



Draft



Great Lakes Water Authority  
Capital Improvement Plan  
2018- 2022



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## I. OVERVIEW

### SECTION 1 GREAT LAKES WATER AUTHORITY

The Great Lakes Water Authority (GLWA) was incorporated by the City of Detroit and the Counties of Macomb, Oakland and Wayne on November 26, 2014 pursuant to Act 233, Public Acts of Michigan, 1955, as amended. At the time of GLWA's incorporation, the City, through its Detroit Water and Sewerage Department (DWSD), was providing water supply services within and outside of the City through a water supply system and drainage and sewage disposal services within and outside of the City through a sewage disposal system. On June 12, 2015, the City and GLWA executed a Regional Water System Lease, a Regional Sewage Disposal System Lease and a Water and Sewer Services Agreement, and as of December 1, 2015, the City and GLWA executed a Shared Services Agreement. The foregoing agreements became effective on January 1, 2016, at which time GLWA, pursuant to the Lease, became responsible for the debt obligations of the City relating to the Water System, including the payment of all DWSD Water Bonds, through the substitution of GLWA for the City as the sole obligor on the DWSD Water Bonds, the assignment to GLWA of all of the revenues of the Water System, and the assumption by GLWA of the DWSD Water Bonds.

The Authority operates the Regional Water System and the Regional Sewer System (each as defined herein) for Southeast Michigan pursuant to the Leases and the Water and Sewer Services Agreement. The governance structure of the Authority gives suburban water and sewer customers a substantial collaborative role in the direction of one of largest water and wastewater utilities in the nation, while also providing the City's local systems the benefits of the Authority's regional strengths. While GLWA manages and controls all regional water and wastewater wholesale services, the City and the suburban customers retain control of local water and sewer services within their respective borders. The City also acts as agent of GLWA with respect to setting, billing, collecting and

enforcing local retail charges. Prior to January 1, 2016, DWSD's financial activities were largely governed by a series of federal court orders designed to separate the management of the regional water and sewer enterprises from local City control and to ensure environmental compliance. In contrast, GLWA is a legally independent, regional authority created pursuant to State law, governed by its own independent Board of Directors and primarily overseen, as to environmental matters, by the Michigan Department of Environmental Quality (MDEQ), as are all water and sewer service providers in the state, and the federal Environmental Protection Agency (EPA).

The new organization has adopted an unwavering commitment to its customers, known as "One Water," with a strong mission statement of customer collaboration and engagement:

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*"Through regional collaboration, GLWA strives to be the provider of choice dedicated to efficiently delivering the nation's best water and sewer service in partnership with our customers."*

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In open partnership with its customers, GLWA is focused on innovation in its business practices, with a commitment to providing the highest quality product and services to current and future generations.

The Regional Water System has a long history of providing reliable service and water quality with the Great Lakes as its source and five water treatment plants, with capacity well in excess of current and projected demands. In light of this capacity, GLWA has undertaken plans to market water services to potential new wholesale

customers, as well as to right-size its facilities for financial and operational optimization of the Regional Water System.

### 1.1. Powers of the Authority

GLWA is a public body corporate organized pursuant to the provisions of Act 233. In addition to this statutory authority, the governance for the Authority is found in its Articles of Incorporation, By-Laws, policies, and ordinances including but not limited to its bond ordinances. The Authority has both express powers and implied powers necessary to carry out its powers, duties, and responsibilities. The Authority's express powers include the following:

The Authority is empowered through its Board of Directors to provide wholesale water and wastewater service to the service area. The six-member GLWA Board has the authority to execute contracts, set policy for the Authority, set service charges and set the revenue requirement for the Retail Customers.

The GLWA Board is required to appoint an Audit Committee to "review the reports related to the financial condition, operations, performance and management of the Authority" on a regular basis. Certain actions by the GLWA Board require the affirmative vote of at least five members of the GLWA Board, including, but not limited to, setting rates and charges for water and sewer services, annual operating budgets, capital improvement programs, issuance of debt and any modification of the Lease.

The Authority must establish biennial budgets, with the first year serving as formal authorization (including an approved schedule of service charges to support the budget) and the second year serving as an initial estimate of revenues and revenue requirements.

The Authority has the ability to enter into water supply and sewage disposal contracts and may establish and fix a schedule of rates, fees, and other charges for its services.

### 1.2. Governance and Board Members

The GLWA Board is composed of six voting members. Two members are residents of the City of Detroit and are appointed by the Mayor of the City of Detroit. The Counties of Macomb, Oakland, and Wayne each appoint one member who is a resident of the County from which appointed and the Governor of the State of Michigan appoints one member who is a resident of an area served by the Authority outside of the Counties. All members of the GLWA Board must have at least seven years of experience in a regulated industry, a utility, engineering, finance, accounting or law. After the initial term specified in the Articles of Incorporation, each GLWA Board member is appointed for a four-year term and serves at the pleasure of the appointing authority.

In order to more efficiently oversee the Authority's operations, the GLWA Board has adopted a committee structure. Four committees have been established: (i) Audit, (ii) Capital Improvement Planning, (iii) Operations and Resources and (iv) Legal.

The GLWA Board currently consists of:

- *Robert J. Daddow, CPA, GLWA Board Chairman; Representative for Oakland County*
- *Gary A. Brown, GLWA Board Vice Chairman; Representative for the City of Detroit*
- *Joseph Nardone, GLWA Board Secretary; Representative for Wayne County*
- *Brian Baker, GLWA Board Representative for Macomb County*
- *Freman Hendrix, GLWA Board Representative for the City of Detroit*
- *Craig Hupy, GLWA Board Representative for the State of Michigan*

The GLWA Capital Improvement Planning committee provides significant input, direction and evaluation of the 2018-2022 CIP. Members of the CIP committee include:

- Gary A. Brown, CIP Committee Chairman
- Robert J. Daddow, CPA
- Craig Hupy, P.E.

### 1.3. Management Team

GLWA's senior management team has operated the Water System since 2012 and is continuing to optimize the organization through innovative job designs, lean business practices and the greater use of technology. These organizational optimization initiatives have already resulted in performance improvements in all aspects of Water and Wastewater System operations, from environmental compliance to customer satisfaction, and have materially improved the Water System's financial metrics and results. In 2016, GLWA has further enhanced its management team's capacity in areas such as Asset Management, Energy Efficiency, Planning and Research, and Innovation. GLWA continues on its path of performance improvement with a new focus on its role in the economic success and the public health and safety of the region it serves.

The GLWA management team is committed to building upon the history of improved performance of the Water System and the Sewer System that began in 2012. GLWA key personnel are:

- Sue F. McCormick, Chief Executive Officer
- Nicolette N. Bateson, CPA, Chief Financial Officer/Treasurer
- William M. Wolfson, Chief Administrative and Compliance Officer/General Counsel
- Suzanne R. Coffey, Chief Planning Officer
- Cheryl Porter, Chief Operating Officer
- Terri Tabor Conerway, Chief Organizational Development Officer

- W. Barnett Jones, Chief Security and Integrity Officer
- Michelle A. Zrodowski, Chief Public Affairs Officer
- Jeffrey E. Small, Chief Information Officer
- Jonathan Wheatley, Public Finance Manager

### 1.4. Service Area and Customer Relationships

The Authority's Water System is one of the largest in the United States, both in terms of water produced and population served. The Water System currently serves an area of 981 square miles located in eight Michigan counties and an estimated population of nearly 3.8 million or approximately 38% of Michigan's population. Suburban customers comprise approximately 82% of the population served by the Authority, and the Retail Water Customers (as defined herein) comprise the remainder served by the Authority.

## SECTION 2 CAPITAL IMPROVEMENT PLAN

The Great Lakes Water Authority's (GLWA) Capital Improvement Program (CIP) supports the continuation of major capital asset investment in programs and projects that will upgrade the Authority's aging water and wastewater system infrastructure, as well as the overarching Centralized service infrastructure that supports both systems. The CIP includes mandated projects and rehabilitation of assets necessary to meet permit and other regulatory requirements. Based upon the execution of programs and projects identified in the CIP, existing levels of service currently provided will be met or exceeded.

Projects and programs established in the CIP are identified and recommended from many different sources. Master plans and condition and need assessments are primary sources of these, however, other projects and programs are brought forward by operations and maintenance personnel tasked to continually provide a high level of service.

This CIP should be considered a planning document – the CIP is a dynamic and evolving plan that requires continual review and modification during the course of each year. The estimates indicated in the early years of the report are likely more precise than those in the later years. The project descriptions and summaries represent brief synopses of the entire project scope; these descriptions are generally more precise for ongoing active projects than for planned new projects, where specific project activities may have yet to be determined.

Copies of this CIP and past CIP are available on GLWA's website at [www.glwater.org](http://www.glwater.org).

### 2.1. Funded Portion of the Programs

This plan spans a 5-year period from 2018 through 2022. The CIP review process also includes an extensive review of the total project, or "lifetime" budget, which reflects historical spending prior to,

during, and beyond the current 5-year period. The goal of the Authority's capital financing strategy is to align capital project financing sources with multiple goals including: (1) recovering the costs of capital investment over the useful lives of the capital assets; (b) minimizing the impact of the capital programs on water and sewage revenue requirements; and (c) protecting and enhancing the Authority's financial position. The potential funding source identified for each project is subject to change based upon the systems need and financial resources available at the time.

### 2.2. Project Status Description

In order to determine a particular project's progress within the CIP, a status is assigned to each project within the CIP. The project status designation provides a high level understanding of the progress. Projects are often divided into multiple phases or categories based upon the contract type. As such, each phase of a multiple phase project will have its own status and contract number. Descriptions of each particular status are provided in Table I-1 on the following page.

Table I-1. Project status descriptions

Project Status	Description
<b>New</b>	Project that has never been included in a previous CIP.
<b>Not Yet Started</b>	Project that has been included in the previous CIP, has never had expenditures charged to it and does not have an assigned BS&A Project Number
<b>Under Procurement</b>	Project that has an assigned BS&A Project Number and has not been issued a Notice to Start Work.
<b>Active</b>	Project that has an assigned BS&A Project Number in the financial system, a Notice to Start Work has been issued, had expenditures in the last fiscal year and has projected expenditures of more than \$100,000 in the current fiscal year.
<b>On-Hold</b>	Project that has been suspended, may or may not have an assigned BS&A Project Number, experienced expenditures or no expenditures in the previous fiscal year(s), and/or has no projected expenditures in the current fiscal year or future fiscal years.
<b>Pending Close-out</b>	Project that has an assigned BS&A Project Number, a Notice to Start Work has been issued, has projected expenditures for the current fiscal year equal to \$100,000 or less - with no future projected expenditures and has reached substantial completion.

### 2.3. Project Categories

Often projects are broken up into several phases related to how the particular project will be delivered and managed. Categories may be grouped to align with work to be performed within each individual phase. Individual categories are identified and named below, however, in reality several categories may exist for each phase. In this case, this implies the same vendor, under one contract, will be performing multiple categories of the overall project. The current project categories are identified below.

S..... Study  
 D ..... Design  
 C ..... Construction  
 CA ..... Construction Assistance  
 DB ..... Design and Build  
 DBA..... Design Build Assistance  
 CM ..... Construction Management  
 MOU ..... Memorandum of Understanding Agreements  
 (coordination with other municipalities)  
 PO ..... Purchase Order

## 2.4. CIP Types

Multiple CIP types are necessary to distinguish the differences in intent of how particular CIP is to be used. This CIP contains three primary CIP types; Project, Program and Allowance. A typical project that has a specific scope and timeframe is considered a Project. Whereas Programs and Allowances do not have specifically developed scopes and typically extend over many years. Allowances are necessary for utility operations due to the unanticipated nature of pipeline and equipment failures that require immediate repair and rehabilitation to continuously meet level of service requirements. Table I-2 CIP Types defines each CIP Type.

Table I-2. CIP Types

CIP Type	Description
Project	A "Project" consists of the replacement and/or rehabilitation of specific capital assets within a finite timeframe and scope.
Program	A "Program" consists of the replacement and/or rehabilitation of specific capital assets on an ongoing or reoccurring basis. The program scope and/or projected expenses may vary from year-to-year depending on the needs identified within the program and as newly established programs develop consistent schedules, requirements and history over time. Although not typically identified in the CIP futures years projected expenses, these programs will typically be funded in perpetuity.
Allowance	An "Allowance" consists of unanticipated replacement and/or rehabilitation of currently unidentified capital assets. Engineering studies, evaluations, testing, construction assistance directly related to the unforeseen replacement or rehabilitation are also included in the projected expenses.



## II. CIP DEVELOPMENT AND APPROVAL PROCESS

### SECTION 1 APPROVAL PROCESS

The CIP development and approval process begins with the approval of the previous year's CIP. The CIP process is a substantial level of effort that involves many people throughout the Authority. Modifications, adjustments and improvements are being continuously considered and vetted internally and externally through various Customer Outreach Work Groups. Projects and programs that ultimately get funded within the CIP are typically identified based upon master planning or condition/need assessment efforts. Projects also are identified internally based upon the needs of engineers, operations or maintenance staff. An internal effort to coordinate and prioritize all identified projects that come from these various sources into one location is currently underway to assist in ensuring the appropriate projects and programs are being funded in a prioritized manner.

The process typically begins in June of each year where project manager training on modifications to the CIP process and documentation occurs. At this time, an Authority wide request for project proposals and the requested for the completion of the Business Case Evaluation documentation is made to all business units throughout the Authority. Business case evaluations from project managers are due to the Capital Management Group by the end of July. At this time, the Capital Management Group (CMG) issues CIP numbers for each project and are added as new projects to the CIP. The CMG prepares a draft of the CIP and it, with back-up documentation is reviewed internally with the Asset Management and CIP work area, management, CFO and the Authority's rate consultant. The CMG receives status updates from project managers with existing projects currently in the CIP. Typically, in September, the Water and Wastewater Review Committees will meet to prioritize newly submitted CIP projects for the upcoming fiscal year.

For this CIP cycle, many of the existing projects that have not yet started have also been prioritized by these committees.

With projects vetted internally, the draft CIP is presented and comments and feedback solicited from the Customer Outreach Asset Management & CIP Work Group, the GLWA Capital Improvement Planning Committee and the wholesale customers. Comments to this plan are due approximately one month after the first external presentation and typically falls within December. Based upon customer and Board feedback, the CIP is modified and presented as version 2 to all parties again in January. It is anticipated that the CIP version 2 or a slightly modified version 2 will be presented to the GLWA Board at their regularly scheduled Board meeting in January. At this point, it is expected that the CIP approval process coincides with the overall budget development process.

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## SECTION 2 CALENDAR

The schedule below is subject to change based upon other outstanding circumstance beyond the control of GLWA. The calendar is based upon current and best available data. Specific approval dates and coordination with the overall GLWA Board of Directors is necessary to identify key milestones leading up to the ultimate approval of the 2018 CIP in the first two quarters of calendar year 2017.

Date	Description
<b>October 27, 2016</b>	AM/CIP Work Group – New Project BCE's, format & prioritization
<b>November 9, 2016</b>	GLWA CIP Committee – Present and solicit input of format revisions
<b>November 18, 2016</b>	AM/CIP Work Group – Present 2018 CIP Version #1
<b>November 30, 2016</b>	GLWA CIP Committee – Present 2018 CIP Version #1
<b>December 1, 2016</b>	Customer Roll-Out – Present 2018 CIP Version #1
<b>December 16, 2016</b>	Customer Comments Due
<b>January 10, 2017</b>	AM/CIP Work Group – Present 2018 CIP Version #2
<b>January 12, 2017</b>	GLWA CIP Committee – Present 2018 CIP Version #2
<b>January 25, 2017</b>	GLWA Board Meeting – Present 2018 CIP Version #2
<b>January 25, 2017 and beyond</b>	The 2018-2022 Capital Improvement Plan approval process will align with the overall 2018 budget development process after January 25, 2017.

## SECTION 3 2018 CIP CHANGES

Many new changes to the 2018 CIP have occurred based upon a number of reasons. The 2018 CIP is the first full CIP that has been developed by the newly established Authority. As such, many changes were necessary strictly based upon the information systems available to GLWA. In addition, many changes were necessary to improve the overall functionality and ease of use of the document. Other improvements were necessary to better align the structure of the CIP to the structure of the actual budget. Major changes will be identified and many more changes, improvements and modification are in conceptual form now and will not be available for the 2018 CIP. This document, the format and content will continue to change and improve from year-to-year.

### 3.1. Business Case Evaluation Development

#### Project Prioritization

GLWA has recently implemented a new CIP project prioritization tool to provide a standardized method of prioritizing projects for the annual GLWA CIP development. This prioritization tool attempts to quantify a project ranking to allow for non-subjective prioritization. Until a formal asset management program is implemented at an asset level, this method will standardize the project evaluation and prioritize projects to ensure the effective and efficient use of public funds. The CIP development and prioritization process results in a prioritized list of projects with anticipated CIP year, schedule and overall cost for inclusion within the official five-year CIP.

Currently, projects to be considered for inclusion in each year of the CIP are identified by the subject matter expert engineers or other project managers. These engineers and project managers utilize available institutional knowledge, data, operations and maintenance reports, need and condition assessments and master plans to identify the project need. The following criteria have been identified to capture GLWA's overall strategy related to the probability and

consequence of failure associated with each identified project: (i) condition, (ii) performance, (iii) regulatory, (iv) safety, (v) public benefit, (vi) financial and (vii) efficiency.

Each project will be scored by the project manager during the completion of a standardized Business Case Evaluation form and by a Review Committee. The Review Committee is comprised of a core group of members from leadership in Financial Service Area, Planning Service Area and from the business unit associated with Water or Wastewater Service Area. To facilitate transparency in this process, a member from one or more of GLWA's customer communities also participate as scoring members of the Review Committee. The 2018-2022 Capital Improvement Program development water and wastewater review committee members are identified below in Table II-1 and Table II-2, respectively.

Table II-1. Water Review Committee Members

Name	Group
Karen Mondora	Customer Representative – City of Farmington Hills
Jody Caldwell	Systems Planning
Cheryl Porter	Water
Terry Daniel	Water
Biren Saparia	Systems Control/Field Services
Shaker Manns	Systems Planning
Grant Gartrell	Water Engineering
Monica Daniels	Capital Management Group
Chandan Sood	Systems Analytics

Table II-2. Wastewater Review Committee Members

Name	Group
Navid Mehram	Customer Representative – Oakland County Water Resource Commissioner's Office
Jody Caldwell	Systems Planning
Suzanne Coffey	Wastewater (Interim)
Majid Khan	Wastewater Operations
Sanjeev Mungarwadi	Wastewater Engineering
Wendy Barrott	Wastewater Maintenance
Biren Saparia	Systems Control/Field Services
Shaker Manns	Systems Planning
Monica Daniels	Capital Management Group
Dan Alford	Wastewater Maintenance
Chandan Sood	Systems Analytics

To aid in evaluating and understanding the project prioritization and process, a Capital Improvement Project Prioritization Guidance Document has been developed. This document details the purpose of the prioritization tool, identifies the anticipated CIP schedule and key milestones, provides details about each criteria and the associated weighting factor and demonstrates the overall prioritization calculation. Most importantly, this document provides the detailed guidance related to each category and displays examples of the information needed for project managers or the review committees to make accurate scoring decisions. In addition, as this methodology continues to evolve within the Authority, it is anticipated that future BCE's will contain specific data related to each

criteria being evaluated thus creating a better and more well defined project justification that can be easily relatable to other projects submitted.

Included within Appendix D are the results of the project prioritization by each project manager and by the individual review committees. These identify in a quick glance the prioritization of each project compared to others. This will be very useful to identify lower priority projects that may be delayed in the event of emergencies that may redirect funding away from the existing project.

### 3.2. Report Format & Consolidation of CIP's

The 2018-2022 CIP format has been modified significantly to provide a document that is more transparent, has better navigation and is user friendly.

#### Consolidation of CIP's

The 2018 CIP has been consolidated into one document. In the past, two separate documents were created, maintained and presented. This consolidation will not require duplication of basic overview type information typically found within each document in the past. This change ultimately provides one source of valuable information related to the CIP, as well as, other general information related to the overall systems.

#### Varying Degrees of Project Detail

Within the document, projects and programs will be portrayed in varying degrees of detail that should meet the needs of most readers. Projects can be viewed in the basic line item format that provides general information about the project and the projected expenditures. Within this format, projects will be rolled up by their major category of Water, Wastewater and Centralized Services. Totals will be provided. Projects will also be broken out by category to give the reader of CIP projects included under each of the main functions within the Authority. One-page summaries of each project (old and new) are newly created and give the reader more detail of the project phases, purpose, scope of work and potential challenges. Finally, for greater details of the project, the original BCE or former Project Justification documents are provided in Appendix A, B and C.

#### Revised Project Categories & Numbering

New to the 2018 CIP is a revised categorization methodology and numbering scheme of CIP projects and programs. The project characterization is extremely beneficial to align CIP project budgets by managing department cost centers. In addition, these will directly align with costs centers in the operating budget within the Authorities financial system. The revisions will be based on the “smart” numbering system as identified in Table II-3 below.



Table II-3. Capital Project/General Ledger Account Numbering Protocol - Six Numeric Digits (4th Segment of GL String)

Digit 1	Digit 1 + Digit 2	Digit 1 + Digit 2 + Digit 3	Draft Digits 4 thru 6
Project Category 1	Project Category 2	Project Category 3	Addition Number 000-999
1XX - Water	11X - Water Treatment Plants & Facilities	111 - Lake Huron	
		112 - Northeast	
		113 - Southwest	
		114 - Springwells	
		115 - Water Works Park	
		116 - General Purpose	
	12X - Field Services	121 - General Purpose	
		122 - Transmission System	
	13X - Systems Control Center	131 - General Purpose	
		132 - Pump Stations & Reservoirs	
	14X - Water Quality	141 - General Purpose	
2XX - Wastewater	15X - Metering	151 - General Purpose	
	16X - General Purpose	161 - General Purpose	
	21X - Wastewater Resource Recovery Facility	211 - Primary Treatment	
		212 - Secondary Treatment & Disinfection	
		213 - Residuals Management	
		214 - Industrial Waste Control	
		215 - CSO RTB & SDF	
		216 - General Purpose	
	22X - Field Services	221 - General Purpose	
		222 - Interceptor	
	23X - Systems Control Center	231 - General Purpose	
		232 - Pump Stations	
		233 - In System Devices (Dams, ISD's)	
	24X - Metering	241 - General Purpose	
	25X - General Purpose	251 - General Purpose	
	31X - Information Technology	311 - General Purpose	

Digit 1	Digit 1 + Digit 2	Digit 1 + Digit 2 + Digit 3	Digits 4 thru 6
3XX - Centralized Services		312 - Service Desk	Draft
		313 - Infrastructure	
		314 - Enterprise Applications	
		315 - Business Applications	
		316 - Security	
		317 - Project Management Office	
	32X - Fleet	321 - General Purpose	
	33X - Facilities	331 - General Purpose	
	34X - Security	341 - General Purpose	
	35X - Energy Management	351 - General Purpose	
	36X - General Purpose	361 - General Purpose	

### Navigation

Links have been included throughout the document to direct the reader to varying level of project details. Links to major sections are embedded within the table of contents and links within the master project table will direct the reader to more in depth detail related to their particular project of interest. Due to the size of the Appendix, the document will be maintained separately from the main body text. In the front of each appendix will be a list of projects that are contained within the appendix. By selecting a project within this list, the reader will be directed to the BCE or previously submitted project justification related to that project.

### CIP and Business Unit Overview

In order to understand the full extent of the water and wastewater systems under the responsibility of GLWA, sections have been added to provide an overview of the services provided and infrastructure maintained within each category. While the information is not all inclusive, it does contain a substantial amount of reference information that will help the reader familiarize themselves with the capital assets and responsibilities of each business unit. As the CIP document evolves annually, these sections will be continuous updated to provide the great source of reference material related to the GLWA infrastructure.

## III. CIP FINANCIAL PLAN

### SECTION 1 INTRODUCTION

The GLWA CIP financing plan balances a number of objectives to support the Authority's mission to be a provider of choice dedicated to efficiently delivering the nation's best water and sewer services in partnership with our customers through regional collaboration. Those objectives include the following.

- ✓ Working with a cross-functional team, identify and fund prioritized capital improvements to ensure a sustainable system.
- ✓ Recover the costs of capital investment over the useful lives of the capital assets.
- ✓ Minimize the impact of the capital programs on system service charges.
- ✓ Protect and enhance the Authority's financial position.

The Authority draws upon five sources of revenue for its capital improvement plan.

1. **Bond Proceeds:** The Authority uses an incremental method of funding long-lived capital projects through a bond financing program rather than funding all projects in advance. The Authority issues revenue bonds pursuant to Michigan Public Act 94 of 1933 (the Revenue Bond Act). The Act provides a pledge of "net revenues" for the payment of the bond principal and interest. "Net revenues" means the revenues of the system remaining after deducting the reasonable expenses of administration, operation, and maintenance of the system.
2. **Revenue Financed Capital:** Based upon ongoing expense, capital, and revenue optimization efforts, the Authority is able to build reserves to fund pay-as-you go capital for shorter-lived and lower-dollar capital expenditures.

3. **Federal Loan Programs:** The Authority's sources of funding includes lower cost financing programs including the State Revolving Fund (SRF) Loan program and the Drinking Water Revolving Fund (DWRf) Loan program. *The lease agreement with the City of Detroit provides for use of SRF and DWRf for the benefit of the City of Detroit Local System. While the Authority is responsible for the debt service on bonds issued to finance capital improvements to the DWSD Local Water System, the annual principal and interest requirements are included in the revenue requirements assigned to the City of Detroit retail customer class.*
4. **Grants:** The Authority utilizes public grants programs such as the Stormwater, Asset Management, and Wastewater (provides both grants and loans) and is pursuing federal and private grants for energy optimization.
5. **Contributed Capital:** Periodically, the Authority has the opportunity to optimize the system with specific customer participation. Depending on the nature of the shared financing strategy, the Authority may offset the cost of system expansion or improvements with contributed capital from that customer.

To ensure proper accountability of funding sources and uses, the Authority utilizes two funds for its capital program for each system: the Construction Bond Fund and the Improvement & Extension (I&E) Fund.

- ✓ **Construction Bond Fund:** This fund represents the proceeds of bond issuances for the purposes of financing capital improvements.
- ✓ **Improvement & Extension Fund:** The I&E fund is defined by the Authority's Master Bond Ordinance (MBO) as the "fund used for improvements, enlargements, extensions or

*The capital financial plan will be updated based on parallel financial planning business improvement process underway.*

betterment” of the System. Cash receipts of the Authority are transferred into the I&E Fund pursuant to a flow of funds after commitments are met for a monthly allocation of System operations and maintenance expense, debt service, pension, water residential assistance program, budget stabilization fund, and extraordinary repair and replacement fund as administered by a trustee.

It should be noted that the basis of accounting for the CIP is the accrual basis. Under this basis of accounting, revenues are recognized when earned and measurable regardless of when collected; and expenses are recorded, or accrued, on a matching basis when incurred. Accrued expenses are expected to be paid in a subsequent accounting period. For purposes of this CIP, expenses and expenditures are used interchangeably.

[see placeholder tables and charts on subsequent pages]

Interim schedule – Water System October 2016 Benchmark to assist in CIP development/reference

[Placeholder for schedule]

#### Sewer System CIP Financial Plan

For the sewer system CIP, the Authority expects that approximately \$XXX million (net of issuance costs) will be financed with proceeds of additional bonds issued during the five-year planning period. The

Interim schedule – Sewer System October 2016 Benchmark to assist in CIP development/reference

[Placeholder for interim schedule]

## SECTION 2 SUMMARY CIP FINANCIAL PLAN REVIEW AND ANALYSIS

The FY 2018 – FY 2022 capital improvement plan provides for \$xxx million of water system improvements and \$xxx million of sewer system improvements over the five year planning cycle.

#### Water System CIP Financial Plan

For the water system CIP, the Authority expects that approximately \$376 million (net of issuance costs) will be financed with proceeds of additional bonds issued during the five-year planning period. The balance of the CIP will be financed with funds on hand and with Water System revenues. **[more commentary to follow when the schedules are complete]**

balance of the CIP will be financed with funds on hand and with Water System revenues. **[more commentary to follow when the schedules are complete]** [see placeholder tables and charts on subsequent pages]

*The capital financial plan will be updated based on parallel financial planning business improvement process underway.*



**Great Lakes Water Authority**  
**Capital Improvement Plan - Sources and Uses of Improvement & Extension and Bond Construction Funds**  
**For the FY 2018 - FY 2022 Planning Cycle**

Sample Tables & Charts

Draft

**Water System**

Fiscal Year	Beginning Balance	Revenue Financed Capital Contributions	Bond Proceeds	Federal Loan Programs	Grants	Contributed Capital	Investment Earnings	Total Resources Available	Capital Expenses	Ending Balance
<u>FY 2018</u>										
Improvement & Extension Fund	\$ 100	\$ 20	\$ -	\$ -	\$ 5	\$ -	\$ -	\$ 125	\$ (30)	\$ 95
Bond Construction Fund	200	30	-	20	-	-	1	251	(160)	91
Total	300	50	-	20	5	-	1	376	(190)	186
<u>FY 2019</u>										
Improvement & Extension Fund	95	20	-	-	5	10	-	130	(30)	100
Bond Construction Fund	91	30	250	20	-	-	1	392	(180)	212
Total	186	50	250	20	5	10	1	522	(210)	312
<u>FY 2020</u>										
Improvement & Extension Fund	100	20	-	-	5	-	-	125	(30)	95
Bond Construction Fund	212	30	-	20	-	-	1	263	(170)	93
Total	312	50	-	20	5	-	1	388	(200)	188
<u>FY 2021</u>										
Improvement & Extension Fund	95	20	-	-	5	10	-	130	(40)	90
Bond Construction Fund	93	30	100	20	-	-	1	244	(200)	44
Total	188	50	100	20	5	10	1	374	(240)	134
<u>FY 2022</u>										
Improvement & Extension Fund	90	20	-	-	5	-	-	115	(30)	85
Bond Construction Fund	44	30	250	20	-	-	1	345	(200)	145
Total	134	50	250	20	5	-	1	460	(230)	230
<u>Five Year Total</u>										
Improvement & Extension Fund	100	100	-	-	25	20	-	245	(160)	85
Bond Construction Fund	200	150	600	100	-	-	5	1,055	(910)	145
Total	\$ 300	\$ 250	\$ 600	\$ 100	\$ 25	\$ 20	\$ 5	\$ 1,300	\$ (1,070)	\$ 230

*The capital financial plan will be updated based on parallel financial planning business improvement process underway.*

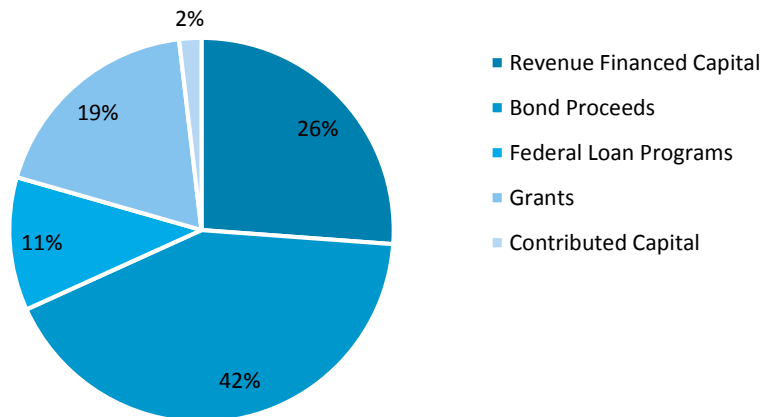
Great Lakes Water Authority  
 Capital Improvement Plan - Water System Funding Source by Project  
 For the FY 2018 - FY 2022 Planning Cycle

# Draft

## Water System

CIP Project ID	Description	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total	Revenue	Bond	Federal			
								Financed	Proceeds	Loan	Contributed		
								Capital		Programs	Grants	Capital	Total
123456	Plant Improvement	\$ 95	\$ 100	\$ 120	\$ 100	\$ 120	\$ 535	\$ 95	\$ 250	\$ 70	\$ 100	\$ 20	\$ 535
123999	Watermain	80	90	50	120	90	430	80	200	50	100	-	430
123444	Computers	15	20	30	20	20	105	105	-	-	-	-	105
	Total	\$ 190	\$ 210	\$ 200	\$ 240	\$ 230	\$ 1,070	\$ 280	\$ 450	\$ 120	\$ 200	\$ 20	\$ 1,070

Water System Funding Source by Project



Sample Tables & Charts

*The capital financial plan will be updated based on parallel financial planning business improvement process underway.*

**Great Lakes Water Authority**  
**Capital Improvement Plan - Sources and Uses of Improvement & Extension and Bond Construction Funds**  
**For the FY 2018 - FY 2022 Planning Cycle**

Sample Tables & Charts

**Sewer System**

Fiscal Year	Beginning Balance	Revenue	Bond Proceeds	Federal	Contributed Capital	Investment Earnings	Total Resources Available	Capital Expenses	Ending Balance
		Financed Capital Contributions		Loan Programs					
<u>FY 2018</u>									
Improvement & Extension Fund	\$ 100	\$ 20	\$ -	\$ -	\$ 5	\$ -	\$ 125	\$ (30)	\$ 95
Bond Construction Fund	200	30	-	20	-	1	251	(160)	91
Total	300	50	-	20	5	1	376	(190)	186
<u>FY 2019</u>									
Improvement & Extension Fund	95	20	-	-	5	10	130	(30)	100
Bond Construction Fund	91	30	250	20	-	1	392	(180)	212
Total	186	50	250	20	5	1	522	(210)	312
<u>FY 2020</u>									
Improvement & Extension Fund	100	20	-	-	5	-	125	(30)	95
Bond Construction Fund	212	30	-	20	-	1	263	(170)	93
Total	312	50	-	20	5	1	388	(200)	188
<u>FY 2021</u>									
Improvement & Extension Fund	95	20	-	-	5	10	130	(40)	90
Bond Construction Fund	93	30	100	20	-	1	244	(200)	44
Total	188	50	100	20	5	1	374	(240)	134
<u>FY 2022</u>									
Improvement & Extension Fund	90	20	-	-	5	-	115	(30)	85
Bond Construction Fund	44	30	250	20	-	1	345	(200)	145
Total	134	50	250	20	5	1	460	(230)	230
<u>Five Year Total</u>									
Improvement & Extension Fund	100	100	-	-	25	20	245	(160)	85
Bond Construction Fund	200	150	600	100	-	5	1,055	(910)	145
Total	\$ 300	\$ 250	\$ 600	\$ 100	\$ 25	\$ 20	\$ 1,300	\$ (1,070)	\$ 230

*The capital financial plan will be updated based on parallel financial planning business improvement process underway.*

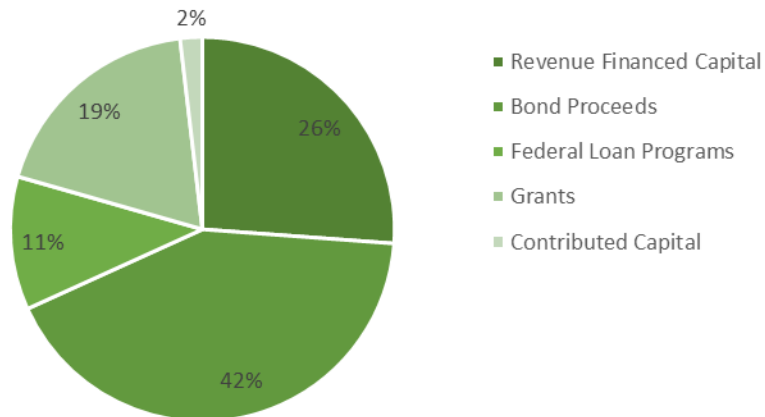
Sample Tables & Charts

**Great Lakes Water Authority  
Capital Improvement Plan - Sewer System Funding Source by Project  
For the FY 2018 - FY 2022 Planning Cycle**

**Sewer System**

CIP Project ID	Description	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total	Revenue	Bond	Federal			
								Financed	Proceeds	Loan	Contributed		
								Capital		Programs	Grants	Capital	Total
123456	Plant Improvement	\$ 95	\$ 100	\$ 120	\$ 100	\$ 120	\$ 535	\$ 95	\$ 250	\$ 70	\$ 100	\$ 20	\$ 535
123999	Sewer Line	80	90	50	120	90	430	80	200	50	100	-	430
123444	Computers	15	20	30	20	20	105	105	-	-	-	-	105
	Total	\$ 190	\$ 210	\$ 200	\$ 240	\$ 230	\$ 1,070	\$ 280	\$ 450	\$ 120	\$ 200	\$ 20	\$ 1,070

**Sewer System Funding Source by Project**



Sample Tables & Charts

*The capital financial plan will be updated based on parallel financial planning business improvement process underway.*



## IV. OVERALL CIP SUMMARY TABLES

The overall Great Lakes Water Authority 2018-2022 Capital Improvement Plan overall summary tables can be seen below. All financial figures are in thousands of dollars (\$1,000's).

Draft

Table IV-1. Water CIP Categories

Category	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond	2018-2022 CIP Total	Project Total
<b>Water</b>										
<b>Treatment Plants &amp; Facilities</b>										
111 Lake Huron	\$ -	\$ 6,300	\$ 17,278	\$ 18,505	\$ 6,203	\$ 200	\$ -	\$ -	\$ 42,186	\$ 48,486
112 Northeast	-	100	880	-	-	-	-	-	880	980
113 Southwest	47,587	1,060	4,954	3,150	900	-	-	2,940	9,004	60,591
114 Springwells	57,156	27,803	33,709	37,000	26,600	10,300	8,000	-	115,609	200,568
115 Water Works Park	761	2,475	5,876	27,900	20,500	-	-	-	54,276	57,512
116 General Purpose	-	7,515	4,500	5,900	10,700	12,400	7,400	-	40,900	48,415
<b>Treatment Plants &amp; Facilities Total</b>	<b>105,504</b>	<b>45,253</b>	<b>67,197</b>	<b>92,455</b>	<b>64,903</b>	<b>22,900</b>	<b>15,400</b>	<b>2,940</b>	<b>262,855</b>	<b>416,552</b>
<b>Field Services</b>										
121 General Purpose	-	-	-	-	-	-	-	-	-	-
122 Transmission System	37,284	24,583	54,094	72,752	90,150	74,400	55,100	67,100	346,496	475,463
<b>Field Services Total</b>	<b>37,284</b>	<b>24,583</b>	<b>54,094</b>	<b>72,752</b>	<b>90,150</b>	<b>74,400</b>	<b>55,100</b>	<b>67,100</b>	<b>346,496</b>	<b>475,463</b>
<b>SCC</b>										
131 General Purpose	-	-	-	-	-	-	-	-	-	-
132 Pump Station/Reservoir	23,634	5,316	11,338	15,392	2,900	2,500	-	-	32,130	61,080
<b>SCC Total</b>	<b>23,634</b>	<b>5,316</b>	<b>11,338</b>	<b>15,392</b>	<b>2,900</b>	<b>2,500</b>	<b>-</b>	<b>-</b>	<b>32,130</b>	<b>61,080</b>
<b>Water Quality</b>										
141 General Purpose	-	-	-	-	-	-	-	-	-	-
<b>Water Quality Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Metering</b>										
151 General Purpose	-	500	4,000	4,000	4,000	4,000	4,000	-	20,000	20,500
<b>Metering Total</b>	<b>-</b>	<b>500</b>	<b>4,000</b>	<b>4,000</b>	<b>4,000</b>	<b>4,000</b>	<b>4,000</b>	<b>-</b>	<b>20,000</b>	<b>20,500</b>
<b>General Purpose</b>										
161 General Purpose	-	20,450	20,155	20,500	20,000	10,000	10,000	-	80,655	101,105
<b>General Purpose Total</b>	<b>-</b>	<b>20,450</b>	<b>20,155</b>	<b>20,500</b>	<b>20,000</b>	<b>10,000</b>	<b>10,000</b>	<b>-</b>	<b>80,655</b>	<b>101,105</b>

Category	Lifetime Actual Thru FY 2016 (Unaudited)	Projected Expenditures							FY 2023 & Beyond	2018-2022 CIP Total	Project Total
	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022					
Water Total	166,423	96,102	156,784	205,099	181,953	113,800	84,500	70,040	742,136	1,074,700	
Water Centralized Services											
31X Information Technology	-	3,828	6,112	5,675	3,000	3,300	3,300	-	21,387	25,215	
32X Fleet	-	1,600	4,662	250	250	250	250	-	5,662	7,262	
33X Facilities	-	3,000	3,000	3,000	2,500	-	-	-	8,500	11,500	
34X Security	-	350	1,400	1,800	1,300	500	-	-	5,000	5,350	
35X Energy Management	-	500	1,433	1,433	1,433	500	500	-	5,299	5,799	
36X Engineering	24,625	3,760	2,580	383	333	333	-	-	3,629	32,014	
37X General Purpose	-	-	-	-	-	-	-	-	-	-	
Water Centralized Services Total	24,625	13,038	19,187	12,541	8,816	4,883	4,050	-	49,477	87,140	
Grand Total	\$191,048	\$109,140	\$175,971	\$217,640	\$190,769	\$118,683	\$88,550	\$70,040	\$791,613	\$1,161,841	

Table IV-2. Wastewater CIP Categories.

Category	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	Projected Expenditures						FY 2023 & Beyond	2018- 2022 CIP Total	Project Total
	FY 2018		FY 2019	FY 2020	FY 2021	FY 2022					
Wastewater											
WRRF											
211 Primary Treatment	\$ 14,344	\$ 22,326	\$ 29,358	\$ 29,224	\$ 23,091	\$ 11,867	\$ 3,303	\$ 2,679	\$ 96,843	\$ 136,192	
212 Secondary Treatment & Disinfection	45,362	11,372	22,297	24,726	11,293	5,540	5,540	10,499	69,396	136,629	
213 Residuals Management	167,263	14,651	21,183	17,817	11,385	5,725	4,791	-	60,901	242,815	
214 IWC	-	-	5,000	2,000	-	-	-	-	7,000	7,000	
215 CSO RTB & SDF	-	3,520	1,000	6,400	9,000	7,200	3,610	-	27,210	30,730	
216 General Purpose	28,426	3,447	10,825	15,400	10,750	13,910	13,379	3,029	64,264	99,166	
WRRF Total	255,395	55,316	89,663	95,567	65,519	44,242	30,623	16,207	325,614	652,532	
Field Services											
221 General Purpose	-	-	-	-	-	-	-	-	-	-	
222 Interceptors	-	16,893	36,537	21,373	31,173	25,500	22,200	-	136,783	153,676	
Field Services Total	-	16,893	36,537	21,373	31,173	25,500	22,200	-	136,783	153,676	
SCC											

Category	Lifetime Actual Thru FY 2016 (Unaudited)	Projected Expenditures							FY 2023 & Beyond	2018-2022 CIP Total	Project Total
		FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022				
231 General Purpose	-	-	-	-	-	-	-	-	-	-	-
232 Pumping Stations	128	1,000	14,908	26,560	30,700	8,000	-	-	-	80,168	81,296
233 In System Devices	-	-	1,387	3,464	5,000	3,000	-	-	-	12,851	12,851
<b>SCC Total</b>	<b>128</b>	<b>1,000</b>	<b>16,295</b>	<b>30,024</b>	<b>35,700</b>	<b>11,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>93,019</b>	<b>94,147</b>
<b>Metering</b>											
241 General Purpose	-	5,500	5,500	5,500	5,500	5,500	5,500	-	-	27,500	33,000
<b>Metering Total</b>	<b>-</b>	<b>5,500</b>	<b>5,500</b>	<b>5,500</b>	<b>5,500</b>	<b>5,500</b>	<b>5,500</b>	<b>-</b>	<b>-</b>	<b>27,500</b>	<b>33,000</b>
<b>General Purpose</b>											
251 General Purpose	-	5,655	14,500	14,000	15,000	18,125	14,737	-	-	76,362	82,017
<b>General Purpose Total</b>	<b>-</b>	<b>5,655</b>	<b>14,500</b>	<b>14,000</b>	<b>15,000</b>	<b>18,125</b>	<b>14,737</b>	<b>-</b>	<b>-</b>	<b>76,362</b>	<b>82,017</b>
<b>Wastewater Total</b>	<b>255,523</b>	<b>84,364</b>	<b>162,495</b>	<b>166,464</b>	<b>152,892</b>	<b>104,367</b>	<b>73,060</b>	<b>16,207</b>	<b>-</b>	<b>659,278</b>	<b>1,015,372</b>
<b>Wastewater Centralized Services</b>											
31X Information Technology	-	5,742	8,085	5,675	3,000	3,300	3,300	-	-	23,360	29,102
32X Fleet	-	3,937	1,684	250	250	250	250	-	-	2,684	6,621
33X Facilities	-	-	2,200	2,060	1,060	1,050	540	2,140	-	6,910	9,050
34X Security	-	350	1,400	1,800	1,300	500	-	-	-	5,000	5,350
35X Energy Management	-	500	500	500	500	500	500	-	-	2,500	3,000
36X Engineering	25,284	3,073	2,176	50	-	-	-	-	-	2,226	30,583
37X General Purpose	-	-	-	-	-	-	-	-	-	-	-
<b>Centralized Services Total</b>	<b>25,284</b>	<b>13,602</b>	<b>16,045</b>	<b>10,335</b>	<b>6,110</b>	<b>5,600</b>	<b>4,590</b>	<b>2,140</b>	<b>-</b>	<b>42,680</b>	<b>83,706</b>
<b>Grand Total</b>	<b>\$280,807</b>	<b>\$ 97,966</b>	<b>\$178,540</b>	<b>\$176,799</b>	<b>\$159,002</b>	<b>\$109,967</b>	<b>\$ 77,650</b>	<b>\$ 18,347</b>	<b>-</b>	<b>\$701,958</b>	<b>\$ 1,099,078</b>

Table IV-3. Centralized Services Categories (also appear broken out in Water and Wastewater tables)

Category	Lifetime Actual Thru FY 2016 (Unaudited)	Projected Expenditures							FY 2023 & Beyond	2018-2022 CIP Total	Project Total
		FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022				
31X Information Technology	\$ -	\$ 9,570	\$ 14,197	\$ 11,350	\$ 6,000	\$ 6,600	\$ 6,600	\$ -	-	\$ 44,747	\$ 54,317
32X Fleet	-	5,537	6,346	500	500	500	500	-	-	8,346	13,883
33X Facilities	-	3,000	5,200	5,060	3,560	1,050	540	2,140	-	15,410	20,550
34X Security	-	700	2,800	3,600	2,600	1,000	-	-	-	10,000	10,700
35X Energy Management	-	1,000	1,933	1,933	1,933	1,000	1,000	-	-	7,799	8,799
36X Engineering	49,909	6,833	4,756	433	333	333	-	-	-	5,855	62,597
37X General Purpose	-	-	-	-	-	-	-	-	-	-	-
<b>Grand Total</b>	<b>49,909</b>	<b>26,640</b>	<b>35,232</b>	<b>22,876</b>	<b>14,926</b>	<b>10,483</b>	<b>8,640</b>	<b>2,140</b>	<b>-</b>	<b>92,157</b>	<b>170,846</b>

Category	Lifetime Actual Thru FY 2016 (Unaudited)	Projected Expenditures							2018-2022 CIP Total	Project Total
		FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond		
<b>31X Information Technology</b>										
Water	\$ -	\$ 3,828	\$ 6,112	\$ 5,675	\$ 3,000	\$ 3,300	\$ 3,300	\$ -	\$ 21,387	\$ 25,215
Wastewater	-	5,742	8,085	5,675	3,000	3,300	3,300	-	23,360	29,102
<b>Information Technology Total</b>	<b>-</b>	<b>9,570</b>	<b>14,197</b>	<b>11,350</b>	<b>6,000</b>	<b>6,600</b>	<b>6,600</b>	<b>-</b>	<b>44,747</b>	<b>54,317</b>
<b>32X Fleet</b>										
Water	-	1,600	4,662	250	250	250	250	-	5,662	7,262
Wastewater	-	3,937	1,684	250	250	250	250	-	2,684	6,621
<b>Fleet Total</b>	<b>-</b>	<b>5,537</b>	<b>6,346</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>-</b>	<b>8,346</b>	<b>13,883</b>
<b>33X Facilities</b>										
Water	-	3,000	3,000	3,000	2,500	-	-	-	8,500	11,500
Wastewater	-	-	2,200	2,060	1,060	1,050	540	2,140	6,910	9,050
<b>Facilities Total</b>	<b>-</b>	<b>3,000</b>	<b>5,200</b>	<b>5,060</b>	<b>3,560</b>	<b>1,050</b>	<b>540</b>	<b>2,140</b>	<b>15,410</b>	<b>20,550</b>
<b>34X Security</b>										
Water	-	350	1,400	1,800	1,300	500	-	-	5,000	5,350
Wastewater	-	350	1,400	1,800	1,300	500	-	-	5,000	5,350
<b>Security Total</b>	<b>-</b>	<b>700</b>	<b>2,800</b>	<b>3,600</b>	<b>2,600</b>	<b>1,000</b>	<b>-</b>	<b>-</b>	<b>10,000</b>	<b>10,700</b>
<b>35X Energy Management</b>										
Water	-	500	1,433	1,433	1,433	500	500	-	5,299	5,799
Wastewater	-	500	500	500	500	500	500	-	2,500	3,000
<b>Energy Management Total</b>	<b>-</b>	<b>1,000</b>	<b>1,933</b>	<b>1,933</b>	<b>1,933</b>	<b>1,000</b>	<b>1,000</b>	<b>-</b>	<b>7,799</b>	<b>8,799</b>
<b>36X Engineering</b>										
Water	24,625	3,760	2,580	383	333	333	-	-	3,629	32,014
Wastewater	25,284	3,073	2,176	50	-	-	-	-	2,226	30,583
<b>Engineering Total</b>	<b>49,909</b>	<b>6,833</b>	<b>4,756</b>	<b>433</b>	<b>333</b>	<b>333</b>	<b>-</b>	<b>-</b>	<b>5,855</b>	<b>62,597</b>
<b>37X General Purpose</b>										
Water	-	-	-	-	-	-	-	-	-	-
Wastewater	-	-	-	-	-	-	-	-	-	-
<b>General Purpose Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Grand Total</b>	<b>49,909</b>	<b>26,640</b>	<b>35,232</b>	<b>22,876</b>	<b>14,926</b>	<b>10,483</b>	<b>8,640</b>	<b>2,140</b>	<b>92,157</b>	<b>170,846</b>



