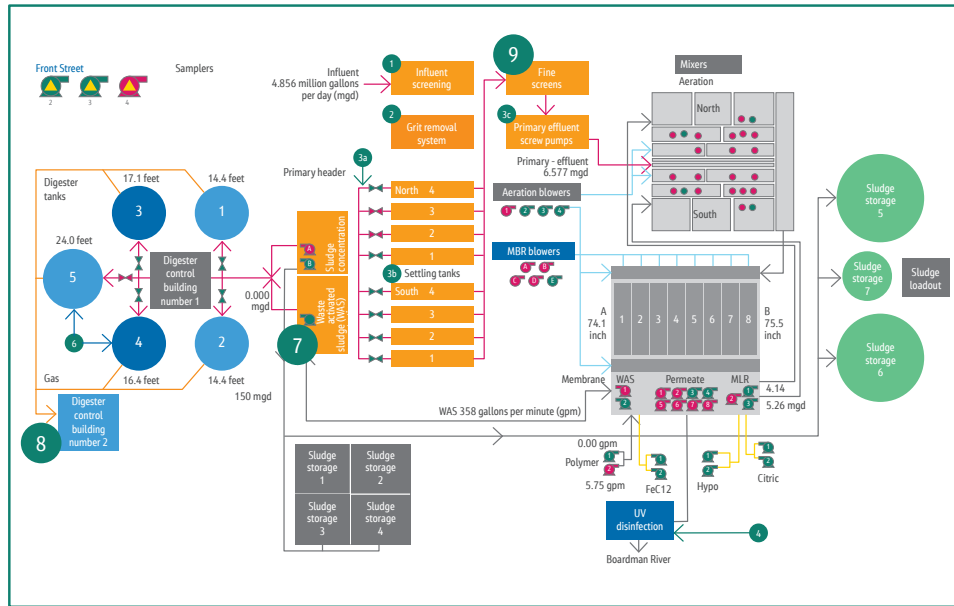


**7 Gravity belt concentrator refurbishment (CIP #1236)** The gravity belt concentrator (GBC) provides the critical function of thickening wasted solids from both the primary settling tanks and the activated sludge system on a daily basis. The thickened solids are then delivered to the digestion process for further treatment. The GBC was installed in 2004 and, after nearly 20 years of service, a complete refurbishment was required to address normal wear identified on major components. This refurbishment will ensure years of continued reliable service.



**8 Boiler controls upgrade (CIP #1077)** The plant's dual fuel boilers were installed in 2004. The boilers are designed to burn digester gas and natural gas to heat the facility's digesters and most of the facility's buildings. Digester gas is the preferred gas to burn to reduce natural gas usage and flaring of excess digester gas. The controls for both boilers are obsolete and no longer supported and currently bypassed. This upgrade will include replacement of the boiler controls and the boiler burners, increasing boiler efficiency and decreasing boiler down time/repair cost.



**9 West fine screen refurbishment (CIP #1237)** The east and west 2-mm fine screen units were installed in 2004 as part of the membrane upgrade. The screens are vital to membrane operation as they remove foreign material that would otherwise accumulate on the membranes themselves eventually causing damage. After almost 20 years of service both units were due for refurbishment and are expected to be completed by Summer 2023.



### Remaining CIP projects for 2023

**SCADA upgrade (CIP #970)** supervisory control and data acquisition (SCADA) is the key component for monitoring and controlling plant processes. The SCADA system was last upgraded in 2014. Upgrading the SCADA improves operational efficiency, plant security and reduces compliance risk.

**PLC upgrade (CIP #970)** Programmable logic controllers (PLCs) are computers used to control plant processes locally. PLCs communicate with the plant SCADA system to allow for process monitoring and control from the SCADA itself. Most of the PLCs from of this upgrade were installed in 2005 (and some even prior to that). Upgrade is critical to reduce compliance and security risk posed by PLC failure.

**Plant structural condition assessment (CIP #1169)** This project will assess the condition of various plant structures (such as tanks, buildings, loading docks, etc.) will prioritize repairs and scheduling. The tanks/structures identified are showing significant signs of degradation.



