Floral Plantings	10,000 sf	$5,828	40%	$2,331	$8,159	$378	50%	$189	$567	$8,726
Woodlands (Natural Area Type A)	10,000 sf	$2,058	35%	$720	$2,778	$567	60%	$340	$907	$3,686
Wetlands (Natural Area Type B)	10,000 sf	$2,275	35%	$796	$3,071	$756	60%	$454	$1,210	$4,280
Stormwater Outfall Wetlands (Natural Area Type C)	10,000 sf	$2,722	40%	$1,089	$3,810	$1,495	65%	$972	$2,467	$6,277
Upland Meadows (Natural Area Type D)	10,000 sf	$818	40%	$327	$1,145	$378	45%	$170	$548	$1,693
Trees (Specimen / Large Caliper)	20 trees	$1,628	35%	$570	$2,197	$1,778	45%	$800	$2,577	$4,775
Trees (Small & Medium Caliper)	20 trees	$765	35%	$268	$1,033	$900	45%	$405	$1,305	$2,338
FURNISHINGS & AMENITIES										
Trash Receptacle	1 Receptacle	$817	55%	$449	$1,266	$90	45%	$41	$131	$1,396
Fixed Bench	100 lf	$540	30%	$162	$702	$100	45%	$45	$145	$847
Bicycle Rack	10 racks	$275	30%	$82	$357	$75	45%	$34	$109	$466
Drinking Fountain	1 fountain	$761	40%	$304	$1,065	$400	55%	$220	$620	$1,685
Lighting (Pole & Pedestrian)	10 fixtures	$281	30%	$84	$365	$200	55%	$110	$310	$675
Lighting (Path & Bollard)	10 fixtures	$161	30%	$48	$209	$50	55%	$28	$78	$286
Signage	10 signs	$329	30%	$99	$427	$50	45%	$23	$73	$500
Railing with Infill Panels	1,000 lf	$156	30%	$47	$203	$150	45%	$68	$218	$420
Railing in Flood Prone Areas	1,000 lf	$222	35%	$78	$300	$462	50%	$231	$693	$993
Retaining Wall (Concrete)	1,000 lf	$725	30%	$217	$942	$165	65%	$107	$272	$1,214
Reinforced Earth Wall / Vegetated Wall	1,000 lf	$1,413	40%	$565	$1,978	$220	65%	$143	$363	$2,341
Seat Walls & Terraces	1,000 lf	$840	30%	$252	$1,092	$110	65%	$72	$182	$1,273
Restrooms	1 set	$20,856	55%	$11,471	$32,327	$2,400	45%	$1,080	$3,480	$35,807

Note: All costs in 2018 USD.

Figure A.2. Calculations for Forecast of Annual Maintenance Cost per Unit for GRC Base LOS (in 2018 USD)

A.4 PER UNIT INSTALLATION/REPLACEMENT COSTS

The following chart lists the per unit costs used for forecasting the installation/replacement costs for the life cycle analysis. Per unit costs are based on those used in cost estimates for the GRC project.

Landscape Type	Per Unit Cost (2018 USD)	Cost Unit	Comments
HARDSCAPES			
Regional Trail	$6.40	sf	
Secondary & Tertiary Chip-Sealed Asphalt Trails	$3.50	sf	
Flood Prone Chip-Sealed Asphalt Trails	$3.50	sf	
Gathering Areas / Plazas - Concrete	$6.00	sf	
Gathering Areas / Plazas - Crushed Gravel	$4.00	sf	
Unit Pavers (Mortared on Concrete Base)	$14.00	sf	
Wood Decking	$80.00	sf	
Metal Decking	$150.00	sf	
Street Crossings	$3.00	sf	
SOFTSCAPES			
Turf Lawn	$2.25	sf	
Ornamental / Floral Plantings	$6.00	sf	
Woodlands (Natural Area Type A)	$5.00	sf	Major replanting costs at 5% of initial costs
Wetlands (Natural Area Type B)	$7.00	sf	Major replanting costs at 5% of initial costs
Stormwater Outfall Wetlands (Natural Area Type C)	$7.00	sf	Major replanting costs at 5% of initial costs
Upland Meadows (Natural Area Type D)	$3.00	sf	Major replanting costs at 5% of initial costs
Trees (Specimen / Large Caliper)	$600.00	each	May vary by species
Trees (Small & Medium Caliper)	$350.00	each	May vary by species
FURNISHINGS & AMENITIES			
Trash Receptacle	$1,100.00	each	
Fixed Bench	$416.67	lf	Assumes each bench is $2,500 and 6' in length.
Bicycle Rack	$800.00	each	
Drinking Fountain	$7,200.00	each	
Lighting (Pole & Pedestrian)	$8,500.00	each	
Lighting (Path & Bollard)	$5,000.00	each	
Signage	-	each	Costs vary widely by size and material
Railing with Infill Panels	$80.00	lf	
Railing in Flood Prone Areas	$80.00	lf	
Retaining Wall (Concrete)	$500.00	lf	
Reinforced Earth Wall / Vegetated Wall	$160.00	lf	Assumes $20 per FF, with 1 lf = 8 FF
Seat Walls & Terraces	$100.00	lf	
Restrooms	$100,000.00	each	Cost is for full restroom

Note: All costs in 2018 USD.

ASSET MANAGEMENT

APPENDIX B: OPPORTUNITY SITE ESTIMATES REFERENCE

CONTENTS

B.1 OPPORTUNITY SITES ANNUAL MAINTENANCE TASKS

As described in Section 4.4, the annual maintenance estimates for the Opportunity Sites were based on the maintenance tasks and hours developed for corridor-wide landscape types/features and on tasks and hours created for elements and features unique to the Opportunity Sites. The corridor-wide task hours can be found in Appendix A.1, while the opportunity site task hours can be found below. They follow the same methodology as the corridor-wide task hours, which is described in Appendix A.1. The abbreviations used have been copied below for reference:

TASK – The specific maintenance task

QTY – The estimated quantity over which a task is performed (Many of the tasks are estimated as a per-centage of the total quantity.)

UNIT – A unit is a commonly accepted unit of measurement for each landscape type and its associated tasks. The unit abbreviations used throughout this project include:

- ACRE - 43,560 Square Feet
- MSF - 1,000 Square Feet
- CSF - 100 Square Feet
- CLF - 100 Linear Feet
- XSF - 10 Square Feet
- XLF - 10 LF
- Each or EA - 1 of a particular item
- Allow – Allowance of time for a particular task

UNIT (MIN) – Time standard necessary to complete 1 UNIT of a task in minutes (These time standards are based on the "Park Maintenance Standards" published by the National Recreation and Park Association (NRPA) and adjusted for the project's location and management goals.)

ONCE (MIN) – The quantity of the task multiplied by the time standard and shown in minutes

ONCE (HOURS) – The time in minutes converted into hours

ANNUAL FREQUENCY – Number of times the task is performed annually

TOTAL HOURS – The annual frequency multiplied by the time in hours for performing the task once

QTY X UNIT = ONCE (MIN) → ONCE (HOURS) X ANNUAL FREQUENCY = TOTAL HOURS/UNIT/YEAR

TASK HOURS FOR GRAND RIVER CORRIDOR - OPPORTUNITY SITE FEATURES

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
OPPORTUNITY SITES' FEATURES											
Parking Areas							**60**	**Hours per 10,000 sf**	**54**	**2**	**4**
Routine Tasks							55	Hours per 10,000 sf	53	1	1
Litter removal	0.5	msf	3	2	0	260	7	5% of an area, 5x per week	7		
Blow debris	1	msf	6	6	0	104	10	10% of area, average 2x per week with hand or backpack blower	10		
Clean surface - street sweeper	10	msf	3	30	1	2	1	100% of area, done 2x per year with street sweeper	1		
Power washing	2	msf	30	60	1	4	4	20% of area; as needed	4		
Curb maintenance		allow					2	Cleaning, inspection, spot repairs	1		1
Debris removal from drain inlets		allow					3	Done every two weeks to remove debris and sediment	3		
Graffiti removal		allow					2	Includes both gum & graffiti removal	1	1	
Snow removal by plow	8	msf	5	40	1	15	10	80% of area	10		
Snow/ice removal by snow blower	2	msf	15	30	1	15	8	To supplement plow removal	8		
Minor snow removal		allow					5	Snow removal done for minor accumulations as needed	5		
Spread de-icer	2	msf	5	10	0	24	4	Paved surfaces as needed, using a calcium chloride de-icer	4		
Non-Routine Tasks							*5*	*Hours per 10,000 sf*	*1*	*1*	*3*
Flood prep and clean-up		*allow*					*2*	*Closures as needed, post-flood inspection, cleaning, and repairs*	*1*	*1*	
Paving repair		*allow*					*3*	*Repair pavement markings, cracks, spalling, settling, etc.*			3
Guardrails							**13**	**Hours per 1,000 lf**	**7**	**4**	**2**
Routine Tasks							5	Hours per 1,000 lf	5	0	0
Clean and inspect	1	clf	6	6	0	52	5	10% weekly	5		
Non-Routine Tasks							*8*	*Hours per 1,000 lf*	*2*	*4*	*2*
Maintenance and repair	2	*xlf*	*60*	*120*	2	*2*	*4*	*2% of railing, includes repair and touch-up*		2	2
Flood prep and clean-up		*allow*					*4*	*Post-flood inspection, cleaning, and repairs*	2	2	
River Landing							**57**	**Hours per 10,000 sf**	**39**	**12**	**6**
Routine Tasks							41	Annual Hours	34	7	0
Litter removal	1	msf	5	5	0	98	8	10% of area; surface cleaning 3x/week May - Oct, 1x/week April, Nov-Dec., 2x/month Jan - March; deep cleaning twice per year to remove buried debris and litter	8		
Raking and leveling	2	msf	15	30	1	34	17	20% of area, done weekly May - Oct, monthly Nov - April and after flood events	17		
Flood prep and cleanup		allow					6	Closures as needed, post-flood inspection, cleaning, refilling/repairs	3	3	
Marine life management		allow					5	As needed	3	2	
Aquatic vegetation management		allow					5	As needed	3	2	
Non-Routine Tasks							*16*	*Annual Hours*	*5*	*5*	*6*
Flood prep and cleanup		*allow*					*10*	*Closures as needed, post-flood inspection, cleaning, refilling/repairs*	*5*	*5*	
Refill / Restore surface	2	*msf*	*180*	*360*	*6*	*1*	*6*	*20% of area, annually; refill, restore, restabilize surface*			*6*
Canopy Trail							**95**	**Hours per 10,000 sf**	**73**	**19**	**3**
Routine Tasks							85	Hours per 10,000 sf	71	14	0
Litter removal	1	msf	5	5	0	260	22	10% of area, 5x per week, includes litter removal below trail	22		
Visual inspection		allow					15	Daily; check walk and supports for damage, safety concerns, etc.; incorporate with routine maintenance, such as litter removal	15		
Physical inspection		allow					9	More thorough inspection, done weekly in peak season (May - Sept), every two weeks in off season (Oct - April)		9	
Clean trail	2	msf	10	20	0	104	35	Twice weekly; remove fallen branches, leaves, etc. as needed and clean surface to provide a safe walking surface	35		
Minor maintenance & repairs		allow					5	Repairing railing, tightening connections, etc.		5	
Non-Routine Tasks							*10*	*Hours per 10,000 sf*	*2*	*5*	*3*
Post-flood inspection & cleaning		*allow*					*4*	*As needed, with particular attention paid to canopy trail supports*	*2*	*2*	
Major maintenance & repairs		*allow*					*6*	*Trail & support structures*		*3*	*3*

