

Program 8089 – Metro WWTP Asset Renewal



Metropolitan Wastewater Treatment Plant (WWTP)

Description

This program provides funding to continue the plant-wide renewal program at the Metropolitan Wastewater Treatment Plant (Metro WWTP), which was initiated under Program 8059 Metro WWTP Rehabilitation and Facilities Improvements. Funds are for planning and implementation of capital improvements to the liquids processing and plant-wide facilities at the Metro WWTP.

Purpose and justification

The program provides for planning and implementation of projects to address renewal needs for continued, reliable and sustainable wastewater service at the Metro WWTP through the year 2040.

Program location

The active projects within this program are in the following Council district: 13

Active projects in program

Project Number	Project Title
808915	Metro WWTP Electrical Distribution Renewal - Phase 2
808916	Metro WWTP Electrical Distribution Renewal - Phase 3
808917	Metro WWTP Secondary Conduit and Conductor Replacement
808918	Metro WWTP Flood Control Improvements
808919	Metro WWTP 408 and F&I #2 Building Envelope Rehabilitation
808923	Metro WWTP Site Preparation & Improvements - Phase 2
808925	Metro WWTP PLC Renewal
808927	Metro WWTP Steam Improvements & Turbine Rehabilitation
808928	Metro WWTP Effluent Pump Station Rehabilitation
808929	Metro WWTP Solids Control Room Improvements
808930	Metro WWTP Secondary Renewal
808935	Metro WWTP Primary and Secondary Renewal – Phase 1

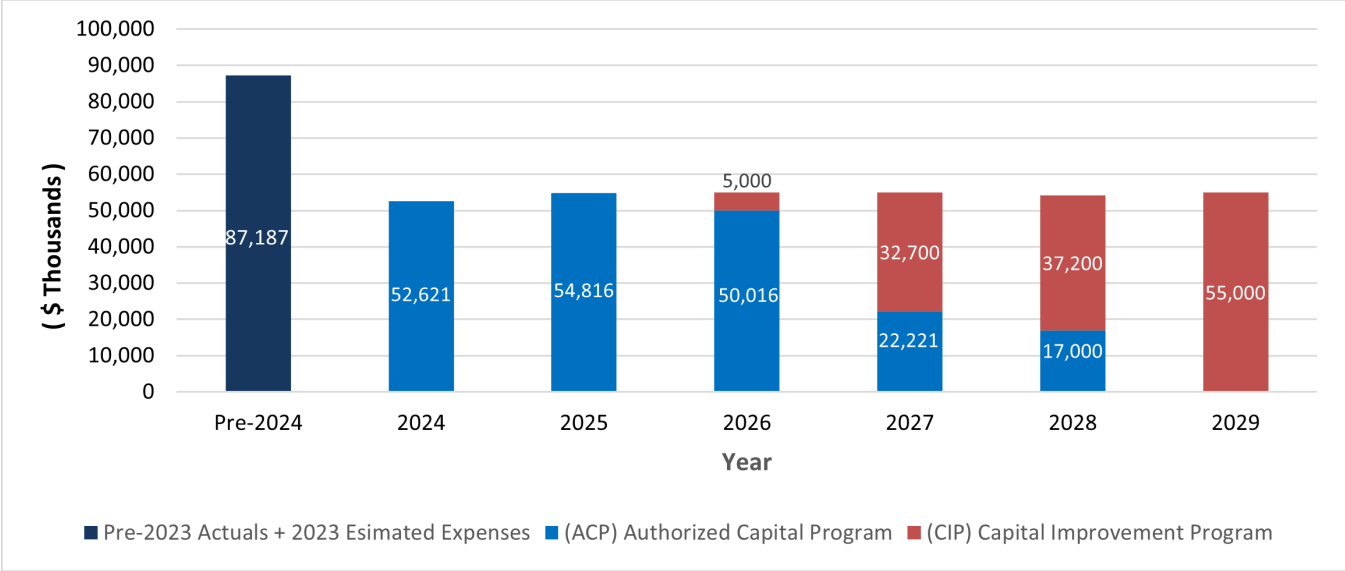
Project Number	Project Title
808963	Metro WWTP Water Systems Renewal & Improvements - Phase 1: Distribution System Renewal
8089xx	Metro WWTP Electrical Distribution Renewal - Phase 4
8089xx	Metro WWTP Primary and Secondary Renewal – Phase 2
8089xx	Metro WWTP Water Systems Renewal and Improvements - Phase 2: City Water
8089xx	Metro WWTP Water Systems Renewal and Improvements - Phase 3: Reclaimed Water
8089xx	Metro WWTP Underdrain & Meter Pit Rehabilitation

Environmental Services 2024 through 2029 Capital Program

- Authorized Capital Program (ACP): \$283,861,214
- Capital Improvement Plan (CIP): \$119,900,000

Estimated program cash flow from 2024 through 2029

Note: the ACP is the total amount of all past and present authorizations including pre-2024 expenses.



