



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 and sewage disposal services within and outside of the City of Detroit. 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 customer communities 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 Authority has adopted an unwavering commitment to its customer communities, known as "One Water," with a strong mission statement of customer collaboration and engagement:

"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."

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. GLWA'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 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 of its members, including, but not limited to, setting charges for water and sewer services, annual operating budgets, capital improvement programs, issuance of debt and any modification of the Lease.

The Authority shall formally adopt a two-year operating budget, consistent with Section 5 of the Articles of Incorporation. The two-year operating budget shall require the affirmative vote of five members.

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

1.2. Governance and Board Members

The GLWA Board of Directors (GLWA Board) is comprised 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*
- *Freman Hendrix, GLWA Board Vice Chairman; Representative for the City of Detroit*
- *Gary A. Brown, GLWA Representative for the City of Detroit*
- *Brian Baker, GLWA Board Representative for Macomb County*
- *Craig Hupy, GLWA Board Representative for the State of Michigan*
- *Abe Munfakh, Representative for Wayne County*

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. Executive Leadership Team

GLWA's Executive Leadership 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 further enhanced its management 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 Executive Leadership 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*
- *William M. Wolfson, Chief Administrative and Compliance Officer/General Counsel*
- *Nicolette N. Bateson, CPA, Chief Financial Officer/Treasurer*
- *Cheryl Porter, Chief Operating Officer, Water & Field Services*
- *Suzanne R. Coffey, P.E., Chief Planning Officer, Interim Chief Operating Officer, Wastewater*
- *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*

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 3.9 million or nearly 40% 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

GLWA's 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 with continually providing a high level of service.

This CIP should be considered a planning document – it 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 because anticipated projects in the early years are typically better defined by studies or scoped by design than projects conceptual in nature in the out years of the plan. 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 CIPs are available on GLWA's website at 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: (a) 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 projects 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 multi-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
New	Project that has never been included in a previous CIP.
Not Yet Started	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
Under Procurement	Project that has an assigned BS&A Project Number and has not been issued a Notice to Start Work.
Active	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.
Pending Close-out	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
- IA.....Intergovernmental Agreement*
- PO.....Purchase Order

*This is pursuant to the Act 35 of 1951, Intergovernmental Contracts Between Municipal Corporations, which can be viewed at <http://www.legislature.mi.gov/documents/mcl/pdf/mcl-act-35-of-1951.pdf>.

2.4. CIP Types

Multiple CIP types are necessary to distinguish the differences in intent of how a particular CIP item 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 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 when project manager training on modifications to the CIP process and documentation occurs. At this time, an Authority-wide request for project proposals and the request for the completion of the Business Case Evaluation documentation is made to all business areas throughout the Authority. Business case evaluations from project managers are due to the Financial Services Area by the end of July. At this time, a CIP number is created for each new project. A draft of the CIP is compiled. That draft report and back-up documentation are reviewed internally with the Asset Management and CIP work area team, management, Chief Financial Officer/Treasurer (CFO) and the Authority's financial planning consultant. Financial Services 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 Authority's customer communities. Comments to this plan are due approximately one month after the first external presentation, which is typically in December. Based upon customer and Board feedback, the CIP is modified and at this point, it is expected that the CIP approval process coincides with the overall budget development and approval process.

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 GLWA Board of Directors is necessary to identify key milestones leading up to the ultimate approval of the 2018 CIP.

Date	Description
October 27, 2016	AM/CIP Work Group – New Project BCE’s, format & prioritization
November 9, 2016	GLWA CIP Committee – Present and solicit input of format revisions
November 18, 2016	AM/CIP Work Group – Present 2018 CIP Version #1
November 30, 2016	GLWA CIP Committee – Present 2018 CIP Version #1
December 1, 2016	Customer Rollout Meeting #1 – Present 2018 CIP Version #1
December 16, 2016	Customer Comments Due
January 10, 2017	AM/CIP Work Group – Present 2018 CIP Comments, Questions and Answers
January 11, 2017	GLWA CIP Committee – Present 2018 CIP Comments, Questions and Answers
May 23, 2017	AM/CIP Work Group – Present 2018 CIP Version 2.0
TBD	GLWA Board Meeting– Present & Approve 2018-2022 CIP
July 1, 2017	Effective Date of 2018-2022 CIP

SECTION 3 2018 CIP CHANGES

Many new changes to the 2018 CIP have occurred. 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 the Financial Service Group, Planning Services Group, and from the business area 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 a scoring member 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	GLWA Systems Planning
Cheryl Porter	GLWA Water Operations
Terry Daniel	GLWA Water Operations
Biren Saparia	GLWA Systems Control/Field Services
Shaker Manns	GLWA Energy Management
Grant Gartrell	GLWA Water Engineering
Monica Daniels	GLWA Capital Management Group
Chandan Sood	GLWA Systems Analytics & Meter Operations

Table II-2. Wastewater Review Committee Members

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

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, navigable and user friendly.

Consolidation of CIP's

The 2018 CIP has been consolidated into one document. Previously, two separate documents were created, maintained and presented. This consolidation will remove the need for duplication of basic overview type information that had typically previously been found within each document. Ultimately, this change 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 identified separately within each category to provide the reader more information on the type and amount of each project within specific service areas. 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 on each 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 business area cost centers. In addition, these will directly align with costs centers in the operating budget within the Authority's financial system. The revisions will be based on the "smart" numbering system as identified in Table II-3 below.

General Purpose

The General Purpose category within Project Category 2 and Project Category 3 in Table II-3 are necessary to identify projects that cross over multiple project categories. Projects that cannot be attributed to one particular area will be identified here.

Programs

As identified previously, programs consist of the replacement and/or rehabilitation of specific capital asset 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 future years projected expenses, these programs will typically be funded in perpetuity. The numbering structure of the "Program" category is slightly different in order to allow for up to 99 separate projects to be attributable to each program.

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 (+ Digit 4)	Digits 4 - 6 / Digits 5 - 6
Project Category 1	Project Category 2	Project Category 3	Number 000-999 / Number 00-99
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	
15X - Metering	151 - General Purpose		
16X - General Purpose	161 - General Purpose		
17X - Programs	1701 - Programs		
2XX - Wastewater	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	

Digit 1	Digit 1 + Digit 2	Digit 1 + Digit 2 + Digit 3 (+ Digit 4)	Digits 4 - 6 / Digits 5 - 6
Project Category 1	Project Category 2	Project Category 3	Number 000-999 / Number 00-99
	26X - Programs	2601 - Programs	
3XX - Central Services	31X - Information Technology	311 - General Purpose	
		312 - Service Desk	
		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 - Engineering	361 - General Purpose	
	37X - General Purpose	371 - General Purpose	
38X - Programs	3801 - Programs		

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 continuously updated to provide the great source of reference material related to the GLWA infrastructure.

III. CIP FINANCIAL PLAN

SECTION 1 INTRODUCTION

The GLWA CIP financial plan balances a number of objectives to support the Authority's mission. Those objectives include the following.

- ✓ Transparency in developing the financial plan.
- ✓ Collaboration – both internally and externally.
- ✓ Ensuring sustainability through an iterative process to challenge our assumptions and seek innovative solutions.
- ✓ Reduce the debt burden by improved selection of funding source with useful lives of the asset.
- ✓ Emphasize predictability thereby smoothing out the impact on service charges.
- ✓ Improve the Authority's financial position with a measurable goal of achieving a AA rating.

The Authority draws upon five sources of funding for its CIP.

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 (Improvement & Extension Fund):** 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. These funds are not budgeted for use until received and then recorded

in the Improvement & Extension Fund for the water or the sewer system.

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.
4. **Grants:** The Authority utilizes public grants programs such as 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 and related interest earnings for the purposes of financing capital improvements. New with this CIP, GLWA has made a concentrated effort to implement a CIP financial plan strategy where long-lived assets, defined as constructed infrastructure and plant facilities with an estimated useful life greater than 20 years, are eligible for bond funding.
- ✓ **Improvement & Extension (I&E) Fund:** The I&E Fund is defined by the Authority's Master Bond Ordinance (MBO) as the "fund used for improvements, enlargements, extensions or betterment" of the System. Cash receipts of the Authority are transferred into the I&E Fund pursuant

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

to a flow of funds after commitments are met for a monthly allocation of operations and maintenance expense, debt service, pension, WRAP, budget stabilization fund, and extraordinary repair and replacement fund as administered by a trustee. New for this CIP, in conjunction with development of the FY 2018-22 budget and financial plan, capital outlay items are funded with I&E Funds. Capital outlay are items that are generally purchased (rather than constructed) and with an estimated useful life of less than 20 years.

The basis of accounting for the capital spending 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.

SECTION 2 SUMMARY CIP FINANCIAL PLAN REVIEW AND ANALYSIS

Improvements in the CIP project *evaluation* process that resulted in this plan were followed by improvements in this year's "CIP financial plan" process. The new GLWA CIP financial plan document is based on a foundational database to support improved analysis and decision-making, provide a new level of transparency, balance risk and opportunity, and demonstrate greater clarity in the long-term GLWA financial strategy. This expanded approach is an evolution from financial capital planning that was previously at a macro level. With the ultimate performance measure of lowering the cost of capital for our customers, a better executed financial plan optimizes the use of bonds, revenue financial capital, revolving fund loans, and grants. It also contemplates execution risk (actual rate of capital project delivery) versus inherent risk in project cost estimating. Lastly a sustainable financial plan encompasses flexibility to allow for

strategic timing of new debt, pace of cash flow needs, and adequate reserves for system needs.

While the GLWA Board of Directors approves the plan, the authority to spend does not occur until additional project review processes are completed prior to the procurement process. Depending on the scope and dollar amount of the project, final approval to proceed may include customer engagement, Chief Executive Officer review, and GLWA Board CIP Committee review and/or GLWA Board action.

2.1. Cost Allocation to Customer Charges

Revenue requirements are the basis for establishing customer charges. Included in that calculation are operations and maintenance expense, debt service, Master Bond Ordinance (MBO) reserve requirements, system lease requirements, revenue financed capital targets, water residential assistance program commitments, and legacy obligations. The cost of capital improvements is allocated to customers among four general cost pools as described below.

1. Common-to-All (CTA) represents costs that are allocable to all customers.
2. Suburban Only represents costs that are allocable to those defined as suburban (i.e. excluding the City of Detroit customers).
3. CSO 83/17 represents capital costs that are allocated based upon terms of a 1999 rate settlement agreement sanctioned by a federal court. The outcome was an allocation of 83% of "combined sewer overflow control facilities" (CSO) costs to City of Detroit customers and 17% to other customers.
4. Industrial Waste Control Facilities (IWC) provide for the pretreatment of industrial wastewater.

As shown in Table III-1 below, many the proposed capital improvements are allocated to the common-to-all cost pool.

Table III-1. Cost Allocation

Cost Allocation	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022	Percent of Five Year Total
Water							
Common-to-all	\$ 133,655	\$ 190,089	\$ 193,259	\$ 137,305	\$ 126,300	\$ 780,608	97.5%
Suburban Only	4,000	4,000	4,000	4,000	4,000	20,000	2.5%
Grand Total	\$ 137,655	\$ 194,089	\$ 197,259	\$ 141,305	\$ 130,300	\$ 800,608	100.0%

Cost Allocation	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022	Percent of Five Year Total
Wastewater							
Common-to-all	\$ 140,091	\$ 166,173	\$ 164,794	\$ 108,242	\$ 85,640	\$ 664,940	88.3%
OMID	13,408	22,920	16,000			52,328	7.0%
CSO 83/17	2,247	6,400	9,000	7,200	3,610	28,457	3.8%
Industrial Waste Control	5,000	2,000	-	-	-	7,000	0.9%
Total	\$ 160,746	\$ 197,493	\$ 189,794	\$ 115,442	\$ 89,250	\$ 752,725	100.0%

2.2. CIP Funding Based on Estimated Useful Life

As a new entity, GLWA is evaluating and establishing financial policies to advance financial sustainability. With the FY 2018-2022 CIP document, an initial effort was made to differentiate between appropriate uses of long-term debt versus revenue financed capital received and recorded to date in the Improvement & Extension (I&E) Fund as defined in the MBO. While GLWA is positioning itself to further reduce reliance on outstanding debt, the financial plan related to this CIP anticipates

further debt issuances. For this reason, the five-year financial plan is regularly reviewed during the fiscal year. Updates may occur due to changes in revenue sources, grant awards, approval of lower interest rate revolving fund debt, and other budgetary conditions. The financial plan reflects grants and federal and state loans only after approval is received by the grantor or authorizing party.

As shown in Table III-2, most of the CIP projects are longer lived assets, defined as greater than a 20-year estimated useful life.

Table III-2. Asset Life and Eligibility for Funding with Long-Term Debt

Asset Life Range	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022	Percent of Five Year Total
Water							
< 20 years	\$ 14,701	\$ 8,833	\$ 4,933	\$ 3,000	\$ 3,000	\$ 34,467	4.3%
> 20 years	122,954	185,256	192,326	138,305	127,300	766,141	95.7%
Total	\$ 137,655	\$ 194,089	\$ 197,259	\$ 141,305	\$ 130,300	\$ 800,608	100.0%

Asset Life Range	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022	Percent of Five Year Total
Wastewater							
< 20 years	\$ 500	\$ 500	\$ 500	\$ 500	\$ 500	\$ 2,500	0.3%
> 20 years	160,246	196,993	189,294	114,942	88,750	750,225	93.7%
Total	\$ 160,746	\$ 197,493	\$ 189,794	\$ 115,442	\$ 89,250	\$ 752,725	94.0%

2.3. Project Status Analysis

As shown in Table III-3, 76.8% of the water system projects and 59.7% of the wastewater system projects are classified as “Not Yet Started”. As defined in Chapter 1, Section 2, a Project Status of “Not Yet Started” are projects that have been included in the previous CIP, have never had expenditures charged to it, and does not have an assigned BS&A Project Number. The high percentage of not yet started has not been unusual because the staff is responsible for identifying and prioritizing system needs without the benefit of a more refined prioritization process. This is not unlike other public utilities. The outcome, however, is that this inherently may result

in a CIP that identifies more projects than there are organizational resources to manage. Additionally, it is not uncommon for operational needs to curtail CIP execution.

With this new plan year, GLWA begins a new day as we reinvent the CIP process. In FY 2016, GLWA began staffing its Systems Planning area. As this role continues to mature, the CIP will become more refined to better align priorities and resources. That Asset Management & CIP team has recently launched a wastewater master plan process which will further inform the ongoing capital planning efforts at GLWA.

Table III-3. Project Status Analysis

Project Status	Number of Project at Beginning of FY 2018	Projected Capital Expenditures FY 2018	Status as a % of Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022
Water								
New	16	\$ 21,569	15.7%	\$ 31,142	\$ 13,533	\$ 6,600	\$ 6,600	\$ 79,444
Not Yet Started	65	105,766	76.8%	156,900	180,522	132,350	122,200	697,738
Under Procurement	7	4,930	3.6%	5,170	2,821	2,000	1,500	16,421
Active	13	2,794	2.0%	877	383	355	-	4,409
Pending Close-out	9	2,596	1.9%	-	-	-	-	2,596
Total	110	\$ 137,655	100.0%	\$ 194,089	\$ 197,259	\$ 141,305	\$ 130,300	\$ 800,608

Project Status	Number of Project at Beginning of FY 2018	Projected Capital Expenditures FY 2018	Status as a % of Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022
Wastewater								
New	35	\$ 27,821	17.3%	\$ 40,269	\$ 64,321	\$ 58,161	\$ 49,050	\$ 239,622
Not Yet Started	46	95,968	59.7%	128,592	117,055	57,281	40,200	439,096
Under Procurement	13	17,298	10.8%	3,412	450	-	-	21,160
Active	14	18,067	11.2%	25,194	7,968	-	-	51,229
Pending Close-out	12	1,592	1.0%	26	-	-	-	1,618
Total	120	\$ 160,746	100.0%	\$ 197,493	\$ 189,794	\$ 115,442	\$ 89,250	\$ 752,725

2.4. Project Category Analysis

As noted in Chapter 1, Section 2.3 on page I-5, project phase categories relate to how a project will be delivered and managed. Categories may be grouped to align with how the work is to be performed and often with one vendor contract. 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
PM.....	Project Management
PO.....	Purchase Order

The project categories inform the financial planning process. In this case, having a relatively high percentage of projects that are Not Yet Started (Table III-3) compared with the Project Category Analysis (Table III-4) that has a high dollar amount in construction categories indicates that it may be challenging to deliver the CIP as presented. Again, this is not necessarily unusual in a large utility. Our goal with improving processes and building staff capacity is to narrow those ratios. When it comes to evaluating the CIP financial plan, the existence of a number of high dollar, long lead time projects that have not started, indicates a reduced need to borrow and/or shift the allocation of financial resources.

Also, new to the FY 2018 – FY 2022 CIP was the elimination of most “as needed” contracts and allowances. Those types of costs

are included in a combination of other areas in the financial plan such as the Improvement & Extension Fund as capital outlay items. Thus, the proposed CIP is limited to clearly defined project categories.

2.5. Total CIP Requests Compared to the Financial Plan

The CIP Financial Plan reduces the rate of capital project delivery, the nature of projects in the CIP, funding source opportunities, and improving financial metrics. In FY 2017, based on projected estimates and preliminary, unaudited financial information, the rate of CIP spend for the water system is at 61% and at 47% for the wastewater system. Given that staff effort has been directed toward stand-up of the GLWA in 2016, and the evaluation of the water system master plan adopted in 2016, it is expected that the rate of capital spend will increase over the next twelve months. Table III-5 below summarizes the requested CIP expenditures and adjusts for an estimated rate of actual capital spend. For GLWA, the financing plan applies a rate of 80% to each project, unless there is an external committed funding source (such as SRF/DWRF). In that instance, 100% of the amount is included in the CIP Financial plan.

Table III-5 provides the total CIP requests at 100% versus the amount funded in the in the financial plan.

Table III-4. Project Category Analysis

Project Category	Number of Projects by Category	Projected Capital Expenditures FY 2017	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022	Category as a Percent of Total FYs 2018-2022
Water									
S	12	\$ 2,540	\$ 5,175	\$ 2,175	\$ -	\$ -	\$ -	\$ 7,350	0.9%
S/D/C	10	4,800	24,900	55,300	43,100	10,800	8,500	142,600	17.8%
S/D/CA	11	1,303	5,575	4,290	3,571	2,072	1,500	17,008	2.1%
C	42	50,629	60,603	72,804	89,095	101,240	98,340	422,082	52.7%
CA	1	-	-	380	-	-	-	380	0.0%
D	12	1,863	4,171	2,029	1,360	1,160	1,160	9,880	1.2%
D/C	11	14,255	31,113	34,011	25,633	14,333	14,000	119,090	14.9%
D/CA	3	200	100	9,000	15,900	3,700	3,700	32,400	4.0%
D/CA/C	1	-	1,000	1,000	500	-	-	2,500	0.3%
DB	6	1,176	4,930	13,100	18,100	8,000	3,100	47,230	5.9%
PM	1	2,316	88	-	-	-	-	88	0.0%
Total	110	\$ 79,082	\$ 137,655	\$ 194,089	\$ 197,259	\$ 141,305	\$ 130,300	\$ 800,608	100.0%

Project Category	Number of Projects by Category	Projected Capital Expenditures FY 2017	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022	Category as a Percent of Total FYs 2018-2022
Wastewater									
S	9	\$ 421	\$ 2,401	\$ 730	\$ 840	\$ 600	\$ 600	\$ 5,171	0.7%
S/D/C	6	6,187	4,002	2,100	1,125	1,100	1,000	9,327	1.2%
S/D/CA	27	5,352	11,118	11,781	10,198	5,961	4,499	43,557	5.8%
S/D/CA/C	2	-	900	200	-	-	-	1,100	0.1%
S/D/CM	1	1,400	100	-	-	-	-	100	0.0%
C	52	39,058	129,708	179,713	175,081	106,781	82,151	673,434	89.5%
CM	1	1,000	800	520	100	-	-	1,420	0.2%
D	15	1,365	8,757	2,073	2,100	1,000	1,000	14,930	2.0%
D/CA	1	472	1,400	350	350	-	-	2,100	0.3%
DB	5	5,133	60	26	-	-	-	86	0.0%
PO	1	-	1,500	-	-	-	-	1,500	0.2%
Total	120	\$ 60,388	\$ 160,746	\$ 197,493	\$ 189,794	\$ 115,442	\$ 89,250	\$ 752,725	100.0%

Table III-5. Total CIP Requests vs Financing Plan

System Allocation	Projected Capital Expenditures FY 2017	Projected Capital Expenditures FY 2018	Projected Capital Expenditures FY 2019	Projected Capital Expenditures FY 2020	Projected Capital Expenditures FY 2021	Projected Capital Expenditures FY 2022	Total Projected Expenditures FYs 2018-2022
Water							
Total CIP Requests @ 100%	\$ 139,469	\$ 137,655	\$ 194,089	\$ 197,259	\$ 141,305	\$ 130,300	\$ 800,608
Financial Plan	\$ 139,469	\$ 110,124	\$ 155,271	\$ 157,807	\$ 113,044	\$ 104,240	\$ 640,487
Effective Rate	100%	80%	80%	80%	80%	80%	80%
Wastewater							
Total CIP Requests @ 100%	\$ 60,388	\$ 160,746	\$ 197,493	\$ 189,794	\$ 115,442	\$ 89,250	\$ 752,725
Financial Plan	\$ 52,435	\$ 139,176	\$ 167,941	\$ 156,933	\$ 92,354	\$ 71,400	\$ 627,804
Effective Rate	87%	87%	85%	83%	80%	80%	83%

Capital Project Expenditures are included in the financing plan at 80%, except for SRF Loan Projects which are included at 100%.

2.6. CIP Financial Plan

The CIP financial plan is shown in Table III-6. The focus is on the sources and uses of funds for capital spending.

In summary, this CIP financial plan demonstrates the following principles applied in its development.

1. Anticipates bond issuance for CIP for projects with an estimated useful life greater than 20 years
2. Includes only state revolving fund loans and grants that are approved and authorized
3. Includes transfers from the I&E Funds limited to funds received to date
4. I&E Funds limited to CIP requests with an estimated useful life less than 20 years
5. The use of I&E Funds will continue to be evaluated to reduce future debt issuances
6. Contributed capital is identified as a future source to accommodate new customers and/or other intergovernmental agreements
7. Expenditures are adjusted for a projected rate of capital delivery rather than the sum of CIP requests.

Table III-6. CIP Financial Plan - Sources and Uses of Capital Spending

CIP Funding Sources and Uses	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Five Year Total	% of Total
Water System Bond Construction Fund								
Beginning Balance (unaudited)	\$ 5,000	\$ 173,953	\$ 109,200	\$ 184,614	\$ 69,081	\$ 100,711	\$ 173,953	24.9%
Bond Proceeds, net	225,883	-	188,000	-	94,000	-	282,000	40.4%
Investment Income	577	435	743	462	408	252	2,299	0.3%
DWRF Loan Reimbursements	-	-	-	-	-	-	-	0.0%
Transfers from I&E Fund - Specific (a)	3,258	14,936	6,942	1,813	266	-	23,957	3.4%
Transfers from I&E Fund - Strategic (b)	2,500	30,000	35,000	40,000	50,000	60,000	215,000	30.8%
Grants	-	-	-	-	-	-	-	0.0%
Contributed Capital Sources	-	-	-	-	-	-	-	0.0%
Subtotal - Sources	237,219	219,324	339,885	226,888	213,755	160,963	697,209	100.0%
Capital Project Expenditures (c)	(63,265)	(110,124)	(155,271)	(157,807)	(113,044)	(104,240)	(640,487)	
Projected Ending Balance	\$ 173,953	\$ 109,200	\$ 184,614	\$ 69,081	\$ 100,711	\$ 56,723	\$ 56,723	

CIP Funding Sources and Uses	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Five Year Total	% of Total
Sewer System Bond Construction Fund								
Beginning Balance (unaudited)	\$ 100,000	\$ 75,143	\$ 119,550	\$ 22,664	\$ 144,433	\$ 77,440	\$ 75,143	11.4%
Bond Proceeds, net	-	96,500	-	230,500	-	-	327,000	49.6%
Investment Income	250	429	299	633	361	194	1,916	0.3%
SRF Loan Reimbursements	20,621	52,897	49,732	25,488	-	-	128,117	19.4%
Transfers from I&E Fund - Specific (a)	1,706	3,758	1,024	2,080	5,000	5,000	16,862	2.6%
Transfers from I&E Fund - Strategic (b)	5,000	30,000	20,000	20,000	20,000	20,000	110,000	16.7%
Grants	-	-	-	-	-	-	-	0.0%
Contributed Capital Sources	-	-	-	-	-	-	-	0.0%
Subtotal - Sources	127,577	258,727	190,605	301,365	169,794	102,634	659,037	100.0%
Capital Project Expenditures (c)	(52,435)	(139,176)	(167,941)	(156,933)	(92,354)	(71,400)	(627,803)	
Projected Ending Balance	\$ 75,143	\$ 119,550	\$ 22,664	\$ 144,433	\$ 77,440	\$ 31,234	\$ 31,234	

(a) Expenditures on projects for studies and short lived projects that may not considered "debt eligible".

(b) Strategic use of revenue financed capital on "debt eligible" projects to transform away from reliance on debt financing.

(c) Capital Project Expenditures are included in the financing plan at 80% of the Requested Expenditures, except for SRF Loan Projects which are included at 100%.

IV. CIP SUMMARY

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).

Table IV-1. Water CIP Categories

Category	Category Number	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
Water											
Treatment Plants & Facilities											
Lake Huron	111	\$-	\$1,170	\$5,628	\$22,200	\$22,593	\$422	\$-	\$-	\$50,843	\$52,013
Northeast	112	-	150	1,983	-	-	-	-	-	1,983	2,133
Southwest	113	47,587	260	5,053	3,209	900	-	-	2,940	9,162	59,949
Springwells	114	57,156	26,503	21,815	18,084	27,100	32,300	29,500	26,500	128,799	238,958
Water Works Park	115	761	2,765	6,575	36,600	20,500	-	-	-	63,675	67,201
General Purpose	116	-	500	3,400	14,200	18,700	4,900	-	-	41,200	41,700
Treatment Plants & Facilities Total		105,504	31,348	44,454	94,293	89,793	37,622	29,500	29,440	295,662	461,954
Field Services											
General Purpose	121	-	-	-	-	-	-	-	-	-	-
Transmission System	122	37,284	24,683	33,332	35,352	59,150	69,700	69,700	69,200	267,234	398,401
Field Services Total		37,284	24,683	33,332	35,352	59,150	69,700	69,700	69,200	267,234	398,401
SCC											
General Purpose	131	-	-	-	-	-	-	-	-	-	-
Pump Station/Reservoir	132	14,063	1,351	8,713	15,692	400	-	-	-	24,805	40,219
SCC Total		14,063	1,351	8,713	15,692	400	-	-	-	24,805	40,219
Water Quality											
General Purpose	141	-	-	-	-	-	-	-	-	-	-
Water Quality Total		-	-	-	-	-	-	-	-	-	-
Metering											
General Purpose	151	-	-	-	-	-	-	-	-	-	-
Metering Total		-	-	-	-	-	-	-	-	-	-
General Purpose											
General Purpose	161	-	290	-	-	-	-	-	-	-	290
General Purpose Total		-	290	-	-	-	-	-	-	-	290
Programs											
Programs	17XX	9,571	16,161	45,501	43,983	43,983	33,483	30,600	-	197,550	223,282
Programs Total		9,571	16,161	45,501	43,983	43,983	33,483	30,600	-	197,550	223,282
Water Total		166,423	73,833	132,000	189,320	193,326	140,805	129,800	98,640	785,251	1,124,147

Category	Category Number	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
Water Central Services											
Information Technology	31X	-	-	-	-	-	-	-	-	-	-
Fleet	32X	-	-	-	-	-	-	-	-	-	-
Facilities	33X	-	3,000	3,000	3,000	2,500	-	-	-	8,500	11,500
Security	34X	-	-	-	-	-	-	-	-	-	-
Energy Management	35X	-	-	933	933	933	-	-	-	2,799	2,799
Engineering	36X	10,146	426	-	-	-	-	-	-	-	10,572
General Purpose	37X	-	-	-	-	-	-	-	-	-	-
Programs	38XX	14,479	1,823	1,722	836	500	500	500	-	4,058	20,360
Water Central Services Total		24,625	5,249	5,655	4,769	3,933	500	500	-	15,357	45,231
Grand Total		\$191,048	\$79,082	\$137,655	\$194,089	\$197,259	\$141,305	\$130,300	\$98,640	\$800,608	\$1,169,378

Table IV-2. Wastewater CIP Categories.