TASK HOURS FOR GRAND RIVER CORRIDOR - OPPORTUNITY SITE FEATURES

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Special Amenities							**67**	**Annual Hours, Water Storage Yard**	**57**	**6**	**4**
Routine Tasks							59	Annual Hours	57	2	0
Inspect & clean tables	2	each	10	20	0	52	17	20% weekly	17		
Inspect & clean grills	2	each	8	16	0	30	8	100% of grills; assumes visitors are responsible for cleaning out grills, but will not always clean them out	8		
Relocate picnic tables		allow					10	As needed; assumes tables are not bolted down	10		
Inspect & clean fire pits	2	each	20	40	1	25	17	Inspect before and after use, clean after use (includes area around the fire pit); assumes 25 uses per year and the fire pits will be covered when not in use	17		
Fire pits seasonal cleaning	2	each	45	90	2	2	3	Thorough seasonal cleaning, 2x/year	3		
Fire rings cleaning & maintenance		allow					0	Assume ceremonial fire rings will be built & maintained by the Anishinaabe			
Graffiti removal		allow					4	As needed	2.0	2	
Non-Routine Tasks							*8*	*Annual Hours*	*0*	*4*	*4*
Table maintenance & repair	*1*	*each*	*120*	*120*	*2*	*1*	2	*10%; tighten connections, material replacement, etc.*		*1*	*1*
Grill maintenance & repair		*allow*					*4*	*Tighten connections, replace grill surface, etc.*		2	2
Fire ring repairs & maintenance		*allow*					2	*As needed*		*1*	*1*
Log-Jam Inspired Playground							**178**	**Annual Hours, Water Storage Yard**	**131**	**23**	**24**
Routine Tasks							139	Annual Hours	131	6	2
Remove litter & debris	1	msf	4	3	0	156	8	10% of area, 3x per week	8		
Inspect & clean surface		allow					70	If EWF: refill, regrade and relevel, sanitize; ensure proper depth of EWF (~70 hours/year) If PIP: cleaning (sweeping, scrubbing, etc.), minor repairs (~15 hours/year)	70		
Inspect play features		allow					35	Daily visual inspection by maintenance staff, weekly physical inspection by trained staff; annual inspection by certified inspector; check for safety hazards, damage, etc.	30	3	2
Clean play features		allow					20	Cleaning and washing, or wiping down of pieces. Some pieces will need to be polished as needed.	20		
Graffiti removal		allow					6	As needed	3	3	
Non-Routine Tasks							*39*	*Annual Hours*	*0*	*17*	*22*
Maintain & repair surface		*allow*					*14*	*If EWF: bring in new material to ensure proper height; replace every 3 to 5 years If PIP: repairs as needed, e.g. rebind, patch, replace worn out areas, etc.*		*7*	*7*
Maintain & repair play features		*allow*					*25*	*Includes material repair/replacement, tightening mechanical connections, touch-up, wood sealing/oiling, annual repaint if applicable, etc.*		*10*	*15*
Outcropping Stones							**85**	**Annual Hours, Water Storage Yard**	**58**	**14**	**13**
Routine Tasks							63	Annual Hours	58	5	0
Remove litter & debris	1	msf	4	3	0	156	9	5% of area, 3x per week	9		
Inspect stones		allow					15	Weekly inspection; check for sharp edges, safety hazards, damage, etc.	15		
Clean stones	3	msf	30	99	2	18	30	Remove dirt, grim, algae build-up in used areas; done 2x per month May - Oct and 1x per month Oct - Apr	30		
Graffiti removal		allow					10	As needed	5	5	
Non-Routine Tasks							*22*	*Annual Hours*	*0*	*9*	*13*
Maintain stones							*10*	*Adjust stones that have shifted; remove sharp edges; replace damaged stones, etc.*		*4*	*6*
Post-flood inspection & cleaning							*12*	*As needed; clean debris from stones, remove sharp edges, replacements as needed*		*4.8*	*7.2*

TASK HOURS FOR GRAND RIVER CORRIDOR - OPPORTUNITY SITE FEATURES

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Winter Lodge							**1330**	**Annual Hours, Water Storage Yard**	**1102**	**167**	**61**
Routine Tasks							1252	Annual Hours	1102	128	22
Interior cleaning		allow					250	Trash removal, cleaning floors, furnishings, inspect for damage, etc.; assumes avg. 5 hours per week	250		
Exterior cleaning		allow					100	Spot clean weekly or as needed, major cleaning done annually	100		
Clean & restock restroom	2	each	30	60	1	546	546	2x daily cleaning from May - Oct. (26 weeks) and 1x daily cleaning from Oct. - Apr. (26 weeks); includes interior cleaning, trash removal, and restocking toiletries	546		
Restroom maintenance		allow					24	Assumes 2 hours of maintenance/repair per month; Includes material replacement, amenity repairs and replacement, plumbing, etc.		12	12
Event & classroom space maintenance		allow					200	Additional cleaning & maintenance associated with the event & classroom spaces; will vary greatly based on the type and amounts of events held and the size of the event space	150	50	
Fire place maintenance		allow					100	Indoor fire place cleaning & maintenance; estimated allowance for cleaning fire place, chutes, regular inspections, seasonal maintenance, etc.	50	50	
Pest control		allow					12	As needed	6	6	
Systems maintenance		allow					20	Lighting, AV, etc.		10	10
Non-Routine Tasks							*78*	*Annual Hours*	*0*	*39*	*39*
Restroom major maintenance & repair		*allow*					*48*	*Assumes 4 hours of maintenance & repair per month when restrooms are at a later stage in their life cycle*		*24*	*24*
Structure maintenance & repair		*allow*					*30*	*As needed; includes material replacement, HVAC, lighting repair, graffiti removal, roof repair, etc.*		*15*	*15*
AHS & Maintenance Building							**n/a**	**Annual Hours, Water Storage Yard**	**0**	**0**	**0**
Not included in estimates		allow					n/a		n/a		
Repurposed Water Tank							**182**	**Annual Hours, Water Storage Yard**	**50**	**63**	**70**
Routine Tasks							112	Annual Hours	50	63	0
Clean interior walls		allow					20	Spot clean as needed (assumes 10 times per year), major cleaning done annually	20		
Clean exterior		allow					17	Spot clean as needed (assumes 6 times per year), major cleaning done annually	17		
Systems maintenance		allow					50	AV, lighting, etc.		50	
Graffiti removal		allow					15	As needed	7.5	7.5	
Pest control		allow					10	As needed	5	5	
Non-Routine Tasks							*70*	*Annual Hours*	*0*	*0*	*70*
Systems repair		*allow*					*30*	*AV, lighting, etc.*			*30*
Structure maintenance & repair		*allow*					*40*	*As needed; includes material replacement, lighting repair, graffiti removal, roof repair, etc.*			*40*

TASK HOURS FOR GRAND RIVER CORRIDOR - OPPORTUNITY SITE FEATURES

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Sculptural Play							**97**	**Annual Hours, Coldbrook**	**68**	**15**	**14**
Routine Tasks							74	Annual Hours	68	5	1
Remove litter & debris	0.4	msf	4	2	0	156	4	10% of area, 3x per week	4		
Inspect & clean surface		allow					35	If EWF: refill, regrade and relevel, sanitize; ensure proper depth of EWF (~70 hours/year) If PIP: cleaning (sweeping, scrubbing, etc.), minor repairs (~15 hours/year)	35		
Inspect play features		allow					18	Daily visual inspection by maintenance staff, weekly physical inspection by trained staff; annual inspection by certified inspector; check for safety hazards, damage, etc.	15	2	1
Clean play features		allow					12	Cleaning and washing, or wiping down of pieces. Some pieces will need to be polished as needed.	12		
Graffiti removal		allow					5	As needed	2.5	2.5	
Non-Routine Tasks							*23*	*Annual Hours*	*0*	*10*	*13*
Maintain & repair surface		*allow*					*8*	*If EWF: bring in new material to ensure proper height; replace every 3 to 5 years If PIP: repairs as needed, e.g. rebind, patch, replace worn out areas, etc.*		*4*	*4*
Maintain & repair play features							*15*	*Includes material repair/replacement, tightening mechanical connections, touch-up, wood sealing/oiling, annual repaint if applicable, etc.*		*6*	*9*
River Edge Rapids Viewing							**80**	**Annual Hours, North Monroe**	**53**	**16**	**12**
Routine Tasks							68	Annual Hours	53	16	0
Litter removal	1	msf	4	3	0	286	16	5% of area, 7x per week May - Oct, 4x per week Nov - Apr	16		
Inspect & clean	2	msf	30	50	1	26	22	10%, weekly May - Oct, every two weeks Nov - Apr. (power washing)	22		
Graffiti removal		allow					6	As needed	3	3	
Post-flood cleaning & inspection		allow					25	Check for integrity, safety hazards, etc.	12.5	12.5	
Non-Routine Tasks							*12*	*Annual Hours*	*0*	*0*	*12*
Repairs & maintenance							*12*	*Spot repairs, removing sharp edges, etc.*			*12*
Event Pavilion							**804**	**Annual Hours, North Monroe**	**699**	**39**	**66**
Routine Tasks							726	Annual Hours	699	15	12
Regular cleaning	1	each	75	75	1.25	80	100	Inspect after each rental/event, spot clean as needed or at least 1x/week	100		
Major cleaning		allow					30	Quarterly cleaning / power washing of roof and structure; cleaning before event season inspects for winter damage	30		
Clean & restock restroom	2	each	30	60	1	546	546	2x daily cleaning from May - Oct. (26 weeks) and 1x daily cleaning from Oct. - Apr. (26 weeks); includes interior cleaning, trash removal, and restocking toiletries	546		
Restroom maintenance		allow					24	Assumes 2 hours of maintenance/repair per month; Includes material replacement, amenity repairs and replacement, plumbing, etc.		12	12
Boat storage area cleaning & maintenance		allow					20	Thorough cleaning seasonally, spot cleaning as needed	20		
Graffiti removal & vandalism repair		allow					6	As needed	3	3	
Note: Any maintenance & repair related to events (set-up, sound, light, etc.) will be the responsibility of the event operator and were not included in maintenance estimates											
Non-Routine Tasks							*78*	*Annual Hours*	*0*	*24*	*54*
Restroom major maintenance & repair		*allow*					*48*	*Assumes 4 hours of maintenance & repair per month when restrooms are at a later stage in their life cycle*		*24*	*24*
Pavilion maintenance & repairs		*allow*					*30*	*Includes material replacement, roof repair, etc.*			*30*

TASK HOURS FOR GRAND RIVER CORRIDOR - OPPORTUNITY SITE FEATURES

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Skate Park							**108**	**Annual Hours, North Monroe**	**46**	**30**	**33**
Routine Tasks							48	Annual Hours	43	5	0
Litter removal	2	msf	2	3	0	276	14	10% of area, daily April - Oct, 3x/week Nov - March	14		
Blow debris	2	msf	6	9	0	104	16	10% of area, average 2x per week with hand or backpack blower	16		
Power washing	3	msf	30	90	2	6	9	20% of area, every two months	9		
Graffiti removal		allow					10	As needed	5	5	
Non-Routine Tasks							*60*	*Annual Hours*	*3*	*25*	*33*
Flood prep and cleanup		*allow*					*5*	*Closures as needed, post-flood inspection, cleaning, repairs*	2.5	2.5	
Surfaces maintenance and repair		*allow*					*30*	*Minor repairs, patching, etc. as needed*		*12*	*18*
Structure maintenance and repair		*allow*					*25*	*Repair to rails, coping, etc.*		*10*	*15*
Fish Ladder Feature							**53**	**Annual Hours, Fish Ladder**	**36**	**14**	**4**
Routine Tasks							33	Annual Hours	28	4	1
Litter & debris removal		allow					10		10		
Inspection & cleaning		allow			1.0	12	12	Monthly	12		
Railing inspection & repair		allow			0.5	6	3	Every 2 months or as needed	2		1
Graffiti removal		allow					8	As needed	4	4	
Non-Routine Tasks							*20*	*Annual Hours*	*8*	*10*	*3*
Flood prep and cleanup		*allow*					*15*	*Post-flood inspection, cleaning, repairs*	7.5	7.5	
Maintenance and repair		*allow*					*5*	*As needed*		*2*	*3*
Special Amenities							**33**	**Annual Hours, Fish Ladder**	**26**	**4**	**3**
Routine Tasks							27	Annual Hours	26	2	0
Inspect & clean tables	1	each	10	12	0	52	10	20% weekly	10		
Inspect & clean grills	2	each	8	16	0	30	8	100% of grills; assumes visitors are responsible for cleaning out grills, but will not always clean them out	8		
Relocate picnic tables		allow					6	As needed; assumes tables are not bolted down	6		
Graffiti removal		allow					3	As needed	1.5	1.5	
Non-Routine Tasks							*5*	*Annual Hours*	*0*	*3*	*3*
Table maintenance & repair	*1*	*each*	*120*	*72*	*1*	*1*	*1*	*10%; tighten connections, material replacement, etc.*		*0.6*	*0.6*
Grill maintenance & repair		*allow*					*4*	*Tighten connections, replace grill surface, etc.*		*2*	*2*
Retractable Bollards							**11**	**Annual Hours, Fish Ladder**	**7**	**3**	**1**
Routine Tasks							6	Annual Hours	5	1	0
Routine maintenance	3	each	15	45	1	3	2	Inspection, cleaning, oiling (if needed); 3x annually	2		
Clean sheath		allow					2	Inspect and clean in-ground bollard sheath (remove trapped debris, etc.)	2		
Graffiti removal		allow					2	As needed	1	1	
Non-Routine Tasks							*5*	*Annual Hours*	*2*	*2*	*1*
Flood prep and cleanup		*allow*					*4*	*Securing and/or lowering pre-food; post-flood inspection, cleaning, repairs*	2	2	
Repairs		*allow*					*1*	*As needed*		*0.4*	*0.6*