Project location: Council district #13, City of Saint Paul, Metro WWTP



Aeration Compressor

Project type

Plants

Objectives

Asset Preservation

Scope

Maintenance staff will coordinate rehabilitation of seven compressor motors through specialty contracted services and install temperature and vibration monitoring for the motors.

Project need

The aeration compressors are critical to the continued performance of the aeration process and inspections by Maintenance staff indicate the compressor motors need to be replaced or rehabilitated to extend service life.

Project schedule:



Planning: 2010 through 2015



Design: 2018 through 2020



Construction: 2020 through 2025

Financial analysis

2024 cash flow:	\$0
Current ACP:	\$3,603,000
2024 through 2029 cash flow:	\$0
Total project cost:	\$3,603,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



New unit substations to be installed

Project type
Plants

Objectives
Asset Preservation, System Expansion, and Quality Improvements

Scope
Replace electrical distribution equipment (unit substations, switchgear, and motor control centers) with new equipment. Upgrade and expand the existing Main Substation Building to provide space for new equipment and to increase worker safety during maintenance.

Project need
Condition assessments determined that electrical equipment in the Main Substation Building and at various buildings throughout the plant are at, or nearing the end of, useful service life and need to be replaced.

Project schedule:



Planning: 2010 through 2015



Design: 2018 through 2021



Construction: 2022 through 2026

Financial analysis

2024 cash flow:	\$12,000,000
Current ACP:	\$60,934,000
2024 through 2029 cash flow:	\$34,800,000
Total project cost:	\$60,934,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Electrical Conduit for Secondary Collector Motors

Project type
Plants

Objectives
Asset Preservation

Scope
The project replaces electrical conduit and conductors for secondary collector motors.

Project need
The east and west secondary collector motor conduits and conductors were installed over 40 years ago. Work on the collectors is a safety hazard for personnel.

Project schedule:



Planning: 2010 through 2015



Design: 2023



Construction: 2023 through 2025

Financial analysis

2024 cash flow:	\$1,200,000
Current ACP:	\$3,208,000
2024 through 2029 cash flow:	\$2,200,000
Total project cost:	\$3,200,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Flood control measure location at the Metro WWTP at Pig's Eye Lake Road and 5th Avenue

Project type

Plants

Objectives

Asset Preservation

Scope

Increase the road elevation or install stop logs at the intersection of Pig's Eye Lake Road and 5th Avenue to the existing levee height.

Project need

There is a need to install flood control measure in the event of a 500-year flood.

Project schedule:



Planning: 2010 through 2015



Design: 2023 through 2024



Construction: 2025 through 2026

Financial analysis

2024 cash flow:	\$500,000
Current ACP:	\$1,138,000
2024 through 2029 cash flow:	\$1,100,000
Total project cost:	\$1,100,000

Metro WWTP 408 and F&I #2 Building Envelope Rehabilitation

Program family 8089

Project #808919

Project location: Council district #13, City of Saint Paul, Metro WWTP



Left: 408 Building looking west. Right: F&I #2 building looking east.

Project type

Plants

Objectives

Asset Preservation

Scope

This project rehabilitates, removes portions of buildings, or demolishes the 408 and F&I#2 buildings based on condition assessments and a business case evaluation.

Project need

The 408 and F&I#2 buildings are over 45 years old and in need of renewal or demolition.

Project schedule:



Planning: 2010 through 2015



Design: 2022 through 2023



Construction: 2024 through 2026

Financial analysis

2024 cash flow:	\$4,000,000
Current ACP:	\$15,000,000
2024 through 2029 cash flow:	\$15,000,000
Total project cost:	\$15,000,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Construction of the new tunnel from EPR to Services Building

Project type
Plants

Objectives
Asset Preservation, Quality Improvements

Scope
Construction of staffed guard station, tunnel access to the Services Building, and road and parking lot rehabilitation.