Category	Category Number	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
Wastewater											
WRRF											
Primary Treatment	211	\$14,344	\$14,528	\$18,809	\$36,052	\$28,263	\$13,242	\$3,303	\$2,679	\$99,669	\$131,220
Secondary Treatment & Disinfection	212	45,362	9,088	27,698	24,554	16,363	5,540	5,540	10,499	79,695	144,644
Residuals Management	213	167,263	8,896	17,342	17,093	12,575	11,975	11,041	-	70,026	246,185
IWC	214	-	-	5,000	2,000	-	-	-	-	7,000	7,000
CSO RTB & SDF	215	-	3,520	2,247	6,400	9,000	7,200	3,610	-	28,457	31,977
General Purpose	216	28,426	3,249	11,422	15,900	18,550	16,810	16,279	2,421	78,961	113,057
WRRF Total		255,395	39,281	82,518	101,999	84,751	54,767	39,773	15,599	363,808	674,083
Field Services											
General Purpose	221	-	-	-	-	-	-	-	-	-	-
Interceptors	222	-	321	37,537	33,550	27,173	11,500	8,200	6,000	117,960	124,281
Field Services Total		-	321	37,537	33,550	27,173	11,500	8,200	6,000	117,960	124,281
SCC											
General Purpose	231	-	-	-	-	-	-	-	-	-	-
Pumping Stations	232	128	8,512	10,408	30,370	30,810	1,000	-	-	72,588	81,228

Category	Category Number	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
In System Devices	233	-	-	1,387	3,464	5,000	3,000	-	-	12,851	12,851
SCC Total		128	8,512	11,795	33,834	35,810	4,000	-	-	85,439	94,079
Metering											
General Purpose	241	-	-	-	-	-	-	-	-	-	-
Metering Total		-	-	-	-	-	-	-	-	-	-
General Purpose											
General Purpose	251	-	-	-	-	-	3,125	2,737	-	5,862	5,862
General Purpose Total		-	-	-	-	-	3,125	2,737	-	5,862	5,862
Programs											
Programs	26XX	-	9,199	25,500	25,500	40,500	40,500	37,500	-	169,500	178,699
Programs Total		-	9,199	25,500	25,500	40,500	40,500	37,500	-	169,500	178,699
Wastewater Total		255,523	57,313	157,350	194,883	188,234	113,892	88,210	21,599	742,569	1,077,004
Wastewater Central Services											
Information Technology	31X	-	-	-	-	-	-	-	-	-	-
Fleet	32X	-	-	-	-	-	-	-	-	-	-
Facilities	33X	-	-	2,200	2,060	1,060	1,050	540	2,140	6,910	9,050
Security	34X	-	-	-	-	-	-	-	-	-	-
Energy Management	35X	-	-	-	-	-	-	-	-	-	-
Engineering	36X	6,006	442	-	-	-	-	-	-	-	6,448
General Purpose	37X	-	-	-	-	-	-	-	-	-	-
Programs	38XX	16,836	2,633	1,196	550	500	500	500	-	3,246	22,715
Central Services Total		22,843	3,075	3,396	2,610	1,560	1,550	1,040	2,140	10,156	38,214
Grand Total		\$278,365	\$60,388	\$160,746	\$197,493	\$189,794	\$115,442	\$89,250	\$23,739	\$752,725	\$1,115,217

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

Category	Category Number	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
Information Technology	31X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Information Technology Total		-	-	-	-	-	-	-	-	-	-
Fleet	32X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Fleet Total		-	-	-	-	-	-	-	-	-	-
Facilities	33X										
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
Facilities Total		-	3,000	5,200	5,060	3,560	1,050	540	2,140	15,410	20,550
Security	34X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
Security Total		-	-	-	-	-	-	-	-	-	-
Energy Management	35X										
Water		-	-	933	933	933	-	-	-	2,799	2,799
Wastewater		-	-	-	-	-	-	-	-	-	-
Energy Management Total		-	-	933	933	933	-	-	-	2,799	2,799
Engineering	36X										
Split (Water/Wastewater)		16,152	868	-	-	-	-	-	-	-	17,020
Engineering Total		16,152	868	-	-	-	-	-	-	-	17,020
General Purpose	37X										
Water		-	-	-	-	-	-	-	-	-	-
Wastewater		-	-	-	-	-	-	-	-	-	-
General Purpose Total		-	-	-	-	-	-	-	-	-	-
Programs	38XX										
Split (Water/Wastewater)		31,315	4,456	2,918	1,386	1,000	1,000	1,000	-	7,304	43,075
General Purpose Total		31,315	4,456	2,918	1,386	1,000	1,000	1,000	-	7,304	43,075
Grand Total		47,467	8,324	9,051	7,379	5,493	2,050	1,540	2,140	25,513	83,444

V. PROJECTS BY CATEGORY

SECTION 1 WATER

All financial figures are in thousands of dollars (\$1,000's). In the Capital Expense Category (CapEx Category), projects are funded with Construction Bonds (CB) or the Improvement & Extension Fund (IE). Cost Allocation has been listed as Common to All (CTA) or Suburban Only (Suburb. Only), as explained in Chapter III.

Table V-1. Water CIP Projects

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	Projected Expenditures								Project Total	Percent of W/S CIP
							2017	FY 2018	2019	2020	2021	2022	2023 & Beyond	2018-2022 CIP Total		
111	1227	Energy Management: Lake Huron Water Treatment Plant Low Lift Pumping Improvements	2010	CB	CTA	0	200	2,500	3,000	0	0	0	0	5,500	5,700	0.7%
111	1280	Miscellaneous Mechanical Improvements at Lake Huron WTP	2014	CB	CTA	0	270	1,030	3,130	3,050	422	0	0	7,632	7,902	1.0%
111	1289	Evaluation of Flocculation Improvement Alternatives at the LHWTP	2014	IE	CTA	0	0	125	0	0	0	0	0	125	125	0.0%
111	1298	Electrical Tunnel Rehabilitation at Lake Huron WTP	2014	CB	CTA	0	0	1,000	3,000	1,600	0	0	0	5,600	5,600	0.7%
111	1299	Miscellaneous Concrete Improvements at the Lake Huron WTP	2014	CB	CTA	0	600	323	0	0	0	0	0	323	923	0.0%
111	1300	Replacement of Filter Instrumentation and Raw Water Flow Metering Improvements at Lake Huron WTP	2014	CB	CTA	0	100	600	12,150	11,780	0	0	0	24,530	24,630	3.1%
111	1318	Lake Huron WTP-Raw Sludge Clarifier and Raw Sludge Pumping System Improvements	2016	CB	CTA	0	0	50	920	6,163	0	0	0	7,133	7,133	0.9%
112	1272	Yard Piping Replacement at Northeast Water Treatment Plant	2014	CB	CTA	0	0	800	0	0	0	0	0	800	800	0.1%
112	1273	Low Lift Pumping Plant Caisson Rehabilitation at Northeast WTP	2014	CB	CTA	0	150	1,183	0	0	0	0	0	1,183	1,333	0.1%
113	262	Southwest Water Treatment Plant, Sludge Treatment & Waste Wash water Treatment Facilities	2003	CB	CTA	47,587	0	1,793	0	0	0	0	0	1,793	49,380	0.2%
113	1277	High Lift Pump Discharge Valve Actuators Replacement at Southwest WTP	2014	CB	CTA	0	160	160	900	900	0	0	0	1,960	2,120	0.2%
113	1283	Replacement of Butterfly Valves and Sluice Gates for Rapid Mix Chamber at Southwest WTP	2014	CB	CTA	0	0	0	0	0	0	2,940	0	2,940	0.0%	
113	1297	Residual Handling Facility's Decant Flow Modifications at Southwest WTP	2014	CB	CTA	0	100	3,100	2,309	0	0	0	0	5,409	5,509	0.7%
114	917	Springwells Water Treatment Plant 1958 Filter Rehabilitation and Auxiliary Facilities	2002	CB	CTA	56,759	20,353	310	0	0	0	0	0	310	77,422	0.0%

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	Projected Expenditures									2018-2022 CIP Total	Project Total	Percent of W/S CIP
							2017	FY 2018	2019	2020	2021	2022	2023 & Beyond					
114	1071	Springwells Water Treatment Plant - Low Lift and High Lift Pump Station	2004	CB	CTA	0	0	1,500	2,000	12,500	22,000	21,500	26,500	59,500	86,000	7.4%		
114	1264	Water Production Flow Metering Improvements at NE, SW, and SPW WTP	2014	IE	CTA	0	1,000	8,800	2,100	1,000	0	0	0	11,900	12,900	1.5%		
114	1265	Miscellaneous Concrete Improvements at Springwells WTP	2014	CB	CTA	398	600	0	0	0	0	0	0	0	998	0.0%		
114	1266	Administration Building Improvements at Springwells WTP	2014	CB	CTA	0	0	0	300	1,700	0	0	0	2,000	2,000	0.2%		
114	1267	Replacement of Rapid Mix Units at Springwells WTP 1958 Process Train	2014	CB	CTA	0	100	875	275	0	0	0	0	1,150	1,250	0.1%		
114	1268	Powdered Activated Carbon System Improvements at Springwells WTP	2014	CB	CTA	0	0	0	0	900	2,000	0	0	2,900	2,900	0.4%		
114	1269	1930 Sedimentation Basin Sluice Gates, Guides & Hoists Improvements at Springwells WTP	2014	CB	CTA	0	0	1,200	2,000	4,000	300	0	0	7,500	7,500	0.9%		
114	1295	Springwells Water Treatment Plant Service Area Redundancy Study	2014	CB	CTA	0	450	0	0	0	0	0	0	0	450	0.0%		
114	1306	Yard Piping Improvements at Springwells WTP	2012	CB	CTA	0	0	0	2,000	7,000	8,000	8,000	0	25,000	25,000	3.1%		
114	1307	Steam, Condensate Return, and Compressed Air Piping Improvements at Springwells WTP	2012	CB	CTA	0	300	3,450	2,500	0	0	0	0	5,950	6,250	0.7%		
114	1320	Springwells Water Treatment Plant 1930 Filter Building-Roof Replacement	2016	CB	CTA	0	3,000	0	0	0	0	0	0	0	3,000	0.0%		
114	1389	Springwells Reservoir Fill Line Improvements	2016	CB	CTA	0	200	3,300	4,000	0	0	0	0	7,300	7,500	0.9%		
114	1407	Springwells WTP Underground Fire Protection Loop Improvements	2017	CB	CTA	0	0	380	2,909	0	0	0	0	3,289	3,289	0.4%		
114	1412	Emergency Grating Replacement at Springwells WTP	2017	CB	CTA	0	500	2,000	0	0	0	0	0	2,000	2,500	0.2%		
115	1166	Yard Piping, Valves and Venturi Meters Replacement at Water Works Park	2007	CB	CTA	0	0	5,500	27,900	20,500	0	0	0	53,900	53,900	6.7%		
115	1274	Miscellaneous Concrete and Road Improvements at Waterworks Park WTP	2014	CB	CTA	761	2,275	0	0	0	0	0	0	0	3,036	0.0%		
115	1301	Comprehensive Condition Assessment at Waterworks Park WTP	2014	IE	CTA	0	200	375	0	0	0	0	0	375	575	0.0%		
115	1410	Water Works Park WTP Chlorine System Upgrade	2017	CB	CTA	0	290	700	8,700	0	0	0	0	9,400	9,690	1.2%		
116	1292	Miscellaneous Improvements to Raw Water Tunnels, Shafts and Related Structures	2014	CB	CTA	0	0	1,000	1,000	500	0	0	0	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	CB	CTA	0	500	2,000	10,000	15,000	4,900	0	0	31,900	32,400	4.0%		
116	1355	Genesee and Lapeer County Transmission System Improvements	2016	CB	CTA	0	0	400	3,200	3,200	0	0	0	6,800	6,800	0.8%		

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	2017	FY 2018	Projected Expenditures						2018-2022 CIP Total	Project Total	Percent of W/S CIP
									2019	2020	2021	2022	2023 & Beyond				
122	1112	Parallel 42-Inch Main in 24 Mile Road from Rochester Station to Romeo Plank Road	2005	CB	CTA	26,926	2,367	715	0	0	0	0	0	715	30,008	0.1%	
122	1216	Replacement of Five (5) PRV Pits of Treated Water Transmission System	2010	CB	CTA	1,015	1,205	0	0	0	0	0	0	0	2,220	0.0%	
122	1305	New Waterworks Park to Northeast Transmission Main	2014	CB	CTA	0	0	1,500	5,000	10,000	38,000	38,000	37,500	92,500	130,000	11.6%	
122	1321	96-inch Main Relocation, Isolation Valves Installations, and New Parallel Main	2016	CB	CTA	0	500	1,500	6,000	35,900	31,700	31,700	31,700	106,800	139,000	13.3%	
122	1323	Transmission System Water Main Work - Replacement of Schoolcraft Water Main	2016	CB	CTA	0	0	0	7,300	7,250	0	0	0	14,550	14,550	1.8%	
122	1324	Transmission System Water Main Work-Wick Road Parallel Water Main	2016	CB	CTA	0	10,000	9,350	0	0	0	0	0	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	CB	CTA	0	0	1,800	2,200	0	0	0	0	4,000	4,000	0.5%	
122	1350	Water System Improvements in Joy Road from Southfield Road to Trinity	2014	CB	CTA	8,323	100	0	0	0	0	0	0	0	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	CB	CTA	0	1,370	1,106	652	0	0	0	0	1,758	3,128	0.2%	
122	1403	Park-Merriman Water Main-Final Phase	2015	CB	CTA	0	0	1,800	2,200	0	0	0	0	4,000	4,000	0.5%	
122	1404	36-inch Water Main in Telegraph Road	2012	CB	CTA	0	2,000	5,061	0	0	0	0	0	5,061	7,061	0.6%	
122	1405	Lyon Township Transmission Main Extension Project	2017	CB	CTA	0	1,300	10,500	12,000	6,000	0	0	0	28,500	29,800	3.6%	
122	1230 b	48-Inch Water Main Installation at Vining and Wick Roads in Romulus	2015	CB	CTA	1,021	3,514	0	0	0	0	0	0	0	4,535	0.0%	
122	1230 c	30-Inch Water main	2017	CB	CTA	0	2,327	0	0	0	0	0	0	0	2,327	0.0%	
132	1047	Wick Road Station Rehabilitation	2004	CB	CTA	13,452	250	0	0	0	0	0	0	0	13,702	0.0%	
132	1226	Replacement of Switchgear at Joy Road Pumping Station	2010	CB	CTA	611	1	0	0	0	0	0	0	0	612	0.0%	
132	1270	Isolation Gate Valves for Line Pumps for West Service Center Pumping Station	2014	CB	CTA	0	0	521	1,000	0	0	0	0	1,521	1,521	0.2%	
132	1271	Hydraulic Surge Control for North Service Center Pumping Station	2014	CB	CTA	0	200	500	2,000	100	0	0	0	2,600	2,800	0.3%	
132	1288	Energy Management: Evaluate Alternatives and Recommend Corrective Actions to Improve Power Factors (PF) at Various GLWA Booster Pumping Stations	2014	IE	CTA	0	0	125	125	0	0	0	0	250	250	0.0%	

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	2017	FY 2018	Projected Expenditures						2018-2022 CIP Total	Project Total	Percent of W/S CIP
									2019	2020	2021	2022	2023 & Beyond				
132	1293	Pressure and Control Improvements at the Electric, Ford Road, Michigan, and West Chicago Water Booster Pumping Stations	2014	IE	CTA	0	0	200	2,800	0	0	0	0	3,000	3,000	0.4%	
132	1294	Energy Management: Freeze Protection Pump Installation at Imlay Pumping Station	2014	CB	CTA	0	0	200	500	300	0	0	0	1,000	1,000	0.1%	
132	1296	Needs Assessment Study for all Water Booster Pumping Stations	2014	IE	CTA	0	500	1,200	0	0	0	0	0	1,200	1,700	0.1%	
132	1334	Study Phase Services for Proposed East Service Center Booster Pumping Station and Reservoir	2015	IE	CTA	0	400	100	0	0	0	0	0	100	500	0.0%	
132	1336	West Service Center/Duval Rd Division Valve Upgrades	2017	CB	CTA	0	0	4,200	7,600	0	0	0	0	11,800	11,800	1.5%	
132	1347	Energy Management: West Service Center (WSC) VFD Installation	2016	CB	CTA	0	0	1,667	1,667	0	0	0	0	3,334	3,334	0.4%	
161	1233	Comprehensive Water Master Plan Update	2010	CB	CTA	0	290	0	0	0	0	0	0	0	290	0.0%	
1701	1256	Water Treatment Plant /Pump Station Allowance	2012	CB	CTA	0	12,645	19,650	20,000	20,000	10,000	10,000	0	79,650	92,295	9.9%	
1702	1291	As Needed Construction Materials, Environmental Media and Special Testing Services, Construction Inspection, and Other Technical Services	2014	CB	CTA	0	0	500	500	500	0	0	0	1,500	1,500	0.2%	
1703	1401	Water Treatment Plant Automation Program	2017	CB	CTA	0	0	1,500	1,500	1,500	1,500	1,500	0	7,500	7,500	0.9%	
1704	1230	Water Transmission Improvement Program	2010	CB	CTA	0	0	10,000	10,000	10,000	10,000	10,000	0	50,000	50,000	6.2%	
1705	1356	Transmission System Valve Assessment and Rehabilitation/Replacement	2017	CB	CTA	0	0	2,930	3,100	3,100	3,100	3,100	0	15,330	15,330	1.9%	
1706	1400	Water Transmission Main Asset Assessment Program	2017	CB	CTA	0	0	2,626	2,000	2,000	2,000	2,000	0	10,626	10,626	1.3%	
1707	1170	Booster Stations and Reservoirs Inspection, Rehabilitation and Inspection Repair Program	2007	CB	CTA	9,571	2,316	88	0	0	0	0	0	88	11,975	0.0%	
1708	1325	Reservoir Inspection, Design and Rehabilitation at Imlay Station, Adams Station, Haggerty Station, LH-WTP, SP-WTP and SW-WTP	2016	CB	CTA	0	50	3,300	2,550	2,550	2,550	0	0	10,950	11,000	1.4%	
1709	1303	Suburban Water Meter Pit Rehabilitation and Meter Replacement	2014	CB	Suburb. Only	0	500	4,000	4,000	4,000	4,000	4,000	0	20,000	20,500	2.5%	
3807	1147	As-needed Engineering Services for Concrete Testing, Geotechnical Soil Borings, other Testing Services, and Related Services	2006	IE	CTA	0	650	907	333	333	333	0	0	1,906	2,556	0.2%	

The regional water system draws its water from the largest fresh water source in North America, the Great Lakes, 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). Water flow and pressure throughout the Water System are monitored and controlled by a Systems Control Center located in the Central Services Facility.

Physical Facilities

INTAKE FACILITIES

The 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 water 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 ⁽¹⁾	1931/1958	540
Water Works Park	2003	240

⁽¹⁾ 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 customer communities.

Regional Water System Master Plan

The Water Master Plan Update was accepted by the GLWA Board 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. Customer communities 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 the 50 years of 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 percent 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 Treatment 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, a number 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. Figure V-1 displays GLWA's service area. Approximately 3.9 million people, or nearly 40 percent of the total population of the State of Michigan, live in the Authority's water service area. Suburban customers comprise approximately 82 percent of the population served by the Authority, and the City of Detroit 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 customer communities are served via wholesale service contracts and the City retail customer class is 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

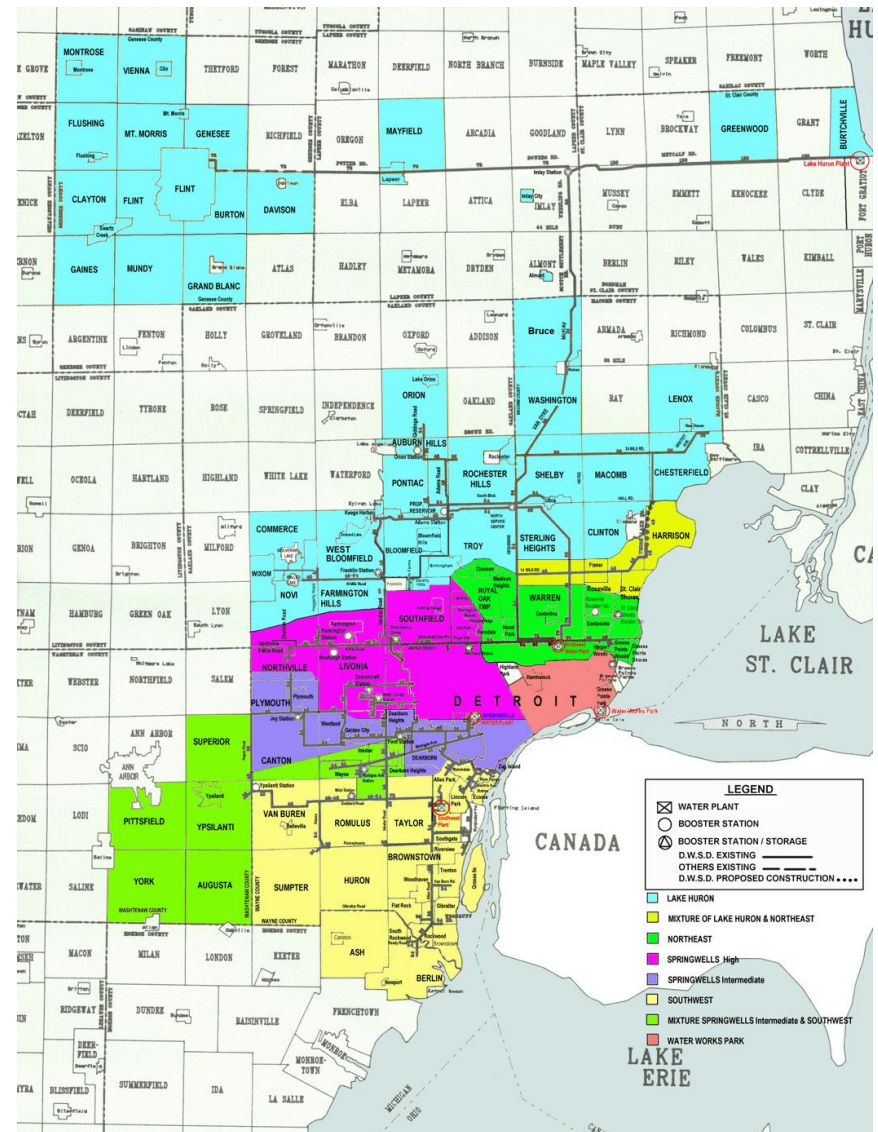


Figure V-1. GLWA water service area

nine wholesale customers, seven are served under the former contract structure, two 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 percent of total billed revenues from 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 and Mayfield Township. 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 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 five 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 community, 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 community’s retail water or wastewater 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 customer communities, 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 that provide water to GLWA customer communities in Southeast 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 that 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, IPD* 450, HPD*	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
System Totals:		1,720	2,400	192	*IPD = Intermediate Pressure District, HPD = High Pressure District

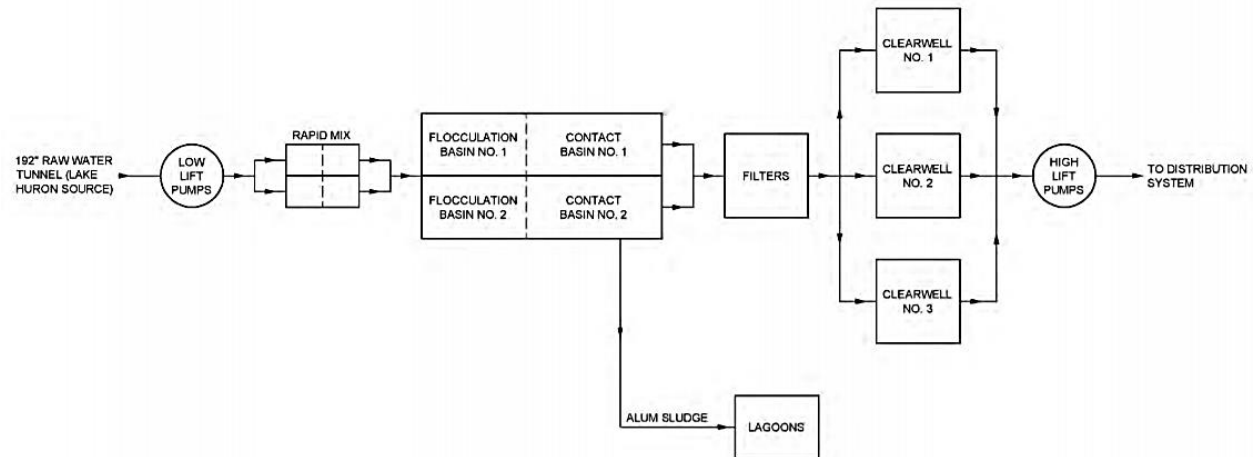
1.1.1. Lake Huron Water Treatment Plant

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 that 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 Water Treatment Plant. 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 former 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

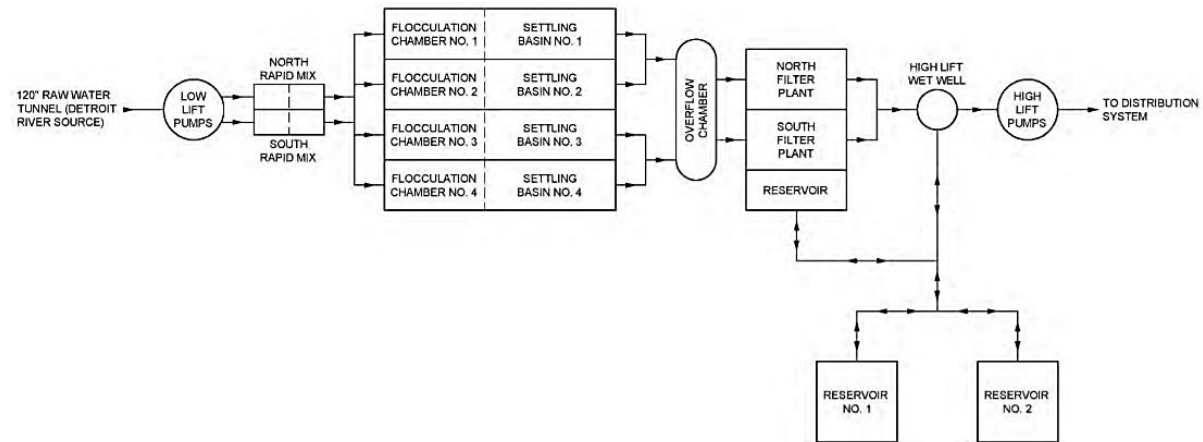


Figure V-5. Northeast WTP process diagram

1.1.3. Southwest Water Treatment Plant

Detroit's fourth water treatment plant, Southwest, 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

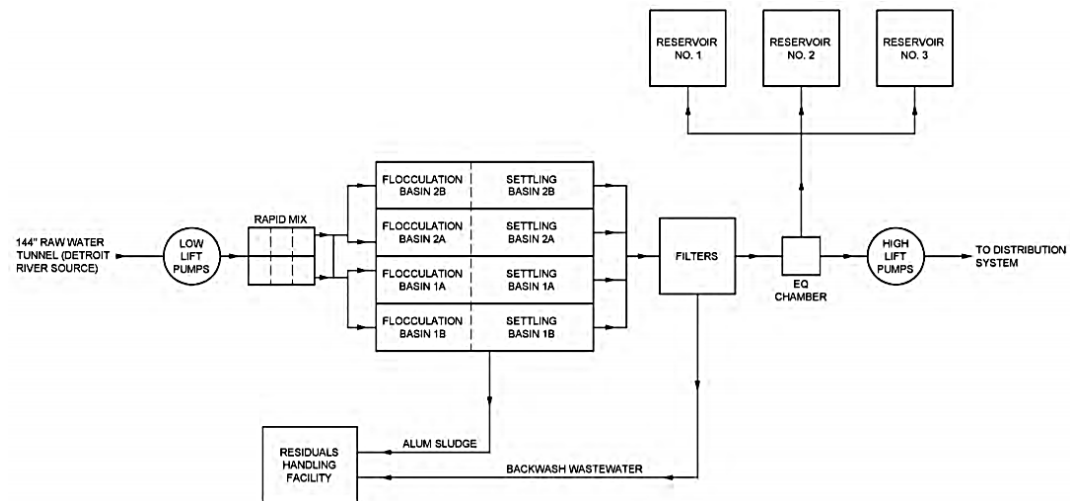


Figure V-7. Southwest WTP process diagram

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, and electrical improvements are also included in this project.



Figure V-8. Springwells WTP

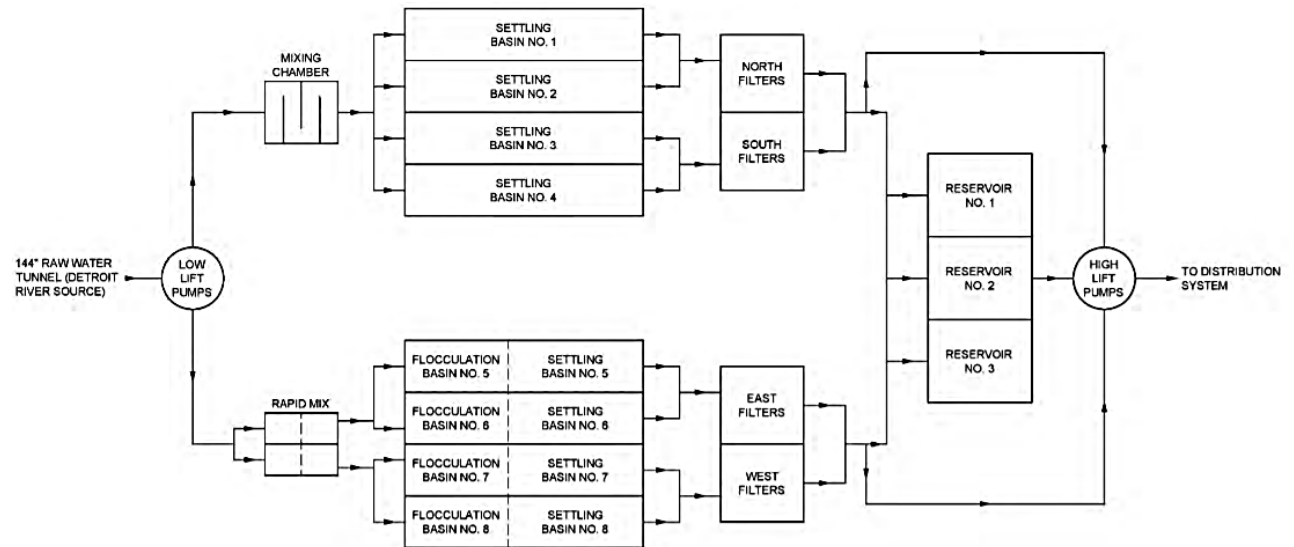


Figure V-9. Springwells WTP process diagram

1.1.5. Water Works Park Water Treatment Plant

Water Works Park Water Treatment 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.

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

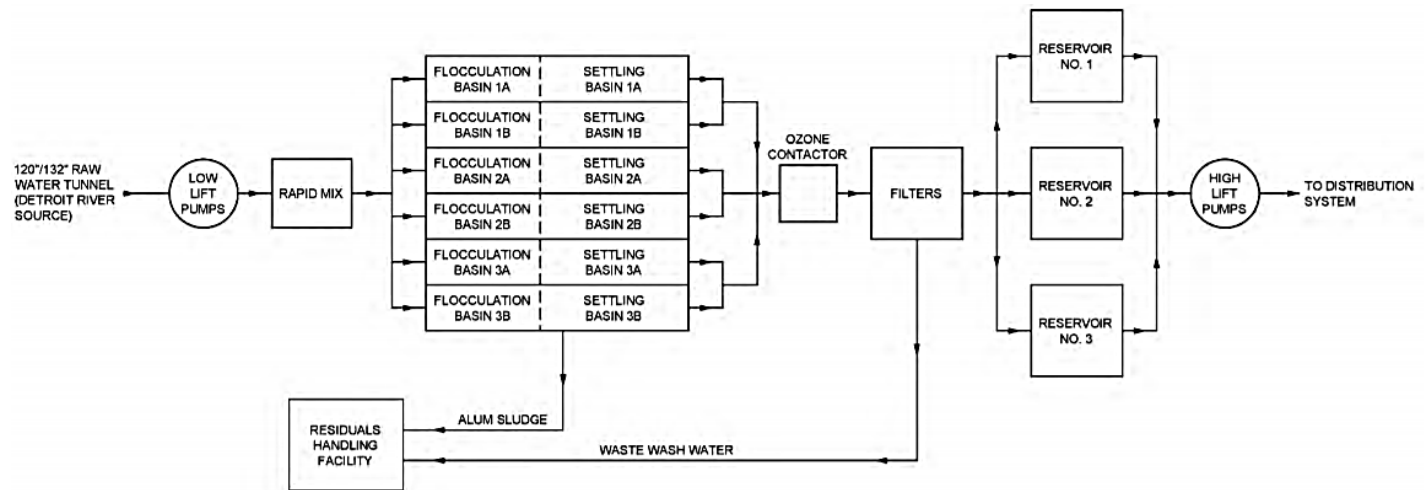


Figure V-11. Water Works Park process diagram

1.1.6. General Purpose

Refer to the General Purpose description on page II-4.

