

ASSET MANAGEMENT PLAN

for Stormwater Executive Summary Report

Prepared for:

City of Big Rapids

SAW Project No. 1566-01

FINAL
December 2020

EXECUTIVE SUMMARY

OVERVIEW

Public Act 562 of 2012 authorized money for Stormwater, Asset Management, and Wastewater (SAW) Grant Program. In 2017, the City of Big Rapids received a SAW Grant from the Michigan Department of Environmental Quality (MDEQ) to provide financial assistance for the development of this Asset Management Plan (AMP) for the City's publicly owned stormwater utility. Working with City staff, Fleis and VandenBrink (F&V) provided technical assistance for asset identification, condition assessment, and capital improvement planning of the stormwater collection system.

This AMP is intended to be a living document that is updated as assets continue to wear and age, and as additional inspection/condition results are found and incorporated into the plan.

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ASSET INVENTORY & CONDITION ASSESSMENT

The stormwater collection system assets consist of approximately 157,360 feet (29.8 miles) of storm sewers and 1,736 stormwater structures connecting the gravity pipe. These assets are located in existing street rights-of-way or in easements dedicated for the assets use and maintenance.

Asset Identification & Location

A comprehensive stormwater system asset inventory was developed from available record drawings, field notes, staff knowledge, and site visits; supplemented with field survey work. Asset material, size and age were identified through the review of available historical record documents and Closed Circuit Televising (CCTV) data. Spatial orientation (pipe location), pipe depth and invert elevations were determined through GPS field survey and a comprehensive evaluation of the gravity system. This information was organized into a new or updated (GIS) database and piping network for archiving, mapping, and further evaluation purposes.

Condition Assessment & Expected Useful Life

A comprehensive evaluation of the collection system was performed. NASSCO-MACP structure field-based assessments were completed on 1,654 structures. Pipeline cleaning and NASSCO-PACP CCTV field-based inspections were conducted on 6.4% of the gravity pipe. Capacity Analysis was modeled for average day and peak hour conditions to identify capacity concerns. Recommendations for short-term (1-5 year) and long term (6-20 year) identified the need for maintenance: 47.8% of the system was tagged for inspection and/or cleaning. Rehabilitation accounted for 2.3% of the of the system identifying the need for replacement, point repairs and lining. The remaining 49.9% of assets were placed in the 20+ year category.

LEVEL OF SERVICE

Level of Service (LOS) defines the way in which the utility stakeholders want the utility to perform over the long term. The LOS can include any technical, managerial, or financial components the utility wishes, as long as all regulatory requirements are met. The LOS is a significant part of the development of the AMP and will become a fundamental part of how the utility is operated.

Items may be included so the utility can communicate its intentions with its customers. Measure its performance and determine critical assets. It is important for the utility to communicate with its customers to avoid confusion, bad feelings, accusations of improper operation, and to make clear what the customer's expectations should be. Defining the LOS sets the goals for the utility. Understanding the desired LOS will help to prioritize and characterize the system's assets, as well as how to manage finances to reach the LOS goals.

Defining the Expected Level of Service

Throughout the development of this AMP, F&V worked with the City Asset Management Team to develop the following LOS statement and goals.

STORMWATER UTILITY – LEVEL OF SERVICE STATEMENT

The overall objective of the City of Big Rapids is to provide appropriate stormwater collection, diversion, and conveyance at a minimum cost, consistent with applicable environmental regulations. To achieve this the following Level of Service (LOS) goals are proposed for the City of Big Rapids:

- Provide adequate stormwater collection system and conveyance capacity for all service areas
- Actively maintain stormwater collection and conveyance system assets in reliable working condition.
- Provide rapid and effective emergency response services to customers.
- Ensure maintenance and operations staff are properly trained.

The LOS goals may need to be adjusted from time to time as the utility ages, the needs of community change or new rules or regulations require a change in operation. For this reason, the LOS goals should be reviewed by the City from time to time to make sure they accurately reflect the desired operation of the utility.

Measuring Performance

While performance measurements are not a required component of this AMP report, the identification and implementation of performance measurement is recommended. Performance measurements are specific metrics designed to assess whether Level of Service objectives are being met. If implemented, and evaluation of goals should be completed at least annually to determine if, the provided resources are being used appropriately. Level of Service requirements can be updated to account for changes due to growth, regulatory requirements, and technology.

CRITICAL ASSETS

Determining Criticality

Business Risk is the determination of criticality of each asset in the stormwater system. Criticality is based on two factors; Likelihood (Probability) of Failure and Consequence of Failure using the following formula.

$$\text{Business Risk} = \text{Consequence of Failure Score} \times \text{Likelihood of Failure Score}$$

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation, maintenance, and capital improvement funds.