Project need
Road, tunnel, parking, and security improvements are required for the new Services Building and Field Service Annex

Project schedule:



Planning: 2006 through 2008



Design: 2015 through 2023



Construction: 2023 through 2025

Financial analysis

2024 cash flow:	\$3,000,000
Current ACP:	\$7,595,100
2024 through 2029 cash flow:	\$5,500,000
Total project cost:	\$7,595,100

Project location: Council district #13, City of Saint Paul, Metro WWTP



Typical PLC (Programmable Logic Controller)

Project type
Plants

Objectives
Asset Preservation

Scope
Replace out-of-date process control systems at the Metropolitan Wastewater Treatment Plant.

Project need
Key elements in the process control system for the Metropolitan Wastewater Treatment Plant are out of date and in need of replacement to continue to provide reliable treatment plant process control.

Project schedule:



Planning: 2010 through 2015



Design: 2023 through 2027



Construction: 2024 through 2028

Financial analysis

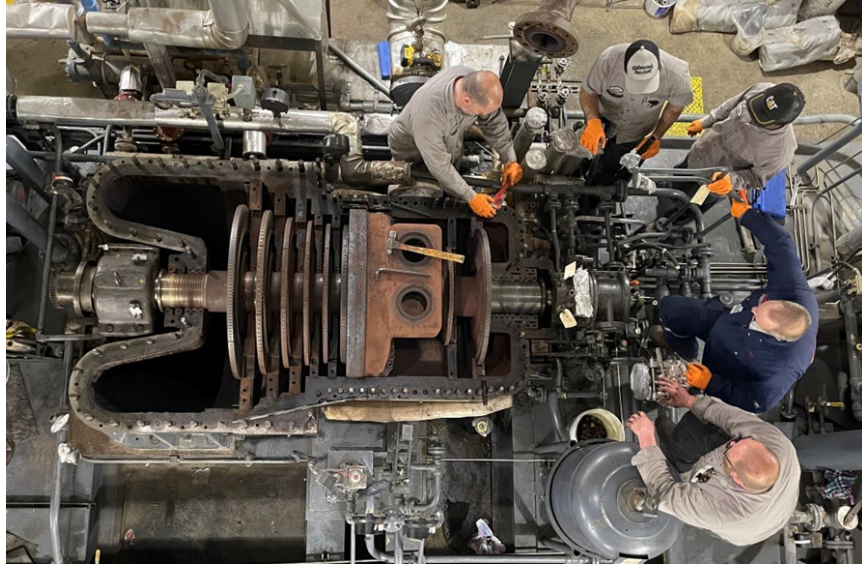
2024 cash flow:	\$1,000,000
Current ACP:	\$2,556,000
2024 through 2029 cash flow:	\$2,500,000
Total project cost:	\$6,056,000

Metro WWTP Steam System Improvements & Turbine Rehabilitation

Program family 8089

Project #808927

Project location: Council district #13, City of Saint Paul, Metro WWTP



Metro Plant staff performing maintenance on the G7 steam turbine generator.

Project type

Plants

Objectives

Asset Preservation

Scope

This project will rehabilitate the existing steam turbine generator and make improvements to boiler feedwater chemistry, instrumentation and controls, moisture mitigation, steam traps, and structural modifications to get an additional 7 to 10 years out of the existing G7 steam turbine generator.

Project need

Rehabilitation and improvements to the G7 steam turbine generator system is needed since G7 can save the Metro Plant roughly \$1,000,000 per year in purchased electricity.

Project schedule:



Design: 2023 through 2024

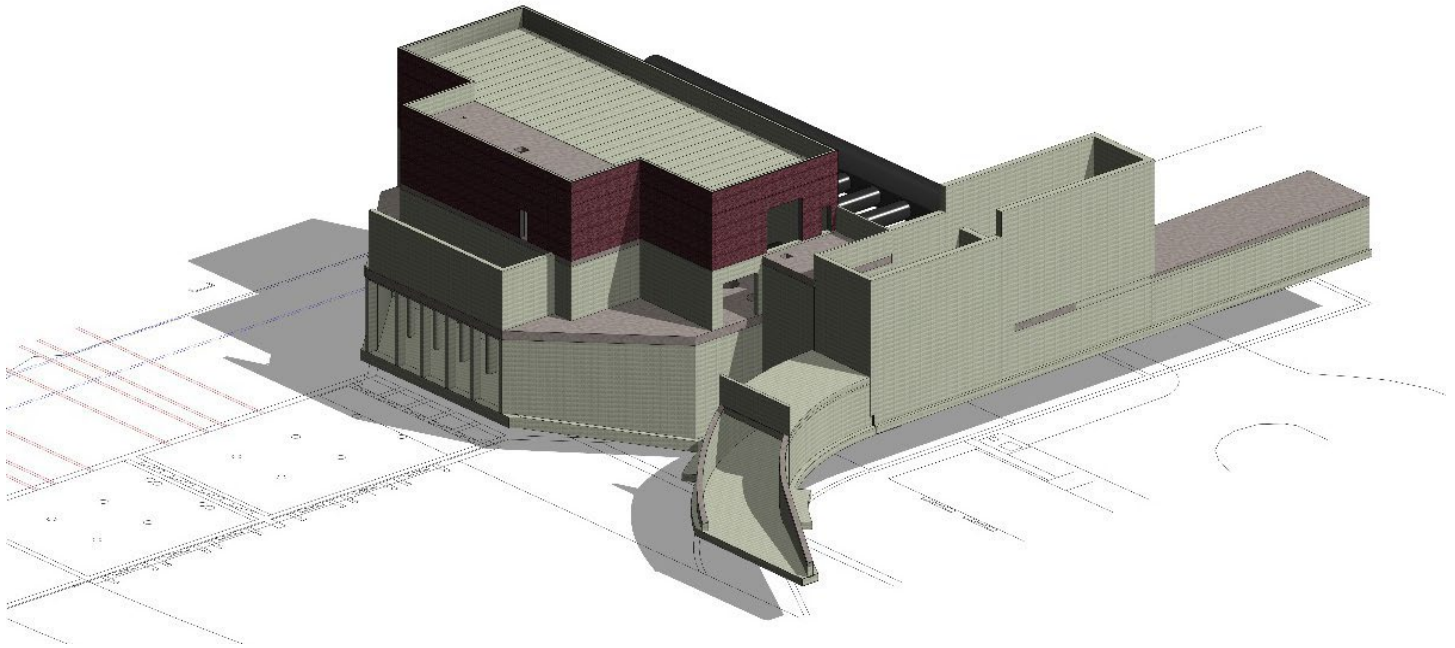


Construction: 2024 through 2025

Financial analysis

2024 cash flow:	\$2,000,000
Current ACP:	\$10,000,000
2024 through 2029 cash flow:	\$10,000,000
Total project cost:	\$10,000,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Effluent Pump Station Revit Model

Project type

Plants

Objectives

Asset Preservation

Scope

This project enhances the effluent pumping reliability by providing a more robust facility to handle peak flows during flood conditions. These improvements include upgrades to address pump vibration issue; interior and exterior building improvements; structural repairs; replacement of switchgear, transformers, MCCs and other electrical equipment; replacement of PLC, HVAC equipment, and sluice gates; demolition of unused structures and decommissioned processes.

Project need

The pump station has experienced problems with pump service availability. There is a need to rehabilitate the station to increase system reliability for an additional 30 to 40 years of service life.

Project schedule:



Planning: 2010 through 2015



Design: 2021 through 2024



Construction: 2025 through 2027

Financial analysis

2024 cash flow:	\$3,221,000
Current ACP:	\$21,474,000
2024 through 2029 cash flow:	\$21,474,000
Total project cost:	\$21,474,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Existing Metro Plant Solids Management Building Control Room built in 2004.

Project type
Plants

Objectives
Quality Improvements

Scope

This project replaces the solids management building existing control room, conference room, and sludge storage operator control area. The project also includes ergonomic improvements to the centrifuge operator control area, ash loadout operator control area, business unit coordinator's office, and other offices in the Solids Management Building.

Project need

The Metro Plant solids control room, conference room, offices, and operator control areas are nearing 20 years old and in need of ergonomic, performance monitoring, and work environment improvements.

Project schedule:



Design: 2023 through 2024



Construction: 2024

Financial analysis

2024 cash flow:	\$300,000
Current ACP:	\$1,600,000
2024 through 2029 cash flow:	\$1,600,000
Total project cost:	\$1,600,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Left: Demolition of diffusers - Metro Plant's secondary treatment. Right: Installation of diffusers - Metro Plant's secondary treatment.