1.2. Field Services

1.2.1. General Purpose

Refer to the General Purpose description on page II-4.

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 customer communities and the City of Detroit.

Figure V-14, 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.

1.3. Systems Control Center

1.3.1. General Purpose

Refer to the General Purpose description on page II-4.

Pressure Reducing Valve (PRV)

Pressure Reducing Valves (PRV) 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.

Pressure Monitoring Site

Fifty-three Pressure Monitoring Sites in the transmission system provide suction/upstream and discharge/downstream pressure readings to aid in System operation.

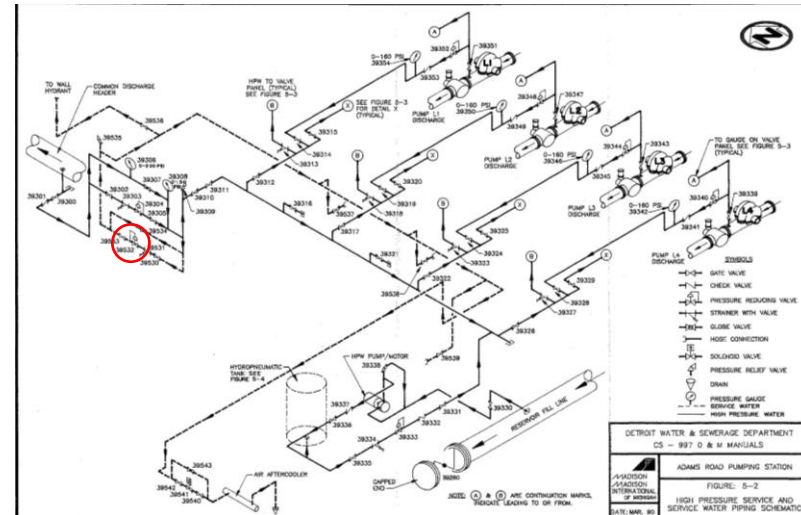


Figure V-12. Adams Road Pumping Station: PRVs can be seen throughout drawing. The one circled for example reduces pressure before feeding to service water line.

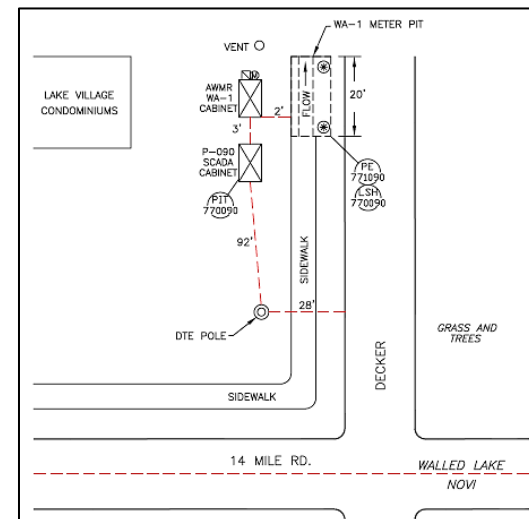


Figure V-13. Pressure Monitoring Site at 14 Mile and Decker.

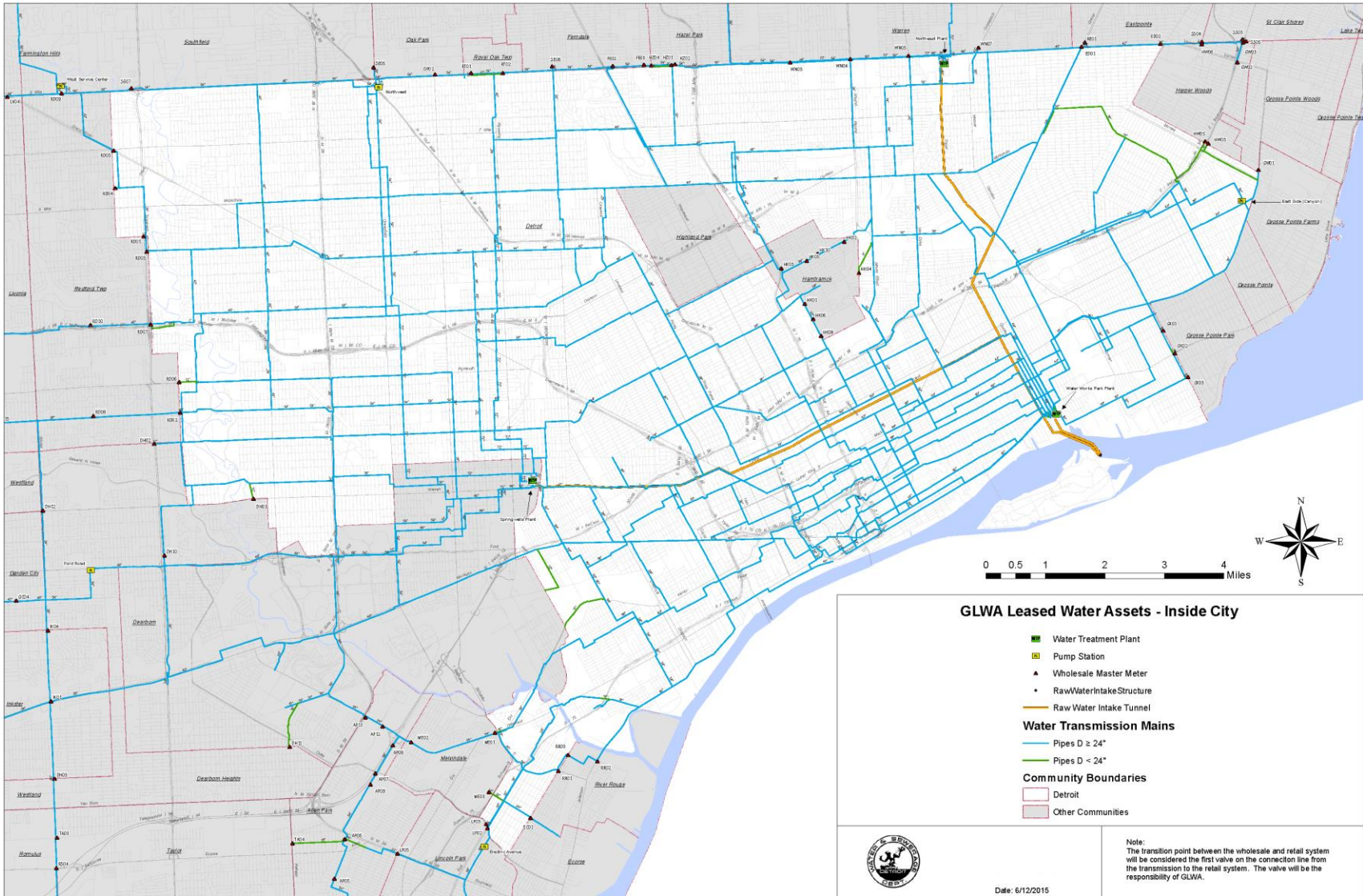


Figure V-14. GLWA Leased Water Assets inside the City of Detroit.

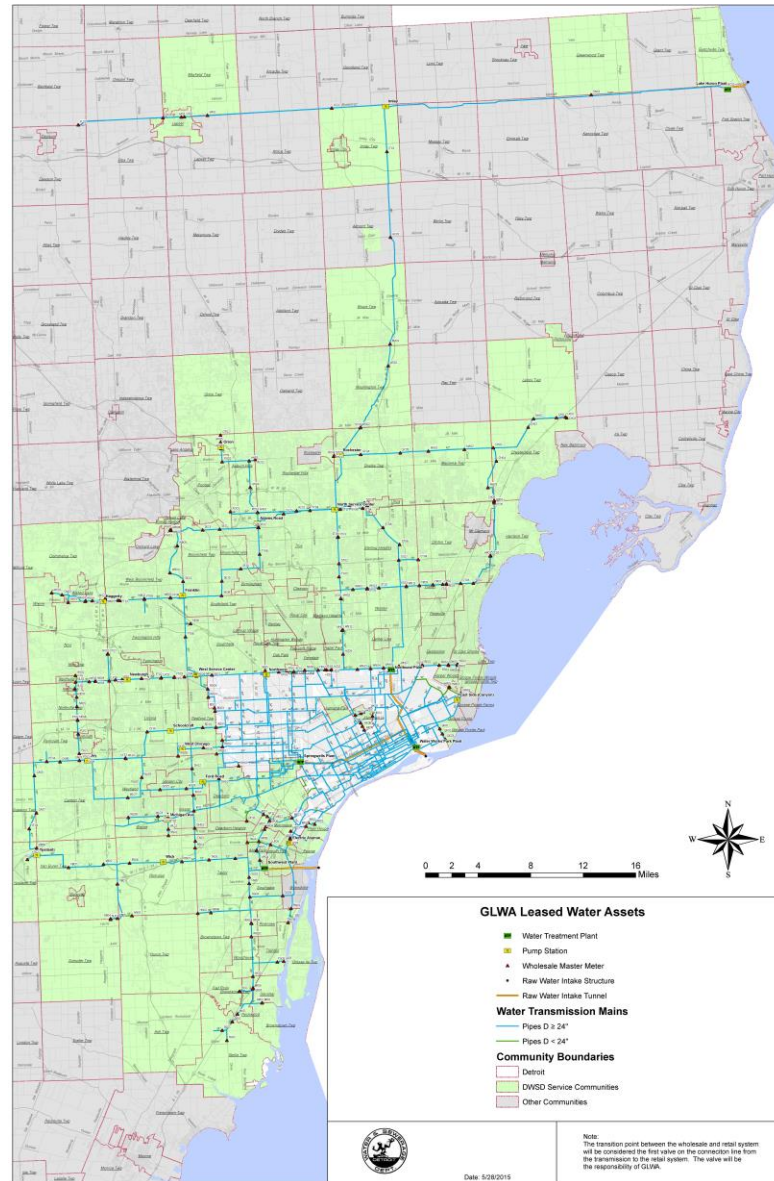


Figure V-15 . GLWA Leased Regional Water Assets

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 these pressures. There are 19 water booster stations in the GLWA transmission system.

Adams Road Pump Station



Figure V-16. 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 customer communities of Rochester Hills, Auburn Hills, Pontiac, as well as Bloomfield Hills and West Bloomfield, during high demand periods.

Elevation	881.50
Suction Pressure	40 - 55 psi
Discharge Pressure	120 -150 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 1500 Hp, 10 MGD, 350 TDH R2 - 1500 Hp, 10 MGD, 350 TDH
Line Pumps	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
Electric Feeds	2

Eastside Pump Station



Figure V-17. Eastside Pump Station

The 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.

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

Electric Avenue Pump Station



Figure V-18. 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 district 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.

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

Haggerty Pump Station



Figure V-19. Haggerty Pump Station

The 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, the 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.

Elevation	880.00
Suction Pressure	55 - 100 psi
Discharge Pressure	80 - 105 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 700 Hp, 14 MGD, 200 TDH R2 - 700 Hp, 14 MGD, 200 TDH
Line Pumps	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
Electric Feeds	2

Ford Road Pump Station



Figure V-20. Ford Road Pump Station

The 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 district 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.

Elevation	618.26
Suction Pressure	35 - 50 psi
Discharge Pressure	75 - 95 psi
Reservoir Capacity	10 MG
Reservoir Pumps	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
Line Pumps	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
Electric Feeds	2

Franklin Pump Station



Figure V-21. Franklin Pump Station

The 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 district 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.

Elevation	832.58
Suction Pressure	35 - 60 psi
Discharge Pressure	135 - 155 psi
Reservoir Capacity	10 MG
Reservoir Pumps	R1 - 1570 Hp, 22 MGD, 320 TDH R2 - 1570 Hp, 22 MGD, 320 TDH
Line Pumps	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
Electric Feeds	2

Michigan Avenue Pump Station



Figure V-22. Michigan Avenue Pump Station

The 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 district of the Springwells Water Treatment Plant and when demand requires it, by the Southwest Water Treatment Plant intermediate pressure district. 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.

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

Joy Road Pump Station



Figure V-23. Joy Road Pump Station

The 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 Toad. Then, the water main runs north along Sheldon Road to Eight Mile in Northville. The station serves the customer communities of Plymouth and Northville and the townships of Plymouth, Northville, and Canton.

Elevation	686.00
Suction Pressure	35 - 55 psi
Discharge Pressure	130 - 150 psi
Reservoir Capacity	2 X 5 MG
Reservoir Pumps	R1 - 1200 Hp, 16.13 MGD, 332 TDH R2 - 1200 Hp, 16.13 MGD, 332 TDH R3 - 1250 Hp, 14.8 MGD, 332 TDH
Line Pumps	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
Electric Feeds	2

Imlay Pump Station



Figure V-24. Imlay Pump Station

The 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.

Elevation	787.87
Suction Pressure	65 - 95 psi
Discharge Pressure	85-w/-75-170-s psi
Reservoir Capacity	18 MG
Reservoir Pumps	R1 - 5250 Hp, 75 MGD, 335 TDH R2 - 5250 Hp, 75 MGD, 335 TDH
Line Pumps	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
Electric Feeds	2

Newburgh Pump Station



Figure V-25. Newburgh Pump Station

The 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 district 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.

Elevation	737.00
Suction Pressure	30 - 60 psi
Discharge Pressure	110 - 130 psi
Line Pumps	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
Electric Feeds	2

Northwest Pump Station



Figure V-26. Northwest Pump Station

The 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 district. 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.

Elevation	657.00
Suction Pressure	
Discharge Pressure	40-55 psi
Reservoir Capacity	10 MG
Reservoir Pumps	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
Electric Feeds	1

North Service Center



Figure V-27. North Service Center

The 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.

Elevation	697.70
Suction Pressure	30 - 50 psi
Discharge Pressure	135 - 150 psi
Reservoir Capacity	2 X 10 MG
Reservoir Pumps	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
Line Pumps	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
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Orion Pump Station



Figure V-28. Orion Pump Station

The 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.

Elevation	946.25
Suction Pressure	75 - 95 psi
Discharge Pressure	105 - 130 psi
Line Pumps	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
Electric Feeds	2

Rochester Pump Station



Figure V-29. Rochester Pump Station

The 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.

Elevation	687.00
Suction Pressure	65 - 95 psi
Discharge Pressure	75 - 140 psi
Line Pumps	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
Electric Feeds	2

West Service Center



Figure V-30. West Service Center

The West Service Center consists of one main pump house, two reservoir pump houses, and two reservoirs. It increases the pressure in the 54-inch water main running along Eight Mile Road, from the high pressure district 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 customer 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.

Elevation	646.89
Suction Pressure	35 - 50 psi
Discharge Pressure	110 - 140 psi
Reservoir Capacity	2 X 10 MG
Reservoir Pumps	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
Line Pumps	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
Electric Feeds	2

Schoolcraft Pump Station



Figure V-31. Schoolcraft Pump Station

The Schoolcraft Pump Station consists of one pump house, an 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.

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

West Chicago Pump Station



Figure V-32. West Chicago Pump Station

The 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 district 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 customer communities of southern Livonia, West Service Center intermediate district, and Westland.

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

Wick Road Pump Station



Figure V-33. Wick Road Pump Station

The 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 customer communities of Romulus, Belleville, Carleton, Wayne, and Ypsilanti.

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

Ypsilanti Pump Station



Figure V-34. Ypsilanti Pump Station

The 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.

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

1.4. Water Quality

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 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.

1.4.1. General Purpose

Refer to the General Purpose description on page II-4.

1.5. Metering

The 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 water metering locations to the head end.

The System Analytics and Meter Operations Group maintains assets with the responsibility to meter wholesale water usage at 290 metering sites. Each of the 290 water metering sites contain

equipment that is located in a control cabinet, as well as assets that are located in a water 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 water 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, the System Analytics and Meter Operations Group maintains a 900MHz telemetry network and a Wholesale Automated Meter Reading (WAMR) system. The 900 MHz telemetry network is composed of 445 repeater sites. Each repeater location consists of radios and antennas. The WAMR system collects flow and pressure information from GLWA wholesale water meter sites every five minutes. The portal provides a customizable, web-based interface that displays meter and customer data in both graphical and tabular formats in increments of five minute, hourly and daily intervals. Customer and site usage can also be downloaded for off-line examination. Billed Consumption with adjustments can be reviewed for customer usage analysis.

1.5.1. General Purpose

Refer to the General Purpose description on page II-4.

1.6. General Purpose

Refer to the General Purpose description on page II-4.

1.7. Programs

Refer to the Programs description on page II-4.

SECTION 2 WASTEWATER

All financial figures are in thousands of dollars (\$1,000's). In the Capital Expense Category (CapEx Category), projects are funded with Construction Bonds (CB) or the Improvement & Extension Fund (IE). Cost Allocation has been listed as Common to All (CTA) or Industrial Waste Control (IWC), or CSO 83/17, as explained in Chapter III.

Table V-4. Wastewater/Sewer Projects

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Projected Expenditures										Project Total	Percent of W/S CIP
						Lifetime Actual Thru 2016	2017	2018	2019	2020	2021	2022	2023 & Beyond	2018-2022 CIP Total			
211	291	Rehabilitation of Primary Clarifiers Rectangular Tanks, Drain Lines, Electrical/Mechanical Building and Pipe Gallery	1999	CB	CTA	0	10,848	12,097	20,990	7,968	0	0	0	41,055	51,903	5.5%	
211	961	Pump Station No. 2 Pumping Improvements	2003	CB	CTA	456	1,157	1,304	616	0	0	0	1,920	3,533	0.3%		
211	1141	Rehabilitation of Primary Clarifiers	2006	CB	CTA	1	220	240	120	0	0	0	360	581	0.0%		
211	1189	Pump Station 1 Rack & Grit and MPI Sampling Station 1 Improvements	2008	CB	CTA	13,887	2,303	2,652	2,652	0	0	0	5,304	21,494	0.7%		
211	1287	Pump Station No. 2 Improvements Phase II at Wastewater Treatment Plant (WRRF)	2014	CB	CTA	0	0	600	1,700	4,800	3,700	0	10,800	10,800	1.4%		
211	1312	Rehabilitation of Main Lift Pumps at Pump Station No. 1	2016	CB	CTA	0	0	600	5,350	5,125	2,054	0	13,129	13,129	1.7%		
211	1314	Replacement of Bar Racks at Pump Station No.2	2016	CB	CTA	0	0	650	2,900	3,300	2,817	0	9,667	9,667	1.3%		
211	1382	Rehabilitation of Ferric Chloride Feed Systems	2017	CB	CTA	0	0	400	1,400	5,200	2,000	633	9,633	9,633	1.3%		
211	1386	Rehabilitation of the Circular Primary Clarifier Scum Removal System	2017	CB	CTA	0	0	266	324	1,870	2,671	2,670	2,679	7,801	10,480	1.0%	
212	1100	Returned Activated Sludge (RAS) Pumps, Influent Mixed Liquor System and Motor Control Centers (MCC) Improvements for Secondary Clarifiers	2005	CB	CTA	24,060	115	0	0	0	0	0	0	24,175	0.0%		
212	1117	Study, Design, & Construction Management Services for Modified Detroit River Outfall No. 2 - WRRF	2006	CB	CTA	8,449	33	0	0	0	0	0	0	8,482	0.0%		
212	1194	Aeration System Improvements	2008	CB	CTA	0	2,348	11,197	2,658	0	0	0	13,855	16,203	1.8%		
212	1222	Replacement of Chlorination and Dechlorination Equipment at the WRRF	2010	CB	CTA	0	0	400	2,800	1,800	0	0	5,000	5,000	0.7%		
212	1235	Rouge River Outfall No. 2 (RRO-2) Segment 1 - WRRF Modifications	2011	CB	CTA	12,125	62	0	0	0	0	0	0	12,187	0.0%		
212	1302	Rouge River Outfall (RRO) Disinfection (Alternative)	2014	CB	CTA	729	6,530	15,800	15,520	9,020	0	0	40,340	47,599	5.4%		
212	1385	Rehabilitation of the Secondary Clarifiers	2017	CB	CTA	0	0	301	3,576	5,543	5,540	5,540	10,499	20,500	30,999	2.7%	
213	1144	Replacement of Belt Filter Presses for Complex I and Upper Level Complex II	2006	CB	CTA	29	1,872	0	0	0	0	0	0	1,901	0.0%		
213	1221	Rehabilitation of Central Offload Facility	2010	CB	CTA	0	800	5,850	6,750	4,350	0	0	16,950	17,750	2.3%		
213	1253	Sewage Sludge Incinerator Air Quality Improvements at WRRF	2012	CB	CTA	33,043	3,000	0	0	0	0	0	0	36,043	0.0%		

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	Projected Expenditures								2018-2022 CIP Total	Project Total	Percent of W/S CIP
							2017	2018	2019	2020	2021	2022	2023 & Beyond				
213	1254	Biosolids Dryer Facility at WRRF	2012	CB	CTA	134,191	1,691	60	26	0	0	0	0	86	135,968	0.0%	
213	1284	Complex I Incinerators Decommissioning and Reusability at Wastewater Treatment Plant (WRRF)	2014	CB	CTA	0	0	900	200	0	0	0	0	1,100	1,100	0.1%	
213	1309	Improvements to Sludge Feed Pumps at Dewatering Facilities	2016	CB	CTA	0	33	402	750	0	0	0	0	1,152	1,185	0.2%	
213	1311	Modification to Incinerator Sludge Feed Systems at Complex -II	2016	CB	CTA	0	1,500	9,600	7,822	0	0	0	0	17,422	18,922	2.3%	
213	1383	Rehabilitation of the Ash Handling Systems	2017	CB	CTA	0	0	530	1,045	6,225	5,725	4,791	0	18,316	18,316	2.4%	
213	1399	Phosphorous Recovery at WRRF	2017	IE	CTA	0	0	0	500	2,000	6,250	6,250	0	15,000	15,000	2.0%	
214	1285	Construction of new Industrial Waste Control Division and Analytical Laboratory Operations	2014	CB	IWC	0	0	5,000	2,000	0	0	0	0	7,000	7,000	0.9%	
215	1384	Rehabilitation of Combined Sewer Overflow (CSO) Retention Treatment Basins (RTB) Screening (Replaces CIP1313)	2017	CB	83/17	0	3,520	2,247	6,400	9,000	7,200	3,610	0	28,457	31,977	3.8%	
216	366	Underground Electrical Duct Bank Repair and EB-1, EB-2, and EB-10 Primary Power Service Improvements - WRRF	1998	CB	CTA	23,037	2,575	1,532	0	0	0	0	0	1,532	27,144	0.2%	
216	1028	Plant-wide Fire Alarm Systems Upgrade/ Integration and Fire Protection Improvements	2004	CB	CTA	5,390	624	0	0	0	0	0	0	0	6,014	0.0%	
216	1140	Study/ Repair Potable Water, Screened Final Effluent, Natural Gas and Compressed Air Pipe Lines at the WRRF	2006	CB	CTA	0	50	690	1,900	1,150	1,210	0	0	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	CB	CTA	0	0	2,500	2,500	0	0	0	0	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	CB	CTA	0	0	1,500	6,000	5,400	0	0	0	12,900	12,900	1.7%	
216	1381	Rehabilitation of the Screened Final Effluent (SFE) Pump Station and Secondary Water System	2017	CB	CTA	0	0	1,700	2,000	12,000	15,600	16,279	2,421	47,579	50,000	6.3%	
216	1402	DTE Primary Electric 3rd Feed Supply to WRRF	2017	CB	CTA	0	0	3,500	3,500	0	0	0	0	7,000	7,000	0.9%	
222	1286	Oakwood District Intercommunity Relief Sewer Modification at Oakwood District	2014	CB	CTA	0	0	0	550	2,750	5,500	2,200	0	11,000	11,000	1.5%	
222	1329	Detroit River Interceptor (DRI) Evaluation and Rehabilitation	2016	CB	CTA	0	321	10,000	5,000	5,000	0	0	0	20,000	20,321	2.7%	
222	1332	North Interceptor East Arm (NIEA) Evaluation and Rehabilitation	2016	CB	CTA	0	0	11,000	12,000	3,000	0	0	0	26,000	26,000	3.5%	
222	1392	Collection System Valve Remote Operation Structures Improvements	2017	CB	CTA	0	0	341	1,000	1,422	0	0	0	2,763	2,763	0.4%	
222	1393	Collection System Access Hatch Improvements	2017	CB	CTA	0	0	3,196	2,000	2,001	0	0	0	7,197	7,197	1.0%	
222	1409	CSO Outfall Rehabilitation	2017	CB	CTA	0	0	6,000	6,000	6,000	6,000	6,000	6,000	30,000	36,000	4.0%	

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	Projected Expenditures										Project Total	Percent of W/S CIP
							2017	2018	2019	2020	2021	2022	2023 & Beyond	2018-2022 CIP Total				
222	1411	NIEA Evaluation and Rehabilitation from WRRF to Gratiot Ave. and Sylvester St.	2017	CB	CTA	0	0	7,000	7,000	7,000	0	0	0	21,000	21,000	2.8%		
232	1241	Fairview Pumping Station - Replace Four Sanitary Pumps	2011	CB	CTA	128	472	2,100	14,350	15,350	0	0	0	31,800	32,400	4.2%		
232	1315	Freud & Conner Creek Pump Station Improvements	2016	CB	CTA	0	8,040	5,900	5,100	2,460	1,000	0	0	14,460	22,500	1.9%		
232	1331	Northeast Pumping Station	2016	CB	CTA	0	0	2,408	10,920	13,000	0	0	0	26,328	26,328	3.5%		
233	1357	Collection System Backwater Gates and Regulator Gates Rehabilitation	2017	CB	CTA	0	0	1,301	3,000	3,000	2,000	0	0	9,301	9,301	1.2%		
233	1391	Collection System In System Storage Devices (ISDs) Improvement	2017	CB	CTA	0	0	86	464	2,000	1,000	0	0	3,550	3,550	0.5%		
251	1388	Wastewater System Wide Instrumentation & Control Software and Hardware Upgrade	2017	CB	CTA	0	0	0	0	0	3,125	2,737	0	5,862	5,862	0.8%		
2601	1257	Wastewater Treatment Plant, Lift Station and Wastewater Collection System Structures Allowance	2012	CB	CTA	0	5,587	12,000	12,000	15,000	15,000	12,000	0	66,000	71,587	8.8%		
2602	1263	Sewer and Interceptor Evaluation and Rehabilitation Program	2013	CB	CTA	0	2,612	8,000	8,000	20,000	20,000	20,000	0	76,000	78,612	10.1%		
2603	1330	Scheduled Replacement Program of Critical Assets	2016	CB	CTA	0	500	5,000	5,000	5,000	5,000	5,000	0	25,000	25,500	3.3%		
2604	1344	Sewage Meter Design, Installation, Replacement and Rehabilitation Program	2014	CB	CTA	0	500	500	500	500	500	500	0	2,500	3,000	0.3%		

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 customer 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 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 percent 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 percent of the pollutant loads to meet federal and state requirements.

Currently, the WRRF serves approximately 3 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 percent of the flow comes from the DRI, 35 percent from the OWI, and the remaining 29 percent 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-35.

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

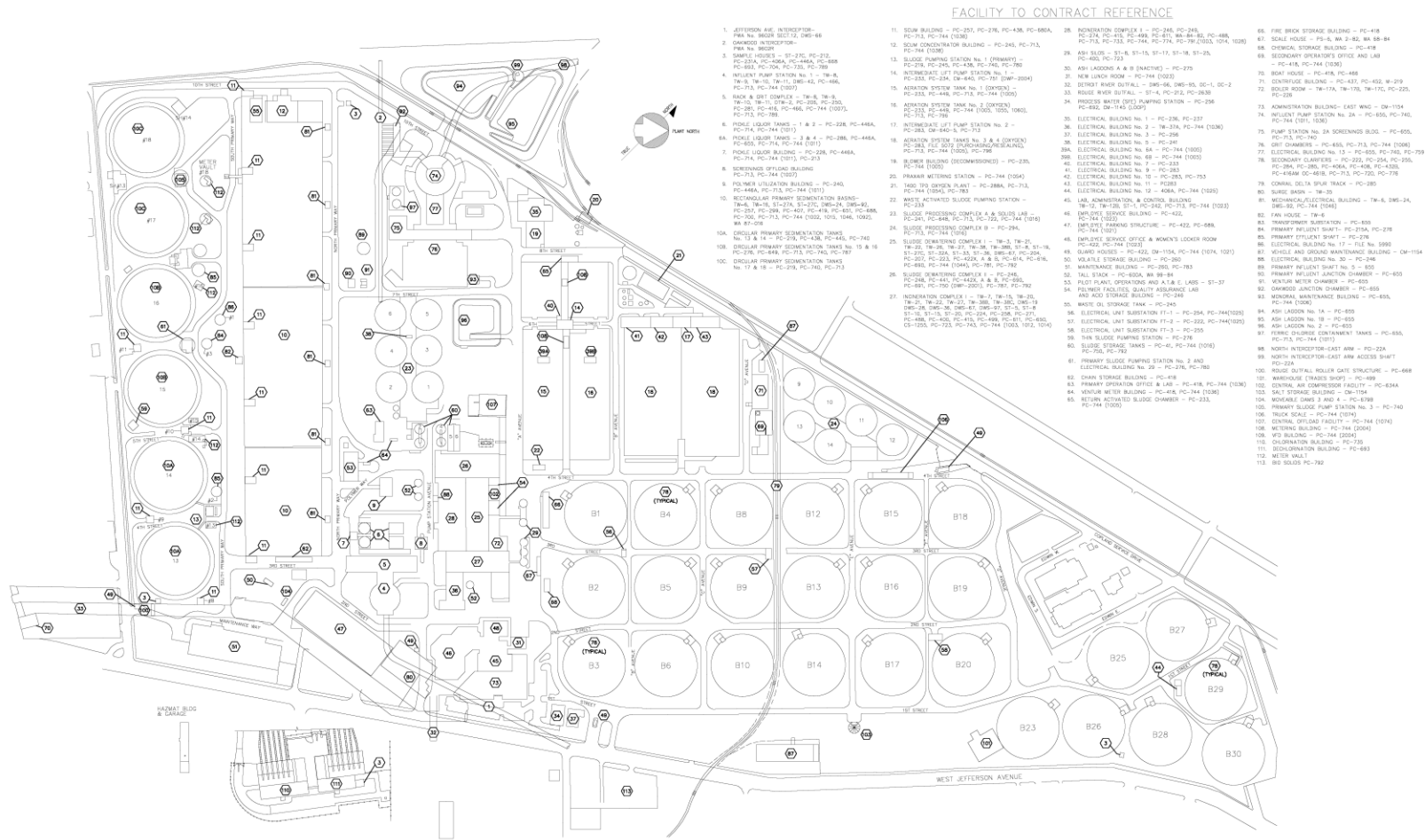


Figure V-35. Water Resource Recovery Facility Layout

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 (continued after next page):

- 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 10 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.