## V. PROJECTS BY CATEGORY

### SECTION 1 WATER

# Draft

Table V-1. Water CIP Projects

Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond	2018-2022 CIP Total	Project Total	Percent of W/S CIP
111	1227	Energy Management: Lake Huron Water Treatment Plant Low Lift Pumping Improvements	2010	-	200	2,500	3,000	-	-	-	-	5,500	5,700	0.7%
111	1280	Miscellaneous Mechanical Improvements at Lake Huron WTP	2014	-	200	750	1,205	950	200	-	-	3,105	3,305	0.4%
111	1289	Evaluation of Flocculation Improvement Alternatives at the LHWTP	2014	-	-	125	-	-	-	-	-	125	125	0.0%
111	1298	Electrical Tunnel Rehabilitation at Lake Huron WTP	2014	-	-	1,000	3,000	1,600	-	-	-	5,600	5,600	0.7%
111	1299	Miscellaneous Concrete Improvements at the Lake Huron WTP	2014	-	600	323	-	-	-	-	-	323	923	0.0%
111	1300	Replacement of Filter Instrumentation and Raw Water Flow Metering Improvements at Lake Huron WTP	2014	-	5,200	11,580	7,800	1,120	-	-	-	20,500	25,700	2.6%
111	1318	Lake Huron WTP-Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	2016	-	100	1,000	3,500	2,533	-	-	-	7,033	7,133	0.9%
112	1272	Yard Piping Replacement at Northeast Water Treatment Plant	2014	-	-	800	-	-	-	-	-	800	800	0.1%
112	1273	Low Lift Pumping Plant Caisson Rehabilitation at Northeast WTP	2014	-	100	80	-	-	-	-	-	80	180	0.0%
113	262	Southwest Water Treatment Plant, Sludge Treatment & Waste Wash water Treatment Facilities	2003	47,587	-	1,793	-	-	-	-	-	1,793	49,380	0.2%
113	1277	High Lift Pump Discharge Valve Actuators Replacement at Southwest WTP	2014	-	160	160	900	900	-	-	-	1,960	2,120	0.2%
113	1283	Replacement of Butterfly Valves and Sluice Gates for Rapid Mix Chamber at Southwest WTP	2014	-	-	-	-	-	-	-	2,940	-	2,940	0.0%
113	1297	Residual Handling Facility's Decant Flow Modifications at Southwest WTP	2014	-	900	3,001	2,250	-	-	-	-	5,251	6,151	0.7%
114	917	Springwells Water Treatment Plant 1958 Filter Rehabilitation and Auxiliary Facilities	2002	56,759	20,353	1,486	-	-	-	-	-	1,486	78,598	0.2%
114	1071	Springwells Water Treatment Plant - Low Lift and High Lift Pump Station	2004	-	-	15,000	25,000	12,000	-	-	-	52,000	52,000	6.6%

Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond	2013-2022 CIP Total	Project Total	Percent of W/S CIP
114	1264	Water Production Flow Metering Improvements at NE, SW, and SPW WTP	2014	-	1,000	8,800	2,100	1,000	-	-	-	11,900	12,900	1.5%
114	1265	Miscellaneous Concrete Improvements at Springwells WTP	2014	398	600	1	-	-	-	-	-	1	999	0.0%
114	1266	Administration Building Improvements at Springwells WTP	2014	-	-	-	300	1,700	-	-	-	2,000	2,000	0.3%
114	1267	Replacement of Rapid Mix Units at Springwells WTP 1958 Process Train	2014	-	100	800	100	-	-	-	-	900	1,000	0.1%
114	1268	Powdered Activated Carbon System Improvements at Springwells WTP	2014	-	-	-	-	900	2,000	-	-	2,900	2,900	0.4%
114	1269	1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements at Springwells WTP	2014	-	-	1,200	2,000	4,000	300	-	-	7,500	7,500	0.9%
114	1295	Springwells Water Treatment Plant Service Area Redundancy Study	2014	-	450	1	-	-	-	-	-	1	451	0.0%
114	1306	Yard Piping Improvements at Springwells WTP	2012	-	-	-	2,000	7,000	8,000	8,000	-	25,000	25,000	3.2%
114	1307	Steam, Condensate Return, and Compressed Air Piping Improvements at Springwells WTP	2012	-	2,100	3,120	1,500	-	-	-	-	4,620	6,720	0.6%
114	1320	Springwells Water Treatment Plant 1930 Filter Building-Roof Replacement	2016	-	3,000	1	-	-	-	-	-	1	3,001	0.0%
114	1389	Springwells Reservoir Fill Line Improvements	2016	-	200	3,300	4,000	-	-	-	-	7,300	7,500	0.9%
115	1166	Yard Piping, Valves and Venturi Meters Replacement at Water Works Park	2007	-	-	5,500	27,900	20,500	-	-	-	53,900	53,900	6.8%
115	1274	Miscellaneous Concrete and Road Improvements at Waterworks Park WTP	2014	761	2,275	1	-	-	-	-	-	1	3,037	0.0%
115	1301	Comprehensive Condition Assessment at Waterworks Park WTP	2014	-	200	375	-	-	-	-	-	375	575	0.0%
116	1292	Miscellaneous Improvements to Raw Water Tunnels, Shafts and Related Structures	2014	-	-	1,000	1,000	500	-	-	-	2,500	2,500	0.3%
116	1327	Pennsylvania, Springwells and Northeast Raw Water Supply Tunnel Improvements based on Contract CS-1623 Inspection Results	2016	-	500	1,500	3,900	9,200	11,400	6,400	-	32,400	32,900	4.1%
116	1355	Lapeer County Chlorine Booster Stations and Isolation Valve for 72-inch Transmission Main	2016	-	7,015	1,000	-	-	-	-	-	1,000	8,015	0.1%
116	1401	Water Treatment Plant Automation Program	2017	-	-	1,000	1,000	1,000	1,000	1,000	-	5,000	5,000	0.6%
122	1112	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road	2005	26,926	2,367	715	-	-	-	-	-	715	30,008	0.1%

Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	Projected Expenditures					FY 2022 FY 2023 & Beyond	2013-2022 CIP Total	Project Total	Percent of W/S CIP
							FY 2019	FY 2020	FY 2021						
122	1216	Replacement of Five (5) PRV Pits of Treated Water Transmission System	2010	1,015	1,205	100	-	-	-	-	-	100	2,320	0.0%	
122	1230	Water Transmission Improvement Program	2010	-	-	10,000	10,000	10,000	10,000	10,000	-	50,000	50,000	6.3%	
122	1305	New Waterworks Park to Northeast Transmission Main	2014	-	-	6,900	29,600	48,300	32,000	10,000	3,200	126,800	130,000	16.0%	
122	1321	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	2016	-	-	1,100	3,200	13,500	27,300	30,000	63,900	75,100	139,000	9.5%	
122	1323	Transmission System Water Main Work - Replacement of Schoolcraft Water Main	2016	-	-	-	7,300	7,250	-	-	-	14,550	14,550	1.8%	
122	1324	Transmission System Water Main Work-Wick Road Parallel Water Main	2016	-	10,000	9,350	-	-	-	-	-	9,350	19,350	1.2%	
122	1326	Design and Construction of a new Newburgh Road 24" Main along Newburgh Road between Cherry Hill and Glenwood Avenue	2016	-	-	1,800	2,200	-	-	-	-	4,000	4,000	0.5%	
122	1333	Downriver Transmission System Needs Assessment	2016	-	400	100	500	-	-	-	-	600	1,000	0.1%	
122	1350	Water System Improvements in Joy Road from Southfield Road to Trinity	2014	8,323	100	-	-	-	-	-	-	-	8,423	0.0%	
122	1351	Water Main Replacement within the City of Detroit - Joy Rd from Greenfield to Schaefer and Davison Ave from Lindwood to Livernois	2014	-	1,370	1,106	652	-	-	-	-	1,758	3,128	0.2%	
122	1356	Transmission System Valve Assessment and Rehabilitation/Replacement	2017	-	-	2,930	3,100	3,100	3,100	3,100	-	15,330	15,330	1.9%	
122	1400	Water Transmission Main Asset Assessment Program	2017	-	-	2,626	2,000	2,000	2,000	2,000	-	10,626	10,626	1.3%	
122	1403	Park-Merriman Water Main-Final Phase	2015	-	-	1,800	2,200	-	-	-	-	4,000	4,000	0.5%	
122	1404	36-inch Water Main in Telegraph Road	2012	-	2,000	5,061	-	-	-	-	-	5,061	7,061	0.6%	
122	1405	Lyon Township Transmission Main Extension Project	2017	-	1,300	10,500	12,000	6,000	-	-	-	28,500	29,800	3.6%	
122	1230b	48-Inch Water Main Installation at Vining and Wick Roads in Romulus	2015	1,021	3,514	1	-	-	-	-	-	1	4,536	0.0%	
122	1230c	30-Inch Watermain	2017	-	2,327	5	-	-	-	-	-	5	2,332	0.0%	
132	1047	Wick Road Station Rehabilitation	2004	13,452	250	1	-	-	-	-	-	1	13,703	0.0%	
132	1170	Booster Stations and Reservoirs Inspection, Rehabilitation and Inspection Repair Program	2007	9,571	2,316	88	-	-	-	-	-	88	11,975	0.0%	
132	1226	Replacement of Switchgear at Joy Road Pumping Station	2010	611	-	1	-	-	-	-	-	1	612	0.0%	
132	1270	Isolation Gate Valves for Line Pumps for West Service Center Pumping Station	2014	-	-	521	1,000	-	-	-	-	1,521	1,521	0.2%	
132	1271	Hydraulic Surge Control for North Service Center Pumping Station	2014	-	200	501	2,000	100	-	-	-	2,601	2,801	0.3%	

Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond	2013-2022 CIP Total	Project Total	Percent of W/S CIP
132	1288	Energy Management: Evaluate Alternatives and Recommend Corrective Actions to Improve Power Factors (PF) at Various GLWA Booster Pumping Stations	2014	-	-	125	125	-	-	-	-	250	250	0.0%
132	1293	Pressure and Control Improvements at the Electric, Ford Road, Michigan, and West Chicago Water Booster Pumping Stations	2014	-	150	234	-	-	-	-	-	234	384	0.0%
132	1294	Energy Management: Freeze Protection Pump Installation at Imlay Pumping Station	2014	-	-	200	500	300	-	-	-	1,000	1,000	0.1%
132	1296	Needs Assessment Study for all Water Booster Pumping Stations	2014	-	500	1,200	-	-	-	-	-	1,200	1,700	0.2%
132	1325	Reservoir Inspection, Design and Rehabilitation at Imlay Station, Adams Station, Haggerty Station, LH-WTP, SP-WTP and SW-WTP	2016	-	1,000	2,500	2,500	2,500	2,500	-	-	10,000	11,000	1.3%
132	1334	Study Phase Services for Proposed East Service Center Booster Pumping Station and Reservoir	2015	-	400	100	-	-	-	-	-	100	500	0.0%
132	1336	West Service Center/Duval Rd Division Valve Upgrades	2017	-	-	4,200	7,600	-	-	-	-	11,800	11,800	1.5%
132	1347	Energy Management: West Service Center (WSC) VFD Installation	2016	-	500	1,667	1,667	-	-	-	-	3,334	3,834	0.4%
151	1303	Suburban Water Meter Pit Rehabilitation and Meter Replacement	2014	-	500	4,000	4,000	4,000	4,000	4,000	-	20,000	20,500	2.5%
161	1233	Comprehensive Water Master Plan Update	2010	-	290	5	-	-	-	-	-	5	295	0.0%
161	1256	Water Treatment Plant /Pump Station Allowance	2012	-	19,660	19,650	20,000	20,000	10,000	10,000	-	79,650	99,310	10.1%
161	1291	As Needed Construction Materials, Environmental Media and Special Testing Services, Construction Inspection, and Other Technical Services	2014	-	500	500	500	-	-	-	-	1,000	1,500	0.1%

The Regional Water System draws its water from the largest fresh water source in North America, the Great Lakes system, with Lake Huron to the north, the Detroit River to the south and Lake St. Clair to the east. With access to nearly 2 billion gallons of high quality source water and with three separate intakes, the Authority has highly reliable and more than sufficient source water for current and projected demands.

The major components of the Regional Water System include three intake facilities, five treatment plants, an extensive conveyance system consisting of over 800 miles of transmission mains throughout the service area, 19 booster pumping stations and 32 water storage reservoirs (14 at the water treatment plants and 18 at booster stations) located throughout the Regional Water System. Water flow and pressure throughout the Regional Water System are

monitored and controlled by a Systems Control Center located in the Central Services Facility.

## Physical Facilities

### INTAKE FACILITIES

The Regional Water System's three intake facilities are listed below and are generally in adequate to good working order and repair.

- The **Lake Huron intake**, located in Lake Huron, approximately 5 miles north of Port Huron and 5 miles into the lake, was placed in operation in 1974. This intake supplies raw water through a tunnel to the Lake Huron water treatment plant.
- The **Belle Isle intake**, located at the eastern end of Belle Isle where Lake St. Clair flows into the Detroit River, was placed in operation in 1931. This intake supplies raw water to the Water Works Park, Springwells and Northeast water treatment plants.
- The **Fighting Island intake** and tunnel, located under the Detroit River on the Canadian side just west of the northern end of Fighting Island, was placed in operation in 1964. This intake supplies raw water to the Southwest water treatment plant.

### WATER TREATMENT PLANTS

Raw water from the intake facilities is treated at the Regional Water System's water treatment plants, which includes screening, filtering, bacteria control, and taste and odor control. Each of the five water treatment plants in the Regional Water System was constructed with the capability to treat the water in accordance with federal requirements under the Safe Drinking Water Act. In the opinion of the Authority, based upon physical evaluations conducted by its consultants, no significant improvements to the treatment plants are presently required to meet such requirements. In addition, each treatment plant is equipped with its own laboratory facilities for the

examination of drinking water which are recertified periodically (every three years) by the Michigan Department of Public Health. The treatment plants are more particularly described in the following table. A summary of the treatment plants is shown in

Table V-2 on the following page.

Table V-2. Treatment plant history and rated capacity

Plant	Placed in Operation	Rated Capacity (MGD)
Lake Huron	1974	400
Southwest	1964	240
Northeast	1956	300
Springwells <sup>(1)</sup>	1931/1958	540
Water Works Park	2003	240

<sup>(1)</sup> A major addition was completed in 1958, doubling the capacity of such water treatment plant by adding a new reservoir, sedimentation basin and filtration facility. Filter upgrades at Springwells limit plant capacity to 300 million gallons per day (MGD) until construction is complete, which is currently expected to occur or about September 2017.

### WATER DELIVERY SYSTEM

The Authority operates and maintains all transmission mains (24 inches to 120 inches in diameter) within the City limits and certain transmission mains throughout the wholesale service area. The Regional Water System connects throughout the wholesale service area with the transmission and distribution mains owned and operated by the wholesale municipal customers including the City of Detroit.

The transmission system is laid out to provide adequate pressures that are reinforced by use of booster stations and reservoirs as necessary. The transmission system is interconnected and flow of water can be controlled, particularly in emergency conditions, to flow in either direction by opening or closing valves. Water pressures can

be boosted to overcome typical losses due to an emergency situation.

#### MONITORING FACILITIES

The Water System Control Center controls and monitors the transmission of water throughout the Regional Water System. Operators in the Systems Control Center can remotely control the pump stations at the treatment plants and the 19 booster stations to adjust flows and pressures to meet the changing demands of customers.

#### Regional Water System Master Plan

The Water Master Plan Update was accepted by GLWA on August 24, 2016. This plan was materially completed in 2015 (the “2015 Water Master Plan Update” or the “Update”) with final closeout in 2016. Customers were engaged in the preparation of the 2015 Water Master Plan Update. This provided a broader perspective utilizing the region’s entire infrastructure for public benefit to leverage existing infrastructure before investing in new infrastructure. The 2015 Water Master Plan Update has been utilized to develop the Regional Water System CIP.

The 2015 Water Master Plan Update, which covers a period of 20 years, instead of 50 years in prior master plans, recognizes the national trend of declining demand. A key focus was to establish a strategic infrastructure and operating plan associated with this reality. The Update recommended right-sizing the capacity of the Regional Water System based on the current lower projections of population and water volumes.

The 2015 Water Master Plan Update found that the Authority’s combined water treatment plant design capacity was estimated to be over 60% greater than the forecasted 20-year water demands. The total rated capacity of the existing five water treatment plants is 1.7 billion gallons per day. The 2015 Master Plan Update identified likely maximum demands in the range of up to 1.0 billion gallons per day

during the 20-year planning period. This provided the rationale to evaluate the possibility of repurposing one or more water treatment plants to strategically align capacity and service requirements and planning for structural de-rating of capacity as warranted at the remaining four water treatment plants. The 2015 Master Plan Update recommended converting the existing Northeast Water Plant into a storage and pumping facility, thereby eliminating the need to invest in improvements that would otherwise be required to maintain rated capacity, and investing in the four remaining water treatment plants.

The 2015 Water Master Plan Update is designed to provide the system with flexibility to meet multiple growth scenarios and regulatory changes in the future, furthering GLWA’s sustainability goals. Realigning water treatment plant capacity with forecasted demands will require additions and modifications to the existing water transmission system. The first five years of the 2015 Water Master Plan Update contain several capital projects related to the additions and modifications to the existing water transmission system, several of which are in the Fiscal Year 2018-22 Regional Water System CIP. An example of the Update’s financial benefits is an estimated \$400 million of capital cost avoidance. In August 2016, the 2015 Water Master Plan Update was further updated to decommission and repurpose the Northeast Water Treatment Plant, provide a new transmission system serving the Authority’s northeast service area and add enhanced water system redundancy and long-term serviceability to a large (96 inch) water main through completion of a repair, relocation and isolation valve installation project for that water main.

#### Service Area and Customers

The Authority currently provides wholesale water services in a service area encompassing 981 square miles and serves all or a portion of eight Michigan counties in southeast Michigan, including Oakland, Macomb, Wayne, Lapeer, Genesee, Washtenaw, St. Clair and Monroe Counties. Approximately 3.8 million people, or





Figure V-1. GLWA water service area

approximately 38% of the total population of the State of Michigan, live in the Authority's water service area. Suburban customers comprise approximately 82% of the population served by the Authority, and the Retail Water Customers comprise the remainder served by the Authority. Under certain circumstances, subject to the Authority's system optimization guidelines, the Authority's water service area may be expanded to include additional communities. The Authority's Customers include communities and districts served via wholesale service contracts and the City retail customer class served via the terms of the Water and Sewer Services Agreement.

### Wholesale Water Customers

The Customers of the Regional Water System include 127 communities served through 87 wholesale water service contracts with municipal and other public entity customers, as well as the City of Detroit, which is served by the Authority pursuant to the Water and Sewer Services Agreement. The first wholesale customer communities to negotiate service agreements under the Authority's model contract did so in 2008. To date, model contracts for 78 of the 87 current wholesale customers have been negotiated, approved, and are in effect. Of the other 9 wholesale customers, 7 are served under the former contract structure, 2 are being served via emergency service contracts, and Genesee County is being served without any formal contract. The 78 customers served by the new model contracts comprise over 91% of total billed revenues from Water Regional Water System wholesale customers (exclusive of Detroit). Since 2015, the Authority has negotiated new model contracts with the communities that formerly made up the Greater Lapeer County Utilities Authority consisting of Village of Almont, City of Lapeer, the City of Imlay City and Mayfield Township. Negotiations are expected to be completed with Imlay Township by December 2016. The Authority has also completed a long term contract with the City of Riverview, which had previously been served under an expired contract. The City of Detroit is not a "wholesale" customer. Instead,

the City of Detroit, acting as agent for the Authority in serving the Retail Customers through the DWSD, is the largest customer of the Water System.

The model water service contracts generally provide for (i) delivery of water by the Authority to the wholesale customer at designated metered points at specified rates of flow and pressure and (ii) payment by the wholesale customer for all water supplied at reasonable charges established by the Authority. The Authority is responsible for meeting all water quality requirements at the designated metered points. The wholesale customer is solely responsible for distributing water from the points of delivery to its retail customers, for local billing, collection and rate setting.

The model contracts have a 30-year initial term and automatically renew for an additional 10-year term unless a party to the contract provides written prior notice of intent to terminate at least 5 years prior to the end of the then-current contract term. In the event of an early termination, the model contract provides that wholesale customers are liable to GLWA for the payment of any costs incurred by the Authority related to the provision of services to the customer, unless the termination is for cause, in which case GLWA has cure rights. The model contract provides that GLWA has no responsibility for distributing, operating, repairing, replacing or maintaining any portion of the customer's retail system, that GLWA shall be the sole supplier of service to the customer's service area and that the customer is prohibited from commingling Authority water with water from any other source without the prior approval of GLWA.

The model contracts also provide that the Water Technical Advisory Committee (the "TAC"), established to facilitate a cooperative working relationship between GLWA and its customers, will remain in place for the contract term. In addition, the model contracts include other provisions required for the orderly operation of an integrated water supply and distribution system such as the following: (i) restrictions on redistribution outside the limits of the

particular municipality or other public entity without the consent of the Authority; (ii) measurement of water furnished by meters; (iii) the metered flow of water is the basis for billing; (iv) prohibition against combining of Regional Water System supplied water with water from any other source without prior written approval of the Authority to ensure a uniform quality of water throughout the area; (v) municipal acceptance of the Authority's standards for construction of distribution mains and Authority approval of construction plans therefor to ensure a uniform standard throughout the area; (vi) Authority commitments regarding notification of rate changes; (vii) payment and late payment terms; (viii) delineation of maintenance responsibilities; (ix) specific water pressure commitments by the Authority; and (x) maximum day, peak hour and annual volume commitments by the wholesale customer.

### 1.1. Water Treatment Plants & Facilities

GLWA operates and maintains five water treatment facilities which provide water to customers in Southeastern Michigan. The Springwells, Northeast, Southwest, Lake Huron, and Water Works Park Water Treatment Plants have a maximum rated treatment capacity of 1,720 million gallons per day and firm high service pumping capacity of 2,400 million gallons per day. The high service pumping capacity exceeds the rated treatment capacity to assist in meeting peak hourly demands from finished water storage. Applicable treatment and pumping capacities and other data can be seen in Table V-3 on the following page.

Four of the five plants (Northeast, Springwells, Southwest and Water Works Park) are conventional treatment facilities with the following process trains: rapid mix, coagulation, flocculation, sedimentation, granular media filtration, and disinfection. Lake Huron is the only facility which is operated as a "modified direct filtration" plant, which means the sedimentation basins do not require a minimum detention time of 4 hours. In addition, Water Works Park is the only plant which employs intermediate ozonation for primary disinfection control. All

five plants use the same chemical systems including alum for coagulation, chlorine for pre-oxidation and primary disinfection (excluding Water Works Park), powdered activated carbon (PAC) for taste and odor (T&O) control, phosphoric acid for corrosion control, and fluoride for dental health protection. Polymers are also added at several facilities to enhance coagulation and filtration as well as for thickening and dewatering of alum residuals. Two of the five plants, Southwest and Water Works Park, employ automated residuals removal from the sedimentations basins. The residuals are thickened and dewatered on site along with backwash wastewater, and disposed of at landfills. Lake Huron's basins are cleaned manually on

an annual basis and the sludge is discharged to the sludge drying lagoons. The lagoons also receive thickened solids from the waste wash water treatment facility which processes filter backwash wastewater. The Springwells and Northeast plants do not have automated alum residuals collection in the sedimentation basins or a thickening treatment process on site for alum residuals or backwash wastewater. At both facilities, the basins have been manually cleaned on an annual or biannual basis and the solids discharged to the wastewater collection system; backwash wastewater is also discharged to the wastewater collection system.

Table V-3. Water Treatment Plant Capacity, Finished Water Storage and Areas Served Summary

Facility	Year Placed in Service	Rated Treatment Capacity (MGD)	Firm High Service Pumping Capacity (MGD)	Finished Water Storage Volume (MG)	Areas Served
Springwells WTP	1931 First Train; 1958 Second Train	540(1)	260 Intermediate Pressure District; 450 High Pressure District	60	Detroit, Northern Wayne County, Eastern Washtenaw County, Oakland County, Southeastern Macomb County, Western Wayne County
Northeast WTP	1956	300	400	30	Northeast Detroit/Wayne County, Southern Macomb County, Southeast Oakland County
Southwest WTP	1964	240	310	30	Southern Wayne County, Northern Monroe County, Eastern Washtenaw County
Lake Huron WTP	1974	400	420	44	Genesee County, Lapeer County, St. Clair County, Macomb County, Oakland County
Water Works Park WTP	2003	240	560	28	Eastside of Detroit, Eastern Wayne County
<b>System Totals:</b>		<b>1,720</b>	<b>2,400</b>	<b>192</b>	

### 1.1.1. Lake Huron Water Treatment Plant

The Lake Huron Water Treatment Plant began full-scale operations in 1974. The plant is located at 3993 Metcalf Road in Fort Gratiot, Michigan. The Lake Huron plant was designed to be easily expandable to meet the needs of growing populations in the communities it serves to the north of Detroit. In 2004, after completion of a pilot study along with various upgrades to the process trains, the MDEQ rated the maximum capacity of Lake Huron at 400 MGD. Lake Huron is the only GLWA facility which is operated in “modified” direct filtration mode. The sedimentation basins do not meet 10-State standards and thus are not considered to be true settling basins by the MDEQ. The raw water source for the plant is Lake Huron. The raw water tunnel is designed for a maximum capacity of 1200 MGD and 800 MGD during cold weather. The plant was constructed with provisions to increase the capacity by adding additional process trains and pumping units to obtain the maximum production capacity of 1200 MGD. In the early 2000’s a variety of process treatment improvements were constructed at the Lake Huron WTP. These improvements included new high lift and backwash water pumps (including discharge piping and valves), rehabilitation of two clear wells and the high service suction well, filtration capacity improvements, pretreatment improvements and filter control modification, and a new treatment facility for filter backwash wastewater.



Figure V-2. Lake Huron WTP

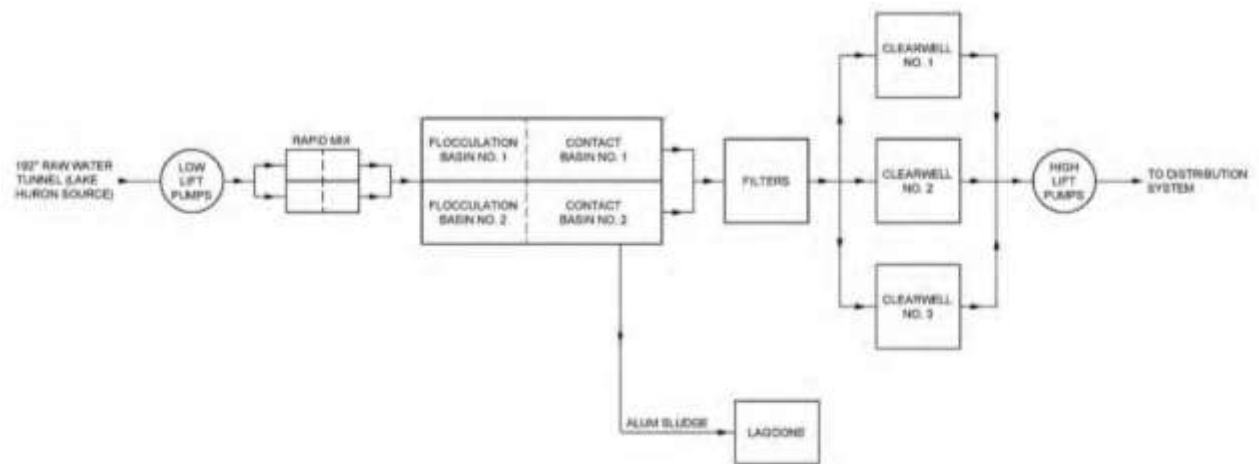


Figure V-3. Lake Huron WTP process diagram

### 1.1.2. Northeast Water Treatment Plant

The Northeast Water Treatment Plant at 11000 E. Eight Mile Road in Detroit became the Detroit water system's third water treatment plant. Dedicated in 1956, the plant was built to meet the needs of suburban communities located east and north of the city. The source of raw water is the Belle Isle intake, located in the Detroit River, which also serves Springwells and Water Works Park. The raw water is chlorinated, fluoridated, and screened at Water Works Park before it flows to Northeast by gravity. Low lift pumps lift the raw water to the process trains, which operate in parallel. With a maximum rated capacity of 300 MGD, the plant process trains consist of rapid mix, flocculation, sedimentation, and dual-media gravity filtration.



Figure V-4. Northeast WTP

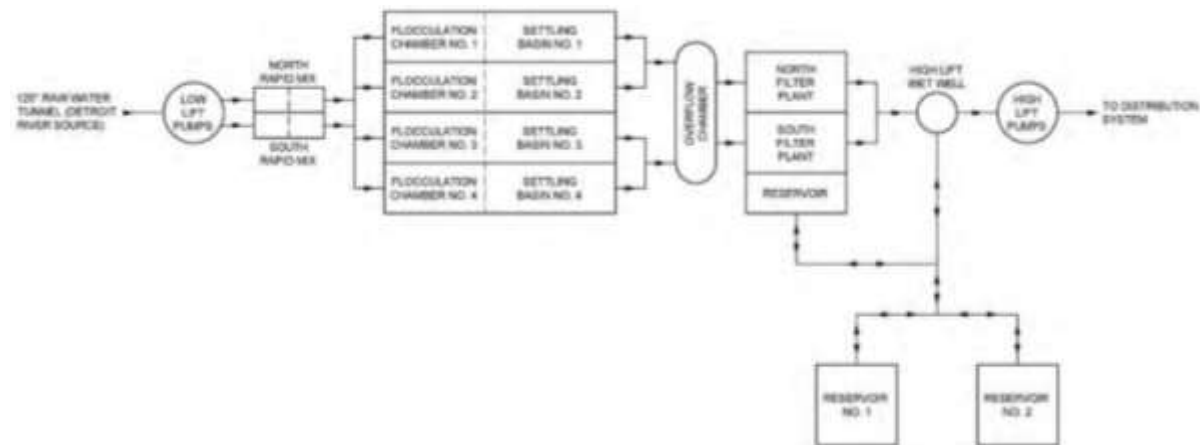


Figure V-5. Northeast WTP process diagram



### 1.1.3. Southwest Water Treatment Plant

Detroit's fourth water treatment plant, Southwest, is located at 14700 Moran Road in Allen Park became operational in 1964. The Southwest Water Treatment Plant was constructed in 1963 at which time it was owned and operated by Wayne County. Through an agreement with Wayne County, the City of Detroit purchased this plant to regionalize water services in Southeast Michigan. Raw water for Southwest flows by gravity from the Detroit River through an intake at Fighting Island. The plant has a rated capacity of 240 MGD. The original plant was designed with the ability to be upgraded to 320 MGD via equipment replacement. There are also spare raw water conduits which can accommodate an expansion up to 480 MGD. The low lift pumps lift the raw water for treatment through the process trains which operate in parallel. The Southwest Water Treatment Plant also has a Residuals Handling Facility to treat filter backwash wastewater and alum sludge residuals.



Figure V-6. Southwest WTP

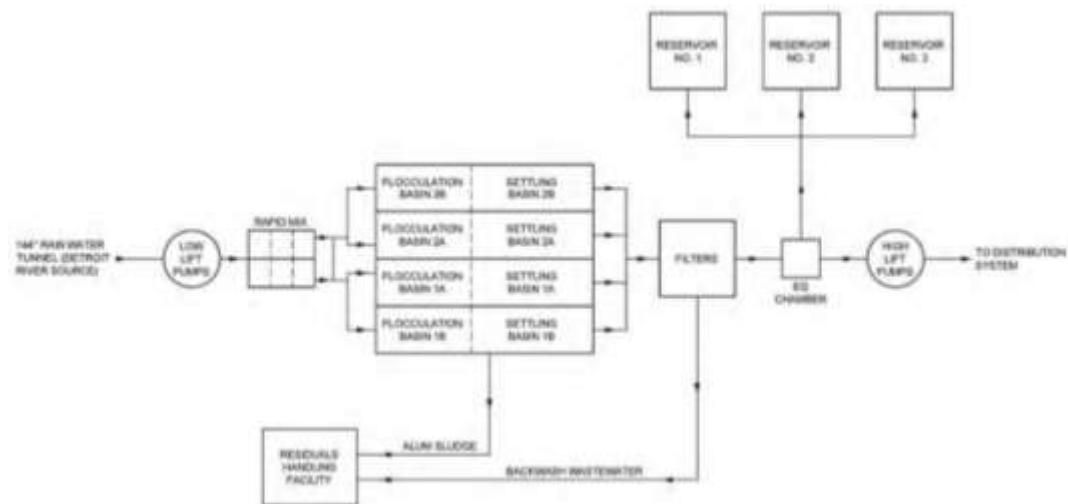


Figure V-7. Southwest WTP process diagram



#### 1.1.4. Springwells Water Treatment Plant

The Springwells Water Treatment Plant at 8300 W. Warren Avenue in Dearborn is the oldest of the GLWA water treatment facilities. At the time of its dedication in 1935 it was the largest water treatment facility in the world. The first train was constructed in 1930 and has a maximum rated capacity of 340 MGD and the second train constructed in 1958 has a maximum rated capacity of 200 MGD, for a total capacity of 540 MGD. Like Northeast, the Springwells plant receives its raw water from the Belle Isle Intake. The raw water influent is screened, chlorinated and fluoridated at Water Works Park before it is conveyed to Springwells. The low lift pumps lift the raw water for treatment through the process trains, which operate independently. The 1930 train provides hydraulic mixing through a baffled chamber for rapid mixing while the 1958 train has mechanical rapid mixers. Both trains have flocculation, sedimentation and filtration treatment units. A major project to upgrade the Springwells plant, SP 583, is currently underway and should be closed out in 2018. This project includes a complete replacement of the 1958 filters and a limited replacement of some of the 1930 filters. A laboratory upgrade, yard piping and other site improvements are also included in this project.



Figure V-8. Springwells WTP

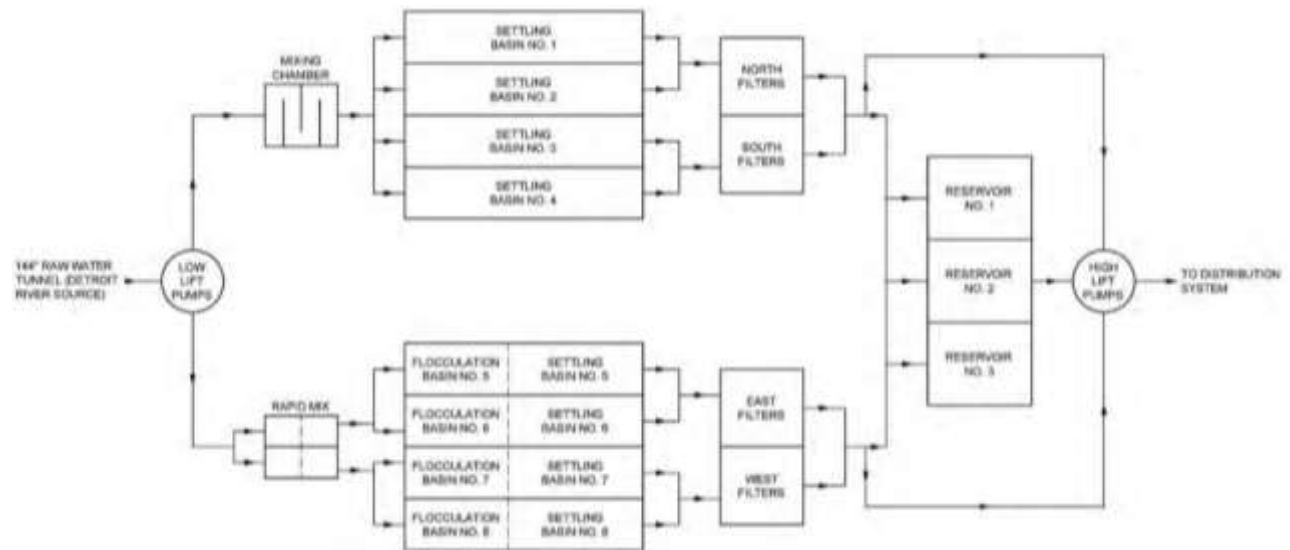


Figure V-9. Springwells WTP process diagram

### 1.1.5. Water Works Park Water Treatment Plant

The plant can produce up to 240 million gallons of superior quality drinking water per day (MGD) with room for expansion to 320 MGD. The end result of the city's \$275 million investment in this state-of-the-art facility is water the way it is meant to be: colorless, odorless, and great tasting; even better tasting than the water for which DWSD has been justifiably lauded for more than 150 years.

The GLWA's newest water treatment plant is located at 10100 E. Jefferson Avenue in Detroit. Water Works Park II began operating in 2003 as a conventional surface water treatment plant. The original Water Works Park water treatment plant was razed and a new facility was constructed on the same site. The raw water source for the plant is the Belle Isle intake on the Detroit River. The plant has a maximum rated capacity of 240 MGD and is GLWA's first facility with ozone disinfection facilities as well as a Residuals Handling Facility to treat filter backwash wastewater and alum sludge residuals. Water Works Park is the largest plant in Michigan to use ozone as a disinfectant. The plant was designed to use independent process trains - a minimum of two process units are provided for each treatment process. In addition, all conveyance facilities such as pipelines, junction chambers, channels, and wet wells are configured to provide a minimum of two treatment pathways.



Figure V-10. Water Works Park WTP

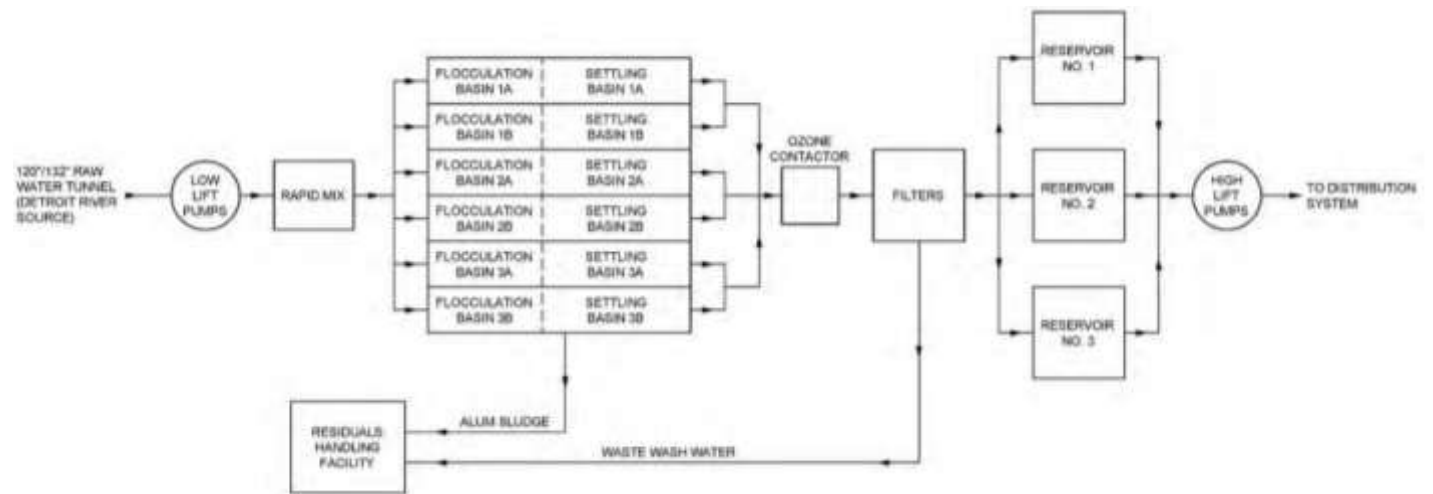


Figure V-11. Water Works Park process diagram

#### 1.1.6. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

### 1.2. Field Services

#### 1.2.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

#### 1.2.2. Transmission System

The Regional Water Transmission System (RWTS) consists of over 800 miles of water main 24-inch and greater typically with the

responsibility for the transport of potable water from the five water treatment facilities to the regional wholesale water customers and the City of Detroit. The Water System currently serves an area of 981 square miles located in eight Michigan counties and an estimated population of nearly 3.8 million or approximately 38% of Michigan's population. Suburban customers comprise approximately 82% of the population served by the Authority, and the Retail Water Customers (as defined herein) comprise the remainder served by the Authority.

Figure V-12, on the following page, depicts only those water transmission mains operated/maintained (leased) by GLWA within the City of Detroit. Figure V-13, depicts the water transmission mains operated/maintained (leased) by GLWA over the entire service area. The suburban communities own, operate, and maintain all of their transmission and distribution systems from the points of connection to the RWTS.



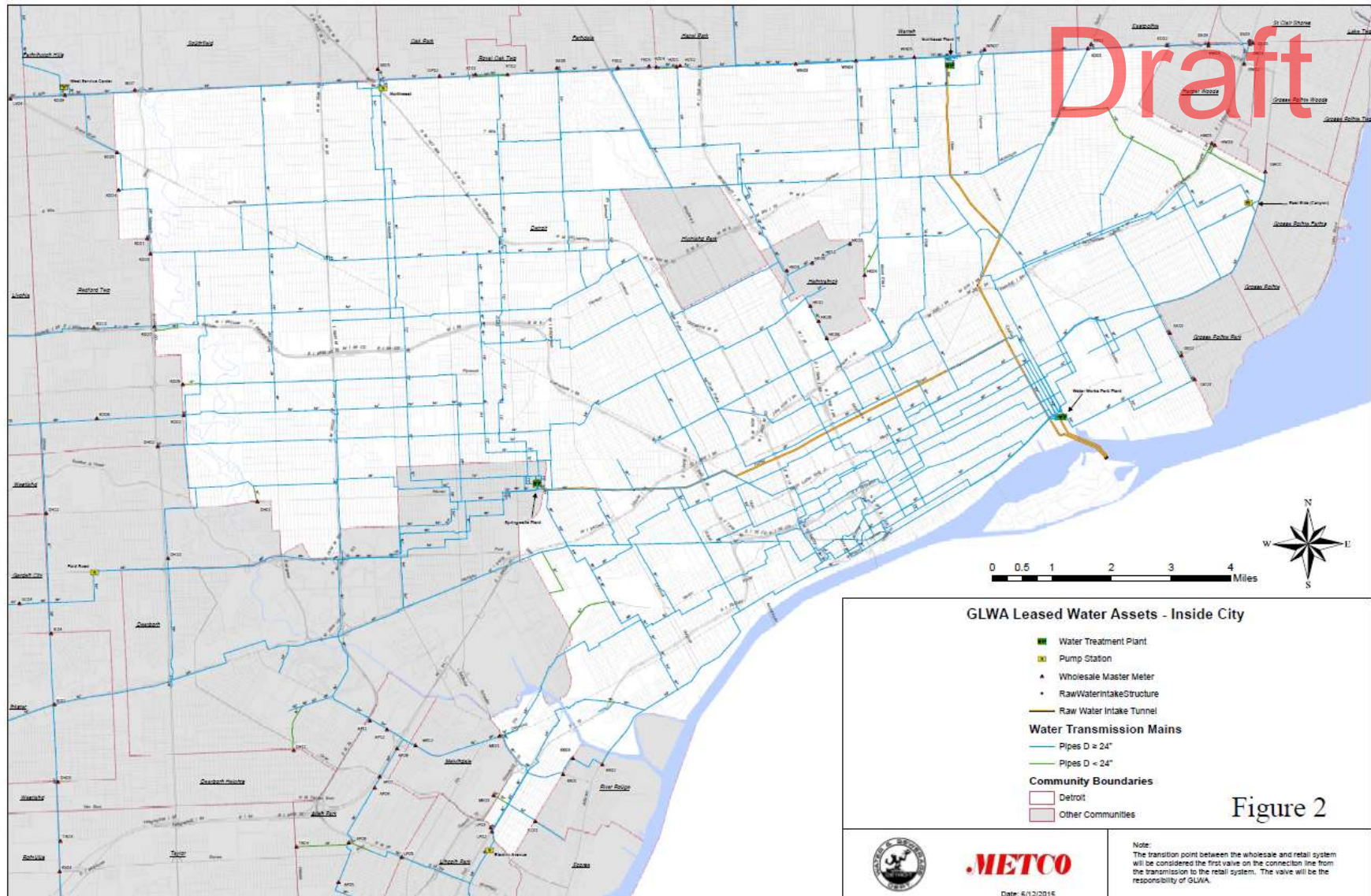
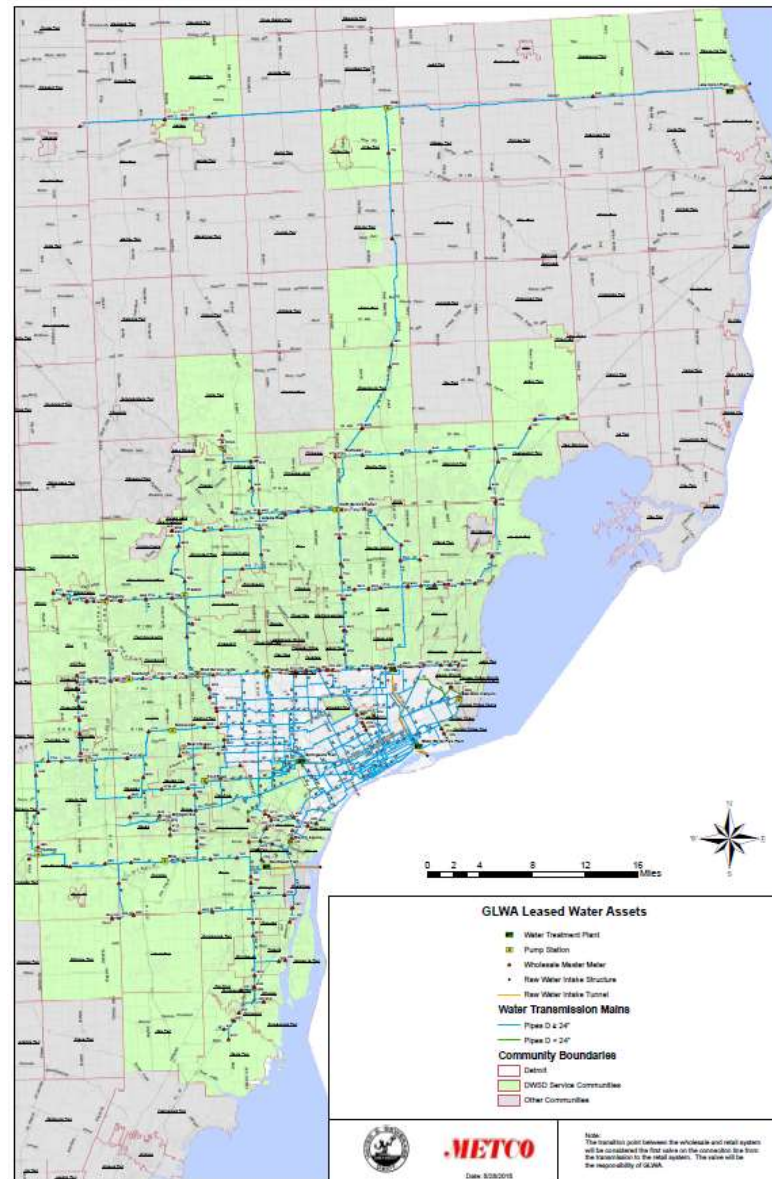


Figure V-12. GLWA Leased Water Assets Inside the City of Detroit.



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Figure V-13. GLWA Leased Regional Water Assets.

### 1.3. Systems Control Center

#### 1.3.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

#### Pressure Reducing Valve (PRV)

PRVs regulate water pressure at critical locations throughout the Regional Water Transmission System. Pressure reduction is needed to protect portions of the water system from being impacted by above normal operating pressures. Downstream of the PRVs, pressure is maintained at a relatively consistent lower pressure.