Project type
Plants

Objectives
Asset Preservation

Scope

This project replaces the aeration tank diffusers, installs aeration control upgrades, rehabilitates underdrains and meter pits, and installs final settling tank backfill gates and air header leak assemblies.

Project need

The aeration system equipment was last replaced in the early 2000s and needs replacement. The new aeration equipment will result in significant energy savings due to improvements in air transfer efficiency.

Project schedule:



Planning: 2010 through 2015



Design: 2020 through 2021



Construction: 2021 through 2025

Financial analysis

2024 cash flow:	\$10,000,000
Current ACP:	\$41,387,000
2024 through 2029 cash flow:	\$14,500,000
Total project cost:	\$41,387,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Left: Primary sludge pumps. Right: Odor control fan

Project type

Plants

Objectives

Asset Preservation

Scope

The following improvements are planned: East Pretreatment Improvements and building expansion, sluice gate replacements, road improvements, East Primary and Compressor building and equipment improvements, and PLC replacements.

Project need

Primary and Secondary equipment and infrastructure is approaching 40 years old and needs replacement. Condition assessment determined that roofs and roads are at or nearing the end of useful service life and need to be replaced.

Project schedule:



Planning: 2010 through 2015



Design: 2021 through 2024



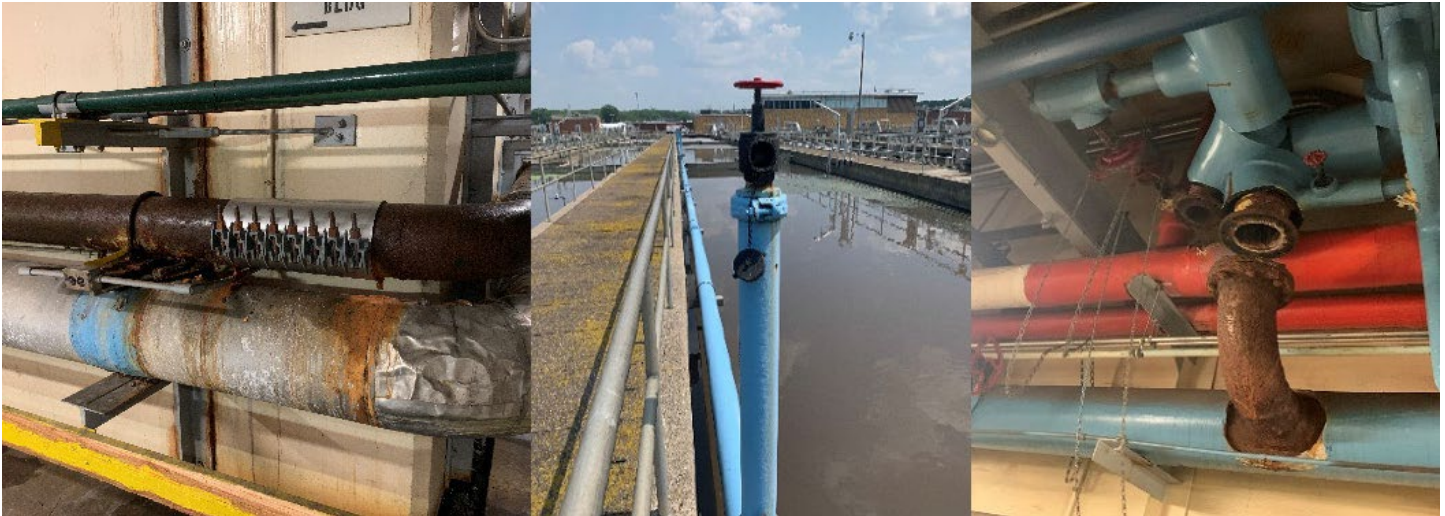
Construction: 2025 through 2028

Financial analysis

2024 cash flow:	\$4,000,000
Current ACP:	\$32,051,000
2024 through 2029 cash flow:	\$32,000,000
Total project cost:	\$32,051,000

Metro WWTP Water Systems Renewal & Improvements - Phase I: Distribution System Renewal
Program family 8089 **Project #808963**

Project location: Council district #13, City of Saint Paul, Metro WWTP



Left: Deteriorated service water piping to be renewed/replaced. Center: Aeration tank spray water piping to be repurposed. Right: Abandoned/obsolete process piping to be removed.

