



Where we're going: System Goals



**CITY OF KALAMAZOO
STORMWATER ASSET MANAGEMENT PLAN**

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Prepared by

ENGINEER:
Prein&Newhof
PN# 2180207

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INTRODUCTION

Our Mission

Our community, City of Kalamazoo (COK), Michigan, is committed to supporting public health and safety, and to protecting property and the environment, through responsible and effective management of three water infrastructure systems: our water supply system, our wastewater system, and our stormwater system. These three systems affect each other and together they all affect public health, safety, property, and the environment. We strive to manage all three water infrastructure systems in a coordinated approach to provide these essential public services for our citizens in a sustainable way. We plan to pursue this mission by implementing asset management.

Asset Management Principles

Asset management is the way to achieve sustainable infrastructure. All infrastructure deteriorates with age and requires proactive management to operate, maintain, repair, and eventually replace each physical component, or asset. This progression over time, from routine operation and maintenance through repairs and eventual replacement, is the asset's life cycle. Waiting to perform maintenance or make repairs can save money in the short term but may shorten the life cycle of an asset. On the other hand, replacing an asset before it fails may not take full advantage of the asset's value. It is this balance which puts the decisions for operations, maintenance, repair, and replacement actions at the heart of asset management.

As a community, we determine the level of service we want from our stormwater system as defined the utility Assessment Management Plan (AMP). Legislation enacted in 2012 by the State of Michigan established a grant program pursuant to Public Acts 511, 560, 561, and 562. Utilizing these public acts, the COK developed the Stormwater, Asset Management, and Wastewater (SAW) grant program. Asset management is an evaluation of needed actions after considering the condition of an asset, the consequences of an asset failure, and the action alternatives available. Condition ratings are based on the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP). The solution that provides the lowest life cycle cost at the desired Level of Service (LoS) is implemented.

Our Stormwater System

The City of Kalamazoo's stormwater system is a network of pipes and structures that collects stormwater runoff from our buildings, streets, parking lots, and adjoining lands, and conveys it to a desired location (typically into the Kalamazoo River and its adjoining wetlands).

About This Document

This document is our Stormwater Asset Management Plan. It outlines our stormwater system goals and summarizes how the COK intends to apply the principles of asset management to achieve the goals. As we implement asset management, the COK intends to update our Stormwater Asset Management Plan to ensure a continuing renewal of our commitment to best management practices.

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This Asset Management Plan covers the City of Kalamazoo owned stormwater system assets and does not include the management of private systems or Waters of the State. Maintaining our Asset Management Program will be a joint effort of our staff, administration and elected officials. The COK intends to update our program every few years to make sure it is relevant and effective.

PART 1: DEFINING OUR GOALS—WHAT IS OUR DESIRED LEVEL OF SERVICE?

In 2004, the COK adopted Chapter 29 (Ordinance 1776) "Stormwater System." This Ordinance was primarily written to address the Illicit Discharge Elimination Program (IDEP), a requirement of its Phase II Stormwater Program, National Pollutant Discharge Elimination System (NPDES) Permit. In 2008, some Amendments were made to address floodplain issues. In 2007, the COK adopted Ordinance 1886 "Performance Standards for Groundwater Protection Within Wellhead Protection Capture Zones and Stormwater Quality Management." These standards provide specific requirements for best management practices to prevent drinking water (groundwater) contamination and pollutants from entering the stormwater collection system (MS4) and eventually into the "Waters of the State."

As a community, we determine the level of service we want from our stormwater system. Legislation enacted in 2012 by the State of Michigan established a grant program pursuant to Public Acts 511, 560, 561, and 562. Utilizing these public acts, the COK developed the SAW grant program. Defining these goals has an effect on the cost of the service. Many factors play into this determination including public health, safety, compliance with regulations, aesthetics, flood risk, and predictable costs. To this end, we have established the following primary goals for our stormwater system:

Goal 1: Meet Regulatory Requirements

Our stormwater system is designed to meet or exceed regulations established in the Federal Clean Water Act and State of Michigan Statutes/Rules. We strive to achieve continued compliance with environmental regulations and maintain the quality of our environment.