TASK HOURS FOR GRAND RIVER CORRIDOR - OPPORTUNITY SITE FEATURES

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Changing Room / Restroom & Fish Cleaning Station							**972**	**Annual Hours, Fish Ladder**	**870**	**53**	**50**
Routine Tasks							914	Annual Hours	870	30	15
Clean & restock restroom; clean changing room	2	each	45	90	1.5	546	819	2x daily cleaning from May - Oct. (26 weeks) and 1x daily cleaning from Oct. - Apr. (26 weeks); includes interior cleaning, trash removal, and restocking toiletries	819		
Clean fish cleaning station	1	each	30	30	1	72	36	2x weekly cleaning from May - Oct. (26 weeks), 1x weekly cleaning Nov, Dec, April (14 weeks), 2x monthly cleaning Jan - March (12 weeks)	36		
Restroom & changing room maintenance		allow					30	Assumes 2 to 3 hours of maintenance/repair per month; Includes material replacement, amenity repairs and replacement, etc.		15	15
Fish cleaning station routine maintenance		allow					24	Inspect surface and drains; clean/disinfect surface and grinder; clean and clear drains; inspect and clean pipes, check electrical system, etc.	12	12	
Graffiti removal		allow					5	As needed	2.5	2.5	
Non-Routine Tasks							*58*	*Annual Hours*	*0*	*23*	*35*
Fish cleaning station major maintenance & repair		*allow*					*10*	*Repair and/or replace components (grinder, spigot, pipes, electrical, etc.) as needed*		*4*	*6*
Restroom/changing room major maintenance & repair		*allow*					*48*	*Assumes 4 hours of maintenance & repair per month when restrooms are at a later stage in their life cycle*		*19.2*	*28.8*

Note: The following features are assumed to be the responsibility of the Public Museum and were not included in the SAMP estimates:

Flume Water Feature
River Classroom
Observatory Beneath Carousel
Woods Adventure Play
Treehouse Deck
Amphitheater

B.2. EXPANDED HOUR & COST CALCULATIONS FOR OPPORTUNITY SITES

B.2.1. Cost Calculations for Opportunity Site Special Features

Like the corridor-wide forecasted annual maintenance costs, the opportunity site cost estimates include both personnel costs and Other Than Personnel Services (OTPS) costs as described in Section 6.1.2. Personnel costs are fully-loaded and are based on hourly rates and fringe benefits for staff provided by the City. The fully loaded rates used for estimating personnel costs are as follows:

- W-1: $36 per hour
- W-2: $45 per hour
- W-3: $55 per hour

These hourly rates were multiplied by the number of annual maintenance hours assigned to each type of staff for each opportunity site feature at both routine and non-routine tasks, and these sums were then added together to arrive at the total personnel costs for routine and non-routine tasks.

Personnel costs were multiplied by a percentage, adjusted by each landscape type based on previous project experience, to calculate the OTPS costs.

B.2.2. Expanded Hour & Cost Calculations

The tables on the following pages show the expanded calculations for estimating the hours and costs for the six opportunity sites. The estimates include both corridor-wide and unique site features and were calculated according to the respective LOS for the opportunity sites.

Landscape Type	Unit	Routine Costs per Unit (2018 USD)				Non-Routine Costs per Unit (2018 USD)				Total Potential Annual Costs per Unit
		Personnel Costs	OTPS%	OTPS Costs	Total Routine Costs	Personnel Costs	OTPS%	OTPS Costs	Total Non-Routine Costs	
HARDSCAPES										
Parking Areas	10,000 sf	$2,022	40%	$809	$2,831	$246	50%	$123	$369	$3,200
River Landing	10,000 sf	$1,545	45%	$695	$2,240	$735	45%	$331	$1,066	$3,306
SOFTSCAPES										
see Corridor-wide features										
FURNISHINGS & AMENITIES										
Guardrails	1,000 lf	$187	30%	$56	$243	$362	45%	$163	$525	$768
OPPORTUNITY SITES' FEATURES										
water storage yard										
Canopy Trail	10,000 sf	$3,198	40%	$1,279	$4,477	$462	50%	$231	$693	$5,170
Speical Amenities	allowance	$2,142	35%	$750	$2,892	$400	45%	$180	$580	$3,472
Log-Jam Playground	allowance	$5,108	40%	$2,043	$7,151	$1,975	45%	$889	$2,864	$10,014
Outcropping Stones	allowance	$2,323	30%	$697	$3,020	$1,122	50%	$561	$1,683	$4,703
Winter Lodge / Boat House	allowance	$46,642	70%	$32,649	$79,291	$3,900	65%	$2,535	$6,435	$85,726
Repurposed Water Tank	allowance	$4,595	50%	$2,297	$6,892	$3,850	65%	$2,503	$6,353	$13,244
coldbrook										
Sculptural Play	allowance	$2,722	40%	$1,089	$3,810	$1,165	50%	$583	$1,748	$5,558
north monroe										
River Edge Rapids Viewing	allowance	$2,598	35%	$909	$3,507	$660	65%	$429	$1,089	$4,596
Event Pavilion	allowance	$26,499	50%	$13,250	$39,749	$4,050	50%	$2,025	$6,075	$45,824
Skate Park	allowance	$1,787	50%	$894	$2,681	$3,008	50%	$1,504	$4,511	$7,192
fish ladder										
Fish Ladder Feature	allowance	$1,243	35%	$435	$1,678	$863	45%	$388	$1,251	$2,929
Special Amenities	allowance	$1,000	35%	$350	$1,350	$260	45%	$117	$377	$1,727
Retractable Bollards	allowance	$234	35%	$82	$316	$213	50%	$107	$320	$635
Changing Room / Restroom & Fish Cleaning Station	allowance	$33,455	35%	$11,709	$45,164	$2,958	50%	$1,479	$4,437	$49,601
public museum										
N/A; Museum is responsible for maintenance of this site.										

Note: All costs in 2018 USD.

Figure B.1. Calculations for Annual Maintenance Estimates for Opportunity Sites Non-GRC-Wide Features (in 2018 USD)

Leonard to Ann Street Trail - Estimated Annual Maintenance Hours & Costs LOS B

Landscape Type	Unit	# of Units	Hours per Unit			Site Total Hours			Loaded Cost per Unit			Site Total Costs		
			Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total
HARDSCAPES						590	45	635				$28,774	$3,345	$32,118
Regional Trail	10,000 sf	4.9	94	5	99	461	25	486	$4,588	$369	$4,957	$22,480	$1,808	$24,289
Wood Decking - Lower Boardwalk	10,000 sf	2.0	63	10	73	124	20	144	$3,064	$738	$3,802	$6,054	$1,458	$7,512
Street Crossings	10,000 sf	0.2	24	6	30	5	1	6	$1,246	$408	$1,654	$239	$78	$317
SOFTSCAPES						1019	320	1338				$51,345	$19,157	$70,502
Woodlands	10,000 sf	7.4	56	15	71	412	111	523	$2,778	$907	$3,686	$20,497	$6,693	$27,191
Wetlands	10,000 sf	8.8	60	20	80	534	177	711	$3,071	$1,210	$4,280	$27,152	$10,696	$37,847
Upland Meadows	10,000 sf	3.2	23	10	33	73	32	105	$1,145	$548	$1,693	$3,695	$1,769	$5,464
FURNISHINGS & AMENITIES						55	23	78				$2,617	$1,777	$4,394
Lighting (Pole & Pedestrian)	10 fixtures	5.2	8	4	12	40	21	61	$365	$310	$675	$1,896	$1,612	$3,508
Lighting (Path & Bollard)	10 fixtures	1	4	1	5	4	1	5	$209	$78	$286	$209	$78	$286
Signage	10 signs	1.2	9	1	10	11	1	12	$427	$73	$500	$512	$87	$599
SPECIAL FEATURES						0	0	0				$0	$0	$0
n/a														
Leonard to Ann Street Trail - Total Estimated Hours & Costs						**1,663**	**388**	**2,051**				**$82,735**	**$24,278**	**$107,014**

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.

Figure B.2.a. Calculations for Annual Maintenance Estimates for Opportunity Sites (in 2018 USD)

Water Department Storage Yard - Estimated Annual Maintenance Hours & Costs LOS B

Landscape Type	Unit	# of Units	Hours per Unit			Site Total Hours			Loaded Cost per Unit			Site Total Costs		
			Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total
HARDSCAPES						573	42	615				$28,634	$2,984	$31,618
Regional Trail	10,000 sf	1.3	94	5	99	124	7	131	$4,588	$369	$4,957	$6,056	$487	$6,543
Gathering Areas / Plazas - Concrete	10,000 sf	1.2	99	4	103	122	5	127	$4,841	$287	$5,127	$5,954	$352	$6,306
Gathering Areas / Plazas - Crushed Gravel	10,000 sf	1.8	62	7	69	111	13	124	$3,138	$491	$3,629	$5,632	$880	$6,512
Unit Pavers (Mortared on Concrete Base)	10,000 sf	1.0	92	4	96	88	4	91	$4,657	$287	$4,943	$4,424	$272	$4,696
Wood Decking - Lower Boardwalk	10,000 sf	0.3	63	10	73	19	3	22	$3,064	$738	$3,802	$927	$223	$1,150
Metal Decking - Lower Boardwalk	10,000 sf	0.4	66	6	72	27	2	29	$3,458	$408	$3,866	$1,416	$167	$1,583
Elevated Tree Walk	10,000 sf	0.5	85	10	95	40	5	44	$4,477	$693	$5,170	$2,084	$323	$2,407
Parking & Roadways	10,000 sf	0.8	55	5	60	42	4	46	$2,831	$369	$3,200	$2,141	$279	$2,420
SOFTSCAPES						2082	452	2534				$112,817	$26,788	$139,605
Turf Lawn	10,000 sf	9.2	101	10	111	921	92	1012	$5,881	$567	$6,448	$53,822	$5,189	$59,011
Ornamental / Floral Plantings	10,000 sf	1.0	152	10	162	152	10	162	$8,159	$567	$8,726	$8,159	$567	$8,726
Woodlands	10,000 sf	14.7	56	15	71	822	221	1043	$2,778	$907	$3,686	$40,896	$13,354	$54,250
Upland Meadows	10,000 sf	5.2	23	10	33	116	52	168	$1,145	$548	$1,693	$5,903	$2,825	$8,728
Trees (Specimen / Large Caliper)	20 trees	1.3	38	42	80	48	52	100	$2,197	$2,577	$4,775	$2,746	$3,222	$5,968
Trees (Small & Medium Caliper)	20 trees	1.3	19	21	40	23	26	50	$1,033	$1,305	$2,338	$1,291	$1,631	$2,922
FURNISHINGS & AMENITIES						238	44	282				$12,612	$3,234	$15,847
Trash Receptacle	1 receptacle	6	23	2	25	135	12	147	$1,266	$131	$1,396	$7,594	$783	$8,377
Fixed Bench	1,000 lf	0.8	15	2	17	12	2	13	$702	$145	$847	$561	$116	$677
Bicycle Rack	10 racks	1	8	2	9	8	2	9	$357	$109	$466	$357	$109	$466
Drinking Fountain	1 fountain	1	20	8	28	20	8	28	$1,065	$620	$1,685	$1,065	$620	$1,685
Lighting (Pole & Pedestrian)	10 fixtures	1.8	8	4	12	14	7	21	$365	$310	$675	$656	$558	$1,214
Lighting (Path & Bollard)	10 fixtures	5	4	1	5	22	5	27	$209	$78	$286	$1,043	$388	$1,431
Signage	10 signs	2	9	1	10	18	2	20	$427	$73	$500	$854	$145	$999
Railing with Infill Panels	1,000 lf	2.4	4	3	7	10	7	17	$203	$218	$420	$481	$516	$997
SPECIAL FEATURES						1,736	232	1,968				$106,406	$19,152	$125,558
Special Amenities (Fire rings, picnic tables, grills)	allowance	-	-	-	-	59	8	67	-	-	-	$2,892	$580	$3,472
Playground	allowance	-	-	-	-	139	39	178	-	-	-	$7,151	$2,864	$10,014
Outcropping Stones	allowance	-	-	-	-	63	22	85	-	-	-	$3,020	$1,683	$4,703
Winter Lodge / Boat House	allowance	-	-	-	-	1252	78	1330	-	-	-	$79,291	$6,435	$85,726
Restroom & Storage Building	allowance	-	-	-	-	110	15	125	-	-	-	$7,160	$1,238	$8,398
Repurposed Water Tank	allowance	-	-	-	-	112	70	182	-	-	-	$6,892	$6,353	$13,244
Water Department Storage Yard - Total Estimated Hours & Costs						**4,628**	**770**	**5,398**				**$260,469**	**$52,158**	**$312,626**

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.
Hours and costs do not include maintenance of the boat launch or hours/costs associated with operations & programming.