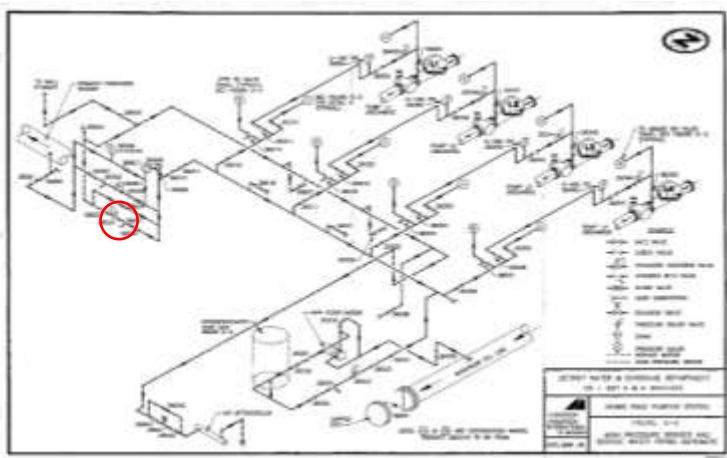


Figure V-13. Adams Road Pumping Station: PRVs can be seen throughout drawing. The one circled for example reduces pressure before feeding to service water line.

### Pressure Monitoring Site

Pressure Monitoring Sites provide suction and discharge pressure readings to aid in system operation. There are 53 pressure monitoring sites in the transmission system.

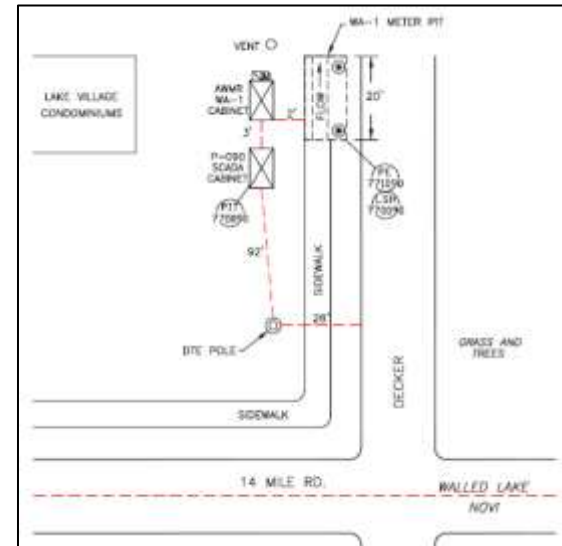


Figure V-14. Example of a Pressure Monitoring Site at 14 Mile and Decker.

#### 1.3.2. Pump Stations & Reservoirs

#### Water Booster Station

Booster stations are located within the regional system and distribute water received from the Water Treatment Facilities to communities and other stations to meet pressure and demand requirements. Some water is diverted to reservoirs at the station until needed during times of high demand. Pumping stations re-pump the water in transmission mains and reservoirs to maintain system these pressures. There are nineteen water booster stations in the GLWA transmission system.



## Adams Road Pump Station



Figure V-15. Adams Road Pump Station

The Adams Road Station consists of a pump house and a primary unit substation. The station's purpose is to increase the pressure in the 42-inch water main running along Adams Road. The station is fed by the North Service Center Station which receives its water from the Lake Huron Water Treatment Plant through the Imlay Station. The station's discharged water flows north through the 42-inch water main along Adams Road. The station serves the communities of Rochester Hills, Auburn Hills, Pontiac, as well as Bloomfield Hills and West Bloomfield, during high demand periods.

<b>Elevation</b>	881.50
<b>Suction Pressure</b>	40 - 55 psi
<b>Discharge Pressure</b>	120 -150 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1 - 1500 Hp, 10 MGD, 350 TDH R2 - 1500 Hp, 10 MGD, 350 TDH
<b>Line Pumps</b>	L1 - 750 Hp, 18.2 MGD, 191 TDH, VFD L2 - 750 Hp, 18.2 MGD, 191 TDH L3 - 750 Hp, 18.2 MGD, 191 TDH L4 - 750 Hp, 18.2 MGD, 191 TDH
<b>Electric Feeds</b>	2

## Eastside Pump Station



Figure V-16. Eastside Pump Station

Eastside Pump Station consists of a pump house and a reservoir. The purpose of the station is to store water during the off-peak hours and use the stored water to supplement the supply during the hours of high demand. The discharged water from the station flows through the 36-inch water main along Canyon Avenue. The station serves the communities of East Detroit and Grosse Pointe.

<b>Elevation</b>	579.26
<b>Suction Pressure</b>	
<b>Discharge Pressure</b>	55 - 70 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1- 350 Hp, 10 MGD, 350 TDH R2- 350 Hp, 10 MGD, 350 TDH R3- 350 Hp, 10 MGD, 350 TDH
<b>Electric Feeds</b>	1

## Electric Avenue Pump Station



Figure V-17. Electric Avenue Pump Station

The Electric Avenue Pumping Station increases the water pressure in the 36-inch water main running along Electric Avenue. The station receives its water from the intermediate pressure system of the Southwest Water Treatment Plant. The station has two reservoirs in which it stores water to supplement the normal water supply during peak demand periods. During low demand periods, the station is used only to circulate the reservoir water once or twice per week. Water from Electric Avenue Pump Station serves the communities of Lincoln Park, Southgate, Riverview, and Trenton.

<b>Elevation</b>	577.71
<b>Suction Pressure</b>	55 - 70 psi
<b>Discharge Pressure</b>	55 - 80 psi
<b>Reservoir Capacity</b>	2 X 3.3 MG
<b>Reservoir Pumps</b>	R3 - 200 Hp, 5.56 MGD, 150 TDH R4 - 300 Hp, 5.56 MGD, 150 TDH
<b>Line Pumps</b>	L1 - 100 Hp, 5.04 MGD, 75 TDH L2 - 100 Hp, 5.04 MGD, 75 TDH
<b>Electric Feeds</b>	2

## Haggerty Pump Station



Figure V-18. Haggerty Pump Station

Haggerty Pumping Station consists of a pump building, 10-million gallon above-ground reservoir, and exterior primary power area. The primary purpose of the station is to boost water pressure and increase flow to the existing water main. The station also has the capacity to provide an emergency supply of water of up to 28 MGD emergency demand in the event of a water main break between Haggerty and Franklin pumping stations. When operating at full capacity during periods of high demand, Haggerty Pumping Station will boost the transmission system pressure in the existing 42-inch water main serving City of Novi, Commerce Township, City of Walled Lake, City of Wixom, West Bloomfield, and Wolverine Lake.

<b>Elevation</b>	880.00
<b>Suction Pressure</b>	55 - 100 psi
<b>Discharge Pressure</b>	80 - 105 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1 - 700 Hp, 14 MGD, 200 TDH R2 - 700 Hp, 14 MGD, 200 TDH
<b>Line Pumps</b>	L1 - 700 Hp, 21 MGD, 100 TDH, VFD L2 - 700 Hp, 21 MGD, 100 TDH, VFD L/R3 - 700 Hp, 21 MGD, 100 TDH, VFD
<b>Electric Feeds</b>	2

## Ford Road Pump Station



Figure V-19. Ford Road Pump Station

Ford Road Station consists of a pump house and a reservoir that stores water to supplement the normal water supply during high demand periods. The station receives water from the intermediate system of the Springwells Water Treatment Plant. The station increases the pressure in the 48-inch water main running along Ford Road. Dearborn Heights, Garden City, Westland, Inkster, and parts of Canton Township are serviced by Ford Road Pump Station.

<b>Elevation</b>	618.26
<b>Suction Pressure</b>	35 - 50 psi
<b>Discharge Pressure</b>	75 - 95 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R6 - 450 Hp, 10.08 MGD, 210 TDH R7 - 450 Hp, 10.08 MGD, 210 TDH R8 - 450 Hp, 10.08 MGD, 210 TDH R9 - 450 Hp, 10.08 MGD, 210 TDH R10 - 450 Hp, 10.08 MGD, 210 TDH
<b>Line Pumps</b>	L1 - 250 Hp, 18.14 MGD, 60 TDH L2 - 250 Hp, 10.08 MGD, 120 TDH L3 - 250 Hp, 10.08 MGD, 120 TDH L4 - 250 Hp, 10.08 MGD, 120 TDH L5 - 250 Hp, 10.08 MGD, 120 TDH
<b>Electric Feeds</b>	2

## Franklin Pump Station



Figure V-20. Franklin Pump Station

Franklin Pumping Station consists of a pump house and reservoir. The station increases pressure in the 42-inch water main running north and the 54-inch water main running south along Inkster Road. The 60-inch main comes from the High Pressure System of the West Service Center which, in turn, is fed by the Northeast and Springwells Water Treatment Plants. The station also stores water to supplement normal supply during the peak demand periods. The station serves Farmington Hills, Franklin Township, Bloomfield, and West Bloomfield.

<b>Elevation</b>	832.58
<b>Suction Pressure</b>	35 - 60 psi
<b>Discharge Pressure</b>	135 - 155 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1 - 1570 Hp, 22 MGD, 320 TDH R2 - 1570 Hp, 22 MGD, 320 TDH
<b>Line Pumps</b>	L1 - 2000 Hp, 30 MGD, 250 TDH L2 - 2000 Hp, 30 MGD, 250 TDH L3 - 2000 Hp, 30 MGD, 250 TDH L4 - 2000 Hp, 30 MGD, 250 TDH
<b>Electric Feeds</b>	2

## Michigan Avenue Pump Station



Figure V-21. Michigan Avenue Pump Station

Michigan Avenue Pumping Station increases the water pressure in the 36-inch water main running along Michigan Avenue. The 36-inch water main is supplied by the intermediate pressure system of the Springwells Water Treatment Plant and when demand requires it, by the Southwest Water Treatment Plant intermediate pressure system. The station also stores water to supplement the normal water supply during peak demand periods. Water from Michigan Avenue Station serves the communities of Canton and Wayne.

<b>Elevation</b>	638.10
<b>Suction Pressure</b>	40 - 60 psi
<b>Discharge Pressure</b>	55 - 75 psi
<b>Reservoir Capacity</b>	2 X 3.5 MG
<b>Reservoir Pumps</b>	R4 - 350 Hp, 8.64 MGD, 150 TDH R5 - 350 Hp, 8.64 MGD, 150 TDH
<b>Line Pumps</b>	L1 - 75 Hp, 3.60 MGD, 90 TDH L2 - 75 Hp, 3.60 MGD, 90 TDH L3 - 125 Hp, 4.32 MGD, 110 TDH
<b>Electric Feeds</b>	2

## Joy Road Pump Station



Figure V-22. Joy Road Pump Station

Joy Road Pumping Station consists of one pump house, two reservoirs, and one primary unit substation. The purpose of the station is to increase the pressure in the 48-inch water main running along Joy Road. The station is fed by the Ford Road and Schoolcraft stations, which are fed by the Springwells Water Treatment Plant. The discharged water from the station flows west through the 48-inch water main along Joy Road to Sheldon Road. Then, the water main runs north along Sheldon Road to Eight Mile in Northville. The station serves the communities of Plymouth and Northville and the townships of Plymouth, Northville, and Canton.

<b>Elevation</b>	686.00
<b>Suction Pressure</b>	35 - 55 psi
<b>Discharge Pressure</b>	130 - 150 psi
<b>Reservoir Capacity</b>	2 X 5 MG
<b>Reservoir Pumps</b>	R1 - 1200 Hp, 16.13 MGD, 332 TDH R2 - 1200 Hp, 16.13 MGD, 332 TDH R3 - 1250 Hp, 14.8 MGD, 332 TDH
<b>Line Pumps</b>	L1 - 1050 Hp, 15.84 MGD, 288 TDH, VFD L2 - 1050 Hp, 15.84 MGD, 288 TDH L3 - 1000 Hp, 14.8 MGD, 288 TDH
<b>Electric Feeds</b>	2



## Imlay Pump Station



Figure V-23. Imlay Pump Station

Imlay Pumping Station consists of a pump house and reservoir. The station maintains the required water pressure in the 72-inch supply line to the Flint area and the 96-inch supply line to North Service Center Pumping Station. The station receives water through a 120-inch water main from the Lake Huron Water Treatment Plant. It also stores water to supplement the water supply during the high demand period. The supply water can bypass the station and go directly from the 120-inch main to the 96- and 72- inch water mains.

<b>Elevation</b>	787.87
<b>Suction Pressure</b>	65 - 95 psi
<b>Discharge Pressure</b>	85-w/-75-170-s psi
<b>Reservoir Capacity</b>	18 MG
<b>Reservoir Pumps</b>	R1 - 5250 Hp, 75 MGD, 335 TDH R2 - 5250 Hp, 75 MGD, 335 TDH
<b>Line Pumps</b>	LR3 - 6000 Hp, 75 MGD, 335 TDH, VFD LR4 - 6000 Hp, 70 MGD, 390 TDH LR5 - 6000 Hp, 70 MGD, 390 TDH LR6 - 6000 Hp, 70 MGD, 390 TDH, VFD LR7 - 6000 Hp, 70 MGD, 390 TDH, VFD LR8 - 6000 Hp, 70 MGD, 390 TDH, VFD
<b>Electric Feeds</b>	2

## Newburgh Pump Station



Figure V-24. Newburgh Pump Station

Newburgh Pumping Station increases the pressure in the 42-inch water main that runs along Eight Mile from West Service Center intermediate pressure line. This main is fed by the high pressure system of the Northeast and Springwells Water Treatment Plants. Discharged water from the station flows west through the 42-inch water main and serves Livonia, Northville, Novi, and Farmington Hills.

<b>Elevation</b>	737.00
<b>Suction Pressure</b>	30 - 60 psi
<b>Discharge Pressure</b>	110 - 130 psi
<b>Line Pumps</b>	L1 - 450 Hp, 8 MGD, 200 TDH L2 - 450 Hp, 8 MGD, 200 TDH L3 - 515 Hp, 12 MGD, 200 TDH L4 - 515 Hp, 12 MGD, 200 TDH L5 - 515 Hp, 12 MGD, 200 TDH
<b>Electric Feeds</b>	2

## Northwest Pump Station



Figure V-25. Northwest Pump Station

Northwest Pumping Station consists of a pump house and a reservoir. The station stores water during the off-peak hours and uses the stored water to supplement the water supply during the hours of high demand. The discharged water from the station flows north, through the 42-inch discharge header along Greenfield Road, to the Southeastern Oakland County Water Association Pump Station. A 24-inch branch line, running south along Greenfield Road, supplies water to the Springwells high pressure system. A 54-inch branch line, running west along Eight Mile, supplies water to the West Service Center. The station serves the communities of northwest Detroit.

<b>Elevation</b>	657.00
<b>Suction Pressure</b>	
<b>Discharge Pressure</b>	40-55 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1 - 350 Hp, 10.08 MGD, 150 TDH R2 - 350 Hp, 10.08 MGD, 150 TDH R3 - 350 Hp, 10.08 MGD, 150 TDH R4 - 350 Hp, 10.08 MGD, 150 TDH R5 - 350 Hp, 10.08 MGD, 150 TDH
<b>Electric Feeds</b>	1

## North Service Center



Figure V-26. North Service Center

North Service Center receives its water from Lake Huron Water Treatment Plant through the Imlay Station. North Service Center maintains adequate pressure in the 84-inch water main supplying Pontiac and Utica, supplies water to the service area of Northeast Water Treatment Plant and to Eight Mile water main, and stores water during low demand periods to be used to supplement normal water supply during peak periods. North Service Center serves Pontiac, Adams Pumping Station, Utica, Northeast Water Treatment Plant service area, and supplies water to the Eight Mile water main.

<b>Elevation</b>	697.70
<b>Suction Pressure</b>	30 - 50 psi
<b>Discharge Pressure</b>	135 - 150 psi
<b>Reservoir Capacity</b>	2 X 10 MG
<b>Reservoir Pumps</b>	R1 - 250 Hp, 15 MGD, 75 TDH R2 - 250 Hp, 15 MGD, 75 TDH R3 - 350 Hp, 20 MGD, 76 TDH R4 - 350 Hp, 20 MGD, 76 TDH
<b>Line Pumps</b>	L2 - 2500/1250 Hp, 23-30 MGD, 240-370 TDH L3 - 2500/1250 Hp, 19.3-25.5 MGD, 260-400 TDH L4 - 2500/1250 Hp, 23-30 MGD, 240-370 TDH L5 - 2500/1250 Hp, 19.3-25.5 MGD, 260-400 TDH

L6 - 2500/1250 Hp, 19.3-25.5 MGD, 260-400 TDH  
 L7 - 2500 Hp, 30 MGD, 370 TDH, VFD  
 L8 - 2500 Hp, 30 MGD, 370 TDH, VFD  
 L9 - 2500 Hp, 30 MGD, 370 TDH, VFD  
 L10 - 2500 Hp, 30 MGD, 370 TDH, VFD

**Electric Feeds** 3

### Orion Pump Station



Figure V-27. Orion Pump Station

Orion Station supplies water at an adequate pressure to Orion's distribution mains. The water comes through the northbound 42-inch water main from Adams Station or North Service Center's 54-inch main, which, in turn, is fed by the Lake Huron Water Treatment Plant through the Imlay Pumping Station. The discharge from the station flows through the 30-inch water main running along Giddings Road and serves the Orion area.

<b>Elevation</b>	946.25
<b>Suction Pressure</b>	75 - 95 psi
<b>Discharge Pressure</b>	105 - 130 psi
<b>Line Pumps</b>	L1 - 75 Hp, 2 MGD, 85 TDH L2 - 75 Hp, 4 MGD, 85 TDH L3 - 75 Hp, 4 MGD, 85 TDH L4 - 75 Hp, 4 MGD, 85 TDH
<b>Electric Feeds</b>	2

### Rochester Pump Station



Figure V-28. Rochester Pump Station

Rochester Pump Station consists of a pump house and a transformer yard. The station supplies water at an adequate pressure to the City of Rochester Hills and Shelby Township distribution mains. The station replaced a temporary station at the site. It is fed by the Imlay Station which receives its water from the Lake Huron Water Treatment Plant. Discharged water will boost pressures in communities currently being served by a 36-inch main running east-west along 24 Mile. The station serves City of Rochester Hills, Shelby Township, City of Rochester, Lennox Township, Macomb Township, and Chesterfield Township.

<b>Elevation</b>	687.00
<b>Suction Pressure</b>	65 - 95 psi
<b>Discharge Pressure</b>	75 - 140 psi
<b>Line Pumps</b>	L1 - 700 Hp, 14.4 MGD, 205 TDH, VFD L2 - 700 Hp, 14.4 MGD, 205 TDH L3 - 700 Hp, 14.4 MGD, 205 TDH, VFD L4 - 700 Hp, 14.4 MGD, 205 TDH L5 - 700 Hp, 14.4 MGD, 205 TDH
<b>Electric Feeds</b>	2



## West Service Center



Figure V-29. West Service Center

West Service Center consists of one main pump house, two reservoir pump houses, and two reservoirs. West Service Center increases the pressure in the 54-inch water main running along Eight Mile Road, from the high pressure system of the Northeast and Springwells Plants. There are six line pumps in the main pump house. Three line pumps supply high pressure water to the Franklin station and other upstream communities. The three remaining pumps supply the intermediate pressure line which serves the Newburgh Station, Farmington Station, and other upstream communities. During low demand periods, water is diverted to the reservoirs. During high demand periods, the reservoir water is pumped to the suction header of the line pumps. The intermediate pressure line running along Eight Mile serves Redford Township and Livonia before reaching the Newburgh Station. High pressure lines running along Inkster Road

serve the Farmington Hills and Southeast Oakland County Water Association before reaching the Franklin Station.

<b>Elevation</b>	646.89
<b>Suction Pressure</b>	35 - 50 psi
<b>Discharge Pressure</b>	110 - 140 psi
<b>Reservoir Capacity</b>	2 X 10 MG
<b>Reservoir Pumps</b>	R1 - 400 Hp, 24 MGD, 96 TDH R2 - 400 Hp, 24 MGD, 96 TDH R3 - 400 Hp, 20 MGD, 85 TDH R4 - 400 Hp, 20 MGD, 85 TDH
<b>Line Pumps</b>	L1 - 700 Hp, 30 MGD, 110 TDH L2 - 700 Hp, 30 MGD, 110 TDH L3 - 700 Hp, 30 MGD, 110 TDH L4 - 1250 Hp, 28.8 MGD, 188 TDH L5 - 1250 Hp, 29.5 MGD, 188 TDH L5 - 1250 Hp, 29.5 MGD, 188 TDH
<b>Electric Feeds</b>	2

## Schoolcraft Pump Station



Figure V-30. Schoolcraft Pump Station

Schoolcraft Pump Station consists of one pump house, electrical building, one reservoir, and one primary unit substation. The station increases the pressure in the 48-inch water main running along Schoolcraft Road. The station is fed by the Springwells Water Treatment Plant and feeds the Joy Road Station. The station serves the City of Livonia and interconnects with the Joy Road Station which services Canton, Westland, and Plymouth areas.

<b>Elevation</b>	626.83
<b>Suction Pressure</b>	35 - 55 psi
<b>Discharge Pressure</b>	80 - 110 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1 - 1200 Hp, 20 MGD, 238 TDH R2/L3 - 1200 Hp, 20 MGD, 238 TDH, VFD
<b>Line Pumps</b>	L1 - 1000 Hp, 20 MGD, 170 TDH, VFD L2 - 1000 Hp, 20 MGD, 170 TDH, VFD
<b>Electric Feeds</b>	2

## West Chicago Pump Station



Figure V-31. West Chicago Pump Station

West Chicago Station increases the water pressure in the 26-inch water main running along West Chicago Road. The 36-inch water main comes from the high pressure system of the Springwells Water Treatment Plant. The station helps increase the pressure in the intake lines for Schoolcraft and Newburgh Stations. The station also stores water to supplement the normal water supply during peak demand periods. Water from the station serves the communities of southern Livonia, West Service Center intermediate district, and Westland.

<b>Elevation</b>	636.71
<b>Suction Pressure</b>	40 - 60 psi
<b>Discharge Pressure</b>	70 - 80 psi
<b>Reservoir Capacity</b>	9.5 MG
<b>Reservoir Pumps</b>	R4 - 300 Hp, 7.2 MGD, 185 TDH R5 - 300 Hp, 7.2 MGD, 185 TDH R6 - 300 Hp, 7.2 MGD, 185 TDH
<b>Line Pumps</b>	L1 - 300 Hp, 7.4 MGD, 180 TDH L2 - 300 Hp, 7.4 MGD, 180 TDH L3 - 125 Hp, 4.3 MGD, 180 TDH
<b>Electric Feeds</b>	2

## Wick Road Pump Station



Figure V-32. Wick Road Pump Station

Wick Road Station consists of a pump house, a reservoir, and an electrical building. The station increases pressure in the 48-inch water main running along Wick Road. The station is fed mainly by the Southwest Water Treatment Plant which is affected by the Springwells Plant's intermediate pressure line. The discharged water from the station flows west through the 48-inch water main along Wick Road. The main is reduced to 42 inches and feeds the Ypsilanti Station. A 24-inch branch from the 48-inch main serves the Van Buren, Sumpter, Huron, and Ash Townships. The station serves the communities of Romulus, Belleville, Carleton, Wayne, and Ypsilanti.

<b>Elevation</b>	626.83
<b>Suction Pressure</b>	40 - 60 psi
<b>Discharge Pressure</b>	80 - 135 psi
<b>Reservoir Capacity</b>	10 MG
<b>Reservoir Pumps</b>	R1 - 1000 Hp, 12 MGD, 238 TDH R2 - 1000 Hp, 12 MGD, 238 TDH R3/L3 - 1000 Hp, 12 MGD, 238 TDH, VFD
<b>Line Pumps</b>	L1 - 1000 Hp, 18 MGD, 252 TDH, VFD L2 - 1000 Hp, 18 MGD, 252 TDH, VFD
<b>Electric Feeds</b>	2

## Ypsilanti Pump Station



Figure V-33. Ypsilanti Pump Station

Ypsilanti Station consists of a pump house and a transformer yard. The station supplies water at adequate pressure to the City of Ypsilanti's distribution mains. It is fed by the Wick Road Station which receives its water from the Southwest Water Treatment Plant's intermediate pressure line. Discharged water from the station flows through the 42-inch water main running along Old Ecorse Road. It serves the City of Ypsilanti as well as Augusta, Pittsfield, and Superior.

<b>Elevation</b>	703.90
<b>Suction Pressure</b>	30 - 60 psi
<b>Discharge Pressure</b>	110 - 130 psi
<b>Line Pumps</b>	L1 - 1000 Hp, 18 MGD, 250 TDH, VFD L2 - 1000 Hp, 18 MGD, 250 TDH, VFD L3 - 1000 Hp, 18 MGD, 250 TDH, VFD
<b>Electric Feeds</b>	2

## 1.4. Water Quality

### 1.4.1. General Purpose

The Water Quality Group is responsible for the majority of the testing and reporting of water quality throughout the water system. The Water Quality group manages the state and federal rules and their application to the entire water system. Functions include the collection, monitoring, and reporting requirements associated with these rules. Total coliform rule (TCR), the consumer confidence rule (CCR) and the lead and copper (LCR) are exclusively managed by the GLWA water quality group for the entire system except in those communities which choose not to participate. The Safe Drinking Water Act (SDWA) rules that apply exclusively to the distribution system other than TCR and LCR are the exclusive responsibility of each local water system.

Currently the GLWA Water Treatment Plant: Water Quality group performs a majority of its work for the overall benefit of the GLWA system. These functions include water quality testing, customer response, disinfection services and the overall program management related to the water system water quality compliance.

## 1.5. Metering

### 1.5.1. General Purpose

System Analytics and Meter Operations Group is responsible for maintenance and operation of numerous remote assets used in the

metering of water, as well as, the communication network used to transmit data from the metering locations to the head end.

System Analytics and Meter Operations Group maintains assets to meter wholesale water usage at 290 metering sites. Each of the 290 metering sites contain equipment that is located in a control cabinet, as well as, assets that are located in a meter vault. The assets that are housed in the control cabinet include Remote Terminal Units, radios, batteries, battery chargers and flow transmitters. The assets that are housed in the meter vault include differential pressure transmitters, venturi tubes, magnetic meters, pressure transmitters, mechanical flow meters, bypass valves, inlet/outlet gate valves, butterfly valves, and sump pumps.

In addition to metering equipment, System analytics maintains a 900MHz telemetry network which is composed of 445 repeater sites. Each repeater location consists of radios and antennas.

## 1.6. General Purpose

### 1.6.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

## SECTION 2 WASTEWATER

Table V-4. Wastewater/Sewer Projects

Draft

Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond	2018-2022 CIP Total	Project Total	Percent of W/S CIP
211	291	Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	1999	-	17,500	18,000	17,000	4,300	-	-	-	39,300	56,800	5.6%
211	961	Pump Station No. 2 Pumping Improvements	2003	456	1,400	1,990	200	-	-	-	-	2,190	4,046	0.3%
211	1141	Rehabilitation of Primary Clarifiers	2006	1	200	200	200	121	-	-	-	521	722	0.1%
211	1189	Pump Station 1 Rack & Grit and MPI Sampling Station 1 Improvements	2008	13,887	2,776	4,252	-	-	-	-	-	4,252	20,915	0.6%
211	1287	Pump Station No. 2 Improvements Phase II at Wastewater Treatment Plant (WRRF)	2014	-	-	600	1,700	4,800	3,700	-	-	10,800	10,800	1.5%
211	1312	Rehabilitation of Main Lift Pumps at Pump Station No. 1	2016	-	450	3,000	5,500	3,500	679	-	-	12,679	13,129	1.8%
211	1314	Replacement of Bar Racks at Pump Station No.2	2016	-	-	650	2,900	3,300	2,817	-	-	9,667	9,667	1.4%
211	1382	Rehabilitation of Ferric Chloride Feed Systems	2017	-	-	400	1,400	5,200	2,000	633	-	9,633	9,633	1.4%
211	1386	Rehabilitation of the Circular Primary Clarifier Scum Removal System	2017	-	-	266	324	1,870	2,671	2,670	2,679	7,801	10,480	1.1%
212	1100	Returned Activated Sludge (RAS) Pumps, Influent Mixed Liquor System and Motor Control Centers (MCC) Improvements for Secondary Clarifiers	2005	24,060	115	1	-	-	-	-	-	1	24,176	0.0%
212	1117	Study, Design, & Construction Management Services for Modified Detroit River Outfall No. 2 - WRRF	2006	8,449	55	1	-	-	-	-	-	1	8,505	0.0%
212	1194	Aeration System Improvements	2008	-	5,652	8,593	5,600	-	-	-	-	14,193	19,845	2.0%
212	1222	Replacement of Chlorination and Dechlorination Equipment at the WRRF	2010	-	-	400	2,800	1,800	-	-	-	5,000	5,000	0.7%
212	1235	Rouge River Outfall No. 2 (RRO-2) Segment 1 - WRRF Modifications	2011	12,125	50	1	-	-	-	-	-	1	12,176	0.0%
212	1302	Rouge River Outfall (RRO) Disinfection (Alternative)	2014	729	5,500	13,000	12,750	3,950	-	-	-	29,700	35,929	4.2%
212	1385	Rehabilitation of the Secondary Clarifiers	2017	-	-	301	3,576	5,543	5,540	5,540	10,499	20,500	30,999	2.9%
213	1144	Replacement of Belt Filter Presses for Complex I and Upper Level Complex II	2006	29	1,103	2	-	-	-	-	-	2	1,134	0.0%
213	1221	Rehabilitation of Central Offload Facility	2010	-	800	5,850	6,750	4,350	-	-	-	16,950	17,750	2.4%
213	1253	Sewage Sludge Incinerator Air Quality Improvements at WRRF	2012	33,043	7,200	3,800	-	-	-	-	-	3,800	44,043	0.5%
213	1254	Biosolids Dryer Facility at WRRF	2012	134,191	5,498	1	-	-	-	-	-	1	139,690	0.0%

Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022 & FY 2023 & Beyond	2016-2022 CIP Total	Projected Total	Percent of W/S CIP
213	1284	Complex I Incinerators Decommissioning and Reusability at Wastewater Treatment Plant (WRRF)	2014	-	-	900	200	-	-	-	1,100	1,100	0.2%
213	1309	Improvements to Sludge Feed Pumps at Dewatering Facilities	2016	-	50	1,000	1,500	810	-	-	3,310	3,360	0.5%
213	1311	Modification to Incinerator Sludge Feed Systems at Complex -II	2016	-	-	9,100	7,822	-	-	-	16,922	16,922	2.4%
213	1383	Rehabilitation of the Ash Handling Systems	2017	-	-	530	1,045	6,225	5,725	4,791	18,316	18,316	2.6%
213	1399	Phosphorous Recovery at WRRF	2017	-	-	-	500	-	-	-	500	500	0.1%
214	1285	Construction of new Industrial Waste Control Division and Analytical Laboratory Operations	2014	-	-	5,000	2,000	-	-	-	7,000	7,000	1.0%
215	1384	Rehabilitation of Combined Sewer Overflow (CSO) Retention Treatment Basins (RTB) Screening (Replaces CIP1313)	2017	-	3,520	1,000	6,400	9,000	7,200	3,610	27,210	30,730	3.9%
216	366	Underground Electrical Duct Bank Repair and EB-1, EB-2, and EB-10 Primary Power Service Improvements - WRRF	1998	23,037	3,002	1,533	-	-	-	-	1,533	27,572	0.2%
216	1028	Plant-wide Fire Alarm Systems Upgrade/ Integration and Fire Protection Improvements	2004	5,390	395	2	-	-	-	-	2	5,787	0.0%
216	1140	Study/ Repair Potable Water, Screened Final Effluent, Natural Gas and Compressed Air Pipe Lines at the WRRF	2006	-	50	690	1,900	1,150	1,210	-	4,950	5,000	0.7%
216	1223	Rehabilitation of Grit and Screening System at PS-2 and Rehabilitation of Sampling Sites at WRRF	2010	-	-	2,500	2,500	-	-	-	5,000	5,000	0.7%
216	1237	Rehabilitation of the Main Plant Maintenance Building, Replacement of Various Plant Maintenance Areas and Work Environment Improvement	2011	-	-	1,500	6,000	5,400	-	-	12,900	12,900	1.8%
216	1381	Rehabilitation of the Screened Final Effluent (SFE) Pump Station and Secondary Water System	2017	-	-	1,100	1,500	4,200	12,700	13,379	32,879	35,908	4.7%
216	1402	DTE Primary Electric 3rd Feed Supply to WRRF	2017	-	-	3,500	3,500	-	-	-	7,000	7,000	1.0%
222	1263	Sewer and Interceptor Evaluation and Rehabilitation Program	2013	-	4,572	8,000	8,000	20,000	20,000	20,000	76,000	80,572	10.8%
222	1286	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	2014	-	-	-	550	2,750	5,500	2,200	11,000	11,000	1.6%
222	1329	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	2016	-	321	10,000	5,000	5,000	-	-	20,000	20,321	2.8%
222	1332	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	2016	-	12,000	15,000	4,823	-	-	-	19,823	31,823	2.8%



Class.	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	FY 2017	FY 2018	Projected Expenditures					FY 2022 & FY 2023 & Beyond	2015-2022 CIP Total	Project Total	Percent of W/S CIP
							FY 2019	FY 2020	FY 2021						
222	1392	Collection System Valve Remote Operation Structures Improvements	2017	-	-	341	1,000	1,422	-	-	-	2,763	2,763	0.4%	
222	1393	Collection System Access Hatch Improvements	2017	-	-	3,196	2,000	2,001	-	-	-	7,197	7,197	1.0%	
232	1241	Fairview Pumping Station - Replace Four Sanitary Pumps	2011	128	500	10,500	10,640	10,700	-	-	-	31,840	32,468	4.5%	
232	1315	Freud & Conner Creek Pump Station Improvements	2016	-	500	2,000	5,000	7,000	8,000	-	-	22,000	22,500	3.1%	
232	1331	Northeast Pumping Station	2016	-	-	2,408	10,920	13,000	-	-	-	26,328	26,328	3.8%	
233	1357	Collection System Backwater Gates and Regulator Gates Rehabilitation	2017	-	-	1,301	3,000	3,000	2,000	-	-	9,301	9,301	1.3%	
233	1391	Collection System In System Storage Devices (ISDs) Improvement	2017	-	-	86	464	2,000	1,000	-	-	3,550	3,550	0.5%	
241	1330	Scheduled Replacement Program of Critical Assets	2016	-	5,000	5,000	5,000	5,000	5,000	5,000	-	25,000	30,000	3.6%	
241	1344	Sewage Meter Design, Installation, Replacement and Rehabilitation Program	2014	-	500	500	500	500	500	500	-	2,500	3,000	0.4%	
251	1224	Replacement of LIMS / PIMS Software System	2010	-	500	2,500	2,000	-	-	-	-	4,500	5,000	0.6%	
251	1257	Wastewater Treatment Plant, Lift Station and Wastewater Collection System Structures Allowance	2012	-	5,155	12,000	12,000	15,000	15,000	12,000	-	66,000	71,155	9.4%	
251	1388	Wastewater System Wide Instrumentation & Control Software and Hardware Upgrade	2017	-	-	-	-	-	3,125	2,737	-	5,862	5,862	0.8%	

## 2.1. Water Resources Recovery Facility

The Water Resources Recovery Facility (WRRF, formerly referred to as the Wastewater Treatment Plant or WWTP) is the largest single-site wastewater treatment facility in the United States. Of the more than \$22.5 million spent to ready the plant for its February 1940 startup, \$10 million was spent on plant construction with the balance going to complete the network of huge interceptor sewers through which a combined stream of storm and sanitary wastewater flows to the plant from communities throughout metro Detroit.

The treatment plant was originally designed to provide primary treatment (screening, grit removal, primary sedimentation and chlorination) for the wastewater generated by 2.4 million people and, with modifications, as many as 4 million people. The plant's

service area in 1940 included Detroit and 11 nearby suburban communities. Secondary treatment (biological treatment and secondary clarification for removal of biodegradable solids, resulting in an even cleaner effluent) was introduced in the 1960s. GLWA's WRRF continues to be the recipient of continual upgrades in order to ensure it is capable of staying abreast of ever more stringent regulatory standards.

Currently, the WRRF services the needs of 35-percent of the state's population contained within Detroit and 76 other communities in a service area of more than 946 square miles. In 1999, the Michigan section of the American Society of Civil Engineers named the WRRF one of the top 10 engineering projects of the 20th century.

The GLWA WRRF is the largest single site WRRF in the United States. The WRRF treats on average 650 MGD. Currently, the peak rated capacity is 1,700 MGD for primary treatment and 930 MGD for secondary treatment. The WRRF has been in service since 1940, at which time it removed approximately 50-70% of the pollutant loads. It was upgraded to full secondary treatment in the 1970s. After the upgrade to secondary treatment, the WRRF removes in excess of 85% of the pollutant loads to meet federal and state requirements.

Currently, the WRRF serves approximately three million residents in southeast Michigan. The WRRF receives wastewater flow from three main interceptors: The Detroit River Interceptor (DRI), the Oakwood

Interceptor (OWI), and the North Interceptor East Arm (NIEA). Approximately 36% of the flow comes from the DRI, 35% from the OWI, and the remaining 29% from the NIEA. After the flow reaches the WRRF via the three interceptors, it is pumped to the primary and secondary treatment processes at Pump Station No. 1 (PS-1) and Pump Station No. 2 (PS-2). Each pump station has eight pumps with a combined total pumping capacity in excess of 2 billion gallons per day (BGD).

A diagram of the WRRF layout is shown on the following page in Figure V-34.

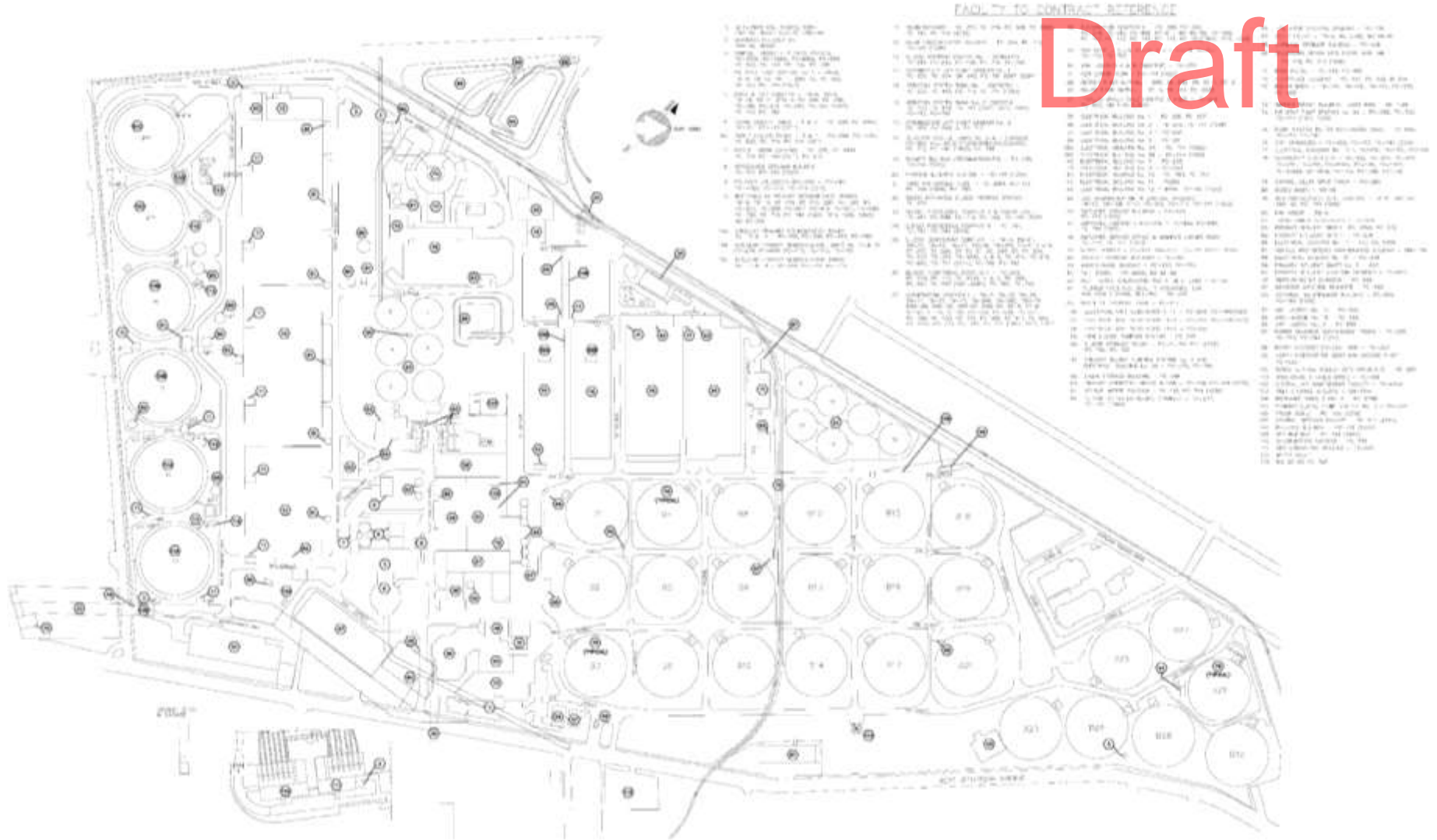


Figure V-34. Water Resource Recovery Facility Layout

### 2.1.1. Primary Treatment

The primary treatment area of the WRRF consists of the following major units:

- Raw wastewater pumping to Pump Station No. 1 (PS-1) and Pump Station No. 2 (PS-2), grit and screenings removal, and chemical addition.
- 12 Rectangular Primary Clarifiers
- 6 Circular Clarifiers
- 7 Rectangular Clarifier Scum Buildings
- 6 Circular Clarifier Scum Buildings
- Rectangular Clarifier Pipe Gallery (including 12 Sludge Pumps)
- 6 Rectangular Clarifier Electrical/Mechanical Buildings
- 3 Circular Clarifier Sludge Pumping Stations
- 1 Scum Concentrator Building
- 1 Thin Sludge Pumping Station
- Miscellaneous Hydraulic Structures and Gates

Wastewater from PS-1 and PS-2 flows by gravity to the rectangular and circular primary clarifiers. Under normal dry weather flow conditions, the rectangular clarifiers typically receive flow from PS-1, while the circular clarifiers typically receive flow from PS-2 and all the primary effluent receives secondary treatment. Under wet weather conditions, a portion of the flow from PS-1 may need to be directed to the circular clarifiers to meet the permit primary flow requirement of 1,700 MGD. The permit requires that flow up to 930 MGD be directed to secondary treatment and that flow above 930 MGD receive chlorination and be discharged through the Detroit River Outfall.

### 2.1.2. Secondary Treatment & Disinfection

The secondary treatment area of the WRRF consists of the following major units:

- ILP Station No. 1 with ILP Nos. 1 and 2

- ILP Station No. 2 with ILP Nos. 3, 4, and 7
- Four Covered Oxygen Tanks (Aeration Deck Nos. 1, 2, 3 and 4)
- One Oxygen Gas Delivery Pipeline
- One Cryogenic Oxygen Production Plant
- Twenty-five Circular Final Clarifiers
- Chlorination/Dechlorination/Outfalls
- Intermediate pumping (ILP Station Nos. 1 and 2).
- Secondary treatment using high purity oxygen activated sludge tanks and 25 secondary clarifiers.
- Disinfection of the final effluent using chlorination and dechlorination.

The Intermediate Lift Pumps (ILPs) lift primary effluent from the Primary Effluent to Activated Sludge (PEAS) Tunnel to the aeration decks. Primary effluent is mixed with return activated sludge at the head of each aeration basin. Aeration Basins Nos. 1 through 4 employ a high purity oxygen activated sludge process.

All required oxygen for the aeration system is supplied by Praxair through a dedicated pipeline. The Praxair pipeline ends at a metering station located where the old T-180 Cryogenic Plant was located (this plant was demolished as part of DWP-1013). From the metering station, an oxygen piping system ties into each aeration deck and the liquid oxygen backup system.

There are four covered aeration decks that use high purity oxygen for biological treatment. Aeration Deck Nos. 1 and 2 each have ten bays, while Aeration Deck Nos. 3 and 4 have eight bays each. The volume of each aeration deck is approximately 17.8 million gallons. Oxygen is fed to the headspace at the first bay of each deck. High efficiency aerators dissolve oxygen into the wastewater and keep the mixed liquor in suspension. Primary effluent and return activated sludge (RAS) enter at the first bay of each aeration deck. All decks are equipped with mixers, a purge blower, oxygen feed and vent valves,

an oxygen flow meter, and LEL and dissolved oxygen monitoring equipment.

Each aeration deck has a rated capacity of 310 MGD (+50 MGD RAS). The plant typically maintains three decks in service at all times to be able to meet the required wet weather flow of 930 MGD through secondary treatment. The fourth deck is always offline and acts as a backup. Aeration Deck No. 1 was converted to a pure oxygen system and Aeration Deck Nos. 2, 3, and 4 were rehabilitated in 2004 through 2006 under DWP-1005 "Aeration Deck Conversion and Rehabilitation."

The mixed liquor flows by gravity from the aeration decks and is distributed to the secondary clarifiers for solids/water separation. Variable speed vertical wet pit pumps return the activated sludge from the clarifiers to the aeration decks. Sludge is wasted on a continuous basis from the return activated sludge to Complex B gravity thickeners.

The secondary effluent is chlorinated before discharge to the river through the Detroit River Outfall (DRO). For discussion of the chlorination/dechlorination system and the outfalls.

As indicated above, the secondary treatment capacity is 930 MGD during wet weather. The 930 MGD capacity is based on the following assumptions:

- 3 out of 5 ILPs each at 310 MGD
- 3 out of 4 aeration decks each at 310 MGD
- 23 of 25 clarifiers each at 40.4 MGD

The conversion of Aeration Basin No. 1 to high purity oxygen in 2004 increased its capacity from 150 MGD to a maximum of 310 MGD, providing the Plant with any one basin as backup capacity. Additionally, the replacement of ILP Nos. 1 and 2 and modification to their flow metering installation under DWP-2004, increased their maximum pumping capacity from 260 MGD to 365 MGD during the year 2004. These improvements have, therefore, provided GLWA

adequate redundancy to allow the maintenance staff to schedule shutdowns of aeration basins or ILPs to conduct preventive maintenance throughout the year regardless of weather conditions.

#### 2.1.3. Residuals Management

- Gravity thickening of the solids generated in primary and secondary treatment in separate facilities for primary sludge and thickened waste activated sludge for drying and disposal.
- Pumping of a portion of the thickened sludge to the new Biosolids Drying Facility (BDF).
- Dewatering of the thickened solids using both high solids centrifuges and belt filter presses (BFPs).
- Incineration of a portion of the dewatered solids.
- Offloading the remainder of the dewatered solids (after lime addition) to trucks for either land application or landfill disposal.

#### 2.1.4. Industrial Waste Control

The Authority's Industrial Waste Control (IWC) Division, located at 303 S. Livernois, is responsible for implementing and enforcing city and federal regulations pertaining to the pretreatment of industrial wastewater.

IWC Charges Industrial Waste Control charges are assessed to all commercial and industrial end users that send wastewater to the GLWA wastewater treatment plant. The IWC charges are to offset the costs incurred in administering regulatory activities under the Sewer Use Ordinance/Industrial Waste Control Ordinance as required in the National Pollutant Discharge Elimination System (NPDES) Permit Program and the Clean Water Act (CWA). There is a delegation Agreement with each community to collect the industrial waste control charges from the end-users even though most communities are contracting agency customers to the wholesale sewer contract customer.

In addition to the IWC Charges a commercial or industrial end user may also have to pay pollutant surcharges if they discharge high-strength wastewater into the system that has compatible pollutant levels higher than is allowed for domestic sources. The IWC Department evaluates users and does testing to identify those users that have excess pollutants. The charges are used to offset the higher chemical and treatment costs for these excess pollutants in the wastewater.

#### 2.1.5. CSO RTB & SDF

The Authority provides CSO Basin and Screening and Disinfection treatment facilities on many of its largest outfalls to provide for removal of floatable material and disinfection of wastewater prior to discharge. The CSO basins are also designed with storage capacity to

contain a volume of wastewater from each storm event, including the first flush of the storm. When the storm event subsides, the captured flows are pumped back through the system for treatment at the WRRF.

GLWA operates nine of the 18 Combined Sewer Overflow (CSO) control facilities tributary to GLWA's Regional sewer system in Wayne, Oakland and Macomb Counties. GLWA operates this facility as prescribed in a shared services agreement. The facilities are an outgrowth of the Long Term CSO Control Plan started in 1993 to address CSO discharges from 78 outfalls along the Detroit and Rouge Rivers. Of the nine facilities, 6 are CSO Retention Treatment Basin and 3 are Screening and Disinfection Facilities (SDF's). The location of CSO RTBs and SDFs assets can be found on Figure V-35 below.





Figure V-35. GLWA Leased Sewer Assets map

## Combined Sewer Overflow Retention Treatment Basins

CSO control is needed because the sewer system can become overloaded during heavy rain events. In older, large metropolitan areas like Detroit, combined sewers are used to transport both wastewater and storm water in the same pipe. During rain storms, these sewers can receive many times the volume of flow that is normally transported on a dry day. CSO control facilities capture, storage and treatment of these excess flows during wet weather to prevent the discharge of untreated CSO into a lake or river. Newer communities have two separate sewer systems: one to handle wastewater flow and the other for storm flow.

