TOWN OF JAY
WATER METER FEASIBILITY STUDY

FINAL ENGINEERING REPORT

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MJ Project #1075.14

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EXECUTIVE SUMMARY

- Currently there are 639 service connections located throughout the Town of Jay's (Town) three (3) water districts, the Jay Water District, the Upper Jay Water district, and the AuSable Forks Water District. This engineering report has been prepared for the Town to evaluate the feasibility of developing and installing a new Town-wide water metering system to serve the 639 service connections. This report evaluates alternative water metering systems and billing software programs.

- Automated Meter Reading systems (AMR) and Advanced Metering Infrastructure systems (AMI) were evaluated to determine the system best suited for the community. AMR systems require utility personnel to physically collect the data from individual meters with a data receiver by either walking or driving by buildings equipped with metering devices. AMI systems automatically transmit data from individual meters to a receiving station on an hourly basis or at predetermined intervals. Accordingly, AMI systems will reduce manpower requirements and improve overall efficiency.

- Three (3) AMR systems were evaluated. Although AMR technology provides advantages over conventional metering and manual-read systems, and although capital and maintenance costs associated with AMR are generally less than for AMI systems, the recommended metering technology for the Town is AMI. Due to limited staffing within the Town, and due to the rural nature of the Town's three (3) water districts, an AMI metering system will allow the Town to accurately, and automatically, obtain water consumption information while conserving available Town resources.

- Four (4) AMI systems were evaluated. Of the four, the Zenner metering system is the recommended system for the Town. The Zenner system transmits meter readings and alarm data to a fixed base station via radio signals. The other three systems evaluated all rely on the existing cellular network to direct collected meter readings to a fixed base station. As cellular communication is inconsistent within portions of the Town, reliance on transmission of meter readings over a cellular network may be ineffective.

- Two (2) billing software programs were similarly evaluated. Each software program was reviewed to determine compatibility with the automatic meter reading systems for billing, but were also reviewed for general accounting, budget preparation, and payroll services. The two systems, one by the Williamson Law Book company, the second by gWorks, Inc., will both provide satisfactory service. The Pubworks software program currently used by the Town's highway department is owned by gWorks, Inc. and will be fully integrated into their municipal software programs later this year.

- Based on the analysis of alternatives conducted and outlined in Sections 5, 6, and 7, the recommended alternatives include:

  - Zenner AMI Metering System
  - gWorks Utility Billing Software

- As discussed in Section 8.2, the opinion of probable project cost for the recommended improvements, exclusive of annually reoccurring fees, is $2,170,000, which includes $2,164,600 for the Zenner meter system and $5,400 for the gWorks software system.

- The Engineering Report Certification is included in Appendix J.

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

The Town of Jay (Town) owns, operates, and maintains three (3) water districts to supply potable water to residents of the community. The districts include the Jay Water District, the Upper Jay Water District, and the AuSable Forks Water District. Together with the three water districts, the Town supplies water through 639 residential and commercial service connections.

The Jay Water District, which serves approximately 500 residents through 265 service connections, is located in the west-central area of the Town, in the Hamlet of Jay, and operates under PWSID NY 1500279. The Upper Jay Water District, which serves approximately 234 residents through 135 service connections, is located in the southwestern section of the Town bordering the east branch of the AuSable River, in the Hamlet of Upper Jay, and operates under PWSID NY 1500294. The AuSable Water District, which services approximately 900 residents through 235 service connections, operates under PWSID NY 1516260. The AuSable Water District is located along the northern border of the Town at the confluence of the east and west branches of the AuSable River. The boundaries of each water district are illustrated in Appendix A.

The Town currently utilizes master water meters to monitor the amount of water being produced at each well field and pumped into the distribution systems for the three water districts. However, individual water meters to monitor the actual amount of water consumed by the residential and commercial establishments within the water districts are not currently being utilized. Meters were previously installed at some residences in the AuSable Forks Water District; however, these meters are aged, leaking, and in many cases non-functioning. No meters were previously installed in the Jay and Upper Jay districts.

In August 2023, the New York State Department of Environmental Conservation (NYSDEC) issued an updated Water Withdrawal Permit to the Town, which is included in Appendix B. As part of the permit, the Town is required by the NYSDEC to establish and implement a water meter program to improve water conservation and reduce usage. To comply with the permit requirements, the Town is proceeding with the implementation of a program for the installation of water meters throughout the Jay, Upper Jay, and Au Sable Forks Water Districts.

1.2 NEED FOR PROJECT

Through the implementation of a Town-wide metering program, the Town will be able to accurately monitor the actual water usage at each service connection within the distribution system. Meters will also allow for accurate billing of water used, will assist in water conservation and reduce waste, and will enable the Town to determine and locate leakage within the distribution system.

To establish a water meter program for the three water districts, and comply with the current Water Withdrawal Permit, the Town has authorized MJ Engineering, Architecture, Landscape Architecture, and Land Surveying, P.C. (MJ) to prepare an Engineering Report in accordance with the New York State Department of Health (NYSDOH) Drinking Water Engineering Report Outline, effective October 1, 2021. The objectives of this engineering report are as follows:

- Review the Town's present water system metering needs.
- Evaluate alternative water metering systems.
- Evaluate billing software platforms.
- Identify the system best suited to serve the needs of the Town.