Project type

Plants

Objectives

Asset Preservation

Scope

The project replaces the service water piping network throughout the plant with a new piping network in preparation for a future reclaimed water system.

Project need

Rehabilitate and repurpose the Metro Plant water systems and reduce withdrawal of water from the Prairie du Chien aquifer.

Project schedule:



Planning: 2006 through 2008



Design: 2020 through 2023



Construction: 2024 through 2027

Financial analysis

2024 cash flow:	\$7,500,000
Current ACP:	\$49,000,000
2024 through 2029 cash flow:	\$48,000,000
Total project cost:	\$49,000,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Motor control center

Project type

Plants

Objectives

Asset Preservation, System Expansion, and Quality Improvements

Scope

Replace electrical distribution equipment (unit substations, switchgear, and motor control centers) with new equipment.

Project need

Condition assessment determined that electrical equipment in various buildings throughout the plant are at, or nearing the end of, useful service life and need to be replaced.

Project schedule:



Planning: 2010 through 2015



Design: 2023 through 2024



Construction: 2024 through 2027

Financial analysis

2024 cash flow:	\$0
Current ACP:	\$0
2024 through 2029 cash flow:	\$20,000,000
Total project cost:	\$20,000,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Existing East Pretreatment Biofilter

Project type

Plants

Objectives

Asset Preservation

Scope

The following improvements are planned: odor control improvements at East Pretreatment and Sludge Storage.

Project need

The odor control systems for pretreatment and sludge storage need to be rehabilitated to mitigate odors.

Project schedule:



Planning: 2010 through 2015



Design: 2026



Construction: 2027 through 2028

Financial analysis

2024 cash flow:	\$0
Current ACP:	\$0
2024 through 2029 cash flow:	\$5,000,000
Total project cost:	\$5,000,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Left: One of two water metering stations which is located near East Primary. Right: City water hydrant and isolation valve at final sedimentation tanks.

Project type

Plants

Objectives

Asset Preservation

Scope

This project replaces the city water piping network throughout the plant with a new piping network.

Project need

Rehabilitate the Metro water system that was installed beginning in the 1930s.

Project schedule:



Planning: 2006 through 2008



Design: 2024 through 2025



Construction: 2026 through 2028

Financial analysis

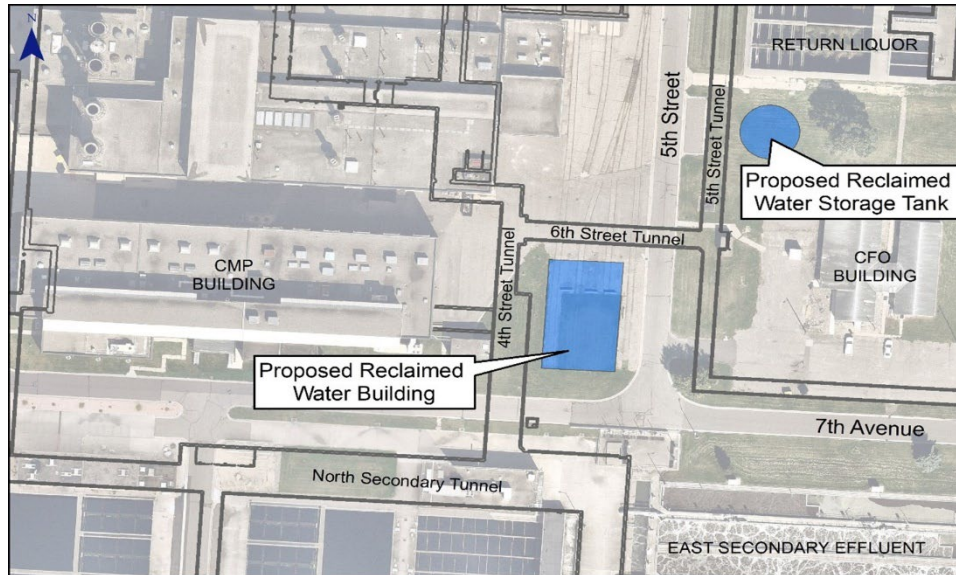
2024 cash flow:	\$0
Current ACP:	\$1,000,000
2024 through 2029 cash flow:	\$11,000,000
Total project cost:	\$21,000,000

Metro WWTP Water Systems Renewal and Improvements - Phase 3: Reclaimed Water

Program family 8089

Project #8089xx

Project location: Council district #13, City of Saint Paul, Metro WWTP



Proposed Reclaimed Water Building and Storage Tank

Project type

Plants

Objectives

Asset Preservation, System Expansion

Scope

This project constructs a new reclaimed water system to replace the water source for processes which are currently served by the Prairie du Chien aquifer through the plant service water system.