Figure B.2.b. Calculations for Annual Maintenance Estimates for Opportunity Sites (in 2018 USD)

Coldbrook Site - Estimated Annual Maintenance Hours & Costs LOS B

Landscape Type	Unit	# of Units	Hours per Unit			Site Total Hours			Loaded Cost per Unit			Site Total Costs		
			Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total
HARDSCAPES						789	43	831				$39,257	$3,100	$42,357
Regional Trail	10,000 sf	1.9	94	5	99	174	9	183	$4,588	$369	$4,957	$8,488	$683	$9,170
Gathering Areas / Plazas - Concrete	10,000 sf	2.0	99	4	103	195	8	203	$4,841	$287	$5,127	$9,487	$562	$10,049
Unit Pavers (Mortared on Concrete Base)	10,000 sf	3.0	92	4	96	273	12	285	$4,657	$287	$4,943	$13,785	$848	$14,633
Wood Decking	10,000 sf	0.1	63	10	73	6	1	7	$3,064	$738	$3,802	$276	$66	$342
Parking & Roadways	10,000 sf	2.6	55	5	60	141	13	154	$2,831	$369	$3,200	$7,221	$941	$8,163
SOFTSCAPES						1087	216	1304				$60,951	$13,339	$74,290
Turf Lawn	10,000 sf	5.9	101	10	111	599	59	658	$5,881	$567	$6,448	$34,985	$3,373	$38,358
Ornamental / Floral Plantings	10,000 sf	1.4	152	10	162	206	14	220	$8,159	$567	$8,726	$11,097	$771	$11,868
Wetlands	10,000 sf	2.4	60	20	80	142	47	189	$3,071	$1,210	$4,280	$7,230	$2,848	$10,078
Stormwater Outfall Wetlands	10,000 sf	1.3	71	35	106	95	47	142	$3,810	$2,467	$6,277	$5,107	$3,306	$8,414
Trees (Specimen / Large Caliper)	20 trees	0.8	38	42	80	31	33	64	$2,197	$2,577	$4,775	$1,758	$2,062	$3,820
Trees (Small & Medium Caliper)	20 trees	0.8	19	21	40	14	16	30	$1,033	$1,305	$2,338	$775	$979	$1,753
FURNISHINGS & AMENITIES						376	56	432				$20,100	$4,198	$24,299
Trash Receptacle	1 receptacle	8	23	2	25	180	16	196	$1,266	$131	$1,396	$10,126	$1,044	$11,170
Fixed Bench	1,000 lf	1.6	15	2	17	24	3	27	$702	$145	$847	$1,123	$232	$1,355
Bicycle Rack	10 racks	1	8	2	9	8	2	9	$357	$109	$466	$357	$109	$466
Drinking Fountain	1 fountain	1	20	8	28	20	8	28	$1,065	$620	$1,685	$1,065	$620	$1,685
Lighting (Pole & Pedestrian)	10 fixtures	1.2	8	4	12	9	5	14	$365	$310	$675	$438	$372	$810
Lighting (Path & Bollard)	10 fixtures	3	4	1	5	13	3	16	$209	$78	$286	$626	$233	$858
Signage	10 signs	2	9	1	10	18	2	20	$427	$73	$500	$854	$145	$999
Guardrails	1,000 lf	0.6	5	8	13	3	5	8	$243	$525	$768	$144	$310	$453
Retaining Wall (Concrete)	1,000 lf	1.5	20	3	23	30	5	35	$942	$272	$1,214	$1,413	$408	$1,821
Reinforced Earth Wall / Vegetated Wall	1,000 lf	2.0	36	4	40	72	8	80	$1,978	$363	$2,341	$3,956	$726	$4,682
SPECIAL FEATURES						74	23	97				$3,810	$1,748	$5,558
Sculptural Play	allowance	-	-	-	-	74	23	97	-	-	-	$3,810	$1,748	$5,558
Coldbrook Site - Total Estimated Hours & Costs						**2,326**	**337**	**2,664**				**$124,119**	**$22,385**	**$146,503**

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.

Figure B.2.c. Calculations for Annual Maintenance Estimates for Opportunity Sites (in 2018 USD)

North Monroe - Estimated Annual Maintenance Hours & Costs LOS A

Landscape Type	Unit	# of Units	Hours per Unit			Site Total Hours			Loaded Cost per Unit			Site Total Costs		
			Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total
HARDSCAPES						853	38	891				$42,099	$2,782	$44,881
Regional Trail	10,000 sf	2.2	113	6	119	245	13	258	$5,505	$443	$5,948	$11,930	$960	$12,890
Gathering Areas / Plazas - Concrete	10,000 sf	2.5	119	5	124	298	12	310	$5,809	$344	$6,152	$14,522	$860	$15,381
Unit Pavers (Mortared on Concrete Base)	10,000 sf	2.8	111	5	115	310	13	323	$5,588	$344	$5,932	$15,647	$963	$16,610
SOFTSCAPES						1628	349	1977				$92,154	$21,998	$114,152
Turf Lawn	10,000 sf	7.8	121	12	133	937	93	1030	$7,057	$680	$7,738	$54,733	$5,277	$60,010
Ornamental / Floral Plantings	10,000 sf	1.9	182	12	194	352	23	375	$9,791	$680	$10,471	$18,897	$1,313	$20,210
Stormwater Outfall Wetlands	10,000 sf	2.7	85	42	127	232	114	346	$4,572	$2,960	$7,532	$12,401	$8,028	$20,429
Trees (Specimen / Large Caliper)	20 trees	1.5	46	50	96	69	75	144	$2,637	$3,093	$5,729	$3,955	$4,639	$8,594
Trees (Small & Medium Caliper)	20 trees	1.8	22	25	48	39	44	83	$1,239	$1,566	$2,805	$2,169	$2,741	$4,909
FURNISHINGS & AMENITIES						887	111	997				$47,654	$8,711	$56,365
Trash Receptacle	1 receptacle	12	27	2	29	324	29	353	$1,519	$157	$1,675	$18,227	$1,879	$20,106
Fixed Bench	1,000 lf	2	18	2	20	36	5	40	$842	$174	$1,016	$1,684	$348	$2,032
Bicycle Rack	10 racks	2	9	2	11	18	4	22	$428	$131	$559	$856	$261	$1,117
Drinking Fountain	1 fountain	1	23	10	33	23	10	33	$1,278	$744	$2,022	$1,278	$744	$2,022
Lighting (Pole & Pedestrian)	10 fixtures	2	9	5	14	18	10	28	$438	$372	$810	$875	$744	$1,619
Lighting (Path & Bollard)	10 fixtures	5	5	1	6	26	6	32	$250	$93	$343	$1,252	$465	$1,717
Signage	10 signs	4	11	1	12	43	5	48	$512	$87	$599	$2,050	$348	$2,398
Railing in Flood Prone Areas	1,000 lf	0.04	7	12	19	0	0	1	$360	$832	$1,191	$14	$33	$48
Reinforced Earth Wall / Vegetated Wall	1,000 lf	8	43	5	48	346	38	384	$2,374	$436	$2,809	$18,991	$3,485	$22,476
Seat Walls & Terraces	1,000 lf	1.9	28	2	30	52	4	56	$1,310	$218	$1,528	$2,427	$404	$2,831
SPECIAL FEATURES						916	178	1094				$50,714	$13,948	$64,662
River Landing	allowance	1.8	41	16	57	73	28	102	$2,688	$1,279	$3,967	$4,777	$2,273	$7,050
River Edge Rapids Viewing	allowance	-	-	-	-	68	12	80	-	-	-	$3,507	$1,089	$4,596
Event Pavilion	allowance	-	-	-	-	726	78	804	-	-	-	$39,749	$6,075	$45,824
Skate Park	allowance	-	-	-	-	48	60	108	-	-	-	$2,681	$4,511	$7,192
North Monroe - Total Estimated Hours & Costs						**4,283**	**676**	**4,960**				**$232,621**	**$47,438**	**$280,059**

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.

Figure B.2.d. Calculations for Annual Maintenance Estimates for Opportunity Sites (in 2018 USD)

Fish Ladder - Estimated Annual Maintenance Hours & Costs LOS A

Landscape Type	Unit	# of Units	Hours per Unit			Site Total Hours			Loaded Cost per Unit			Site Total Costs		
			Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total	Routine	Non-Routine	Total
HARDSCAPES						274	17	291				$13,480	$1,257	$14,737
Regional Trail	10,000 sf	1.0	113	6	119	113	6	119	$5,505	$443	$5,948	$5,505	$443	$5,948
Gathering Areas / Plazas - Concrete	10,000 sf	0.5	119	5	124	55	2	57	$5,809	$344	$6,152	$2,672	$158	$2,830
Unit Pavers (Mortared on Concrete Base)	10,000 sf	0.6	111	5	115	69	3	72	$5,588	$344	$5,932	$3,465	$213	$3,678
Wood Decking	10,000 sf	0.5	75	12	87	38	6	44	$3,677	$886	$4,562	$1,838	$443	$2,281
SOFTSCAPES						406	148	554				$21,901	$8,745	$30,647
Turf Lawn	10,000 sf	1.1	121	12	133	131	13	144	$7,057	$680	$7,738	$7,628	$735	$8,364
Wetlands	10,000 sf	1.9	72	24	96	138	46	184	$3,685	$1,452	$5,136	$7,026	$2,768	$9,794
Upland Meadows	10,000 sf	3.5	27	12	39	94	42	136	$1,374	$658	$2,032	$4,790	$2,292	$7,082
Trees (Specimen / Large Caliper)	20 trees	0.7	46	50	96	30	32	62	$2,637	$3,093	$5,729	$1,714	$2,010	$3,724
Trees (Small & Medium Caliper)	20 trees	0.6	22	25	48	13	15	29	$1,239	$1,566	$2,805	$744	$940	$1,683
FURNISHINGS & AMENITIES						207	37	244				$10,924	$2,708	$13,631
Trash Receptacle	1 receptacle	4	27	2	29	108	10	118	$1,519	$157	$1,675	$6,076	$626	$6,702
Fixed Bench	1,000 lf	0.8	18	2	20	14	2	16	$842	$174	$1,016	$674	$139	$813
Bicycle Rack	10 racks	1	9	2	11	9	2	11	$428	$131	$559	$428	$131	$559
Drinking Fountain	1 fountain	1	23	10	33	23	10	33	$1,278	$744	$2,022	$1,278	$744	$2,022
Lighting (Pole & Pedestrian)	10 fixtures	1	9	5	14	9	5	14	$438	$372	$810	$438	$372	$810
Lighting (Path & Bollard)	10 fixtures	2	5	1	6	10	2	13	$250	$93	$343	$501	$186	$687
Signage	10 signs	2	11	1	12	22	2	24	$512	$87	$599	$1,025	$174	$1,199
Railing with Infill Panels	1,000 lf	0.04	5	4	9	0	0	0	$243	$261	$504	$10	$10	$20
Guardrails	1,000 lf	0.5	5	8	13	2	4	6	$243	$525	$768	$112	$242	$354
Retaining Wall (Concrete)	1,000 lf	0.1	24	4	28	3	1	4	$1,130	$327	$1,457	$158	$46	$204
Seat Walls & Terraces	1,000 lf	0.2	28	2	30	5	0	5	$1,310	$218	$1,528	$225	$37	$263
SPECIAL FEATURES						994	93	1087				$49,224	$6,725	$55,949
Fish Ladder Feature	allowance	-	-	-	-	33	20	53	-	-	-	$1,678	$1,251	$2,929
River Landing	allowance	0.3	41	16	57	13	5	18	$2,240	$1,066	$3,306	$717	$341	$1,058
Special Amenities	allowance	-	-	-	-	27	5	33	-	-	-	$1,350	$377	$1,727
Retractable Bollards	allowance	-	-	-	-	6	5	11	-	-	-	$316	$320	$635
Changing Room / Restroom & Fish Cleaning Station	allowance	-	-	-	-	914	58	972	-	-	-	$45,164	$4,437	$49,601
Fish Ladder - Total Estimated Hours & Costs						**1,881**	**296**	**2,177**				**$95,530**	**$19,435**	**$114,965**

Note: All costs in 2018 USD. Costs include fringe and indirect benefits and OTPS costs.

Figure B.2.e. Calculations for Annual Maintenance Estimates for Opportunity Sites (in 2018 USD)

ASSET MANAGEMENT

APPENDIX C: LYON SQUARE O+M REPORT

CONTENTS

C.1 INTRODUCTION & BACKGROUND

Separate from the SAMP and the Opportunity Sites, ETM was also asked to develop an Operations & Maintenance (O+M) Report for the improvements to Lyon Square (Lyons Edge)*. Lyon Square is located along the Grand River and is expected to follow similar maintenance standards as those presented in the SAMP. Because of this connection, the O+M Report is included as an Appendix to the SAMP.

**The existing space is referred to as Lyon Square, while the proposed improvements to the space are referred to as Lyons Edge.*

Figure C.1. Location of Lyon Square along the Grand River.

Improvements in LYON SQUARE (Lyons Edge)

OPERATIONS + MAINTENANCE REPORT

DECEMBER 2018

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CONTENTS

1.0 INTRODUCTION

Lyon Square is located along the east side of the Grand River in Grand Rapids, Michigan. The City of Grand Rapids (City) and the Downtown Development Authority (DDA) engaged Bishop Land Design, LLC, (BLD) and a team of subconsultants to revitalize the site. The redesign – Improvements in Lyons Square (Lyons Edge) – aims to improve accessibility to and reestablish the connection between the river and the upland. While the larger goals of the three-phased project (plaza, upland, and downtown docks) will establish a connection to the waters of the Grand River, the currently assessed "Upland" scope of work will make no connection to the existing lower boardwalk, the Riveredge Trail.

ETM was brought onto the team to analyze the operations and maintenance needs for the proposed Upland design. This report is based on the 90% Final Design Documents and Specifications, dated August 3, 2018, and CAD files provided by BLD in October 2018.

Note: "Lyon Square" in this report refers to the current conditions of the site. "Lyons Edge" refers to the proposed design.