## Traverse City Regional Wastewater Treatment Plant (TCRWWTTP)

Overview of Clean Water State Revolving Loan Fund (CWSRF) Plan and Capital Improvement Projects (CIP)



**1 Influent Screening (CIP #904)** The automatic 1/4-inch influent bar screen was installed in the early 90s. During periods of high flow or when performing maintenance on the automatic screening unit, influent is screened by a manual 2-inch bar screen. The automatic screening unit is obsolete and is no longer supported by the manufacturer. The manual bar screen is largely ineffective at removing debris, causing issues in downstream processes. An upgrade, included in the CWSRF plan, would provide effective screening, adequate redundancy and address issues faced by maintaining obsolete equipment.



Influent screen.

**2 Grit removal (CIP #904)** The grit chambers discharge into the primary header. The east grit chamber was installed in 1976, while the west grit chamber was installed in 1959. The grit chamber rehabilitation project is included in the CWSRF application.



East grit effluent channel discharging to primary header.

**3a Primary Header (CIP #904)** Portions of the primary header, the pipe that conducts influent from the grit chambers to the primary tanks, were installed in the 1950s and 1970s. Some portions of the pipe have failed or have become greatly compromised. As an interim solution, until the CWSRF upgrade is complete, the City contracted services to encapsulate the problem areas of the primary header pipe with a ceramic pipe wrap. This work was completed in 2022.



Primary header installed in 1976.

Primary header.

Primary header.

**3b Primary Settling Tanks Upgrade (CIP #904)** The rehabilitation/replacement of the facility's eight primary tanks is included in the CWSRF Plan and City's CIP. Four of the tanks were installed in 1932 and the remaining were installed in 1976. One tank is currently out of service and the repair cost is roughly \$180,000. The equipment in all tanks is at the end of its useful life. To optimize removal of pollutants in the primary tanks, reduce the energy required to treat the waste stream in the aeration basin, regain process reliability and reduce vulnerabilities, a process rehabilitation/upgrade is recommended.