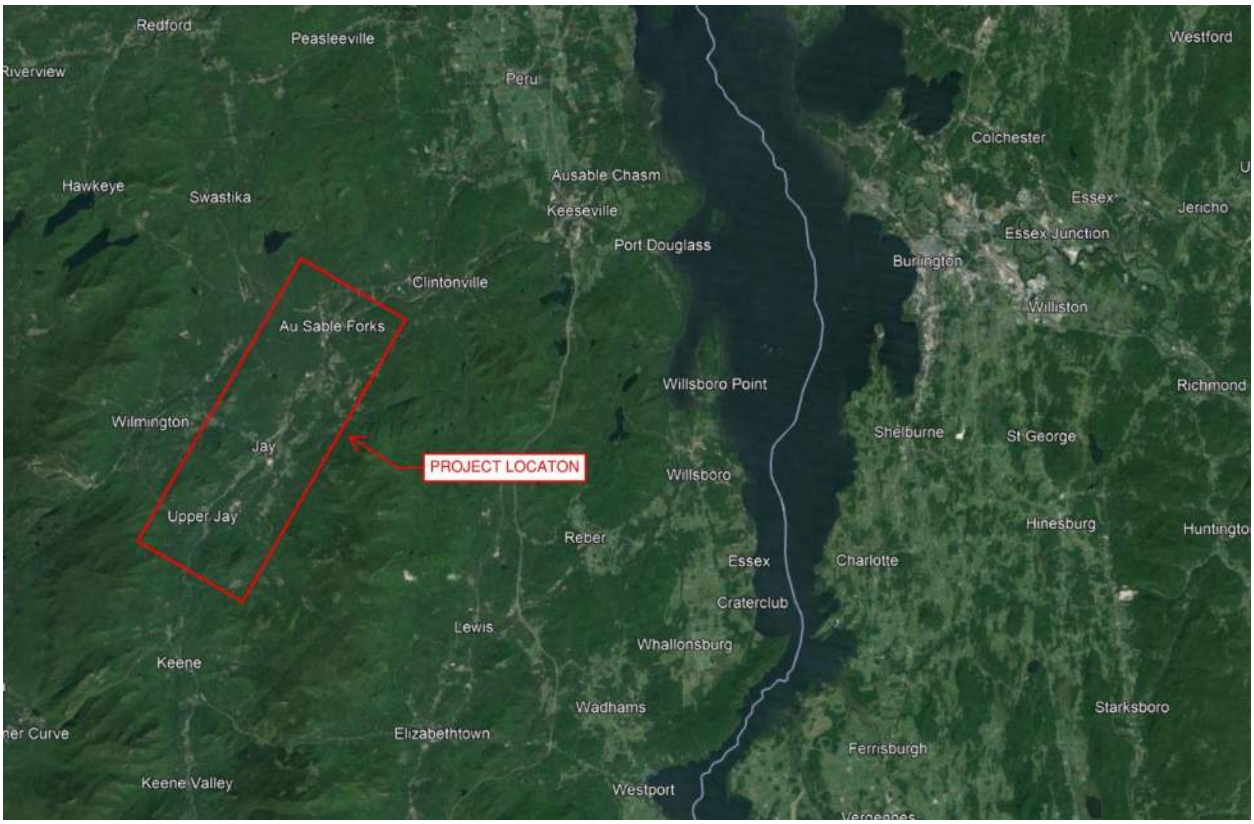
- Provide opinion of probable project cost for the recommended improvements.

2.0 PLANNING

2.1 PROJECT AREA AND OWNERSHIP

2.1.1 Location

The Town is located in Essex County, New York, within the boundary of the Adirondack Park. The Town is situated due east of the Town of Wilmington and Village of Lake Placid, and directly north of the Town of Keene, NY. The AuSable River runs through the Town bordering the Hamlets of Jay and AuSable Forks. A general project location map is provided below in Figure 2.1, and USGS Topographic Maps for each water district are provided in Appendix A.



Source: Google Earth Imagery

FIGURE 2.1 – PROJECT LOCATION MAP

2.1.2 Ownership

The Town owns, operates, and maintains the three (3) water districts included in this evaluation, which includes Jay, Upper Jay, and AuSable Forks.

2.1.3 Management

The Town Water Department is led by Mr. Paul Mintz, Superintendent of Water/Wastewater. Mr. Mintz is the Chief Water Treatment Plant Operator, and maintains NYS Class IIB – GW, C, and D licenses under the NYSDOH Operator certification program, for operation of the three water districts.

2.1.4 Outside Users

In addition to providing potable water to residents within the Town, the AuSable Forks water district previously provided water to the residents of the Town of Black Brook in Clinton County. The Town of Black Brook, however, recently developed its own water supply and, effective January 5, 2024, is no longer purchasing water from the Town through the AuSable Forks Water District. An emergency interconnection between the AuSable Forks Water District and the Town of Black Brook, however, remains in place. In addition, the Town provides water service to several residences outside the limits of the existing water districts. These are provided water from the Jay Water District.

2.2 POPULATION TRENDS AND PROJECTED GROWTH

Census data indicates the Town has experienced a 2.8% growth rate between 2010 and 2020, and a growth rate of 0.7% between 2020 and 2022, as shown in Table 2.1. Based on these trends, it is expected that the growth rate over the next 20 years (2020 - 2040) will be approximately 7.0%, with the estimated population increasing to 2,729±, or approximately 180 additional residents.

TABLE 2.1
TOWN POPULTATION TRENDS

2000 Population	2010 Population	2020 Population	2022 Population	2040 Projected Population
2,306	2,480 (7.0%)	2,550 (2.8%)	2,567 (0.7%)	2,729 (7.0%)

2.3 SITE CHARACTERISTICS

2.3.1 Land Use of Project Area

Land use within the Town is generally comprised of residential, land conservation, recreational, and general business.

2.3.2 Geological Conditions

This project involves the installation of residential water meters throughout Jay, Upper Jay, and AuSable Forks Water Districts. There are a variety of soils and geological features throughout these water districts, however soils will be minimally disturbed through this project. The work to be completed will involve water meters installed within residential and commercial buildings, as well as water meters installed within below grade meter pits.

2.3.3 Agricultural Considerations

The Cornell University Geospatial Information Repository was reviewed for the presence of agricultural districts within the project area. There are agricultural districts in the Jay, Upper Jay, and AuSable Forks Water Districts. However, no impacts to agricultural districts are expected, as any work performed beyond the footprint of existing buildings (i.e., meter pits) will be performed on existing infrastructure, and in areas of previous disturbance.

2.3.4 Environmental Resources

The Freshwater Wetlands Act (Article 24 of the Conservation Law) required the NYSDEC and Adirondack Park Agency (APA) to map the freshwater wetlands that are subject to jurisdiction of the law. Accordingly, the NYSDEC Environmental Resource Mapper was reviewed for the presence of natural resources within the project area. Based on the available mapping, there are wetlands, significant natural communities, and rare plants or animals throughout Jay, Upper Jay, and AuSable Forks Water Districts. However, no impacts to environmental resources are expected, as any work performed beyond the footprint of existing buildings (i.e., meter pits) will be performed on existing infrastructure, and within areas of previous disturbance.

2.3.5 Floodplain Considerations

NYS Route 9N runs diagonally south to north through the Town, bordering the East Branch of the AuSable River from the Hamlet of Upper Jay, at the southern end of the Town, to the Hamlet of AuSable Forks at the northern end. At AuSable Forks, the West Branch of the AuSable River is joined by the East Branch of the river and continues northeast to Lake Champlain. The Hamlets of Upper Jay, Jay, and AuSable Forks are the most densely populated areas of the Town. Sections of the three Hamlets border the AuSable River, which has been designated by the Federal Emergency Management Agency (FEMA) as a Zone AE flood zone, with areas within the 100-year and 500-year flood zones. However, much of the Town is not within a designated flood zone. Where water meters are proposed to be installed within below grade meter pits, flood resiliency will be achieved by utilizing submersible water meters and ancillary devices. Although flood waters may temporarily impact signal transmission from remote read water metering equipment, the equipment will continue to operate, and record water usage, under a submerged condition.