Figure 1 - Current view of Lyon Square (Google Earth)

Figure 2 - Renderings of proposed Lyons Edge design

2.0 STANDARDS OF CARE & CONNECTION TO THE GRC

Proper maintenance and management are crucial for the long-term success of a project. Effective maintenance provides a clean, safe, and usable site that attracts visitors, while effective management ensures that the proper tasks and levels of maintenance are delivered. It also allows for the ability to adapt practices to meet changing conditions. To the best extent possible, Lyons Edge should have a strong maintenance initiative and appropriate standards to ensure its vitality and sustainability for years to come.

The standards of care for maintenance of any public space directly affect maintenance budgets and influence perceptions of safety and use. For example, a maintenance plan in which all tasks are carried out at or above recommended best maintenance practices may create a pristine landscape, but may ultimately prove to be financially unsustainable. Alternatively, a maintenance plan in which tasks and repairs are carried out at minimal levels may reduce annual budgets but will likely result in high capital costs required for replacement or repairs that could have been prevented with regular care. Low standards of care can also create the perception of an unsafe environment for users.

Intensity of use and standards of care are intimately linked. In general, the greater number of visitors a park receives, the greater the maintenance load. Similarly, areas with intensive use and higher concentrations of visitors, such as play areas and lawns, typically require greater maintenance and higher standards than areas with limited public access. Directly related to this is the fact that the level of maintenance impacts park use: a well-maintained park attracts visitors, whereas a poorly maintained site discourages positive park visitorship and often invites misuse and vandalism. Given this relationship between maintenance and use, it is important to develop a maintenance plan that balances fiscal considerations with maintenance needs in order to provide a sustainable, high-quality visitor experience.

Lyons Edge is included in the "Downtown Promenade" Character Area addressed in the Grand River Corridor Design Guidelines (Design Guidelines) and Strategic Asset Management Plan (SAMP). In the SAMP this area is recommended to receive the highest levels of care in the corridor, "The Heart of Downtown" service level. The standards of care used in this O+M report are based on the Heart of Downtown service level, with some adjustments based on the proposed materials and anticipated usage of Lyons Edge.

The levels of service developed for the SAMP were based on City standards and account for the anticipated usage of the Corridor, seasonal events (snow and floods), and proposed materials. They have been selected to balance fiscal considerations with maintenance needs in order to ensure a high-quality, well-maintained, and financially sustainable site.

3.0 MAINTENANCE CONCERNS & RECOMMENDATIONS

This chapter examines the anticipated maintenance needs of Lyons Edge, including potential material and maintenance concerns. Needs and concerns have been divided into three broad feature categories: paving/ hardscape; plantings; and furnishings and amenities.

PAVING

All hardscapes and paving areas will require frequent litter removal and regular cleaning. Due to the location and expected use of Lyons Edge, daily litter removal is recommended. Additional debris may need to be removed after floods. Graffiti should be removed as needed, ideally within 24 hours of detection. All hardscapes should be inspected when performing maintenance tasks for any damage, vandalism, or needed repairs. Repairs should be addressed as soon as the need arises. Some repairs are expected to be needed annually due to flooding. It is crucial that the paved surfaces are properly leveled and graded to manage the melting snow from the hydronic snow melt system. As assessed in the 90% design drawing level, paved surfaces have a load limit of 8 kip, which is adequate for an ambulance or utility maintenance truck. It has been confirmed by the design team that a portion of the paved surfaces will be rated for a full-size fire truck for the 100% drawing level. The fire-truck weight rated area is shown in Figure 3.

Specific maintenance needs are outlined below.

Concrete Surfaces

Concrete surfaces at Lyons Edge include vehicular concrete, colored concrete, and stamped concrete. All will have similar maintenance needs. Cleaning may involve blowing debris with a hand or backpack

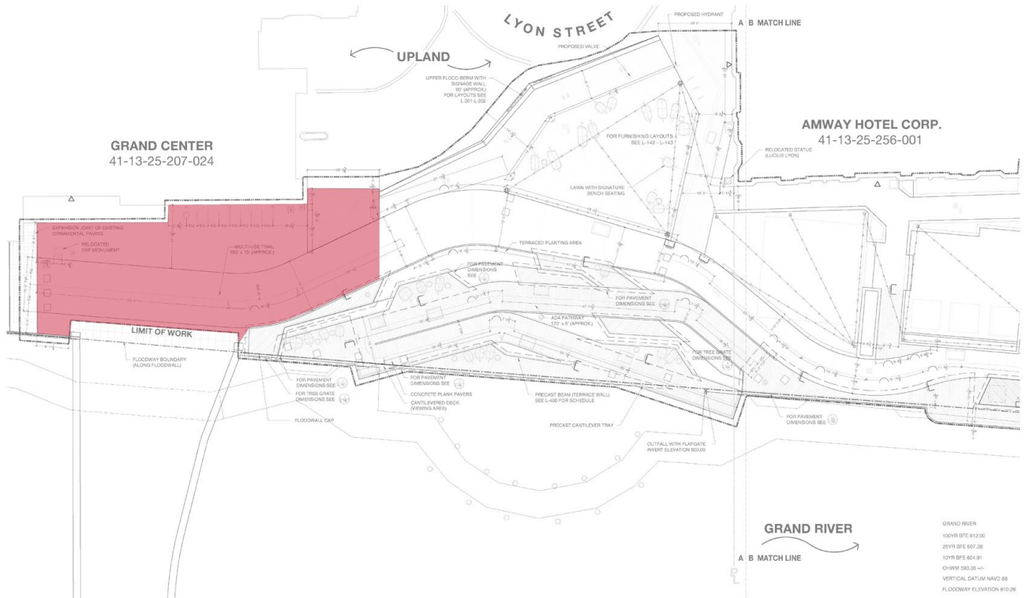

Figure 3 - Fire Truck Weight Rated Paved Areas (indicated in red)

blower and power washing. As a best practice, it is recommended that power washing be performed without chemicals due to the adjacency of the Grand River. Take care not to blow or wash debris into the river. Note that water soluble surface stains may be dislodged or faded by excessive power washing at high pressures and close range. Maintenance of surface stained concretes should be limited to spot treating and hand brooming with soap and water prior to the application of excessive water pressure. Concrete repairs should try to match the stamped pattern or color of the existing concrete as much as possible. Management may want to keep attic stock of the stain or admixture initially used for the concrete; at the least, the brand and color used should be recorded and referenced for future repairs.

Concrete Pavers

Most concrete pavers on site will be mortared set, while those at the Amway cantilever will be sand set. Mortar-set pavers can be maintained similarly to other concrete surfaces; they should be cleaned regularly using a hand or backpack blower and power washed every few months or as needed to remove dirt and stains. Power washing should be done using a fan-tipped nozzle at a lower pressure to avoid stripping the mortar joints. Additional maintenance that should be performed as needed includes releveling pavers, replacing damaged pavers, and re-mortaring.

Sand-set pavers have different maintenance needs. Due to the sand joints, the surface should not be blown, and power washing should only be done when necessary and always at a lower pressure with a fan-tipped nozzle to minimize blowing out the sand joints. Instead, the surface should be swept and cleaned with a stiff bristle brush as needed. New sand may need to be swept between pavers throughout the year and particularly after storm and flood events. Compared to mortar-set pavers, sand-set pavers will need to be reset and releveled more often, but repairs are simpler and faster to perform.

Snow Melt System

Hydronic snow melt systems use a mixture of hot water and glycol in closed loop tubing to warm paved surfaces and melt snow. They are designed to have a long life but need to be properly cared for. Maintenance needs will mainly involve checking the propylene glycol installed in the system. It should be checked at least once per year for proper pH and freeze protection. Refer to the glycol manufacturer for the proper operating parameters. Buffers can be added to the glycol to alter its pH, but after time (5 to 7 years depending on the glycol and additives), the system will need to be fully flushed and the glycol replaced. Note that glycol can cause corrosion if not properly maintained. In addition, the pumps and system supplying the heat must also be inspected throughout the year, and cleaned and repaired as needed.

As described in the specifications, the intent is to have an automatic snowmelt system that will operate continuously in “idle” mode during the winter months, or otherwise operate once every three days to help prevent seizure during periods of non-operation. The system will be turned off when the outdoor temperature and the temperature of the paving rises above the “melting” surface temperature setting. Check the controls regularly, e.g. daily, for any error messages or other warning signs that the system is not operating correctly. Thoroughly inspect the system before and after each winter season to ensure proper function and proper shut down. Any repairs to the hydronic elements in the pavement will likely require capital funding, since such repairs would involve shutting down and flushing the system, removing concrete paving, repairing the system, and connecting it with the old system. Concrete removal has the risk of damaging more tubing if not done properly. Finding the spot that needs repair within the concrete can be tricky. A heat-detecting infrared scan gun can be used to locate ruptures in hydronic tubing. Use pumps or wheelbarrows to place concrete to avoid damaging the tubes during concrete placement, rather than large repair trucks. Repairs to other system components are expected to be comparatively easier and cheaper.

Even with the snow melt system, there may be times when de-icers will need to be applied, such as at the beginning of the winter and when the system is undergoing repairs. As a best practice, it is recommended that any de-icers used be environmentally friendly due to the adjacency of the Grand River.

PLANTING

All planting areas will require litter and debris removal and regular weeding. Plantings should be monitored for health and function, and to identify where there are problems that need to be addressed. Temporary fencing should be used to cordon off planting areas undergoing renovation or replanting. As much as possible, maintenance should be performed when landscapes are dry to avoid overly compacting and damaging wet soils. Establishing plants will require higher levels of care to ensure successful establishment.

Lawns

The best management plan for lawns is to develop and maintain a healthy root system, periodically resting lawns and applying effective amendments when needed to foster plant growth and maintain soil biology. Lawns will need to be regularly mowed throughout the growing season (every 5 days on average) to a height appropriate for the grass species (typically 2 to 3 inches high). Lawns should be fertilized one to three times per year based on the results of soil tests. Weeds and pests should be managed as needed. Annual aeration is recommended for regular turf areas, while dethatching can be performed every three years. Aeration may not be needed on the fiber reinforced turf, but if it is performed, it should only be done manually and with a slit aerator to avoid damaging the fibers. This higher level of maintenance will help ensure the turf is better able to tolerate higher levels of use, more likely to recover from damage, and less likely to require full replacement/resodding. When turf is reseeded or resodded, ensure grass is fully developed after establishment before use is permitted. This may involve closing off the lawn for four to six weeks or more while turf is establishing.

Perennial & Grass Plantings

The ornamental plantings proposed for Lyons Edge will be a mix of perennials and grasses. Plants should be kept free of disease, pests, and dead or dying branches. At a minimum, the plants should receive seasonal maintenance in the spring and fall (pruning, weeding, bed cleanup, removing invasive species, replanting as needed) and in-season maintenance every month (weeding, pruning, fertilizing (if needed), spot watering, and invasive species control). Dead or dying plants should be removed and replaced promptly. Grasses can be cut back annually or every two years.

Trees

Trees should be inspected quarterly. Pruning should be done seasonally while plants are still in their “dormant” state. Additional pruning might be needed throughout the year due to special conditions, such as after a storm event, to address a safety hazard, or when vandalism occurs. Pruning should be performed or supervised by a professional arborist. Trees may also require fertilization and spot watering, particularly during establishment. Additional maintenance may be needed throughout the year depending on the inspection. A professional arborist should be consulted if and when diseases and pests are identified after inspection. Treatments will vary depending on tree species and specific pest or disease. Emerald Ash Borer is an impending threat to ash trees in the Grand Rapids area and trees should be monitored for any signs of the pest.

Irrigation

Perennial and grass planting areas will have drip irrigation, while the turf will have sprinkler irrigation. The irrigation systems should be regularly monitored to ensure adequate coverage and functionality and check for any damage. Above-grade components should be repaired and/or replaced as needed. There is a chance for the drip irrigation system to “rise up” or “walk” over time from water pressure and use. Staff should monitor drip irrigation areas for this and restake, reposition, and remulch as necessary. The irrigation systems should be repaired as needed and cleaned annually. The system will also need to be winterized in the fall and started up in the spring. Repair and replacement of the drip irrigation should be done with a contracted service provider or qualified City employee.

FURNISHINGS & AMENITIES

Furnishings and amenities proposed for Lyons Edge include trash receptacles, bicycle racks, walls, lighting, railing, and signature seating. All amenities should be kept clean, safe, and functional. Cleaning and inspections should be conducted regularly. Furnishing and amenities in the lower areas of Lyons Edge will require additional inspections and cleaning after floods. Maintenance of the monument and sculptures are likely to require a specialist.

Trash Receptacles

Two 36-gallon trash receptacles are proposed for Lyons Edge. During periods of heavy use, the receptacles will need to emptied frequently, potentially once to twice daily. It is possible for trash to exceed the holding capacity of the receptacles and for overflow to occur; therefore, cleaning of the immediate area may be required from time to time. Cleaning of the interior and pest control will be required on an as needed basis.