A CSO RTB is an underground tank that temporarily stores and treats combined sewage that previously was discharged through outfalls during storms. Flows diverted to the RTB are screened and treated with a disinfectant and discharged to the river if RTB storage capacity is exceeded. Materials removed by the screens are sent to the WRRF for disposal. The stored flows are sent to the WRRF after the storm has subsided and capacity is available in the sewer system. Many times the flows are small enough to be completely captured and stored in the RTB.

Some RTBs have a first-flush compartment used to store flow with the highest level of pollutants from the first part of the storm. These pollutants include organic material, oil, sediment, salt and lawn chemicals that are picked up by the storm water as it runs off roads and lawns. Flows from this compartment are always stored and sent to the WRRF when the RTB is emptied.

GLWA adopted a four-part strategy to address CSO:

- Source reduction – reduce the amount of storm flow that enters the wastewater system.
- In-system storage – maximize the use of existing storage space in the sewer system during storms.
- Wastewater treatment plant expansion – expand capacity of primary treatment from 1.5 to 1.7 billion gallons per day to treat more flows during storms.
- End-of-pipe treatment – construct facilities to store and treat the combined sewage, preventing it from entering area waterways unless treated and disinfected.

A summary of the overall flow and treatment capacity of the GLWA CSO RTB Facilities is shown in Table V-5 on the following page.

Table V-5. Flow and Treatment Capacity of CSO RTBs<sup>b</sup>

	Hubbell- Southfield	Seven Mile	Puritan-Fenkell	Conner Creek	Belle Isle	Oakwood
Year of Startup	2,000	1999	1999	2005	2008	2010
Drainage Area (Acres) <sup>a</sup>	14,440	463	649	83,000	900	1,500
Retention Volume (MG)	22	2.2	2.8	30	0.3	9.0
In-System Storage (MG) <sup>b</sup>	4.4	1.9	2.5	32	0	0
Peak Flow Rates (cfs)	3,200	656	845	13,962	66	1,660
Compartments	2	2	2	4	2	2
Sanitary Pump Station <sup>c</sup>	No	No	Yes	No	Yes	Yes
Influent	Gravity	Gravity	Gravity	Gravity	Gravity <sup>d</sup>	Pumped
Effluent	Gravity					
Dewatering	Gravity / Pumped	Pumped	Gravity / Pumped	Pumped	Pumped	Gravity / Pumped
Screening	1.5-inch Catenary- Type Bar Screens	0.5-inch Open Space Centenary- Type Bar Screens		1.5-inch Centenary Type Bar Screens	Fined Screens (4-6 mm) in Up Flow Configuration	Perforated Plate Screens (6-8 mm)
Odor Control	Horizontal Wet Scrubber with Sodium Hypochlorite	Vertical Wet Scrubber with Sodium Hypochlorite		Carbon Absorption		
Flushing	Flushing Nozzles	Tipping Buckets		Flushing Gates		
Ventilation	Forced-Air					
Disinfection	Sodium Hypochlorite					
<sup>a</sup> Combined wet weather flow sources drained from tributary districts (acreage) is preferentially transported to the WRRF until Primary capacity is exceeded per established Operational Protocols; residual flows are transported to CSO Facilities.						
<sup>b</sup> Tributary upstream wet weather flow volume also captured and drained to basin during events and subsequently dewatered.						
<sup>c</sup> See Section 1 of report for description of sanitary pump stations built integral with three RTBs.						
<sup>d</sup> Includes tributary flow pumped to gravity sewers on island from seven packaged pump stations.						

## BELLE ISLE CSO RTB



Figure V-36. Belle Isle CSO RTB

The Belle Isle CSO RTB is the smallest RTB and was sized to provide 10 minutes of detention for the peak flow of the 10-year, 1-hour storm. Located on Belle Isle along the Detroit River, this RTB has a storage capacity of 300,000 gallons. It eliminated one untreated CSO outfall and has been operational since March 2008.

## CONNER CREEK CSO RTB



Figure V-37. Conner Creek CSO RTB

Detroit's largest CSO control facility, the Conner Creek CSO RTB eliminated three outfalls and has dramatically improved water quality in Conner Creek and the Detroit River since going into operation in November 2005. This RTB provides 62 million gallons of total storage, with 30 million gallons in the retention treatment basin and 32 million gallons in upstream structures. High-speed mixers are used to rapidly disinfect flows and achieve the required fecal coliform limits. This facility was sized to provide 5 minutes of detention for settling and disinfection for the peak flow from the 10-year, 1-hour storm. DWSD has been working with DTE Energy to support efforts to attract wildlife to this upper reach of the Detroit River through a more naturalized site along the river, near the RTB and adjacent to the Connor Creek Power Plant and the Bayview Yacht Club.

## HUBBELL-SOUTHFIELD CSO RTB



Figure V-39. Hubbell-Southfield CSO RTB

The Hubbell-Southfield CSO RTB is one of DWSD's most active, longest operating CSO facilities and the largest on the Rouge River. Since August 1999, it has been effectively capturing and treating combined sewage through screening, settling and disinfection to meet discharge permit requirements that protect public health. Sized to fit into the available land and site constraints, the basin has a 22-million-gallon storage capacity. Located next to the Tournament Players Championship Golf Course (TPC) in Dearborn, this RTB serves as an example of how these facilities can be good neighbors and blend in with the surrounding environment. The facility features an innovative design component that enables three different operational modes within the RTB and prevents resuspension of solids during large storms with high flow rates.

## OAKWOOD CSO RTB



Figure V-38. Oakwood CSO RTB

The Oakwood CSO RTB is currently under construction and is expected to be placed in service by the end of 2012. Located on the lower portion of the Rouge River immediately south of I-75, the 9-million-gallon RTB is designed to provide CSO treatment through storage plus fine screening and disinfection. This facility includes a major influent pumping station with capacity to pump 1,800 cubic feet per second (cfs). Once completed, this pumping station will replace the existing pumping station and increase the level of service for the Oakwood District and help alleviate basement flooding in the upstream area.



### PURITAN-FENKELL CSO RTB



Figure V-39. Puritan-Fenkell CSO RTB

Located in Eliza Howell Park, the Puritan-Fenkell CSO RTB is the third Rouge River CSO RTB. This facility successfully demonstrated that a facility sized to provide 20 minutes of detention time for settling and disinfection of the 1-year, 1-hour storm event peak flow is sufficient to meet protection of public health standards. The 2.8-million-gallon facility became operational in August 1999 and eliminated two untreated CSO outfalls.

### SEVEN MILE CSO RTB



Figure V-40 Seven Mile CSO RTB

The Seven Mile CSO RTB was constructed at the same time as the Hubbell-Southfield and Puritan-Fenkell CSO RTBs with funding from the Rouge River National Wet Weather Demonstration Program. Located on the northeast corner of West Seven Mile Road, the roof of the basin also serves as the parking lot for the Greater Grace Temple. The RTB is sized to provide 30 minutes of detention time for settling and disinfection of the 1-year, 1-hour storm event peak flow. It has a 2.2-million-gallon storage capacity. Two untreated CSO outfalls were eliminated when it went into operation in December 1998.



## Combined Sewer Overflow Screening and Disinfection Facilities

A CSO Screening and Disinfection Facility (SDF) treats combined sewage without ever storing it. Called flow-through facilities, they use fine screens to remove solids and sanitary trash from the combined sewage. Flows are injected with Sodium Hypochlorite disinfectant to kill bacteria before discharging to receiving waters (Detroit and Rouge Rivers). Materials removed by the screens are sent to the WRRF for disposal. A summary of the overall flow and treatment capacity of the GLWA CSO SDFs is shown in Table V-6 below.

Table V-6. Flow and Treatment Capacity CSO Screening and Disinfection Facilities

Component Criteria	Baby Creek	Leib	St. Aubin
<b>Peak Hydraulic Capacity</b>	5,700 cfs	2,000 cfs	310 cfs
<b>Toward Treatment Capacity</b>	Not Applicable	150 cfs	Not Applicable
<b>Screening Capacity</b>	5,100 cfs	1,550 cfs	250 cfs
<b>Disinfection Capacity (10 minute contact)</b>	5,100 cfs	1,550 cfs	250 cfs
<b>Dewatering Capacity</b>		Static Volume in 24 hours	Static Volume in 24 hours
<b>Total Disinfection Volume</b>		225 MG	98 MG

## BABY CREEK SCREENING AND DISINFECTION FACILITY



Figure V-41. Baby Creek SDF

The Baby Creek facility is another screening and disinfection facility that uses fine screens and disinfection to treat combined sewage flows that pass through it. It is located at Miller and Industrial Drive in southwest Detroit at the city limit shared with Dearborn. The facility is rated for 5,100 cfs. The site area includes the Woodmere Pumping Station that services a 450-acre portion of the Baby Creek tributary area.

## LEIB SCREENING AND DISINFECTION FACILITY



Figure V-42. Leib SDF

The Leib facility was constructed to address a large outfall on the Detroit River and to demonstrate the effectiveness of fine screening (horizontal and vertical) in combination with 10 minutes of disinfection time for the design flow to meet protection of public health standards. High-energy mixers are being used to mix sodium hypochlorite to maximize bacterial kill and minimize discharge of residual chlorine to the Detroit River. The facility can treat a flow rate of up to 1,500 cfs. It began operation in 2002 and successfully achieved the required treatment levels during the demonstration period.

## ST. AUBIN SCREENING AND DISINFECTION FACILITY



Figure V-43. St. Aubin SDF

The St. Aubin facility was undertaken at the same time as the Leib facility; it uses the same technology but a different type of screen. While St. Aubin is much smaller, with about one fifth of the treatment capacity of Leib, it is important in addressing water quality along Chene Park that frequently hosts concerts and other events. This facility has operated successfully since 2002.

### 2.1.6. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

## 2.2. Field Services

### 2.2.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

### 2.2.2. Interceptor

The Regional Wastewater Collection System (RWCS) is responsible for the conveyance of wastewater and stormwater flows to the GLWA WRRF. The collection system is the oldest part of the wastewater treatment and transportation system. There are some sewers that are over 130 years old still in service today.

The RWCS is comprised of approximately 180 miles of sewer pipe. Around 170 miles of the piping is considered “Common Use” interceptors or trunk sewers with the remaining ten miles of pipe being considered “Customer Connection” (i.e., a dedicated line connecting a suburban customer to the GLWA WRRF with no other

customer taps to it) See Figure V-44, the map of the RWCS, and Table V-7, the list of all of GLWA-leased sewer (pipe) assets below. Information has been gathered in this table from best available sources, including various reference documents, as well as GIS information.

Figure V-44 depicts only those interceptors and trunk sewers operated/maintained (leased) by GLWA. The suburban communities own, operate, and maintain all of their collection system up to the points of connection to the RWCS.

There are three primary interceptors that make up the RWCS and ultimately serving all of the combined drainage districts. Those interceptors are the Detroit River Interceptor (DRI), Oakwood-Northwest Interceptor (O-NWI), and North Interceptor East Arm (NI-EA). These interceptors are shown in red/green. These primary interceptors total approximately 44 miles in length with the remaining 136 miles being trunk sewers that primarily service the City of Detroit 9 drainage districts.

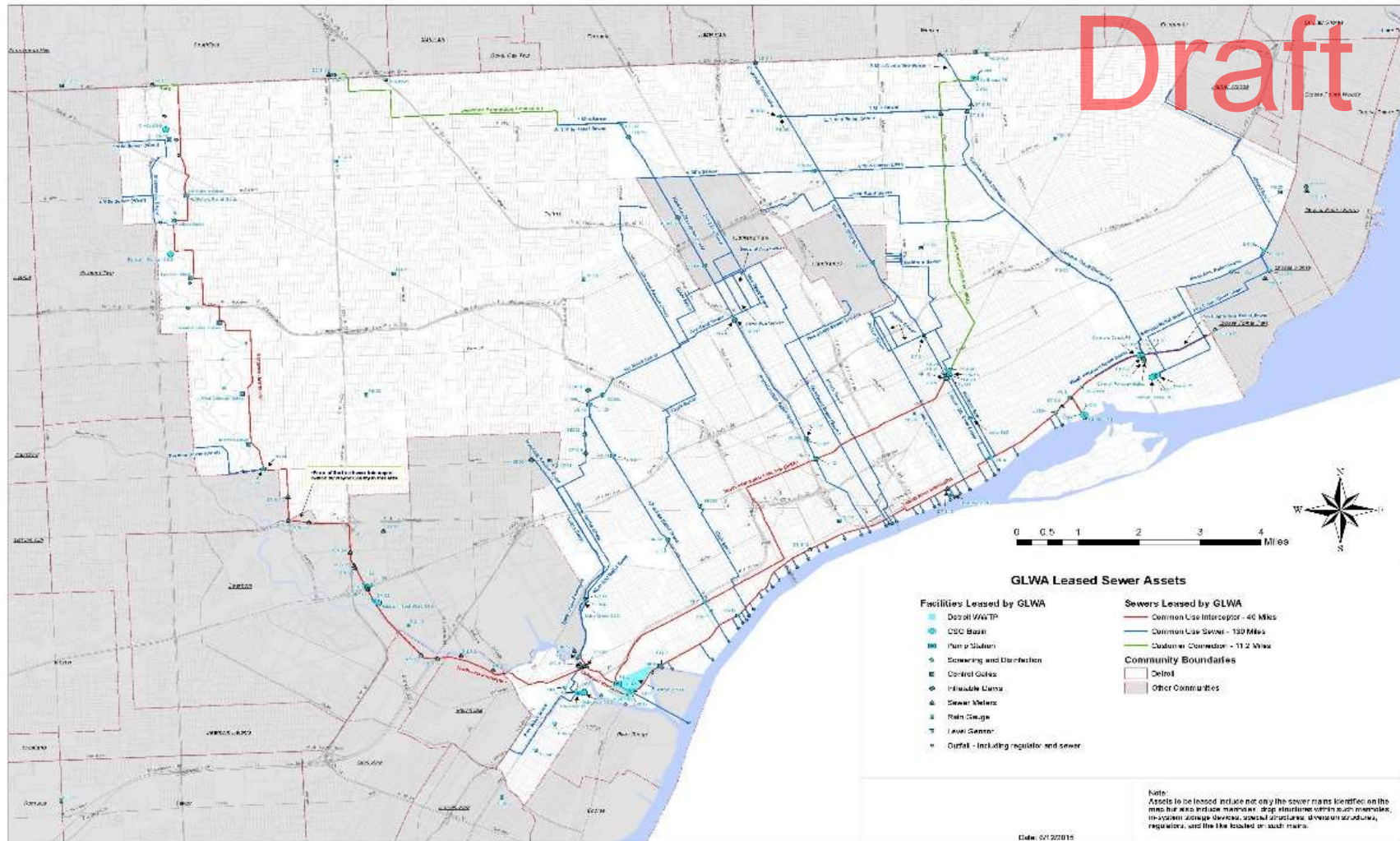


Figure V-44. Sewer interceptors and trunk sewers operated/maintained by GLWA.



Table V-7. Sewer interceptors and trunk sewers operated/maintained by GLWA.

Sewer Name	Material:	Type	Drains to Interceptor	Size:	Years Constructed (year - year)		Age Range: (years - years)		Average Age:	Inspection Date
Berg Sewer	CIPP	Customer Connection	Oakwood-Northwest	21"	2015		1	1	1	Yes, lined 2015
Woodward Sewer	Brick	Trunk	DRI & NIEA & ONWI	5'-5.5'	1892		124		124	
Palmer Sewer, McDougal, Blvd Ave, Grandy Ave	Conc., Brick	Trunk	DRI		1885	1916	131	100	116	
Third Ave Sewer, Second Ave Relief, Hamilton-Woodward-	Conc., Brick	Trunk	DRI & NIEA & ONWI	1'-9.5', 2.5'x3.75' - 3'x4.5' (box)	1898	1931	118	85	102	
Clark Sewer, Morell, Extension of Morrell, Tuxedo	Conc., Brick	Trunk	DRI	6'-14'	1912	1923	104	93	99	
Linwood Avenue Sewer	Conc., Brick	Trunk	DRI	1.25'-9.5', 3'x4.5' - 3.3'x5' (box)	1919	1921	97	95	96	
6 Mile Sewer	Conc., Brick	Trunk	DRI	6.25'-7.25'	1921	1922	95	94	95	
Jos. Campau Sewer	Conc., Brick	Trunk	DRI	6.75'-11.5'	1921	1922	95	94	95	
Meldrum Sewer, Mt. Elliot Ave Swr, Miller Rd Swr, Carrie Av	Crock, Brick	Trunk	DRI	1.25'-9'	1913	1930	103	86	95	Some
Weatherby Ave Sewer	Concrete	Trunk	DRI & NIEA & OWN	17.75'x13.4' (Box)	1921		95		95	
7 Mile Sewer	Concrete	Trunk	DRI & NIEA	5.5'-11.5'	1921	1924	95	92	94	Some
Brush/Bates Sewer	Conc., Brick	Trunk	DRI	2.7'-13.5' & 3'x4.5' (Box)	1922		94		94	
Joy Road Sewer, Highland Pk Swr - Edison Ave Arm, Highlan	Conc., Brick	Trunk	DRI & NIEA & ONWI	7.75'-14'	1922	1923	94	93	94	
Lonyo Sewer	Conc., Brick	Trunk	Oakwood-Northwest	13.6', 14.5'x14' (2 Box)	1922		94		94	
Wyoming Avenue Sewer	Brick	Trunk	Oakwood-Northwest	11.5'	1923		93		93	
6 Mile Sewer East	Concrete	Trunk	DRI	10.5'	1921	1927	95	89	92	
Conner Creek Enclosure	Concrete	Trunk	DRI	12'x17.5' - 122.9'x17.5' (2-3Box)	1922	1928	94	88	91	Some
Fort Street Sewer	Crock, Brick, Concrete	Trunk	Oakwood-Northwest	2'-6'	1924	1927	92	89	91	
East Jefferson Relief Sewer	Conc., Brick	Trunk	DRI	5'-14'	1927		89		89	
Woodward Sewer South, Smith Ave Swr, Chrysler Exp., Fisc	Conc., Brick	Trunk	DRI	5.25'-9', 3'x4.5' (box)	1890	1964	126	52	89	
8 Mile-Centerline Sewer/Connors Ave Arm	Brick,?	Trunk	DRI	3.5'-13.5'	1928	1930	88	86	87	
6 Mile Sewer West	Concrete	Trunk	Oakwood-Northwest	6.25'-7.25'	1930		86		86	
West Jefferson Relief Sewer	Crock, Concrete	Trunk	DRI	2'-12'	1930		86		86	
Detroit River Interceptor	Conc., Brick	Interceptor	WRRF	8'-16'	1927	1936	89	80	85	DWS 876, CS 1329
7 Mile Sewer West	Brick	Trunk	Oakwood-Northwest	9.25'	1931		85		85	
Tireman Sewer (west)	Concrete	Trunk	Oakwood-Northwest	2'-4.5'	1929	1948	87	68	78	
Oakwood-Northwest Interceptor	Concrete	Interceptor	WRRF	4'-13.5'	1928	1950	88	66	77	Some
Rivard Sewer	Concrete	Trunk	DRI	9.25'-11.75'	1928	1957	88	59	74	
Lynch Road Sewer, Davison Ave Swr, Conner Creek Connect	Concrete	Trunk	DRI	5.5'-11.5'	1920	1966	96	50	73	
Shiawassee Sewer, Telegraph Swr, Puritan-Telegraph Swr	Concrete	Trunk	Oakwood-Northwest	4.25'-10.25'	1930	1964	86	52	69	
Fox Creek Relief Sewer	Concrete	Trunk	DRI	13.5'-16'	1948	1953	68	63	66	
Conant-Mt. Elliot Sewer	Concrete	Trunk	DRI & NIEA	11'-16.25'	1954	1957	62	59	61	None
Livernois Relief Sewer	Concretet	Trunk	DRI & NIEA	3'-10.5', 10'x10' (box)	1949	1972	67	44	56	
Ashland Relief Sewer	Concrete	Trunk	DRI	11.5'-16'	1961		55		55	
7 Mile Sewer East Relief	Concrete	Trunk	DRI	5'-13'	1962		54		54	
Baby Creek Enclosure	Concrete	Trunk	Oakwood-Northwest	14.5'x17.5' (2&3 Box)	1962		54		54	Some
Elmer-Ternes Sewer (West End Relief)	Concrete	Trunk	Oakwood-Northwest	14.5', 14.5x14.5' (1-2 box)	1962	1965	54	51	53	Some
First-Hamilton Relief Sewer	Concrete	Trunk	DRI & NIEA	7'-15.5', 2.7'x4' - 10'x10.5' (box)	1956	1970	60	46	53	None
Dequindre Interceptor	Concrete	Trunk	DRI & NIEA	9'-13.75'	1960	1970	56	46	51	
7 Mile Sewer West Relief	Concrete	Trunk	DRI & NIEA	6.5'-12.25'	1967		49		49	
Mack Avenue Relief Sewer	Concrete	Trunk	DRI	9.25'-14'	1967		49		49	
North Interceptor East Arm	Reinf. Conc.	Interceptor	WRRF	17.5'-12'	1969	1976	47	40	44	CS 1332
Evergreen-Farmington Connection	Concrete	Customer Connection	DRI & NIEA	8'	1991		25		25	



The RWCS serves 77 Suburban Communities that covers an area of 1,100 square miles. A large majority of the suburban communities are served by separated storm/sewer systems. The RWCS is comprised of 29 sewer districts representing drainage districts within the City of Detroit, drainage districts from adjoining counties/municipal districts, and various districts serving individual suburban communities. The sewer service areas served by the RWCS are as follows:

#### City of Detroit



Figure V-45. Sewer Districts within Detroit.

Nine sewer districts: Rouge River, Hubbell, Southfield, Baby Creek, Conner Creek, Oakwood, Central City, Fox Creek, and East Jefferson.

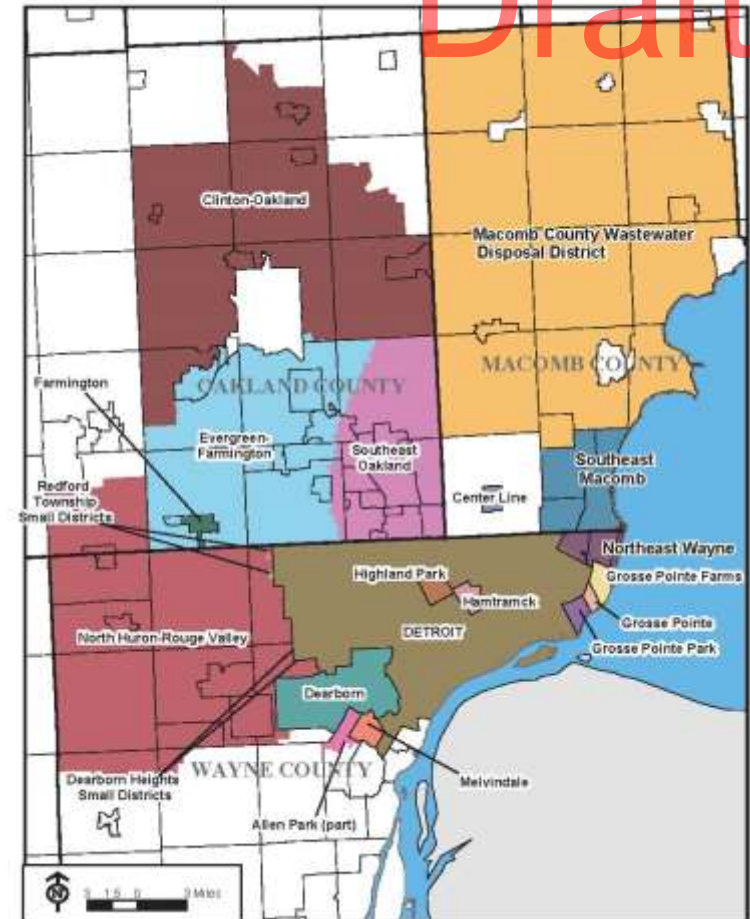


Figure V-46. Sewer districts served by GLWA.

#### Wayne County

Two sewer districts: Rouge Valley Sewage Disposal System (RVSDS) and Northeast Sewage Disposal System (NESDS).

Individual communities of Highland Park, Hamtramck, Dearborn, Allen Park, Melvindale, Grosse Pointe, Grosse Pointe Farms, and Grosse Pointe Park.

Small contract areas in Redford Township, Dearborn Heights, and Harper Woods.

### Oakland County

Four sewer districts: Evergreen-Farmington, Clinton-Oakland, George W. Kuhn Drainage District, and the City of Farmington.

Oakland Macomb Interceptor Drain Drainage District

### Macomb County

Three sewer districts: Southeast Macomb (through the Wayne County NESDS), Macomb, and the City of Centerline.

## 2.3. Systems Control Center

Systems Control Center operates and maintains five Wastewater Pumping Stations located in the GLWA collection system that assist conveyance of wastewater and stormwater flows to the WRRF. They are Conner Sewage Pumping Station, Fairview Sewage Pumping Station, Freud Sewage Pumping Station, Northeast Sewage Pumping Station, and Oakwood Sewage Pumping Station. These facilities are described in the table below.

GLWA maintains 13 in-system storage devices throughout central Detroit and seven in-system gates throughout the west side of Detroit to maximize the storage capacity of sewers during storms. The in-system storage devices are rubber, inflatable dams located inside large trunk sewers. The in-system gates are mechanical gates located inside outfall sewers. These devices are designed to temporarily retain flows in the sewer system during storm events up to a certain level before discharge to the river occurs. These devices operate automatically but are monitored by GLWA staff. These staff members coordinate and apply operational protocols prior to storm

events to dewater the wastewater collection system and treatment facilities to maximize the available in-system storage capacity. Along with the flow control devices, the Systems Control Center team also operates and maintains many rain gauges and level sensors throughout the RWCS.

### 2.3.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

### 2.3.2. Wastewater Pumping Stations

Wastewater Pump Stations pump wastewater, and when necessary excess storm water, to the Wastewater Treatment Plant. Most of the wastewater collection system is gravity fed, but in low lying areas, lift stations are necessary to lift wastewater to a higher elevation in order for flow by gravity to be possible. There are nine sewer lift station in the wastewater collection system; an example is shown in

Figure V-.

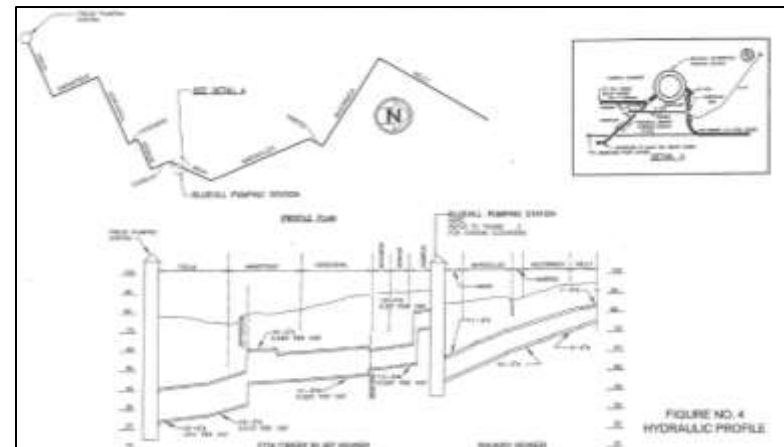


Figure V-49. Hydraulic Profile at Bluehill Station

## Conner Creek Pump Station



Figure V-47. Conner Creek Pump Station

<b>Max Wet Well Level</b>	74 ft
<b>Sanitary Pumps</b>	SN9 - 500 Hp, 96 MGD SN10 - 350 Hp, 96 MGD SN11 - 500 Hp, 96 MGD SN12 - 200 Hp, 48 MGD
<b>Storm Pumps</b>	ST1- 2300 Hp, 320 MGD ST2- 2300 Hp, 320 MGD ST3- 2300 Hp, 320 MGD ST4- 2300 Hp, 320 MGD ST5- 2250 Hp, 320 MGD ST6- 2250 Hp, 320 MGD ST7- 2300 Hp, 320 MGD ST8- 2300 Hp, 320 MGD

Sewage flows by gravity to the Conner Creek Pumping Station through the western and eastern East Jefferson Avenue relief sewers. These sewers are designed to carry both sanitary sewage and storm water to the Conner Creek Pumping Station wet wells. The Conner Creek Pumping Station is required because the elevation of the relief sewers is too low to allow the sewage to continue to flow by gravity to subsequent treatment facilities or to the Conner Creek CSO Basin.

During normal dry weather flow, wastewater is discharged to the Detroit River Interceptor (DRI). During wet weather, the wastewater is discharged to the Conner Creek CSO.

This station consists of a sanitary pump house, storm water pump house, switch house, and backwater gates. During normal dry weather flow, wastewater is discharged by four sanitary pumps (two 71 MGD, one 48 MGD, and one 38 MGD) to the Detroit River Interceptor (DRI). During wet weather, eight storm water pumps (318 MGD each) discharge combined wastewater to the Conner Creek CSO.

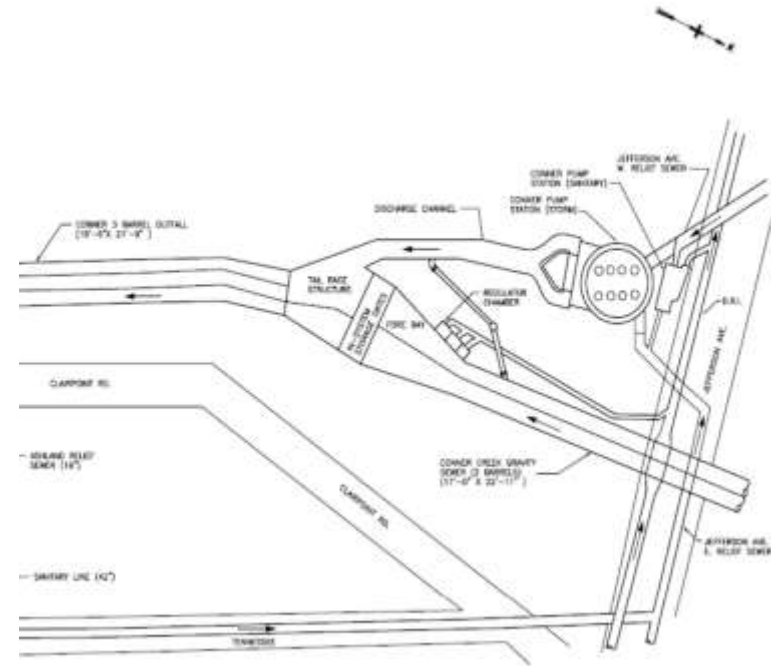


Figure V-48. Schematic of Conner Creek Pump Station

Table V-8. Summary of Major Rehabilitation and Improvements Projects at the Conner Pump Station

Contract No.	Contract Title	Summary of Work	Year
<b>TW-24-A</b>	Conner Creek	N/A.	
<b>PC-265</b>	Regulator Improvement-Conner Station	N/A.	
<b>PW-212</b>	Conner Creek Pumping Station Motor Driven Pumping Unit Nos. 5 and 6	Installation of Storm Water Pumps 5 and 6.	1947
<b>PW-3042</b>	Conner Creek Sanitary Pumping Station	Construction of the sanitary pump station.	1958
<b>PC-674</b>	Conner Station Rehabilitation	Rehabilitation of buildings at the Conner Station site and Fox Creek Backwater Gate Building. Rehabilitation of the buildings include masonry work, windows and doors, roofing and sheet metal, heating and ventilating systems, toilet facilities, lighting and electrical systems, and interior finishes. Rehabilitation of the sanitary pumps, sanitary pump motors and controls, replacement of the control switchboard for the storm water pumps, and repair the storm water pumps. Also included are new sanitary pump isolation valves, revised suction and discharge piping, hydraulic modeling of the sanitary wet well, and replacement of storm water sump pumps. Rehabilitation of the site shall include replacement of all roadways, curbs, sidewalks, site lighting, and demolition of the oil pump house.	May 2009
<b>PC-713</b>	Department-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
<b>DWS-828</b>	Emergency Generators	Installed the four (4) Emergency Generators with power of 2MW.	December 1999
<b>Maintenance Contract</b>	Transformer	Replaced the powerhead on Transformer 1 and painted.	2015
<b>PC-773</b>	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

## Fairview Pump Station



Figure V-49. Fairview Pump Station

<b>Max Wet Well Level</b>	20 ft
<b>Sanitary Pumps</b>	SN1 - 700 Hp, 96 MGD SN2 - 700 Hp, 96 MGD SN3 - 700 Hp, 96 MGD SN4 - 400 Hp, 48 MGD

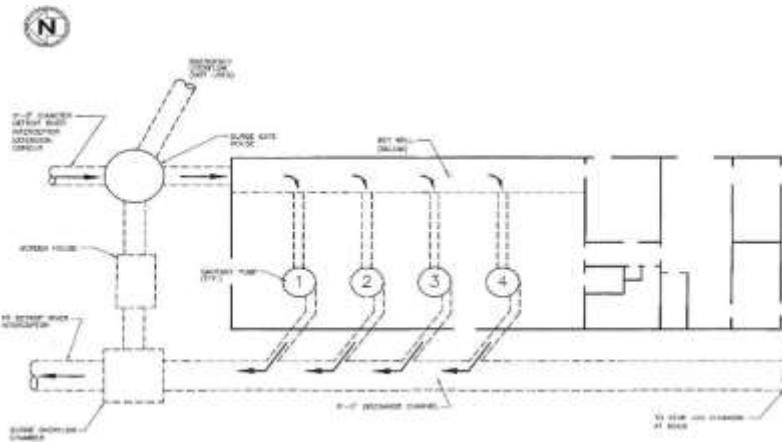


Figure V-50. Fairview Pump Station Schematic

Fairview Pumping Station is an interceptor pumping station on the Detroit River Interceptor (DRI) and it provides about 22 feet of lift. Wastewater flow from the DRI is lifted by pumps at the Fairview Pumping Station and discharged into the downstream DRI to continue on to the Detroit WWTP. The function of this station is to pump the wastewater received in the wet well and return it efficiently and as quickly as possible to the downstream DRI. The station facilities include the influent DRI, gate house, and pumping station. The pumping station consists of the pump house and wet well.

Table V-9. Summary of Major Rehabilitation and Improvements Projects at the Fairview Pump Station

Contract No.	Contract Title	Work Summary	Year
PW	Fairview Pumping Station	Construction of Fairview Pump Station.	1913
PW-679	Fairview Additions and Alterations	Modification and upgrades at Fairview Pump Station.	1949
PC-264	Modifications to Fairview Pumping Station	Modification of riser chamber and cover, stop log chamber, and surge overflow.	Set of the drawings: April 1972
PC-606	Fairview Seawall Phase II	N/A.	
PC-684	Fairview Pumping Station Rehabilitation	Replacement of the Pump 2 and associated equipment.	1995
PC-713	Department-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016



## Freud Pump Station



Figure V-51. Freud Pump Station

<b>Max Wet Well Level</b>	71 ft
<b>Sanitary Pumps</b>	SN9 - 200 Hp, 27 MGD SN10 - 200 Hp, 13 MGD
<b>Storm Pumps</b>	ST1 - 3000 Hp, 290MGD ST2 - 3000 Hp, 290MGD ST3 - 3000 Hp, 290MGD ST4 - 3000 Hp, 290MGD ST5 - 3000 Hp, 290MGD ST6 - 3000 Hp, 290MGD ST7 - 3000 Hp, 290MGD ST8 - 3000 Hp, 290MGD

Freud Pump Station consists of a pump house, wet well, and transformer enclosure area. All wastewater flow to the Freud Pumping Station is combined sanitary sewage and stormwater overflow from the East Jefferson Relief Sewer. This overflow occurs when the handling capacity of the Conner Creek Station has been exceeded. The station's initial goal is to store as much wastewater as possible until it can be pumped back to the Conner Creek Pumping Station using dewatering and sanitary pumps. From the Conner Creek

Station, the wastewater is transported to Detroit WWTP. The Freud Pumping Station wet well and corresponding relief sewers provide 20 million gallons of in-line storage.

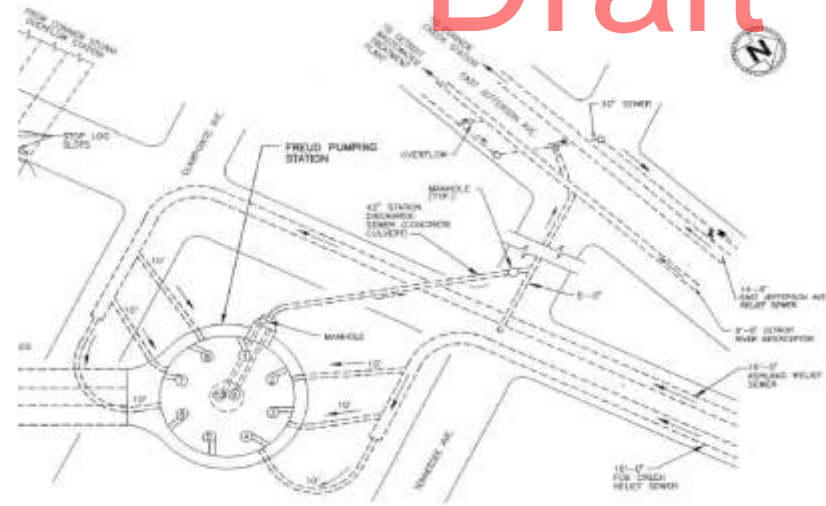


Figure V-52. Freud Pump Station Schematic

Table V-10. Summary of Major Rehabilitation and Improvements Projects at the Freud Pump Station

Contract	Contract Title	Work Summary	Year
PC-268	Freud Station Sewerage Discharge	N/A.	
PC-664	Freud Station Improvements Pump Replacement	Replacement of pumps.	1989
PC-685	Bluehill and Freud Sewage Pumping Station Rehabilitation	Freud Sewage Pumping Station work includes removal and replacement of switchgear and protective relaying and controls; maintaining of four bus electrical architecture; extensive rework of conduit and cables for power and control system; and other electrical work due to relocation of switchgear.	2011
PC-713	Department-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
DWS-828	Emergency Generators	Installed the four (4) Emergency Generators with power of 2MW.	December 1999
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

Northeast Pump Station



Figure V-53. Northeast Pump Station

<b>Max Wet Well Level</b>	26 ft
<b>Sanitary Pumps</b>	SN1 - 2000 Hp, 96 MGD SN2 - 2250 Hp, 96 MGD SN5 - 2000 Hp, 65 MGD SN6 - 2000 Hp, 96 MGD

The Northeast Pump Station consists of a wet well and pump house. The station receives wastewater from the 12.75-foot Corridor Interceptor. The Corridor Interceptor receives flow from the 15 Mile Interceptor, which receives flow from the Romeo Arm and Lakeshore Interceptor through the Clintondale Station. The wastewater flow to the station is nearly all sanitary sewage, with only a small portion of stormwater from suburban communities. The main goal of the pumping station is to transport wastewater to the Detroit WWTP as quickly as possible. Northeast Pump Station is designed to pump all wastewater from the Corridor and Lakeshore connection into the 17.5-foot North Interceptor, East Arm. The wastewater flow from the North Interceptor East Arm is currently diverted to the 7 Mile Relief Sewer where it is transported by gravity through the Connant-Mt. Elliot Sewer and the DRI to the Detroit WWTP. The station receives

wastewater flow from all the communities of Macomb County (except the cities of Centerline and Warren), northeastern communities of Oakland County, and all areas served by the Lakeshore Interceptor through the Clintondale Station. The pumping station currently has six sanitary pumps with a total combined capacity of 355.4 MGD.

Table V-11. Summary of Major Rehabilitation and Improvements Projects at the Northeast Pump Station

Contract No.	Contract Title	Work Summary	Year
PC-216	Northeast Sewage Pumping Station	The Northeast Sewage Pumping Station was built with this contract. The station consists of wet well, pump house (three sanitary pumps 1, 5, and 6), and transformer.	1969
PC-672	Northeast Sewage Station Improvements	N/A.	
PC-713	Department-Wide Instrumentation, Control and Computer Systems Program	Ovation System.	2007
PC-736	Northeast Sewage Station-Pump No. 2 Installation	Installation of the new Pump No. 2.	May 2006 (As-built drawings)
DWS-828	Emergency Generators	Installed the tree (3) Emergency Generators with power of 2MW.	December 1999
PC-773	Ovation Control	Control Window upgrade from Window NT to Window 7.0.	2015
		AT&T's Wide Area Network Upgrade.	October 2016

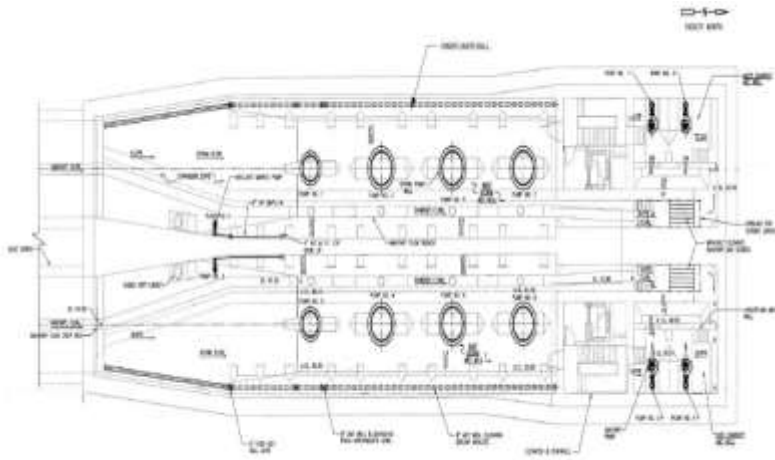
## Oakwood Pump Station



Figure V-54. Oakwood Pump Station

<b>Max Wet Well Level</b>	79 ft	
<b>Sanitary Pumps</b>	SN1 - 6.4 MGD SN2 - 6.4 MGD SN3 - 6.4 MGD SN4 - 6.4 MGD	
<b>Storm Pumps</b>	ST1 - 97 MGD ST2 - 97 MGD ST3 - 177 MGD ST4 - 177 MGD	ST5 - 177 MGD ST6 - 177 MGD ST7 - 177 MGD ST8 - 177 MGD

Oakwood Pump Station receives flow through a combined sewer collection system from Junction Chamber No. 1, which is upstream from the pumping station. Once all flows are combined at Junction Chamber No. 1, they are conveyed into the pump station through a pair of 18' diameter influent conduits. The combined wastewater, consisting of both sanitary and storm flows, are managed by the pump station. During normal operation, the combined wastewater is pumped by the sanitary pumps to the Detroit WWTP. When the flows into the facility exceed the capacity of these pumps during storm events, the pump station storm pumps convey any excess flow to the screenings facility and then into two 4.5 MG CSO Basins.



# Draft

Figure V-55. Oakwood Pump Station Schematic

Table V-12. Wastewater Pumping Stations

Name of Pump Station	Location	Function	Sanitary Capacity				Storm Capacity				No. of Pumps	
			DESIGN		MAXIMUM		DESIGN		DESIGN		MAXIMUM MGD	DESIGN MGD
			MGD	CFS	MGD	MGD	CFS	MGD	MGD	CFS		
Conner / GLWA	12244 East Jefferson, Detroit	Sanitary / Storm	158.4	245	229.5	355	2226	3444	2544	3936	4	8
Fairview / GLWA	202 Parkview, Detroit	Sanitary	242.3	375	339.3	525	-	-	-	-	4	-
Freud / GLWA	12300 Freud, Detroit	Sanitary / Storm	12.96	20	35.64	55	2031	3143	2322	3592	2	8
Northeast / GLWA	11000 East Eight Mile, Detroit	Sanitary	162	251	258.4	400	-	-	-	-	4	-
Oakwood / GLWA	12330 Sanders, Detroit	Sanitary / Storm	13	20	26	40	246.9	382	315.4	488	2	6
Puritan-Fenkell / GLWA	Fenkell East of Telegraph, Detroit, MI 48223	Sanitary Pumps	-	-	-	-	-	-	-	-	2	-

### 2.3.3. In System Devices (Dams, ISD's)

## Level Sensor (LS)

Level sensors detect the level of liquid in the sewers. This information is used to determine the best way to store stormwater, locate possible sewer overflows, and also to monitor dry weather wastewater pumping operations. An example is shown in Figure V-59.

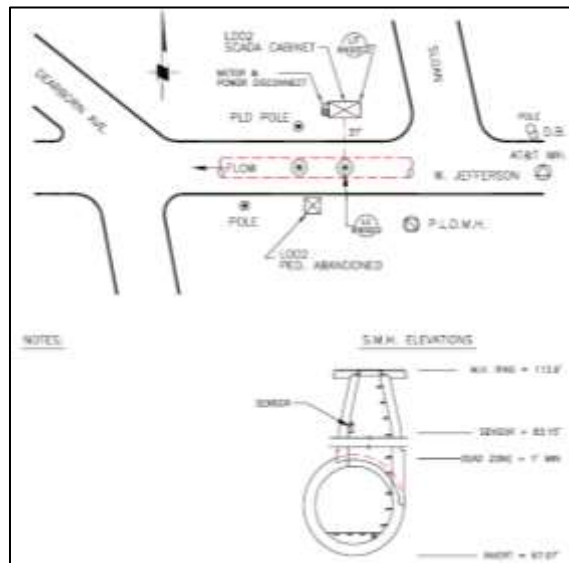


Figure V-59. Example of a level sensor at West Jefferson and Sloan

## Inflatable Storage Dam (ISD)

Inflatable Storage Dams, as illustrated in Figure V-60, are utilized to detain upstream sewage in order to regulate flows to the Wastewater Treatment Plant. The dams can be remotely deflated and inflated as necessary.

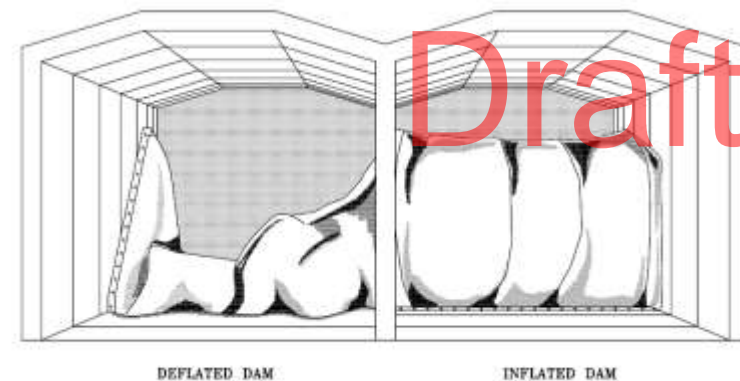


Figure V-60. Inflatable dam illustration

## Valve Remote (VR)

VRs are used to direct wastewater flow. An example is shown in Figure V-56.

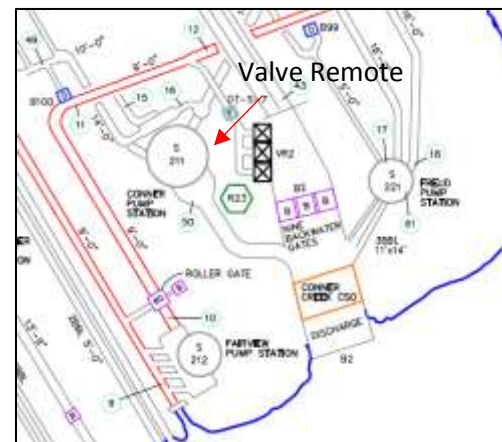


Figure V-56. Example of VR located at Conner Pump Station

## Precipitation Gage (PG)

A precipitation gauge (see Figure V-57) measures the amount of liquid precipitation over a set period of time. Ovation reports the precipitation data to aid the operation of the collection system and minimize combined sewer overflows during storm events. Thirty-three tipping bucket rain gages are installed throughout the service area.

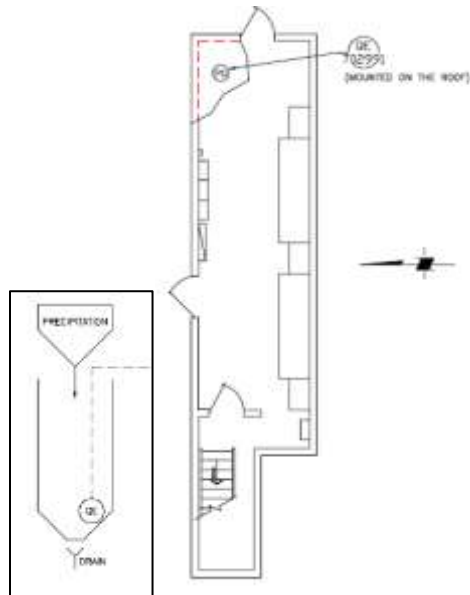


Figure V-57. Example of Precipitation Gauge mounted on roof at Schoolcraft Pump Station

## 2.4. Metering

### 2.4.1. General Purpose

System Analytics and Meter Operations Group is responsible for maintenance and operation of numerous remote assets used in the metering of wastewater, as well as, the communication network used to transmit data from the metering locations to the head end.

System Analytics and Meter Operations Group maintains assets at 46 sewer meter locations. Each of these locations contain equipment that is located in a control cabinet, as well as, assets that are located in meter vaults. The assets that are housed in the control cabinet include Remote Terminal Units, radios, flow transmitters and level transmitters. The assets that are housed in the meter vault include, flow meters and level sensors.