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 Group 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 these facilities 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, six are CSO Retention Treatment Basin and three are Screening and Disinfection Facilities (SDF's). The location of CSO RTBs and SDFs assets can be found on Figure V-36.

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 pages.

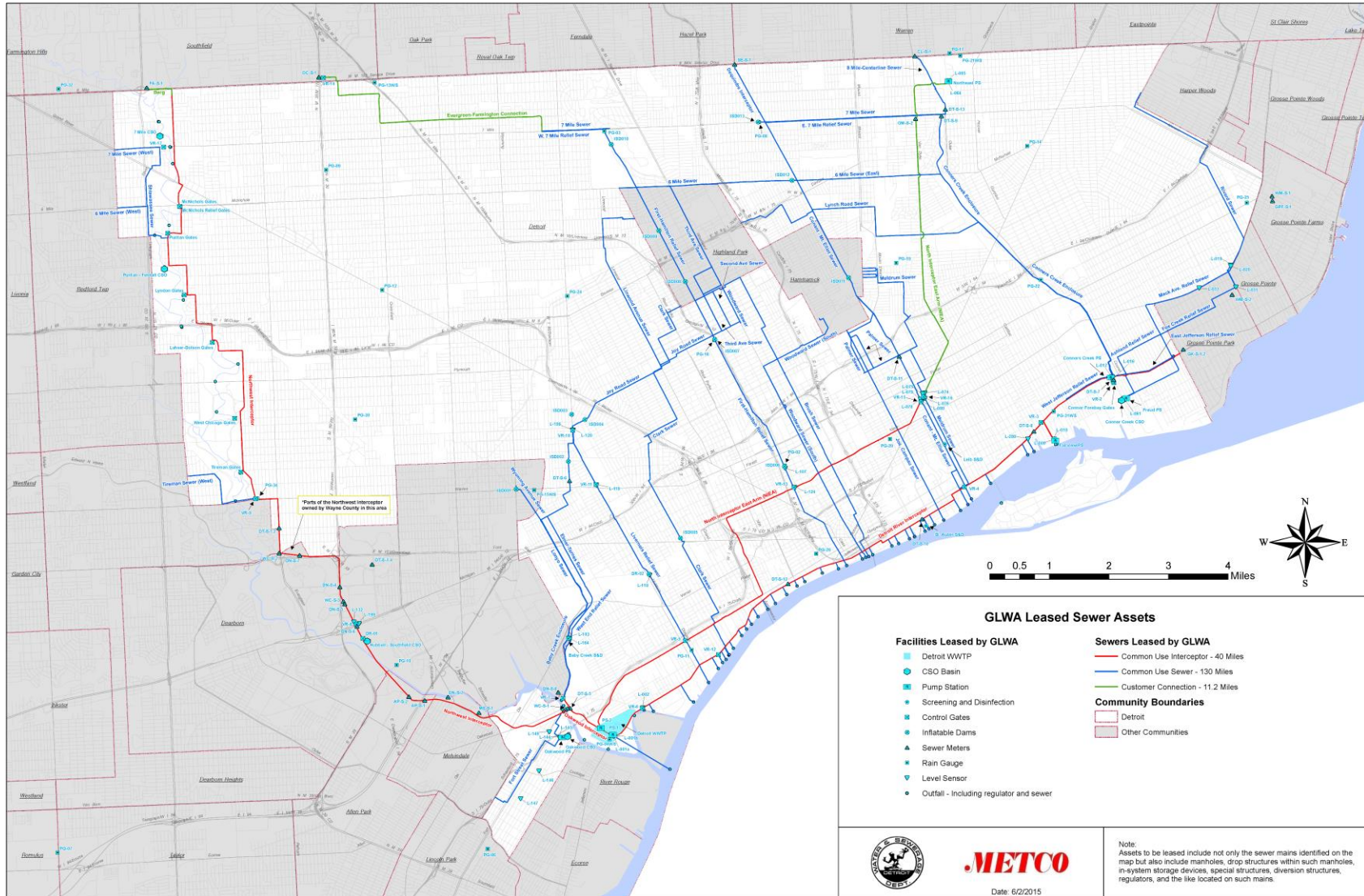


Figure V-36. GLWA Leased Sewer Assets map

Table V-5. Flow and Treatment Capacity of GLWA CSO RTBs^b

	Hubbell- Southfield	Seven Mile	Puritan-Fenkell	Conner Creek	Oakwood
Year of Startup	2000	1999	1999	2005	2012
Drainage Area (Acres)^a	14,440	463	649	83,000	1,500
Retention Volume (MG)	22	2.2	2.8	30	9.0
In-System Storage (MG)^b	4.4	1.9	2.5	32	0
Peak Flow Rates (cfs)	3,200	656	845	13,962	1,660
Compartments	2	2	2	4	2
Sanitary Pump Station^c	No	No	Yes	No	Yes
Influent	Gravity	Gravity	Gravity	Gravity	Pumped
Effluent	Gravity				
Dewatering	Gravity / Pumped	Pumped	Gravity / 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	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				
^a 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. ^b Tributary upstream wet weather flow volume also captured and drained to basin during events and subsequently dewatered. ^c See Section 1 of report for description of sanitary pump stations built integral with three RTBs. ^d Includes tributary flow pumped to gravity sewers on island from seven packaged pump stations.					

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 five minutes of detention for settling and disinfection for the peak flow from the 10-year, one-hour storm.

HUBBELL-SOUTHFIELD CSO RTB



Figure V-38. Hubbell-Southfield CSO RTB

The Hubbell-Southfield CSO RTB is one of GLWA'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-39. Oakwood CSO RTB

The Oakwood CSO RTB was placed in service in 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). This pumping station increases the level of service for the Oakwood District and helps to alleviate basement flooding in the upstream area.

PURITAN-FENKELL CSO RTB



Figure V-40. 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 one-year, one-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-41 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 one-year, one-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
In Service Date	2007	2002	2002
Peak Hydraulic Capacity	5,700 cfs	2,000 cfs	310 cfs
Toward Treatment Capacity	Not Applicable	150 cfs	Not Applicable
Screening Capacity	5,100 cfs	1,550 cfs	250 cfs
Disinfection Capacity (10 minute contact)	5,100 cfs	1,550 cfs	250 cfs
Dewatering Capacity		Static Volume in 24 hours	Static Volume in 24 hours
Total Disinfection Volume		225 MG	98 MG

BABY CREEK SCREENING AND DISINFECTION FACILITY



Figure V-42. 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 treatment capacity. 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-43. 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-44. St. Aubin SDF

The St. Aubin facility was built 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 (which frequently hosts concerts and other events). This facility has operated successfully since 2002.

2.1.6. General Purpose

Refer to the General Purpose description on page II-4.

2.2. Field Services

2.2.1. General Purpose

Refer to the General Purpose description on page II-4.

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. Approximately 170 miles of the piping is considered “Common Use” interceptors or trunk sewers, with the remaining 10 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-45, the map of the RWCS, and 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-45 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.

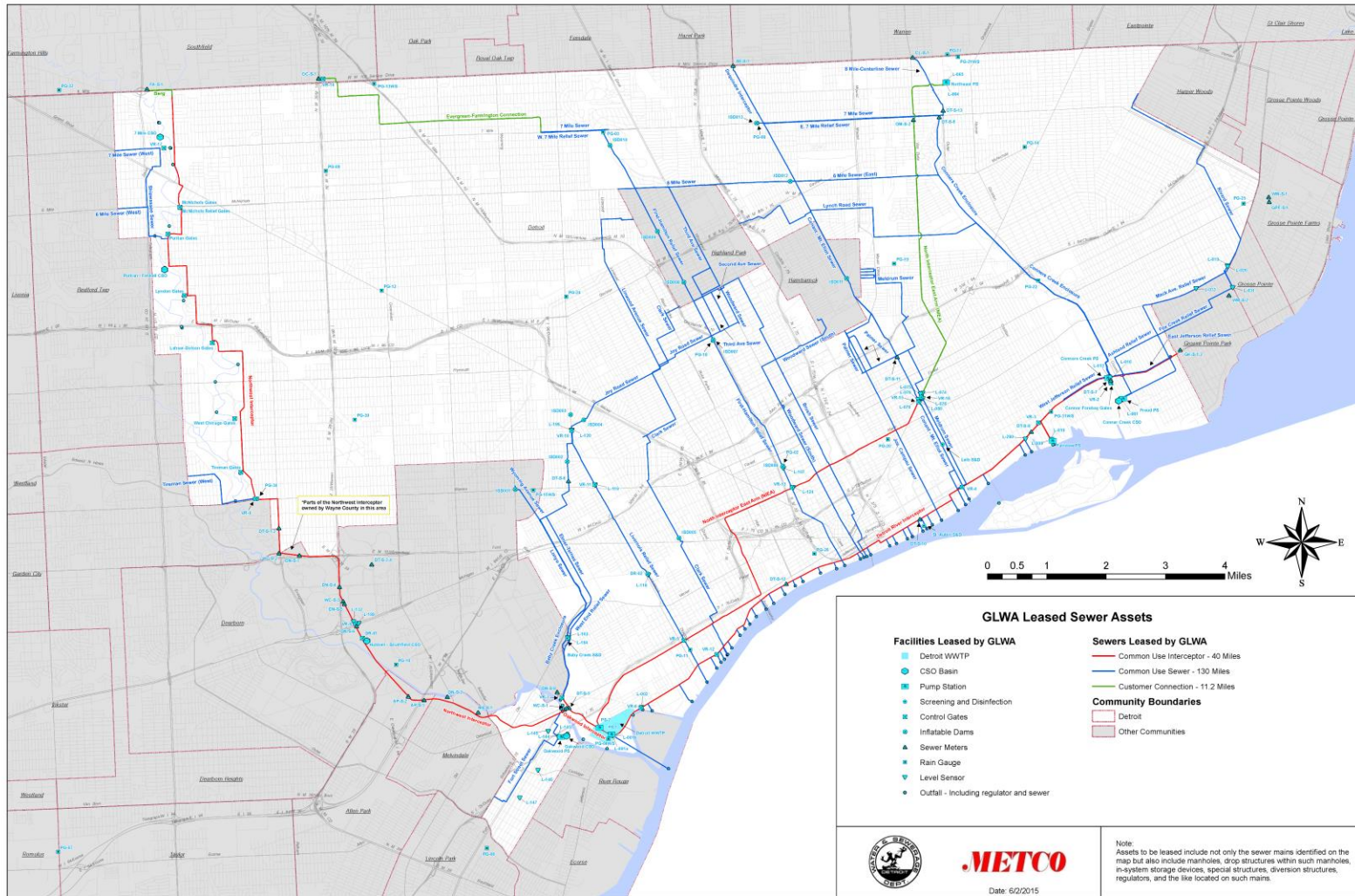


Figure V-45. Sewer interceptors and trunk sewers operated/maintained by GLWA.

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

Sewer Name	Material:	Type	Drains to Interceptor:	Size:	Years Constructed		Age Range:		Average Age:	Inspection Data?	Length (Mile):
					(year - year)	(years - years)					
Berg Sewer	CIPP	Customer Connection	Oakwood-Northwest	21"	2015		1		1	Yes, lined 2015	0.5
Woodward Sewer	Brick	Trunk	DRI & NIEA & ONWI	5'-5.5'	1892		124		124		0.7
Palmer Sewer, McDougal, Blvd Ave, Grandy Ave	Conc., Brick	Trunk	DRI		1885	1916	131	100	116		2.0
Third Ave Sewer, Second Ave Relief, Hamilton-Woodward-Webster, Village of Highland Prk Swr,	Conc., Brick	Trunk	DRI & NIEA & ONWI	1'-9.5', 2.5'x3.75' - 3'x4.5' (box)	1898	1931	118	85	102		4.5
Clark Sewer, Morell, Extension of Morrell, Tuxedo	Conc., Brick	Trunk	DRI	6'-14'	1912	1923	104	93	99		8.0
Linwood Avenue Sewer, Lateral Sewer - Puritan & Linwood Puritan Ave Arm	Conc., Brick	Trunk	DRI	1.25'-9.5', 3'x4.5' - 3.3'x5' (box)	1919	1921	97	95	96		3.3
6 Mile Sewer	Conc., Brick	Trunk	DRI	6.25'-7.25'	1921	1922	95	94	95		2.9
Jos. Campau Sewer	Conc., Brick	Trunk	DRI	6.75'-11.5'	1921	1922	95	94	95		4.5
Meldrum Sewer, Mt. Elliot Ave Swr, Miller Rd Swr, Carrie Ave Relief,	Crock, Brick	Trunk	DRI	1.25'-9'	1913	1930	103	86	95	Some	6.5
Weatherby Ave Sewer	Concrete	Trunk	DRI & NIEA & OWNI	17.75'x13.4' (Box)	1921		95		95		2.0
7 Mile Sewer	Concrete	Trunk	DRI & NIEA	5.5'-11.5'	1921	1924	95	92	94	Some	4.2
Brush/Bates Sewer	Conc., Brick	Trunk	DRI	2.7'-13.5' & 3'x4.5' (Box)	1922		94		94		5.4
Joy Road Sewer, Highland Pk Swr - Edison Ave Arm, Highland Pk Arm	Conc., Brick	Trunk	DRI & NIEA & ONWI	7.75'-14'	1922	1923	94	93	94		4.1
Lonyo Sewer	Conc., Brick	Trunk	Oakwood-Northwest	13.6', 14.5'x14' (2 Box)	1922		94		94		3.4
Wyoming Avenue Sewer	Brick	Trunk	Oakwood-Northwest	11.5'	1923		93		93		0.8
6 Mile Sewer East	Concrete	Trunk	DRI	10.5'	1921	1927	95	89	92		2.6
Conner Creek Enclosure	Concrete	Trunk	DRI	12'x17.5' - 122.9'x17.5' (2-3Box)	1922	1928	94	88	91	Some	11.4
Fort Street Sewer, Liddesdale Ave Sewer	Crock, Brick, Concrete	Trunk	Oakwood-Northwest	2'-6'	1924	1927	92	89	91		2.4
East Jefferson Relief Sewer	Conc., Brick	Trunk	DRI	5'-14'	1927		89		89		1.1
Woodward Sewer South, Smith Ave Swr, Chrysler Exp., Fischer Freeway Swr, Civic Center Plaza, et al.	Conc., Brick	Trunk	DRI	5.25'-9', 3'x4.5' (box)	1890	1964	126	52	89		5.4
8 Mile-Centerline Sewer/Connors Ave Arm	Brick,?	Trunk	DRI	3.5'-13.5'	1928	1930	88	86	87		0.7
6 Mile Sewer West	Concrete	Trunk	Oakwood-Northwest	6.25'-7.25'	1930		86		86		0.5
West Jefferson Relief Sewer	Crock, Concrete	Trunk	DRI	2'-12'	1930		86		86		0.9
Detroit River Interceptor	Conc., Brick	Interceptor	WRRF	8'-16'	1927	1936	89	80	85	DWS 876, CS 1329	12.7
7 Mile Sewer West	Brick	Trunk	Oakwood-Northwest	9.25'	1931		85		85		0.7
Tireman Sewer (west)	Concrete	Trunk	Oakwood-Northwest	2'-4.5'	1929	1948	87	68	78		1.6
Oakwood-Northwest Interceptor	Concrete	Interceptor	WRRF	4'-13.5'	1928	1950	88	66	77	Some	17.3
Rivard Sewer	Concrete	Trunk	DRI	9.25'-11.75'	1928	1957	88	59	74		4.0
Lynch Road Sewer, Davison Ave Swr, Conner Creek Connection	Concrete	Trunk	DRI	5.5'-11.5'	1920	1966	96	50	73		5.0
Shiawassee Sewer, Telegraph Swr, Puritan-Telegraph Swr	Concrete	Trunk	Oakwood-Northwest	4.25'-10.25'	1930	1964	86	52	69		2.0
Fox Creek Relief Sewer, Cadieux Rd Sewer	Concrete	Trunk	DRI	13.5'-16'	1948	1953	68	63	66		4.0
Conant-Mt. Elliot Sewer	Concrete	Trunk	DRI & NIEA	11'-16.25'	1954	1957	62	59	61	None	7.9
Livernois Relief Sewer	Concrete	Trunk	DRI & NIEA	3'-10.5', 10'x10' (box)	1949	1972	67	44	56		4.9
Ashland Relief Sewer	Concrete	Trunk	DRI	11.5'-16'	1961		55		55		1.7
7 Mile Sewer East Relief	Concrete	Trunk	DRI	5'-13'	1962		54		54		3.2
Baby Creek Enclosure	Concrete	Trunk	Oakwood-Northwest	14.5'x17.5' (2&3 Box)	1962		54		54	Some	4.3
Elmer-Ternes Sewer (West End Relief)	Concrete	Trunk	Oakwood-Northwest	14.5', 14.5'x14.5' (1-2 box)	1962	1965	54	51	53	Some	2.6
First-Hamilton Relief Sewer	Concrete	Trunk	DRI & NIEA	7'-15.5', 2.7'x4' - 10'x10.5' (box)	1956	1970	60	46	53	None	8.9
Dequindre Interceptor	Concrete	Trunk	DRI & NIEA	9'-13.75'	1960	1970	56	46	51		0.9
7 Mile Sewer West Relief	Concrete	Trunk	DRI & NIEA	6.5'-12.25'	1967		49		49		1.0
Mack Avenue Relief Sewer	Concrete	Trunk	DRI	9.25'-14'	1967		49		49		2.2
North Interceptor East Arm	Reinf. Conc.	Interceptor	WRRF	17.5'-12'	1969	1976	47	40	44	CS 1332	15.1
Evergreen-Farmington Connection	Concrete	Customer Connection	DRI & NIEA	8'	1991		25		25		4.7
Detroit River Outfalls	Concrete, Brick, Clay, unknown	DRI Outfalls (not conn. to other swrs)	N/A	1' - 15.5' (varying shapes)	1885	1967	131	49	90	Yes, 2015	10.7

The RWCS serves 77 suburban communities that cover 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 27 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 Sewer Districts

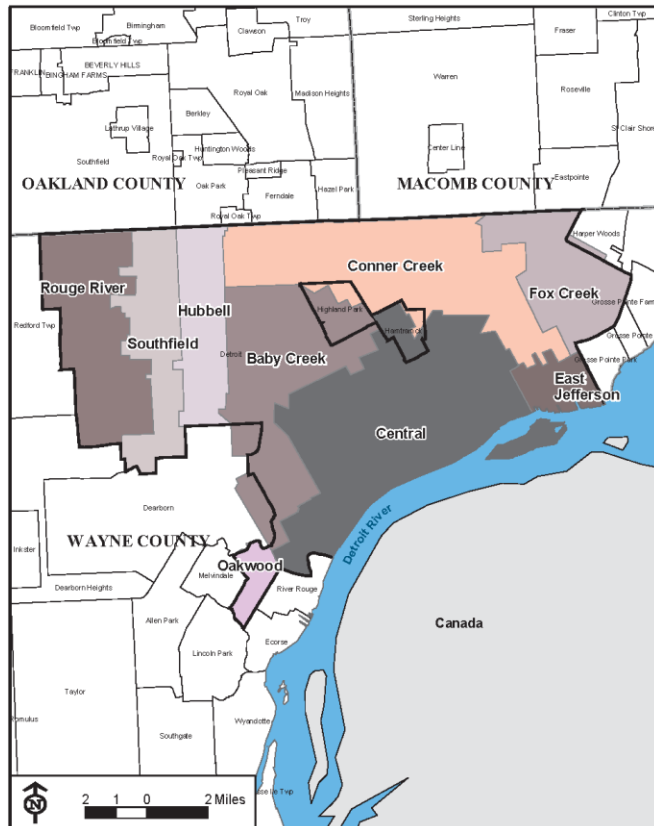


Figure V-46. Sewer Districts within Detroit.

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

GLWA Sewer Districts

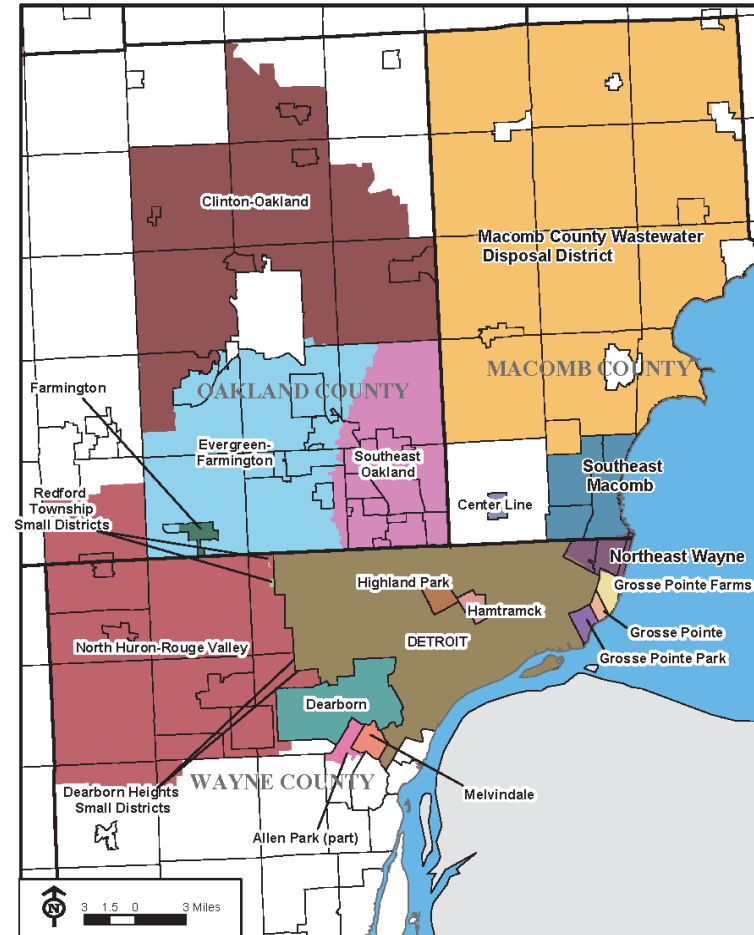


Figure V-47. Sewer districts served by GLWA.

Total GLWA Sewer Districts

Communities served by the varying sewer districts are provided below.

Table V-8. GLWA Service Districts & Communities Served

County/ City	District	Communities
Detroit	Rouge River	City of Detroit
Detroit	Hubbell	City of Detroit
Detroit	Southfield	City of Detroit
Detroit	Baby Creek	City of Detroit, Highland Park
Detroit	Conner Creek	City of Detroit, Highland Park, Hamtramck
Detroit	Oakwood	City of Detroit
Detroit	Central City	City of Detroit
Detroit	Fox Creek	City of Detroit
Detroit	East Jefferson	City of Detroit
Macomb	Southeast Macomb Sanitary Sewer District (SEMSD)	St. Clair Shores, East Pointe, Roseville (Through NESDS)
Macomb	Macomb County Wastewater District (part of Oakland Macomb Interceptor Drainage District)	Fraser, Sterling Heights, Clinton Twp, Harrison Twp, Shelby Twp, Utica, Macomb Twp, Waldenburn, Chesterfield, New Haven, Lenox, Ray, Washington Twp
Macomb	Centerline	City of Centerline
Oakland	Evergreen-Farmington District	Farmington Hills, Orchard Lake Village, Keego Harbor, Bloomfield Hills, Bloomfield Twp, Birmingham, Franklin, Beverly Hills, Lathrup Village, Southfield, Troy

County/ City	District	Communities
Oakland	Southeast Oakland County District (George W. Kuhn Drainage District)	Troy, Oak park, Madison Heights, Clawson, Hazel Park, Royal Oak, Pleasant Ridge, Huntington Woods, Berkley, Royal Oak Twp, Ferndale
Oakland	Clinton Oakland District (part of Oakland Macomb Interceptor Drainage District)	West Bloomfield Twp, Waterford Twp, Lake Angelis, Auburn Hills, Rochester Hills, Rochester, Oakland Twp, Orion Twp, Village of Clarkston, Independence Twp, Orion Twp, Lake Orion, Oxford Twp, City of Oxford
Oakland	City of Farmington	City of Farmington
Wayne	Rouge Valley Sewage Disposal System (RVSDS)	City of Inkster, City of Wayne, Canton Twp, Van Buren Twp, City of Westland, Garden City, Dearborn heights, Redford Twp, City of Livonia, City of Plymouth, City of Northville, City of Novi, Novi Twp, Romulus
Wayne	Northeast Sewage Disposal System (NESDS)	Harper Woods, Grosse Pointe Shores, Grosse Pointe Woods
Wayne	Grosse Pointe Farms	Grosse Pointe Farms
Wayne	Grosse pointe Park	Grosse pointe Park
Wayne	Grosse Pointe	Grosse Pointe
Wayne	City of Dearborn	City of Dearborn
Wayne	Melvindale	Melvindale
Wayne	Allen Park	Allen Park
Wayne	Redford Township	Redford Township
Wayne	Dearborn heights	Dearborn heights
Wayne	Harper Woods	Harper Woods

2.3. Systems Control Center

The 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

Refer to the General Purpose description on page II-4.

2.3.2. Wastewater Pumping Stations

Wastewater Pump Stations pump wastewater, and when necessary excess storm water, to the WRRF. 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 stations in the wastewater collection system; an example is shown in Figure V-48.

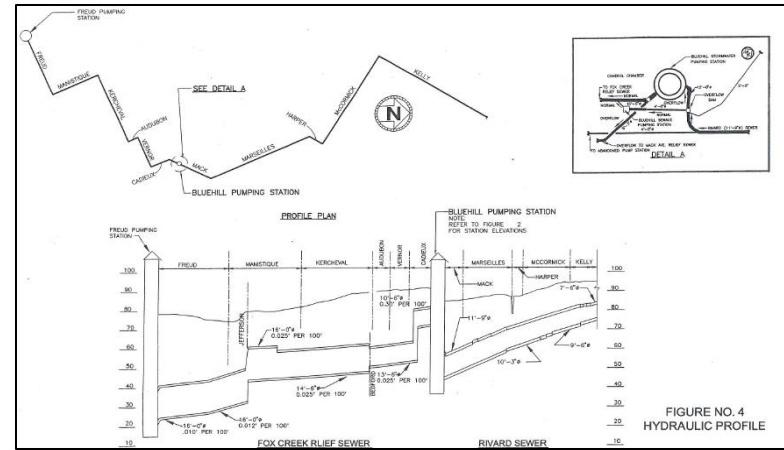


Figure V-48. Hydraulic Profile at Bluehill Station

Conner Creek Pump Station



Figure V-49. Conner Creek Pump Station

Max Wet Well Level	74 ft
Sanitary Pumps	SN9 - 500 Hp, 96 MGD SN10 - 350 Hp, 96 MGD SN11 - 500 Hp, 96 MGD SN12 - 200 Hp, 48 MGD
Storm Pumps	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 though 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 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

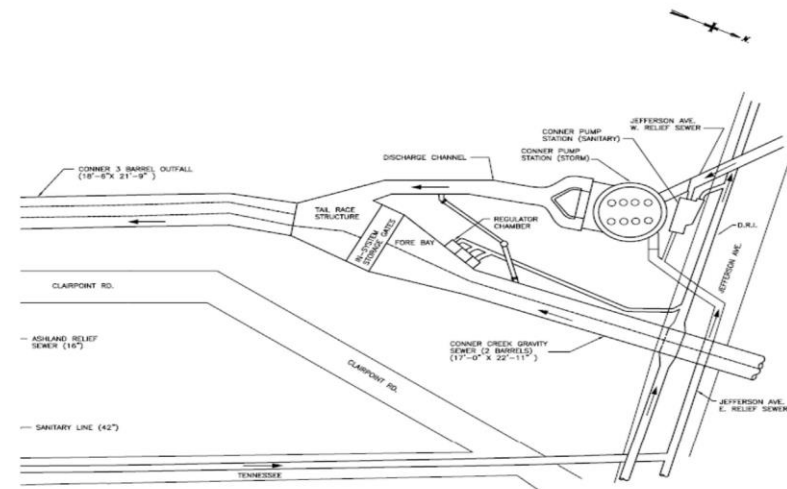


Figure V-50. Schematic of Conner Creek Pump Station

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

Contract No.	Contract Title	Summary of Work	Year
TW-24-A	Conner Creek	N/A.	
PC-265	Regulator Improvement-Conner Station	N/A.	
PW-212	Conner Creek Pumping Station Motor Driven Pumping Unit Nos. 5 and 6	Installation of Storm Water Pumps 5 and 6.	1947
PW-3042	Conner Creek Sanitary Pumping Station	Construction of the sanitary pump station.	1958
PC-674	Conner Station Rehabilitation	<p>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.</p> <p>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.</p> <p>Rehabilitation of the site shall include replacement of all roadways, curbs, sidewalks, site lighting, and demolition of the oil pump house.</p>	May 2009
PC-713	Authority-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
Maintenance Contract	Transformer	Replaced the powerhead on Transformer 1 and painted.	2015
PC-773	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-51. Fairview Pump Station

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

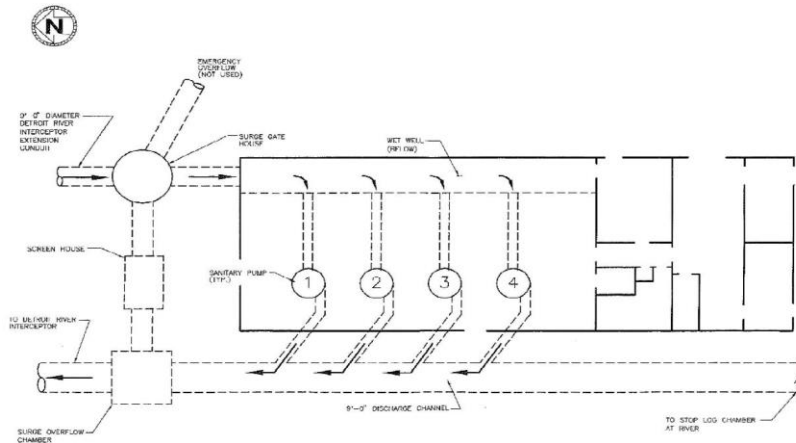


Figure V-52. Fairview Pump Station Schematic

The Fairview Pumping Station is an interceptor pumping station on the DRI, which 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 as efficiently and 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-10. 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	Authority-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-53. Freud Pump Station

Max Wet Well Level	71 ft
Sanitary Pumps	SN9 - 200 Hp, 27 MGD SN10 - 200 Hp, 13 MGD
Storm Pumps	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

The 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 WRRF. The Freud Pumping Station wet well and corresponding relief sewers provide 20 million gallons of in-line storage.