Walls

Compared to other site features, walls are relatively low-maintenance: they should be inspected regularly for damage or vandalism, and spot cleaned monthly or as needed. Walls will need additional inspections, cleaning, and potential repairs after floods. Skate stops will need to be installed as skateboarding and grinding on walls is expected to be an issue.

The "Signage Wall" will need additional maintenance for the integrated light which illuminates the recessed "Lyon Square" lettering (see the drawing in Figure 4 and detail in Figure 5). The lights will need occasional cleaning and should be repaired or replaced when they fail. Note that the exact method of access and replacement is still being coordinated with the precast concrete team. Additional time may also be needed to remove litter or debris caught in the recessed lettering.

Railing

Railings (handrails and guardrails) typically require minimal maintenance, but the integrated light feature will increase the maintenance needs of the guardrail proposed for Lyons Edge. All railings should be inspected on a regular schedule for any damage or vandalism. Any breaks should be repaired immediately. Temporary barriers may need to be erected around damaged railing, particularly guardrails, to ensure visitor safety until repairs are complete. Railing should be cleaned weekly or as needed. Litter may get trapped in the guardrail panels and may need to be removed more frequently. The LED light within the guardrail should be inspected and cleaned with other maintenance tasks. Because the light is LED and is protected by the rest of the guardrail, it is not expected to need frequent repairs or replacements. Damage may occur during floods however. Given the small size of the opening with the LED (1"), replacements and repairs to the lights may be difficult and/or time consuming.

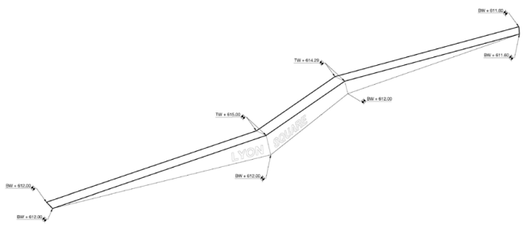

Figure 4 - Signage Wall Axon (90% FD Drawing Set)

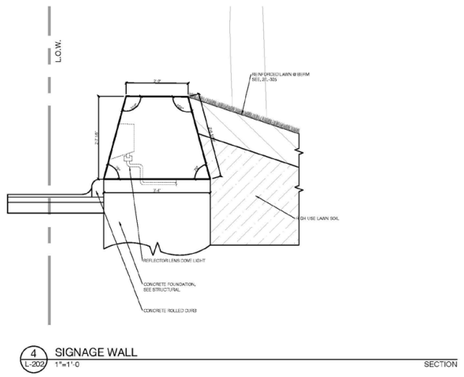

Figure 5 - Signage Wall Lighting Detail (90% FD Drawing Set)

Signature Seating

A family of precast concrete "Signature Seating" elements are proposed for Lyons Edge, including a stool and a few different types of seats and loungers. Thirteen stools and 26 "benches" (seats and loungers) are proposed. The seating features are both heated and lit (see seating details for Bench 2 in Figure 7). The lights are LED tape lights, housed in an aluminum channel, while the heated seating surface is connected to the hydronic system. Cleaning the benches will be straightforward, but debris and litter may get trapped in the LED channels. Given that the height of the largest lighting channel is 2.125", a tool may be needed to clean trapped debris. Similarly, this will make it difficult to access and replace the LED tape once it goes out.

Repairing the heated seating elements will be a capital repair, as the elements cannot be replaced without replacing the seating unit. More than likely, if the seat heating element fails, the chair will be left in place with the heating element not working.

Lighting

All lighting fixtures will require routine inspection for maintenance needs. Lights should be disconnected and allowed to cool before being cleaned or performing maintenance. Most lighting is expected to be LED and should not require frequent replacement. Replacement intervals will vary based on the fixture, level of use, and flood damage. Damage to lighting elements should be repaired as needed. Repair and replacement of luminaires or lumen boards of some lighting types, particularly pole lights, should be done with a contracted service provider or qualified City employee due to their height and electronics.

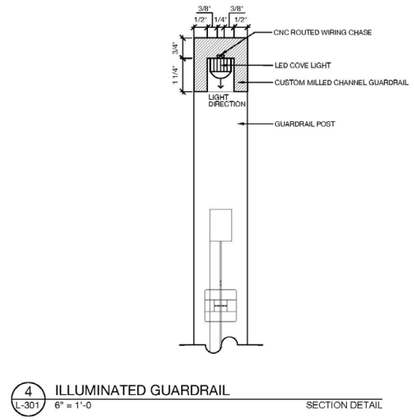

Figure 6 - Railing Light Detail (90% FD Drawing Set)

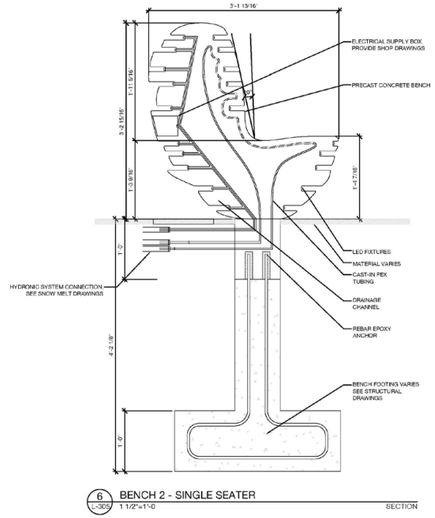

Figure 7 - Signature Seating, Bench 2 (90% FD Drawing Set)

4.0 HOUR & BUDGET ESTIMATES

METHODOLOGY

Every successful maintenance plan needs an appropriate framework. For the purpose of this report and our estimates, ETM defined three broad categories of landscape areas and site features proposed for Lyons Edge: paving/hardscape; plantings; and furnishings and amenities. For the hour estimates, each category was sub-divided into specific landscape and feature types (e.g. pavers, lawn, trash receptacles, etc.). The characteristics and maintenance needs of each type (discussed in the previous chapter) were used as the basis for defining annual maintenance tasks and estimating the annual hours needed for maintenance of that landscape or feature type. See the Appendix for the tasks and hours for each type. The hours for each type were then added together to arrive at the total estimated annual hours needed for maintenance of Lyons Edge.

To arrive at the annual budget, the annual hours were multiplied by hourly rates for staff. Also included are allowances for other annual maintenance expenses, such as materials and supplies, equipment and vehicle maintenance, plant replacement, and utilities. Additional assumptions used in the budget are described in the Budget Section.

Both the estimated hours and estimated budget were divided into "routine" and "non-routine" hours and costs. Routine hours and costs represent services that are needed each year, such as cleaning and horticulture care. These hours and costs are expected to remain constant from year to year. Non-routine services may not be needed each year, and include tasks that are seasonal and weather dependent or are a result of failure, vandalism, or wear-and-tear. Non-routine hours and costs will vary from year to year, but still must be accounted for when developing a maintenance plan.

ESTIMATED ANNUAL MAINTENANCE HOURS

The following assumptions were used in estimating the annual maintenance hours for Lyons Edge:

- All materials and features are properly installed.
- A push mower is used for lawn areas.
- The hydronic snow melt system will be used for most snow and ice removal, but there will be a few occasions throughout the year where manual snow removal and de-icer applications will be needed to supplement the system.
- The lower elevations of the site may flood annually or several times per year.
- No hours associated with the existing restaurant terrace, proposed water harvesting tank, programming, security, or administration were included.

Hours were assigned to three categories of staff based on the skill level needed for various maintenance tasks: W-1 for semi-skilled staff, W-2 for skilled staff, and W-3 for trades staff. Based on the hours assigned to each staff, full-time equivalents (FTEs) were also calculated and are shown in Figure 9. While one FTE usually represents 2080 hours per year, ETM assumes that one FTE will effectively work only 1860 hours per year after accounting for vacation, sick leave, and holidays.

Lyons Edge Estimated Annual Maintenance Hours

Landscape/Feature Type	Unit	QTY	Annual Hours		
			Routine	Non-Routine	Total
PAVING					
Concrete Surfaces	10,000 sf	0.8	62	5	67
Concrete Pavers (Mortar Set)	10,000 sf	0.3	21	2	23
Concrete Pavers (Sand Set)	10,000 sf	0.1	8	0	9
Hydronic Snow Melt System	Annual Hours	-	71	144	215
PLANTING					
Turf / Lawns	10,000 sf	0.4	60	4	65
Perennial & Grass Planting	10,000 sf	0.1	21	1	23
Trees - Large / Canopy	20 trees	0.8	36	16	52
Trees - Small / Understory	20 trees	0.4	12	6	18
Irrigation*	-	-	-	-	-
FURNISHINGS & AMENITIES					
Trash Receptacles	1 receptacle	2	67	8	75
Bike Racks	10 racks	1.1	8	3	12
Sculptures & Monuments	1 piece	2	30	30	60
Tree Grates	10,000 sf	0.1	5	1	5
Signature Seating (26 benches, 13 stools)	Annual Hours	-	131	11	142
Railing	1,000 lf	0.4	5	4	9
Retaining Wall	1,000 lf	1.0	20	3	24
Signage Wall	Annual Hours	-	12	5	17
Lighting - Pole	10 fixtures	0.6	5	2	7
Lighting - Path / Bollard	10 fixtures	4.6	28	5	32
TOTAL			**602**	**252**	**854**

**Hours for irrigation are included in Turf/Lawn and Perennial & Grass Planting hours.*

Figure 8 - Estimated Annual Maintenance Hours for Lyons Edge

Staff Level	Total Hours	Routine FTEs	Non-Routine FTEs	Total FTEs
W-1	477	0.25	0.01	0.26
W-2	96	0.03	0.02	0.05
W-3	66	0.01	0.03	0.04

Note: Does not include hydronic system

Figure 9 - Estimated FTEs Required for Annual Maintenance

ESTIMATED ANNUAL MAINTENANCE BUDGET

Two budgets were developed for Lyons Edge: one assuming maintenance of the hydronic system will be contracted out (Figure 10), and one assuming the hydronic system maintenance will be done in-house (Figure 11). The following assumptions were used in estimating the annual maintenance budgets:

- Hours were assigned to three categories of staff - semi-skilled (W-1), skilled (W-2), and trades (W-3) - and FTEs were calculated using 1860 working hours per FTE. Costs were calculated for staff using 2080 paid hours per FTE.
- Hourly rates are fully loaded and are based on rates and fringe benefits provided by the City.
- All costs are in 2018 US dollars.
- No costs associated with the existing restaurant terrace, proposed water harvesting tank, programming, security, or administration were included.
- Costs were divided into Routine Costs (will be needed each year) and Non-Routine Costs (may or may not be needed each year depending on snow, vandalism, and wear-and-tear) with flood cleanup as a separate line item.
- Capital repairs were included as an estimated allowance separate from the rest of the budget.

The total potential annual maintenance costs for Lyons Edge is estimated at approximately $85,000 per year. This amount is not expected to be needed each year; rather the typical annual cost will vary depending on the amount of snow and flooding, level of use, vandalism, and the age of the features. At minimum, maintenance is estimated to cost approximately $47,000 per year for Lyons Edge.

PROJECTED MAINTENANCE VS. CURRENT MAINTENANCE

The City currently spends limited time and resources on maintenance for Lyon Square. The Lyons Edge improvements will increase the time and resources needed through the installation of maintenance-intensive features, such as lawns and the signature seating, and by attracting more people to the space. Lyons Edge may not need the level of maintenance detailed in this report in the first few years after opening when the features are new and the site may not be as popular. However, as more improvements are completed nearby and along the river, more visitors come to the site, and features experience wear-and-tear, the higher maintenance levels that are described in this report will be needed. The higher maintenance levels are also consistent with the proposed standards for the Grand River Corridor, which Lyons Edge will be located on.