In addition to metering equipment, System analytics maintains a 900MHz telemetry network which is composed of 445 repeater sites. Each repeater location consists of radios and antennas.

## 2.5. General Purpose

### 2.5.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.



## SECTION 3 CENTRALIZED SERVICES

Table V-13. Centralized Services Projects

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Class	CIP #	Title	Year Added	Lifetime Actual Thru FY 2016 (Unaudited)	Projected Expenditures							2018-2022 CIP Total	Project Total	Percent of W/S CIP
					FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023 & Beyond			
311	1262	IT Systems Allowance	Multiple	-	9,570	9,197	6,850	2,000	2,100	2,100	-	22,247	31,817	(Split W/S)
311	1262a	IT Systems Allowance - part 2	2017	-	-	5,000	4,500	4,000	4,500	4,500	-	22,500	22,500	(Split W/S)
321	1328	Vehicle, Heavy Equipment and Equipment Purchases	2016	-	5,537	6,346	500	500	500	500	-	8,346	13,883	(Split W/S)
331	1279	Roofing Systems Replacement at Water Plants and Booster Pump Stations	2014	-	3,000	3,000	3,000	2,500	-	-	-	8,500	11,500	1.1%
331	1387	Roofing Systems Replacement at GLWA Wastewater Treatment Plant CSO Retention Treatment Basins (RTB) and Screening Disinfection Facilities (SDF)	2017	-	-	2,200	2,060	1,060	1,050	540	2,140	6,910	9,050	1.0%
341	1354	Security Infrastructure Improvements	2016	-	700	2,800	3,600	2,600	1,000	-	-	10,000	10,700	(Split W/S)
351	1343	Energy Management: Electric Metering Improvement Program	2016	-	1,000	1,000	1,000	1,000	1,000	1,000	-	5,000	6,000	(Split W/S)
351	1366	Water Facility Lighting Renovations	2017	-	-	933	933	933	-	-	-	2,799	2,799	0.4%
361	956	As-needed CIP Implementation Assistance and Related Services (1)	2002	4,770	1,400	1,400	-	-	-	-	-	1,400	7,570	(Split W/S)
361	1026	Department-wide General Engineering Services on an As-needed Basis (1)	2004	10,065	500	200	-	-	-	-	-	200	10,765	(Split W/S)
361	1031	General Engineering Services (1)	2004	14,011	446	200	100	-	-	-	-	300	14,757	(Split W/S)
361	1147	As-needed Engineering Services for Concrete Testing, Geotechnical Soil Borings, other Testing Services, and Related Services	2006	-	1,300	1,574	333	333	333	-	-	2,573	3,873	(Split W/S)
361	1153	Consolidated Process Control System Upgrades	2006	3,928	619	-	-	-	-	-	-	-	4,547	(Split W/S)
361	1164	Geotechnical and Related Services on an As-Needed Basis	2007	4,883	264	2	-	-	-	-	-	2	5,149	(Split W/S)
361	1182	General Engineering Services (1)	2007	28	1,346	1,380	-	-	-	-	-	1,380	2,754	(Split W/S)
361	1206	Data Center Reliability/Availability Improvements (1)	2009	6,003	25	-	-	-	-	-	-	-	6,028	(Split W/S)
361	1207	SCADA Radio Network Upgrade (1)	2009	6,221	933	-	-	-	-	-	-	-	7,154	(Split W/S)

### 3.1. Information Technology

Information Technology at Great Lakes Water Authority provides centralized technology implementation, support and services across

all business functions. This includes infrastructure and cloud technologies, software and applications, desktop and computing hardware, system security, portfolio and project management

services, technology forecasting and budgeting management, as well as print services and document management. The goal of the ITS team is to provide reliable and forward-thinking technologies that meet the needs today and in the future of all the various business groups, enabling them to realize their goals and make processes more effective and efficient.

### Office of the Chief Information Officer

The Office of the Chief Information Officer delivers leadership to the ITS Group. The Capital Improvement Plan is submitted by the CIO and includes projects and capital improvements related to all areas of the ITS Group as well as information technology needs from across the organization.

#### 3.1.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

#### 3.1.2. Service Desk

The Service Delivery Group provides core technology support services, including troubleshooting, desktop and laptop configuration, software installation, mobile device management, smart board, and printers/scanners. This group also provides physical document management services in addition to full print shop services. Projects in this area include workstation computing replacements and upgrades, software and system replacements and purchases, mobile computing technologies, printers, scanners and other all in ones devices, and more.

#### 3.1.3. Infrastructure

The Infrastructure Group provides administration and continuous monitoring of the GLWA business network, Internet services, data center, storage, and servers. It maintains Intermediate Distribution Facilities (IDF) and Main Distribution Facilities (MDF) across more

than 40 facilities spanning the region. It also provides telephony services and all wireless internet access points. Projects that fall within this group work to improve network and telecommunications infrastructure, server hardware and systems, storage devices and related hardware, enterprise Active Directory and Office 365 infrastructure and licensing, and more.

#### 3.1.4. Enterprise Applications

The Enterprise Applications Group monitors and manages applications that are used by the entire organization and may be public and/or forward facing, web-based and cross-functional. These include the Geographic Information System (GIS), public website, internal (Intranet) Sharepoint site, enterprise content management systems, business intelligence, reporting analytics (KPIs), and Legistar. Projects in this group include system replacements and/or upgrades, new application implementations, and more.

#### 3.1.5. Business Applications

The Business Applications Group monitors and manages line of business applications, including database administration, for Oracle WAM (Asset Management), ServiceLink, BS&A Financials, Ceridian DayForce, LIMS/PIMS, and many other specialized software packages designed to help individual business groups improve data management and daily operations. Projects in this group include system replacements and/or upgrades, new application implementations, and more.

#### 3.1.6. Security

The Enterprise Technology Security Group provides secure infrastructure support, administration, monitoring and training for network and computing security across the organization. It participates in and support Homeland Security initiatives and exercises and participates in other desktop security efforts to ensure breaches are monitored, repelled and remediated on a continuous basis. Projects in this area provide additional security features,

penetration testing, disaster recovery planning and implementation, security training, and more.

#### 3.1.7. Project Management Office

The Program Management Office provides various administrative and strategic functions, including overall portfolio and project management, budgeting and forecasting, policy development and strategic planning, and shared services administration. Projects that fall within this group will strengthen the overall management of technology implementations here at GLWA, including but not limited to project management software and systems, process and workflow development, analysis, and strategic planning.

#### 3.2. Fleet

(Information to be added.)

##### 3.2.1. General Purpose

#### 3.3. Facilities

(Information to be added.)

##### 3.3.1. General Purpose

#### 3.4. Security

##### 3.4.1. General Purpose

The Water and Wastewater Systems are vulnerable to a variety of attacks. If these attacks were realized, the result could be large numbers of illnesses or casualties and/or a denial of service that would also impact public health and economic vitality. Critical services such as firefighting and healthcare (hospitals), and other dependent and interdependent sectors, would suffer negative consequences from a denial of service of Water and Wastewater Systems. The critical security systems, both physical and electronic, require continual upgrade and replacement to minimize the ever present threats to GLWA staff and infrastructure.

#### 3.5. Energy Management

##### 3.5.1. General Purpose

The Energy Management Team has been very active in pursuing new solutions for GLWA to improve operational efficiency by using new concepts and technologies to achieve sustainability. Much of the current work revolves around auditing existing facilities, evaluating equipment, studying various processes and developing an overall understanding of our energy consumption. Many of these initial studies, pilot projects, evaluations will directly result in future capital investments. To ensure long-term sustainability, the Energy Management Team is in the process of developing a Strategic Energy Plan that will detail the challenges facing GLWA, establish goals and identify the methodology for measuring our success.

Several of the key projects and studies currently underway that are not part of the current CIP, but may directly impact future CIP projects related to energy management, are:

- Investment Grade Audit (IGA) of the wastewater treatment plant, utilizing the captured savings from energy conservation measures to fund infrastructure projects.
- Better Buildings Program with the Department of Energy, State of Michigan and Aquasight to establish a 30% energy reduction plan. The program includes a monitoring agreement with Aquasight to provide real-time intelligence and to provide 5% no cost or low cost energy savings measures that can be implemented immediately.
- Solar feasibility study at 8 GLWA sites. At the conclusion of the study, we will determine the best method to implement solar generation, owner operator or through a power purchase agreement. Solar generation is a large contributor for utilities that have obtained energy neutrality.
- Pump load management pilot program will begin at the Adams booster station. The program will collect energy use data along with flow rates to determine optimal pump

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configurations, maintenance schedules and dashboards that allow us to make informed decisions.

- Development of new language for RFP's and Construction contracts to include the requirement that equipment must at a minimum be Energy Star certified and the specific equipment must be reviewed by the Energy Manager for efficiency ratings.
- Reasearching third party utility bill management firms to assist in making sure bills are accurate, digitally recorded and easily parseable.

The Energy Management Group continues its work alongside GLWA's Business Intelligence staff to collect and compile energy consumption data. The effort is evolving from the original concept of monitoring pumps' electric consumption to a broader vision of modeling the entire set of business activities that bring value to our customers. As this specifically relates to energy management, it is anticipated that consumption data will be compiled across multiple Departments to enable the cross-referencing between business units by using a single data warehouse. This allows for flexibility in data mining, dashboard construction and process tracking. The results of many of these initiatives will allow the team to identify specific, prioritized areas within the Authority for future capital investment to improve efficiency.

### 3.6. Engineering

Overall engineering services required resulting from emergencies or from needs that require immediate investigations, evaluations and support to ensure continued operation and the highest level of service will typically be charged against these programmatic expenses. In addition, the engineering work performed will directly result in capital projects. Several categories exist that are typically needed in this manner. These categories are general engineering services, geotechnical services and CIP implementation services.

#### 3.6.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here

### 3.7. General Purpose

#### 3.7.1. General Purpose

The General Purpose category is necessary to identify projects that cross over multiple categories within this section of the CIP. Projects or programs that cannot be attributed to one particular area will be identified here.

## VI. PROJECT DESCRIPTIONS

This chapter contains a one-page description of each CIP project. These are intended to be at-a-glance information related to each project that provides a general understanding of the scope of work, project phasing and projected expenses. The full Business Case Justification documentation related to each project can be found within the Appendices.

### SECTION 1 WATER

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**CIP Number:** CIP 262

**Title:** SOUTHWEST WATER TREATMENT PLANT, SLUDGE TREATMENT & WASTE WASH WATER TREATMENT FACILITIES

**Classification:** 113: Water > Treatment Plants & Facilities > Southwest

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** SW-548

**Significance:** N/A - Pending Closeout

**Location:** N/A - Pending Closeout

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

N/A - Pending Closeout

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Pending Close-out	5/12/2010	7/3/2016	\$47587	\$0	\$1793	\$0	\$0	\$0	\$0	\$0	\$1793	\$49380
Totals				\$47587	\$0	\$1793	\$0	\$0	\$0	\$0	\$0	\$1793	\$49380

Picture not available

**CIP Number:** CIP 917

**Title:** SPRINGWELLS WATER TREATMENT PLANT 1958 FILTER REHABILITATION AND AUXILIARY FACILITIES

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** CS-1425, SP-563

**Significance:** Rehabilitation of Springwells WTP 1958 Filters and 1930s failed filters to provide the WTP with a renovated capacity of 295 MGD

**Location:** Springwells WTP

**Driver:** N/A - Active

**Explanation:** N/A - Active

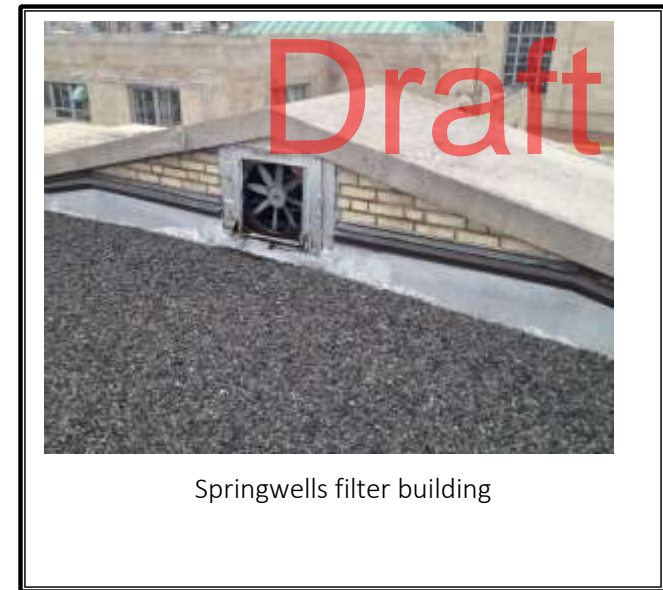
**Preliminary Scope of Work:**

This project includes the study, design (CS-1425) and construction assistance of improvements to the Springwells WTP that includes the replacement of Phosphoric Acid Feed System, rehabilitation of the 1958 Filters, rehabilitation of failed 1930s Filters, Update of Operation and Maintenance Manuals, and addition of polymer systems and controls. Provide construction services to furnish and install new filter media, underdrains, filter valves, and rate controllers; replace the existing filter control consoles, hydraulic control valves with electric control valves, enclosures; add appurtenances to enable automatic backwashing of the filters; provide a Filter Aid Polymer System to the 1930 and 1958 filter complexes; Programmable Logic Controller-based controls for automatic control of the polymer system; install a local instrumentation and controls system.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Active	1/18/2008	1/18/2018	\$0	\$353	\$95	\$0	\$0	\$0	\$0	\$0	\$95	\$448
C	Active	7/8/2013	3/14/2018	\$56759	\$20000	\$1391	\$0	\$0	\$0	\$0	\$0	\$1391	\$78150
Totals				\$56759	\$20353	\$1486	\$0	\$0	\$0	\$0	\$0	\$1486	\$78598



Springwells filter building

**CIP Number:** CIP 1047

**Title:** WICK ROAD STATION REHABILITATION

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** DWS-858

**Significance:** N/A - Pending Closeout

**Location:** N/A - Pending Closeout

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

N/A - Pending Closeout

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Picture not available

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB	Pending Close-out	11/25/2008	6/30/2016	\$13452	\$250	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$13703
Totals				\$13452	\$250	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$13703

**CIP Number:** CIP 1071

**Title:** SPRINGWELLS WATER TREATMENT PLANT - LOW LIFT AND HIGH LIFT PUMP STATION

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 69.2

**Contract No.:** NA

**Significance:** Existing low & high lift pumping system electrical is original, unsafe, not reliable, and is oversized for current & projected demands. New and/or rehabilitated pumping system equipment is needed.

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The electrical gear at the Springwells WTP high and low lift stations is old and parts are no longer available. The outdated equipment also poses safety issues. Furthermore, the pumps may be right-sized to provide more efficient pumping systems.

**Challenges:** Extremely complicated sequence of construction required to replace electrical gear while maintaining system demands throughout construction. During construction, new costly equipment will be operating next to existing equipment/facilities to be demolished, potentially exposing new equipment to adverse operating conditions.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A/C	Not Yet Started	NA	NA	\$0	\$0	\$15000	\$25000	\$12000	\$0	\$0	\$0	\$52000	\$52000
Totals				\$0	\$0	\$15000	\$25000	\$12000	\$0	\$0	\$0	\$52000	\$52000



**CIP Number:** CIP 1112

**Title:** PARALLEL 42-INCH MAIN IN 24 MILE ROAD FROM ROCHESTER STATION TO ROMEO PLANK ROAD

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** WS-681

**Significance:** Paralleling original 36" water main that is critical to the supply of three communities and has had history of breaks

**Location:** 24 Mile Road from Rochester Station to Romeo Plank Road

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

This project will provide for the installation of approximately 35,650 feet of parallel 42-inch diameter pre-stressed embedded concrete cylinder pipe (PCCP) and approximately 1,070 linear feet of 36-inch diameter of PCCP in 24 Mile Road from Rochester Station to Romeo Plank Road. The work will also provide for all interconnections and valves.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Pending Close-out	4/7/2014	10/9/2016	\$26926	\$2367	\$715	\$0	\$0	\$0	\$0	\$0	\$715	\$30008
Totals				\$26926	\$2367	\$715	\$0	\$0	\$0	\$0	\$0	\$715	\$30008





**CIP Number:** CIP 1166

**Title:** YARD PIPING, VALVES AND VENTURI METERS REPLACEMENT AT WATER WORKS PARK

**Classification:** 115: Water > Treatment Plants & Facilities > Water Works Park

**Managing Dept:** Water Eng

**RC Score:** 65.4

**Contract No.:** WW-536

**Significance:** Existing yard piping is 100 years old and requires replacement with new piping installed in a more efficient configuration.

**Location:** Waterworks Park WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Much of the yard piping and valve system at Waterworks Park is old and at the end of its service life. Furthermore, the Water Treatment Plant does not have functioning production flow metering as the existing equipment is oversized and non-functioning. Replacement of the yard piping, valve, and metering system is needed at the site.

**Challenges:** Very complicated sequence of construction, and demands of DWSD-R must be maintained along with coordination with 84" between Water Works Park and Northeast WTPs. Condition of existing valves required to complete the work is unknown, and even though it is in the scope of the design consultant to assess the valves, many of them are original.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$5500	\$27900	\$20500	\$0	\$0	\$0	\$53900	\$53900
Totals				\$0	\$0	\$5500	\$27900	\$20500	\$0	\$0	\$0	\$53900	\$53900



**CIP Number:** CIP 1170

**Title:** BOOSTER STATIONS AND RESERVOIRS INSPECTION, REHABILITATION AND INSPECTION REPAIR PROGRAM

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** DWS-874

**Significance:** Identifying issues that may have a direct impact on water quality due to interior/exterior structural failure

**Location:** Pumping Stations and Reservoirs

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

The work provides for all Pumping Stations, study, design, and construction contract documents for rehabilitation and upgrades, and management services related to construction including award of contract, inspection during construction, and furnishing all construction work through provisional allowance for sub agreements.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
PM	Pending Close-out	7/3/2013	10/30/2019	\$9571	\$2316	\$88	\$0	\$0	\$0	\$0	\$0	\$88	\$11975
Totals				\$9571	\$2316	\$88	\$0	\$0	\$0	\$0	\$0	\$88	\$11975



**CIP Number:** CIP 1216

**Title:** REPLACEMENT OF FIVE (5) PRV PITS OF TREATED WATER TRANSMISSION SYSTEM

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** DWS-891

**Significance:** Replacement of the PRVs to enhance operability of the system and improve control of the system to meet customer pressure needs

**Location:** DWS-891 - Various

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This project will replace five existing pressure reducing valves (PRVs) that are defective and no longer controlling downstream pressures. During the replacement, the PRV pits will be upgraded to improve accessibility, provide new sump pumps as needed, and make other necessary improvements.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Active	5/14/2015	1/1/2017	\$1015	\$1205	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$2320
Totals				\$1015	\$1205	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$2320



**CIP Number:** CIP 1226

**Title:** REPLACEMENT OF SWITCHGEAR AT JOY ROAD PUMPING STATION

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** DWS-896

**Significance:** Replacing 4,800 volt switchgear at Joy Road to address service life issues with equipment

**Location:** Joy Rd Water Pumping Station

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

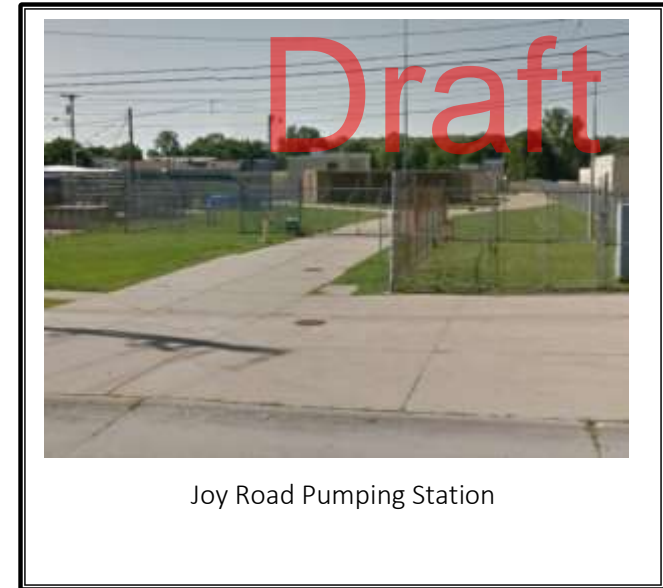
**Preliminary Scope of Work:**

The existing switchgear at the Joy Road pumping station is original, difficult to maintain due scarce replacement parts, and at the end of its service life. The equipment is housed in an outdoor enclosure and is subject to frequent pump trips resulting in low pressure issues to the service area. This project involves replacement of outdoor switchgear, associated wiring, and provision of new housing and power consumption monitoring in the Ovation (SCADA) system for the two DTE feeds at the Joy Road Pumping Station.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Pending Close-out	3/13/2015	3/7/2016	\$611	\$0	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$612
Totals				\$611	\$0	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$612



**CIP Number:** CIP 1227

**Title:** ENERGY MANAGEMENT: LAKE HURON WATER TREATMENT PLANT LOW LIFT PUMPING IMPROVEMENTS

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Water Eng

**RC Score:** 71.6

**Contract No.:** NA

**Significance:** Improvements needed to align the existing low lift pumping rate with the Lake Huron WTP production rate per the 2015 WMPU. Currently constant speed pumping forces the WTP to operate in a batch mode.

**Location:** Lake Huron WTP

**Driver:** 8 - Efficiency

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Currently constant speed pumping forces the Lake Huron WTP to operate in a batch mode as the low lift pump capacities exceed the high lift pump capacities. Improvements needed to align the existing low lift pumping rate with the Lake Huron WTP production rate per the 2015 WMPU.

**Challenges:** Coordination between existing pumping unit and motor required during design. Critical speed analysis may show pump improvements needed to operate at reduced speeds.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$200	\$2500	\$3000	\$0	\$0	\$0	\$0	\$5500	\$5700
Totals				\$0	\$200	\$2500	\$3000	\$0	\$0	\$0	\$0	\$5500	\$5700



**CIP Number:** CIP 1230

**Title:** WATER TRANSMISSION IMPROVEMENT PROGRAM

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** NA

**Significance:** Assessing, rehabilitating or replacing aging transmission mains in the water system.

**Location:** Transmission System

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project is a yearly funding allocation for the design and/or construction work for the rehabilitation or replacement/construction of aging water transmission lines and all appurtenances, connections and related structures.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	4/4/2016	9/30/2016	\$0	\$0	\$10000	\$10000	\$10000	\$10000	\$10000	\$0	\$50000	\$50000
Totals				\$0	\$0	\$10000	\$10000	\$10000	\$10000	\$10000	\$0	\$50000	\$50000



Example of a failed water main



**CIP Number:** CIP 1230B

**Title:** 48-INCH WATER MAIN INSTALLATION AT VINING AND WICK ROADS IN ROMULUS

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** MOU-4848

**Significance:** Placement of a parallel water main to minimize service disruptions to customer communities

**Location:** Telegraph Rd, Cherry Hill to Warren Ave

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

The City of Romulus notified DWSD of a significant retail development opening in Autumn 2016 at the southeast corner of Vining and Wick Roads. Romulus was also aware that DWSD has a project pending to place a 48" water main along Wick Road. Placement of the new 48" water main would be disruptive to the retail development traffic entrances/exits facing Wick road. Thus, Romulus asked if the 48" water main project could be expedited so it could be in place at the time of the retail development construction in Spring/Summer 2016. The 48" water main will be placed by Romulus as a part of the pavement upgrade work being pursued by Romulus early in 2016.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C 3	Active	3/7/2016	10/1/2016	\$1021	\$3514	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$4536
Totals				\$1021	\$3514	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$4536



Pipe ready to install

**CIP Number:** CIP 1230c

**Title:** 30-INCH WATERMAIN

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CON-105

**Significance:** Unavailable

**Location:** Not provided.

**Driver:** N/A

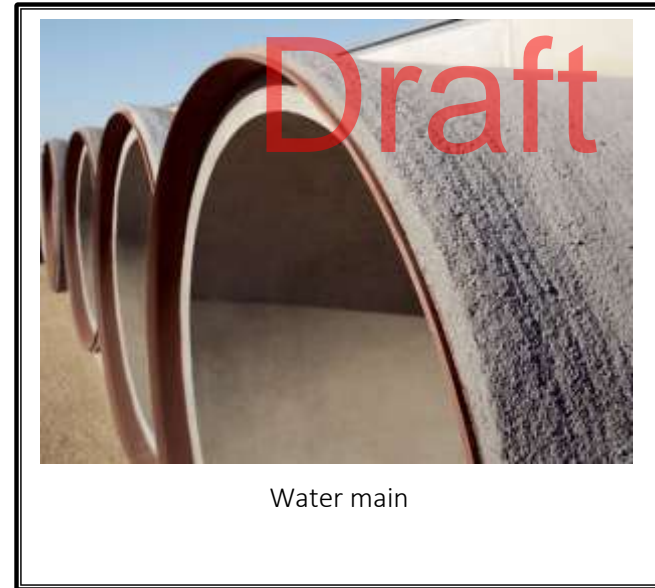
**Explanation:** Not provided.

**Preliminary Scope of Work:**

Not provided.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**



Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C 4	New	--	--	\$0	\$2327	\$5	\$0	\$0	\$0	\$0	\$0	\$5	\$2332
Totals				\$0	\$2327	\$5	\$0	\$0	\$0	\$0	\$0	\$5	\$2332

**CIP Number:** CIP 1233

**Title:** COMPREHENSIVE WATER MASTER PLAN UPDATE

**Classification:** 161: Water > General Purpose > General Purpose

**Managing Dept:** Systems Planning

**RC Score:** NA

**Contract No.:** CS-1528

**Significance:** Road map to maintain and improve the overall system performance on a cost-efficient basis

**Location:** System-wide

**Driver:** N/A - Active

**Explanation:** N/A - Active

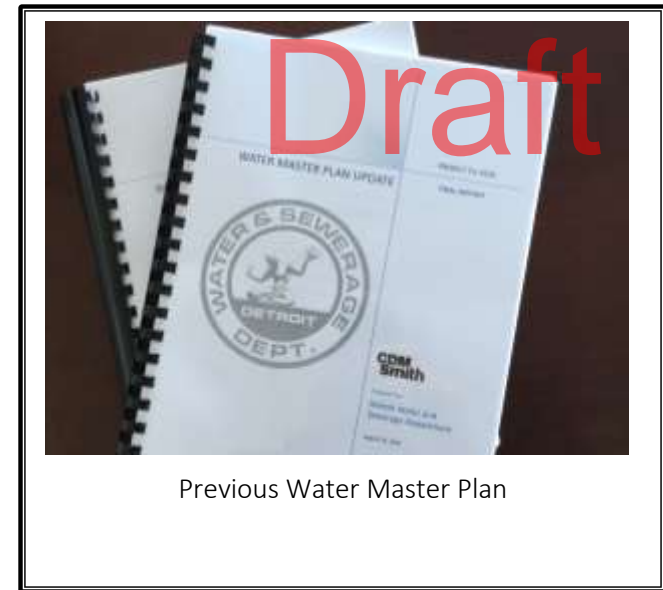
**Preliminary Scope of Work:**

This project consists of the update of the 2004 Water Master Plan including a review of current and ongoing studies, regulatory mandates under the Clean Water Act and State of Michigan, contractual obligations to the customers and Department policies.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Active	6/3/2013	12/31/2016	\$0	\$290	\$5	\$0	\$0	\$0	\$0	\$0	\$5	\$295
Totals				\$0	\$290	\$5	\$0	\$0	\$0	\$0	\$0	\$5	\$295



**CIP Number:** CIP 1256

**Title:** WATER TREATMENT PLANT /PUMP STATION ALLOWANCE

**Classification:** 161: Water > General Purpose > General Purpose

**Managing Dept:** Water Eng

**RC Score:** 64.4

**Contract No.:** NA

**Significance:** This allowance is reserved for unplanned and critical project needs that need to be addressed quickly.

**Location:** WTPs and Boosters

**Driver:** Varies

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project is an allowance for unplanned, critical projects that may occur at the Water Treatment Plants and Booster Pump Stations throughout the system. These projects may include repair, replacement or rehabilitation of key assets as required to allow the Authority to provide sufficient water quality, quantity and pressure to meet customer demands in accordance with federal and state requirements under the Safe Drinking Water Act.

**Challenges:** Close coordination with operations and ability to jump on needs.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$19660	\$19650	\$20000	\$20000	\$10000	\$10000	\$0	\$79650	\$99310
Totals				\$0	\$19660	\$19650	\$20000	\$20000	\$10000	\$10000	\$0	\$79650	\$99310



**CIP Number:** CIP 1264

**Title:** WATER PRODUCTION FLOW METERING IMPROVEMENTS AT NE, SW, AND SPW WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 41.4

**Contract No.:** NA

**Significance:** Existing water production flow meters need to be rehabilitated to place back into reliable and accurate service. Once completed, accurate flow measurement from these plants will answer non-revenue water questions.

**Location:** Springwells, Northeast and Southwest WTP

**Driver:** 7 - Financial

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Water production metering is needed at the Water Treatment Plants to manage non-revenue and provide estimates of usage for non-wholesale customers.

**Challenges:** Removing and replacing existing meters in original piping requires isolation using existing yard piping and valving. Condition of existing pipe and valves needs to be adequately addressed in the final design documents and coordinated with operations.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$1000	\$8800	\$2100	\$1000	\$0	\$0	\$0	\$11900	\$12900
Totals				\$0	\$1000	\$8800	\$2100	\$1000	\$0	\$0	\$0	\$11900	\$12900



Water production flow metering device

**CIP Number:** CIP 1265

**Title:** MISCELLANEOUS CONCRETE IMPROVEMENTS AT SPRINGWELLS WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** SP-570

**Significance:** Concrete repairs to prevent further deterioration to critical structures at Springwells WTP

**Location:** Springwells WTP

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This construction project involves repairing cracked and spalled concrete to stop water leaking from water-containing structures, to stop water from migrating into buildings and tunnels, and to repair deteriorated concrete where substantial delamination has occurred. The project also involves re-grading and re-constructing a plant roadway over pedestrian and utility tunnels to protect these tunnels from water infiltration and damage.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Active	11/18/2015	10/13/2016	\$398	\$600	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$999
Totals				\$398	\$600	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$999





**CIP Number:** CIP 1266

**Title:** ADMINISTRATION BUILDING IMPROVEMENTS AT SPRINGWELLS WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 35.4

**Contract No.:** NA

**Significance:** Existing administration building is over 80 years old with many of its facilities being original. The building needs architectural, plumbing and electrical improvements.

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The work includes, but not necessarily limited to, removal and replacement of the existing plumbing piping, fittings, valves, plumbing fixtures, and any other necessary accessories. The work also includes relocating the electrical gear from basement to first floor locker room.

**Challenges:** Major component of this project includes the relocation/replacement of existing electrical gear located in the basement, and switchover to the new gear and location will need to be seamless. All plumbing needs to be replaced, the majority of which is concealed in walls and floors and serves the new laboratory being constructed under SP-563.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$300	\$1700	\$0	\$0	\$0	\$2000	\$2000
Totals				\$0	\$0	\$0	\$300	\$1700	\$0	\$0	\$0	\$2000	\$2000



**CIP Number:** CIP 1267

**Title:** REPLACEMENT OF RAPID MIX UNITS AT SPRINGWELLS WTP 1958  
PROCESS TRAIN

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 69.4

**Contract No.:** NA

**Significance:** Existing rapid mixing units at the 1958 treatment train are not operable and are needed for effective water treatment at Springwells.

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The work includes removal and replacement of all of the four rapid mixers including electrical, mechanical and structural components.

**Challenges:** Work requires treatment trains to be shut down to complete the installation/replacement, so coordination with operations and overall system demands required.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$100	\$800	\$100	\$0	\$0	\$0	\$0	\$900	\$1000
Totals				\$0	\$100	\$800	\$100	\$0	\$0	\$0	\$0	\$900	\$1000



**CIP Number:** CIP 1268

**Title:** POWDERED ACTIVATED CARBON SYSTEM IMPROVEMENTS AT SPRINGWELLS WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 43.4

**Contract No.:** NA

**Significance:** Existing PAC system is not operable and is needed at times to control taste and odor episodes.

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Existing PAC system is not operable.

**Challenges:** Layout of piping to correct existing problems and drainage difficult.

Diffuser replacement/relocation/installation will require plant shutdowns to complete, so it will be seasonal demand dependent.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$900	\$2000	\$0	\$0	\$2900	\$2900
Totals				\$0	\$0	\$0	\$0	\$900	\$2000	\$0	\$0	\$2900	\$2900



**CIP Number:** CIP 1269

**Title:** 1930 SEDIMENTATION BASIN SLUICE GATES, GUIDES & HOISTS IMPROVEMENTS AT SPRINGWELLS WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 47.6

**Contract No.:** NA

**Significance:** Existing sedimentation basin gates, guides and hoists are early 1930s and are in need of upgrade. Further, upgrades must result in a safer mode of gate operation.

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project will evaluate and rehabilitate or replace the sluice gates, guides and hoists at the 1930s Filter Building at the Springwells Water Treatment Plant. These gates and appurtenances have surpassed their expected service life and require rehabilitation and/or replacement for the isolation and operation of the 1930s filters and overall maintenance of various systems at the Springwells WTP. Options for maintenance of flows are limited with current condition of these gates.

**Challenges:** Work will either require sedimentation basins to be shut down and dewatered or the work performed by divers. In either case, portions of the 1930 plant will need to be shut down to complete the work.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$1200	\$2000	\$4000	\$300	\$0	\$0	\$7500	\$7500
Totals				\$0	\$0	\$1200	\$2000	\$4000	\$300	\$0	\$0	\$7500	\$7500



**CIP Number:** CIP 1270

**Title:** ISOLATION GATE VALVES FOR LINE PUMPS FOR WEST SERVICE CENTER PUMPING STATION

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** 54.4

**Contract No.:** NA

**Significance:** Project needed to provide isolation of the existing pumping units from the distribution and transmission system during pumping unit and discharge flow control valve maintenance. Existing conditions require three pumping units to be taken out of service to maintain one pump as there currently there is no means to isolate individual pumping units.

**Location:** West Service Center

**Driver:** 2 - Performance

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Currently there is no means to isolate individual pumping units at the West Service Center. Maintenance on individual units require taking out entire high or intermediate pumping systems without isolation valves.

**Challenges:** Sequence of construction and meeting system demands will need to be coordinated with operations and on-going work to repurpose the Northeast WTP.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$0	\$521	\$1000	\$0	\$0	\$0	\$0	\$1521	\$1521
Totals				\$0	\$0	\$521	\$1000	\$0	\$0	\$0	\$0	\$1521	\$1521



**CIP Number:** CIP 1271

**Title:** HYDRAULIC SURGE CONTROL FOR NORTH SERVICE CENTER PUMPING STATION

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** 20.6

**Contract No.:** NA

**Significance:** Madison Heights, Troy, and Sterling Heights experience pressure spikes from the suction side of the North Service Center when line pumps trip. Hydraulic transient study is needed to identify the most cost effective solution to mitigate the pressure spikes.

**Location:** North Service Center

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

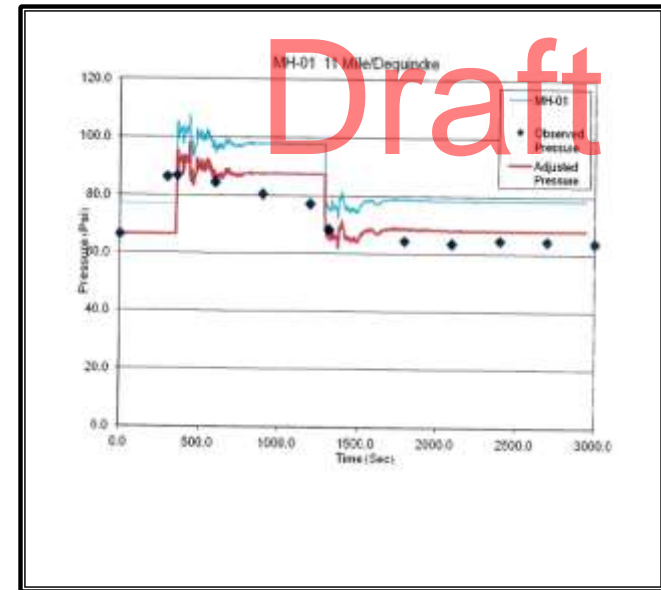
**Preliminary Scope of Work:**

In recent years, the North Service Center has experienced power failures resulting in pump trips at the facility. The pump trips have caused high pressure transients along the transmission mains serving Madison Heights, Sterling Heights, Troy, Warren, Fraser, Clinton Township, and Roseville. The proposed project involves the study of control measures to mitigate the hydraulic transients present within the system.

**Challenges:** Coordination with operations and customers necessary to complete the work.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	TBD	TBD	\$0	\$200	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$201
D/C	Not Yet Started	NA	NA	\$0	\$0	\$500	\$2000	\$100	\$0	\$0	\$0	\$2600	\$2600
Totals				\$0	\$200	\$501	\$2000	\$100	\$0	\$0	\$0	\$2601	\$2801





**CIP Number:** CIP 1272

**Title:** YARD PIPING REPLACEMENT AT NORTHEAST WATER TREATMENT PLANT

**Classification:** 112: Water > Treatment Plants & Facilities > Northeast

**Managing Dept:** Water Eng

**RC Score:** 62.2

**Contract No.:** NA

**Significance:** Flow control valves are needed at the terminus of the proposed 84-inch Waterworks Park to Northeast finish water transmission system. This project is needed to control flow rates from Waterworks Park to the re-purposed Northeast system.

**Location:** Northeast WTP

**Driver:** 2 - Performance

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The work includes providing and installing water main, new state fair valve and bulk heads.

**Challenges:** Sequencing of construction with the phase-over of Northeast WTP becoming a booster station. Connecting to existing piping and/or reservoirs will require reservoir shut and isolation, requiring close coordination with operations.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$0	\$800	\$0	\$0	\$0	\$0	\$0	\$800	\$800
Totals				\$0	\$0	\$800	\$0	\$0	\$0	\$0	\$0	\$800	\$800



**CIP Number:** CIP 1273

**Title:** LOW LIFT PUMPING PLANT CAISSON REHABILITATION AT NORTHEAST WTP

**Classification:** 112: Water > Treatment Plants & Facilities > Northeast

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** CS-1744

**Significance:** Preventing further degradation of steel and concrete structure of the Low Lift Pumps Caisson at the Northeast WTP

**Location:** Northeast WTP

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

The work includes design and repair of concrete cracks and concrete restoration to stop leakage on the concrete covers of the encased steel beams and along the inner surfaces of the caisson wall.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	TBD	TBD	\$0	\$100	\$80	\$0	\$0	\$0	\$0	\$0	\$80	\$180
Totals				\$0	\$100	\$80	\$0	\$0	\$0	\$0	\$0	\$80	\$180



Low Lift Pumping Plant at Northeast WTP

**CIP Number:** CIP 1274

**Title:** MISCELLANEOUS CONCRETE AND ROAD IMPROVEMENTS AT WATERWORKS PARK WTP

**Classification:** 115: Water > Treatment Plants & Facilities > Water Works Park

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** WW-538

**Significance:** Necessary concrete repairs to prevent further deterioration to critical treatment systems at Waterworks Park WTP

**Location:** Waterworks Park WTP

**Driver:** N/A - Active

**Explanation:** N/A - Active

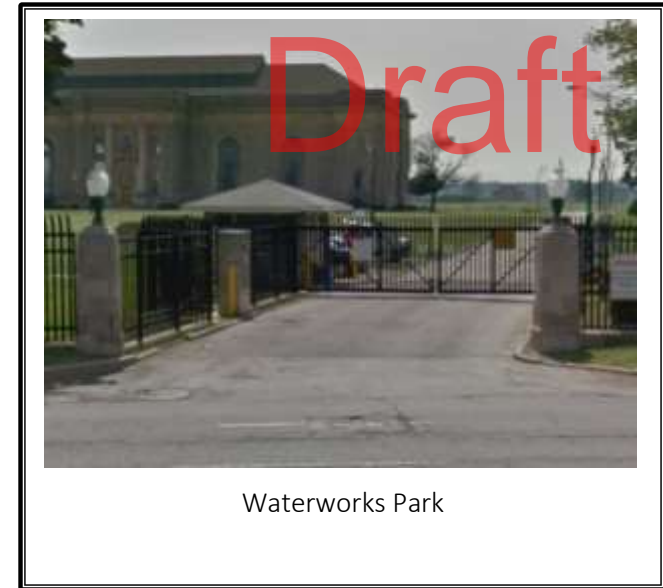
**Preliminary Scope of Work:**

This construction project involves repairing cracked and spalled concrete to stop water leaking from water-containing structures and process units (i.e., filter tanks, sedimentation basins, ozone contactors), re-constructing plant roadways and parking areas that have substantial pavement deterioration, and re-grading and re-paving the administration building parking area to improve drainage.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	7/15/2016	9/8/2017	\$761	\$2275	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$3037
Totals				\$761	\$2275	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$3037



**CIP Number:** CIP 1277

**Title:** HIGH LIFT PUMP DISCHARGE VALVE ACTUATORS REPLACEMENT AT SOUTHWEST WTP

**Classification:** 113: Water > Treatment Plants & Facilities > Southwest

**Managing Dept:** Water Eng

**RC Score:** 46.6

**Contract No.:** NA

**Significance:** Existing oil hydraulic high lift valve actuators are leaking oil and at the end of service life. The leaking actuators pose safety concerns and replacement of valve actuators is needed.

**Location:** Southwest WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project involves replacement of the valve actuators at the high lift pump system as the existing oil hydraulic actuators are leaking and at the end of their service life.

**Challenges:** Sequencing the demolition and replacement of the existing oil hydraulic power system will require shutdown of individual high lift pumping units.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$160	\$160	\$900	\$900	\$0	\$0	\$0	\$1960	\$2120
Totals				\$0	\$160	\$160	\$900	\$900	\$0	\$0	\$0	\$1960	\$2120



Oil hydraulic valve actuators leaking oil

**CIP Number:** CIP 1280

**Title:** MISCELLANEOUS MECHANICAL IMPROVEMENTS AT LAKE HURON WTP

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Water Eng

**RC Score:** 77

**Contract No.:** CS-1732

**Significance:** Existing heating, ventilating and air-conditioning systems Lake Huron are 40 years old and are either not operable or energy-inefficient. Thus, replacement with new, energy efficient mechanical HVAC systems is needed.

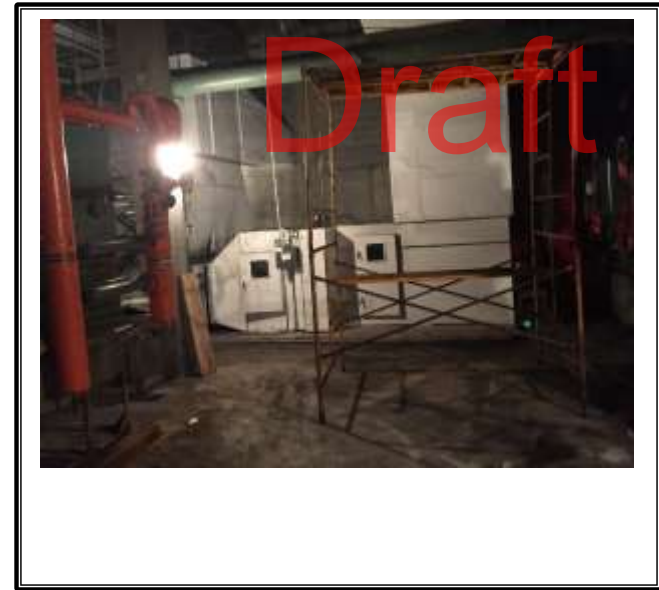
**Location:** Lake Huron WTP

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

The work includes replacement of the existing Natural Gas-Fired hot water boilers, back flow preventers, and dehumidification units with related accessories.



**Challenges:** Heating system modifications will be seasonally dependent.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA	Not Yet Started	TBD	TBD	\$0	\$200	\$350	\$255	\$0	\$0	\$0	\$0	\$605	\$805
C	Not Yet Started	NA	NA	\$0	\$0	\$400	\$950	\$950	\$200	\$0	\$0	\$2500	\$2500
Totals				\$0	\$200	\$750	\$1205	\$950	\$200	\$0	\$0	\$3105	\$3305

**CIP Number:** CIP 1283

**Title:** REPLACEMENT OF BUTTERFLY VALVES AND SLUICE GATES FOR RAPID MIX CHAMBER AT SOUTHWEST WTP

**Classification:** 113: Water > Treatment Plants & Facilities > Southwest

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** Replacing improperly functioning as well as cracked valves and gates, causing operational and maintenance concerns.

**Location:** Southwest WTP

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The work includes study, design, and construction services for the replacement of 2 - 72" diameter butterfly valves, 4 motorized sluice gates, 7 potable sluice gates, and 1 - 36" flag valve.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2940	\$0	\$2940
Totals				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2940	\$0	\$2940





**CIP Number:** CIP 1288

**Title:** ENERGY MANAGEMENT: EVALUATE ALTERNATIVES AND RECOMMEND CORRECTIVE ACTIONS TO IMPROVE POWER FACTORS (PF) AT VARIOUS GLWA BOOSTER PUMPING STATIONS

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** Energy management improvements necessary to reduce energy cost associated with penalties charge by power providers during varying demand scenarios. Improvements include electrical improvements likely in the form of power factor correction capacitors.

**Location:** Booster Pumping Stations

**Driver:** 8 - Efficiency

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The scope of work for this project is to evaluate the available alternatives to correct the power factor at the selected booster pumping stations and recommend the most cost effective and reliable solution to increase the power factors above 85%.

**Challenges:** Impact on electrical system design required and coordination with pump station needs assessment required.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$0	\$125	\$125	\$0	\$0	\$0	\$0	\$250	\$250
Totals				\$0	\$0	\$125	\$125	\$0	\$0	\$0	\$0	\$250	\$250

No picture. **Draft**

**CIP Number:** CIP 1289

**Title:** EVALUATION OF FLOCCULATION IMPROVEMENT ALTERNATIVES AT THE LHWTP

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Water Eng

**RC Score:** 30.2

**Contract No.:** NA

**Significance:** Existing flocculator drives are horizontal type with submerged bearings that are expensive to maintain. This evaluation will focus on alternatives that may provide more efficient flocculation and are easier and less costly to maintain.

**Location:** Lake Huron WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

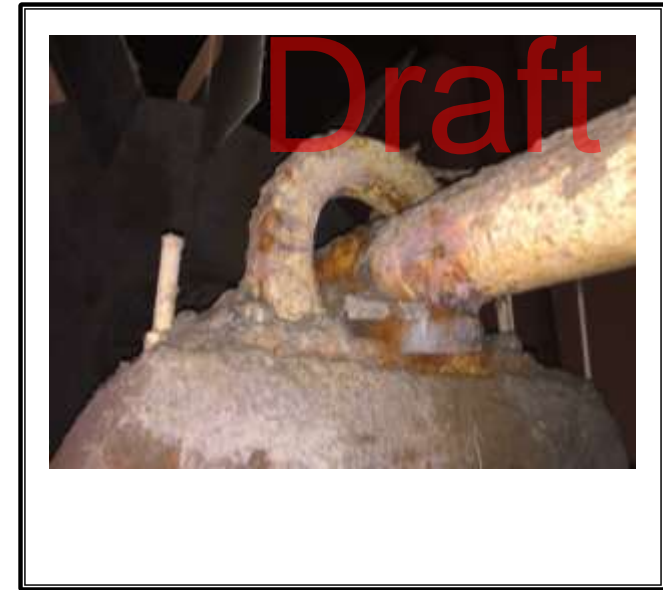
**Preliminary Scope of Work:**

Evaluation of failing flocculation system to improve treatment and reduce chemical consumption

**Challenges:** Uncovering an innovative rehabilitation design to minimize maintenance of existing drives.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$0	\$125	\$0	\$0	\$0	\$0	\$0	\$125	\$125
Totals				\$0	\$0	\$125	\$0	\$0	\$0	\$0	\$0	\$125	\$125



**CIP Number:** CIP 1291

**Title:** AS NEEDED CONSTRUCTION MATERIALS, ENVIRONMENTAL MEDIA AND SPECIAL TESTING SERVICES, CONSTRUCTION INSPECTION, AND OTHER TECHNICAL SERVICES

**Classification:** 161: Water > General Purpose > General Purpose

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1726

**Significance:** Provides readily accessible, qualified testing and inspection services for unforeseen and minor projects

**Location:** System-wide

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

This engineering/technical services contract involves as-needed engineering and technical services related to geotechnical investigations and related geotechnical engineering, construction materials sampling and testing, environmental media sampling and testing, soils sampling and testing, land surveying, corrosion testing and inspection, computer-aided design, and construction inspection.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	TBD	TBD	\$0	\$500	\$500	\$500	\$0	\$0	\$0	\$0	\$1000	\$1500
Totals				\$0	\$500	\$500	\$500	\$0	\$0	\$0	\$0	\$1000	\$1500



**CIP Number:** CIP 1292

**Title:** MISCELLANEOUS IMPROVEMENTS TO RAW WATER TUNNELS, SHAFTS AND RELATED STRUCTURES

**Classification:** 116: Water > Treatment Plants & Facilities > General Purpose

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** This CIP provides funds for possible improvement needs that may be discovered under the SCP-CS-1623 intake and tunnel condition assessment contract. The raw water tunnels and intakes are critical infrastructure and rehab needs are typically required quickly so this CIP provides a quick source of funds.