2.3.6 Cultural / Historical Resources

The NYS Office of Parks, Recreation and Historic Preservation (OPRHP) GIS-based Cultural Resource Information System (CRIS) was reviewed for the presence of cultural and historic resources within the project area. There are select properties and building sites listed on the National Register in the Jay, Upper Jay, and AuSable Forks Water Districts. However, no impacts to cultural and/or historic resources are expected, as any work performed beyond the footprint of existing buildings (i.e., meter pits) will be performed on existing infrastructure, and within areas of previous disturbance.

2.3.7 Environmental Justice

Included in Appendix C is a map obtained from the NYSDEC website which indicates that the Town's water districts are not located within a potential environmental justice area. As such, no further actions or coordination with the NYSDEC is anticipated to be required.

3.0 WATER USAGE EVALUATION

3.1 HISTORICAL AND PROJECTED WATER USAGE

The combined average daily demand for the Town of Jay's three (3) water districts in 2023 was approximately 249,000± gallons per day (GPD). This also included water service to the Hamlet of Black Brook in Franklin County. As Black Brook has recently developed their own source of supply and is no longer purchasing water from the Town the water demands for the AuSable Forks water district are expected to decrease significantly. Excluding the water supplied to Black Brook, the combined average daily demand for the Town's three water districts in 2023 was approximately 196,418 GPD. Based on an estimated 639 total service connections within the three districts, this equates to 307 gallons per connection per day. This is slightly higher than the expected water usage per household indicating possible leakage in the distribution systems, excessive water usage by residents, and/or aged water fixtures in the respective households. A summary of the water usage from 2021 through 2023 is outlined by district in Tables 3.1 through 3.3. Monthly water usage data for 2023 is listed in Appendix D.

TABLE 3.1
JAY WATER DISTRICT WATER USAGE*[1]

Year	Average Daily Demand (gallons)	Maximum Daily Demand (gallons)	Total Annual Usage
2021	96,574	295,109	35,249,856
2022	113,456	222,586	41,276,772
2023	118,339	159,780	43,193,612

TABLE 3.2
UPPER JAY WATER DISTRICT WATER USAGE*[1]

Year	Average Daily Demand (gallons)	Maximum Daily Demand (gallons)	Total Annual Usage
2021	24,704	94,584	9,016,792
2022	21,422	41,067	7,818,616
2023	20,405	103,551	7,447,756

TABLE 3.3
AUSABLE FORKS WATER DISTRICT WATER USAGE*[2]

Year	Average Daily Demand (gallons)	Maximum Daily Demand (gallons)	Total Annual Production
2021	128,260	312,931	46,814,963
2022	132,403	222,380	48,326,983
2023	109,911	245,318	40,117,353

[1]The water usage values in Table 3.1 combined with those in Table 3.2 will equal the total water production from the Nugent Road well field.

[2]The water usage values in Table 3.3 for the AuSable Forks Water district include water supplied to the Hamlet of Black Brook in Franklin County. Excluding the water service to Black Brook for 2023 reduces the average daily demand for the AuSable Forks water district to 58,000± GPD and the total annual production to 21,000,000± gallons.

As the projected population growth for the next twenty (20) years reflects only a slight increase in the number of residents, it is expected that the average and maximum daily demands will only increase marginally in the three water districts Also, through the installation of the proposed metering program, the total system demand through each district is expected to decrease through improved flow monitoring, leak detection, water conservation, and proper billing based upon water usage.

4.0 EXISTING FACITILIES

4.1 WATER DISTRICTS

4.1.1 Jay Water District

The Jay Water District (PWSID NY 1500279), located in the west-central portion of the Town, supplies water to the residents of the Hamlet of Jay principally along NYS Route 9N and adjacent roadways. The district serves approximately 500 people through 265 service connections. The source of supply for the Jay Water District includes three (3) drilled wells located along Nugent Road within the Town. All existing wells are approximately 60-foot deep, screened, and gravel packed wells with artesian flow characteristics. Well No. 1, a 6-inch diameter well, has been taken out of service and abandoned. Well No. 2, also a 6-inch diameter well, is currently in service producing approximately 110 gallons per minute (GPM) via a 5 hp submersible pump. A new pitless unit was recently purchased for Well No. 2, however the pitless unit has not been installed, and the existing pitless adapter currently remains in use. Well No. 3, a 12-inch diameter well, currently produces approximately 360 GPM via a 15 hp submersible pump. Recent improvements to Well No. 3 include a new submersible pump and drop piping, as well as an upgraded electrical service. The existing wells are located adjacent to Rocky Branch, which is a tributary to the East Branch of the Ausable River.

Water flows from Well No. 2 and Well No. 3 to the Nugent Road Water Treatment Plant (WTP), located immediately adjacent to the well field, where it is treated with liquid sodium hypochlorite for disinfection. Following disinfection, the treated water flows to a 400,000-gallon concrete ground storage tank, located approximately 550-feet southeast from the WTP. The water level within the water storage tank is monitored at the WTP via an existing pressure transducer. From the water storage tank, treated water enters the Jay Water District distribution system through an 8-inch diameter transmission main.

A supervisory control and data acquisition (SCADA) system is currently utilized at the Nugent Road WTP to control and monitor the exiting well pumps, treatment systems, and water storage tank level. The existing SCADA system also communicates with the Valley Road pumping station (Upper Jay Water District) and Upper Jay water storage tank via licensed two-way radio communications. The Valley Road pumping station communicates directly with the Nugent Road WTP, whereas the Upper Jay water storage tank transmits signals to the Nugent Road WTP by way of the Valley Road pump station, which acts as a repeater. The Nugent Road WTP SCADA system is comprised of a main control panel, which includes a programmable logic controller (PLC), a desktop PC workstation, and chart recorders used to record water storage tank levels.

The Jay Water District also includes a small booster pump station, located along NYS Route 86 just west of NYS Route 9N, that serves approximately 30 residences. The NYS Route 86 pump station consists of a below-grade concrete vault housing two (2) 7.5 hp multistage vertical centrifugal Grundfos pumps with across-the-line motor starters. Six (6) 50-gallon hydropneumatic tanks are also installed within the NYS Route 86 pump station to maintain consistent pressure to downstream residents in between pumping cycles. The booster pumps are called to run based on the pressure within the hydropneumatic

tanks, as indicated by an existing pump discharge pressure sensor/switch. The booster pump station is not currently equipped with a permanent emergency standby generator and no means for communication with the Nugent Road WTP are currently in place.