Lyons Edge Estimated Annual Maintenance Costs - City Staff with Contracted Hydronics

Item	Hours	FTEs	$/Hr*	Cost	Notes
Routine Costs					
Maintenance Personnel				$31,006	
W-1 Staff	463	0.25	$36	$18,656	Semi-skilled staff; cleaning, landscape work, some maintenance
W-2 Staff	55	0.03	$45	$2,745	Skilled labor; some landscape work, repairs, and equipment operations
W-3 Staff	13	0.01	$55	$805	Trades labor; includes lighting and infrastructure maintenance and repair, other specialized maintenance, etc.
Hydronic System				$6,000	Annual contract for start up, shut down, inspection, recharging, and preventative maintenance
Flood Cleanup				$2,800	Estimated at $2,800 per day for cleanup crew, equipment, materials, etc.; assumes 1 day per year
Maintenance Expenses				$16,000	
Materials & Supplies				$3,500	Small tools, equipment (hoses, brooms, paint, etc.), parts, lighting, trash bags, sand, mulch, fertilizer, etc. (Allowance)
Equipment Maintenance, Fuel & Repair				$1,500	Utility vehicles, power washers, trimmers, backpack blowers, small equipment, etc.; parts, fule, and repair (Allowance)
Equipment Rentals				$2,000	Trucks, hi-boy, scissor lift, etc. (Allowance)
Plant Replacement				$2,000	Replacement for diseased or dead plants in understory
Utilities				$7,000	Estimated allowance; will vary greatly based on amount of snow and use of hydronic system
Total Routine Costs				$47,006	2018 USD
Non-Routine Costs					
Maintenance Personnel				$20,274	
W-1 Staff	13	0.01	$36	$537	Semi-skilled staff; cleaning, landscape work, some maintenance
W-2 Staff	41	0.02	$45	$2,082	Skilled labor; some landscape work, repairs, and equipment operations
W-3 Staff	53	0.03	$55	$3,254	Trades labor; includes lighting and infrastructure maintenance and repair, other specialized maintenance, etc.
Hydronic System	144		$100	$14,400	Maintenance & repairs of the hydronic system; glycol flush needed every 5 to 7 years
Maintenance Expenses				$18,000	
Materials & Supplies				$1,500	Small tools, equipment (hoses, brooms, paint, etc.), parts, lighting, trash bags, sand, mulch, fertilizer, etc. (Allowance)
Equipment Maintenance, Fuel & Repair				$1,000	Utility vehicles, power washers, trimmers, backpack blowers, small equipment, etc.; parts, fule, and repair (Allowance)
Equipment Rentals				$3,500	Large equipment (Allowance)
Plant Replacement				$3,000	Replacement for diseased or dead plants, including trees
Re-sod Lawn				$4,000	Frequency dependent on level of use; assume it will not be needed yearly
Utilities				$5,000	Estimated allowance; will vary greatly based on amount of snow and use of hydronic system
Total Non-Routine Costs				$38,274	2018 USD
Total Base Annual Maintenance Costs				**$47,006**	**Routine costs only; 2018 USD**
Total Potential Annual Maintenance Costs				**$85,280**	**Routine and Non-Routine costs; 2018 USD**
Additional Flood Cleanup				$8,400	Estimated at $2,800 per day for cleanup crew, equipment, materials, etc.; assumes 3 days per year
Capital Repairs				$75,000	For Signature Seating and Hydronic System, as needed

Note: Hourly rates are fully loaded.

Figure 10 - Estimated Annual Maintenance Budget for Lyons Edge - Contracted Hydronic Services

Lyons Edge Estimated Annual Maintenance Costs - All City Staff

Item	Hours	FTEs	$/Hr*	Cost	Notes
Routine Costs					
Maintenance Personnel				$28,579	
W-1 Staff	463	0.25	$36	$18,656	Semi-skilled staff; cleaning, landscape work, some maintenance
W-2 Staff	126	0.07	$45	$6,318	Skilled labor; some landscape work, repairs, and equipment operations; includes hydronic system
W-3 Staff	13	0.01	$55	$805	Trades labor; includes lighting and infrastructure maintenance and repair, other specialized maintenance; includes hydronic system
Flood Cleanup				$2,800	Estimated at $2,800 per day for cleanup crew, equipment, materials, etc.; assumes 1 day per year
Maintenance Expenses				$18,000	
Materials & Supplies				$3,500	Small tools, equipment (hoses, brooms, paint, etc.), parts, lighting, trash bags, sand, mulch, fertilizer, etc. (Allowance)
Equipment Maintenance, Fuel & Repair				$1,500	Utility vehicles, power washers, trimmers, backpack blowers, small equipment, etc.; parts, fule, and repair (Allowance)
Equipment Rentals				$2,000	Trucks, hi-boy, scissor lift, etc. (Allowance)
Plant Replacement				$2,000	Replacement for diseased or dead plants in understory
Hydronic System				$2,000	Misc. parts, tools, etc.
Utilities				$7,000	Estimated allowance; will vary greatly based on amount of snow and use of hydronic system
Total Routine Costs				$46,579	2018 USD
Non-Routine Costs					
Maintenance Personnel				$14,731	
W-1 Staff	13	0.01	$36	$537	Semi-skilled staff; cleaning, landscape work, some maintenance
W-2 Staff	41	0.02	$45	$2,082	Skilled labor; some landscape work, repairs, and equipment operations
W-3 Staff	197	0.11	$55	$12,111	Trades labor; includes lighting and infrastructure maintenance and repair, other specialized maintenance, etc.
Maintenance Expenses				$26,000	
Materials & Supplies				$1,500	Small tools, equipment (hoses, brooms, paint, etc.), parts, lighting, trash bags, sand, mulch, fertilizer, etc. (Allowance)
Equipment Maintenance, Fuel & Repair				$1,000	Utility vehicles, power washers, trimmers, backpack blowers, small equipment, etc.; parts, fule, and repair (Allowance)
Equipment Rentals				$3,500	Large equipment (Allowance)
Plant Replacement				$3,000	Replacement for diseased or dead plants, including trees
Re-sod Lawn				$4,000	Frequency dependent on level of use; assume it will not be needed yearly
Hydronic System				$8,000	Misc. parts, tools, etc.; glycol flush needed every 5 to 7 years
Utilities				$5,000	Estimated allowance; will vary greatly based on amount of snow and use of hydronic system
Total Non-Routine Costs				$40,731	2018 USD
Total Base Annual Maintenance Costs				**$46,579**	**Routine costs only; 2018 USD**
Total Potential Annual Maintenance Costs				**$87,310**	**Routine and Non-Routine costs; 2018 USD**
Additional Flood Cleanup				$8,400	Estimated at $2,800 per day for cleanup crew, equipment, materials, etc.; assumes 3 days per year
Capital Repairs				$75,000	For Signature Seating and Hydronic System, as needed

Note: Hourly rates are fully loaded.

Figure 11 - Estimated Annual Maintenance Budget for Lyons Edge - All City Staff

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APPENDIX: TASK HOUR SHEETS

Below is a summary of the methodology behind determining the necessary task hours to annually maintain the proposed features of Lyons Edge (see Chapters 3 and 4). The standards of care in the task hour tables have been developed to reflect the proposed GRC Heart of Downtown Level of Service as well as the climate and anticipated usage of the site. The frequencies represent an average to be performed over the course of the year. Actual maintenance will ultimately be based on usage, weather, season, and available resources.

To aid in cost estimates, tasks were assigned to three different levels of staff. W-1 is semi-skilled labor, W-2 is skilled labor, and W-3 is trades labor.

The task hour charts on the following pages include the following terms and abbreviations:

TASK – The specific maintenance task

QTY – The estimated quantity over which a task is performed (Many of the tasks are estimated as a percentage of the total quantity.)

UNIT – A unit is a commonly accepted unit of measurement for each landscape type and its associated tasks. The unit abbreviations used throughout this project include:

ACRE - 43,560 Square Feet
MSF - 1,000 Square Feet
CSF - 100 Square Feet
CLF - 100 Linear Feet
XSF - 10 Square Feet
XLF - 10 LF
Each or EA - 1 of a particular item
Allow – Allowance of time for a particular task

UNIT (MIN) – Time standard necessary to complete 1 UNIT of a task in minutes (These time standards are based on the "Park Maintenance Standards" published by the National Recreation and Park Association (NRPA) and adjusted for the project's location and management goals.)

ONCE (MIN) – The quantity of the task multiplied by the time standard and shown in minutes

ONCE (HOURS) – The time in minutes converted into hours

ANNUAL FREQUENCY – Number of times the task is performed annually

TOTAL HOURS – The annual frequency multiplied by the time in hours for performing the task once

QTY X UNIT = ONCE (MIN) → ONCE (HOURS) X ANNUAL FREQUENCY = TOTAL HOURS/UNIT/YEAR

As an example of how to read the task hours, the sample line item below is for mowing turf (open area). The task's units are 1,000 sf (msf). The quantity for each time the task is performed is 28,000 square feet (28 x 1,000 sf), which is approximately 65% of an acre (see comments). It is estimated that doing this task once for 1,000 sf would be three minutes, so doing the task once for 28,000 sf would take 84 minutes (or approximately 1.4 hours). If the task would be done 28 times per year, it would require about 39 hours per year.

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS
Mow turf (open area)	28	msf	3	84	1.4	28	39	65% of an acre with ride-on mower; 1x/week during growing season

Anticipated Tasks & Estimated Annual Hours for Lyon Square

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
HARDSCAPES											
Concrete Paving							**83**	**Hours per 10,000 sf**	**78**	**3**	**3**
Routine Tasks							77	Hours per 10,000 sf	76	1	0
Litter removal	1	msf	3	3	0	417	21	10% of an area, daily to twice daily during peak times	21		
Blow debris	1	msf	6	6	0	182	18	10% of area, 3x to 4x per week with hand or backpack blower	18		
Power washing	1	msf	25	25	0	52	22	10% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle	22		
Debris removal from drain inlets		allow					2	Done every two weeks to remove debris and sediment	2		
Graffiti removal		allow					2	Includes both gum & graffiti removal	1	1	
Snow/ice removal by snow blower	9	msf	15	135	2	2	5	Paved surfaces accessible by blower; assumes 90% of paved areas twice per year; all other snow events addressed by hydronic snow melt system	5		
Snow/ice removal by hand	1	msf	80	80	1	5	7	Paved surfaces not accessible by blower; assumes 10% of paved areas 5x per year; all other snow events addressed by hydronic snow melt system	7		
Minor snow removal		allow					0	Snow removal done for minor accumulations as needed	0		
Spread de-icer	2	msf	5	10	0	8	1	Limited frequency due to hydronic snow melt system	1		
Non-Routine Tasks							*6*	*Hours per 10,000 sf*	*2*	*2*	*3*
Flood prep and clean-up		*allow*					*3*	*Closures as needed, post-flood inspection, cleaning, and repairs*	*2*	*1.5*	
Paving repair		*allow*					*3*	*Repair pavement markings, cracks, spalling, settling, etc.; resealing; match concrete color and/or stamped pattern as much as possible*			*3*
Concrete Pavers (Mortar Set)							**81**	**Hours per 10,000 sf**	**76**	**3**	**3**
Routine Tasks							75	Hours per 10,000 sf	74	1	0
Litter removal	1	msf	3	3	0	417	21	10% of an area, daily to twice daily during peak times	21		
Blow debris	1	msf	6	6	0	182	18	10% of area, 3x to 4x per week with hand or backpack blower	18		
Power washing	1	msf	25	25	0	52	22	10% of area; clean stained/dirty areas with power washer using a fan-tipped nozzle	22		
Graffiti removal		allow					2	Includes both gum and graffiti removal	1.0	1	
Snow/ice removal by snow blower	9	msf	15	135	2	2	5	Paved surfaces accessible by blower; assumes 90% of paved areas twice per year; all other snow events addressed by hydronic snow melt system	5		
Snow/ice removal by hand	1	msf	80	80	1	5	7	Paved surfaces not accessible by blower; assumes 10% of paved areas 5x per year; all other snow events addressed by hydronic snow melt system	7		
Minor snow removal		allow					0	Snow removal done for minor accumulations as needed	0		
Spread de-icer	2	msf	5	10	0	8	1	Limited frequency due to hydronic snow melt system	1		
Non-Routine Tasks							*6*	*Hours per 10,000 sf*	*2*	*2*	*3*
Flood prep and clean-up		*allow*					*3*	*Closures as needed, post-flood inspection, cleaning, and repairs*	*2*	*1.5*	
Pavers maintenance & repair		*allow*					*3*	*Level any pavers that have shifted, replace damaged pavers, remortar, etc.*			*3*

Anticipated Tasks & Estimated Annual Hours for Lyon Square

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Concrete Pavers (Sand Set)							**111**	**Hours per 10,000 sf**	**107**	**2**	**2**
Routine Tasks							107	Hours per 10,000 sf	106	1	0
Litter removal	1	msf	3	3	0	417	21	10% of an area, daily to twice daily during peak times	21		
Clear surface	1	msf	15	15	0	182	46	10% of area, sweeping 3x to 4x per week	46		
Manual cleaning	2	msf	70	140	2	8	19	20% of area; clean stained/dirty areas with stiff bristle brush; use power washer only if necessary and at a low pressure to minimize blowing out joints	19		
Sweep sand between pavers	2	msf	30	60	1	7	7	20% of area, done quarterly and after flood events	7		
Graffiti removal		allow					2	Includes both gum and graffiti removal	1.0	1	
Snow/ice removal by snow blower	9	msf	15	135	2	2	5	Paved surfaces accessible by blower; assumes 90% of paved areas twice per year; all other snow events addressed by hydronic snow melt system	5		
Snow/ice removal by hand	1	msf	80	80	1	5	7	Paved surfaces not accessible by blower; assumes 10% of paved areas 5x per year; all other snow events addressed by hydronic snow melt system	7		
Minor snow removal		allow					0	Snow removal done for minor accumulations as needed	0		
Spread de-icer	2	msf	5	10	0	8	1	Limited frequency due to hydronic snow melt system	1		
Non-Routine Tasks							*4*	*Hours per 10,000 sf*	*1*	*1*	*2*
Flood prep and clean-up		*allow*					2	*Closures as needed, post-flood inspection, cleaning, and repairs*	*1*	*1*	
Pavers maintenance & repair		*allow*					2	*Level any pavers that have shifted, replace damaged pavers, add in more sand to joints, etc.*			2
Hydronic Snow Melt System							**215**	**Annual Hours**	**0**	**71**	**144**
Routine Tasks							71	Annual Hours	0	71	0
Check controls	1	allow	5	5	0	180	15	Daily during operating season (mid Oct - Apr)		15	
Inspect & adjust glycol		allow					6	Inspect/test at least once per year for proper pH and freeze protection; adjust as needed		6	
Inspect system		allow					10	Pumps, boiler/heating element, etc. for damage and needed maintenance		10	
Seasonal maintenance		allow					40	Thorough inspection of entire system before and after winter; clean and repair components as needed		40	
Non-Routine Tasks							*144*	*Annual Hours*	*0*	*0*	*144*
Tubing repairs		*allow*					*64*	*Find damaged tube; remove paving and concrete slab; repair tube; repour concrete and replace paving*			*64*
Glycol replacement		*allow*					*32*	*Flush the system of old glycol mixture and replace with new mixture, done every 5 to 7 years*			*32*
System repairs		*allow*					*48*	*As needed*			*48*