State and federal regulations have established a MS4 permit with which we must comply. Our MS4 permit requires that we implement an IDEP and Stormwater Pollution Prevention Initiatives (SWPPI). We continue to partner with the neighboring MS4 communities collectively referred to as the Kalamazoo Area Stormwater Coalition (KASC), the Kalamazoo River Watershed Committee and the Total Maximum Daily Load (TMDL) group, working within these regulatory systems, to improve stormwater quality for our community.

Goal 2: Minimize Flooding and Public Hazards

Our stormwater system allows us to collect surface runoff water, convey it to a desired location, and discharge it back into the environment. Breaks, blockages, and erosion can affect our stormwater assets. Flooding can cause roadway accidents, reduce life of pavements, inhibit use of our transportation assets, and may cause property damage/erosion. Extreme weather can potentially overwhelm any stormwater system and there is no level of storm protection that can guarantee against all flooding. Our goal is to minimize flood risk to a reasonable level that balances the cost of improvements with the benefits of flood prevention.

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We have established standards for the design of new stormwater systems. The standards are based on regional rainfall statistics, the probability of a rain event overwhelming the system, and the potential impacts of such an event. When making modifications to our existing system, the COK intends to seek to apply current design standards while balancing the costs with the benefits to the community. System extensions and replacements in our system will be designed to meet the planned LoS of a 10-year 24-hour design storm. Areas where flooding may cause significant damage or create hazards may be designed to a higher LoS.

Goal 3: Minimize Public Hazards

Underground drainage systems (storm sewers and culverts) can crack, crumble, and collapse if not maintained. Such failures can allow the water to wash away the soil, forming sink holes that can damage streets or other infrastructure. Erosion can undermine structures, sidewalks, and streets. We plan to maintain our stormwater system, following the principals of asset management, to minimize these risks for our community.

Goal 4: Manage Stormwater Inflow into our Wastewater System

Stormwater flowing into the wastewater system, through sources such as roof drains and catch basins (inflow) can cause wastewater overflows or backups in basements. Infiltration of groundwater into the wastewater system can also cause backups. Both inflow and infiltration (I/I) take up flow and treatment capacity in the wastewater system, and increase our transport and treatment costs. We strive to identify and disconnect sources of I/I from the wastewater system.

We also recognize that many homeowners desire dry basements, and that sump pumps have made this possible and common place in recent decades. Much of our infrastructure was built at a time when this was not the case. As a result, some home owners desiring to install sump pumps may not have access to a public storm sewer for proper discharge of the water. In order to minimize the potential for illegal discharge of sump pumps to the wastewater system, our goal is to make public storm sewer available for properties with potentially wet basements.

Goal 5: Provide Capacity for Community Growth

Our City is built along a river, the natural low place in the terrain. As a result, any outward growth is likely to be upstream. As land development occurs, additional stormwater runoff flows downstream and can increase flood risk for existing properties. Our goal is to ensure proper management of stormwater with new land development to mitigate the potential flood risk impacts for existing properties. To achieve this goal, the COK has an established ordinance and performance standards requiring development plans to promote redevelopment over new development and ensure controlled growth in the stormwater system without over-expansion.

Goal 6: Maintain Water Quality

As stormwater travels to and through our stormwater system, it can collect sediment, debris, and pollutants, and release them into downstream waterways. Our goal is to release clean stormwater to the environment and minimize any environment effects of our stormwater discharge. The regulatory framework described above provides a strategy for pursuing this goal.

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Goal 7: Maintain Customer Service

The COK intends to respond expediently to customer complaints using the 311 Call Service Center (269-337-8000 outside COK limits). Complaints will be responded to 24 hours, 7 days a week to increase communication efficiency.

Goal 8: Work Orders

The COK intends to develop a work order system to identify, assign and track preventative, reactive and routine work on the system and report on the status of the work orders regularly.

