City of East Lansing
Sewer Infrastructure
Webinar

November 18, 2021
Agenda

- City of East Lansing Service Area
- Combined Sewer System Area
- History of Infrastructure Installation
- Components of a Sewer System
- Water Resource Recovery Facility (WRFF)
- Pump Stations, Retention Treatment Basin, Combined Sewer Overflow (CSO) Tunnel, & Regulators
- Sewer Interceptors
- Sanitary, Combined, & Storm Sewers Design & Function
- Manholes & Catch Basins
- Recent and Upcoming Sewer System Improvements
- Funding & How to Move Forward
City of East Lansing Service Area

- Approximately 5,700 acres
  - 912 acres are combined (16%)
- Sewer flow is treated at the Water Resource Recovery Facility (WRRF) on Trowbridge Road
  - Most sewers flow by gravity to the WRRF
  - WRRF treats sewage flow from the City, Meridian Township & Michigan State University
- Service area includes
  - 4 Pumps Stations (1 major, 3 minor)
  - CSO Facility & Retention Treatment Basin (2.6 million gallons (MG) of storage)
    - Provides treatment before discharging to Red Cedar River during overflows
  - CSO tunnel (5.1 MG of storage)
Combined Sewer System Area

- 912 acres within the City have combined sewers
- Located in the oldest area of the City
History of Infrastructure Installation

- The City’s sewer system include sewers constructed as far back as the 1920s
  - This laid the backbone of the City’s sewer infrastructure
  - Sewer infrastructure installed during this time was designed to discharge into waterways
  - As the City expanded, separate storm and sanitary sewers began to be installed in the 1950s
- The Clean Water Act was passed in 1972 and required treatment of sewage prior to discharging to local waterways
- The Water Resource Recovery Facility (WRRF) was constructed in 1965 and expanded in 1973
  - Continuous improvements are ongoing at the WRRF since 2015
- The Woodingham Pump Station was built in 1962, expanded in 1985 and replaced in 2020.
  - This station serves portions of Meridian Township and northern areas of the City
- The other three pump stations are in the Northern Tier and were constructed in the last 20 years.
In the early 1990’s, the State of Michigan required municipalities to evaluate their combined sewer areas to limit combined sewer overflows into the waters of the state.

- Combined sewer overflows (CSO) occur during heavy or prolonged rainfall events

The City hired a consulting firm to evaluate the combined sewer area to determine the best way to limit the City’s overflows.

The decision made was to move forward with the installation of the CSO tunnel, completion of separation of Wilmarth combined sewer area, and installation of the Retention Treatment Basin (RTB) at an approximate cost of $38 million. Construction took approximately 10 years.

- The tunnel and RTB store excess flow during rain event to limit overflows to river.

Full separation was estimated to cost approximately $46 million (in 1993 dollars) based on $30,000 per acre for separation.

- In today’s dollars, that equates to approximately $72,000 per acre to separate or $67 million for the remaining 912 acres. Construction estimated to take 20-30 years.

- Does not include cost to upgrade water main or other infrastructure improvements.
Components of the City’s Sewer System

- Water Resource Recovery Facility
- Retention Treatment Basin
- Combined Sewer Overflow Tunnel & Regulators
- Interceptors
- Pump Stations
- Sanitary, Combined, and Storm Sewers
- Manholes & Catch Basins
Water Resource Recovery Facility

- Current design capacity sized to treat 18.75 million gallons per day (MGD) of sewage, current average annual flow is approximately 13 MGD
- Hydraulic Capacity of the WRRF is 40 MGD that can be fully treated
- Current and upcoming improvements will increase the wet weather capacity to approximately 60 MGD
- The next phase of upgrades at the WRRF is just starting. This is the 4th project in the past 6 years.
- These upgrades are critical to the continued operation of the facility
- Serves the City, Meridian Township, and MSU. Costs shared based on capacity.
  - 26.67% East Lansing
  - 33.33% Meridian Township
  - 40% Michigan State University
Pump Stations, Retention Treatment Basin, Combined Sewer Overflow (CSO) Tunnel, & Regulators