Anticipated Tasks & Estimated Annual Hours for Lyon Square

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
SOFTSCAPES											
Turf Lawn							**182**	**Hours per 10,000 sf**	**118**	**34**	**30**
Routine Tasks							170	Hours per 10,000 sf	108	32	30
Remove litter	1	msf	3	3	0	417	21	10% of an area, daily to twice daily during peak times	21		
Fall leaf removal	3	msf	12	36	1	8	5	30% of turf area	5		
Mow turf (open area)	0	msf	3	0	0	32	0	0% of open turf with ride-on mower; once every 5 working days during growing season	0		
Mow walking/trim	10	msf	10	100	2	32	53	100% of open turf, with walking mower and string trimmer	53		
Soil Test/Evaluation		allow					1	Done prior to fertilization		1	
Turf fertilizer/weed preventer appl.	10	msf	10	100	2	3	5	100% of area; fertilizer and pre-emergent applications	5		
Horticultural pest control	2	msf	10	20	0	6	2	20% of area; monitor/control grubs, moles, rodents, etc.	1	1	
Top dress soil	5	msf	15	75	1	2	3	50% of turf area	3		
Seasonal turf renovation	7.5	msf	75	562.5	9	2	19	75% of area; dethatch, aerate, seed	19		
Temporary fencing	2	mlf	15	30	1	4	2	Install/maintain temporary fencing, assumes 2,000 lf	2		
Irrigation maintenance		allow					60	Monitor to ensure adequate coverage and functionality; check for damage; repair & replace above-grade components as needed; repair & clean out system; winterization & spring startup		30	30
Non-Routine Tasks							*12*	*Hours per 10,000 sf*	*10*	*2*	*0*
Establishment tasks		*allow*					*12*	*Applied to establishment years; includes erosion control, additional temporary fencing, spot watering and weed control*	*9.6*	*2.4*	
Perennial & Grass Plantings							**233**	**Hours per 10,000 sf**	**179**	**29**	**25**
Routine Tasks							218	Hours per 10,000 sf	167	26	25
Litter removal	1.0	msf	5	5	0	417	35	10% of an area, daily to twice daily during peak times	35		
Weeding	2	msf	12	24	0	28	11	20% of planting areas, weekly, April-October	11		
Seasonal prep	5	msf	120	600	10	2	20	Spring clean-up and winter prep	20		
Planting areas maintenance	2	msf	90	180	3	28	84	20% of planting areas, once every two weeks, April-October; deadheading, trimming, minor cutbacks, pruning, inspection for invasive species, fertilizing, etc.	84		
Spot watering	2	msf	30	60	1	8	8	20% of planting areas, as needed to supplement irrigation	8		
Leaf removal	3	msf	15	45	1	6	5	30% of planting areas	5		
Pest control	2	msf	30	60	1	4	4	20% of planting areas	3	1	
Plant replacement	1	msf	90	90	2	1	2	10% of planting areas, spring or fall	2		
Irrigation maintenance		allow					50	Monitor to ensure adequate coverage and functionality; check for damage; repair & replace above-grade components as needed; repair & clean out system; winterization & spring startup		25	25
Non-Routine Tasks							*15*	*Hours per 10,000 sf*	*12*	*3*	*0*
Establishment tasks		*allow*					*15*	*Tasks for the first 4 years of establishment, including spot watering, temporary fencing, plant replacement, and weed control*	*12*	*3*	
Trees (Specimen / Large Caliper)							**69**	**Hours per 20 Trees**	**21**	**48**	**0**
Routine Tasks							48	Hours per 20 Trees	16	31	0
Monitoring & inspection	20	each	15	300	5	4	20	Quarterly visual inspection and analysis of tree and soil moisture levels performed by a certified arborist; check for pests & diseases		20	
Tree maintenance	5	each	90	450	8	3	23	25% of trees on site; prune, restake/remove stakes, fertilize, mulch, control pests as needed	11.25	11.25	
Spot watering	5	allow	10	50	1	6	5	25% of trees	5		
Non-Routine Tasks							*22*	*Hours per 20 Trees*	*5*	*17*	*0*
Establishment tasks		*allow*					*20*	*Additional 1 hour per tree; Includes additional spot watering, weed control, adjusting tree stakes/ protection, plant replacement/ removal & thinning*	*5*	*15*	
Tree replanting		*only if needed*					*2*	*Tree removal ~300 to 500 man hours; planting is ~90 minutes*		2	

Anticipated Tasks & Estimated Annual Hours for Lyon Square

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Trees (Small & Medium Caliper)							**46**	**Hours per 20 Trees**	**18**	**28**	**0**
Routine Tasks							30	Hours per 20 Trees	14	15	0
Monitoring & inspection	20	each	8	160	3	2	5	Bi-annual visual inspection and analysis of tree and soil moisture levels performed by a certified arborist; check for pests & diseases		5	
Tree maintenance	5	each	60	300	5	4	20	25% of trees on site; prune, restake/remove stakes, fertilize, mulch, control pests as needed	10	10	
Spot watering	5	allow	10	50	1	5	4	25% of trees	4		
Non-Routine Tasks							*16*	*Hours per 20 Trees*	*4*	*12*	*0*
Establishment tasks		*allow*					*15*	*Additional hour per tree; includes additional spot watering, weed control, adjusting tree stakes/ protection, plant replacement/ removal & thinning*	*3.75*	*11.25*	
Tree replanting		*only if needed*					*1*	*Tree removal ~200 to 350 man hours; planting is ~45 to 90 minutes*		*1*	
FURNISHING & AMENITIES											
Trash Receptacle							**38**	**Hours per Receptacle**	**32**	**6**	**0**
Routine Tasks							34	Hours per Receptacle	32	2	0
Empty trash can - Peak	1	each	4	4	0	216	14	10x/week for 24 weeks	14		
Empty trash can - Shoulder	1	each	4	4	0	60	4	5x/week for 12 weeks	4		
Empty trash can - Off-season	1	each	4	4	0	48	3	3x/Week for 16 weeks	3		
Clean trash can	1	each	10	10	0	36	6	Every two weeks to every week	6		
Rodent and pest control		allow					6	2x/Month	4.2	1.8	
Non-Routine Tasks							*4*	*Hours per Receptacle*	*0*	*4*	*0*
Basic maintenance		*allow*					*4*	*Replace can liners/lid, resecure cans, etc.*		*4*	
Bicycle Rack							**11**	**Hours per 10 Racks**	**7**	**2**	**2**
Routine Tasks							8	Hours per 10 Racks	7	1	0
Clean and inspect	5	each	3	15	0	26	7	50% every two weeks	7		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*3*	*Hours per 10 Racks*	*0*	*2*	*2*
Repair & maintenance	*1*	*each*	*90*	*90*	*2*	*2*	*3*	*10% of racks, includes tightening connections, vandalism repair, etc.*		*1.5*	*1.5*
Sculptures / Monuments / Public Art							**30**	**Hours per Piece**	**15**	**0**	**15**
Routine Tasks							15	Hours per Piece	15	0	0
Clean and inspect		allow					15	Inspect with other maintenance tasks, clean as needed; includes graffiti removal	15		
Non-Routine Tasks							*15*	*Hours per Piece*	*0*	*0*	*15*
Maintenance & repair		*allow*					*15*	*As needed; will require a specialist*			*15*
Tree Grates							**60**	**Hours per 10,000 sf**	**50**	**6**	**4**
Routine Tasks							52	Hours per 10,000 sf	50	2	0
Remove litter	1	msf	5	5	0	417	35	10% of area, daily to twice daily at peak times; assume some debris trapped in grate	35		
Clean	2	msf	35	70	1	12	14	20% of area, monthly	14		
Graffiti removal		allow					3	As needed	1.5	1.5	
Non-Routine Tasks							*8*	*Hours per 10,000 sf*	*0*	*4*	*4*
Repair & maintenance	*1*	*msf*	*240*	*240*	*4*	*2*	*8*	*As needed*		*4*	*4*
Signature Seating							**142**	**Annual Hours**	**129**	**8**	**6**
Routine Tasks							131	Annual Hours	129	2	0
Clean and inspect	10	each	15	146	2	52	127	30% of items, weekly; clean surface, remove litter from light channels, etc.	127		
Seat heating maintenance		allow					-	Included with hydronic system hours			
Graffiti removal		allow					4	As needed	2	2	
Non-Routine Tasks							*11*	*Annual Hours*	*0*	*6*	*6*
Repair & maintenance	*3*	*each*	*210*	*683*	*11*	*1*	*11*	*10% of items, repairing cracks, chips, lighting, etc. Assume heated surface repair / replacement as a capital cost*		*5.7*	*5.7*
Railing							**21**	**Hours per 1,000 lf**	**13**	**5**	**3**
Routine Tasks							11	Hours per 1,000 lf	11	0	0
Clean and inspect	1	clf	5	5	0	30	3	10% weekly, 30 weeks per year	3		
Clean and inspect	2	clf	5	10	0	22	4	20% weekly, 22 weeks per year	4		
Light maintenance		allow					5	Inspect during rail cleaning; clean and repair as needed	5		
Non-Routine Tasks							*10*	*Hours per 1,000 lf*	*2*	*5*	*3*
Maintenance and repair	*6*	*xlf*	*30*	*180*	*3*	*2*	*6*	*6% of railing, includes repair and touch-up*		*3*	*3*
Flood prep and clean-up		*allow*					*4*	*Post-flood inspection, cleaning, and repairs*	*2.0*	*2*	

Anticipated Tasks & Estimated Annual Hours for Lyon Square

TASK	QTY	UNIT	UNIT (min)	ONCE (min)	ONCE (hours)	ANNUAL FREQ.	TOTAL HOURS	COMMENTS	Staffing W1	W2	W3
Retaining Wall (Concrete)							**23**	**Hours per 1,000 lf**	**20**	**1**	**3**
Routine Tasks							20	Hours per 1,000 lf	20	1	0
Clean and inspect	3	clf	20	60	1	15	15	30% monthly or as needed after storm events	15		
Post-flood cleaning & inspection		allow					4	Check for integrity, safety hazards, etc.	4		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*3*	*Hours per 1,000 lf*	*0*	*0*	*3*
Repair & maintenance		*allow*					*3*	*Spot repairs, patching cracks, etc.*			*3*
Signage Wall (Concrete)							**17**	**Annual Hours**	**13**	**1**	**4**
Routine Tasks							12	Annual Hours	12	1	0
Clean and inspect	0.3	clf	10	3	0	30	1	Clean 30% every two weeks or as needed	1		
Clean lettering area	1	allow	5	5	0	60	5.0	Remove trapped debris and litter from recessed lettering weekly or as needed	5		
Light maintenance		allow					5	Inspect with litter removal / cleaning, clean as needed	5		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*5*	*Annual Hours*	*1*	*0*	*4*
Repair & maintenance		*allow*					*4*	*Spot repairs, patching cracks, repairing light element, etc.*			*4*
Post-flood cleaning & inspection		*allow*					*1*	*Limited, regular floods not expected to reach wall; check for integrity, safety hazards, etc.*	*1*		
Lighting (Pole & Pedestrian)							**12**	**Hours per 10 Fixtures**	**7**	**3**	**2**
Routine Tasks							8	Hours per 10 Fixtures	7	1	0
Clean and inspect	10	each	10	100	2	4	7	4x/year; inspect for proper function and potential damage; clean as needed	7		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*4*	*Hours per 10 Fixtures*	*0*	*2*	*2*
Repair & maintenance	*1*	*each*	*120*	*120*	*2*	*2*	*4*	*As needed*		*2*	*2*
Lighting (Path & Bollard)							**7**	**Hours per 10 Fixtures**	**6**	**1**	**1**
Routine Tasks							6	Hours per 1,000 lf	6	1	0
Clean and inspect	10	each	5	50	1	6	5	4x/year and after storm events; inspect for proper function and potential damage; clean as needed	5		
Graffiti removal		allow					1	As needed	0.5	0.5	
Non-Routine Tasks							*1*	*Hours per 1,000 lf*	*0*	*1*	*1*
Repair & maintenance	*1*	*each*	*60*	*60*	*1*	*1*	*1*	*As needed*		*0.5*	*0.5*


RIVER FOR ALL