Goal 9: Minimize Life Cycle Costs

The best financial decisions are those which achieve the lowest life cycle cost while still meeting the desired level of service. This means we consider the full life cycle of each investment each time we evaluate improvements to our system. We recognize that short term fixes, while they may have the lowest immediate costs, may not be the best long term financial decision. Likewise, not spending money on maintenance and repairs can provide short term cost savings, but may result in asset failure, ultimately increasing life cycle costs. We intend to manage our system to always pursue the lowest life cycle cost possible for each system asset while maintaining our desired level of service.

The COK intends to implement asset condition tracking and Criticality assessments to determine the optimum time for asset maintenance and/or replacement. Decisions will be made which strike a balance between maximizing the lifecycle use of all assets, the risk of failure of the assets, and the consequence of failure of the assets.

PART 2: INVENTORY - WHAT DO WE OWN?

Program Status

An inventory of storm sewers and structures has been completed. Manhole and catch basin inventory data includes structure installation year, material, size, and rim elevations. Global Positioning System (GPS) coordinates have been collected for a majority of manholes, catch basins, and pipe inlets/outlets for reliable locational accuracy. Sewer pipe inventory data includes the pipe installation years, materials, sizes, inverts, slopes, and approximate depth below grade. The pipe locations are based on manhole GPS coordinates and record drawing information. The locations of the retention and detention basins have been mapped. Our system ownership limits, along with that of private, County, and State systems within our City, has been determined according to our best available information. Outfall and discharge point locations (places where our system ownership starts or ends) have been identified.

System inventory data is maintained in our Geographic Information System (GIS). The GIS provides convenient access to system inventory information through digital maps which can be accessed both by administrators and maintenance crews.

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Our System

Our stormwater system includes assets such as collection pipes, culverts, manholes, catch basins, retention/detention basins, and discharge outlets. Vitrified clay pipe (heat-treated clay) and concrete pipe were the main choices for storm sewers in North America for many decades. Material for culverts is typically either concrete or corrugated metal. The metal pipes are subject to rusting and shorter life cycles. Clay brick with mortared joints used to be the primary material for manholes and catch basins. Our system also has structures made with concrete block and precast concrete.

In recent decades, plastic sewer pipe is common in new sewer construction. Although plastics have good corrosion resistance, they are vulnerable to poor installation practices. Given this vulnerability, we typically utilize concrete pipe as our material of choice.

A detailed summary of our stormwater system assets is in our Storm Sewer System Evaluation Report dated July 2020 by Prein & Newhof and in a detailed asset inventory maintained by our Department of Public Services (DPS).

The DPS keeps a list of non-pipe assets which includes purchase date, original cost, inspection reports, repair history, maintenance schedule, and specifications.

Our Plan

We will keep our system inventory current by storing records of our storm water system in our Geographic Information System (GIS). A GIS contains maps of all pipes, manholes, catch basins, and outlets along with an inventory of non-pipe assets (equipment, buildings, etc.) and asset data pertinent to Operations, Maintenance, and Replacement.

PART 3: RISK OF FAILURE – WHAT ARE THE CONDITIONS OF OUR ASSETS?

Our System

To understand how long each of our assets may last, their condition and potential failure risk can be tracked. A functional asset failure is the primary consideration for Risk of Failure (RoF). However, we also must evaluate the risk of a physical asset failure for pipes, manholes, catch basins, culverts, and outlets. The COK intends to use physical inspections and maintenance records to rate their condition.

Our Plan

The COK intends to keep our condition assessments current using periodic asset inspections at intervals frequent enough to document reasonably expected condition changes. The inspection intervals will vary by asset type and its expected life. The COK intends to score each asset on its likelihood or risk of failure using the PACP numeric grading system. RoF ratings are on a scale of 1-5 with 5 being the highest RoF.

PART 4: CONSEQUENCE OF FAILURE – WHAT HAPPENS WITH A FAILURE?

Our System

It is important we understand the severity of consequences which may occur if any asset in our system fails. Functional failure consequences can occur when pipes and catch basins become blocked with sediment or debris. Physical failure consequences can occur when we have pipe breaks, outlet washouts, and structure collapses.