No water meters were previously installed in the Jay Water District to record residential and commercial water use throughout the distribution system.

4.1.2 Upper Jay Water District

The Upper Jay Water District (PWSID NY 1500294) purchases water from the Jay Water District and serves approximately 234 people through 135 services connections. Water flows to the Upper Jay Water District through a booster pump station located on Valley Road, adjacent to Ward Lumber. The Valley Road pump station consists of two (2) 15 hp multistage vertical centrifugal Grundfos pumps equipped with variable frequency drives. Control of the Valley Road booster pumps is achieved via an existing local control panel and PLC. Operation of the Valley Road pump station is monitored at the Nugent Road WTP via two-way radio communication. Flow through the Valley Road pump station is monitored via an existing 3-inch "turbine style" flow meter installed upstream of the booster pumps. An emergency standby generator is also installed at the Valley Road pump station.

From the Valley Road pump station, water flows to a 330,000-gallon concrete ground storage tank located off Upper Jay – Trumbull Corners Road. A chlorine booster station is installed immediately adjacent to the water storage tank; however, the chlorine booster station is currently not in use. Flow through the water storage tank is monitored using an 8-inch magnetic flow meter, and water level within the water storage tank is monitored using a pressure transducer. Both the flow meter and pressure transducer are located within the chlorine booster station and communicate to the Nugent Road WTP using two-way radio communication. The chlorine booster station is not currently equipped with a permanent emergency standby generator.

No water meters were previously installed in the Upper Jay Water District to record residential and commercial water use within the distribution system.

4.1.3 AuSable Forks Water District

The AuSable Forks Water District (PWSID NY1516260) serves approximately 900 people through approximately 235 service connections. The source of supply for the AuSable Forks Water District includes two (2) drilled wells located along Grove Road within the Town of Jay. The existing wells are 12-inch diameter wells each approximately 160-feet deep. Each well is equipped with a submersible pump rated at 300 GPM. A Water Withdrawal Permit was issued to the Town of Jay in August 2023 by the NYSDEC which increased the maximum permitted daily withdrawal from the Grove Street well field to 648,000 GPD.

From the wells, water flows to the Grove Road WTP, located immediately adjacent to the well field, where it is treated with liquid sodium hypochlorite for disinfection. Following disinfection, the treated water flows directly to the distribution system. A 360,000-gallon steel ground storage tank, located southwest of the well field along Rolling Mill Hill Road, is connected directly to the distribution system downstream of the Grove Road WTP.

Water meters were previously installed at some residences within the AuSable Forks Water District; however, these are aged, leaking, and in many cases non-functioning.

4.2 PERMIT CONDITIONS

To ensure proper protection of New York State's water resources, the NYSDEC requires, and issues, water withdrawal permits for any system withdrawing greater than 100,000 GPD from all water sources. Given the capacity of the Town's existing well supplies and the anticipated system demand, the NYSDEC has established maximum withdrawal permit limits of 432,000 GPD from the Nugent Road Well Field that supplies the Jay and Upper Jay Water Districts and 648,000 GPD from the Grove Road Well Field that supplies the AuSable Forks Water District. As these permit limits greatly exceed the existing and projected system demands, the Town is in compliance with the permit requirements relative to source capacity.

As part of the Water Withdrawal Permit, the Town is required to file an annual water withdrawal report for submission to the NYSDEC. Information to be provided includes data on the location and capacity of the source, amount of water withdrawn for the calendar year, including average and peak withdrawals, and water conservation and efficiency measures undertaken during the reporting period. The Town is also required under the current permit issued by the NYSDEC in August 2023 to establish and implement a water meter program to improve water conservation and reduce usage.

4.3 CAPACITY DEVELOPMENT

Included in Appendix E is the Town's Capacity Development Program Evaluation Form. This form has been completed to demonstrate the Town's technical, managerial, and financial capabilities to provide safe drinking water to the Jay, Upper Jay, and AuSable Forks Water Districts, and to allow the Town to be eligible for funding assistance through the NYS Drinking Water State Revolving Fund.

5.0 ALTERNATIVE ANALYSIS

This section presents alternatives for providing water meters and a meter reading system for the Jay, Upper Jay, and AuSable Forks Water Districts. The technically feasible alternatives outlined herein adhere to the latest version of the Recommended Standards for Water Works. The following alternatives were investigated:

- Alternative No. 1 - No Action
- Alternative No. 2 - Technically Feasible Alternatives
  - Automated Meter Reading (AMR) System
  - Advanced Metering Infrastructure (AMI) System

Detailed cost estimates deriving the opinion of probable project cost associated with each alternative are included in Appendix F and include the following factors:

- Construction Costs
  - Escalation to Construction Start (yr 2026): 6%
  - General Conditions: 10%
  - Contractor Overhead & Profit: 15%
  - Design Contingency: 20%
- Non-Construction Costs
  - Legal, Administration, Engineering: 15%

Included in Appendix G are life cycle costs associated with each alternative and are based on the following:

- Life Cycle Period: 25-years (assumed loan period for project financing)

- Inflation Rate: 3% (for deriving future maintenance costs)
- Utility Escalation Rate: 1% (for deriving future electrical costs)
- Interest Rate: 3.5% (for deriving present value)

The short-lived assets for each alternative, including rehabilitation and/or replacement costs, are included under the maintenance breakdown in the life cycle costs. Annual operational and maintenance (O&M) costs presented for each alternative are derived by dividing the total present value of future O&M costs by the life cycle period of 25-years.

5.1 ALTERNATIVE NO. 1 – NO ACTION

Under the no action alternative**,** no changes will be made to the Town's three (3) water districts and no water metering system will be installed. Taking no action will result in a continued over usage of water throughout the system, leading to overuse of the well pumps and treatment facilities. Without a metering system in place, proper billing for water usage cannot be provided. In addition, the no action alternative does not provide compliance with the requirements of the Town's current Water Withdrawal Permit. Accordingly, this alternative is not recommended and will not be investigated further.