**Location:** Belle Isle, Southwest, and Lake Huron raw water systems

**Driver:** 1 - Condition

**Explanation:** Not provided.

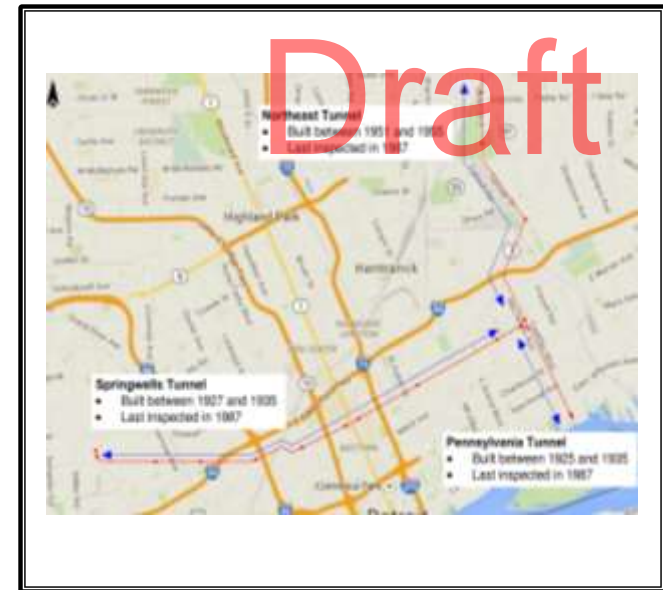
**Preliminary Scope of Work:**

The scope of this project is to address miscellaneous repairs identified as part of the ongoing raw water tunnel inspection project. The scope of these repairs is to rehabilitate structures within the tunnels, shafts and related appurtenances that are identified during the raw water tunnel inspections. Note: due to the scale of the repairs for the Springwells, Pennsylvania and Northeast Tunnels, a separate CIP project request was generated (CIP 1327).

**Challenges:** Maintaining a supply of raw water to Springwells, Northeast and Water Works Park throughout construction to meet finished water production requirements/demands of the system. Specialized/complicated construction.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA/C	Not Yet Started	TBD	TBD	\$0	\$0	\$1000	\$1000	\$500	\$0	\$0	\$0	\$2500	\$2500
Totals				\$0	\$0	\$1000	\$1000	\$500	\$0	\$0	\$0	\$2500	\$2500



**CIP Number:** CIP 1293

**Title:** PRESSURE AND CONTROL IMPROVEMENTS AT THE ELECTRIC, FORD ROAD, MICHIGAN, AND WEST CHICAGO WATER BOOSTER PUMPING STATIONS

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1749

**Significance:** Design of pressure and flow control equipment for efficient delivery of consistent pressures to wholesale customers

**Location:** Water Booster Pumping Stations

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

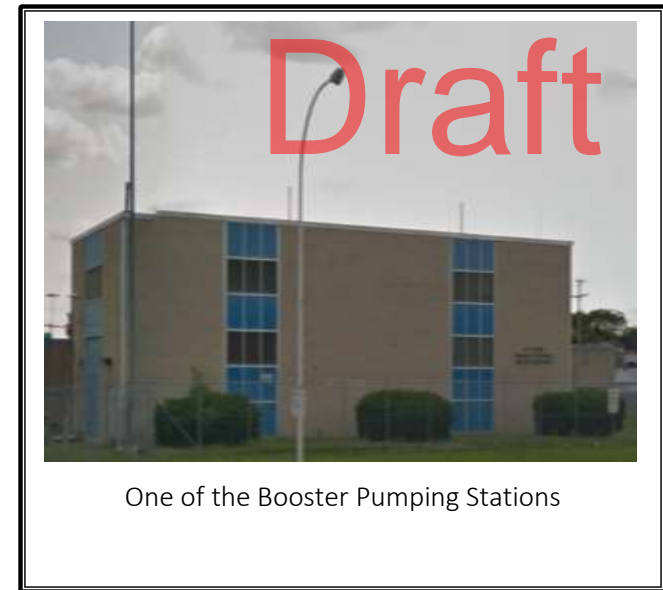
The work involves designing variable speed pumping equipment and controls on line

and reservoir pumping units to better match water demands to efficiently provide consistent pressures and flows to wholesale customers in the service area.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA	Not Yet Started	TBD	TBD	\$0	\$150	\$234	\$0	\$0	\$0	\$0	\$0	\$234	\$384
Totals				\$0	\$150	\$234	\$0	\$0	\$0	\$0	\$0	\$234	\$384



**CIP Number:** CIP 1294

**Title:** ENERGY MANAGEMENT: FREEZE PROTECTION PUMP INSTALLATION AT IMLAY PUMPING STATION

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** 35.2

**Contract No.:** NA

**Significance:** Project driven by eliminating the application of using existing large pumping units to recirculate and maintain water quality in the existing reservoir during low demand season. Project reduces operating costs, maintains water quality and reduces operating complexity.

**Location:** Imlay Pumping Station

**Driver:** 8 - Efficiency

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The purpose of this project is to minimize the electrical peak demand power charges associated with cycling water in the reservoir during low-demand periods. Rather than running a 6,000 HP motor-driven pump for a few minutes daily, a 150 HP motor-driven pump can run for a few hours to do the same work much less expensively.

**Challenges:** None.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$0	\$200	\$500	\$300	\$0	\$0	\$0	\$1000	\$1000
Totals				\$0	\$0	\$200	\$500	\$300	\$0	\$0	\$0	\$1000	\$1000





**CIP Number:** CIP 1295

**Title:** SPRINGWELLS WATER TREATMENT PLANT SERVICE AREA REDUNDANCY STUDY

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1772

**Significance:** Hydraulic analysis and Evaluation of options to maintain adequate pressure at Springwell's high pressure district

**Location:** Lake Huron WTP to West Service Center

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

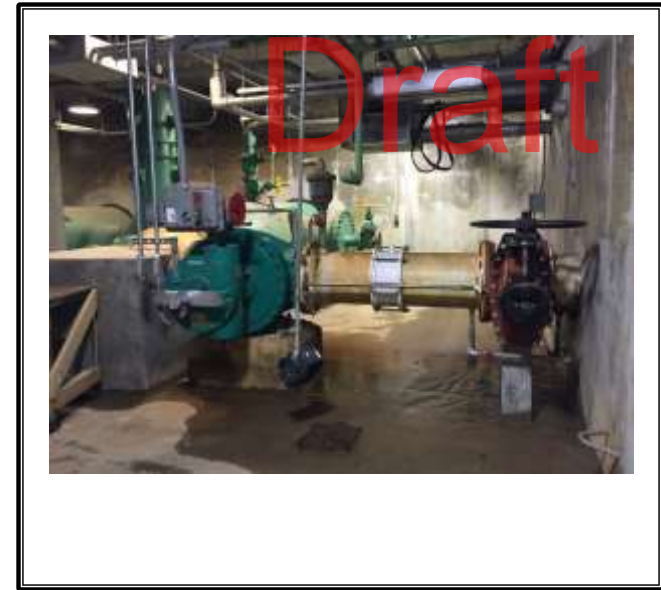
**Preliminary Scope of Work:**

This study involves hydraulic analyses and evaluation of options to transmit finished water from the Lake Huron Water Treatment Plant through the West Service Center in order to provide finished water to the Springwells Water Treatment Plant's high-pressure district.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	TBD	TBD	\$0	\$450	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$451
Totals				\$0	\$450	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$451



**CIP Number:** CIP 1296

**Title:** NEEDS ASSESSMENT STUDY FOR ALL WATER BOOSTER PUMPING STATIONS

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** 51.2

**Contract No.:** CS-2014 Proposal

**Significance:** The work includes a comprehensive needs assessment and hydraulic modeling to determine future station capacities for the nineteen (19) water booster pumping station facilities. Study will include assessment of existing condition and providing list of improvements, upgrading the following items: Facility HVAC and Lighting, Pumping System, Electrical Switch Gear, Instrumentation, Control and Ovation, Fire Protection and Alarms, etc.

**Location:** Booster Pumping Stations

**Driver:** 1 - Condition

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

This project includes a comprehensive condition and needs assessment study of all water booster stations, exclusive of reservoirs. System wide modelling will confirm station decommissioning as recommended by the 2015 Water Master Plan Update. The condition assessments will include all engineering disciplines, with a focus on variable speed pumping applications to meet changing station demands, DTE rate incentive identification, station metering, valve and yard piping improvements and station bypasses.

**Challenges:** Shutdown, operation and manpower required to cover the condition assessment inspections to complete the work.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	6/5/2016	7/1/2017	\$0	\$500	\$1200	\$0	\$0	\$0	\$0	\$0	\$1200	\$1700
Totals				\$0	\$500	\$1200	\$0	\$0	\$0	\$0	\$0	\$1200	\$1700



**CIP Number:** CIP 1297

**Title:** RESIDUAL HANDLING FACILITY'S DECANT FLOW MODIFICATIONS AT SOUTHWEST WTP

**Classification:** 113: Water > Treatment Plants & Facilities > Southwest

**Managing Dept:** Water Eng

**RC Score:** 44.8

**Contract No.:** CS-1730

**Significance:** Existing raw water sampling location include recycled decant flows from residual handling facilities and do not represent a true raw water sample. A new sample pump system located upstream of the recycled decant flows is needed to obtain a true raw water sample.

**Location:** Southwest WTP

**Driver:** 3 - Regulatory

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project will design the modifications necessary to eliminate the decant and recycle of solid handling flows from the raw water sample location serving the Southwest WTP. This project will provide for a representative raw water only sample that will improve process monitoring and associated chemical usage.

**Challenges:** Improvements may require another tap to the existing raw water tunnel requiring a plant shutdown (low lift pumping as a minimum). Coordination with operations required.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA	Not Yet Started	TBD	TBD	\$0	\$641	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$642
C	Not Yet Started	TBD	TBD	\$0	\$259	\$3000	\$2250	\$0	\$0	\$0	\$0	\$5250	\$5509
Totals				\$0	\$900	\$3001	\$2250	\$0	\$0	\$0	\$0	\$5251	\$6151



**CIP Number:** CIP 1298

**Title:** ELECTRICAL TUNNEL REHABILITATION AT LAKE HURON WTP

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Water Eng

**RC Score:** 31

**Contract No.:** NA

**Significance:** Existing electrical tunnel concrete has failed in the past and has seen emergency repairs. This project will provide permanent concrete and structural improvements to this tunnel that carries the primary electrical feed to the entire plant.

**Location:** Lake Huron WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Repairing electrical tunnel to prevent intrusion of water and further structural damage to concrete cables, duct banks and cable trays.

**Challenges:** None.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$0	\$1000	\$3000	\$1600	\$0	\$0	\$0	\$5600	\$5600
Totals				\$0	\$0	\$1000	\$3000	\$1600	\$0	\$0	\$0	\$5600	\$5600



Lake Huron WTP Electrical Tunnel

**CIP Number:** CIP 1299

**Title:** MISCELLANEOUS CONCRETE IMPROVEMENTS AT THE LAKE HURON WTP

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** LH-397

**Significance:** Concrete repairs to prevent further deterioration to critical structures at Lake Huron WTP

**Location:** Lake Huron WTP

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

This project includes miscellaneous concrete and other improvements at several areas in the plant where significant damage, deterioration and water leakage exists such as basement floor slab crack, concrete spalling jointing repair, roof drainage improvement, pave service roads, walls and stairwells etc.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	TBD	TBD	\$0	\$600	\$323	\$0	\$0	\$0	\$0	\$0	\$323	\$923
Totals				\$0	\$600	\$323	\$0	\$0	\$0	\$0	\$0	\$323	\$923



**CIP Number:** CIP 1300

**Title:** REPLACEMENT OF FILTER INSTRUMENTATION AND RAW WATER FLOW METERING IMPROVEMENTS AT LAKE HURON WTP

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Water Eng

**RC Score:** 62.2

**Contract No.:** CS-1771

**Significance:** The filter instrumentation and raw water metering at the Lake Huron WTP is non-functioning and is in need of replacement. Replacement of this equipment is needed for reliable plant operations.

**Location:** Lake Huron WTP

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

The filter instrumentation and raw water metering at the Lake Huron WTP is non-functioning and is in need of replacement.

**Challenges:** Venturi meters are non-standard dimensions and determining accuracy may be difficult.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D	Not Yet Started	TBD	TBD	\$0	\$200	\$400	\$410	\$60	\$0	\$0	\$0	\$870	\$1070
C	Not Yet Started	TBD	TBD	\$0	\$5000	\$11180	\$7390	\$1060	\$0	\$0	\$0	\$19630	\$24630
Totals				\$0	\$5200	\$11580	\$7800	\$1120	\$0	\$0	\$0	\$20500	\$25700



Raw Water Flow Meter



**CIP Number:** CIP 1301

**Title:** COMPREHENSIVE CONDITION ASSESSMENT AT WATERWORKS PARK WTP

**Classification:** 115: Water > Treatment Plants & Facilities > Water Works Park

**Managing Dept:** Water Eng

**RC Score:** 32

**Contract No.:** NA

**Significance:** A condition assessment of Waterworks Park Water Treatment Plant has not been completed since the 2004 reconstruction. Condition assessment is needed to identify critical assets in need of repair or replacement.

**Location:** Waterworks Park WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

A condition assessment of Waterworks Park Water Treatment Plant has not been completed since the 2004 reconstruction. Continued and periodic inspection of the Water Treatment Plant is needed to maintain a reliable production system, especially given the reliance on Waterworks Park to provide finish water to the Northeast Service Area.

**Challenges:** Coordinating shutdowns required for condition assessment inspections.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$200	\$375	\$0	\$0	\$0	\$0	\$0	\$375	\$575
Totals				\$0	\$200	\$375	\$0	\$0	\$0	\$0	\$0	\$375	\$575



**CIP Number:** CIP 1303

**Title:** SUBURBAN WATER METER PIT REHABILITATION AND METER REPLACEMENT

**Classification:** 151: Water > Metering > General Purpose

**Managing Dept:** Systems Planning

**RC Score:** NA

**Contract No.:** NA

**Significance:** Improving meter data reliability, ensuring accurate billing, improving customer service and allow high quality analysis of the system

**Location:** Various meter locations in Transmission System

**Driver:** 2 - Performance

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The Proposed improvements should include the following; The replacements of meters that have surpassed their life expectancy, and or the current flow rates exceed the mechanical limits of the meter. Installing entrance hatches that allow safer ingress, and egress, and that can be locked for security. Sand blasting and painting of piping and walls. Waterproofing meter vaults to keep the ground water out. Provide a proper floor slope in meter chambers that allow water to settle in puddles. Repairing damage sump pump discharge lines. Repairing any structural deficiencies in the meter chambers, loose concrete, bricks, and ladder rungs. Installing access tunnels for the meter location that require extensive traffic control, or are very dangerous to enter because of the entrance location. Upgrading and repairing damaged electrical fixtures in the meter vaults. Weather proofing the meter control cabinets, chalking, replacing rubber door seals, replacing missing foam insulation, replacing upgrading cabinet heaters, repairing damaged locking mechanisms. Improving, or paving the access roads, and or parking for meter locations that have limited parking or get overgrown with foliage in the summer time.

**Challenges:** Requires temporary shutdown of the water supply through the meter

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$500	\$4000	\$4000	\$4000	\$4000	\$4000	\$0	\$20000	\$20500
Totals				\$0	\$500	\$4000	\$4000	\$4000	\$4000	\$4000	\$0	\$20000	\$20500



**CIP Number:** CIP 1305

**Title:** NEW WATERWORKS PARK TO NORTHEAST TRANSMISSION MAIN

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Water Eng

**RC Score:** 56.4

**Contract No.:** NA

**Significance:** New Transmission System needed to convey finish water to re-purposed Northeast WTP.

**Location:** WWP to NE WTP

**Driver:** 8 - Efficiency

**Explanation:** Not provided.

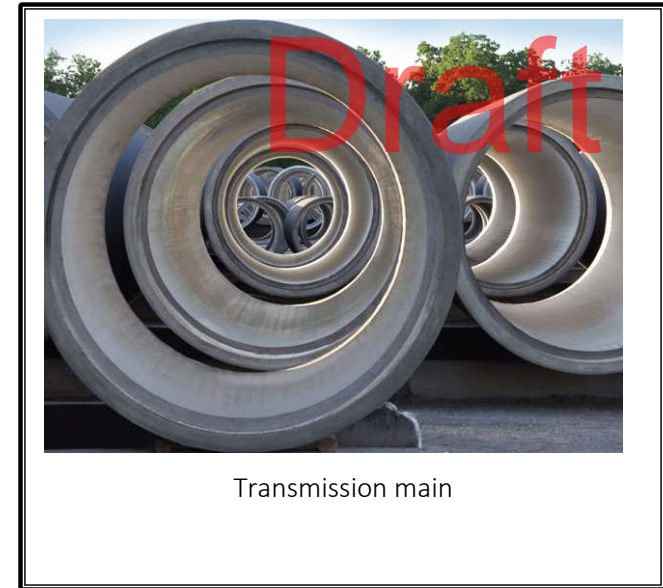
**Preliminary Scope of Work:**

GLWA system has excess treatment capacity. In order to right-size system capacity and avoid future treatment upgrade, treatment is to be discontinued at the Northeast WTP. In order to discontinue treatment at Northeast, a new finish water supply from Waterworks Park to Northeast is needed.

**Challenges:** Route determination, utility conflicts and connections to yard piping at Northeast and Water Works Park WTPs. The large new main will cross I-94 and run through 7 miles of residential/commercial streets.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$6900	\$29600	\$48300	\$32000	\$10000	\$3200	\$126800	\$130000
Totals				\$0	\$0	\$6900	\$29600	\$48300	\$32000	\$10000	\$3200	\$126800	\$130000



**CIP Number:** CIP 1306

**Title:** YARD PIPING IMPROVEMENTS AT SPRINGWELLS WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 62.2

**Contract No.:** NA

**Significance:** Existing yard piping is original riveted steel early 1930s main and requires replacement to reduce leakage and the potential for catastrophic breaks

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Existing yard piping is original riveted steel early 1930s and has experienced leaks. These leaks have potential to disrupt service to Springwells Service area customers. Formerly CIP 1248.

**Challenges:** Complex construction sequencing, and reliability of existing gate valves for isolation will be critical. Design will need to address the isolation valve issue, as well as the condition of the existing yard piping being connected to.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$2000	\$7000	\$8000	\$8000	\$0	\$25000	\$25000
Totals				\$0	\$0	\$0	\$2000	\$7000	\$8000	\$8000	\$0	\$25000	\$25000



**CIP Number:** CIP 1307

**Title:** STEAM, CONDENSATE RETURN, AND COMPRESSED AIR PIPING IMPROVEMENTS AT SPRINGWELLS WTP

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 58.8

**Contract No.:** CS-1671

**Significance:** These existing mechanical systems are largely broken and leaking creating an inefficient use of energy.

**Location:** Springwells WTP

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

This engineering services contract involves designing a new, more energy-efficient steam heating system for the entire Springwells Water Treatment Plant, including all steam unit heaters, steam piping, condensate return piping, condensate return pumping stations, steam pressure reducing valves, and appurtenances. This project also involves replacing the compressed air piping in the plant used for service air. Once completed, the project will provide energy savings by eliminating extensive steam and condensate leaking currently inherent in the antiquated system. This project includes design and construction administration (CS-1671) and construction (SP-TBD) to replace the leaking steam piping, condensate return piping and compressed air piping throughout the Springwells WTP. The scope of work includes replacing inefficient unit heaters, radiators, condensate return pump stations, pressure reducing valves, regulators, and heating system appurtenances throughout the plant. Once completed, the project will provide energy savings by eliminating extensive steam and condensate leaking currently inherent in the antiquated system.

**Challenges:** Many components of the existing system are original to the existing heating system, are not functioning and need to be demolished/removed. Seasonal work and sequencing with the heating season is required.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA	Not Yet Started	TBD	TBD	\$0	\$100	\$120	\$250	\$0	\$0	\$0	\$0	\$370	\$470
C	Not Yet Started	TBD	TBD	\$0	\$2000	\$3000	\$1250	\$0	\$0	\$0	\$0	\$4250	\$6250
Totals				\$0	\$2100	\$3120	\$1500	\$0	\$0	\$0	\$0	\$4620	\$6720



**CIP Number:** CIP 1318

**Title:** LAKE HURON WTP-RAW SLUDGE CLARIFIER AND RAW SLUDGE PUMPING SYSTEM IMPROVEMENTS

**Classification:** 111: Water > Treatment Plants & Facilities > Lake Huron

**Managing Dept:** Water Eng

**RC Score:** 53.2

**Contract No.:** NA

**Significance:** This project will provide a study and design on the structural integrity, capacity and performance requirements for pumps and piping to meet maximum design flows. The construction services will re-construct the clarifiers, piping and pumps to meet the design capacity.

**Location:** Lake Huron WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The sludge clarifier is integral to the backwash water treatment system and the walls of the clarifiers are severely bowed and in the process of failing. If the clarifier and backwash tank fail, the ability to backwash the Lake Huron WTP filters will be lost and result in the loss of the Lake Huron WTP to the system until a temporary bypass can be arranged.

**Challenges:** Improvements will require coordination with plant operations (filter backwashing).

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$100	\$1000	\$3500	\$2533	\$0	\$0	\$0	\$7033	\$7133
Totals				\$0	\$100	\$1000	\$3500	\$2533	\$0	\$0	\$0	\$7033	\$7133



Raw sludge clarifier at Lake Huron WTP



**CIP Number:** CIP 1320

**Title:** SPRINGWELLS WATER TREATMENT PLANT 1930 FILTER BUILDING-  
ROOF REPLACEMENT

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** 59.4

**Contract No.:** NA

**Significance:** The existing roof over the 1930 filters is leaking in places and poses water quality concerns due to roof leaks.

**Location:** Springwells WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

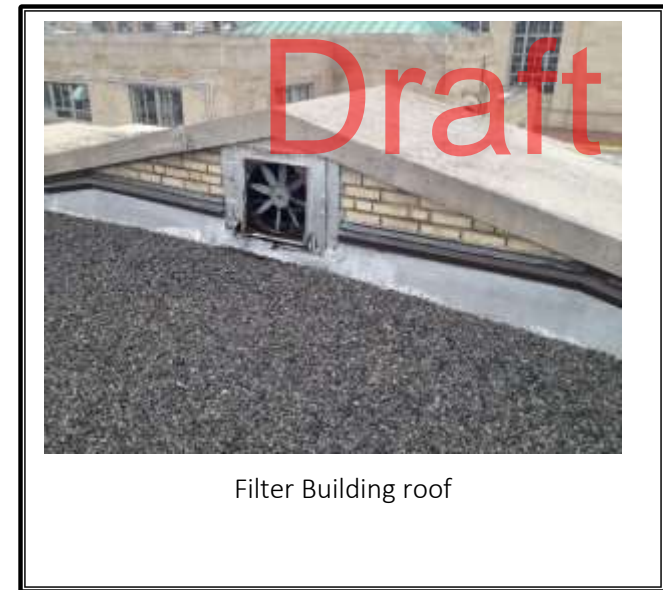
**Preliminary Scope of Work:**

This project encompasses replacement of the existing 1930 Filter Building roofing system, including the built-up roofing material, flashing, roof drains/conductors and sealing cap stones to prevent water from penetrating the building envelop and causing water damage. Construction activity under Contract SP-563 in 2014-2015 revealed that water damage has been on-going and is causing clerestory window lintel deterioration. Additionally, construction traffic under Contract SP-563 has shown the built-up material to be blistering and spongy.

**Challenges:** Seasonal construction work, and construction will require working around new rooftop equipment installed under SP-563.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$3000	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$3001
Totals				\$0	\$3000	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$3001



**CIP Number:** CIP 1321

**Title:** 96-INCH MAIN RELOCATION, ISOLATION VALVES INSTALLATIONS, AND NEW PARALLEL MAIN

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Water Eng

**RC Score:** 65.2

**Contract No.:** NA

**Significance:** Project critical to providing redundancy to Lake Huron WTP supply and protection of water supply from potential contamination. Project includes relocation around existing landfill and addition of a parallel main with interconnection to meters between Romeo and 24 Mile Road.

**Location:** Imlay Station to North Service Center

**Driver:** 2 - Performance

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Relocate 2.5 miles of 96-inch transmission main currently located in an EPA NPL landfill, a portion of which is submerged in landfill leachate. Relocation includes crossing the Clinton River, coordination with many various authorities having jurisdiction and easement acquisition. Isolation valve installation portion of the project provides the ability to isolate segments of the 96-inch main between Imlay Station and North Service Center for maintenance while maintaining customer expected level of service.

**Challenges:** Shutdown, isolation and live tapping of the 96" main while maintaining the Lake Huron WTP supply and operations of Rochester Station. Routing and possible property acquisition for both the parallel main and relocation around the landfill.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$1100	\$3200	\$13500	\$27300	\$30000	\$63900	\$75100	\$139000
Totals				\$0	\$0	\$1100	\$3200	\$13500	\$27300	\$30000	\$63900	\$75100	\$139000



**CIP Number:** CIP 1323

**Title:** TRANSMISSION SYSTEM WATER MAIN WORK - REPLACEMENT OF SCHOOLCRAFT WATER MAIN

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** NA

**Significance:** Improving transmission system reliability and redundancy

**Location:** Schoolcraft water main

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Design work of a new 48-inch transmission main along I-96 under the freeway service drive. Due to excessive breaks the Schoolcraft water main in Redford/Livonia will be replaced. The purpose is to improve the transmission system reliability/redundancy.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$7300	\$7250	\$0	\$0	\$0	\$14550	\$14550
Totals				\$0	\$0	\$0	\$7300	\$7250	\$0	\$0	\$0	\$14550	\$14550



Water main replacement

**CIP Number:** CIP 1324

**Title:** TRANSMISSION SYSTEM WATER MAIN WORK-WICK ROAD PARALLEL WATER MAIN

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** NA

**Significance:** Placement of parallel water main to minimize service disruptions to customer communities

**Location:** Romulus

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Construction of the new 48-inch transmission main along a principal roadway in Romulus. Original water main from Wick station to Ypsilanti station has history of excessive breaks. Additionally, the main is the only principal connection between the two facilities with multiple community Master Meters along its length. A break in this line is disruptive to several communities dependent upon this supply line. The purpose is to improve the transmission system reliability/redundancy.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$10000	\$9350	\$0	\$0	\$0	\$0	\$0	\$9350	\$19350
Totals				\$0	\$10000	\$9350	\$0	\$0	\$0	\$0	\$0	\$9350	\$19350



**CIP Number:** CIP 1325

**Title:** RESERVOIR INSPECTION, DESIGN AND REHABILITATION AT IMLAY STATION, ADAMS STATION, HAGGERTY STATION, LH-WTP, SP-WTP AND SW-WTP

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** Complete the routine inspection, design and rehabilitation of reservoirs 1/19/2016 1 44 41PM to maintain system reliability.

**Location:** Imlay Station, Adams Station, Haggerty Station, LH-WTP, SP-WTP, SW-WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Complete the routine inspection, design and rehabilitation of reservoirs to maintain system reliability.

**Challenges:** Coordination with operations for shutdowns required to complete the inspection and construction work. System demand dependent.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$1000	\$2500	\$2500	\$2500	\$2500	\$0	\$0	\$10000	\$11000
Totals				\$0	\$1000	\$2500	\$2500	\$2500	\$2500	\$0	\$0	\$10000	\$11000



**CIP Number:** CIP 1326

**Title:** DESIGN AND CONSTRUCTION OF A NEW NEWBURGH ROAD 24" MAIN ALONG NEWBURGH ROAD BETWEEN CHERRY HILL AND GLENWOOD AVENUE

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** WS-699

**Significance:** Project identified in the 2015 Water Master Plan Update; improves system reliability, redundancy, and provides operational savings

**Location:** Newburgh Road, Cherry Hill to Glenwood Ave

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project involves design and construction services associated with the installation of 10,000 feet of new 24-inch transmission main on Newburgh Road, from Cherry Hill to Glenwood Avenue.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$0	\$1800	\$2200	\$0	\$0	\$0	\$0	\$4000	\$4000
Totals				\$0	\$0	\$1800	\$2200	\$0	\$0	\$0	\$0	\$4000	\$4000



Water main installation



**CIP Number:** CIP 1327

**Title:** PENNSYLVANIA, SPRINGWELLS AND NORTHEAST RAW WATER SUPPLY TUNNEL IMPROVEMENTS BASED ON CONTRACT CS-1623 INSPECTION RESULTS

**Classification:** 116: Water > Treatment Plants & Facilities > General Purpose

**Managing Dept:** Water Eng

**RC Score:** 64.4

**Contract No.:** NA

**Significance:** Project critical to production at Springwells WTP during repurposing of Northeast WTP as recommended by the 2015 WMPU. Contract CS-1623 identified problem areas on the raw water supply system that compromised the system's ability to meet demands during the repurposing of Northeast WTP.

**Location:** Springwells, Northeast, & Pennsylvania raw water tunnels

**Driver:** 1 - Condition

**Explanation:** Failure of the affected raw water tunnels could impact as much as 50% of the GLWA customers.

**Preliminary Scope of Work:**

The scope of work is to conduct supplemental investigations to design the repairs for the sections of tunnel identified in CS-1623 as having structural concerns. Three areas were identified with the highest concern being a portion of the Springwells Tunnel near the Springwells WTP.

**Challenges:** The tunnels are approximately 80 feet below the surface of the Detroit River. This poses challenges for assessing the extent of damage to the structures, as well as repair. Dewatering the tunnels to repair them will create extensive stresses that must be considered prior to performing the work.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D	Not Yet Started	NA	NA	\$0	\$500	\$180	\$0	\$0	\$0	\$0	\$0	\$180	\$680
C	Not Yet Started	NA	NA	\$0	\$0	\$1320	\$3900	\$9200	\$11400	\$6400	\$0	\$32220	\$32220
Totals				\$0	\$500	\$1500	\$3900	\$9200	\$11400	\$6400	\$0	\$32400	\$32900



**CIP Number:** CIP 1333

**Title:** DOWNRIVER TRANSMISSION SYSTEM NEEDS ASSESSMENT

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:**

**Significance:** Study redundancy in the Downriver portion of the water transmission system through use of community distribution mains

**Location:** Downriver

**Driver:** N/A

**Explanation:** Not provided.

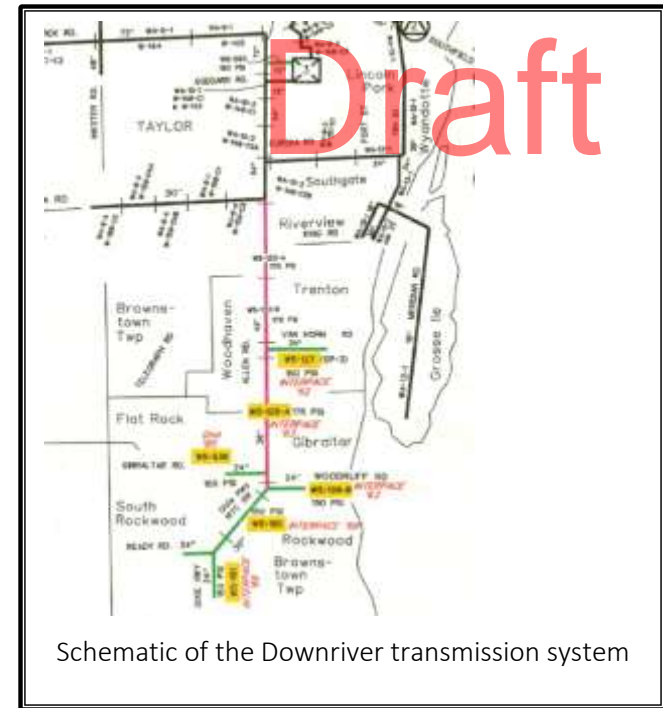
**Preliminary Scope of Work:**

Analytical Workgroup and Master Plan teams indicated concerns with the lack of redundancy issues along the Downriver branch of the water transmission system. These analyses indicate that a disruption of service to the main downriver feed – the Allen Road transmission main, north of Pennsylvania Road - would affect 18 wholesale meters and would cut-off service to Brownstown Township, Berlin Township, Flat Rock, Gibraltar, Rockwood, South Rockwood and Woodhaven. A multi-community cooperative hydraulic model and study is recommended to develop alternatives and emergency contingencies.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$400	\$100	\$500	\$0	\$0	\$0	\$0	\$600	\$1000
Totals				\$0	\$400	\$100	\$500	\$0	\$0	\$0	\$0	\$600	\$1000



**CIP Number:** CIP 1334

**Title:** STUDY PHASE SERVICES FOR PROPOSED EAST SERVICE CENTER BOOSTER PUMPING STATION AND RESERVOIR

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** 55.6

**Contract No.:** NA

**Significance:** Demands from the Rochester Pump Station may exceed the station's firm capacity. A study is needed to evaluate if a new pump station and reservoir is needed at the existing Snover control valve.

**Location:** Proposed East Service Center

**Driver:** 2 - Performance

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This study will provide an evaluation of alternatives to improve redundancy and capacity within the 24-Mile Road branch of the transmission system.

**Challenges:** Coordination with the pumping station needs assessment and repurposing of Northeast WTP.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$400	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$500
Totals				\$0	\$400	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$500



**CIP Number:** CIP 1336

**Title:** WEST SERVICE CENTER/DUVAL RD DIVISION VALVE UPGRADES

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Water Eng

**RC Score:** 54

**Contract No.:** NA

**Significance:** Study and condition assessment of West Service Center Division Valves is needed to convey Lake Huron flows through the West Service Center to the Springwells high service area while the Springwells raw water tunnel is out of service for repairs.

**Location:** West Service Center

**Driver:** 2 - Performance

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Lake Huron WTP needs to provide flows to the Springwells high service area while the Springwells raw water tunnel is out of service for repair.

**Challenges:** Coordination with operations critical meet testing of existing valves. Isolation, shutdown and operation of Lake Huron and Springwells WTPs, North Service Center, and other facilities.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$0	\$4200	\$7600	\$0	\$0	\$0	\$0	\$11800	\$11800
Totals				\$0	\$0	\$4200	\$7600	\$0	\$0	\$0	\$0	\$11800	\$11800

Picture not  
**Draft**  
 available

**CIP Number:** CIP 1347

**Title:** ENERGY MANAGEMENT: WEST SERVICE CENTER (WSC) VFD INSTALLATION

**Classification:** 132: Water > SCC > Pump Station/Reservoir

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** NA

**Significance:** Install Variable Frequency Drives at West Service Center Pump Station to reduce electrical costs

**Location:** West Service Center

**Driver:** N/A

**Explanation:** Not provided.

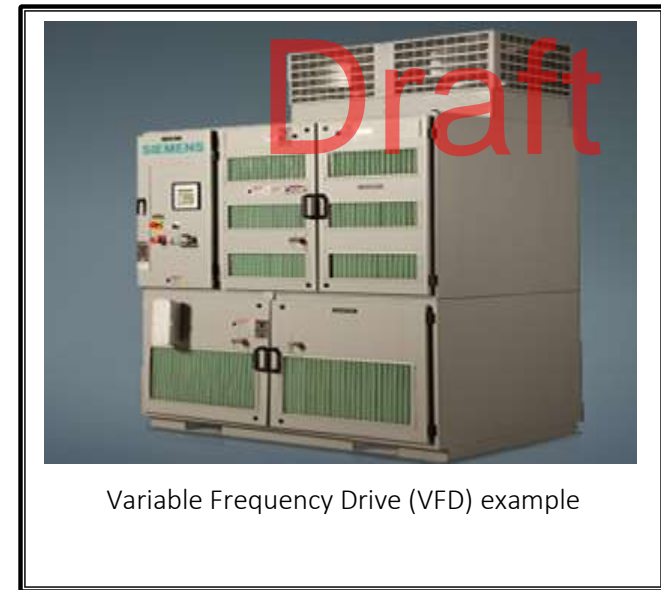
**Preliminary Scope of Work:**

To match the non-peak demands the valves are throttled at the station, resulting in loss of energy. This project will install Variable Frequency Drives (VFD) on 700 Hp and 1250 Hp constant speed pumps. VFDs provide better flow and pressure control while providing significant energy savings.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$500	\$1667	\$1667	\$0	\$0	\$0	\$0	\$3334	\$3834
Totals				\$0	\$500	\$1667	\$1667	\$0	\$0	\$0	\$0	\$3334	\$3834



**CIP Number:** CIP 1350

**Title:** WATER SYSTEM IMPROVEMENTS IN JOY ROAD FROM SOUTHFIELD ROAD TO TRINITY

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** WS-691

**Significance:** Replacement of original piping with excessive break history with new ductile iron main along Wayne County roadway

**Location:** Joy Road, Southfield Rd to Trinity Rd

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

The work consists of replacement of existing distribution mains and existing 24-inch transmissions mains, including gate valve, blow offs, air release valves and other appurtenances along Joy Road from Southfield Freeway to Trinity Road in the City of Detroit. A portion of this work is part of the Retail system (not included in this amount) CIP No. 463. Joy Road is also a significant Wayne County roadway within Detroit and a DDOT bus route.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C 5	Not Yet Started	8/11/2014	8/10/2016	\$8323	\$100	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8423
Totals				\$8323	\$100	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8423



Water main being laid



**CIP Number:** CIP 1351

**Title:** WATER MAIN REPLACEMENT WITHIN THE CITY OF DETROIT - JOY RD FROM GREENFIELD TO SCHAEFER AND DAVISON AVE FROM LINDWOOD TO LIVERNOIS

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** WS-693

**Significance:** Original piping has history of excessive breaks; replacing to minimize disruption in high-traffic area

**Location:** Joy Road & Davison Road

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

Work includes replacement of approx. 18500 ft. of existing water main with 8", 12", and 16" DI pipe along both Joy Rd and Davison. The scope of work also includes approx. 5300 ft. of 24" DI pipe along Joy Rd. A portion of this work is part of the Retail system (amounts not included) CIP No. 463.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C 6	Not Yet Started	8/1/2016	8/1/2018	\$0	\$1370	\$1106	\$652	\$0	\$0	\$0	\$0	\$1758	\$3128
Totals				\$0	\$1370	\$1106	\$652	\$0	\$0	\$0	\$0	\$1758	\$3128



Water main being replaced

**CIP Number:** CIP 1355

**Title:** LAPEER COUNTY CHLORINE BOOSTER STATIONS AND ISOLATION VALVE FOR 72-INCH TRANSMISSION MAIN

**Classification:** 116: Water > Treatment Plants & Facilities > General Purpose

**Managing Dept:** Water Eng

**RC Score:** 54.6

**Contract No.:** NA

**Significance:** Project critical to maintaining chlorine residual to customers connected to the 72" main feeding Flint and Genesee County and abandonment of the 72" main once Flint and Genesee County are off the system. Projects need to be substantially complete by July 2017.

**Location:** Lapeer County

**Driver:** 5 - Public Health & Safety

**Explanation:** Not provided.

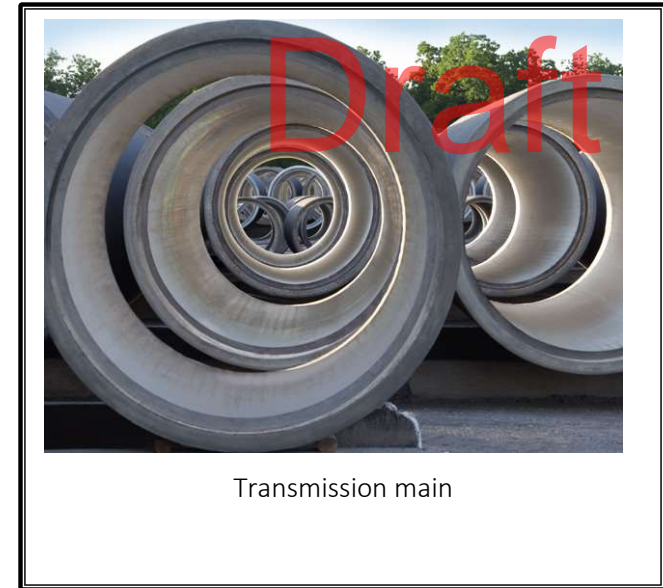
**Preliminary Scope of Work:**

With the departure of Flint and Genesee County from the GLWA system, the water age in the 72-inch transmission main increases to levels where minimum chlorine residuals cannot be maintained. Chlorine booster stations are needed along the 72-inch transmission main to maintain acceptable chlorine residuals.

**Challenges:** Live tapping and line stops on 72" PCCP required for both projects and is specialized construction. Work requires close coordination with operations to meet pressure requirements required to tap the pipe.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB	Not Yet Started	NA	NA	\$0	\$7015	\$1000	\$0	\$0	\$0	\$0	\$0	\$1000	\$8015
Totals				\$0	\$7015	\$1000	\$0	\$0	\$0	\$0	\$0	\$1000	\$8015



**CIP Number:** CIP 1356

**Title:** TRANSMISSION SYSTEM VALVE ASSESSMENT AND REHABILITATION/REPLACEMENT

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Water Eng

**RC Score:** 66.8

**Contract No.:** NA

**Significance:** Replacement/Rehabilitation of GLWA Transmission System Gate Valves will aid in implementing a regular valve exercising program as recommended by AWWA as well as increase the reliability of the transmission system.

**Location:** Transmission System Gate Valves

**Driver:** 1 - Condition

**Explanation:** Conditions of many of the gate valves are unknown and unreliable.

**Preliminary Scope of Work:**

Evaluate the existing conditions, provide the necessary replacement/ rehabilitation option, design and implement them.

**Challenges:** May require shutdown of large transmission mains.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB	New	NA	NA	\$0	\$0	\$2930	\$3100	\$3100	\$3100	\$3100	\$0	\$15330	\$15330
Totals				\$0	\$0	\$2930	\$3100	\$3100	\$3100	\$3100	\$0	\$15330	\$15330



A large valve for a transmission pipe.

**CIP Number:** CIP 1389\*

**Title:** SPRINGWELLS RESERVOIR FILL LINE IMPROVEMENTS

**Classification:** 114: Water > Treatment Plants & Facilities > Springwells

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** SCP-CS-038

**Significance:** Reservoir fill line to Springwells is needed to provide finish water to the Springwells high service area from Southwest and Waterworks Park while the Springwells raw water tunnel is out of service for repairs.

**Location:** SPW WTP

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Reservoir fill line to Springwells is needed to provide finish water to the Springwells high service area from Southwest and Waterworks Park while the Springwells raw water tunnel is out of service for repairs.

**Challenges:** Very complicated sequence of construction, and coordination with wholesale customers is required.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA	Under Procurement	TBD	TBD	\$0	\$200	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$300
C	Not Yet Started	NA	NA	\$0	\$0	\$3200	\$4000	\$0	\$0	\$0	\$0	\$7200	\$7200
Totals				\$0	\$200	\$3300	\$4000	\$0	\$0	\$0	\$0	\$7300	\$7500



\*Project originated from Water Treatment Plant/Pump Station Allowance (CIP 1256)

**CIP Number:** CIP 1400

**Title:** WATER TRANSMISSION MAIN ASSET ASSESSMENT PROGRAM

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** Many of the water mains serving the GLWA service area were installed in the early part of the 20th century or the later part of the 19th century, and are now reaching the end of their useful life span. Condition assessment is a process that helps to establish a record of the state of water pipelines. It's essential for cost-efficient repair and replacement programs which in turn will increase the reliability and performance of the system.

**Location:** Transmission Mains

**Driver:** 1 - Condition

**Explanation:** Conditions of many of the gate valves are unknown and unreliable.

**Preliminary Scope of Work:**

Evaluate the existing conditions of the transmission system, provide the necessary recommendation for replacement/ rehabilitation.

**Challenges:** Gaining access to inspect buried pipes is difficult, disruptive and costly. However, there are ways to monitor and test the condition of the piping and methods of performing condition assessment

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	New	NA	NA	\$0	\$0	\$2626	\$2000	\$2000	\$2000	\$2000	\$0	\$10626	\$10626
Totals				\$0	\$0	\$2626	\$2000	\$2000	\$2000	\$2000	\$0	\$10626	\$10626

Picture not  
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 available

**CIP Number:** CIP 1401

**Title:** WATER TREATMENT PLANT AUTOMATION PROGRAM

**Classification:** 116: Water > Treatment Plants & Facilities > General Purpose

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** The automation design and construction project comes from recommendations that identified existing station process data conditions, station needs, GLWA mission critical assets, alternative improvement options to address identified needs, recommended improvements to address the needs, prioritized projects based on the GLWA CIP scoring tool, and a scheduling for making the improvements along with associated capital improvement budgets associated with each project established under CS-108.

**Location:** Water Treatment Plants

**Driver:** 8 - Efficiency

**Explanation:** This automation would be one of the main drivers for increased efficiency in data monitoring and regulatory reporting and reduced workload and maintenance cost.

**Preliminary Scope of Work:**

The purpose of this project is to implement the recommendations from CS-108 that are prioritized in five (5) year increments with an estimated cost of \$1 million dollars per year over a twenty (20) year span.

**Challenges:** Standardization of multiple different data process equipment already installed throughout the 5 plants could be a problem.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	New	NA	NA	\$0	\$0	\$1000	\$1000	\$1000	\$1000	\$1000	\$0	\$5000	\$5000
Totals				\$0	\$0	\$1000	\$1000	\$1000	\$1000	\$1000	\$0	\$5000	\$5000





**CIP Number:** CIP 1403\*

**Title:** PARK-MERRIMAN WATER MAIN-FINAL PHASE

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** WS-699

**Significance:** Replacement of new water main to convert deduct water meters to direct connection meters

**Location:** Telegraph Rd, Cherry Hill to Warren Ave

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This third and final leg of the 24" water main project will convert a handful of DWSD Master Meters from a deduct to direct connection service and retire Master Meter WY-01 in favor of two new Master Meter vaults.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C 2	Not Yet Started	NA	NA	\$0	\$0	\$1800	\$2200	\$0	\$0	\$0	\$0	\$4000	\$4000
Totals				\$0	\$0	\$1800	\$2200	\$0	\$0	\$0	\$0	\$4000	\$4000

\*Created out of the Water Transmission Improvement Program



Water main being installed

**CIP Number:** CIP 1404

**Title:** 36-INCH WATER MAIN IN TELEGRAPH ROAD

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** WS-684A

**Significance:** Excessive joint leaks warrant replacement; new water line to be placed in greenbelt

**Location:** Telegraph Rd, Cherry Hill to Warren Ave

**Driver:** N/A - Active

**Explanation:** N/A - Active

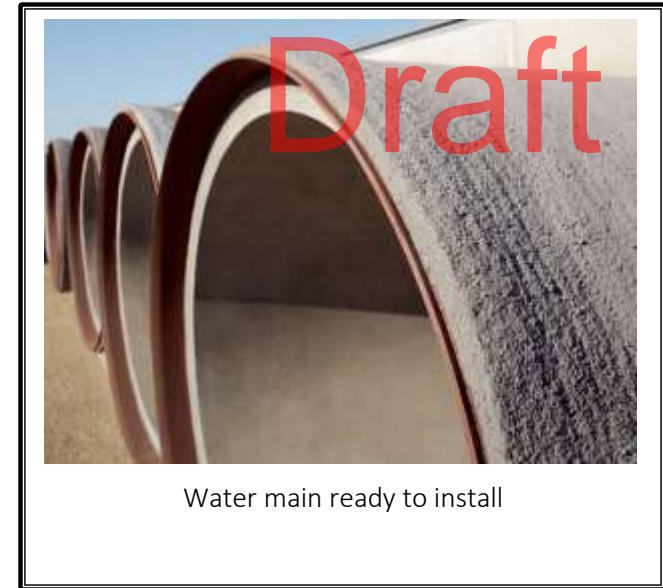
**Preliminary Scope of Work:**

This project includes installation of approximately 10,530 feet of 36-inch dia. water main in Telegraph Road from Cherry Hill to Warren Ave.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	11/12/2013	6/19/2016	\$0	\$2000	\$5061	\$0	\$0	\$0	\$0	\$0	\$5061	\$7061
Totals				\$0	\$2000	\$5061	\$0	\$0	\$0	\$0	\$0	\$5061	\$7061



**CIP Number:** CIP 1405

**Title:** LYON TOWNSHIP TRANSMISSION MAIN EXTENSION PROJECT

**Classification:** 122: Water > Field Services > Transmission System

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** This project involves installation of approximately 23,000 feet of 54-inch transmission main to provide service to Lyon Township. The proposed transmission main extension also serves as phase 1 of a larger project to provide a looped connection between the 14 Mile transmission and 8 Mile transmission systems.

**Location:** Beck/West Maple to Napier/Grand River

**Driver:** 7 - Financial

**Explanation:** Additional purchase volume (new customers) defrays fixed costs of operating and maintaining the system ensuring the long-term financial viability of the system.

**Preliminary Scope of Work:**

The preliminary scope of work for this project includes study, design, and construction for a proposed 54-inch, 23,000 foot transmission main from Maple and Beck to Grand River and Napier.