Our Plan

The COK intends to evaluate the Consequence of Failure (CoF) of each asset, from both a functional and physical failure perspective. The COK intends to maintain redundancy on assets with a high CoF. All CoF ratings will be on a scale of 1-5 with 5 being the highest CoF.

PART 5: CRITICALITY – HOW DO WE PRIORITIZE OUR ACTIONS?

Our System

The COK plans to prioritize our actions to meet our LoS goals while managing our work loads and minimizing life cycle costs using the PACP numeric grading system. Consequence of Failure and Criticality should not be confused. Criticality is the product of an asset's RoF and CoF. Criticality drives an asset's action priority.

Our Plan

Criticality ratings help us prioritize improvements and with development of our Capital Improvement Plan. Criticality of assets within our system will be determined by multiplying each asset's RoF (1-5) by its CoF (1-5).

PART 6: CAPACITY – DO WE HAVE ENOUGH, NOW AND FOR THE FUTURE?

Our System

The COK plans to meet service demands both now and into the future based on current and future land use. Over time, flows fluctuate with changes in property use and population. The majority of our system is providing our desired level of flood protection. However, there are a few areas where improvements are required. An engineering study of stormwater flows has been completed, covering the downtown area of the storm system assets. The findings are presented in a January 2020 engineering study entitled Kalamazoo Downtown Area Storm System Capacity Analysis by Prein & Newhof.

Our Plan

The COK intends to maintain our stormwater assets to provide adequate capacity for existing development and plan for system improvements which allow our community to grow. The COK intends to manage system expansion by balancing needs for community redevelopment/infill and desires for new development.

PART 7: OPERATIONS AND MAINTENANCE – MAINTAINING ROUTINE O&M

Our System

Our system must meet service demands both now and into the future based on current and future land use. Over time, flows fluctuate with changes in property use and population. The majority of our system is providing our desired level of flood protection. However, there are a few areas where improvements are required.

Our Plan

We have established the following Operation and Maintenance (O&M) goals:

1. Reduce O&M driven by emergency situations and promote preventive activities.
2. Maintain staffing and equipment levels so in-house staff can perform routine O&M activities.
3. Use in-house staff to verify proper function of all system assets.
4. The COK intends to hire outside consultants and contractors when we need specialized technical or equipment capabilities.
5. The COK intends to develop a work order system to identify, assign and track preventative, reactive and routine work on the system and report on the status of the work orders regularly.

PART 8: CAPITAL IMPROVEMENTS – CONTINUING SYSTEM RENEWAL

Our System

System improvement recommendations for our stormwater system are provided in our Storm Sewer System Evaluation Report dated July 2020 by Prein & Newhof. This report identifies the scope and priorities of proposed stormwater system improvements such as pipe replacements, equipment replacements, and major O&M activities.

Our Plan

The COK intends to incorporate the recommendations of the various reports into a comprehensive Capital Improvement Plan (CIP) which will document the major projects we plan to complete within the next 10 years. The CIP is used to prioritize capital improvements and routine maintenance projects, providing an extended period of time to plan and schedule for, and as necessary, to account for expenditures. Criticality ratings set the order and timing of projects. Project timing often is driven by the availability of outside funding such as loans and grants. The COK intends to maintain and update our comprehensive CIP frequently.

PART 9: FINANCIAL STRATEGY –PLANNING AND STABILITY

Our System

Actions on our stormwater system are funded through our General Fund or through charges to private development when required to support that development.

Our Plan

The COK intends to maintain a life cycle forecast of expected costs to minimize and stabilize budget impacts to the General Fund.

Recognizing that our stormwater system is a utility similar to our drinking water and wastewater systems, The COK intends to evaluate the potential establishment of a stormwater utility.

SUMMARY

Our Asset Management Program outlines how The COK intends to achieve our Asset Management Plan goals. The COK intends to adjust it periodically with new/improved tools, software, and evaluation techniques. Regardless of those changes, incorporating Asset Management into our everyday activities, including system improvements and master planning is our goal. By proactively managing our stormwater system, we can meet our desired LoS goals at the lowest possible long term cost.