5.2 ALTERNATIVE NO. 2 – TECHNICALLY FEASIBLE ALTERNATIVES

5.2.1 Automated Meter Reading (AMR) System

This alternative includes the installation of an automated meter reading (AMR) system. An AMR system utilizes communication technology to automatically collect water usage and status data from individual water meters located in residential units and commercial establishments. With AMR systems, data can be collected by utility personnel either walking or driving by buildings equipped with metering devices. An endpoint is connected to each meter's encoder register. The endpoint collects and records the water usage and alarm data which is subsequently collected by utility personnel with a data receiver in proximity to the meter. After collection, the meter data is transferred to a database where the utility can monitor and analyze usage, troubleshoot issues, and accurately bill customers based on actual water usage.

Three (3) AMR systems were evaluated for the Town's consideration, including the Neptune AMR system, manufactured by the Neptune Technology Group; the SENSUS AMR Metering system manufactured by the Xylem Corporation; and the Badger AMR meter system. All are walk-by/drive-by systems with radio read software and equipment. Equipment brochures for each system are included in Appendix H and a summary of each system is provided as follows.

5.2.1.1 Neptune AMR Meter System

The Neptune system includes Neptune T-10 meters integrated with the Neptune E-Coder – R900i interface unit. The Neptune T-10 meters consist of three major assemblies: a copper alloy main case, nutating disc measuring chamber, and a data register. The integrated E-Coder – R900i is an encoder register/radio frequency interface unit that provides two-way communication of metering data. The E-coder can store up to 96-days of hourly consumption readings along with alerts for leakage or backflow. Included as part of the system is Neptune's R900 belt clip transceiver (R900 BCT). This is a mobile reading device carried by the operating personnel to collect and store data to be downloaded into Neptune's 360 software platform. The Neptune software platform is capable of interfacing directly with the Town's future billing software.

5.2.1.2 Sensus AMR Meter System

The Sensus system by Xylem includes the Sensus iPERL smart water meter. The meters use solid state magnetic technology for measuring usage as opposed to a mechanical measuring element (i.e., nutating disc). Magnetic metering technology provides enhanced accuracy at both low and high flows. The meter body is a composite alloy containing no metal material. Inside the meter body is an electronic register and a measuring device comprised of a composite alloy flow tube. The unit is battery-operated and has a 20-year accuracy warranty and 20-year battery life guarantee (15 years-full warranty, 5 years-limited warranty). The meter is also equipped with smart water alarms including leak detection and reverse flow. Each meter can store up to 120-days of consumption data. Each meter is interfaced with a Smart Point 510M module to transmit the collected data from each meter to a handheld device. The 510M module is a waterproof device that can be mounted either in a basement or on the outside of a building. The battery-operated module transmits meter readings, the meter identification number, and any alarms via radio signals.

An Archer3 handheld mobile data collector or an android tablet would be a required accessory for the Sensus system. This would permit operating personnel to walk or drive-by to collect information from the individual meter installations. The Sensus AMR Auto-read software provided with the system is compatible with any billing program that can produce and receive a Microsoft Excel CSV file. When connected to the billing computer, the handheld device will export all meter data directly into the billing software. The Sensus AMR system is also migratable, meaning it can initially be set up as an AMR walk-by or a drive-by system, and can be upgraded to a fixed base AMI system. All components would be usable with either an AMR or AMI system.

5.2.1.3 Badger AMR Meter System

The Badger AMR metering system consists of Badger's Recordall Disc Meter Model 25 and Badger RCDL25 HRE-LCD Encoder. This is a lead-free bronze meter with a polymer measuring chamber similar in operation to the Neptune T-10 meter, whereas opposed to an impeller, the unit employes a nutating disc for flow measurement. A drive magnet transmits the motion of the disc to a follower magnet connected to the register gear train that reduces the nutations into volume totalization units displayed on the register. The HRE-LCD encoder is a solid-state encoder with no moving parts that mounts directly to the meter and sends a signal through a wired connection to a Badger Orion ME endpoint. This Orion ME endpoint is a two-way water endpoint for mobile applications that transmits the meter readings at predetermined intervals to a mobile transceiver. The system includes a Badger Orion ME mobile receiver with a Dell Latitude 7220 tablet for highly mobile operations. The system is designed for use with Badger's Orion endpoint utility software and Beacon AMA mobile solutions. Similar to the Neptune and Sensus systems, the Badger AMA software is capable of interfacing directly with the Town's future billing software.

5.2.2 Advanced Metering Infrastructure (AMI) System

This alternative includes the installation of an advanced metering infrastructure (AMI) system. AMI systems provide an integrated system of water meters, communication networks, and data management systems that enables two-way communications between meter endpoints and a utility database. The AMI system automatically transmits data from the meters directly to the utility at predetermined intervals. Unlike the AMR system, utility personnel are not required to physically collect the data from the meters, resulting in a reduction in manpower requirements while improving overall efficiency. With an AMI system, meter data is transmitted via a fixed network. As with the AMR system, the collected data will enable the Town to monitor water usage and detect leakage, but as the system can report data

on a more frequent basis, the AMI system will provide greater accuracy in monitoring system operations and detecting potential malfunctions more effectively. Data from the meters is transmitted either by radio signal or through the existing cellular network to the facility base station.

Four (4) AMI systems were evaluated for the Town's consideration, including the Zenner metering system manufactured by Zenner USA; the SENSUS Metering system manufactured by the Xylem Corporation; the Badger metering system; and an AMI system by the Neptune Technology Group. These four (4) systems all collect and transmit meter readings via radio signals or through cellular communication. Equipment brochures for each system are included in Appendix H and a summary of each system is provided as follows.

5.2.2.1 Zenner AMI Meter System

The Zenner meter system by Zenner USA is a complete AMI meter reading package that transmits meter readings and alarm data to a fixed base station (Data Collection Units – DCU's) via radio signals. Included with the system are Zenner bronze multi-jet meters with Zenner Stealth transmitters. In operation, water flows into a measuring chamber which drives an impeller. A drive magnet transmits the motion of the impeller to a driven magnet connected to a gear train that translates the impeller's rotation to the meters digital display. Connected to each meter is a Zenner Stealth Reader Meter Interface Unit (MIU). The MIU's can store up to one year of hourly meter readings. Data collected from the MIU's is then transmitted to the DCU's across a mesh network. Once on the network, all MIU's work together passing either their own information or the information from neighboring MIU's to the network, assuring that all MIU's will remain on the network. Due to the Town's varying topography and rural population densities, standalone repeater sites will be required at various locations throughout the system to bridge communication gaps and ensure reliable data transmission between MIU's is maintained.