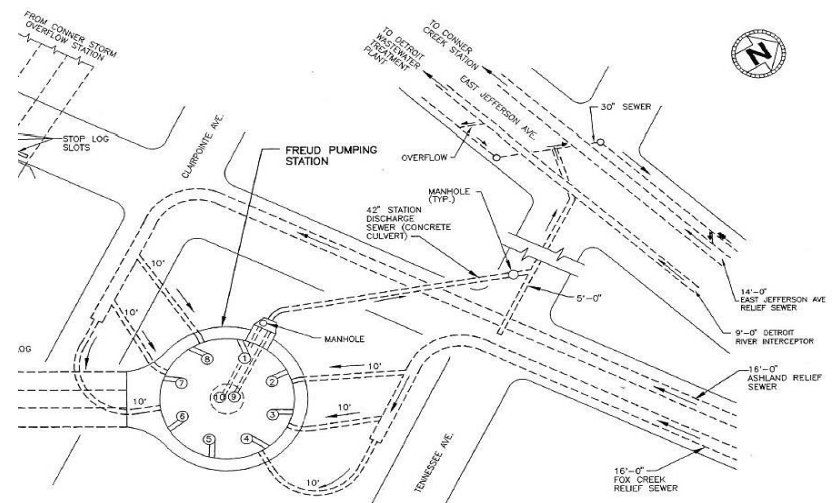


Figure V-54. Freud Pump Station Schematic

Table V-11 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	Authority-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-55. Northeast Pump Station

Max Wet Well Level	26 ft
Sanitary Pumps	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 WRRF as quickly as possible. The 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 WRRF. 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-12. 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	Authority-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-56. Oakwood Pump Station

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

The 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 WRRF. 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.

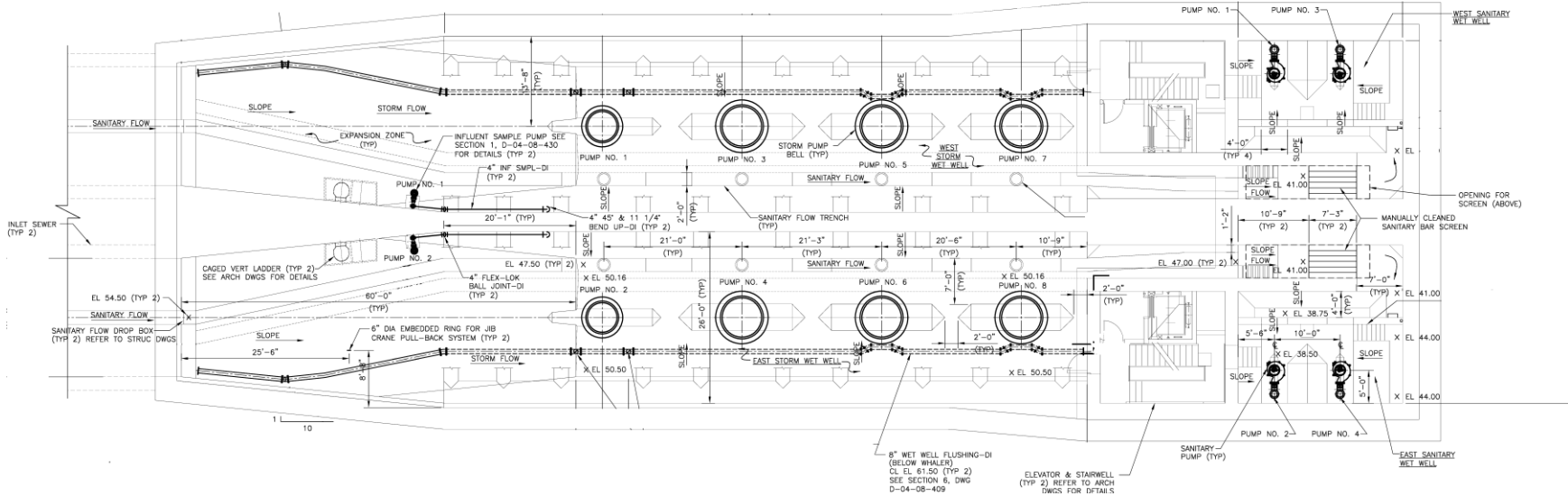


Figure V-57. Oakwood Pump Station Schematic

Table V-13. Wastewater Pumping Stations

Name of Pump Station	Location	Function	Sanitary Capacity				Storm Capacity				No. of Pumps	
			DESIGN		MAXIMUM		DESIGN		MAXIMUM		SANITARY	STORM
			MGD	CFS	MGD	CFS	MGD	CFS	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	1.4	2.2	2.8	4.4	-	-	-	-	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. There are 25 sewer level sensors located and monitored throughout the collection system. Overall, there are more than 150 level sensors in the entire System. An example is shown in **Error! Reference source not found.**

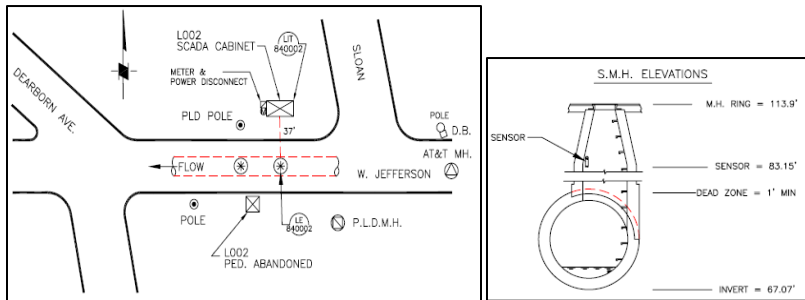


Figure V-58. Example of a level sensor at West Jefferson and Sloan

Inflatable Storage Dam (ISD)

Inflatable Storage Dams, as illustrated in Figure V-59, are utilized to detain upstream sewage in order to regulate flows to the WRRF. The dams can be remotely deflated and inflated as necessary.

Valve Remote (VR)

The GLWA Wastewater conveyance system has 17 Valve Remote (VR) gate locations. At these locations, there are one or more gates that are used to selectively load the interceptors, provide in-system storage and route the flow. These gates are operated locally and remotely from the SCC during wet weather periods. During dry weather, remotely controlled gates are opened to direct flow to the interceptors, and during wet weather they are

typically closed when the flow in the interceptors reach predetermined levels. Some are operated by electric operators, but the majority of them are operated by hydraulic units (SCUBA). Most of these gates were installed in the 1970s and rehabilitated in 1998 under PC-695. Average life expectancy is 20 to 35 years. An example of a valve remote location is shown in Figure V-60.

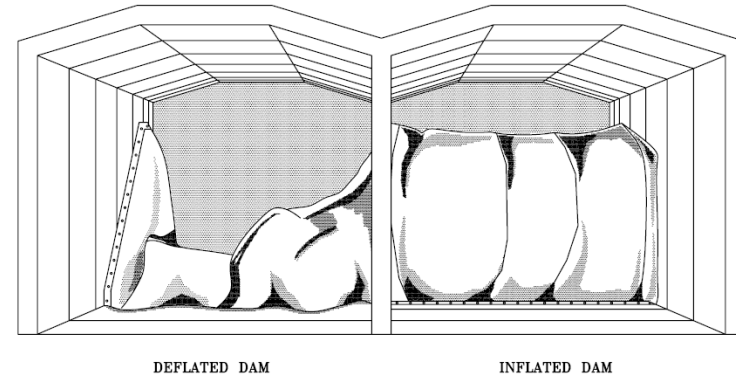


Figure V-59. Inflatable dam illustration

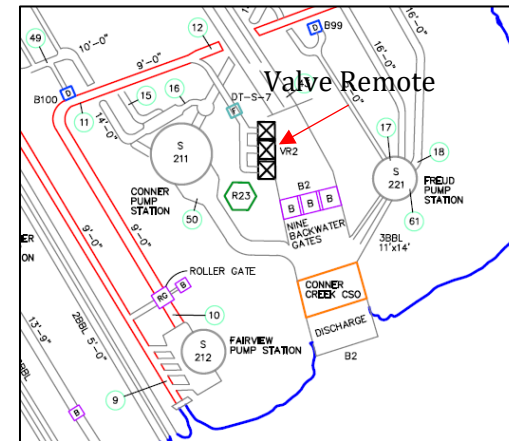


Figure V-60. Example of VR located at Conner Pump Station

Precipitation Gage

A precipitation gauge (PG, see Figure V-61) measures the amount of liquid precipitation over a set period of time. Ovation, the Authority's Supervisory Control and Data Acquisition system, 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.

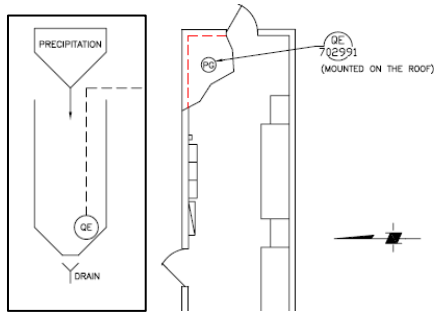


Figure V-61. Example of Precipitation Gauge mounted on roof at Schoolcraft Pump Station

2.4. Metering

The 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.

The 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, the System Analytics and Meter Operations Group maintains a 900MHz telemetry network and a Greater Detroit regional sewer system (GDRSS). The 900 MHz telemetry network is composed of 445 repeater sites. Each repeater location consists of radios and antennas. The GDRSS system collects flow and depth information from GLWA sewerage meters in five minute increments and from rain gauges in 15 minute increments. The GDRSS portal provides a web-based interface that displays meter data (collected the day before) in both graphical and tabular formats in increments of five minute, hourly, daily, monthly, and yearly intervals. Data can be exported for off-line examination. Billing reports can be reviewed for customer analysis, as well as precipitation data.

2.4.1. General Purpose

Refer to the General Purpose description on page II-4.

2.5. General Purpose

Refer to the General Purpose description on page II-4.

2.6. Programs

Refer to the Programs description on page II-4.

SECTION 3 CENTRALIZED SERVICES

All financial figures are in thousands of dollars (\$1,000's). In the Capital Expense Category (CapEx Category), projects are funded with Construction Bonds (CB) or the Improvement & Extension Fund (IE). Cost Allocation has been listed as Common to All (CTA), as explained in Chapter III.

Table V-14. Centralized Services Projects

Class.	CIP #	Title	Year Added	CapEx Category	Cost Allocation	Lifetime Actual Thru 2016	Projected Expenditures							Project Total	Percent of W/S CIP	
							2017	2018	2019	2020	2021	2022	2023 & Beyond			2018-2022 CIP Total
331	1279	Roofing Systems Replacement at Water Plants and Booster Pump Stations	2014	CB	CTA	0	3,000	3,000	3,000	2,500	0	0	0	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	CB	CTA	0	0	2,200	2,060	1,060	1,050	540	2,140	6,910	9,050	0.9%
351	1366	Water Facility Lighting Renovations	2017	IE	CTA	0	0	933	933	933	0	0	0	2,799	2,799	0.3%
361	1153	Consolidated Process Control System Upgrades	2006	CB	CTA	3,928	640	0	0	0	0	0	0	0	4,568	Split
361	1206	Data Center Reliability/Availability Improvements	2009	CB	CTA	6,003	10	0	0	0	0	0	0	0	6,013	Split
361	1207	SCADA Radio Network Upgrade	2009	CB	CTA	6,221	218	0	0	0	0	0	0	0	6,439	Split
3804	956	As-needed CIP Implementation Assistance and Related Services	2002	IE	CTA	4,770	1,400	100	0	0	0	0	0	100	6,270	Split
3805	1026	Department-wide General Engineering Services on an As-needed Basis	2004	IE	CTA	10,065	228	228	0	0	0	0	0	228	10,521	Split
3806	1031	General Engineering Services	2004	IE	CTA	14,011	446	436	386	0	0	0	0	822	15,279	Split
3808	1164	Geotechnical and Related Services on an As-Needed Basis	2007	IE	CTA	2,441	132	0	0	0	0	0	0	0	2,573	Split
3809	1182	General Engineering Services	2007	IE	CTA	28	1,250	1,154	0	0	0	0	0	1,154	2,432	Split
3810	1343	Energy Management: Electric Metering Improvement Program	2016	CB	CTA	0	1,000	1,000	1,000	1,000	1,000	1,000	0	5,000	6,000	Split

3.1. Information Technology

Information Technology (IT) at GLWA 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

IT team is to provide reliable and forward-thinking technologies that meet the needs today, and in the future, of GLWA's various business groups, enabling them to realize their goals and make processes more effective and efficient.

3.1.1. General Purpose

Refer to the General Purpose description on page II-4.

3.1.2. Service Delivery

The Service Delivery Group provides core technology support services, including troubleshooting, desktop and laptop configuration, software installation, mobile device management, smart boards, 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.

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.

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, and new application implementations.

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, and new application implementations.

3.1.6. Security

The Enterprise Technology Security Group provides secure infrastructure support, administration, monitoring and training for network and computing security across the Authority. It participates in and supports 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, and security training.

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 at GLWA, including but not limited to project management software and systems, process and workflow development, analysis, and strategic planning.

3.2. Fleet

The Fleet Group is responsible for efficiently and effectively maintaining all GLWA Fleet and Fleet-related equipment.

The Fleet Group provides the vehicles and proper equipment for GLWA staff to accomplish their required work. The vehicles and

equipment acquisition, disposal, record management, inventory and maintenance are accomplished through coordination with the DWSD Garage. All vehicles must be kept in a safe and proper manner in order to provide GLWA staff with reliable equipment to accomplish their work.

3.2.1. General Purpose

Refer to the General Purpose description on page II-4.

3.3. Facilities

The Facilities Group is responsible for efficiently and effectively maintaining all GLWA facilities and structures.

The facilities house the operations of GLWA and must remain clean, secure, environmentally safe and attractive. All systems must operate in a proper and acceptable manner in order to provide a clean and safe working environment for staff, visitors and customers. The group's objectives are accomplished through the use of maintenance mechanics with specific skills in various trades, team leaders, administrative staff, and a manager.

3.3.1. General Purpose

Refer to the General Purpose description on page II-4.

3.4. Security

The Water and Wastewater Systems are vulnerable to a variety of security breaches and attacks. If these breaches/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 from the Water and Wastewater Systems. GLWA's critical security systems, both physical and electronic, require continual upgrade and replacement to minimize the ever present threats to GLWA staff and infrastructure.

3.4.1. General Purpose

3.5. Energy Management

The Energy Management Team has been very active in pursuing new solutions for GLWA to improve operational efficiency through the use of new concepts and technologies to achieve sustainability. Much of the team's current work revolves around auditing existing facilities, evaluating equipment, studying various processes and developing an overall understanding of the Authority's energy consumption. Many of these initial studies, pilot projects, and 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 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 WRRF, 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 percent energy reduction plan. The program includes a monitoring agreement with Aquasight to provide real-time intelligence and to provide five percent no cost or low cost energy savings measures that can be implemented immediately;
- Solar feasibility study at eight GLWA sites. At the conclusion of the study, GLWA 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;

- A pump load management pilot program has begun at the Adams booster station and will continue through the spring of 2018. The program will collect energy use data along with flow rates to determine optimal pump 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 GLWA's Energy Manager for efficiency ratings;
- Reasearching third party utility bill management firms to assist in making sure bills received by GLWA 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 customer communities. As this specifically relates to energy management, it is anticipated that consumption data will be compiled across multiple business areas to enable the cross-referencing between business areas 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.

3.5.1. General Purpose

Refer to the General Purpose description on page II-4.

3.6. Engineering

Overall engineering services required as a result of emergencies, immediate investigations, evaluations and support to ensure continued operation and the highest level of service will typically be charged against projects and programs within this category. 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

Refer to the General Purpose description on page II-4.

3.7. General Purpose

Refer to the General Purpose description on page II-4.

3.8. Programs

Refer to the Programs description on page II-4.

VI. PROJECT DESCRIPTIONS

This chapter contains a one-page description of each CIP project. These descriptions 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

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

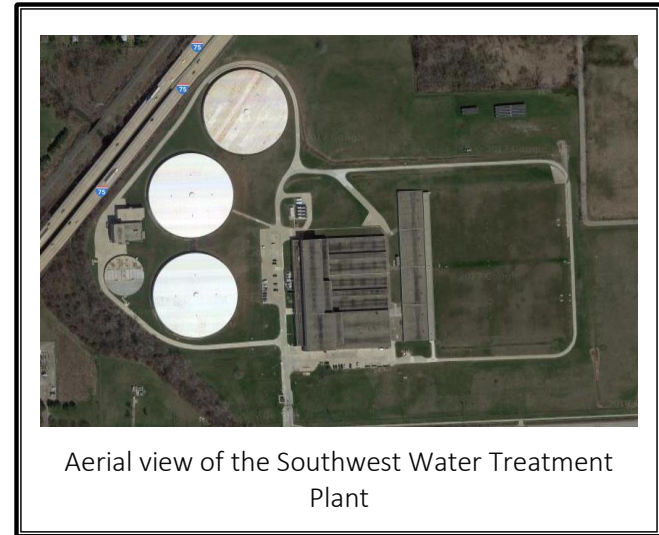
Explanation: N/A - Pending Closeout

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

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	\$215	\$0	\$0	\$0	\$0	\$0	\$215	\$76974
Totals				\$56759	\$20353	\$310	\$0	\$0	\$0	\$0	\$0	\$310	\$77422



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)



Wick Road Station

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13702
Totals				\$13452	\$250	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13702

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.: CS-103

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.

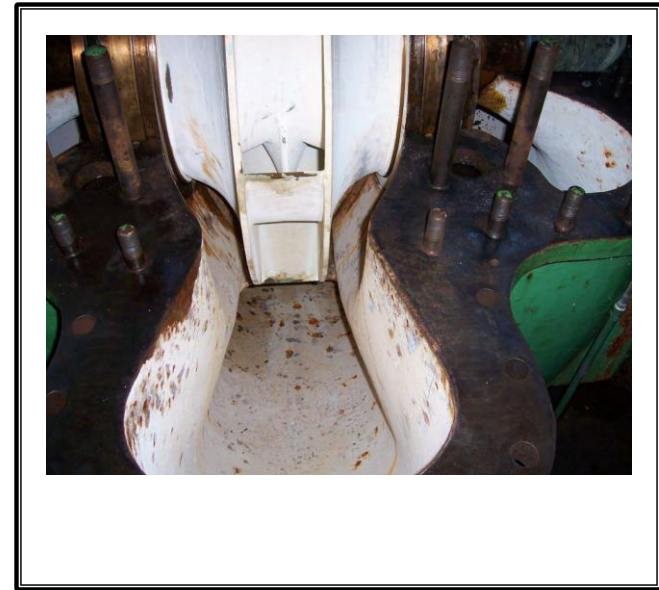
Preliminary Scope of Work:

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/CA	Under Procurement	NA	NA	\$0	\$0	\$1500	\$2000	\$2500	\$2000	\$1500	\$1500	\$9500	\$11000
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$10000	\$20000	\$20000	\$25000	\$50000	\$75000
Totals				\$0	\$0	\$1500	\$2000	\$12500	\$22000	\$21500	\$26500	\$59500	\$86000



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



A large water main.

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.

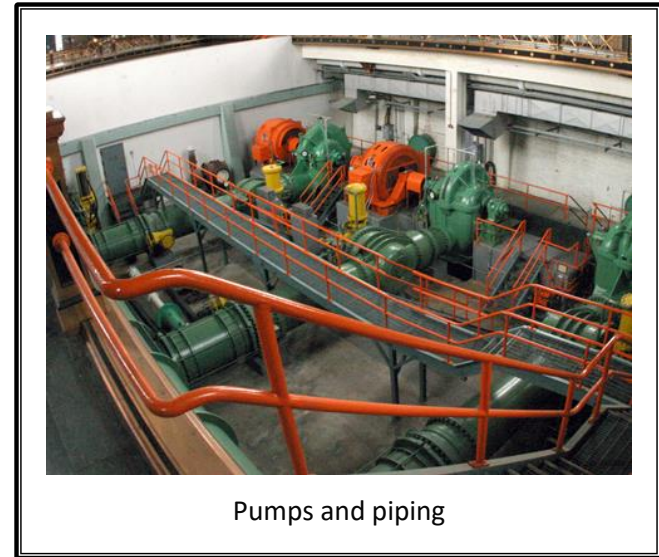
Preliminary Scope of Work:

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



Pumps and piping

CIP Number: CIP 1170

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

Classification: 1707: Water > Programs > Programs

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



A GLWA reservoir

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	6/30/2017	\$1015	\$1205	\$0	\$0	\$0	\$0	\$0	\$0	\$10	\$2220
Totals				\$1015	\$1205	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2220



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	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$611
Totals				\$611	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$611



Joy Road Pumping Station

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: 1704: Water > Programs > Programs

Managing Dept: Unavailable

RC Score: NA

Contract No.: NA

Significance: 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. This allowance will also be used to fund critical pump station upgrades.

Location: Transmission System

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 assets, provide the necessary recommendation for replacement/rehabilitation and eventual construction.

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	Not Yet Started	NA	NA	\$0	\$0	\$1000	\$1000	\$1000	\$1000	\$1000	\$0	\$5000	\$5000
C	Not Yet Started	NA	NA	\$0	\$0	\$9000	\$9000	\$9000	\$9000	\$9000	\$0	\$45000	\$45000
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: Wick Rd near Vining Rd in Romulus

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	Active	3/7/2016	TBD	\$1021	\$3514	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4535
Totals				\$1021	\$3514	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4535



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	New	NA	NA	\$0	\$2327	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2327
Totals				\$0	\$2327	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2327

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

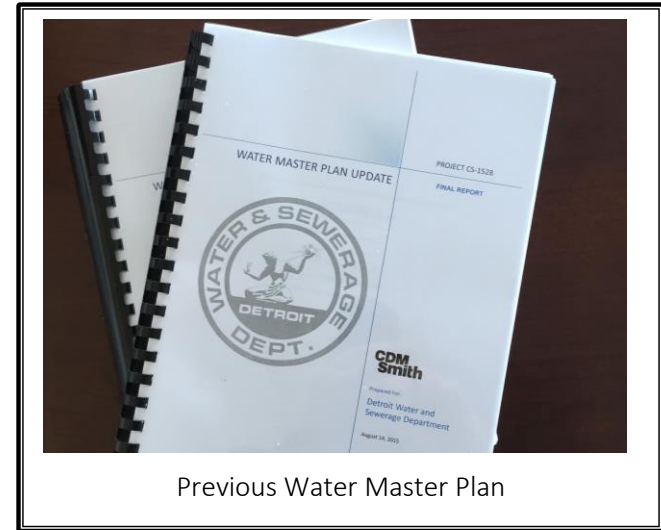
Preliminary Scope of Work:

This project consisted 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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$290
Totals				\$0	\$290	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$290



Previous Water Master Plan

CIP Number: CIP 1256

Title: WATER TREATMENT PLANT /PUMP STATION ALLOWANCE

Classification: 1701: Water > Programs > Programs

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.

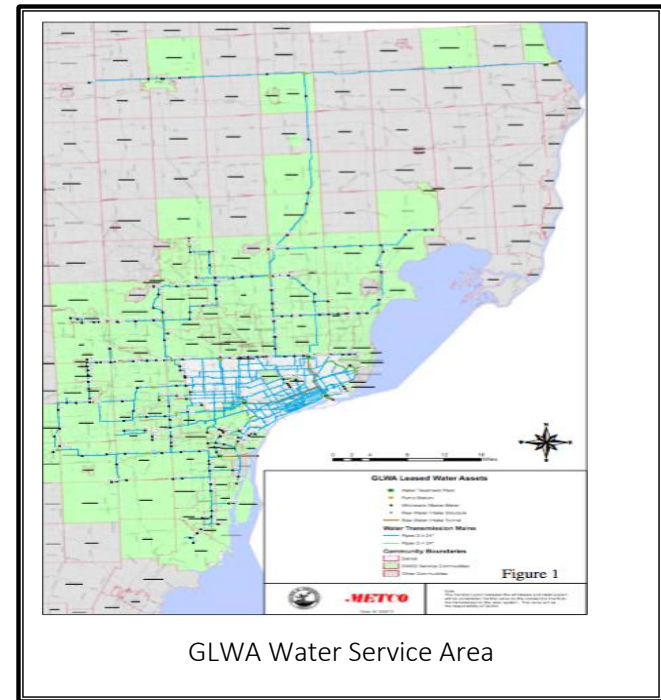
Preliminary Scope of Work:

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	\$12645	\$19650	\$20000	\$20000	\$10000	\$10000	\$0	\$79650	\$92295
Totals				\$0	\$12645	\$19650	\$20000	\$20000	\$10000	\$10000	\$0	\$79650	\$92295



GLWA Water Service Area

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.

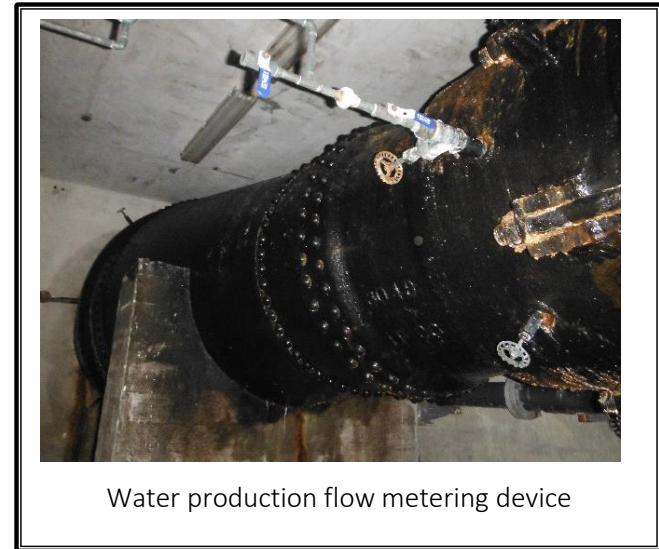
Preliminary Scope of Work:

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$998
Totals				\$398	\$600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$998



Springwells WTP

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.

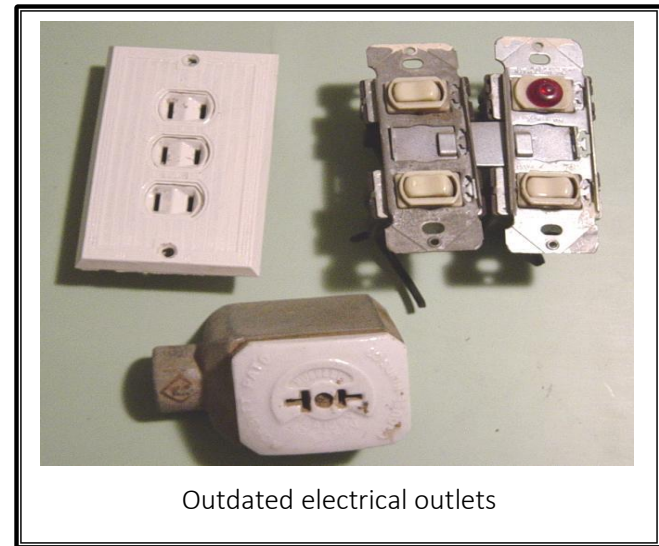
Preliminary Scope of Work:

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.: SCP-CS-045

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	Active	2/6/2017	5/9/2019	\$0	\$100	\$75	\$78	\$0	\$0	\$0	\$0	\$153	\$253
C	Not Yet Started	NA	NA	\$0	\$0	\$800	\$197	\$0	\$0	\$0	\$0	\$997	\$997
Totals				\$0	\$100	\$875	\$275	\$0	\$0	\$0	\$0	\$1150	\$1250



Springwells WTP

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.: SCP-CS-054

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

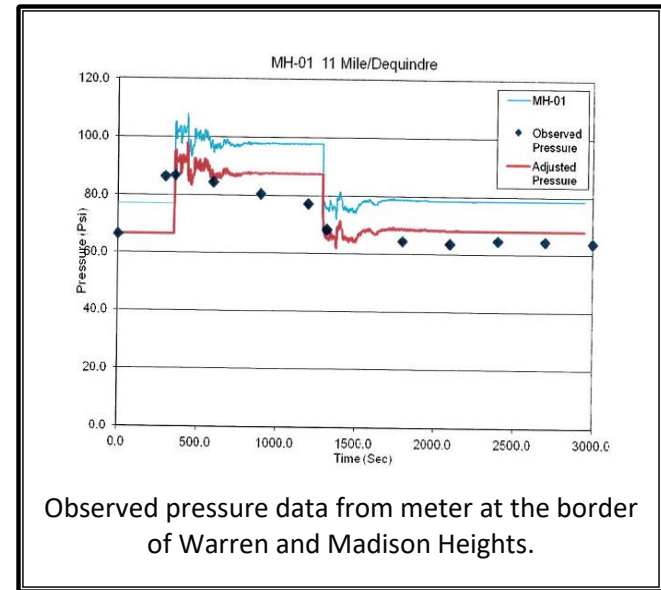
Preliminary Scope of Work:

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$200
D/C	Not Yet Started	NA	NA	\$0	\$0	\$500	\$2000	\$100	\$0	\$0	\$0	\$2600	\$2600
Totals				\$0	\$200	\$500	\$2000	\$100	\$0	\$0	\$0	\$2600	\$2800



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.