Likelihood of Failure (LoF) is a measure of how likely an asset is to fail. The following categories have been developed to quantify how likely an asset is to fail:

- Condition of the asset
- Remaining useful life (Age)

- Service History
- Operational status

Consequence of Failure (CoF) is a measure of the social, economic or environmental impact of failure of an asset and the utility’s ability to convey stormwater. CoF categories of the stormwater collection system include:

- Location of asset
- Facilities served by asset
- Size

Criticality Results

Using the strategy outlined above, a Business Risk Evaluation (BRE) was performed for each asset using a graphical ArcGIS-based sewer asset management and capital planning software that compiles, analyzes and assesses Business Risk for each asset and develops a Capital Improvement Plan. The results of the BRE are provided in easily understood tabular and graphical output.

Figure 1 provides the risk rating for storm sewer pipes by number of pipe segments. Three pipe segments in the stormwater collection system have an extreme risk rating and are recommended to be for near-term rehabilitation or replacement.

		<u>Pipes</u>		
		Low	Medium	High
Consequence of Failure	High	85	0	0
	Medium	561	4	3
	Low	1264	8	15
		Likelihood of Failure		

Figure 1: Business Risk Matrix (Risk Rating) by Number of Gravity Pipes

Figure 2 provides the risk rating for the storm sewer structures. Twenty structures are identified as extreme risk and are recommended for replacement or rehabilitation.

		<u>Manhole</u>		
		Low	Medium	High
Consequence of Failure	High	35	9	1
	Medium	260	109	19
	Low	729	430	144
		Likelihood of Failure		

Figure 2: Business Risk Matrix (Risk Rating) by Number of Structures

A spreadsheet providing asset criticality for each utility asset is included in the AMP detailed report for the stormwater collection system.

CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) with rehabilitation recommendations was prepared for the City’s stormwater utility assets based on the Business Risk evaluation. From the BRE, a short-term (1-5 year CIP) and long-term (6-20-year CIP) was developed for the utility. Table 1 shows detailed recommendations of the assets needing rehabilitation in the short term.

Table 1. 5-Year Capital Improvement Plan: Rehabilitation							
Rehabilitation Action	Total Cost (Current Year Dollars)	2021	2022	2023	2024	2025	
Pipe Replacement	\$ 788,441	\$ 36,612	\$ 77,651	\$ 531,470	\$ 179,906	\$ 12,199	
Pipe Lining	\$ 74,834	\$ -	\$ -	\$ 79,391	\$ -	\$ -	
Pipe Point Repair	\$ 38,368	\$ -	\$ -	\$ -	\$ -	\$ 43,184	
Pipe Upsize	\$ 270,218	\$ 35,198	\$ -	\$ -	\$ 256,813	\$ -	
Manhole Replacement	\$ 731,760	\$ 36,090	\$ 52,994	\$ 34,564	\$ 162,303	\$ 521,234	
Total	\$ 1,903,621	\$ 107,899	\$ 130,645	\$ 645,426	\$ 599,022	\$ 576,617	

OPERATIONS & MAINTENANCE

Regular operation and maintenance is essential in the management of a stormwater collection system. The collection system is subject to a variety of operational problems and can suffer from clogging, scour, corrosion, and collapse. Inspection, cleaning, and rehabilitation are important for optimizing the proper functioning of the collection system.

Table 2 summarizes the recommended preventative maintenance inspections to be considered in the short term (1-5 years) with recommended cost over the 5-year period.

Table 2. 5-Year Capital Improvement Plan: Maintenance							
Maintenance Action	Total Cost (Current Year Dollars)	2021	2022	2023	2024	2025	
Manhole Inspection	\$ 45,237	\$ 15,447	\$ 11,933	\$ 8,779	\$ 10,851	\$ -	
Manhole Cleaning	\$ 314,450	\$ 107,575	\$ 128,701	\$ 9,657	\$ 70,530	\$ 9,314	
CCTV and Cleaning	\$ 307,831	\$ 9,991	\$ -	\$ 122,933	\$ 63,656	\$ 139,236	
Total	\$ 667,518	\$ 133,013	\$ 140,634	\$ 141,369	\$ 145,037	\$ 148,549	



Department of Environment, Great Lakes, and Energy (EGLE)
SAW Grant
Stormwater Asset Management Plan
Certification of Project Completeness

Completion Due Date 12/23/2020
 (no later than 3 years from executed grant date)

The City of Big Rapids (legal name of grantee) certifies that all stormwater asset management plan (SWAMP) activities specified in SAW Grant No. 1566-01 have been completed and the SWAMP, prepared with the assistance of SAW Grant funding, is being maintained. Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, requires implementation of the SWAMP within 3 years of the executed grant (Section 5204e(3)).

Attached to this certification is a summary of the SWAMP that identifies major assets. Copies of the SWAMP and/or other materials prepared through SAW Grant funding will be made available to EGLE or the public upon request by contacting:

Mark Gifford, City Manager	at 231-592-4000	mgifford@cityofbr.org
_____ Name	_____ Phone Number	_____ Email

	<u>12/28/2020</u>
_____ Signature of Authorized Representative (Original Signature Required)	_____ Date

Mark Gifford, City Manager

 Print Name and Title of Authorized Representative