City of Silver Bay

has started construction on upgrading its preliminary treatment at the Wastewater Treatment Facility

City of SILVER BAY

Silver Bay's Wastewater Treatment Facility is an existing gravity collection system consisting of varying pipe sizes. The City performs infrastructure improvements as necessary to replace aging infrastructure. The City has been focusing improvements on areas believed to be major sources of infiltration and inflow (I&I). In addition, the safety of our employees is of concern as our current system is manual and employees are forced to work in confined spaces. The new automated system will remove the confined spaces making it safer for the employees.

The pretreatment portion of the Wastewater Treatment Facility to be upgraded includes the following:

a) **Influent Manhole** - The influent manhole was constructed with the original plant in 1954. The concrete has shown signs of deterioration but the manhole structure is in fair condition overall. With improvements to the preliminary treatment, the influent manhole is being replaced.

b) **High Flow Diversion Structure and High Flow Manual Bar Screen** is a high-flow diversion structure that precedes the pre-treatment process at the WWTF. This structure was added in 1994 and includes an influent by-pass structure, a manually cleaned bar screen on the by-pass line, and influent flow monitoring for the by-pass. The by-pass constructed in 1994 involves diverting flows in excess of the capacity of the previously constructed bar screen, grit removal, and influent flow monitoring to the primary clarifier splitter box. The concrete structure for the high-flow bypass has 20 plus years of useful life remaining and is in good condition. However, operational issues with the manual bar screen during high flow events have resulted in rags and other debris continuing downstream and causing operational problems with pumps, digester heating, and contributing to excess solids accumulating in the digesters which increases costs associated with biosolids removal. The high flow diversion structure and manual bar screen are exposed to weather resulting in operation that is more difficult during rainfall and winter conditions. With the above operational concerns noted, the manual bar screen and high flow diversion structure are in need of replacement.

c) **Manual Bar Screen** - Under normal flow conditions, pre-treatment at the WWTF begins with a manual bar screen. The existing bar screen has 3/8” bars and 1 ½” openings. The effective area of the screen is 2’-1” by 3’-0” and sits at a 26o angle with the horizontal plane. The manual bar screen was installed in 1972. The existing manual bar screen has operational problems that allow rags and other debris to pass through which has led to clogging problems with pumps and excess debris and solids settling in the clarifiers. The excess solid are sent to the digesters, which has affected digester heating and has led to increase biosolids handling costs. The manual bar screen is currently not protected from the weather. High flows and winter freezing conditions make operation of the bar screen difficult. Overall, with poor screening efficiency and difficult operation, the manual bar will be replaced.

d) **Grit Removal** - Once the wastewater has been screened, flow enters the grit removal chamber. The grit removal chamber was installed in 1972 and is 14 feet in diameter with an effective liquid depth of 4.67 feet. The grit chamber and associated grit removal equipment are in poor condition. The conveyor that removes the settled material from the grit tank has been repaired numerous times and is inoperable at times. The existing equipment in the chamber is inefficient and is in need of replacement. With equipment that is outdated and has poor efficiency and reliability, significant amounts of grit pass through this structure and settle in the primary clarifiers. The excess solids from the clarifiers are sent to the digesters. These excess solids accumulate in the digesters, and as noted before, increase the costs for biosolids handling and removal from the facility. The existing grit removal chamber is undersized for the influent flows and has several operational concerns. As noted earlier the equipment has failed several times and is inoperable. The existing concrete structure is showing signs of deterioration and requires significant rehabilitation and modifications to accommodate new equipment. The grit and solids that settle out in the bottom of the tank are sent to a washing unit and collection bin in the adjacent building. The adjacent building is in poor condition. The building was replaced in 1994 and requires repairs to the masonry walls and concrete. The building does not have any wall insulation and only 1 ½” of board insulation on the roof that results in freezing conditions during winter months. The building is in need of significant improvements.

e) **Bar Screen/Comminuter Combination** - Following grit removal, wastewater enters the bar screen/comminuter combination. The purpose of the comminuter is to grind up rags and other debris to prevent downstream processes and pipes from clogging. The bar screen is manually cleaned in the 24 inch channel in which the comminuter sits in. However, flows often exceed the capacity of the bar screen and watermarks on the concrete structure indicate water levels above the bar screen. These flows exceed the capacity of the comminuter. The comminuter was installed in 1954 with the original WWTF. The bar screen and comminuter combination isinefficient at removing debris from the wastewater and has exceeded its useful life.

f) **Biosolids Storage** - Solids produced at the WWTF (in the primary, secondary, and tertiary clarifiers) are sent via pumps to the first and second stage anaerobic digesters. The first stage anaerobic digester was installed in 1954, while the second stage anaerobic digester was added in 1995. It has been noted that the waste gas burner and equipment is not operating correctly and requires new parts and components. The sediment trap on the stage two digester is in need of replacement. The second stage digester has a floating cover that was rehabilitated in 1995, but has not had any major improvements since that time. The cover exterior is in ok condition, but an inspection will need to be completed to verify the condition inside the tank. Floating covers typically require maintenance after 20 years and it is most likely that the floating cover will need to be rehabilitated. In addition, the concrete foundation inside the first stage digester is noted to have a crack that needs to be sealed. The mixer in digester one in in need of replacement. There is no mixer in the second stage digester. The facility produces class B biosolids that are applied to local fields. The structures are in good condition and have 30 plus years of useful life remaining, but the mixers are being replaced as part of the preliminary treatment project.

g) **Dome Covers** for primary clarifiers will also be installed as part of the preliminary treatment project in an effort to reduce mercury from rainwater into our system. The clarifiers are currently exposed to the natural elements, thus requiring our system to treat the rainwater.