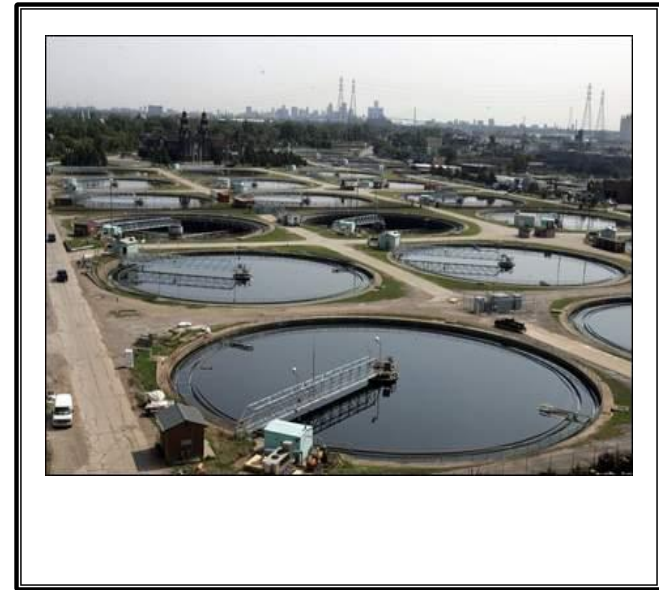
Preliminary Scope of Work:

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: There are several locations where water is visibly leaking from behind the tiles causing a hazard for loose and falling tiles and slip hazard on the low lift motor floor. The structural condition of the caisson must be inspected to determine the cause.

Location: Northeast WTP

Driver: Condition

Explanation: Not provided.

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: The inspection of the caisson requires confined space entry and partial plant shut down on the exterior and requires overhead crane access on the inside of the caisson. The cost of the remedy needs to be factored into the long term decommissioning of the Northeast Water Treatment Plant treatment train.

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	Active	TBD	TBD	\$0	\$150	\$130	\$0	\$0	\$0	\$0	\$0	\$130	\$280
C	Not Yet Started	NA	NA	\$0	\$0	\$1053	\$0	\$0	\$0	\$0	\$0	\$1053	\$1053
Totals				\$0	\$150	\$1183	\$0	\$0	\$0	\$0	\$0	\$1183	\$1333



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

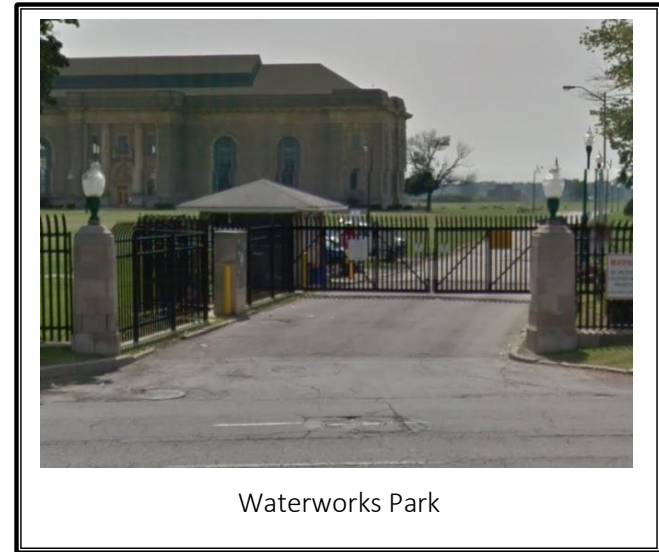
Preliminary Scope of Work:

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3036
Totals				\$761	\$2275	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3036



Waterworks Park

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.

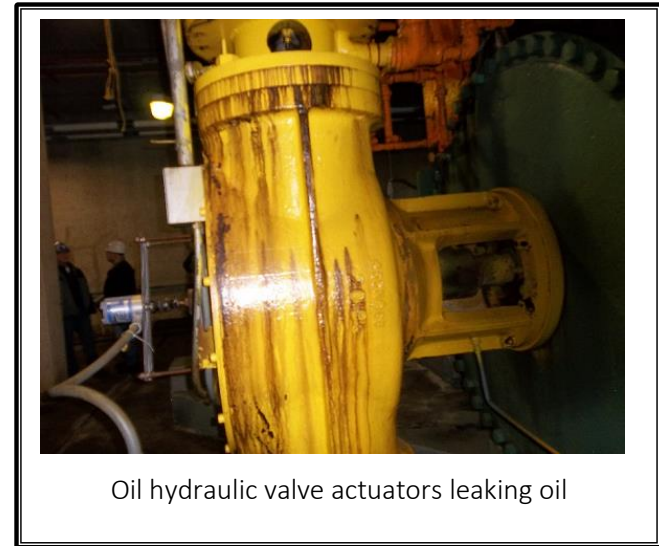
Preliminary Scope of Work:

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.



Mechanical/furnace room

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
S/D/CA	Active	TBD	TBD	\$0	\$250	\$150	\$130	\$50	\$22	\$0	\$0	\$352	\$602
C	Not Yet Started	NA	NA	\$0	\$0	\$800	\$3000	\$3000	\$400	\$0	\$0	\$7200	\$7200
C	Under Procurement	NA	NA	\$0	\$20	\$80	\$0	\$0	\$0	\$0	\$0	\$80	\$100
Totals				\$0	\$270	\$1030	\$3130	\$3050	\$422	\$0	\$0	\$7632	\$7902

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.

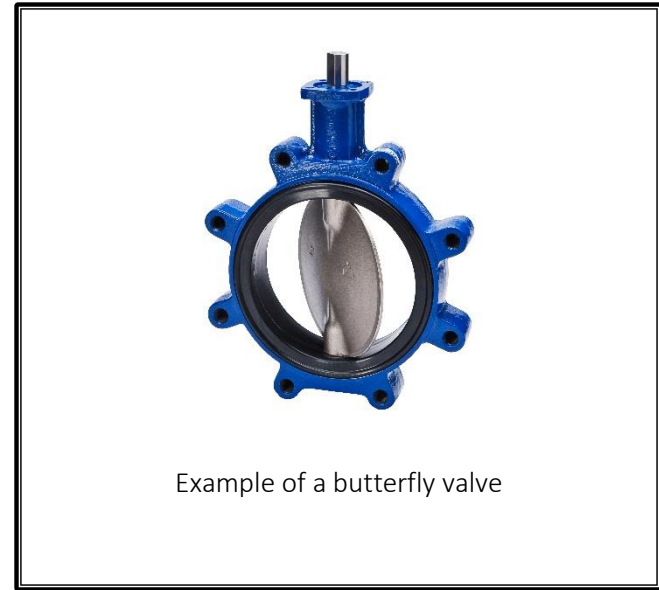
Preliminary Scope of Work:

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



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.

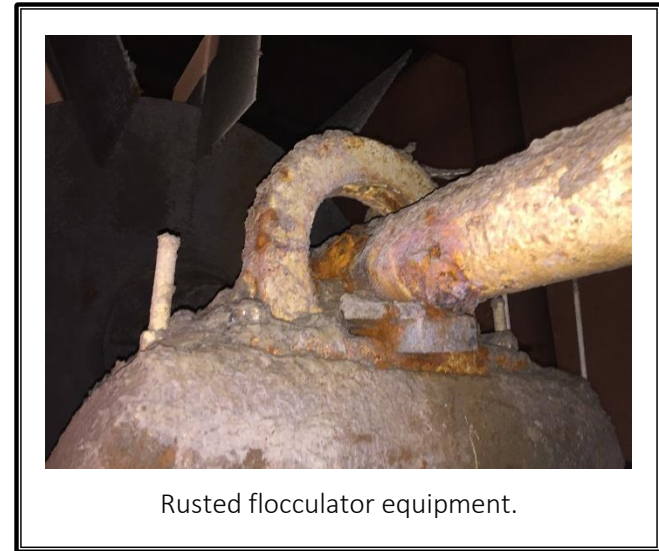
Preliminary Scope of Work:

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



Rusted flocculator equipment.

CIP Number: CIP 1291

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

Classification: 1702: Water > Programs > Programs

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: Condition

Explanation: The age and size of the system causes issues that cannot be identified and planned for in advance.

Preliminary Scope of Work:

Develop a job order proposal that specifies scope, schedule, budget and deliverables prior to GLWA authorization to proceed for each job order task assigned. This engineering/technical services contract involves as-needed engineering and technical services related to geotechnical, environmental, materials, soils, corrosion and related sampling and analysis. Services also include as-needed land surveying, computer-aided design, construction inspection and various engineering support as may be required.

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/CA	Not Yet Started	TBD	TBD	\$0	\$0	\$500	\$500	\$500	\$0	\$0	\$0	\$1500	\$1500
Totals				\$0	\$0	\$500	\$500	\$500	\$0	\$0	\$0	\$1500	\$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.

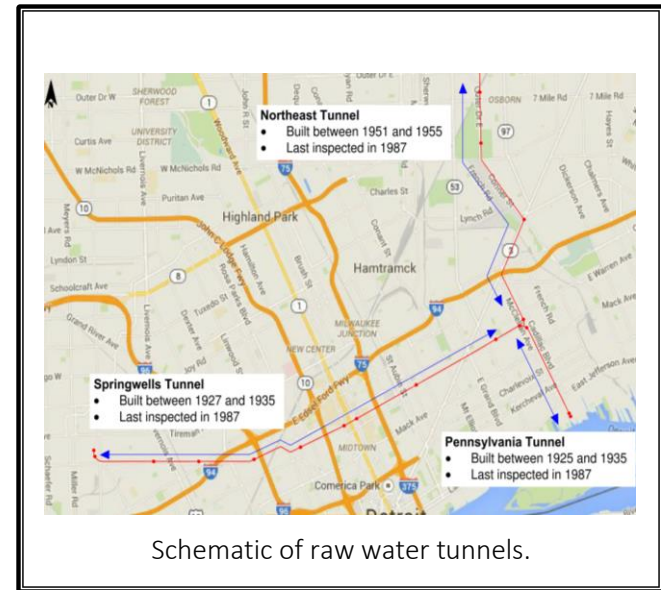
Preliminary Scope of Work:

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: The water booster stations operate without reliable pressure control and pose issues for customers.

Location: Water Booster Pumping Stations

Driver: N/A - Under Procurement

Explanation: N/A - Under Procurement

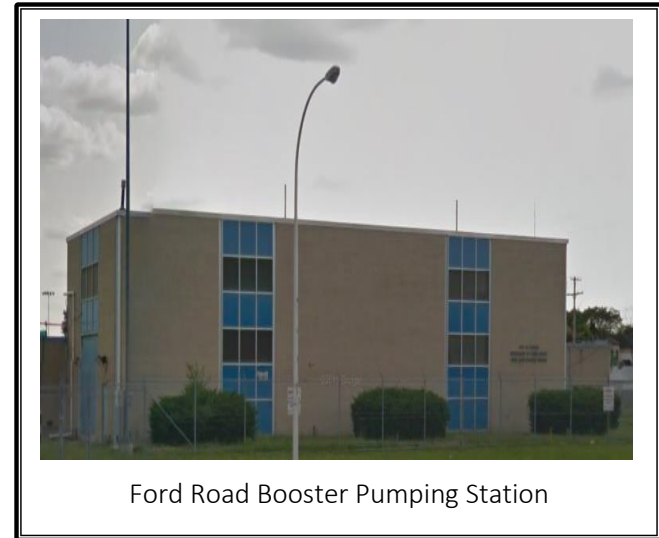
Preliminary Scope of Work:

This project will address the best alternative to provide pressure control to the service areas for the above pump stations, to improve customer satisfaction with pressure control at the master meters.

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/CA	Under Procurement	TBD	TBD	\$0	\$0	\$200	\$250	\$0	\$0	\$0	\$0	\$450	\$450
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$2550	\$0	\$0	\$0	\$0	\$2550	\$2550
Totals				\$0	\$0	\$200	\$2800	\$0	\$0	\$0	\$0	\$3000	\$3000



Ford Road Booster Pumping Station

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.

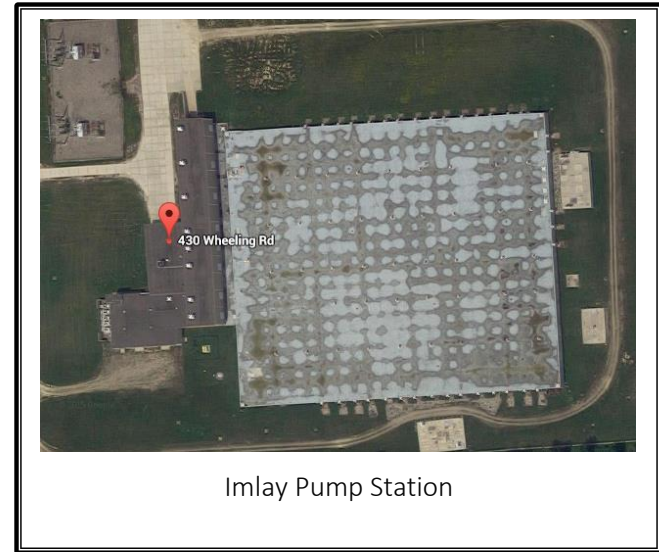
Preliminary Scope of Work:

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



Imlay Pump Station

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

Explanation: N/A

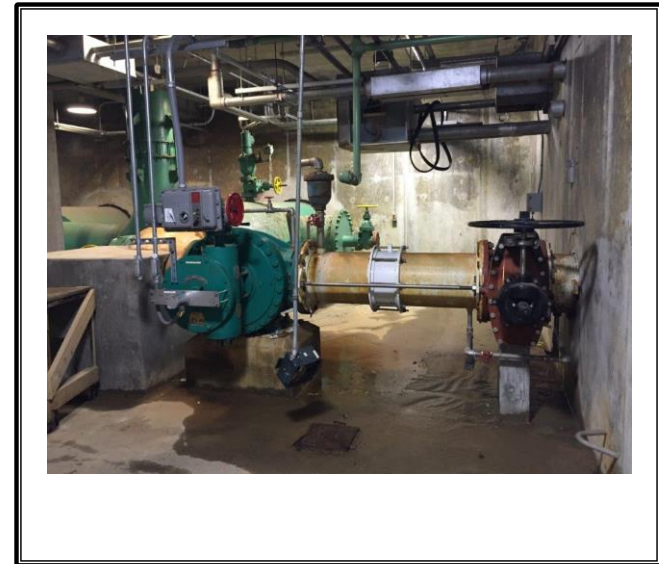
Preliminary Scope of Work:

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

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$450
Totals				\$0	\$450	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$450



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.: SCP-CS-052

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



Example of a large pipe and valve installation

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 includes 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
S/D/CA	Not Yet Started	TBD	TBD	\$0	\$100	\$100	\$40	\$0	\$0	\$0	\$0	\$140	\$240
C	Not Yet Started	TBD	TBD	\$0	\$0	\$3000	\$2269	\$0	\$0	\$0	\$0	\$5269	\$5269
Totals				\$0	\$100	\$3100	\$2309	\$0	\$0	\$0	\$0	\$5409	\$5509



Access manhole

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	1/8/2017	3/9/2017	\$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
S/D/CA	Not Yet Started	TBD	TBD	\$0	\$100	\$600	\$150	\$150	\$0	\$0	\$0	\$900	\$1000
C	Not Yet Started	TBD	TBD	\$0	\$0	\$0	\$12000	\$11630	\$0	\$0	\$0	\$23630	\$23630
Totals				\$0	\$100	\$600	\$12150	\$11780	\$0	\$0	\$0	\$24530	\$24630



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.

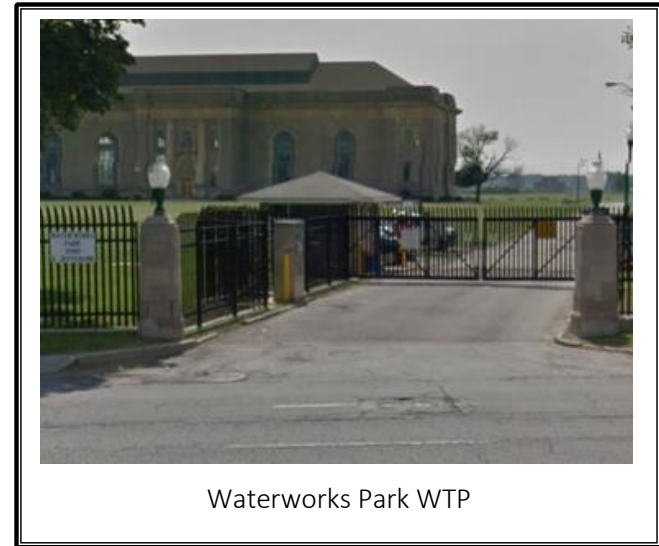
Preliminary Scope of Work:

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



Waterworks Park WTP

CIP Number: CIP 1303

Title: SUBURBAN WATER METER PIT REHABILITATION AND METER REPLACEMENT

Classification: 1709: Water > Programs > Programs

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.: CS-152

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	Under Procurement	NA	NA	\$0	\$0	\$1500	\$2000	\$0	\$0	\$0	\$0	\$3500	\$3500
D/CA	Not Yet Started	NA	NA	\$0	\$0	\$0	\$3000	\$10000	\$2000	\$2000	\$1850	\$17000	\$18850
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$0	\$36000	\$36000	\$35650	\$72000	\$107650
Totals				\$0	\$0	\$1500	\$5000	\$10000	\$38000	\$38000	\$37500	\$92500	\$130000



Transmission main

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



Water pipe

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
S/D/ CA	Not Yet Started	TBD	TBD	\$0	\$300	\$450	\$250	\$0	\$0	\$0	\$0	\$700	\$1000
C	Not Yet Started	TBD	TBD	\$0	\$0	\$3000	\$2250	\$0	\$0	\$0	\$0	\$5250	\$5250
Totals				\$0	\$300	\$3450	\$2500	\$0	\$0	\$0	\$0	\$5950	\$6250



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: The Lake Huron WTP clarifier/wash water equalization basin structure has concrete walls that have bowed in and will eventually fail. This project is to evaluate and develop alternatives for GLWA to select and remedy the issue.

Location: Lake Huron WTP

Driver: 1 - Condition

Explanation: The structure’s concrete walls have deformed due to soil pressure and failure of the structure would reduce or eliminate LH WTP’s ability to make finished water.

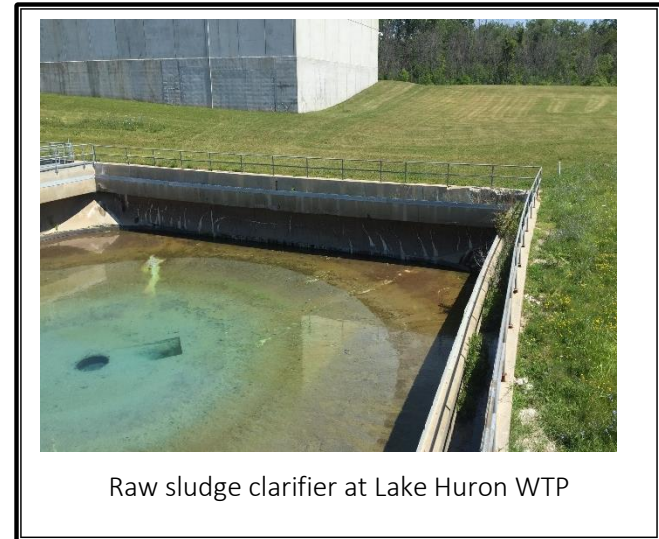
Preliminary Scope of Work:

The scope of this project is to study, recommend alternatives and design the selected remedy to ensure the LH WTP can process sludge and backwash water to meet Safe Drinking Water Act and NPDES requirements. Recommendations will be evaluated to update all pumping and piping to and from the lagoons to meet future LH WTP requirements as developed under the 2015 Water Master Plan Update.

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/CA	Under Procure.	NA	NA	\$0	\$0	\$50	\$920	\$321	\$0	\$0	\$0	\$1291	\$1291
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$5842	\$0	\$0	\$0	\$5842	\$5842
Totals				\$0	\$0	\$50	\$920	\$6163	\$0	\$0	\$0	\$7133	\$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
C	Not Yet Started	NA	NA	\$0	\$3000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3000
Totals				\$0	\$3000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3000



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.: CS-165

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	Under Procure.	NA	NA	\$0	\$500	\$1500	\$0	\$0	\$0	\$0	\$0	\$1500	\$2000
D/CA	Not Yet Started	NA	NA	\$0	\$0	\$0	\$6000	\$5900	\$1700	\$1700	\$1700	\$15300	\$17000
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$0	\$30000	\$30000	\$30000	\$30000	\$90000	\$120000
Totals				\$0	\$500	\$1500	\$6000	\$35900	\$31700	\$31700	\$31700	\$106800	\$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



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: 6 – Public Benefit

Explanation: Providing a parallel feed to the GLWA Wick Road transmission main will result in redundancy of the system and hence improved community and stakeholder relationships and confidence in GLWA.

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.

Challenges: May require shut down 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
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



Transmission main

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: 1708: Water > Programs > Programs

Managing Dept: Water Eng

RC Score: NA

Contract No.: CS-151

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, and SW-WTP

Driver: 1 - Condition

Explanation: Not provided.

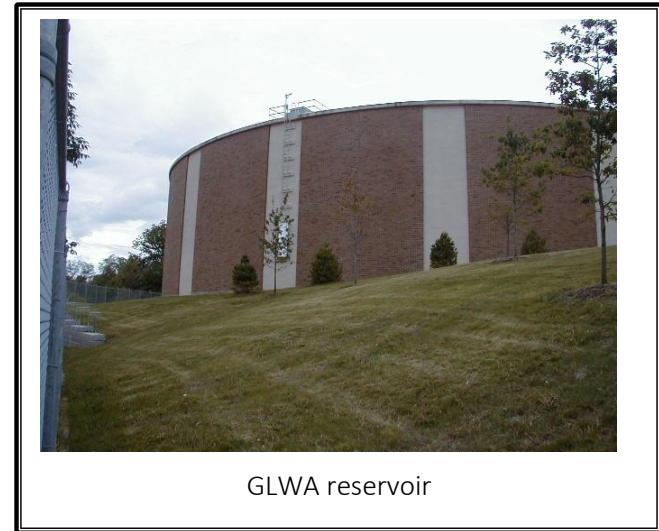
Preliminary Scope of Work:

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/CA	Not Yet Started	NA	NA	\$0	\$50	\$1800	\$50	\$50	\$50	\$0	\$0	\$1950	\$2000
C	Not Yet Started	NA	NA	\$0	\$0	\$1500	\$2500	\$2500	\$2500	\$0	\$0	\$9000	\$9000
Totals				\$0	\$50	\$3300	\$2550	\$2550	\$2550	\$0	\$0	\$10950	\$11000



GLWA reservoir

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



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.: DB-150

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
DB	Not Yet Started	NA	NA	\$0	\$500	\$2000	\$10000	\$15000	\$4900	\$0	\$0	\$31900	\$32400
Totals				\$0	\$500	\$2000	\$10000	\$15000	\$4900	\$0	\$0	\$31900	\$32400



Crown cracks are especially concerning in the Springwells Raw Water Tunnel

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.

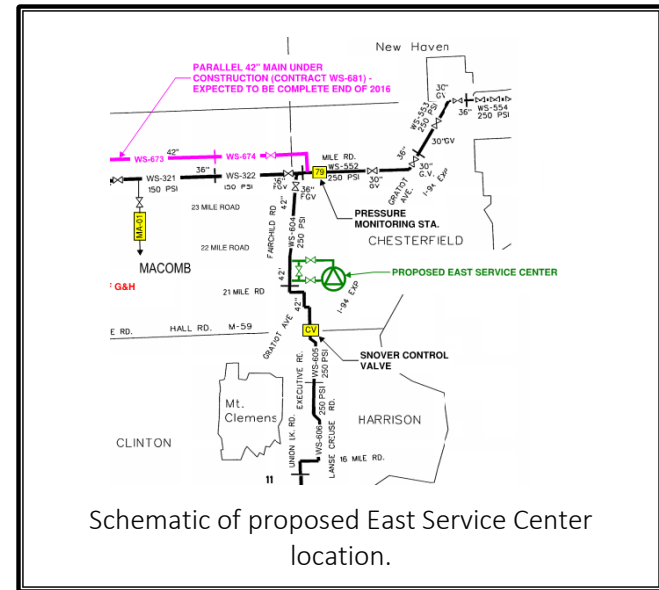
Preliminary Scope of Work:

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/DUAL 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



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.

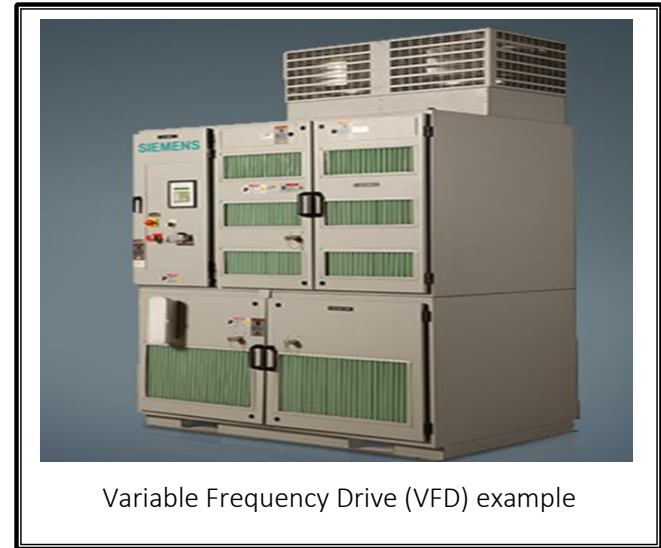
Preliminary Scope of Work:

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	Not Yet Started	NA	NA	\$0	\$0	\$50	\$50	\$0	\$0	\$0	\$0	\$100	\$100
D	Not Yet Started	NA	NA	\$0	\$0	\$133	\$133	\$0	\$0	\$0	\$0	\$266	\$266
C	Not Yet Started	NA	NA	\$0	\$0	\$1484	\$1484	\$0	\$0	\$0	\$0	\$2968	\$2968
Totals				\$0	\$0	\$1667	\$1667	\$0	\$0	\$0	\$0	\$3334	\$3334



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	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: GENESEE AND LAPEER COUNTY TRANSMISSION SYSTEM IMPROVEMENTS

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

Managing Dept: Water Eng

RC Score: 54.6

Contract No.: NA

Significance: Provide necessary infrastructure to enable reciprocal backup water service between Genesee Co. Drain Commission & GLWA.

Location: Genesee and Lapeer Counties

Driver: 2 – Performance (Service Level/Reliability)

Explanation: Reciprocal backup water service between GCDC and GLWA will provide redundancy for GLWA’s Lapeer and Mayfield customers.

Preliminary Scope of Work:

Design-bid-build project delivery for approximately 2000 feet of 24” to 36” new transmission main to connect to GCDC’s 48” main and GLWA’s master meter GN-01, isolation valve, control valve, new valve vaults, master meter right-sizing, and related civil, structural, mechanical, electrical and instrumentation work to support the new control valve, vaults and appurtenances.

Challenges: Permitting, easements, property acquisition, expedited schedule, and coordination with multiple parties.

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	\$0	\$400	\$200	\$200	\$0	\$0	\$0	\$800	\$800
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$3000	\$3000	\$0	\$0	\$0	\$6000	\$6000
Totals				\$0	\$0	\$400	\$3200	\$3200	\$0	\$0	\$0	\$6800	\$6800



Transmission main

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.

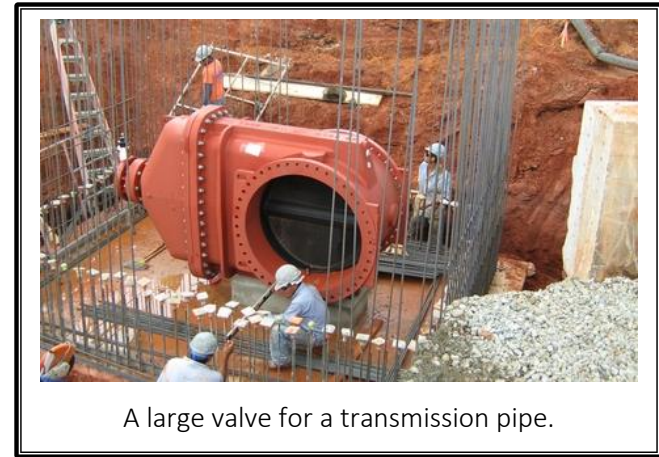
Preliminary Scope of Work:

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



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



Springwells WTP

*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.

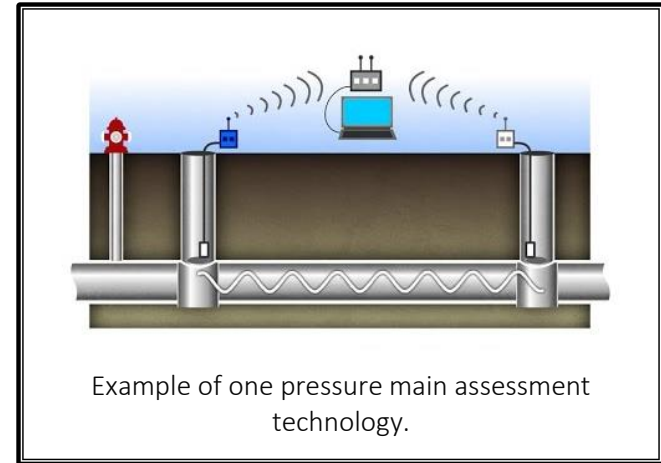
Preliminary Scope of Work:

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	New	NA	NA	\$0	\$0	\$200	\$0	\$0	\$0	\$0	\$0	\$200	\$200
D	New	NA	NA	\$0	\$0	\$426	\$0	\$0	\$0	\$0	\$0	\$426	\$426
C	New	NA	NA	\$0	\$0	\$2000	\$2000	\$2000	\$2000	\$2000	\$0	\$10000	\$10000
Totals				\$0	\$0	\$2626	\$2000	\$2000	\$2000	\$2000	\$0	\$10626	\$10626



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	New	NA	NA	\$0	\$0	\$160	\$160	\$160	\$160	\$160	\$0	\$800	\$800
C	New	NA	NA	\$0	\$0	\$1340	\$1340	\$1340	\$1340	\$1340	\$0	\$6700	\$6700
Totals				\$0	\$0	\$1500	\$1500	\$1500	\$1500	\$1500	\$0	\$7500	\$7500



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: 1 – Condition

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: The work under this last phase occurs in three main locations, each presenting a different primary challenge. The first phase of the work will occur in Venoy Dorsey Park, a Wayne County Park, near a wetland area. The second phase will run along Merriman, a major road. The final phase, near Michigan Avenue Booster Station, has several meter pits and significant coordination necessary with nearby communities.