Project need

There is a need to rehabilitate and repurpose the Metro Plant water system and reduce use of the Prairie du Chien aquifer.

Project schedule:



Planning: 2006 through 2008



Design: 2027 through 2028

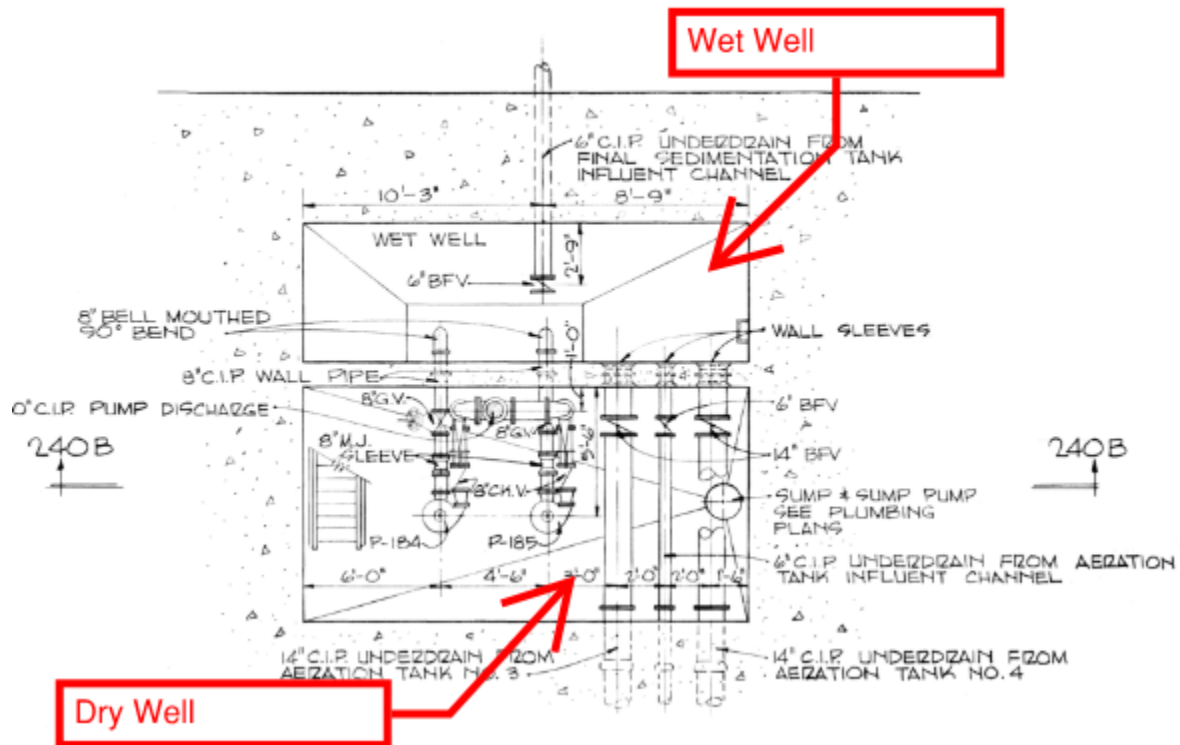


Construction: Starts in 2029

Financial analysis

2024 cash flow:	\$0
Current ACP:	\$0
2024 through 2029 cash flow:	\$5,000,000
Total project cost:	\$25,000,000

Project location: Council district #13, City of Saint Paul, Metro WWTP



Typical underdrain pit to be rehabilitated.

Project type
 Plants

Objectives
 Asset Preservation

Scope
 This project rehabilitates the underdrain and meter pits in East and West Secondary.

Project need
 Condition assessment determined the underdrain and meter pits need to be rehabilitated.

Project schedule:



Planning: 2010 through 2015



Design: 2026



Construction: 2027 through 2028

Financial analysis

2024 cash flow:	\$0
Current ACP:	\$0
2024 through 2029 cash flow:	\$10,000,000
Total project cost:	\$10,000,000