**Challenges:** Potential challenges include construction schedule for completion of the project. Lyon Township has indicated that they would like to connect to the system in the next three years.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	New	NA	NA	\$0	\$1300	\$10500	\$12000	\$6000	\$0	\$0	\$0	\$28500	\$29800
Totals				\$0	\$1300	\$10500	\$12000	\$6000	\$0	\$0	\$0	\$28500	\$29800



## SECTION 2 WASTEWATER

# Draft

**CIP Number:** CIP 291

**Title:** REHABILITATION OF PRIMARY CLARIFIERS RECTANGULAR TANKS, DRAIN LINES, ELECTRICAL/MECHANICAL BUILDING AND PIPE GALLERY

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** PC-757

**Significance:** Rehabilitation for meeting NPDES Permit and NEC requirements

**Location:** WRRF

**Driver:** N/A - Active

**Explanation:** N/A - Active

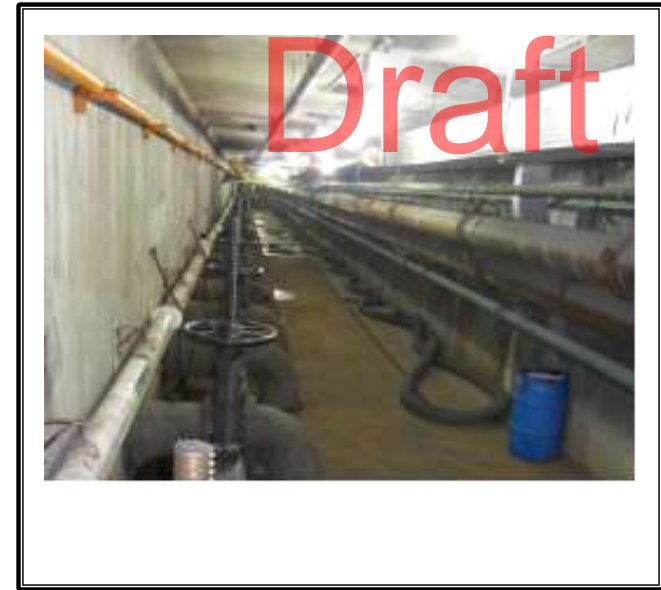
**Preliminary Scope of Work:**

The work to be completed under this project will include installing ventilation and atmospheric control for the pipe gallery; providing new lights and emergency lights, etc.. This work also includes rehabilitation of 12 drain lines from rectangular clarifiers 3-12, circular clarifiers 16 and 16, installation of large manhole with sump pumps to collect drainage and discharge to clarifier, and concrete crack repairs, and rehabilitation work in Electrical/Mechanical Building.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Active	TBD	TBD	\$0	\$17500	\$18000	\$17000	\$4300	\$0	\$0	\$0	\$39300	\$56800
Totals				\$0	\$17500	\$18000	\$17000	\$4300	\$0	\$0	\$0	\$39300	\$56800



**CIP Number:** CIP 366

**Title:** UNDERGROUND ELECTRICAL DUCT BANK REPAIR AND EB-1, EB-2, AND EB-10 PRIMARY POWER SERVICE IMPROVEMENTS - WRRF

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** CS-1449, PC-783

**Significance:** Procure and install electrical power system to meet safety standards and prove third redundant electric feeder per NPDES permit

**Location:** WRRF

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

This project involves the study, design, and construction assistance work for repairing the 15KV Primary Switch Gears A & B, unit substation EB-1, EB-2, and EB-10, unit 5KV substation and switch gear DE-1, and two outdoor 3-phase primary transformers; and repair of building structure and associated components. The work will also include coordination of system shut-down, and coordination of system reconnection with new cables.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Pending Close-out	6/12/2008	6/11/2016	\$0	\$75	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$76
C	Pending Close-out	5/21/2012	5/21/2016	\$23037	\$2927	\$1532	\$0	\$0	\$0	\$0	\$0	\$1532	\$27496
Totals				\$23037	\$3002	\$1533	\$0	\$0	\$0	\$0	\$0	\$1533	\$27572





**CIP Number:** CIP 961

**Title:** PUMP STATION NO. 2 PUMPING IMPROVEMENTS

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** CS-1444, PC-795

**Significance:** Correct drifting issues of pumps and meet long term wet weather capacity needs

**Location:** WRRF

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This project involves evaluating and recommending alternatives for providing more reliable pumping capacity at Pump Station No. 2 for Pumps Nos. 11 and 14.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Active	8/11/2010	4/28/2018	\$0	\$1300	\$1890	\$200	\$0	\$0	\$0	\$0	\$2090	\$3390
C	Active	8/11/2010	8/11/2015	\$456	\$100	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$656
Totals				\$456	\$1400	\$1990	\$200	\$0	\$0	\$0	\$0	\$2190	\$4046



Pumps in Pump Station 2

**CIP Number:** CIP 1028

**Title:** PLANT-WIDE FIRE ALARM SYSTEMS UPGRADE/ INTEGRATION AND FIRE PROTECTION IMPROVEMENTS

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** CS-1443, PC-782

**Significance:** Install an integrated Fire Alarm system to facilitate centralized monitoring

**Location:** WRRF

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

This project involves the installation of an Integrated Plant-wide Fire Alarm System in approximately 100 buildings (of which 50+ have a stand-alone fire alarm system) at the WRRF in order to facilitate centralized monitoring and assure faster corrective action. The new system will be interfaced with the existing WRRF Control System.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Pending Close-out	6/12/2008	12/31/2015	\$0	\$35	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$36
C	Pending Close-out	4/15/2013	11/4/2016	\$5390	\$360	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$5751
Totals				\$5390	\$395	\$2	\$0	\$0	\$0	\$0	\$0	\$2	\$5787



**CIP Number:** CIP 1100

**Title:** RETURNED ACTIVATED SLUDGE (RAS) PUMPS, INFLUENT MIXED LIQUOR SYSTEM AND MOTOR CONTROL CENTERS (MCC) IMPROVEMENTS FOR SECONDARY CLARIFIERS

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** PC-776

**Significance:** Replace aging pump units, control and instrumentation and building enclosures

**Location:** WRRF

**Driver:** N/A

**Explanation:** N/A

**Preliminary Scope of Work:**

This project provides new power supply cable to/from secondary clarifiers and substation MCC, provides new MCCs at each secondary clarifier, provides short-circuit analysis and fault rating, replace 25 RAS pumps at the secondary clarifiers and complete all miscellaneous electrical work such as replacement of cables, conduit, pull boxes, panels and junctions boxes, etc.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Pending Close-out	8/23/2016	5/9/2016	\$24060	\$115	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$24176
Totals				\$24060	\$115	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$24176



**CIP Number:** CIP 1117

**Title:** STUDY, DESIGN, & CONSTRUCTION MANAGEMENT SERVICES FOR MODIFIED DETROIT RIVER OUTFALL NO. 2 - WRRF

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** CS-1448

**Significance:** Provide remediation and decommissioning of non-utilized portions of as-built PC-709 construction, which resulted in a flooded tunnel

**Location:** WRRF

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

The scope of work includes limited study, detailed design, preparation of construction plans, and construction management services necessary to implement the modified Detroit River Outfall No. 2 in accordance with NPDES Permit requirements.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	10/31/2006	10/31/2016	\$8449	\$55	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$8505
Totals				\$8449	\$55	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$8505



**CIP Number:** CIP 1140

**Title:** STUDY/ REPAIR POTABLE WATER, SCREENED FINAL EFFLUENT, NATURAL GAS AND COMPRESSED AIR PIPE LINES AT THE WRRF

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 55.6

**Contract No.:** NA

**Significance:** These utilities are vital to the operations of the WRRF. The integrity of these systems is necessary to operate the WRRF reliably.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** These support systems are required for the process equipment to be operable.

**Preliminary Scope of Work:**

The potable water supply to WRRF is experiencing low pressure problem. The study design and construction for the secondary water system improvements to improve reliability and water pressure to the WRRF ids required. Other tasks include repair/replace the aging and corroded pipes, valves and fittings for Potable Water Supply System. Repair/replace the aging and corroded pipes, valves and fittings for Natural Gas system. Repair/replace the aging and corroded pipes, valves and fittings for the SFE system. Repair/replace the aging and corroded pipes, valves and fittings for the Compressed Air System. Design and Install Compressed Air to supply the required air to the pneumatic tools in Pump Station #2.

**Challenges:** Temporary air, water, natural gas system shutdowns may be required to perform the work.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	NA	NA	\$0	\$50	\$190	\$400	\$150	\$100	\$0	\$0	\$840	\$890
C	Not Yet Started	NA	NA	\$0	\$0	\$500	\$1500	\$1000	\$1110	\$0	\$0	\$4110	\$4110
Totals				\$0	\$50	\$690	\$1900	\$1150	\$1210	\$0	\$0	\$4950	\$5000



Multiple pipe lines such as Potable Water, Screened Final Effluent, Natural Gas, and Compressed Air Pipe lines at the WRRF are aging, getting corroded, leaking and failing at the WRRF

**CIP Number:** CIP 1141

**Title:** REHABILITATION OF PRIMARY CLARIFIERS

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** CS-1484

**Significance:** Rehabilitation to maintain NPDES permit capacity and addressing excessive, maintenance induced downtime

**Location:** WRRF

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This project includes rehabilitation of sludge and scum collectors, replacement of sludge conveyance equipment, and sludge cross scum and collectors for the rectangular clarifiers. The scope of work also includes concrete crack repair on floor, wall, and ceiling.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	8/11/2010	7/9/2019	\$1	\$200	\$200	\$200	\$121	\$0	\$0	\$0	\$521	\$722
Totals				\$1	\$200	\$200	\$200	\$121	\$0	\$0	\$0	\$521	\$722





**CIP Number:** CIP 1144

**Title:** REPLACEMENT OF BELT FILTER PRESSES FOR COMPLEX I AND UPPER LEVEL COMPLEX II

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** CS-1483, PC-787

**Significance:** Study, design and construction assistance of equipment experiencing numerous breakdowns and for meeting permit capacities

**Location:** WRRF

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

The work will consist of replacements of 10 Belt Filter Presses for Complex 1 and 12 Belt Filter Presses for Complex II Dewatering, Screened Final Effluent booster pumps, sludge belt conveyors, sludge grinders, and all related supportive equipment including control panels and associated wiring.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	5/21/2012	8/3/2016	\$2	\$114	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$117
C	Not Yet Started	1/11/2010	12/31/2016	\$27	\$989	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$1017
Totals				\$29	\$1103	\$2	\$0	\$0	\$0	\$0	\$0	\$2	\$1134



Belt filter presses

**CIP Number:** CIP 1189

**Title:** PUMP STATION 1 RACK & GRIT AND MPI SAMPLING STATION 1 IMPROVEMENTS

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** PC-789

**Significance:** Rehabilitate aging rack and grit system for efficient removal of grit to reduce loading on downstream process areas

**Location:** WRRF

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

The scope of work includes modifications and improvements of the existing grit and screening handling system at Pump Station 1 and MPI Sampling Station 1.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	11/18/2013	7/30/2017	\$13887	\$2776	\$4252	\$0	\$0	\$0	\$0	\$0	\$4252	\$20915
Totals				\$13887	\$2776	\$4252	\$0	\$0	\$0	\$0	\$0	\$4252	\$20915



Rack and Grit

**CIP Number:** CIP 1194

**Title:** AERATION SYSTEM IMPROVEMENTS

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** CS-1498, PC-796

**Significance:** Improve aeration system and provide necessary inter-connections

**Location:** WRRF

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

The scope of work includes study, design, and construction assistance for the oxygen baffle on Bay 10 of A1 & A2 decks, replacement of influent, Return Activated Sludge (RAS) piping, isolation gate and valves for decks Nos. 3 & 4, replace RAS and influent magmeters for Intermediate Lift Pumps (ILP) Nos. 3, 4 & 7. The work also includes replacement of influent gates and operators on Aeration Deck No. 1 & 2.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Active	2/21/2012	2/28/2018	\$0	\$202	\$93	\$0	\$0	\$0	\$0	\$0	\$93	\$295
C	Under Procurement	TBD	TBD	\$0	\$5450	\$8500	\$5600	\$0	\$0	\$0	\$0	\$14100	\$19550
Totals				\$0	\$5652	\$8593	\$5600	\$0	\$0	\$0	\$0	\$14193	\$19845



**CIP Number:** CIP 1221

**Title:** REHABILITATION OF CENTRAL OFFLOAD FACILITY

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** 60.2

**Contract No.:** CS-1701

**Significance:** Refurbishment or replacement of COF equipment including sludge storage bins, conveyors, and lime offload system, scrubber system, HVAC, etc., will improve reliability and performance. This improvement will enable WRRF to be in compliance with NPDES permit.

**Location:** N. Side of Complex A (BSD Facility)

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

The scope of work for the rehabilitation of the central offload facility includes bin activators, rotary feeder valves, knife gate valves, bottom hoppers, conveyors, and other associated items. The work also includes rehabilitation of HVAC system of the entire facility, lime offloading system, drainage system, elevator, and doors.

**Challenges:** Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Under Procurement	TBD	TBD	\$0	\$800	\$350	\$250	\$350	\$0	\$0	\$0	\$950	\$1750
C	Not Yet Started	NA	NA	\$0	\$0	\$5500	\$6500	\$4000	\$0	\$0	\$0	\$16000	\$16000
Totals				\$0	\$800	\$5850	\$6750	\$4350	\$0	\$0	\$0	\$16950	\$17750



Powdered lime discharges into the COF causing lime to discharge throughout the building making the scrubber system to fail.

**CIP Number:** CIP 1222

**Title:** REPLACEMENT OF CHLORINATION AND DECHLORINATION EQUIPMENT AT THE WRRF

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** WW Eng

**RC Score:** 52.8

**Contract No.:** NA

**Significance:** The disinfection complex equipment condition has deteriorated because of the corrosive characteristics of the chemicals utilized in the operations of the area. This project is needed to restore equipment performance to OEM levels.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** Non-compliance with the manufacturers recommended maintenance schedule has caused the disinfection equipment condition to deteriorate.

**Preliminary Scope of Work:**

Scope of Work is to refurbish evaporators, chlorinators/sulfonators, replace regulating check valves, ejectors, process water valves, gas safety panels, compressors, gas flow meters, and all accessories and appurtenances. The RRO disinfection project's PC-797 control and existing DRO Chlorination and De-chlorination system controls needs to be integrated during the design and construction phase of "RRO Disinfection Project PC-797" in order to meet future NPDES Permit requirements. This proposed CIP budget is for construction only. The design and construction assistance services are budgeted through Sigma As Needed Engineering Services Contract CS-1481, Task #23.

**Challenges:** Chlorine and sulfur dioxide are both extremely hazardous toxic chemicals that can impact staff and the public if an uncontrolled gas release occurs. Maintaining staff safety, regulatory compliance, and meeting production requirements is a challenge.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$0	\$400	\$2800	\$1800	\$0	\$0	\$0	\$5000	\$5000
Totals				\$0	\$0	\$400	\$2800	\$1800	\$0	\$0	\$0	\$5000	\$5000





**CIP Number:** CIP 1223

**Title:** REHABILITATION OF GRIT AND SCREENING SYSTEM AT PS-2 AND  
REHABILITATION OF SAMPLING SITES AT WRRF

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 64.8

**Contract No.:** NA

**Significance:** The work consists of rehabilitation of the existing sampling stations including removal and installation of new samplers, pumps, piping, housing, and related equipment at various sampling sites at WRRF. This work also include construction of Ferric Chloride System at PS # 2. These improvements will enable WRRF to be in compliance with NPDES permit.

**Location:** WRRF

**Driver:** 2 - Performance

**Explanation:** Plant operations report on the failure of shear pins and accelerated wearing and tearing of the bar racks causing downtime for the maintenance and violation of the permit.

**Preliminary Scope of Work:**

The study and design to rehabilitate various sampling station has been completed under As Needed Engineering Services Contract CS-1481, Task #18 and construction will be bid out. The scope of this project included: Review the additional need for Ovation System, if needed. Conduct detailed study of all the listed sampling stations and their rehabilitation, provide the design for the removal and installation of existing samplers, pumps, piping, housing and related equipment in the Sampling Buildings causing frequent shutdowns due to poor back flush, clogging and difficult to obtain reliable analysis for compliance samples submitted to the MDNRE. The Sampling sites are located at Oakwood, MPI-1, MPI-2, NEIA, PE, River Rouge Outfall, PEAS1, 3 & 4, ML1 thru 4, and RAS1 thru 4, C2SE 3 and 4. Sampling is performed to monitor permit compliance and process performance. Rehabilitation of these sampling facilities will improve system reliability and allow for consistent and accurate sampling. The scope of work performed for sampling station rehabilitation include study, design, construction assistance and construction. The construction of this project shall follow the sequencing of shutdown to ensure WRRF meet the NPDES required permit throughout the rehabilitation period.

**Challenges:** Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$0	\$2500	\$2500	\$0	\$0	\$0	\$0	\$5000	\$5000
Totals				\$0	\$0	\$2500	\$2500	\$0	\$0	\$0	\$0	\$5000	\$5000



The RAS-3 sampling station in the basement of Intermediate Lift Pump No. 2 (ILP No. 2) Building samples the return activated sludge flows to Aeration Deck No.4.



**CIP Number:** CIP 1224

**Title:** REPLACEMENT OF LIMS / PIMS SOFTWARE SYSTEM

**Classification:** 251: Wastewater > General Purpose > General Purpose

**Managing Dept:** IT

**RC Score:** NA

**Contract No.:** NA

**Significance:** Updating software system for increased efficiency and improved communication between laboratory and facilities

**Location:** System Wide

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The study, design, purchase, and installation of the LIMS/PIMS software system. This will include identifying major tasks to be performed and customizing software requirements, testing, and training.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$500	\$2500	\$2000	\$0	\$0	\$0	\$0	\$4500	\$5000
Totals				\$0	\$500	\$2500	\$2000	\$0	\$0	\$0	\$0	\$4500	\$5000



Person using LIMS/PIMS software in the lab

**CIP Number:** CIP 1235

**Title:** ROUGE RIVER OUTFALL No. 2 (RRO-2) SEGMENT 1 - WRRF MODIFICATIONS

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** PC-786

**Significance:** Cap abandoned entrance shaft of failed DRO-2 tunnel and rehabilitate movable dams and stop logs to control wet weather flow discharge

**Location:** WRRF

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

The scope of work includes installation of new Stop Log-8 Gates, modification of Movable Dam MD-1, and installation of new power pack building. This project will also provide for a hydraulic actuation system for gates MD-3 A/B and SG 41-44, modification of stop logs SL-1 A/B, and replace chlorination/dechlorination tank car emergency shutoff valves. The project will further include modification of PLC based control system, capping abandoned PC-709 precast tunnel lining segments.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Pending Close-out	5/21/2012	12/21/2016	\$12125	\$50	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$12176
Totals				\$12125	\$50	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$12176



CIP Number: CIP 1237

**Title:** REHABILITATION OF THE MAIN PLANT MAINTENANCE BUILDING,  
REPLACEMENT OF VARIOUS PLANT MAINTENANCE AREAS AND WORK  
ENVIRONMENT IMPROVEMENT

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 39

**Contract No.:** NA

**Significance:** Reconfiguring the Main Plant Maintenance building to consolidate and to accommodate the maintenance shops such as welding, millwrights, electrical, instrumentation, and plumbing shops will reduce equipment handling, quicken repairs and improve maintenance efficiency.

**Location:** WRRF

**Driver:** 2 - Performance

**Explanation:** The Plant Maintenance Building was constructed in 1971, and since then no improvements have been performed.

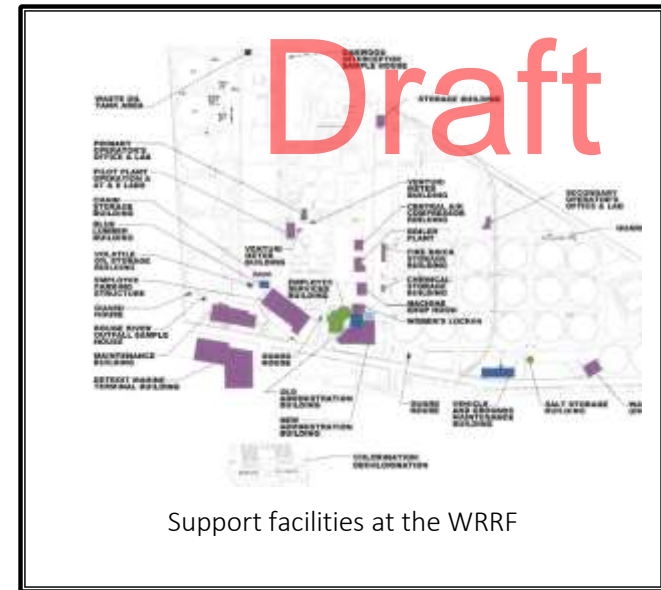
### Preliminary Scope of Work:

Study the existing maintenance facilities and evaluate suitable modifications to consolidate the maintenance areas and also to provide sufficient storage. In addition, it will provide new maintenance areas, rehabilitate the needed maintenance facilities such as the existing chain storage and Primary Treatment area. Rehabilitation of Main Maintenance Building: Rehabilitation would include improving the working environment of the building. The various building systems, including heating, ventilation, electrical, and lighting would be improved to be in compliance with applicable building codes and regulations.

**Challenges:** Requires significant input from Operations and Maintenance due to changes in the organizational structure and functions, since the original CIP proposal approved on 03/11/11. Also, require temporary work spaces to accommodate new and rehabilitation of the existing maintenance areas.

### Initial Project Cost Estimates (in \$1000s)

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	Not Yet Started	NA	NA	\$0	\$0	\$1000	\$440	\$400	\$0	\$0	\$0	\$1840	\$1840
C	Not Yet Started	NA	NA	\$0	\$0	\$500	\$5560	\$5000	\$0	\$0	\$0	\$11060	\$11060
Totals				\$0	\$0	\$1500	\$6000	\$5400	\$0	\$0	\$0	\$12900	\$12900



**CIP Number:** CIP 1241

**Title:** FAIRVIEW PUMPING STATION - REPLACE FOUR SANITARY PUMPS

**Classification:** 232: Wastewater > SCC > Pumping Stations

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** CS-1747

**Significance:** Replacement and upgrade of pumping equipment's to improve transportation of waste water to the treatment plant

**Location:** Fairview Pumping Station

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

The scope of work consists of the study, design, and construction for four new pumping systems including inlet and discharge valves and wet well hydraulics. This will also include enlarging doorways, revamping roadways, and upgrading electrical and control systems.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/CA	Not Yet Started	NA	NA	\$128	\$500	\$500	\$640	\$700	\$0	\$0	\$0	\$1840	\$2468
C	Not Yet Started	NA	NA	\$0	\$0	\$10000	\$10000	\$10000	\$0	\$0	\$0	\$30000	\$30000
Totals				\$128	\$500	\$10500	\$10640	\$10700	\$0	\$0	\$0	\$31840	\$32468



Sanitary pumps at Fairview Pumping Station

**CIP Number:** CIP 1253

**Title:** SEWAGE SLUDGE INCINERATOR AIR QUALITY IMPROVEMENTS AT WRRF

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** PC-791

**Significance:** Provide sludge incinerations air quality improvements at Incinerator Complex II to meet NPDES Permit requirements

**Location:** WRRF

**Driver:** N/A - Active

**Explanation:** N/A - Active

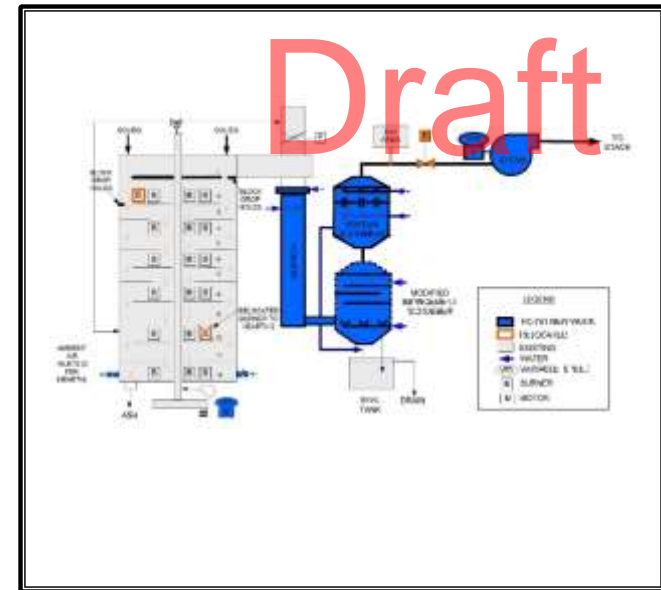
**Preliminary Scope of Work:**

This project involves the design and construction for sludge incinerator air quality improvements at Complex II Incinerator Facility at WRRF. The scope of work includes installation of new scrubber, induced draft fan, noise reduction modification, and air quality and monitoring equipment.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB	Not Yet Started	12/17/2012	6/30/2017	\$33043	\$7200	\$3800	\$0	\$0	\$0	\$0	\$0	\$3800	\$44043
Totals				\$33043	\$7200	\$3800	\$0	\$0	\$0	\$0	\$0	\$3800	\$44043



**CIP Number:** CIP 1254

**Title:** BIOSOLIDS DRYER FACILITY AT WRRF

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** PC-792

**Significance:** Allows retirement of Complex I Incinerators. Will provide significant cost savings and is the largest biosolids dryer facility in North America

**Location:** WRRF

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

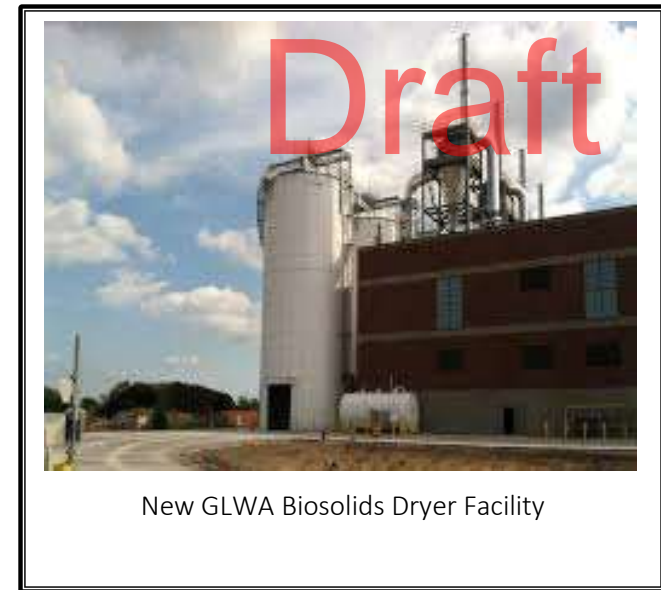
**Preliminary Scope of Work:**

This project provides for study, design and construction of a thermal dryer facility with a firm capacity of 330 dry tons per day (dtpd). The scope of work also includes a conveyance system from Complex I to Complex II.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB	Pending Close-out	5/23/2016	10/31/2016	\$134191	\$5498	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$139690
Totals				\$134191	\$5498	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$139690





**CIP Number:** CIP 1257

**Title:** WASTEWATER TREATMENT PLANT, LIFT STATION AND WASTEWATER COLLECTION SYSTEM STRUCTURES ALLOWANCE

**Classification:** 251: Wastewater > General Purpose > General Purpose

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** PC-014

**Significance:** Funding required for unplanned and critical small capital projects in the entire wastewater system

**Location:** System Wide

**Driver:** N/A - Allowance

**Explanation:** N/A - Allowance

**Preliminary Scope of Work:**

This is an allowance for unplanned critical projects, equipment replacement/rehabilitation, critical asset replacement, energy saving projects, etc.. at the Wastewater Treatment Plant and other Wastewater Operation Facilities. Unplanned critical items including but no limited to mechanical, HVAC, electrical, instrumentation and control, demolition, earthwork, concrete, masonry, etc.

**Challenges:** N/A - Allowance

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C	Not Yet Started	NA	NA	\$0	\$4555	\$11421	\$12000	\$15000	\$15000	\$12000	\$0	\$65421	\$69976
C	Not Yet Started	TBD	TBD	\$0	\$600	\$579	\$0	\$0	\$0	\$0	\$0	\$579	\$1179
Totals				\$0	\$5155	\$12000	\$12000	\$15000	\$15000	\$12000	\$0	\$66000	\$71155



Aerial view of WTP

**CIP Number:** CIP 1263

**Title:** SEWER AND INTERCEPTOR EVALUATION AND REHABILITATION PROGRAM

**Classification:** 222: Wastewater > Field Services > Interceptors

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** CS-068

**Significance:** Evaluation of the existing condition of the sewers and interceptors, cleaning and rehabilitating are essential to optimize the transportation capacity of the GLWA collection system and to increase its life expectancy.

**Location:** Sewers and Interceptors

**Driver:** 1 - Condition

**Explanation:** Some sewers have sediment deposits that results in transportation capacity limitation. Some have deterioration.

**Preliminary Scope of Work:**

Provide CCTV and or sonar inspection of the GLWA Collection System Interceptors and Trunk Sewers to reveal the existing conditions as per the National Association of Sewer Service Companies' (NASSCO) Pipeline Assessment Certification Program (PACP) standards, evaluate the existing conditions, and provide the necessary cleaning/rehabilitation/replace to optimize the design capacity of the collection system and to minimize the inflow and infiltration into the collection system.

**Challenges:** Very large sewers and interceptors may have flow control challenges for both inspection and rehabilitation.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S,D,C	Not Yet Started	TBD	TBD	\$0	\$4572	\$2000	\$0	\$0	\$0	\$0	\$0	\$2000	\$6572
S	Not Yet Started	NA	NA	\$0	\$0	\$240	\$240	\$600	\$600	\$600	\$0	\$2280	\$2280
D	Not Yet Started	NA	NA	\$0	\$0	\$400	\$400	\$1000	\$1000	\$1000	\$0	\$3800	\$3800
C	Not Yet Started	NA	NA	\$0	\$0	\$5360	\$7360	\$18400	\$18400	\$18400	\$0	\$67920	\$67920
Totals				\$0	\$4572	\$8000	\$8000	\$20000	\$20000	\$20000	\$0	\$76000	\$80572



**CIP Number:** CIP 1284

**Title:** COMPLEX I INCINERATORS DECOMMISSIONING AND REUSABILITY AT WASTEWATER TREATMENT PLANT (WRRF)

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** 36

**Contract No.:** NA

**Significance:** This project will decommission the C-I Incinerators building.

**Location:** WRRF

**Driver:** 3 - Regulatory

**Explanation:** Due to new EPA regulations and cost issues this facility will need to be phased out.

**Preliminary Scope of Work:**

Provide basis of design report for decommissioning of the Complex-I demolition and relocation drawings for existing pass on utilities. Provide recommendation for future reusability plan for Complex I. The demolition cost and construction assistance, and relocation of utilities is not included in this budgeted CIP. The budgeted CIP includes study, design and minimum rehabilitation to install heating to continue utilizing the building other than incinerations. The cost to demolish equipment and rehabilitate the existing building for reuse is very high and further capital investment is deferred until reuse need of this building is well defined.

**Challenges:** Possible challenges with this project will include shutdowns of the secondary water system and abatement of asbestos and lead for this building built 1940's. Some utility service lines may be shared with adjoining Complex II Incinerator and Complex I Dewatering.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A/C	Not Yet Started	NA	NA	\$0	\$0	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$100
S/D/C A/C	Not Yet Started	NA	NA	\$0	\$0	\$800	\$200	\$0	\$0	\$0	\$0	\$1000	\$1000
Totals				\$0	\$0	\$900	\$200	\$0	\$0	\$0	\$0	\$1100	\$1100



Complex – I Incinerator Building at the WRRF

**CIP Number:** CIP 1285

**Title:** CONSTRUCTION OF NEW INDUSTRIAL WASTE CONTROL DIVISION AND ANALYTICAL LABORATORY OPERATIONS

**Classification:** 214: Wastewater > WRRF > IWC

**Managing Dept:** WW Eng

**RC Score:** 51.4

**Contract No.:** NA

**Significance:** Permit requirements, continued operation of IWC and Lab, lease term for analytical laboratory, meet site relocation and underutilized WRRF NAB

**Location:** System Wide

**Driver:** 3 - Regulatory

**Explanation:** Length and reorganization is yet established.

**Preliminary Scope of Work:**

Industrial Waste Control Building and Analytical Lab need to be relocated to New Administration Building at WRRF location.

**Challenges:** May require shut down of control and laboratory redesign on 3rd FL NAB.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$0	\$5000	\$2000	\$0	\$0	\$0	\$0	\$7000	\$7000
Totals				\$0	\$0	\$5000	\$2000	\$0	\$0	\$0	\$0	\$7000	\$7000



Old IWC and Analytical Lab; new one will be built at the location of the WRRF because of Gordie Howe International Bridge Project.

**CIP Number:** CIP 1286

**Title:** OAKWOOD DISTRICT INTERCOMMUNITY RELIEF SEWER MODIFICATION  
AT OAKWOOD DISTRICT

**Classification:** 222: Wastewater > Field Services > Interceptors

**Managing Dept:** WW Eng

**RC Score:** 51.8

**Contract No.:** NA

**Significance:** In lieu of implementing previously planned relief sewer modifications in the Oakwood District largely deferred due to Detroit's financial hardship case, this project address the district's hydraulic transport capacity deficiencies given changed demographics, land uses and intercommunity service needs. This project will validate the recent study, design and construction to alternative wet weather relief sewer modifications to mitigate historical basement and street flooding to provide increased flow transport and treatment for economic benefit of effected intercommunity regional customers. This project will be on hold until the completion of wastewater master plan recommendation.

**Location:** Oakwood District

**Driver:** 2 - Performance

**Explanation:** Preferred alternative wet weather relief sewer modifications to mitigate historical basement and street flooding in impacted districts and otherwise provide increased flow transport and treatment for economic, ecologic and societal benefit of customers in Oakwood District and of effected intercommunity regional customers

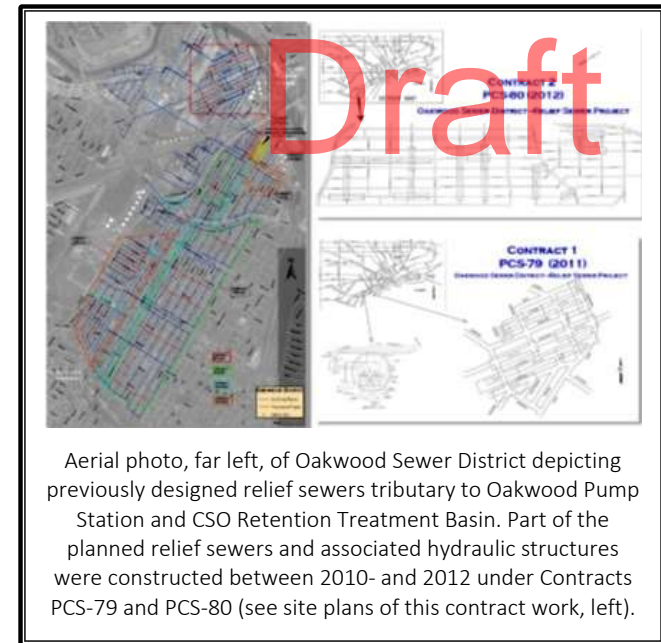
**Preliminary Scope of Work:**

The work includes basis of design (study) report on alternative solution to proposed Oakwood District Intercommunity Relief Sewer, design for replacement of sewer lines catch basins, diversion of storm water flow, and construction assistance during construction phase of emerging projects, etc.

**Challenges:** Maintaining the wet weather contract capacities and adequate CSO treatment during extreme storm events and mitigate basement and street flooding in the District and intercommunity regional districts are the most significant challenges that project is intended to responsibly address.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	Not Yet Started	NA	NA	\$0	\$0	\$0	\$550	\$350	\$200	\$100	\$0	\$1200	\$1200
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$2400	\$5300	\$2100	\$0	\$9800	\$9800
Totals				\$0	\$0	\$0	\$550	\$2750	\$5500	\$2200	\$0	\$11000	\$11000



**CIP Number:** CIP 1287

**Title:** PUMP STATION NO. 2 IMPROVEMENTS PHASE II AT WASTEWATER TREATMENT PLANT (WRRF)

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** 50.8

**Contract No.:** NA

**Significance:** This project will improve the pump reliability of PS-2 to meet the NPDES permit flow capacity requirements.

**Location:** WRRF

**Driver:** 2 - Performance

**Explanation:** The advantage of rehabilitating Pump Station No. 2 is to increase the long-term rated capacity, operational efficiency, and reliability of the pumping system. Replacement of the existing VFDs and adding new VFDs to constant speed pumps would also provide energy savings and reliable flow control to the Pump Station No. 2; hence, meeting the long-term goal of NPDES permit requirements.

**Preliminary Scope of Work:**

The preliminary scope of this project is to provide basis of design (study) report for rehabilitation/rebuilding plan for existing pump and its control and any associated equipment. Also included in the evaluation and recommendation is addition of VFD to three constant speed pumps. The study will not be limited to increasing the capacity of existing pumps to meet the long-term goal for wet weather capacity. Provide engineering design for rehabilitation/rebuilding of the pumps, replacement of HVAC System, I&C Improvements (i.e. automation, etc.), structural, architectural and electrical improvement. Also, provide design for any recommendation made by the study report. The services during construction is provide construction assistance, such as review of shop drawings, response to RFIs, attending progress meetings, verifying and assisting DWSD for any changes requested by the contractor, etc.

**Challenges:** Shutdowns of the pumps to be rehabilitated will require co-ordination with operations and careful planning to meet NPDES permit requirements for the flow capacity during the construction phase.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	Not Yet Started	NA	NA	\$0	\$0	\$600	\$300	\$300	\$200	\$0	\$0	\$1400	\$1400
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$1400	\$4500	\$3500	\$0	\$0	\$9400	\$9400
Totals				\$0	\$0	\$600	\$1700	\$4800	\$3700	\$0	\$0	\$10800	\$10800





**CIP Number:** CIP 1302

**Title:** ROUGE RIVER OUTFALL (RRO) DISINFECTION (ALTERNATIVE)

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** PC-797

**Significance:** Provide project oversight and design build services for alternative disinfection services to meet NPDES Permit requirements at existing Rouge River Outfall

**Location:** Rouge River Outfall

**Driver:** N/A - Under Procurement

**Explanation:** N/A - Under Procurement

**Preliminary Scope of Work:**

The consultant shall provide comprehensive professional services for project oversight and Owner's representation for the PC-797 RRO Disinfection Progressive Design-Build Contract. The scope of work consists of completing basis of design, design and construction services to develop and implement a solution that will result in 100% disinfection of wet weather flow discharged from WRRF to Detroit River outfall and Rouge River Outfall in order to meet NPDES Permit requirements.

**Challenges:** N/A - Under Procurement

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Under Procurement	2/19/2016	12/31/2019	\$729	\$5000	\$12000	\$12000	\$3600	\$0	\$0	\$0	\$27600	\$33329
CM	Under Procurement	TBD	TBD	\$0	\$500	\$1000	\$750	\$350	\$0	\$0	\$0	\$2100	\$2600
Totals				\$729	\$5500	\$13000	\$12750	\$3950	\$0	\$0	\$0	\$29700	\$35929



**CIP Number:** CIP 1309

**Title:** IMPROVEMENTS TO SLUDGE FEED PUMPS AT DEWATERING FACILITIES

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:**

**Significance:** Due to problems with current pumps, improve sludge feed pumping system for wide operating conditions

**Location:** WRRF

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The scope of work includes study, design, and construction for the replacement of sludge feed pumps SFP 1, 2, 5 and 6 at the WRRF.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Active	NA	NA	\$0	\$50	\$1000	\$1500	\$810	\$0	\$0	\$0	\$3310	\$3360
Totals				\$0	\$50	\$1000	\$1500	\$810	\$0	\$0	\$0	\$3310	\$3360



**CIP Number:** CIP 1311

**Title:** MODIFICATION TO INCINERATOR SLUDGE FEED SYSTEMS AT COMPLEX-II

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** 67.8

**Contract No.:** NA

**Significance:** GLWA have an ongoing study and design of sludge cake conveyance system improvements project after the March 4, 2016 fire incident in Complex –II Incinerators building. The scope of this project requires study and design a cleaner, fire resistant, reliable and safe sludge cake conveyance system. This design upon completion will require a complete new cake conveyance system, repair or replacement in kind to be implemented/constructed in an expedited schedule to the sludge feed system in Complex II Incinerators. Lighting upgrades to both Incinerator Complex II and Dewatering Complex II have been added to the scope to address the need for improved lighting in both of these buildings.

**Location:** WRRF

**Driver:** 3 - Regulatory

**Explanation:** The existing sludge conveyance system is very old and is critical to disposal of biosolids to meet permit requirements (e.g. incinerator air permit requirements). The disposal of biosolids to meet allowable permitted inventory of biosolids at the WRRF, sludge conveyance system play's key role in meeting permit requirements.

**Preliminary Scope of Work:**

The design scope of this project includes restoration of sludge conveying capacity lost due to fire damage and provide improved sludge conveyance from each dewatering facility to improve operations and reduce future risks.

**Challenges:** Maintaining the sludge conveyance capacity to meet permit requirements during the construction of these improvements, will be the most significant challenge on this project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C	Not Yet Started	NA	NA	\$0	\$0	\$9100	\$7822	\$0	\$0	\$0	\$0	\$16922	\$16922
Totals				\$0	\$0	\$9100	\$7822	\$0	\$0	\$0	\$0	\$16922	\$16922



Picture from left to right Sludge Conveyor G Damaged by Fire and Conveyor B in the Complex – II Dewatering Building and Fire Damaged Conveyor H in Complex-II Incinerators Building.

**CIP Number:** CIP 1312

**Title:** REHABILITATION OF MAIN LIFT PUMPS AT PUMP STATION NO. 1

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** Inspection of condition of all pumps at pump station and rehabilitation to increase efficiency and reliability

**Location:** WRRF

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

The study/design work will identify all major parts including impellers and wear rings to be refurbished for each pump and all related appurtenances. The construction services will provide rehabilitation and/or replacement as determined in the study and design along with the sequencing of pump shutdown throughout the rehabilitation period.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$450	\$3000	\$5500	\$3500	\$679	\$0	\$0	\$12679	\$13129
Totals				\$0	\$450	\$3000	\$5500	\$3500	\$679	\$0	\$0	\$12679	\$13129



One of the main lift pumps at Pump Station No. 1

**CIP Number:** CIP 1314

**Title:** REPLACEMENT OF BAR RACKS AT PUMP STATION No.2

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** 65.2

**Contract No.:** NA

**Significance:** Replacement of all bar racks and associated equipment for more reliable and efficient operations

**Location:** WRRF

**Driver:** 2 - Performance

**Explanation:** Plant operations report on the failure of shear pins and accelerated wearing and tearing of the bar racks causing downtime for the maintenance and violation of the permit

**Preliminary Scope of Work:**

The work consists of rehabilitation/replacement of Bar Racks and Grit Collection System including existing 8 bar screens and their associated motors and electrical panels and grit collection system as necessary to meet the long-term wet weather requirements at the PS-2. These improvements will enable WRRF to be in compliance with NPDES permit.

**Challenges:** Maintaining the MDEQ-NPDES required capacity during the construction phase of the project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	NA	NA	\$0	\$0	\$650	\$400	\$250	\$100	\$0	\$0	\$1400	\$1400
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$2500	\$3050	\$2717	\$0	\$0	\$8267	\$8267
Totals				\$0	\$0	\$650	\$2900	\$3300	\$2817	\$0	\$0	\$9667	\$9667



PS-2 Bar Screens problems include screening conveyor belt failure resulting in frequent shutdown and significant maintenance man-hours. Grit chamber drains get clogged frequently resulting in significant grit accumulation.

**CIP Number:** CIP 1315

**Title:** FREUD & CONNER CREEK PUMP STATION IMPROVEMENTS

**Classification:** 232: Wastewater > SCC > Pumping Stations

**Managing Dept:** WW Eng

**RC Score:** 79.6

**Contract No.:** NA

**Significance:** The primary objective of this project is to study the overall performance of Connor Creek and Freud sewage pumping stations and develop design, and build an operational strategy to optimize the utilization of interconnected piping and operation between both pumping stations and the Connor Creek Retention and Treatment Basin.

**Location:** Conner Creek & Freud Pump Stations

**Driver:** 2 - Performance

**Explanation:** During peak wet weather there is a potential for the sewers to surcharge and flood the street.

**Preliminary Scope of Work:**

Provide basis of design, and final design for an operational strategy to optimize the utilization of interconnected piping and operation between Connor Creek and Freud pumping stations and the Connor Creek Retention and Treatment Basin. Provide construction of the emerging project and construction assistance during construction of the emerging project.

**Challenges:** Meeting the collection system transport capacity during the construction

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$500	\$660	\$0	\$0	\$0	\$0	\$0	\$660	\$1160
D	Not Yet Started	NA	NA	\$0	\$0	\$1100	\$0	\$0	\$0	\$0	\$0	\$1100	\$1100
C	Not Yet Started	NA	NA	\$0	\$0	\$240	\$5000	\$7000	\$8000	\$0	\$0	\$20240	\$20240
Totals				\$0	\$500	\$2000	\$5000	\$7000	\$8000	\$0	\$0	\$22000	\$22500





**CIP Number:** CIP 1329

**Title:** DETROIT RIVER INTERCEPTOR (DRI) EVALUATION AND REHABILITATION

**Classification:** 222: Wastewater > Field Services > Interceptors

**Managing Dept:** WW Eng

**RC Score:** 65.4

**Contract No.:** NA

**Significance:** Evaluation of the existing condition of the Detroit River interceptor (DRI), and rehabilitation/replacement of portions based on the evaluation results are essential to optimize the transportation capacity of the GLWA collection system and to increase its life expectancy.

**Location:** Detroit River Interceptor

**Driver:** 1 - Condition

**Explanation:** Recent inspections revealed portions with encrustation and deterioration.

**Preliminary Scope of Work:**

Preliminary Scope of Work of the Project is as follows: Provide CCTV and or sonar inspection of the DRI to reveal the existing conditions as per the National Association of Sewer Service Companies' (NASSCO) Pipeline Assessment Certification Program (PACP) standards, evaluate the existing conditions, and provide the necessary cleaning/rehabilitation/replace to optimize the design capacity of the collection system, minimize the inflow and infiltration into the collection system, and extend the service life.

**Challenges:** DRI may have flow control challenges for both inspection and rehabilitation.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$321	\$300	\$150	\$150	\$0	\$0	\$0	\$600	\$921
D	Not Yet Started	NA	NA	\$0	\$0	\$500	\$250	\$250	\$0	\$0	\$0	\$1000	\$1000
C	Not Yet Started	NA	NA	\$0	\$0	\$9200	\$4600	\$4600	\$0	\$0	\$0	\$18400	\$18400
Totals				\$0	\$321	\$10000	\$5000	\$5000	\$0	\$0	\$0	\$20000	\$20321



Visual inspection of a large sewer

**CIP Number:** CIP 1330

**Title:** SCHEDULED REPLACEMENT PROGRAM OF CRITICAL ASSETS

**Classification:** 241: Wastewater > Metering > General Purpose

**Managing Dept:** WW Eng

**RC Score:** NA

**Contract No.:** SCP-001

**Significance:** This program is to perform the scheduled replacement as per the Needs Assessment for critical asset replacement and planned small capital projects (SCP) at WRRF and WW operations

**Location:** WRRF & CSO Facilities

**Driver:** 2 - Performance

**Explanation:** To reduce equipment and process down times of critical assets

**Preliminary Scope of Work:**

The scope of SRP is to develop a comprehensive database. SRP implementation procedures that includes replacement intervals for key Equipment and facilities, long-range replacement schedules, yearly budget Estimates, O & M annual costs, Equipment Replacement Criteria and conclusions and recommendations.

**Challenges:** Depending on type of project, long term or short term projects equipment or part of process areas need to shut down.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	Not Yet Started	NA	NA	\$0	\$500	\$500	\$500	\$500	\$500	\$500	\$0	\$2500	\$3000
C	Not Yet Started	NA	NA	\$0	\$3000	\$4500	\$4500	\$4500	\$4500	\$4500	\$0	\$22500	\$25500
PO	Not Yet Started	TBD	TBD	\$0	\$1500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1500
Totals				\$0	\$5000	\$5000	\$5000	\$5000	\$5000	\$5000	\$0	\$25000	\$30000



Aerial view of the WRRF

**CIP Number:** CIP 1331

**Title:** NORTHEAST PUMPING STATION

**Classification:** 232: Wastewater > SCC > Pumping Stations

**Managing Dept:** WW Eng

**RC Score:** 89

**Contract No.:** NA

**Significance:** This project will include replacement of the inlet gate valves, installation of Pump No. 3 and new chopper pumps, repair of the original service elevator, rebuilding of the spare pumps, repair and upgrade of the wet well, repair and upgrade of the dry well, repair and upgrade of the Gate House air handling systems, emergency bypass of the station etc.

**Location:** NE Sewage Pumping Station

**Driver:** 1 - Condition

**Explanation:** Some equipment in this station are the original one when the station was built in 1969

**Preliminary Scope of Work:**

Provide basis of design, and final design for a complete rehabilitation for the station with an emergency bypass option. Provide construction of the emerging project and construction assistance during construction.