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	\$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.

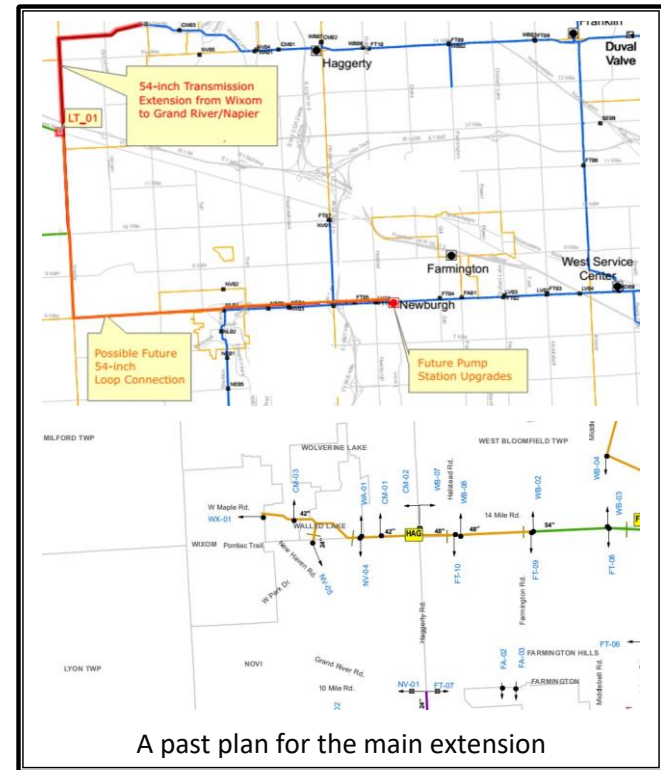
Preliminary Scope of Work:

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



A past plan for the main extension

CIP Number: CIP 1407

Title: SPRINGWELLS WTP UNDERGROUND FIRE PROTECTION LOOP IMPROVEMENTS

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

Managing Dept: Water Operating Services

RC Score: NA

Contract No.: NA

Significance: Improvements will provide reliable fire protection to all plant facilities, replace non-functioning isolation valves and hydrants, provide fire system backflow protection, and bring the fire system into conformance with the requirements of the Dearborn Fire Marshal.

Location: Springwells Water Treatment Plant

Driver: 5 – Public Health & Safety

Explanation: Fire line has exceeded its useful life and is a liability in terms of providing adequate reliable fire protection and protecting water quality without backflow prevention.

Preliminary Scope of Work: Construction contract document and construction oversight preparation (administration and RPR services) by a consulting engineer under a Professional Services contract and construction of the improvements by a contractor under a separate Construction Contract. The scope of the Professional Service contract includes finalizing the Dearborn Fire Marshal’s requirements, completing a topographic survey of routing required to meet the Fire Marshal’s requirements, preparation of plan and profile drawings of the new loop location (calling out all connections and underground interferences), preparation of construction Contract Documents, bid phase services and construction phase services.

Challenges: The new fire loop will cross a lot of buried utilities and structures, and identification of these facilities and showing them accurately in Contract Documents will be critical to minimizing interruptions/complications during construction.



Fire protection loop schematic

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	New	NA	NA	\$0	\$0	\$380	\$0	\$0	\$0	\$0	\$0	\$380	\$380
CA	New	NA	NA	\$0	\$0	\$0	\$380	\$0	\$0	\$0	\$0	\$380	\$380
C	New	NA	NA	\$0	\$0	\$0	\$2529	\$0	\$0	\$0	\$0	\$2529	\$2529
Totals				\$0	\$0	\$380	\$2909	\$0	\$0	\$0	\$0	\$3289	\$3289

CIP Number: CIP 1410

Title: WATER WORKS PARK WTP CHLORINE SYSTEM UPGRADE

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

Managing Dept: WSO Engineering

RC Score: NA

Contract No.: NA

Significance: WWP Chlorine System suffered a major leak in 2014. Since that time, additional leaks and maintenance issues have occurred on a more frequent basis. Due to the toxicity of chlorine gas, this project is a high priority to protect worker safety and the general public.

Location: Water Works Park

Driver: 5 – Public Health & Safety

Explanation: The current system is experiencing leaks and must be replaced as soon as practicable.

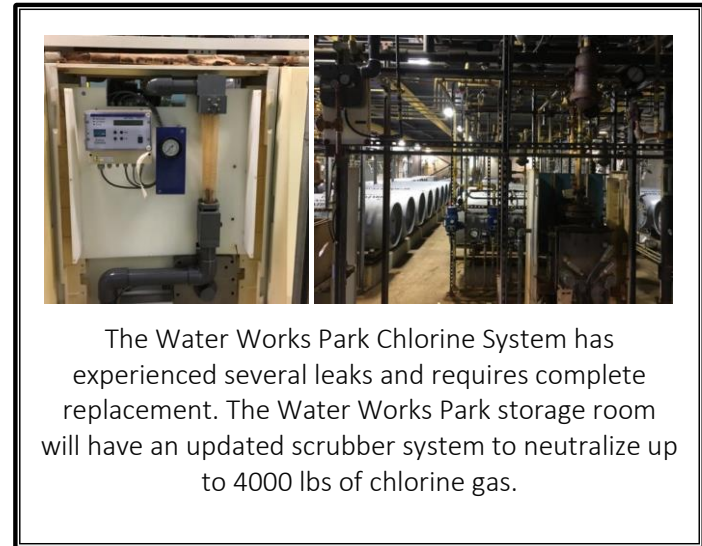
Preliminary Scope of Work:

Demolition and replacement of all mechanical systems, equipment and piping related to chlorine transport, vaporization and application. New chlorine system will be able to meet current dose rates and be able to meet future loadings estimated for WWP after the Northeast WTP treatment system is taken off line.

Challenges: It will be critical for the contractor to phase the work to provide ongoing chlorine application during the retrofit.

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	New	7/8/2016	1/25/2018	\$0	\$290	\$200	\$200	\$0	\$0	\$0	\$0	\$400	\$690
C	New	NA	NA	\$0	\$0	\$500	\$8500	\$0	\$0	\$0	\$0	\$9000	\$9000
Totals				\$0	\$290	\$700	\$8700	\$0	\$0	\$0	\$0	\$9400	\$9690



CIP Number: CIP 1412

Title: EMERGENCY GRATING REPLACEMENT AT SPRINGWELLS WTP

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

Managing Dept: WSO Engineering

RC Score: NA

Contract No.: NA

Significance: Original grating and supporting structural steel dating back to 1930 has deteriorated to the point where operator, consultant and contractor safety at Springwells is severely compromised.

Additionally, structural failure could result in lost water production at Springwells.

Location: Springwells Water Treatment Plant

Driver: 1 – Condition

Explanation: Failure of structural components could injure personnel and/or take Springwells out of commission

Preliminary Scope of Work:

Refer to the RFP and proposals received. The scope is very well defined, and the winning proposal is very well authored. It involves a lot of demolition and replacement of deteriorated grating and structural steel at five (5) locations at Springwells, the bulk of which is in the Low Lift Station.

Challenges: Maintaining operations through execution of 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	New	NA	NA	\$0	\$250	\$250	\$0	\$0	\$0	\$0	\$0	\$250	\$500
C	New	NA	NA	\$0	\$250	\$1750	\$0	\$0	\$0	\$0	\$0	\$1750	\$2000
Totals				\$0	\$500	\$2000	\$0	\$0	\$0	\$0	\$0	\$2000	\$2500



SECTION 2 WASTEWATER

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	\$10848	\$12097	\$20990	\$7968	\$0	\$0	\$0	\$41055	\$51903
Totals				\$0	\$10848	\$12097	\$20990	\$7968	\$0	\$0	\$0	\$41055	\$51903



Pipe gallery

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 provide 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/CA	Pending Close-out	6/12/2008	6/11/2016	\$0	\$75	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$75
C	Pending Close-out	5/21/2012	5/21/2016	\$23037	\$2500	\$1532	\$0	\$0	\$0	\$0	\$0	\$1532	\$27069
Totals				\$23037	\$2575	\$1532	\$0	\$0	\$0	\$0	\$0	\$1532	\$27144



Electrical Duct Bank

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/CA	Active	8/11/2010	9/11/2017	\$456	\$130	\$72	\$0	\$0	\$0	\$0	\$0	\$272	\$658
C	Active	8/11/2010	6/20/2019	\$0	\$1027	\$1232	\$616	\$0	\$0	\$0	\$0	\$1848	\$2875
Totals				\$456	\$1157	\$1304	\$616	\$0	\$0	\$0	\$0	\$1920	\$3533



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/CA	Pending Close-out	6/12/2008	12/31/2015	\$0	\$23	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$23
C	Pending Close-out	4/15/2013	11/4/2016	\$5390	\$601	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5991
Totals				\$5390	\$624	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6014



Fire alarm system

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$24175
Totals				\$24060	\$115	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$24175



Return activated sludge pump and Motor Control Center building.

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	\$33	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8482
Totals				\$8449	\$33	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8482



DRO2 plan at WRRF

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.

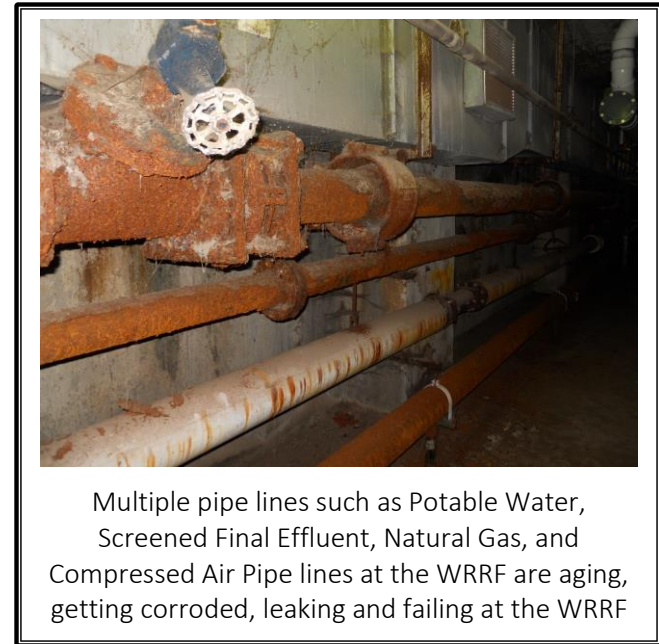
Preliminary Scope of Work:

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/CA	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/CA	Active	8/11/2010	7/9/2019	\$1	\$220	\$240	\$120	\$0	\$0	\$0	\$0	\$360	\$581
Totals				\$1	\$220	\$240	\$120	\$0	\$0	\$0	\$0	\$360	\$581



Primary Clarifiers

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/CA	Not Yet Started	1/11/2010	12/31/2016	\$2	\$96	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$98
C	Not Yet Started	5/21/2012	8/3/2016	\$27	\$1776	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1803
Totals				\$29	\$1872	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1901



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	Active	11/18/2013	7/30/2017	\$13887	\$2303	\$2652	\$2652	\$0	\$0	\$0	\$0	\$5304	\$21494
Totals				\$13887	\$2303	\$2652	\$2652	\$0	\$0	\$0	\$0	\$5304	\$21494



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/CA	Active	2/21/2012	2/28/2018	\$0	\$106	\$97	\$16	\$0	\$0	\$0	\$0	\$113	\$219
C	Under Procurement	TBD	TBD	\$0	\$2242	\$11100	\$2642	\$0	\$0	\$0	\$0	\$13742	\$15984
Totals				\$0	\$2348	\$11197	\$2658	\$0	\$0	\$0	\$0	\$13855	\$16203



Equipment for aeration system

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: 2 – Performance

Explanation: The gates did not seal causing equipment failure and drain plugging. Powdered lime discharges throughout the building making ventilation and scrubber system to fail.

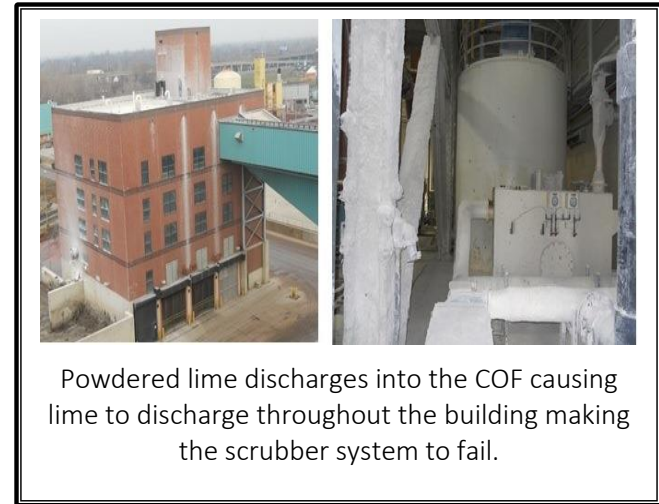
Preliminary Scope of Work:

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



Chlorinator/sulfonator buildings

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.

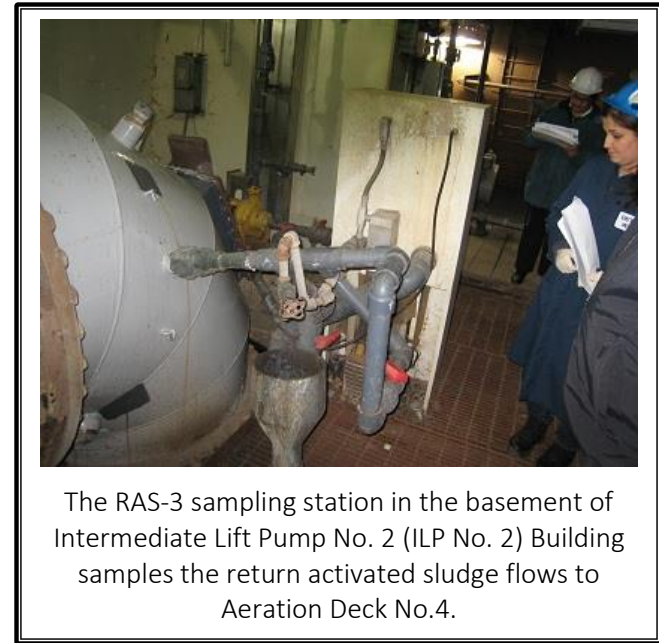
Preliminary Scope of Work:

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 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	\$62	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12187
Totals				\$12125	\$62	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12187



Piece of movable dam at DRO-2

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.

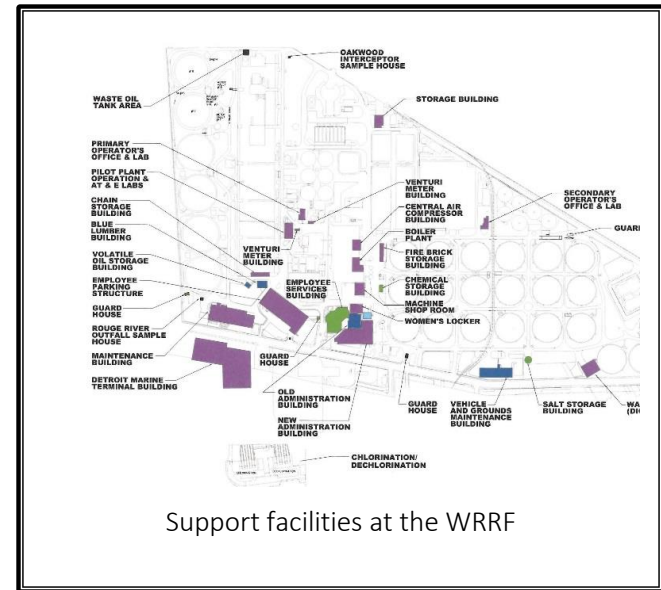
Preliminary Scope of Work:

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 Expenditure res FY2017	Projected Expenditure res FY2018	Projected Expenditure res FY2019	Projected Expenditure res FY2020	Projected Expenditure res FY2021	Projected Expenditure res FY2022	Projected Expenditure res 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



Support facilities at the WRRF

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: 1 – Condition

Explanation: Not provided.

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: Recent flooding in the Freud Pump Station area was attributed to, but unrelated to the FSPS performance. Ultimately, the service of the FSPS needs to be considered relative to the long term Wastewater Master Plan currently underway.

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	7/5/2016	10/5/2021	\$128	\$472	\$1400	\$350	\$350	\$0	\$0	\$0	\$2100	\$2700
C	Not Yet Started	NA	NA	\$0	\$0	\$700	\$14000	\$15000	\$0	\$0	\$0	\$29700	\$29700
Totals				\$128	\$472	\$2100	\$14350	\$15350	\$0	\$0	\$0	\$31800	\$32400



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

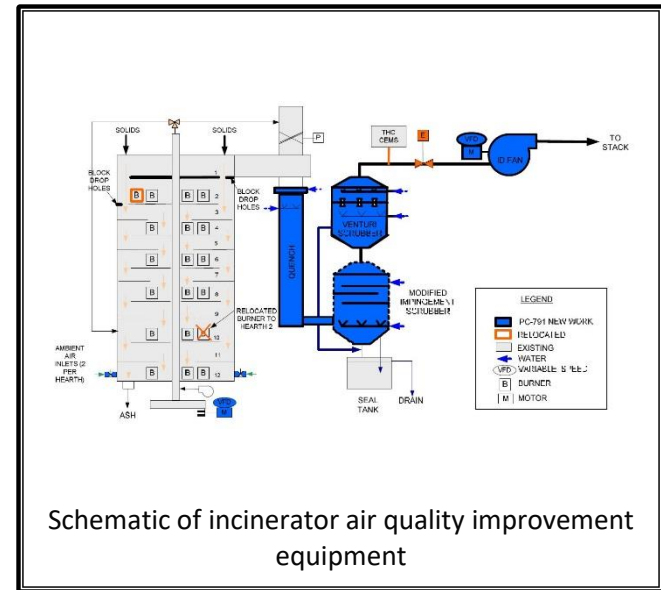
Preliminary Scope of Work:

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	\$3000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$36043
Totals				\$33043	\$3000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$36043



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	\$1691	\$60	\$26	\$0	\$0	\$0	\$0	\$86	\$135968
Totals				\$134191	\$1691	\$60	\$26	\$0	\$0	\$0	\$0	\$86	\$135968



New GLWA Biosolids Dryer Facility

CIP Number: CIP 1257

Title: WATER RESOURCE RECOVERY FACILITY, LIFT STATION AND WASTEWATER COLLECTION SYSTEM STRUCTURES ALLOWANCE

Classification: 2601: Wastewater > Programs > Programs

Managing Dept: WW Eng

RC Score: NA

Contract No.: SCP-PC-014, SCP-PC-016G

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 Water Resources Recovery Facility 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
S/D/CA	Not Yet Started	NA	NA	\$0	\$0	\$2000	\$2000	\$2500	\$2500	\$2000	\$0	\$11000	\$11000
C	Active	TBD	TBD	\$0	\$600	\$579	\$0	\$0	\$0	\$0	\$0	\$579	\$1179
C	Not Yet Started	NA	NA	\$0	\$4555	\$9421	\$10000	\$12500	\$12500	\$10000	\$0	\$54421	\$58976
C	Pending Closeout	4/22/2016	4/17/2017	\$0	\$432	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$432
Totals				\$0	\$5587	\$12000	\$12000	\$15000	\$15000	\$12000	\$0	\$66000	\$71587



Aerial view of WRRF

CIP Number: CIP 1263

Title: SEWER AND INTERCEPTOR EVALUATION AND REHABILITATION PROGRAM

Classification: 2602: Wastewater > Programs > Programs

Managing Dept: WW Eng

RC Score: NA

Contract No.: CS-068, PO-005030

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.

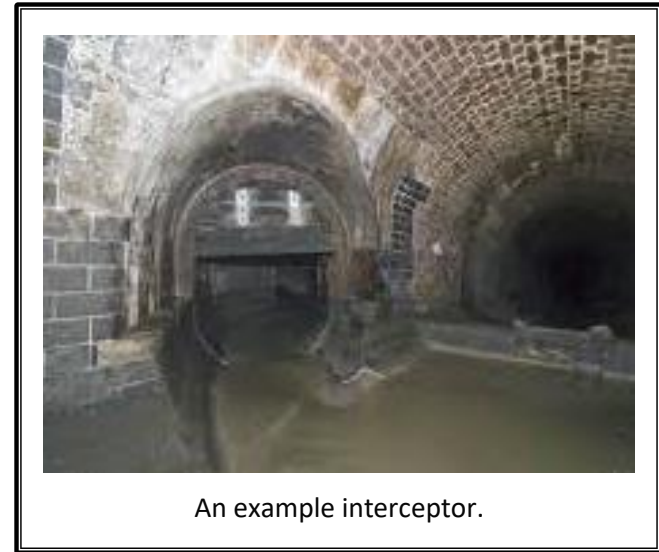
Preliminary Scope of Work:

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	NA	NA	\$0	\$2464	\$2000	\$0	\$0	\$0	\$0	\$0	\$2000	\$4464
S,D,CA	Under Procure.	NA	NA	\$0	\$148	\$22	\$0	\$0	\$0	\$0	\$0	\$22	\$170
S	Not Yet Started	NA	NA	\$0	\$0	\$218	\$240	\$600	\$600	\$600	\$0	\$2258	\$2258
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	\$2612	\$8000	\$8000	\$20000	\$20000	\$20000	\$0	\$76000	\$78612



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.

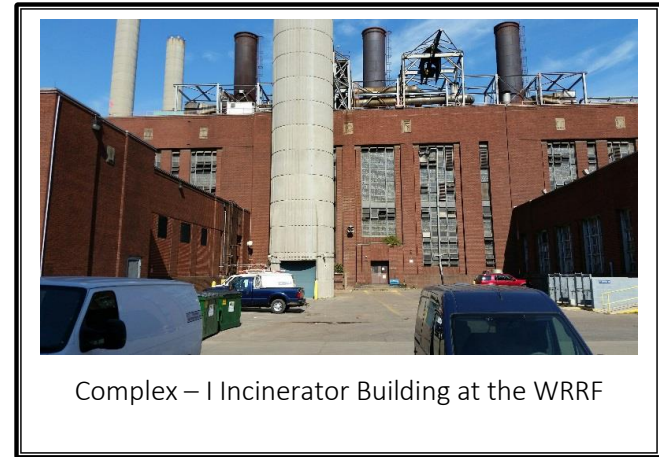
Preliminary Scope of Work:

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/CA/C	Not Yet Started	NA	NA	\$0	\$0	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$100
S/D/CA/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



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



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

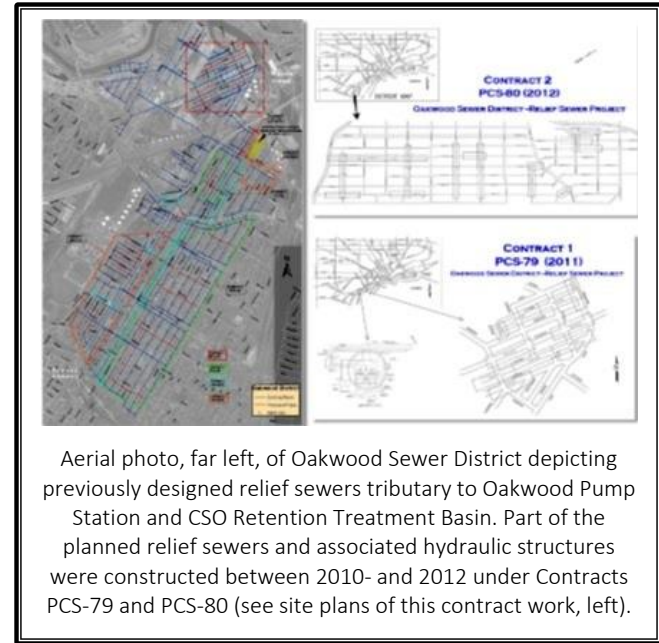
Preliminary Scope of Work:

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 WATER RESOURCES RECOVERY FACILITY (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, CS-1781

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: 3 – Regulatory (Environmental/Legal)

Explanation: In order to be in compliance with its NPDES permit, GLWA’s WRRF must provide disinfection to all effluent flows from the DRO and RRO by April 2019. Only the DRO currently has disinfection; this project will provide chlorination and de-chlorination for RRO effluent during wet weather events.

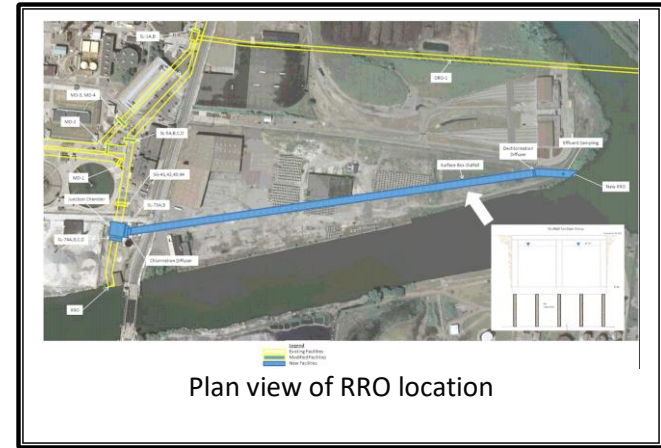
Preliminary Scope of Work:

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 Procure.	2/19/2016	12/31/2019	\$729	\$2690	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3419
CM	Under Procure.	TBD	TBD	\$0	\$1000	\$800	\$520	\$100	\$0	\$0	\$0	\$1420	\$2420
C	Not Yet Started	2/19/2016	12/31/2019	\$0	\$2840	\$15000	\$15000	\$8920	\$0	\$0	\$0	\$38920	\$41760
Totals				\$729	\$6530	\$15800	\$15520	\$9020	\$0	\$0	\$0	\$40340	\$47599



Plan view of RRO location

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.: NA

Significance: Due to problems with current pumps, improve sludge feed pumping system for wide operating conditions

Location: WRRF

Driver: N/A

Explanation: Not provided.

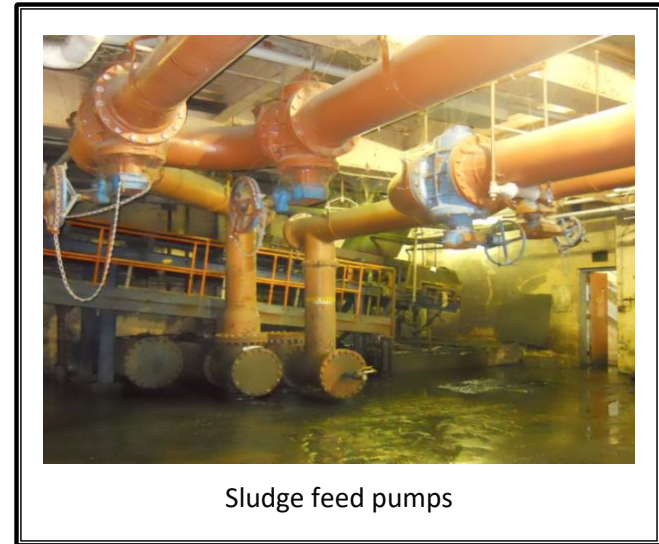
Preliminary Scope of Work:

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	\$33	\$402	\$750	\$0	\$0	\$0	\$0	\$1152	\$1185
Totals				\$0	\$33	\$402	\$750	\$0	\$0	\$0	\$0	\$1152	\$1185



Sludge feed pumps

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.: CS-060

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.

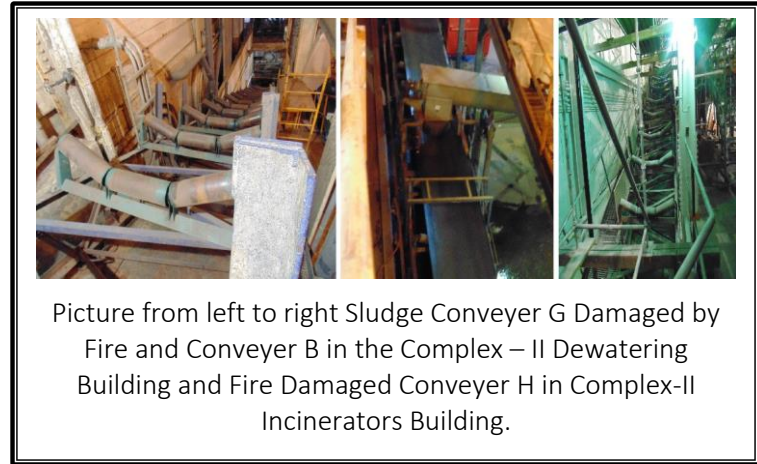
Preliminary Scope of Work:

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
S/D/ CA	Under Procure.	NA	NA	\$0	\$1500	\$500	\$0	\$0	\$0	\$0	\$0	\$500	\$2000
C	Not Yet Started	NA	NA	\$0	\$0	\$9100	\$7822	\$0	\$0	\$0	\$0	\$16922	\$16922
Totals				\$0	\$1500	\$9600	\$7822	\$0	\$0	\$0	\$0	\$17422	\$18922



Picture from left to right Sludge Conveyer G Damaged by Fire and Conveyer B in the Complex – II Dewatering Building and Fire Damaged Conveyer 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: Rehabilitation and adequate operation of the Pump Station 1 is vital to maintain NPDES permit compliance.

Location: WRRF

Driver: 1 – Condition

Explanation: The WRRF Pump Station No 1 pumps are old and due to normal operation wear and tear over the years needs rehabilitation. The pumping capacity is declining and rehabilitation is critical to meet MDEQ permit requirements.

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 work shall also include the sequencing of pump shutdown to ensure the WRRF meets the NPDES permit throughout the rehabilitation period. The construction will complete rehabilitation and/or replacement as determined in the study and design along with the sequencing of pump shutdown throughout the rehabilitation period.