- Woodingham Pump Station - 21 million gallon per day (MGD) Capacity
  - Serves portions of Meridian Township and northern areas of the City
- State Road Pump Station - 0.7 MGD capacity
  - Serves the Eagle Eye Golf Course area
- Coleman Road Pump Station - 3.3 MGD capacity
  - Serves the area north of Coleman Road
- DPW Pump Station - 0.15 MGD capacity
  - Serves the DPW facility
- Retention Treatment Basin - 2.6 MG capacity
- CSO Tunnel - 5.1 MG Capacity
- Regulators in the system provide the ability to send excess flow to the CSO Tunnel during rain events
Sewer Interceptors

- There are multiple primary sewer interceptors throughout the City
  - Carry sanitary flow to the WRRF
- Red Cedar Interceptor
  - Runs parallel to the Red Cedar River and conveys flow from the City and Township
- Tower Interceptor/ Brody Express Interceptor
  - Discharges to the Woodingham Pump Station and drains to the Brody Express Interceptor
  - Carries flow from the Township, City and MSU
- East Brookfield Interceptor
  - Runs on the east side of the City and carries flow from the City and the Township
- Goritz Drain, Trowbridge Road, and Spartan Village Interceptors
  - Carries flows from the City and MSU
Sanitary, Combined, & Storm Sewers
Design & Function

- **Gravity Sewer Design**
  - Sized based on service area and projected development type and density upstream of the sewer
  - Start at the downstream end of the system and work towards the upstream end
  - Sewers utilize various slopes based on the size to maintain cleaning velocity

- **Sanitary Sewers**
  - Designed to handle a 25-year, 24-hour storm event
  - Approximately 3.71 inches of rainfall in 24 hours

- **Combined and Storm Sewers**
  - Designed to handle a 10-year, 1-hour storm event
  - Approximately 1.7 inches of rain in 1-hour
Manholes & Catch Basins

- Manholes are installed along the sewer routes to provide access for maintenance
- Catch Basins are installed along the roadways to collect storm water
  - These discharge into the storm or combined sewers
  - Catch basins have sumps installed in them to collect sediment prior to discharging into the sewers
  - If installed on a combined sewer system, catch basins typically have traps installed in them on the discharge line to keep water in the structure to prevent sewer odor from exiting the catch basin
Recent and Upcoming Sewer System Improvements

- 2020 Combined Sewer System Modeling and Master Plan Report
  - Michigan Avenue and Harrison Road Sewer Improvements (Complete)
  - Oakhill & Evergreen Improvements (Complete)
  - Northlawn Avenue Sewer Improvements (Under Construction)
  - Kedzie Street & Sunrise Court Storm Sewers (2022 Construction)
  - Center and Beal Regulator Modifications (Design Complete)

- 2020 SRF Project Plan Sewer Projects
  - River/Waters Edge District and Milford/Gunson Sewer Improvements (2023)
  - Wilmarth-Woodmere Relief (2023)
  - Elm Valley Sewer District Improvements (2025)
  - Cowley-Highland-Kensington Sewer Improvements (2025)
  - Shaw Estates Sewer Separation (2025)
Funding & How to Move Forward

- **Sewer Rates**
  - Currently $7.50 per 1,000 gallons
  - Look closely at rate affordability
    - Rates were increasing steadily to fund improvements, COVID impacted this

- **State Revolving Fund Low Interest Loans**

- **American Rescue Plan Act (ARPA) - limited**
  - Backflow Prevention for homeowners in combined sewer areas
    - Policy being developed to assist homeowners with cost of installing a backflow valve on their sewer line

- **Continued construction in neighborhoods to update the sewer system**

- **The City doesn’t have a sanitary sewer issue, we have a storm water issue.**
  - The greatest challenge from climate change is found in changes to rainfall intensity and frequencies.
  - We need a solution for funding storm water.
  - Green Infrastructure can be a viable option for mitigating storm water
    - A study or Green Infrastructure opportunity assessment should be completed to determine the best options for the City’s system.
Questions?