**Challenges:** Meeting the collection system transport capacity during the construction

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$0	\$780	\$0	\$0	\$0	\$0	\$0	\$780	\$780
D	Not Yet Started	NA	NA	\$0	\$0	\$1628	\$0	\$0	\$0	\$0	\$0	\$1628	\$1628
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$10920	\$13000	\$0	\$0	\$0	\$23920	\$23920
Totals				\$0	\$0	\$2408	\$10920	\$13000	\$0	\$0	\$0	\$26328	\$26328



Pump at the Northeast Pumping Station

**CIP Number:** CIP 1332

**Title:** NORTH INTERCEPTOR EAST ARM (NIEA) EVALUATION AND REHABILITATION

**Classification:** 222: Wastewater > Field Services > Interceptors

**Managing Dept:** WW Eng

**RC Score:** 65.4

**Contract No.:** NA

**Significance:** Evaluation of the existing condition of NIEA, and rehabilitation/replacement of portions with structural deficiencies based on the evaluation results are essential to optimize the transportation capacity of the GLWA collection system and to increase its life expectancy.

**Location:** North Interceptor East Arm

**Driver:** 1 - Condition

**Explanation:** Recent inspections revealed portions with encrustation and deterioration.

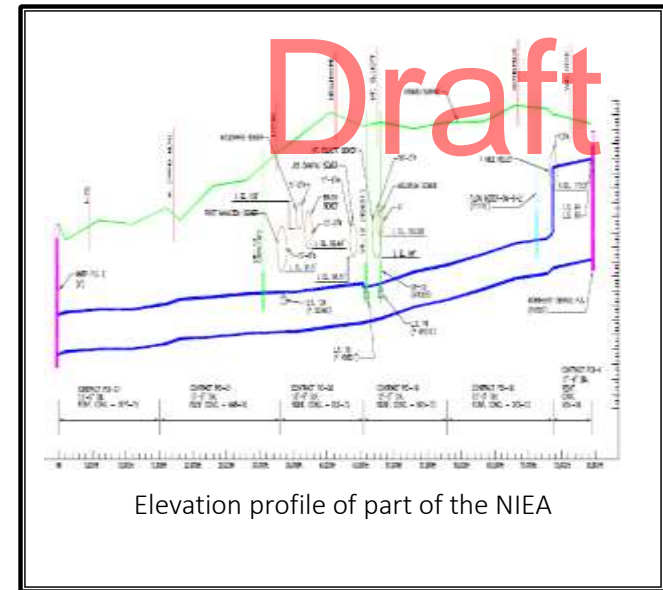
**Preliminary Scope of Work:**

Provide CCTV and or sonar inspection of the NIEA to reveal the existing conditions as per the National Association of Sewer Service Companies' (NASSCO) Pipeline Assessment Certification Program (PACP) standards, evaluate the existing conditions, and provide the necessary cleaning/rehabilitation/replace to optimize the design capacity of the collection system, minimize the inflow and infiltration into the collection system, and to extend the service life.

**Challenges:** NIEA may have flow control challenges for both inspection and rehabilitation.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	Not Yet Started	NA	NA	\$0	\$12000	\$330	\$90	\$0	\$0	\$0	\$0	\$420	\$12420
D	Not Yet Started	NA	NA	\$0	\$0	\$550	\$150	\$0	\$0	\$0	\$0	\$700	\$700
C	Not Yet Started	NA	NA	\$0	\$0	\$14120	\$4583	\$0	\$0	\$0	\$0	\$18703	\$18703
Totals				\$0	\$12000	\$15000	\$4823	\$0	\$0	\$0	\$0	\$19823	\$31823



**CIP Number:** CIP 1344

**Title:** SEWAGE METER DESIGN, INSTALLATION, REPLACEMENT AND REHABILITATION PROGRAM

**Classification:** 241: Wastewater > Metering > General Purpose

**Managing Dept:** Systems Planning

**RC Score:** NA

**Contract No.:** NA

**Significance:** Improving meter data reliability, ensuring accurate billing, improving customer service and allow high quality analysis of the system

**Location:** Meter Locations

**Driver:** 2 - Performance

**Explanation:** Not provided.

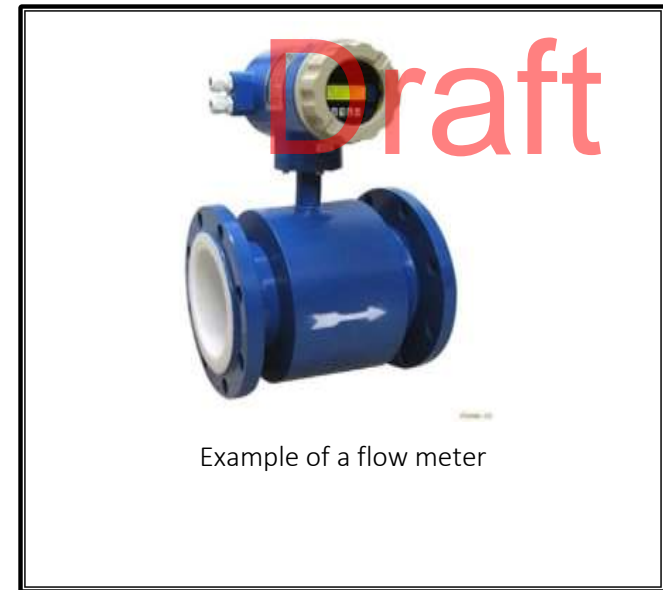
**Preliminary Scope of Work:**

Replace the existing antiquated metering equipment with new metering equipment.

**Challenges:** Requires temporary shutdown of large sewers

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C	Not Yet Started	NA	NA	\$0	\$500	\$500	\$500	\$500	\$500	\$500	\$0	\$2500	\$3000
Totals				\$0	\$500	\$500	\$500	\$500	\$500	\$500	\$0	\$2500	\$3000



**CIP Number:** CIP 1357

**Title:** COLLECTION SYSTEM BACKWATER GATES AND REGULATOR GATES REHABILITATION

**Classification:** 233: Wastewater > SCC > In System Devices

**Managing Dept:** SCC

**RC Score:** 46.2

**Contract No.:** NA

**Significance:** Replacement of CSO outfall back water gate is essential to prevent the river inflow into the collection system. Many are missing and the rest of them have reached their life expectancy.

**Location:** CSO Backwater Outfall Gates

**Driver:** 1 - Condition

**Explanation:** Some gates have reached their life expectancy and some are missing.

**Preliminary Scope of Work:**

Locate the CSO Outfall back water gates, evaluate the existing conditions, and provide the necessary replacement / rehabilitation to minimize the river flow into the collection system.

**Challenges:** Some outfalls are below the river elevation; installation may be challenging.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	New	NA	NA	\$0	\$0	\$80	\$0	\$0	\$0	\$0	\$0	\$80	\$80
D	New	NA	NA	\$0	\$0	\$375	\$0	\$0	\$0	\$0	\$0	\$375	\$375
C	New	NA	NA	\$0	\$0	\$846	\$3000	\$3000	\$2000	\$0	\$0	\$8846	\$8846
Totals				\$0	\$0	\$1301	\$3000	\$3000	\$2000	\$0	\$0	\$9301	\$9301





**CIP Number:** CIP 1381

**Title:** REHABILITATION OF THE SCREENED FINAL EFFLUENT (SFE) PUMP STATION AND SECONDARY WATER SYSTEM

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 52.2

**Contract No.:** NA

**Significance:** The SFE Pump Station provides non-potable water to many of the GLWA WRRF treatment processes and needs to be completely rehabilitated to keep supplying the necessary non-potable water to the treatment processes. Secondary water is used for fire protection and process applications such as seal water and the main system needs to either be relocated or completely refurbished.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** The SFE pump station is very old and is critical to other treatment processes meeting permit requirements (e.g. incinerator air permit requirements). The Secondary Water System is very corroded and needs to be rehabilitated or relocated.

**Preliminary Scope of Work:**

This project will include the study, design, and construction for the needed improvements to the SFE and Secondary Water pump stations. This includes required capacity, pumps, strainers, piping, controls, building improvements, and electrical supply. It is possible that the secondary water system may need to be relocated. The option for relocation or continuing to operate in the C-I Complex will be part of the alternatives evaluation. This will also include a study to evaluate the potential for replacing the secondary water utilization with SFE utilization where feasible. The distribution models for both water systems will also be updated. A redundant potable water feed to the WRRF will also be evaluated. The evaluation of all alternatives will include the ability to reduce energy and potable water usage.

**Challenges:** Maintaining the adequate supply of SFE and Secondary Water to the other treatment processes during construction of the SFE improvements, will be the most significant challenge on this project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$0	\$1100	\$1500	\$1200	\$700	\$600	\$230	\$5100	\$5330
C	New	NA	NA	\$0	\$0	\$0	\$0	\$3000	\$12000	\$12779	\$2799	\$27779	\$30578
Totals				\$0	\$0	\$1100	\$1500	\$4200	\$12700	\$13379	\$3029	\$32879	\$35908



Significant SFE & Secondary Water Pump Station and pipe corrosion, requiring equipment and building rehabilitation. No redundancy for power supply to SFE pump station. Latest cooling oil test (DGA) indicates potential issues with two 5kV Transformers.

**CIP Number:** CIP 1382

**Title:** REHABILITATION OF FERRIC CHLORIDE FEED SYSTEMS

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** 57

**Contract No.:** NA

**Significance:** The Ferric Chloride Systems at PS-1 is used to reduce phosphorus to required permit levels. The systems, which include chemical storage tanks, secondary containment, valves and piping is in need of rehabilitation.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** The current chemical feed systems at PS-1 has deteriorated to the point where this need to be rehabilitated.

**Preliminary Scope of Work:**

The scope of work will include study design and construction for the ferric chloride feed system at PS-1. Specifically it will include: a study to evaluate alternative locations for application of ferric chloride, a pilot study to test alternative application points, and inspection of the existing chemical feed systems, a study to provide recommendations for system modifications and improvements, design of recommended system improvements, and construction of chemical feed system improvements.

**Challenges:** Maintaining capacity of the existing feed system during construction will be a challenge. Also, determining the simplest system that will meet current and future phosphorous limits for both primary and secondary effluent will be a challenge.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$0	\$400	\$400	\$200	\$0	\$0	\$0	\$1000	\$1000
C	New	NA	NA	\$0	\$0	\$0	\$1000	\$5000	\$2000	\$633	\$0	\$8633	\$8633
Totals				\$0	\$0	\$400	\$1400	\$5200	\$2000	\$633	\$0	\$9633	\$9633



Recent inspection of Ferric Chloride Tanks at Pump Station 1 found failed rubber lining and Complex B Sludge Lines clogged due to Struvite.

**CIP Number:** CIP 1383

**Title:** REHABILITATION OF THE ASH HANDLING SYSTEMS

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** 53.8

**Contract No.:** NA

**Significance:** The ash systems convey and store ash for ultimate disposal. The incinerators cannot be used if both the systems are not working.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** The wet ash system has been out of service for over five years and the dry ash system is nearing the end of its useful life.

**Preliminary Scope of Work:**

This scope of work will include study, design, and construction for the rehabilitation of the wet and dry ash systems. The scope will also include the piping, valves, isolation gates, vacuum pumps, air filters, HVAC, boilers, miscellaneous silo repairs (concrete, access, etc.) site work and drainage, and miscellaneous structural repairs (foot bridge, spalling concrete, etc.) at the dry ash handling system. It will also include the pumps, piping, and sluicing system at the wet ash system.

**Challenges:** Maintaining the dry ash system at capacity while the wet ash system is being built will be a challenge.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C A	New	NA	NA	\$0	\$0	\$530	\$1045	\$225	\$225	\$125	\$0	\$2150	\$2150
C	New	NA	NA	\$0	\$0	\$0	\$0	\$6000	\$5500	\$4666	\$0	\$16166	\$16166
Totals				\$0	\$0	\$530	\$1045	\$6225	\$5725	\$4791	\$0	\$18316	\$18316



Ash crusher system was last rehabilitated 15 years ago and near the end of its useful life, due to Complex I decommissioning dry ash system needs to be reconfigured and rehabilitated

**CIP Number:** CIP 1384

**Title:** REHABILITATION OF COMBINED SEWER OVERFLOW (CSO) RETENTION TREATMENT BASINS (RTB) SCREENING (REPLACES CIP1313)

**Classification:** 215: Wastewater > WRRF > CSO RTB & SDF

**Managing Dept:** WW Eng

**RC Score:** 90.6

**Contract No.:** NA

**Significance:** The rehabilitation and adequate operation of these permitted CSO facilities are vital to maintain NPDES permit compliance.

**Location:** Conner Creek, Seven Mile, Puritan-Fenkell, Hubble-Southfield, Belle Isle, Oakwood CSO Basins, Baby Creek, Leib and St. Aubin Screening and Disinfection Facilities

**Driver:** 1 - Condition

**Explanation:** The chemical feed system pumps, valves, gates, dewatering and sampling pumps are old and critical to the CSO RTB and SDF treatment processes meeting permit requirements.

**Preliminary Scope of Work:**

This project will include study, rehabilitation design and standardization of the existing chemical feed pumps, valves, recirculation pumps, mixers, rehabilitation of chemical tanks and pipes. The scope will include Instrumentation & Control (I&C) upgrade to standardize hardware and software, automation of the CSO RTB and SDF facilities to be operated from each facility control room. This project will also include rehabilitation or replacement of difficult to maintain equipment such as valves, gates, actuators, dewatering pumps, sampling pumps etc. The other facility upgrades include testing and upgrades to gas detection, security and fire alarm system. The building upgrades will include roof repair or replacement, windows doors replacement, HVAC and odor control systems. The study and design will include evaluation of high efficiency equipment and ability of alternatives to reduce chemical and energy costs.

**Challenges:** Maintaining the adequate CSO treatment processes capacity during construction of the CSO RTB and SDF's improvements, will be the most significant challenge on this project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$3520	\$1000	\$1400	\$1000	\$200	\$100	\$0	\$3700	\$7220
C	New	NA	NA	\$0	\$0	\$0	\$5000	\$8000	\$7000	\$3510	\$0	\$23510	\$23510
Totals				\$0	\$3520	\$1000	\$6400	\$9000	\$7200	\$3610	\$0	\$27210	\$30730



**CIP Number:** CIP 1385

**Title:** REHABILITATION OF THE SECONDARY CLARIFIERS

**Classification:** 212: Wastewater > WRRF > Secondary Treatment & Disinfection

**Managing Dept:** WW Eng

**RC Score:** 40.8

**Contract No.:** NA

**Significance:** The secondary clarifiers need to be inspected and rehabilitated for certain components such as the rake arms.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** Some of the key components are approaching the end of their useful life.

**Preliminary Scope of Work:**

This project will provide for inspection, study, design, and construction for refurbishing the secondary clarifiers. A key component will be the inspection of the concrete and the rake arms. Once the condition of these components is determined, alternatives will be evaluated and the selected alternative will be designed and constructed. The scope will also include evaluating and designing isolation gates for the individual clarifiers. The B Houses have energy intensive HVAC units. These will be evaluated for potential payback with alternative, energy efficient units.

**Challenges:** This will be a long term project because only one or two clarifiers can be taken out of service at a time. Also, there may be different levels of rehabilitation for each clarifier depending upon the results of the inspection.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$0	\$301	\$576	\$543	\$540	\$540	\$1499	\$2500	\$3999
C	New	NA	NA	\$0	\$0	\$0	\$3000	\$5000	\$5000	\$5000	\$9000	\$18000	\$27000
Totals				\$0	\$0	\$301	\$3576	\$5543	\$5540	\$5540	\$10499	\$20500	\$30999



Only one or maximum two out of total 25 secondary clarifiers can be taken out of service at a time for repairs. Secondary system has a lot of moving parts and equipment. A long term (8 years) rehabilitation program for the secondary clarifiers needs to be initiated

**CIP Number:** CIP 1386

**Title:** REHABILITATION OF THE CIRCULAR PRIMARY CLARIFIER SCUM REMOVAL SYSTEM

**Classification:** 211: Wastewater > WRRF > Primary Treatment

**Managing Dept:** WW Eng

**RC Score:** 49.4

**Contract No.:** NA

**Significance:** The circular clarifiers scum removal system is over 10 years old and need to be rehabilitated. They will help protect the secondary treatment process by preventing scum from entering the aeration tanks.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** The condition of the existing equipment is old and complicated, this results in significant down time and maintenance challenges.

**Preliminary Scope of Work:**

This project will provide for the study, design and construction of new scum equipment in the circular clarifier SBs (8-14). The study will consist of an evaluation of the existing process and simplified alternative systems for scum removal including the scum removal from the buildings. Future alternatives for scum disposal, such as addition to an anaerobic digestion process, will be considered. All alternatives will be evaluated for energy efficiency (reduction of electrical usage). The scum removal system at the rectangular PCs will also be evaluated to determine which aspects can be applied to the circular SBs. The final scope of work could also include some additional improvements such as handrails at PCs 13 and 14. Design and construction services will be included for the selected scum removal system.

**Challenges:** Each of the scum removal facility serves two circular clarifiers, so two circular clarifiers at a given time needs to be out of services during rehabilitation, this will limit the primary capacity to minimum to meet NPDES permit requirements. This will require all the rectangular and remaining circular clarifiers in-service. No other capacity reduction construction activity in the primary system can happen during the execution of this project.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$0	\$266	\$324	\$370	\$171	\$170	\$179	\$1301	\$1480
C	New	NA	NA	\$0	\$0	\$0	\$0	\$1500	\$2500	\$2500	\$2500	\$6500	\$9000
Totals				\$0	\$0	\$266	\$324	\$1870	\$2671	\$2670	\$2679	\$7801	\$10480



The existing scum system is complicated to operate and difficult to maintain, equipment remains out of service for extended period. The scum beaches need better enclosure and heating system, during extreme cold conditions scum collection system get frozen.



**CIP Number:** CIP 1388

**Title:** WASTEWATER SYSTEM WIDE INSTRUMENTATION & CONTROL SOFTWARE AND HARDWARE UPGRADE

**Classification:** 251: Wastewater > General Purpose > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 33

**Contract No.:** NA

**Significance:** This Instrumentation & Controls (I&C) system upgrade is for the operating system and miscellaneous ovation hardware upgrades. It is necessary when the old OS is no longer supported by Microsoft, ovation needs to be upgraded.

**Location:** GLWA WRRF, Combined Sewer Overflow (CSO) Retention Treatment Basins (RTB) and Screening and Disinfection Facilities (SDF)

**Driver:** 4 - O&M

**Explanation:** It is necessary when the old OS is no longer supported by Microsoft, Ovation software and miscellaneous hardware needs to be upgraded.

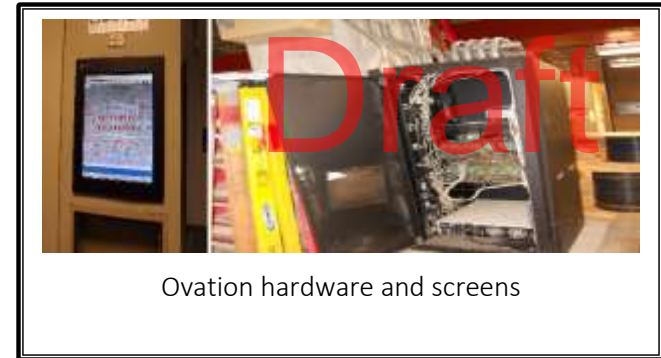
**Preliminary Scope of Work:**

Upgrade Ovation software and miscellaneous hardware. An evaluation for the upgrade will be conducted. During the evaluation of the upgrade, the study will also consider an evaluation of Ovation's ultimate ability to meet GLWA's future needs.

**Challenges:** Co-ordinate with Plant and CSO operation for shutdown requests during the software and hardware upgrade.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$0	\$0	\$0	\$0	\$325	\$174	\$0	\$499	\$499
C	New	NA	NA	\$0	\$0	\$0	\$0	\$0	\$2800	\$2563	\$0	\$5363	\$5363
Totals				\$0	\$0	\$0	\$0	\$0	\$3125	\$2737	\$0	\$5862	\$5862



**CIP Number:** CIP 1391

**Title:** COLLECTION SYSTEM IN SYSTEM STORAGE DEVICES (ISDs) IMPROVEMENT

**Classification:** 233: Wastewater > SCC > In System Devices

**Managing Dept:** SCC

**RC Score:** 30.6

**Contract No.:** NA

**Significance:** ISDs are operational elements in the collection system that help in storing combined sewage during wet weather events to minimize the frequency and volume of the untreated overflows and to maximize the flows to the wastewater treatment plant and CSO control facilities.

**Location:** In System Storage Services-1,2,3,4,5,6,7,8,9,10,11,12,&13

**Driver:** 1 - Condition

**Explanation:** These gates have reached their life expectancy and the operating technology is outdated.

**Preliminary Scope of Work:**

Assess the existing conditions of the ISD elements and their structures and rehabilitate/ replace.

**Challenges:** These are operational elements, so flow control may be a challenge especially during wet weather periods.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	New	NA	NA	\$0	\$0	\$86	\$0	\$0	\$0	\$0	\$0	\$86	\$86
D	New	NA	NA	\$0	\$0	\$0	\$143	\$0	\$0	\$0	\$0	\$143	\$143
C	New	NA	NA	\$0	\$0	\$0	\$321	\$2000	\$1000	\$0	\$0	\$3321	\$3321
Totals				\$0	\$0	\$86	\$464	\$2000	\$1000	\$0	\$0	\$3550	\$3550

Picture not available

**CIP Number:** CIP 1392

**Title:** COLLECTION SYSTEM VALVE REMOTE OPERATION STRUCTURES IMPROVEMENTS

**Classification:** 222: Wastewater > Field Services > Interceptors

**Managing Dept:** SCC

**RC Score:** 68.2

**Contract No.:** NA

**Significance:** VR-Gates are operational elements in the collection system that help in minimizing the untreated overflows and maximizing the flows to the wastewater treatment plant and CSO control facilities.

**Location:** Valve Remote Gates-3,4,5,6,9,10,11&13

**Driver:** 1 - Condition

**Explanation:** These gates have reached their life expectancy and the operating technology is outdated.

**Preliminary Scope of Work:**

Evaluate the existing conditions of the VR-Gates and their structures, provide the necessary design for the replacement of the SCUBA actuators and rehabilitation of the structures, purchase and replace.

**Challenges:** These are operational elements, so flow control may be a challenge.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	New	NA	NA	\$0	\$0	\$41	\$0	\$0	\$0	\$0	\$0	\$41	\$41
D	New	NA	NA	\$0	\$0	\$300	\$0	\$0	\$0	\$0	\$0	\$300	\$300
C	New	NA	NA	\$0	\$0	\$0	\$1000	\$1422	\$0	\$0	\$0	\$2422	\$2422
Totals				\$0	\$0	\$341	\$1000	\$1422	\$0	\$0	\$0	\$2763	\$2763

**Draft**  
 Picture not available

**CIP Number:** CIP 1393

**Title:** COLLECTION SYSTEM ACCESS HATCH IMPROVEMENTS

**Classification:** 222: Wastewater > Field Services > Interceptors

**Managing Dept:** SCC

**RC Score:** 52.8

**Contract No.:** NA

**Significance:** Access Hatches are structures in the collection system to provide reliable access to buried equipment and pipe lines. Many are deteriorated and dangerous to operate.

**Location:** Access Hatches

**Driver:** 1 - Condition

**Explanation:** These gates have reached their life expectancy and the operating technology is outdated.

**Preliminary Scope of Work:**

Locate the deteriorating access hatches, evaluate the existing conditions, provide the necessary replacement/ rehabilitation to minimize the inflow into the collection system and underground structures.

**Challenges:** NA

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	New	NA	NA	\$0	\$0	\$66	\$0	\$0	\$0	\$0	\$0	\$66	\$66
D	New	NA	NA	\$0	\$0	\$198	\$0	\$0	\$0	\$0	\$0	\$198	\$198
C	New	NA	NA	\$0	\$0	\$2932	\$2000	\$2001	\$0	\$0	\$0	\$6933	\$6933
Totals				\$0	\$0	\$3196	\$2000	\$2001	\$0	\$0	\$0	\$7197	\$7197



**CIP Number:** CIP 1399

**Title:** PHOSPHOROUS RECOVERY AT WRRF

**Classification:** 213: Wastewater > WRRF > Residuals Management

**Managing Dept:** WW Eng

**RC Score:** 39.4

**Contract No.:** NA

**Significance:** This study will evaluate the cost/benefit of harvesting phosphorous from the waste stream. A secondary benefit is the reduction in struvite formation/clogging in the plant piping

**Location:** WRRF

**Driver:** 6 - Public Benefit

**Explanation:** The benefit will be in helping GLWA become a true resource recovery facility by enhancing the sustainable practices at the WRRF.

**Preliminary Scope of Work:**

The scope of work will be a study that includes: quantifying the amount of phosphorous in the sludge streams, estimating the potential amount of phosphorous that can be recovered, evaluating the potential market for recovered phosphorous, evaluating the alternatives for recovering phosphorous, developing an alternatives evaluation that includes life-cycle cost estimates and overall cost benefit analysis, identification of potential locations for a phosphorous recovery facility (if proven feasible), and preliminary layouts of facility equipment (if feasible).

**Challenges:** Potential locations for a phosphorous recovery facility.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S	New	NA	NA	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$500	\$500
Totals				\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$500	\$500



**CIP Number:** CIP 1402

**Title:** DTE PRIMARY ELECTRIC 3RD FEED SUPPLY TO WRRF

**Classification:** 216: Wastewater > WRRF > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 73.4

**Contract No.:** NA

**Significance:** GLWA's WWTP has two independent power feeds Maxwell 1 and 2 from DTE, each capable of powering the WWTP equipment.

**Location:** WRRF

**Driver:** 3 - Regulatory

**Explanation:** GLWA's WWTP requires a reliable and redundant primary electrical power supply in order to be in compliance with its NPDES permit requirements. The disconnection and removal of backup power supply line and substation from PLD leaves GLWA very vulnerable in the event of power failure and this urgent 3rd power supply line to the WWTP needs to be installed at the earliest.

**Preliminary Scope of Work:**

The scope of this design-build project includes design and construction of 3rd 120 kV primary electric supply transmission line owned by DTE tapping into the 120-kV Waterman-Zug line in the vicinity of Dearborn St. and Copland St right-of-way at Tower 1368. The design-build services also include securing the property right-of-way easements from the property owners, as well as the design and construction of power transmission supply line. This primary transmission power line will energize the already installed new 120-13.8 industrial substation owned by GLWA near EB-1.

**Challenges:** Negotiation with private property owners and testing of the automatic switch over will require co-ordination with operations.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$0	\$500	\$500	\$0	\$0	\$0	\$0	\$1000	\$1000
C	New	NA	NA	\$0	\$0	\$3000	\$3000	\$0	\$0	\$0	\$0	\$6000	\$6000
Totals				\$0	\$0	\$3500	\$3500	\$0	\$0	\$0	\$0	\$7000	\$7000



The new 3rd 120/13.8 kV Transformer installed and owned by the Great Lakes Water Authority waiting for the 3rd Primary Electric Feed Line to be installed and energized.



## SECTION 3 CENTRALIZED SERVICES

Draft

**CIP Number:** CIP 956

**Title:** AS-NEEDED CIP IMPLEMENTATION ASSISTANCE AND RELATED SERVICES  
(1)

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** Systems Planning

**RC Score:** NA

**Contract No.:** CS-1433

**Significance:** Provide multi discipline engineering services, program management, technical services, and project oversight on an as needed basis

**Location:** Water Treatment Plants

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This project provides for multi-discipline Engineering services on an "as-needed basis" to support DWSD's Water & Sewer Systems.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CM (Water)	Active	3/24/2006	7/24/2017	\$0	\$700	\$700	\$0	\$0	\$0	\$0	\$0	\$700	\$1400
S/D/CM (Sewer)	Active	3/24/2006	7/24/2017	\$4770	\$700	\$700	\$0	\$0	\$0	\$0	\$0	\$700	\$6170
Totals				\$4770	\$1400	\$1400	\$0	\$0	\$0	\$0	\$0	\$1400	\$7570



**CIP Number:** CIP 1026

**Title:** DEPARTMENT-WIDE GENERAL ENGINEERING SERVICES ON AN AS-NEEDED BASIS (1)

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1499

**Significance:** Various engineering as needed services for design and replacement of aging water and sewer lines.

**Location:** Water Treatment Plants

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This project involves designing water main and lateral sewer replacement projects for aging and dysfunctional water mains and sewers throughout the system under different tasks on an as-needed basis. The work also includes civil, structural, architectural, hydraulics, mechanical, electrical, surveying, instrumentation and piping design services.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D (Water)	Active	5/12/2010	6/2/2018	\$5032	\$250	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$5382
D (Sewer)	Active	5/12/2010	6/2/2018	\$5032	\$250	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$5382
Totals				\$10065	\$500	\$200	\$0	\$0	\$0	\$0	\$0	\$200	\$10765



**CIP Number:** CIP 1031

**Title:** GENERAL ENGINEERING SERVICES (1)

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1432A

**Significance:** Allowance for the study and design of critical projects throughout the system prior to bidding and construction.

**Location:** System-wide

**Driver:** N/A - Active

**Explanation:** N/A - Active

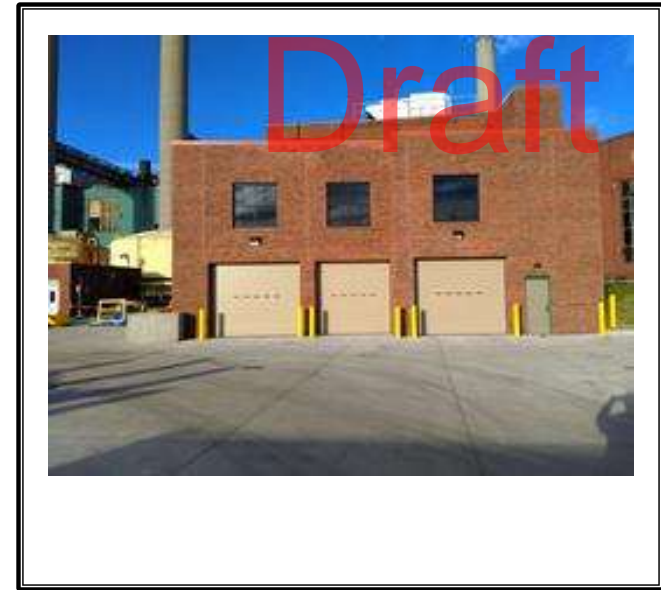
**Preliminary Scope of Work:**

This project involves design services for a variety of disciplines including, but not limited to, civil, architectural, structural, geotechnical, hydraulics, mechanical, piping, electrical, and instrumentation in a variety of tasks on an as-needed basis. Further tasks involve one or more facilities including, but not limited to water treatment plants, water distribution system including booster stations, wastewater treatment plant, wastewater collection system including pumping stations, combined sewer overflow facilities, and administrative and logistical support facilities.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D (Water)	Active	1/23/2008	12/12/2018	\$7006	\$336	\$100	\$50	\$0	\$0	\$0	\$0	\$150	\$7492
D (Sewer)	Active	1/23/2008	12/12/2018	\$7006	\$110	\$100	\$50	\$0	\$0	\$0	\$0	\$150	\$7266
Totals				\$14011	\$446	\$200	\$100	\$0	\$0	\$0	\$0	\$300	\$14757



**CIP Number:** CIP 1147

**Title:** AS-NEEDED ENGINEERING SERVICES FOR CONCRETE TESTING, GEOTECHNICAL SOIL BORINGS, OTHER TESTING SERVICES, AND RELATED SERVICES

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1488

**Significance:** Design of Telegraph Rd, Wick Rd, Park-Merriman, & Schoolcraft water main projects.

**Location:** System-wide

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

Project utilized as the design mechanism for the Telegraph Road, Wick Road, Park-Merriman, and Schoolcraft water main projects. Also, contract has provisions for the as-needed services associated with pipeline construction projects such as testing, staking, and inspection.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C (Sewer)	Active	4/8/2009	4/8/2021	\$0	\$650	\$667	\$0	\$0	\$0	\$0	\$0	\$667	\$1317
D/C (Water)	Active	4/8/2009	4/8/2021	\$0	\$650	\$907	\$333	\$333	\$333	\$0	\$0	\$1906	\$2556
Totals				\$0	\$1300	\$1574	\$333	\$333	\$333	\$0	\$0	\$2573	\$3873



Example of testing being performed

**CIP Number:** CIP 1153

**Title:** CONSOLIDATED PROCESS CONTROL SYSTEM UPGRADES

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** PC-773C

**Significance:** Provide reliability, redundancy and improved functionality to department-wide Process Control System.

**Location:** System-wide

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

This project involves integrating the control and monitoring network throughout all of the facilities with the new SCADA system installed under PC-713. The work includes control system hardware, software, and firmware upgrade or replacement, troubleshooting, installation, start-up, testing, and repair services.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB1 (Water)	Pending Close-out	5/25/2013	5/25/2016	\$3925	\$312	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4237
DB1 (Sewer)	Pending Close-out	5/25/2013	5/25/2016	\$3	\$307	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$310
Totals				\$3928	\$619	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4547





**CIP Number:** CIP 1164

**Title:** GEOTECHNICAL AND RELATED SERVICES ON AN AS-NEEDED BASIS

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** N/A - Pending Closeout

**RC Score:** NA

**Contract No.:** CS-1490

**Significance:** As Needed consultant geotechnical service.

**Location:** System-wide

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

The work includes consultant services for geotechnical work on as-needed basis. The work also provides for additional engineering/ technical services as requested.

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D (Water)	Pending Close-out	1/14/2010	7/14/2016	\$2441	\$132	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$2574
D (Sewer)	Pending Close-out	1/14/2010	7/14/2016	\$2441	\$132	\$1	\$0	\$0	\$0	\$0	\$0	\$1	\$2574
Totals				\$4883	\$264	\$2	\$0	\$0	\$0	\$0	\$0	\$2	\$5149



**CIP Number:** CIP 1182

**Title:** GENERAL ENGINEERING SERVICES (1)

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** CS-1481

**Significance:** As needed multi-discipline engineering services for various small scale projects at WTP.

**Location:** Water Treatment Plants

**Driver:** N/A - Active

**Explanation:** N/A - Active

**Preliminary Scope of Work:**

This project provides for rapid design turn-around for a variety of small scale projects on an as-needed basis providing multi-disciplinary professional services including meter pit improvement services.

**Challenges:** N/A - Active

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D (Water)	Active	3/27/2008	3/27/2018	\$0	\$741	\$772	\$0	\$0	\$0	\$0	\$0	\$772	\$1513
D (Sewer)	Active	3/27/2008	3/27/2018	\$28	\$605	\$608	\$0	\$0	\$0	\$0	\$0	\$608	\$1241
Totals				\$28	\$1346	\$1380	\$0	\$0	\$0	\$0	\$0	\$1380	\$2754



**CIP Number:** CIP 1206

**Title:** DATA CENTER RELIABILITY/AVAILABILITY IMPROVEMENTS (1)

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** SCC

**RC Score:** NA

**Contract No.:** DWS-881

**Significance:** N/A - Pending Closeout

**Location:** N/A - Pending Closeout

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

N/A - Pending Closeout

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Picture not available

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB (Water)	Pending Close-out	1/29/2013	2/27/2016	\$2846	\$17	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2863
DB (Sewer)	Pending Close-out	1/29/2013	2/27/2016	\$3158	\$8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3166
Totals				\$6003	\$25	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6028

**CIP Number:** CIP 1207

**Title:** SCADA RADIO NETWORK UPGRADE (1)

**Classification:** 361: Centralized Services > Engineering > General Purpose

**Managing Dept:** SCC

**RC Score:** NA

**Contract No.:** DWS-882

**Significance:** N/A - Pending Closeout

**Location:** N/A - Pending Closeout

**Driver:** N/A - Pending Closeout

**Explanation:** N/A - Pending Closeout

**Preliminary Scope of Work:**

N/A - Pending Closeout

**Challenges:** N/A - Pending Closeout

**Initial Project Cost Estimates (in \$1000s)**

Picture not available

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB (Water)	Pending Close-out	3/26/2013	9/30/2016	\$3375	\$622	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3997
DB (Sewer)	Pending Close-out	3/26/2013	9/30/2016	\$2846	\$311	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3157
Totals				\$6221	\$933	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7154

**CIP Number:** CIP 1262

**Title:** IT SYSTEMS ALLOWANCE

**Classification:** 311: Centralized Services > Information Technology > General Purpose

**Managing Dept:** IT

**RC Score:** NA

**Contract No.:** NA

**Significance:** Upgrading IT Systems to support facilities and collection system operations.

**Location:** System-wide

**Driver:** N/A - Allowance

**Explanation:** N/A - Allowance

**Preliminary Scope of Work:**

This is an allowance for the procurement of IT equipment or services for the replacement or upgrade of the department's computer systems, software licensing, and related IT items.

**Challenges:** N/A - Allowance

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB (Sewer)	Not Yet Started	NA	NA	\$0	\$5742	\$5585	\$3425	\$1000	\$1050	\$1050	\$0	\$12110	\$17852
DB (Water)	Not Yet Started	NA	NA	\$0	\$3828	\$3612	\$3425	\$1000	\$1050	\$1050	\$0	\$10137	\$13965
Totals				\$0	\$9570	\$9197	\$6850	\$2000	\$2100	\$2100	\$0	\$22247	\$31817



**CIP Number:** CIP 1262A

**Title:** IT SYSTEMS ALLOWANCE - PART 2

**Classification:** 311: Centralized Services > Information Technology > General Purpose

**Managing Dept:** IT

**RC Score:** NA

**Contract No.:** NA

**Significance:** Unavailable

**Location:** Not provided.

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Not provided.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**



Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
DB (Water)	New	NA	NA	\$0	\$0	\$2500	\$2250	\$2000	\$2250	\$2250	\$0	\$11250	\$11250
DB (Sewer)	New	NA	NA	\$0	\$0	\$2500	\$2250	\$2000	\$2250	\$2250	\$0	\$11250	\$11250
Totals				\$0	\$0	\$5000	\$4500	\$4000	\$4500	\$4500	\$0	\$22500	\$22500



**CIP Number:** CIP 1279

**Title:** ROOFING SYSTEMS REPLACEMENT AT WATER PLANTS AND BOOSTER PUMP STATIONS

**Classification:** 331: Centralized Services > Facilities > General Purpose

**Managing Dept:** Water Eng

**RC Score:** NA

**Contract No.:** NA

**Significance:** This CIP provides funds to replace roofing systems that are past their useful service life and thus too costly to repair. Sound roofing systems are important to protect the process infrastructure inside GLWA's buildings.

**Location:** Water Plants & Booster Pump Stations

**Driver:** 1 - Condition

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This project encompasses the evaluation of all Water Treatment Plant and Booster Pump Station roofs to determine their current condition and to prioritize their repair or replacement. The project will evaluate the type of roof, built-up roofing material, flashing, roof drains/conductors and sealing materials that comprise the building envelope. The findings of the roof survey and evaluation will be used to prioritize roof repair and replacement projects for design and construction.

**Challenges:** Weather dependent and seasonal work. May require management of several construction projects simultaneously to complete the work.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C (Water)	Not Yet Started	NA	NA	\$0	\$3000	\$3000	\$3000	\$2500	\$0	\$0	\$0	\$8500	\$11500
Totals				\$0	\$3000	\$3000	\$3000	\$2500	\$0	\$0	\$0	\$8500	\$11500



**CIP Number:** CIP 1328

**Title:** VEHICLE, HEAVY EQUIPMENT AND EQUIPMENT PURCHASES

**Classification:** 321: Centralized Services > Fleet > General Purpose

**Managing Dept:** IT

**RC Score:** NA

**Contract No.:** NA

**Significance:** Funding for equipment needed to support operations and maintenance activities

**Location:** System-wide

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This is an allowance for planned and unplanned equipment replacement, vehicles, and heavy equipment.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C (Sewer)	Not Yet Started	NA	NA	\$0	\$3937	\$1684	\$250	\$250	\$250	\$250	\$0	\$2684	\$6621
C (Water)	Not Yet Started	NA	NA	\$0	\$1600	\$4662	\$250	\$250	\$250	\$250	\$0	\$5662	\$7262
Totals				\$0	\$5537	\$6346	\$500	\$500	\$500	\$500	\$0	\$8346	\$13883



**CIP Number:** CIP 1343

**Title:** ENERGY MANAGEMENT: ELECTRIC METERING IMPROVEMENT PROGRAM

**Classification:** 351: Centralized Services > Energy Management > General Purpose

**Managing Dept:** IT

**RC Score:** NA

**Contract No.:** NA

**Significance:** Meters for measuring power usage in real-time to reduce the electrical demands and shift the loads

**Location:** System-wide

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

This program will increase the number of electric meters at pumping stations and treatment facilities to allow for active demand management to reduce electricity rates.

The meters can be tied to the existing data management system for data archiving and use.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/C (Water)	Not Yet Started	NA	NA	\$0	\$500	\$500	\$500	\$500	\$500	\$500	\$0	\$2500	\$3000
S/D/C (Sewer)	Not Yet Started	NA	NA	\$0	\$500	\$500	\$500	\$500	\$500	\$500	\$0	\$2500	\$3000
Totals				\$0	\$1000	\$1000	\$1000	\$1000	\$1000	\$1000	\$0	\$5000	\$6000



**CIP Number:** CIP 1354

**Title:** SECURITY INFRASTRUCTURE IMPROVEMENTS

**Classification:** 341: Centralized Services > Security > General Purpose

**Managing Dept:** Unavailable

**RC Score:** NA

**Contract No.:** NA

**Significance:** Unavailable

**Location:** Not provided.

**Driver:** N/A

**Explanation:** Not provided.

**Preliminary Scope of Work:**

Not provided.

**Challenges:** N/A

**Initial Project Cost Estimates (in \$1000s)**

Picture not available

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
D/C (Water)	Not Yet Started	NA	NA	\$0	\$350	\$1400	\$1800	\$1300	\$500	\$0	\$0	\$5000	\$5350
D/C (Sewer)	Not Yet Started	NA	NA	\$0	\$350	\$1400	\$1800	\$1300	\$500	\$0	\$0	\$5000	\$5350
Totals				\$0	\$700	\$2800	\$3600	\$2600	\$1000	\$0	\$0	\$10000	\$10700

**CIP Number:** CIP 1366

**Title:** WATER FACILITY LIGHTING RENOVATIONS

**Classification:** 351: Centralized Services > Energy Management > General Purpose

**Managing Dept:** Systems Planning

**RC Score:** 60.8

**Contract No.:** NA

**Significance:** Energy savings, improved visibility and safety

**Location:** Multiple water facilities

**Driver:** 8 - Efficiency

**Explanation:** Technology of LED lamps and associated fixtures will reduce electrical operating expenses and improve worker safety.

**Preliminary Scope of Work:**

Remove identified old fixtures and replace with new LED technology and lamps.

**Challenges:** None.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
C 1 (Water)	New	NA	NA	\$0	\$0	\$933	\$933	\$933	\$0	\$0	\$0	\$2799	\$2799
Totals				\$0	\$0	\$933	\$933	\$933	\$0	\$0	\$0	\$2799	\$2799



**CIP Number:** CIP 1387

**Title:** ROOFING SYSTEMS REPLACEMENT AT GLWA WASTEWATER TREATMENT PLANT CSO RETENTION TREATMENT BASINS (RTB) AND SCREENING DISINFECTION FACILITIES (SDF)

**Classification:** 331: Centralized Services > Facilities > General Purpose

**Managing Dept:** WW Eng

**RC Score:** 40.4

**Contract No.:** NA

**Significance:** Some of the roofs at GLWA wastewater facilities are near its end of useful life. The roofs help protect the expensive equipment by preventing rain water entering through roofs into the facilities.

**Location:** WRRF

**Driver:** 1 - Condition

**Explanation:** GLWA wastewater roof systems are old and some are near end of its useful life.

**Preliminary Scope of Work:**

Inspect the roofing system conditions and assess drainage conditions on all the GLWA wastewater related facility buildings. Document the roofing systems inspections by taking and submitting high-quality photographs, scaled drawings, sketches, and inspection notes to adequately describe the conditions and deficiencies of the roofing systems and their drainage facilities and the extent of the roofing repairs and replacements required. Include the area of each roof for each building inspected on the project. Differentiate the roofs into three (3) main categories, including 1) those roofs that require complete replacement, 2) those roof that only require repair, and those roofs that require no action within the next 10 years. Develop a recommended implementation/planning schedule with budgetary costs tied to the schedule for roofing system repairs and replacements that GLWA should plan for over the next 10 years. Provide preventative care suggestions for the GLWA's roofing systems evaluated under this contract. Provide any OSHA compliance suggestions that may be applicable for the GLWA's roofing systems evaluated under this contract.

**Challenges:** Roof material testing for asbestos before demolition and flashing will be challenge to manage as low levels of asbestos are very common in the GLWA's old roof type systems.

**Initial Project Cost Estimates (in \$1000s)**

Phase	Status	Start Date	End Date	Lifetime Actual Thru FY2016 (Unaudited)	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 & Beyond	2018-2022 CIP Total	Phase Total
S/D/CA (Sewer)	New	NA	NA	\$0	\$0	\$200	\$60	\$60	\$50	\$40	\$140	\$410	\$550
C (Sewer)	New	NA	NA	\$0	\$0	\$2000	\$2000	\$1000	\$1000	\$500	\$2000	\$6500	\$8500
Totals				\$0	\$0	\$2200	\$2060	\$1060	\$1050	\$540	\$2140	\$6910	\$9050



Photo of Complex – I Dewatering Roof at the WRRF. Complex – II Incinerator (\$1.8M) and Complex – II Dewatering (\$1.0 M) replacement are under consideration to be part of fire remediation project.



## VII. GLOSSARY

BCE	Business Case Evaluations	ITS	Information Technology and Services
BDF	Biosolids Dryer Facility	IWC	Industrial Waste Control
BFP	Belt Filter Press	LCR	Lead and Copper Rule
BGD	Billion Gallons per Day	LED	Light-Emitting Diode
CCR	Consumer Confidence Rule	LEL	Lower Explosive Limit
CCTV	Closed-Circuit Television	LIMS/PIMS	Laboratory Information Management System/Project Information Management System
cfs	cubic feet per second	MACP	Manhole Assessment Certification Program
CIP	Capital Improvement Plan	MCC	Motor Control Centers
CMG	GLWA Capital Management Group	MDEQ	Michigan Department of Environmental Quality
COF	Central Offload Facility	MDNRE	Michigan Department of Natural Resources and Environment
CSF	Central Services Facility	MG...	Million Gallons
CSO	Combined Sewer Overflow	MGD	Million Gallons per Day
CWA	Clean Water Act	NAB	New Administration Building at the WRRF
DDOT	Detroit Department of Transportation	NASSCO	National Association of Sewer Service Companies
DI	Ductile Iron	NEC	National Electric Code
DRI	Detroit River Interceptor	NESDS	Northeast Sewerage Disposal System
DRO	Detroit River Outfall	NIEA	North Interceptor East Arm
dtpd	dry tons per day	NPDES	US EPA National Pollutant Discharge Elimination System
DWRF	Drinking Water Revolving Fund	NPL	US EPA National Priorities List
DWSD	Detroit Water and Sewerage Department	O&M	Operations & Maintenance
DWSD-R	Specifying the new, Detroit-focused Detroit Water and Sewerage Department	OEM	Original Equipment Manufacturer
EPA	United States Environmental Protection Agency	O-NWI	Oakwood-Northwest Interceptor
GIS	Geographic Information System	OSHA	Occupational Safety and Health Administration
GLWA	Great Lakes Water Authority	OWI	Oakwood Interceptor
GPS	Global Positioning System	PAC	Powdered Activated Carbon
HVAC	Heating, Ventilation, and Air Conditioning	PACP	Pipeline Assessment Certification Program
I&C	Instrumentation & Controls	PCCP	Pre-Stressed Concrete Cylinder Pipe
ILP	Intermediate Lift Pumps	PEAS	Primary Effluent to Activated Sludge
ISD	In System Storage Device	PLC	Programmable Logic Controller
IT	Information Technology	PLD	Programmable Logic Device

PRV	Pressure Reducing Valve
PS	Pump Station
RAS	Return Activated Sludge
RTB	Retention Treatment Basins
RVSDS	Rouge Valley Sewerage Disposal System
RWCS	Regional Water Transmission System
SAMO	GLWA System Analytics and Meter Operations
SCADA	Supervisory Control And Data Acquisition (GLWA uses Ovation brand)
SCC	Systems Control Center
SCP	Small Capital Projects
SCUBA actuators	Self-Contained Universal Bi-directional Actuator
SDF	Screening and Disinfection Facility
SDWA	Safe Drinking Water Act
SFE	Secondary Final Effluent
SFP	Sludge Feed Pump

SOW	Scope of Work
SRP	Scheduled Replacement Program
T&O	Taste and Odor
TAC	Technical Advisory Committee
TCR	Total Coliform Rule
TPC	Tournament Players Championship Golf Course in Dearborn
VFD	Variable Frequency Drive
VR-Gates	Valve Remote Gates
WAM	Work and Asset Management
WMP	Water Master Plan
WMPU	Water Master Plan Update
WRRF	Water Resource Recovery Facility
WSC	West Service Center
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant (old terminology)

Draft

## VIII. APPENDICES

Appendix A Water Business Case Evaluations  
Appendix B Sewer Business Case Evaluations  
Appendix C Centralized Services Business Case Evaluations  
Appendix D Water & Wastewater Project Prioritization

Draft