Challenges: Maintaining the adequate pumping capacity during construction 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/C	Not Yet Started	NA	NA	\$0	\$0	\$600	\$350	\$125	\$100	\$0	\$0	\$1175	\$1175
C	Not Yet Started	NA	NA	\$0	\$0	\$0	\$5000	\$5000	\$1954	\$0	\$0	\$11954	\$11954
Totals				\$0	\$0	\$600	\$5350	\$5125	\$2054	\$0	\$0	\$13129	\$13129



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

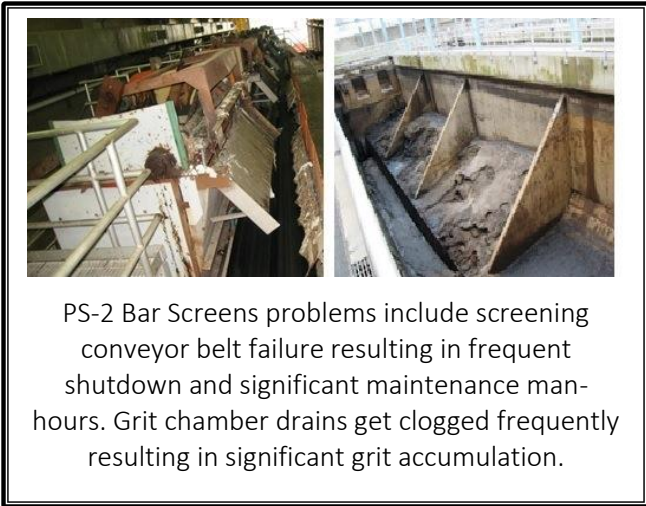
Preliminary Scope of Work:

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/CA	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



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.: CON-109

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	\$100	\$500	\$0	\$0	\$0	\$0	\$0	\$500	\$600
D	Not Yet Started	NA	NA	\$0	\$340	\$3400	\$0	\$0	\$0	\$0	\$0	\$3400	\$3740
C	Not Yet Started	NA	NA	\$0	\$5636	\$0	\$5100	\$2460	\$1000	\$0	\$0	\$8560	\$14196
C	Under Procure.	NA	NA	\$0	\$1964	\$2000	\$0	\$0	\$0	\$0	\$0	\$2000	\$3964
Totals				\$0	\$8040	\$5900	\$5100	\$2460	\$1000	\$0	\$0	\$14460	\$22500



Freud Pump Station

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: 2603: Wastewater > Programs > Programs

Managing Dept: WW Eng

RC Score: NA

Contract No.: SCP-001, CON-143

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	\$0	\$500	\$500	\$500	\$500	\$500	\$0	\$2500	\$2500
C	Not Yet Started	NA	NA	\$0	\$0	\$1721	\$4500	\$4500	\$4500	\$4500	\$0	\$19721	\$19721
PO	Not Yet Started	NA	NA	\$0	\$0	\$1500	\$0	\$0	\$0	\$0	\$0	\$1500	\$1500
C	Under Procure.	NA	NA	\$0	\$500	\$1279	\$0	\$0	\$0	\$0	\$0	\$1279	\$1779
Totals				\$0	\$500	\$5000	\$5000	\$5000	\$5000	\$5000	\$0	\$25000	\$25500



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

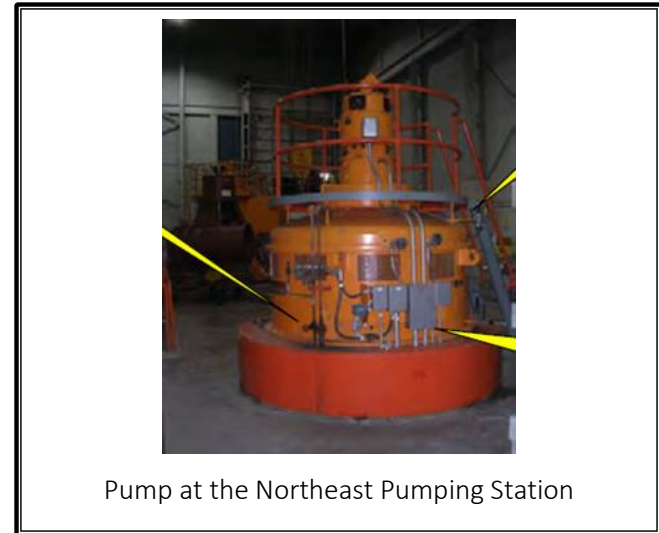
Preliminary Scope of Work:

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 1344

Title: SEWAGE METER DESIGN, INSTALLATION, REPLACEMENT AND REHABILITATION PROGRAM

Classification: 2604: Wastewater > Programs > Programs

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.

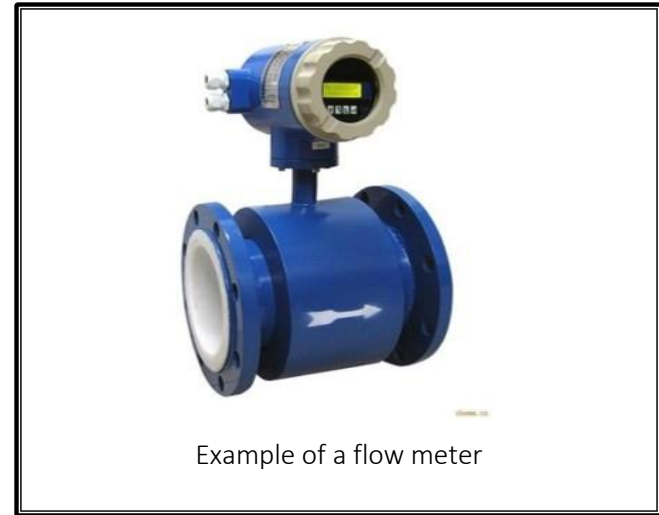
Preliminary Scope of Work:

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.

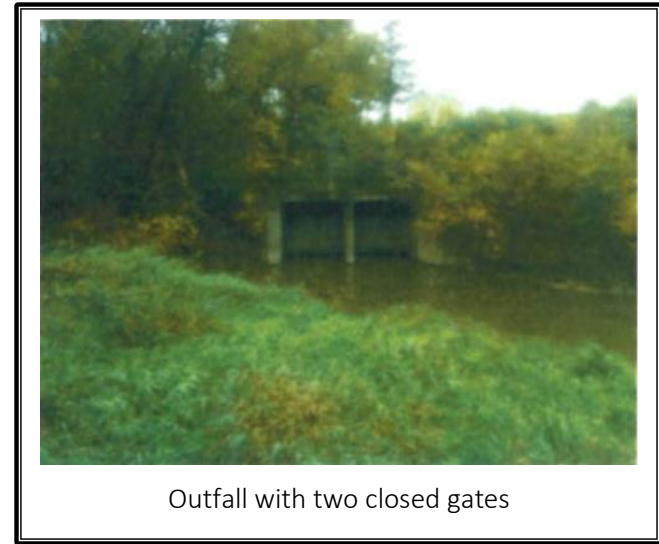
Preliminary Scope of Work:

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



Outfall with two closed gates

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: This project is significant for two primary reasons. First, due to their condition, the SFE and Secondary Water systems require improvements (pumping systems, distribution, etc.). Second, this project will evaluate the current and potential future uses of SFE to ultimately reduce reliance on the potable drinking water system, thus being self-reliant and reducing potable water expenses. (The SFE Pump Station provides non-potable water to many of the GLWA WWTP treatment processes. Secondary water is used for fire protection and process applications such as seal water.)

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 corroded and needs to be rehabilitated or relocated.

Preliminary Scope of Work: This project consists of two distinct scopes of work.

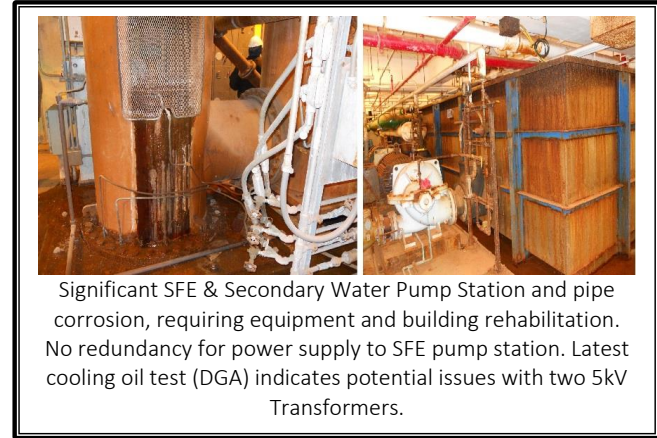
(1) SFE & Secondary Water Pump Station and Distribution Piping Improvements: This project will include the study, design, and construction for the needed improvements to the SFE and Secondary Water pump stations and distribution piping. It is possible that the secondary water system may need to be relocated. The option for relocation or continuing to operate in the C-I Complex will be part of the alternatives evaluation.

(2) SFE Utilization Evaluation: An evaluation and cost benefit analysis of possible additional uses of the SFE will be performed. This includes the potential need for a water treatment facility to bring the SFE to sufficient quality to be carrier water and identifying the required capacity, pumps, strainers, piping, controls, building improvements, and electrical supply associated with it. 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 and a redundant potable water feed to the WWTP will be evaluated. The evaluation of all alternatives will include the ability to reduce energy, potable water usage and ultimately reduce expenses.

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	\$1700	\$2000	\$2000	\$600	\$500	\$280	\$6800	\$7080
C	New	NA	NA	\$0	\$0	\$0	\$0	\$10000	\$15000	\$15779	\$2141	\$40779	\$42920
Totals				\$0	\$0	\$1700	\$2000	\$12000	\$15600	\$16279	\$2421	\$47579	\$50000



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.

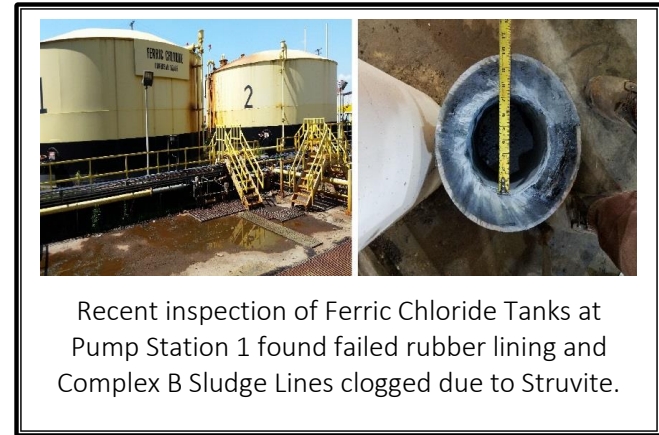
Preliminary Scope of Work:

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.

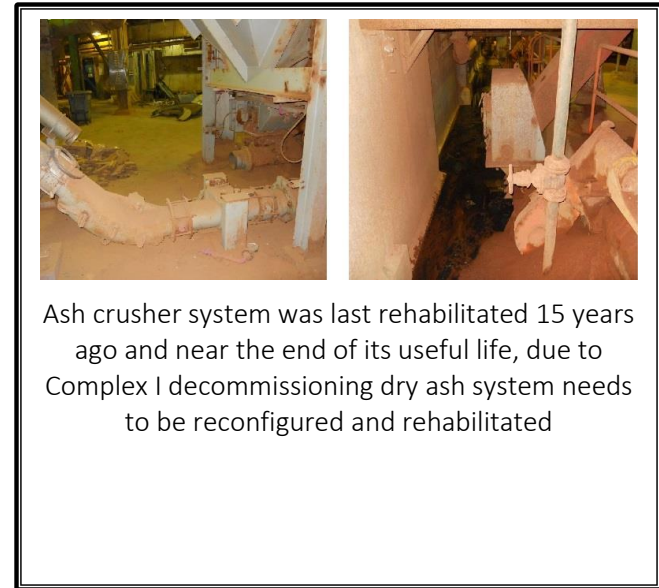
Preliminary Scope of Work:

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	Projected Expenditures FY2017	Projected Expenditures FY2018	Projected Expenditures FY2019	Projected Expenditures FY2020	Projected Expenditures FY2021	Projected Expenditures FY2022	Projected Expenditures FY2023 &	2018-2022 CIP Total	Phase Total
S/D/CA	New	NA	NA	\$0	\$2171	\$1000	\$1400	\$1000	\$200	\$100	\$0	\$3700	\$5871
C	New	NA	NA	\$0	\$0	\$0	\$5000	\$8000	\$7000	\$3510	\$0	\$23510	\$23510
C	Under Procure.	NA	NA	\$0	\$500	\$1137	\$0	\$0	\$0	\$0	\$0	\$1137	\$1637
C	Under Procure.	NA	NA	\$0	\$167	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$167
C	Under Procure.	NA	NA	\$0	\$390	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$390
C	Under Procure.	NA	NA	\$0	\$92	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$92
C	Under Procure.	NA	NA	\$0	\$200	\$110	\$0	\$0	\$0	\$0	\$0	\$110	\$310
Totals				\$0	\$3520	\$2247	\$6400	\$9000	\$7200	\$3610	\$0	\$28457	\$31977



Retrofitted chemical feed pump replacement at Puritan-Fenkell RTB and makeshift wooden stairs to enter Basin Valve Gallery

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.

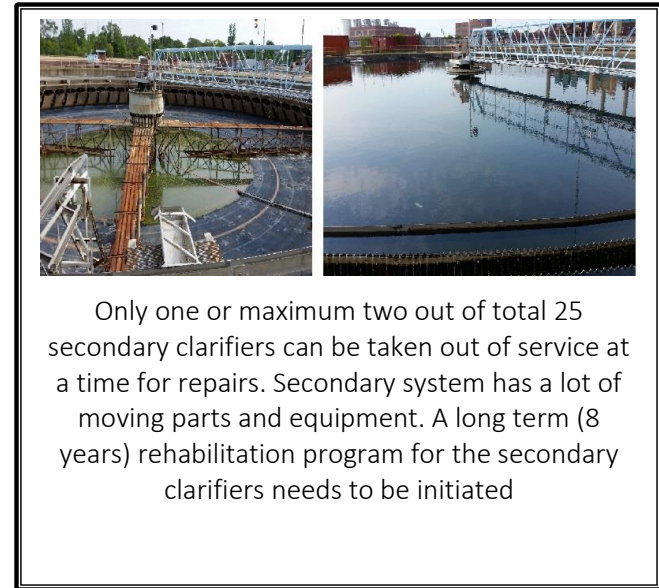
Preliminary Scope of Work:

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.

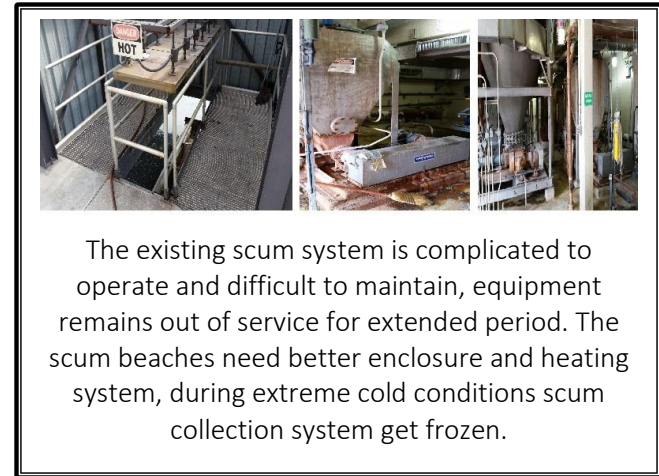
Preliminary Scope of Work:

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



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.

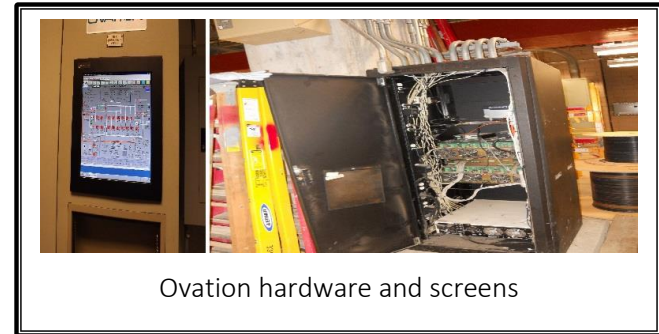
Preliminary Scope of Work:

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



Ovation hardware and screens

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 Devices-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.

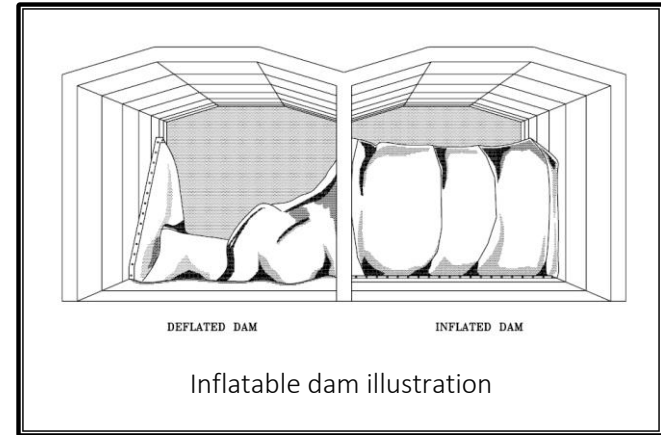
Preliminary Scope of Work:

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



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.

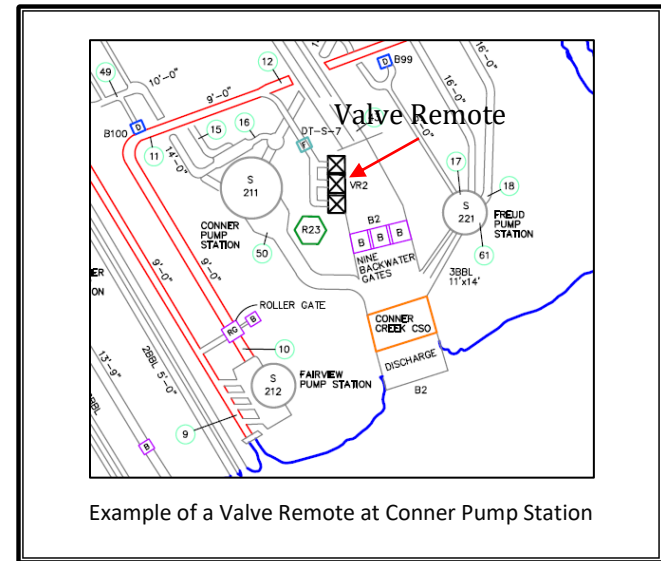
Preliminary Scope of Work:

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



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



Deteriorating access hatches

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/D/CA	New	NA	NA	\$0	\$0	\$0	\$500	\$1000	\$250	\$250	\$0	\$2000	\$2000
C	New	NA	NA	\$0	\$0	\$0	\$0	\$1000	\$6000	\$6000	\$0	\$13000	\$13000
Totals				\$0	\$0	\$0	\$500	\$2000	\$6250	\$6250	\$0	\$15000	\$15000



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



CIP Number: CIP 1409

Title: CSO OUTFALL REHABILITATION

Classification: 222: Wastewater > Field Services > Interceptors

Managing Dept: Systems Control Center

RC Score: NA

Contract No.: NA

Significance: Rehabilitation of GLWA CSO outfalls is essential to properly discharge the uncontrollable combined sewer overflow to the receiving waters and to prevent sewer back up into the Conveyance System. Recent inspections of the outfalls revealed fractures, missing mortar from bricks, and sediment and debris deposits in many of them.

Location: CSO Outfalls

Driver: 1 - Condition

Explanation: Some outfalls have fractures, some have missing bricks and mortars, and some have deposits in them.

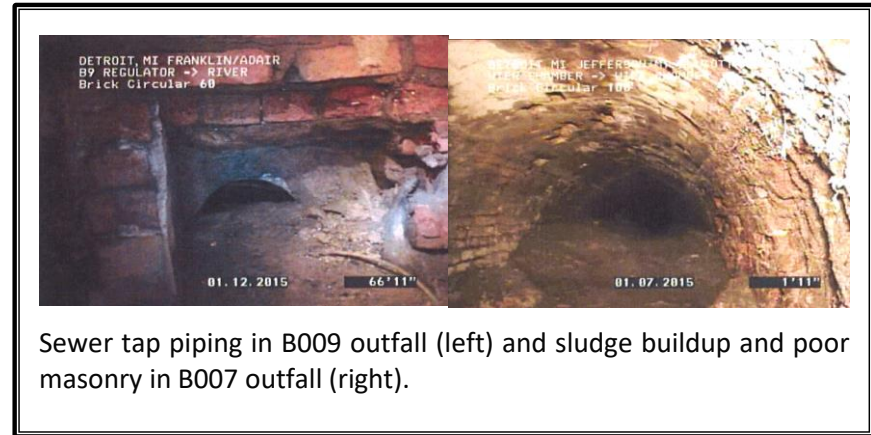
Preliminary Scope of Work:

Construction: Contract CS-168 will review the existing records, evaluate the existing conditions, and provide the necessary design to rehabilitate.

Challenges: Some outfalls are below the river elevation; rehabilitation 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
C	New	NA	NA	\$0	\$0	\$6000	\$6000	\$6000	\$6000	\$6000	\$6000	\$30000	\$36000
Totals				\$0	\$0	\$6000	\$6000	\$6000	\$6000	\$6000	\$6000	\$30000	\$36000



Sewer tap piping in B009 outfall (left) and sludge buildup and poor masonry in B007 outfall (right).

CIP Number: CIP 1411

Title: NIEA EVALUATION AND REHABILITATION FROM WRRF TO GRATIOT AVE. AND SYLVESTER ST.

Classification: 222: Wastewater > Field Services > Interceptors

Managing Dept: Systems Control Center

RC Score: NA

Contract No.:

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: Sewers & Interceptors

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: Review available data, provide the necessary rehabilitation/replacement option, design and implement them 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
D	New	NA	NA	\$0	\$0	\$700	\$700	\$700	\$0	\$0	\$0	\$2100	\$2100
C	New	NA	NA	\$0	\$0	\$6300	\$6300	\$6300	\$0	\$0	\$0	\$18900	\$18900
Totals				\$0	\$0	\$7000	\$7000	\$7000	\$0	\$0	\$0	\$21000	\$21000



Example inspection of a large sewer

SECTION 3 **CENTRALIZED SERVICES**

CIP Number: CIP 956

Title: AS-NEEDED CIP IMPLEMENTATION ASSISTANCE AND RELATED SERVICES

Classification: 3804: Centralized Services > Programs > Programs

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 (Sewer)	Active	3/24/2006	7/24/2017	\$4770	\$1400	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$6270
Totals				\$4770	\$1400	\$100	\$0	\$0	\$0	\$0	\$0	\$100	\$6270



CIP Number: CIP 1026

Title: DEPARTMENT-WIDE GENERAL ENGINEERING SERVICES ON AN AS-NEEDED BASIS

Classification: 3805: Centralized Services > Programs > Programs

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	\$5032.4	\$114	\$114	\$0	\$0	\$0	\$0	\$0	\$114	\$5260
D (Sewer)	Active	5/12/2010	6/2/2018	\$5032.4	\$114	\$114	\$0	\$0	\$0	\$0	\$0	\$114	\$5260
Totals				\$10065	\$228	\$228	\$0	\$0	\$0	\$0	\$0	\$228	\$10521



Example of pipe being laid.

CIP Number: CIP 1031

Title: GENERAL ENGINEERING SERVICES

Classification: 3806: Centralized Services > Programs > Programs

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	\$7005.6	\$336	\$336	\$336	\$0	\$0	\$0	\$0	\$672	\$8014
D (Sewer)	Active	1/23/2008	12/12/2018	\$7005.6	\$110	\$100	\$50	\$0	\$0	\$0	\$0	\$150	\$7266
Totals				\$14011	\$446	\$436	\$386	\$0	\$0	\$0	\$0	\$822	\$15279



CIP Number: CIP 1147

Title: AS-NEEDED ENGINEERING SERVICES FOR CONCRETE TESTING, GEOTECHNICAL SOIL BORINGS, OTHER TESTING SERVICES, AND RELATED SERVICES

Classification: 3807: Centralized Services > Programs > Programs

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 (Water)	Active	4/8/2009	4/8/2021	\$0	\$650	\$907	\$333	\$333	\$333	\$0	\$0	\$1906	\$2556
Totals				\$0	\$650	\$907	\$333	\$333	\$333	\$0	\$0	\$1906	\$2556



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, PC-773D

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
DB (Water)	Pending Close-out	5/25/2013	5/25/2016	\$3925	\$312	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4237
DB (Sewer)	Pending Close-out	5/25/2013	5/22/2016	\$3	\$328	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$331
Totals				\$3928	\$640	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4568



A system control room.

CIP Number: CIP 1164

Title: GEOTECHNICAL AND RELATED SERVICES ON AN AS-NEEDED BASIS

Classification: 3808: Centralized Services > Programs > Programs

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	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2573
Totals				\$2441	\$132	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2573



Example of a pipe being laid.

CIP Number: CIP 1182

Title: GENERAL ENGINEERING SERVICES

Classification: 3809: Centralized Services > Programs > Programs

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	\$509	\$382	\$0	\$0	\$0	\$0	\$0	\$382	\$919
Totals				\$28	\$1250	\$1154	\$0	\$0	\$0	\$0	\$0	\$1154	\$2432



CIP Number: CIP 1206

Title: DATA CENTER RELIABILITY/AVAILABILITY IMPROVEMENTS

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)



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	\$2845.8	\$5	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2851
DB (Sewer)	Pending Close-out	1/29/2013	2/27/2016	\$3157.6	\$5	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3163
Totals				\$6003	\$10	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6013

CIP Number: CIP 1207

Title: SCADA RADIO NETWORK UPGRADE

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

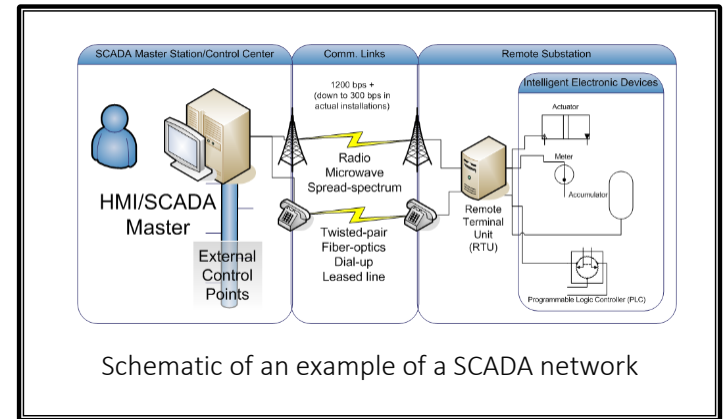
Preliminary Scope of Work:

N/A - Pending Closeout

Challenges: N/A - Pending Closeout

Initial Project Cost Estimates (in \$1000s)

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	\$109	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3484
DB (Sewer)	Pending Close-out	3/26/2013	9/30/2016	\$2846	\$109	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2955
Totals				\$6221	\$218	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6439



Schematic of an example of a SCADA network

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



Roof in need of repair

CIP Number: CIP 1343

Title: ENERGY MANAGEMENT: ELECTRIC METERING IMPROVEMENT PROGRAM

Classification: 3810: Centralized Services > Programs > Programs

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



Example of an electric meter

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 (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 WATER RESOURCES RECOVERY FACILITY 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 WRRF are near the end of their 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 WRRF roof systems are old and some are near end of their 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	IWC	Industrial Waste Control
BDF	Biosolids Dryer Facility	LCR	Lead and Copper Rule
BFP	Belt Filter Press	LED	Light-Emitting Diode
BGD	Billion Gallons per Day	LEL	Lower Explosive Limit
CCR	Consumer Confidence Rule	LIMS/PIMS	Laboratory Information Management System/Project Information Management System
CCTV	Closed-Circuit Television		
cfs	cubic feet per second		
CIP	Capital Improvement Plan	MACP	Manhole Assessment Certification Program
CMG	GLWA Capital Management Group	MCC	Motor Control Centers
COF	Central Offload Facility	MDEQ	Michigan Department of Environmental Quality
CSF	Central Services Facility		
CSO	Combined Sewer Overflow	MDNRE	Michigan Department of Natural Resources and Environment
CWA	Clean Water Act		
DDOT	Detroit Department of Transportation	MG	Million Gallons
DI	Ductile Iron	MGD	Million Gallons per Day
DRI	Detroit River Interceptor	NAB	New Administration Building at the WRRF
DRO	Detroit River Outfall	NASSCO	National Association of Sewer Service Companies
dtpd	dry tons per day		
DWRF	Drinking Water Revolving Fund	NEC	National Electric Code
DWSD	Detroit Water and Sewerage Department	NESDS	Northeast Sewerage Disposal System
DWSD-R	Specifying the new, Detroit-focused Detroit Water and Sewerage Department	NIEA	North Interceptor East Arm
		NPDES	US EPA National Pollutant Discharge Elimination System
EPA	United States Environmental Protection Agency		
		NPL	US EPA National Priorities List
GIS	Geographic Information System	O&M	Operations & Maintenance
GLWA	Great Lakes Water Authority	OEM	Original Equipment Manufacturer
GPS	Global Positioning System	O-NWI	Oakwood-Northwest Interceptor
HVAC	Heating, Ventilation, and Air Conditioning	OSHA	Occupational Safety and Health Administration
I&C	Instrumentation & Controls	OWI	Oakwood Interceptor
ILP	Intermediate Lift Pumps	PAC	Powdered Activated Carbon
ISD	In System Storage Device	PACP	Pipeline Assessment Certification Program
IT	Information Technology	PCCP	Pre-Stressed Concrete Cylinder Pipe
ITS	Information Technology and Services	PEAS	Primary Effluent to Activated Sludge

PLC	Programmable Logic Controller	SFP	Sludge Feed Pump
PLD	Programmable Logic Device	SOW	Scope of Work
PRV	Pressure Reducing Valve	SRP	Scheduled Replacement Program
PS	Pump Station	T&O	Taste and Odor
RAS	Return Activated Sludge	TAC	Technical Advisory Committee
RTB	Retention Treatment Basins	TCR	Total Coliform Rule
RVSDS	Rouge Valley Sewerage Disposal System	TPC	Tournament Players Championship Golf Course in Dearborn
RWCS	Regional Water Transmission System	VFD	Variable Frequency Drive
SAMO	GLWA System Analytics and Meter Operations	VR-Gates	Valve Remote Gates
SCADA	Supervisory Control And Data Acquisition (GLWA uses Ovation brand)	WAM	Work and Asset Management
SCC	Systems Control Center	WMP	Water Master Plan
SCP	Small Capital Projects	WMPU	Water Master Plan Update
SCUBA actuators	Self-Contained Universal Bi-directional Actuator	WRRF	Water Resource Recovery Facility
SDF	Screening and Disinfection Facility	WSC	West Service Center
SDWA	Safe Drinking Water Act	WTP	Water Treatment Plant
SFE	Secondary Final Effluent	WWTP	Wastewater Treatment Plant (old terminology)

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
Appendix E	CIP Request by Funding Source by Year