Total project costs are expected to be $4.5 million. Funding for the project will come through a combination of $2 million in grants and the remaining $2.5 million from a 1% loan from the Public Facilities Authority (PFA). Construction will primarily take place in 2020; however, parts of the project will carry over and closeout in 2021.

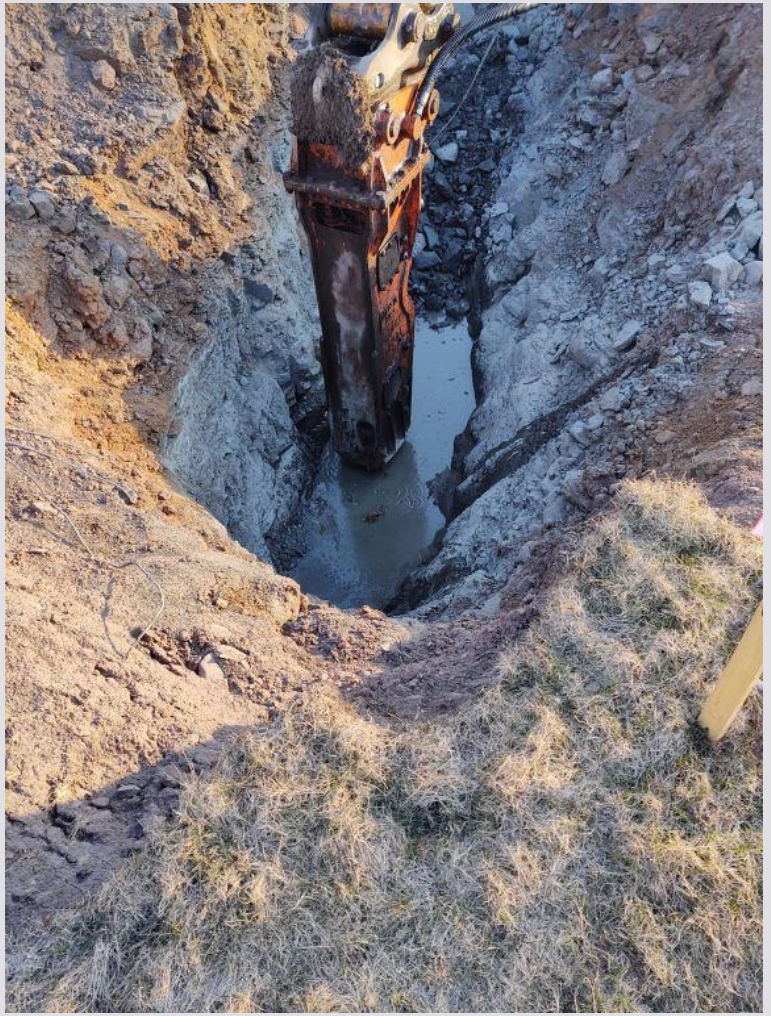
The City is just finishing up completion on the upgrading of two sewer bridges and a new trunk sanitary main that feeds directly into the preliminary treatment portion of the Wastewater Facility. This $1.5 million project was funded through a grant from Iron Range Resources and Rehabilitation and the use of sewer reserves.

Pretreatment Building – Ground Breaking

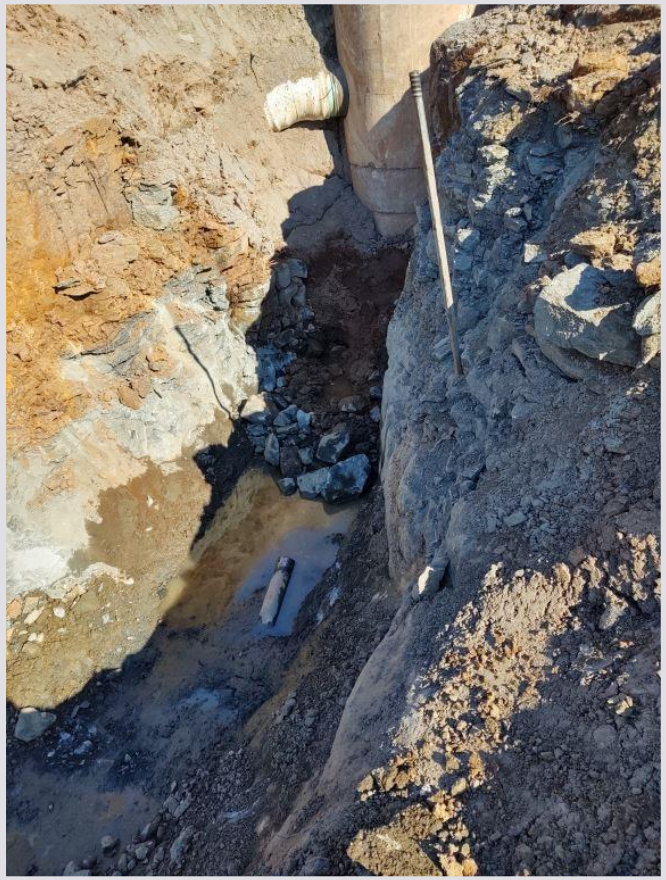
Pretreatment Building – Rock & Soil Excavation

Pretreatment Building – Ground Breaking

Pretreatment Building – Site Electrical Conduit Installation



Pretreatment Building – Rock Excavation



Pretreatment Building – Rock Excavation for Future Influent Pipe