The Zenner Stealth DCU's are each capable of managing and connecting hundreds of MIU's to the Town's monitoring and control computer system. The Zenner Stealth DCU would be located at either or both the Town Hall or WTP. Data from the DCU's would then be sent by ethernet connection to the Zenner Stealth server. Within the Stealth Server, the data is saved to the database and is accessible via the System Manager and Stealth Reader Web. Both the Stealth Reader Network and the Stealth Reader Web Application can then access the database and provides visibility and functionality to the utility user. The Stealth Reader Web, which is the software component of the system, is the main web application for billing, meter readings, and reporting.

5.2.2.2 Neptune AMI Meter System

Similar to the Neptune AMR system, this system would utilize Neptune T-10 Meters. Each meter would then be hardwired to a Neptune First Net Cellular Endpoint. The cellular endpoint is a meter interface unit that utilizes a cellular network to transmit data to a software data management platform. The management software will store the collected meter readings and associated data and assist with analysis of the collected information. With this system, the cellular endpoint would securely transmit meter reading data using Verizon's FirstNet cellular network. This eliminates the cost of installing and maintaining AMI mesh infrastructure. The Neptune cellular endpoint and Neptune 360 software can provide the Town with a means to monitor meter activity in real time, and at a specific location within the system. In addition to meter readings, this includes information such as leak detection, reverse flow, continuous flow, etc. The Neptune 360 Data Management /platform is a cloud-based solution easily accessible via an internet web browser. The system will allow Town personnel to fully manage metering processes and interface directly with the Town's future billing software.

5.2.2.3 Sensus FlexNet AMI Meter System

The Sensus AMI system utilizes the same iPERL smart water meters and Smart Point 510M modules as provided with the Sensus AMR system. As opposed to utilizing a handheld device to drive by and collect data from each individual meter, the data is transmitted to a Sensus FlexNet M400 B2 fixed base station that will store and transmit the meter readings to the Town Hall or WTP for billing purposes.

Unlike a mesh system, each Meter-Smart Point module installation will send an independent radio signal to an antenna connected directly to the M400 B2 base station. The radio signals from each meter installation are transmitted over a primary-use licensed 900 MHZ two-way radio frequency. This avoids competition with other wireless systems and interference from other radio devices. Data collected at the fixed base station can then be sent by cellular transmission or ethernet to a receiving computer at the Town Hall or WTP for billing. However, if an antenna can be installed at the Town Hall sufficiently high to receive the radio signals from the individual endpoints, cellular transmission from the base station to the receiving computer would not be required. From the receiving computer, meter consumption data can then be extracted and exported to the Town's future billing software.

5.2.2.4 Badger AMI Meter System

The Badger AMI Meter system utilizes the same meters and encoders as the Badger AMR system, Badger's Recordall Disc Meter Model 25 and RCDL25 HRE-LCD Encoder. However, with the AMI system, a different endpoint unit is utilized, the Badger LTE-M/Orion Cellular endpoint. Each meter installation would be equipped with an Orion Cellular C Endpoint. The Cellular C endpoint communicates directly with the encoder and captures 15-minute interval meter read data and status information. The endpoint then automatically broadcasts this information via the cellular network to Badger's Beacon Advanced Metering Analytics (AMA) software. This is a cloud-based application accessed through a standard web browser. The AMA software is capable of interfacing directly with the Town's future billing software.

6.0 COMPARISON OF ALTERNATIVE METERING SYSTEMS

Table 6.1 provides a comparison of the AMI meter reading systems presented in Section 5, including the advantages, disadvantages, system capital cost, annual fees, and life cycle costs. No action alternatives are not included in the comparison table as the justification is discussed in Section 5.

TABLE 6.1
COMPARISON OF WATER METER SYSTEMS

System	Advantages	Disadvantages	Cost
Zenner AMI Meter System (Mesh/Radio)	• The system is a fully two directional, self-forming mesh network with integrated database systems to provide billing, reporting, and network management. • Automatic and Continuous Data Collection - Information is collected continuously and water	• Multiple repeaters are required to direct the meter signals to the data collectors. More infrastructure to maintain. • Radio transmission from the meter interface units to	• Capital Cost: $2,164,600 • Annual Fees: $4,600 • Life Cycle Cost: $2,285,000

	use can be provided to customers, as requested. • Radio transmission of meter signals to data collectors. Collected information sent from the data collectors via radio transmission to a receiving computer at the Town Hall or WTP • Additional meters will automatically integrate into the network. With the mesh system, each meter enhances the network by acting as a repeater. • Local Consideration – Nearby towns, Willsboro and Wilmington, NY, are currently using this meter system and could be a resource for trouble shooting or replacement parts.	the data collectors is on an unlicensed frequency band. Possible interference from other devices. • Battery operated mesh network	
Neptune AMI Meter System (Cellular)	• No AMI fixed network infrastructure required. Each endpoint communicates directly, through Verizon's FirstNet cellular network, with the Neptune 360 management platform software at the Town Hall or WTP. • Full two-way communication • Repeaters are not required. Less infrastructure to install and maintain.	• System relies totally on the existing cellular network • Battery operated endpoint units • The annual fee is greater than the other water meter systems	• Capital Cost: $2,194,900 • Annual Fees: $9,770 • Life Cycle Cost: $2,440,000
Badger AMI Meter System (Cellular)	• Automatic Data Collection – Information is collected automatically. The Badger Orion endpoint unit collects meter readings at 15 minute intervals. • The Orion endpoint units transmit data through the existing cellular network. Repeaters are not required. Less infrastructure to install and maintain. • Each meter endpoint unit communicates directly with Badger BEACON advanced metering analytics software at the base station	• System relies totally on the existing cellular network • Battery operated endpoint units	• Capital Cost: $2,342,500 • Annual Fees: $6,750 • Life Cycle Cost: $2,523,000

	• Full two-way communication		
Sensus AMI Meter System (Radio)	• System uses long-range radio network to transmit data collected from each individual meter directly to a fixed base station. No repeaters required – less infrastructure to install and maintain. • Each meter will communicate readings to a radio transmitter once per hour. Every four hours, the radio will send readings to the fixed base station. • iPERL Smart Water meters – no moving parts. Twenty-year accuracy warranty and twenty-year battery life guarantee. • Licensed radio spectrum avoids interference with other radio devices. • Base stations communicate directly to the Town hall or WTP via cellular or ethernet connection. Full two-way communication with meters	• Base station with antenna must be installed at high point in the system. • Multiple fixed base stations may be required. • Battery operated meters and radio transmitters. • Still required to use handheld equipment for activation and troubleshooting. • Cellular or ethernet connection required to transmit data from base station to Town Hall or WTP. • Licensed radio frequency required.	• Capital Cost: $2,438,200 • Annual Fees: $6,000 • Life Cycle Cost: $2,596,000

Two (2) alternative metering technologies were evaluated, the Automated Meter Reading (AMR) system and the Advanced Metering Infrastructure (AMI) System. However, given the limited resources of the Town's Water Department, an AMI system is better suited for the Town. With AMR systems, data is collected by utility personnel either walking or driving by buildings equipped with metering devices. With an AMI system, meter readings and collected information is communicated automatically on an hourly basis, or at predetermined intervals, to a fixed base station for analysis and review. Unlike the AMR system, AMI systems do not require utility personnel to personally collect data from the meters, resulting in a reduction in manpower requirements and improving overall efficiency. Further, the AMI system will provide two-way communication, continually monitoring data that will assist in improving system efficiency and detecting leakage and excessive usage. Data from an AMR system is recorded on an infrequent basis, only when the operator periodically collects data for billing. With an AMR system, leakage and excessive usage may go unnoticed for an extended period. Accordingly, AMI systems are considered better suited for the Town's metering system and are the recommended metering technology.