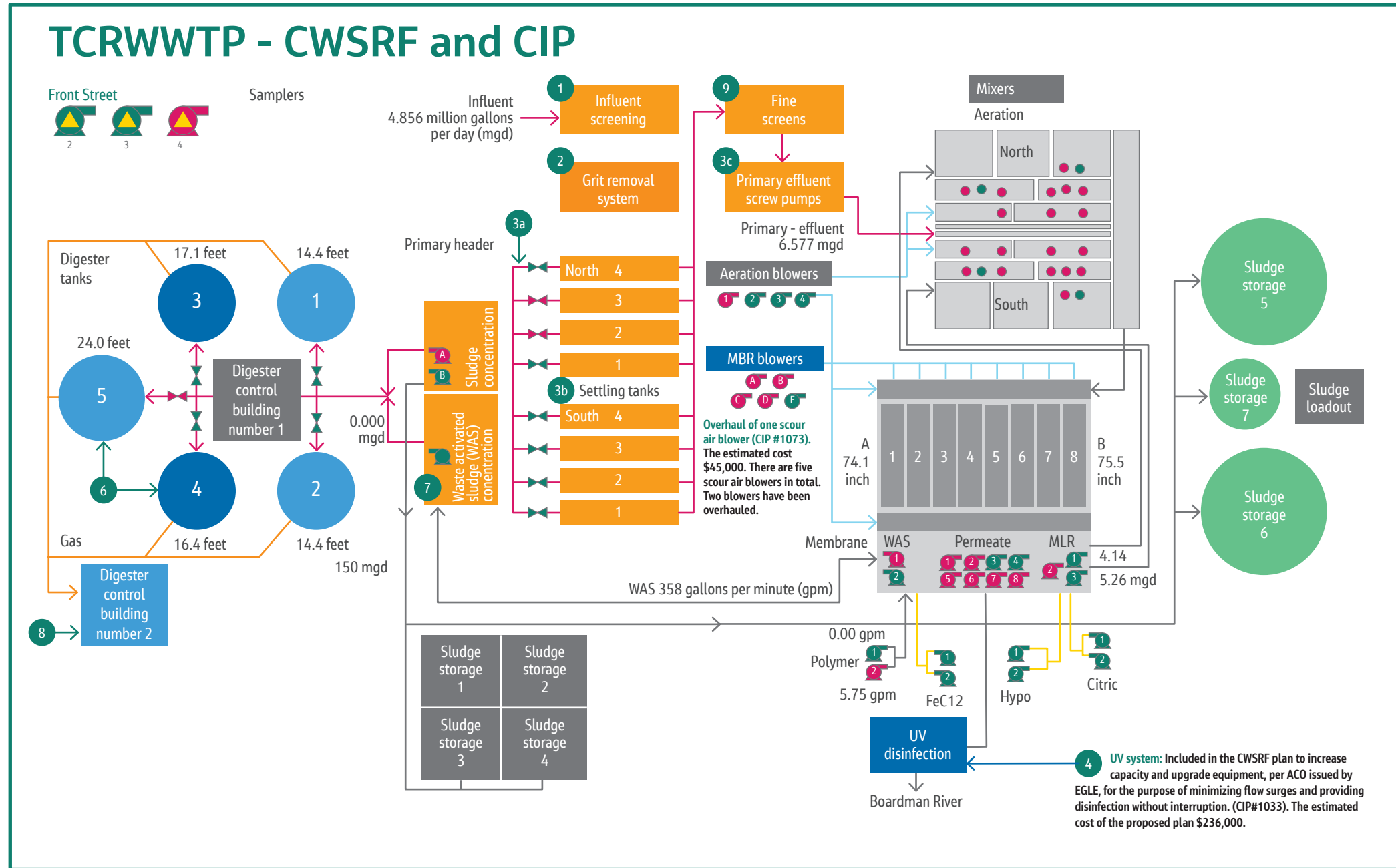


Inside a clarifier tank installed in 1932.

**3c Screw Pump Replacement (CIP #904)** The screw pumps, the pumps that pump primary effluent to the aeration basin were installed in 1976. Screw pump 1 has been upgraded. The CWSRF plan includes the upgrade of screw pumps 2 and 3 and both replacements are included in the CIP #893.



General condition of screw pumps 2 and 3.

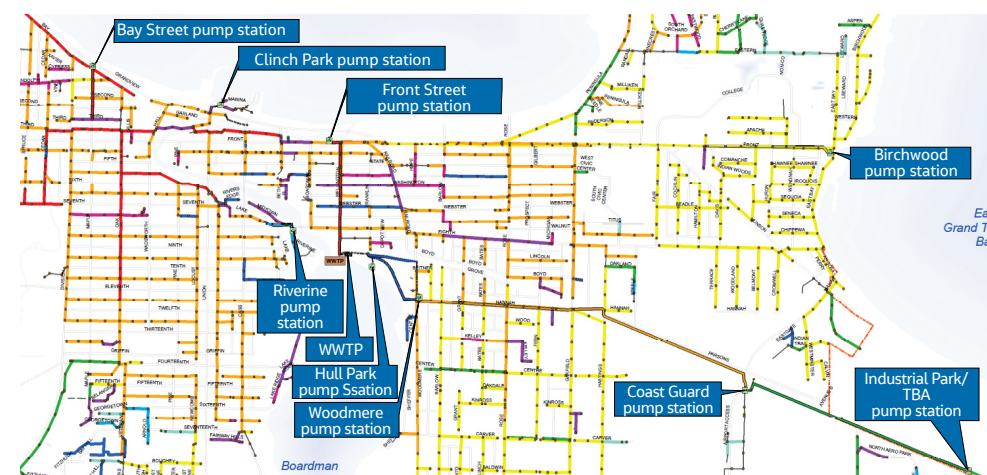


**4 UV System and Related Structures Modification Project (CIP# 1033)** Installed in 1995, the UV system and related structures were modified in 2021 to eliminate the possible flooding of the UV modules per an Administrative Consent Order issued by the Michigan Department of Environment, Great Lakes and Energy. Complete replacement of the UV system is mandated through the ACO to be completed by July 1, 2026. The upgrade has been included as part of the CWSRF upgrade.