7.0 COMPARISON OF BILLING SOFTWARE SYSTEMS

Each of the meter systems evaluated has a data management platform that stores and provides access to the meter readings and associated collected data. The software enables the operator to review and analyze the collected information and provides an interface to export billing information to the Town or

utility's billing software. Two (2) alternative municipal software programs were reviewed for water billing. The two programs, provided by Williamson Law Book Company (Williamson) and gWorks, Inc. offer comprehensive software programs that will not only interface with the auto read meter systems for billing, but will also provide for general accounting, budget preparation, and payroll services. Williamson is located in New York and has successfully installed over 2,200 software programs throughout the state. Williamson offers a NYS specific municipal software program, designed to be in full compliance with NYS rules and regulations as prescribed by the Comptroller's office.

The gWorks Enterprise and Core software programs offer similar functions to the Williamson software, and can also assist with work orders and job costing. The Pubworks software program currently used by the Town's Highway Department is owned by gWorks, Inc. and will be fully integrated into their municipal software suite later this year. A cost comparison of the gWorks and Williamson software platforms is provided below:

- gWorks Enterprise and Core Software
  - Installation and Set-Up: $5,400
  - Annual Maintenance Fee: $5,000± / year
  - Total First Year Fee: $10,400
- Williamson Lawbook Co. Municipal Water/Sewer Billing Software
  - Installation and Set-Up: $10,800
  - Annual Maintenance Fee: $3,000 / year
  - Total First Year Fee: $13,800

8.0 RECOMMENDED ALTERNATIVES

8.1 BASIS OF SELECTION

Four (4) AMI systems were reviewed, the Zenner AMI Meter system, the Sensus FlexNet AMI system, the Badger AMI Meter system and the Neptune AMI Meter system. Of the four, only the Zenner system utilizes a mesh network. Meter readings with this system are transmitted via radio signals to repeaters and ultimately to a Zenner Stealth DCU. The DCU would be located in either or both the Town Hall or WTP. As the range of the radio signals from the MIUs is limited to between 1/4 to 1/2 miles, a series of repeaters are required to direct the signals to the data collector(s). Information would then be transmitted from the DCUs to the web based Zenner software via an ethernet connection.

The Sensus Meter AMI system utilizes long range radio signals, on a licensed radio spectrum, to transmit data to a fixed base station located within the water district. An antenna would be located at a highpoint, presumably a water tank, with the fixed base station positioned below. Meter readings and associated data collected at the fixed base station would then be sent, either by cellular transmission or ethernet, to a receiving computer at the Town Hall or WTP for analysis and billing. Given the terrain and the distance between the Town's three water districts, separate base stations may be required at each district. Each additional base station would increase the cost of the system by approximately $45,000.

The Badger and Neptune AMI systems rely completely on the community's cellular network to collect meter readings and convey the data to a fixed base station in either the Town Hall or the WTP.

The associated costs for the four systems range from $652,300±, for the Zenner AMI system, to $932,700± for the Sensus meter system.

After assessing the four (4) metering systems, it is recommended that the Town utilize the Zenner AMI meter system to serve the needs of the Town. As cellular communication is inconsistent within portions

of the Town, reliance on the transmission of meter readings and collected data over a cellular network may be ineffective. In support of the recommended alternative, Zenner USA has performed a desktop propagation study across the Town's three (3) water districts to simulate communications across the proposed mesh network. The results of the propagation study confirm that the Zenner AMI system is a feasible alternative for the Town, however, approximately twenty (20) standalone repeater sites will be required to ensure reliable communication between the individual metering sites. Although the Zenner AMI system will require additional infrastructure with the installation of radio repeaters and antennas, it will provide greater assurance and reliability in continually transmitting the recorded data. The associated capital costs for the Zenner system are also the lowest of the four (4) systems evaluated.

The recommended billing software for the Town is the gWorks Enterprise and Core Software program. Although annual maintenance fees are greater for gWorks than for the Williamson software platform, the Town has expressed interest in utilizing gWorks for billing purposes due to the anticipated seamless integration with the Town's Pubworks software program.

8.2 WATER METER INSTALLATION

The water meter and endpoint installation location will be dependent upon varying factors, including but not limited to, site constraints and seasonal vs. non-seasonal occupancies. To permit year-round unfettered access to the water meters by Town personnel, the preferred option is to install the water meters within below grade meter pits external to the building footprint. The use of meter pits will allow for routine maintenance and servicing of the water metering equipment without the need to enter the residence or commercial establishment. Under this scenario, a below grade meter pit will be installed immediately downstream of the existing curb valve. The meter pits will be provided with coiled flexible tubing to allow for the meter mounting platform to be raised and lowered. Under normal operation, the meter mounting platform will be lowered to a depth below the frost line for freeze protection. When routine maintenance or meter replacement is necessary, the meter mounting platform can be raised to provide easy access to the metering equipment and mounting hardware.

Although below grade meter pits are the preferred option for water meter installation, site features, such as paved areas, sidewalks, etc. are expected to prohibit the use of below grade meter pits. In these locations, primarily within downtown areas and commercial districts, the water meters will be installed within the respective building footprint. Based on a cursory review of potentially restrictive site features, approximately 80% of the meters are proposed to be installed in individual below grade meter pits with the remaining 20% requiring installation within the building footprint.

8.3 PROJECT COST

As summarized in Table 8-1, the opinion of probable project cost for the recommended improvements outlined in Sections 6 and 7 is $2,164,600 and will result in an increase in annual O&M costs of approximately $17,600. For reference, included in Appendix I is the Town's 2025 adopted water budget. A detailed breakdown of the opinion of probable costs, O&M costs, and life cycle costs are included in Appendices F and G.