After modules were lifted out of the flood zone.

**5 Engineering evaluation of four city lift stations including Woodmere, Riverine, Coast Guard and Clinch Park (CIP #967).** The estimated cost of this project is \$60,000. Jacobs maintains a total of nine lift stations for the City, including these four. The evaluation of these lift stations will identify any capacity issues, and any issues with the condition of the structures or equipment at each lift station. (Please refer to the map identifying the location of the three lift stations, as well as, the other six lift stations.)



**6 Digester 4 and 5 condition assessment (CIP# 1175)** Digester 4 was constructed in 1959, and Digester 5 was constructed in 2004. The condition assessment will include cleaning of the digesters (preventive maintenance performed every 5-10 years) and a thorough assessment of the tanks interior/exterior walls, tank roof, piping, associated valving and other process related equipment. This information will be used to budget and plan future repairs/upgrades.







## Timeline of project accomplishments and equipment installation and upgrades

### 1900

- 1932  
■ Added four inside settling tanks
- Added digesters #1 and #2

### 1959

- Added west grit chamber
- Added digesters #3 and #4

### 1976

- Added east grit chamber
- Added four outside settling tanks
- Installed aeration basin

### 1985

- Added sludge storage building and pumps

### Early 1990s

- Selected Jacobs for TCRWWTP operation
- Expanded contract to include IPP; discharge permit issued to industrial users
- Added influent screening
- Installed fiberglass covers helping contain odors

### Late 1990s

- Received second place for U.S. Environmental Protection Agency (U.S. EPA) IPP Excellence Award
- Completed the \$1.5 million WWTP upgrade
- Added ultraviolet (UV) disinfection

# Timeline of project accomplishments and equipment installation and upgrades

2001

- Added activated carbon system

2004

- \$31 million plant upgrade including newest, largest membrane bioreactor (MBR) in North America (both upgrades designed by Jacobs)
- Received the Michigan Water Environment Association (MWEA) Health and Safety Award
- Modified aeration basin
- Added membranes
- Added digester #5

2006

- Received the American Council of Engineering Companies (ACEC) Engineering Excellence Award
- Received the ACEC and Society of Professional Engineers Eminent Conceptor Award for Engineering

2007

- Received the U.S. EPA Region 5 Best Operated and Maintained Facility Award

2012

- Signed new 5-year agreement with the City

2013

- Upgraded fiberglass odor ducts

2000

2015

- Worked with GE water technologists and operating team to replace and upgrade three membrane filtration units in the MBR

2016

- Renewed partnership with the City to operate and maintain TCRWWTP and lift stations

2017

- Oversaw replacement of screw pump and trough reconditioning; and oversaw upgrade of Traverse Bay Academy (TBA) lift station, replacement of the membrane cassettes in train 4, and cleaning and condition assessment of digester 3

2018

- Replaced the cassettes in train 3, upgraded one programmable logic controller (PLC) at the WWTP and at Front Street lift station and replaced the piston pump in the west biosolids storage building with two progressive cavity pumps

2019

- Jacobs Operator Lane Peterson received the MWEA Operator of the Year Award
- Received, in conjunction with the City, the MWEA Large Facility Safety Award

2020

- Replaced and installed the seventh and eighth trains of new membranes
- Completed the pump replacement project at the Riverine lift station
- Collaborated with Michigan State University and Arizona State University to monitor the spread of COVID-19 by detecting its presence in wastewater

2021

- Completed UV project per Administrative Consent Order (ACO) requirements, completion of the digester 3 rehabilitation and the replacement of the eighth and original membrane train cassettes

2022

- Upgraded administration building heating, ventilation and air conditioning (HVAC) system
- Engineering studies at Front Street, Birchwood Bay Street and Riverine lift stations
- Completed interim repairs to primary header
- Refurbished third membrane system scour air blower