Table 8-1 OPINION OF PROBABLE PROJECT COST	
RECOMMENDED IMPROVEMENTS	**TOTAL COST**
Zenner AMI Meter System	$2,164,600
gWorks Billing and Accounting software	$5,400
TOTAL PROJECT COST[1,2]	**$2,170,000**

[1]*Costs include capital costs and are in 2024 dollars. Costs for equipment and materials are subject to change based on market conditions.*
[2]*Estimated costs include all metering equipment, software, and installation. For installation costs, it is assumed 80% of the meters will be installed in pits with 20% installed within the building footprint.*

8.4 PROJECT SCHEDULE AND FINANCING

This Engineering Report will be submitted to the New York State Environmental Facilities Corporation (NYSEFC) along with a project listing form to be included in the 2025-26 Intended Use Plan (IUP) through the Drinking Water State Revolving Fund (DWSRF) program. The report will be submitted to the NYSEFC for the 2025 project listing. The project schedule for the design and construction of the recommended improvements will be dependent on securing funding for the project.

The Town also plans to pursue funding through the NYSEFC Green Innovation Grant Program (GIGP) for installation of water meters in unmetered areas. The installation of water meters is a water efficiency eligible practice under this program.

Appendix A \

Water District Maps

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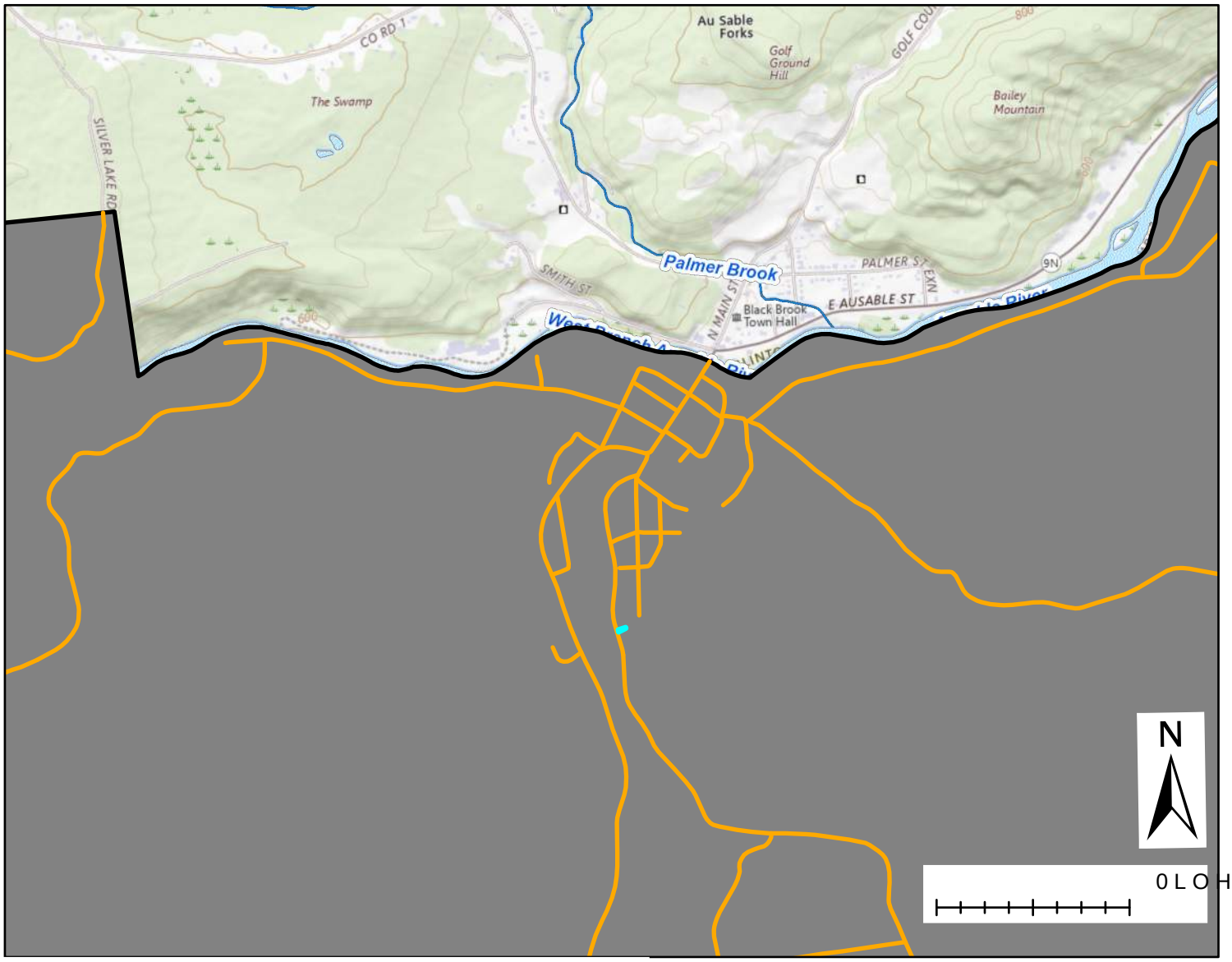

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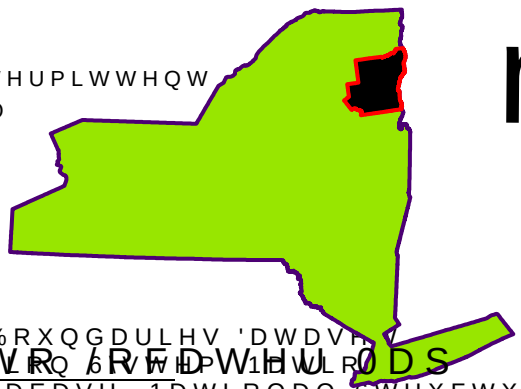

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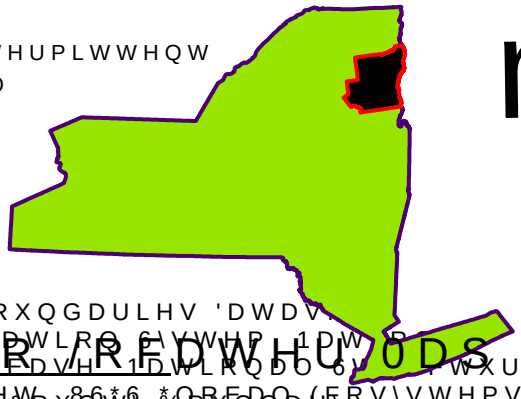

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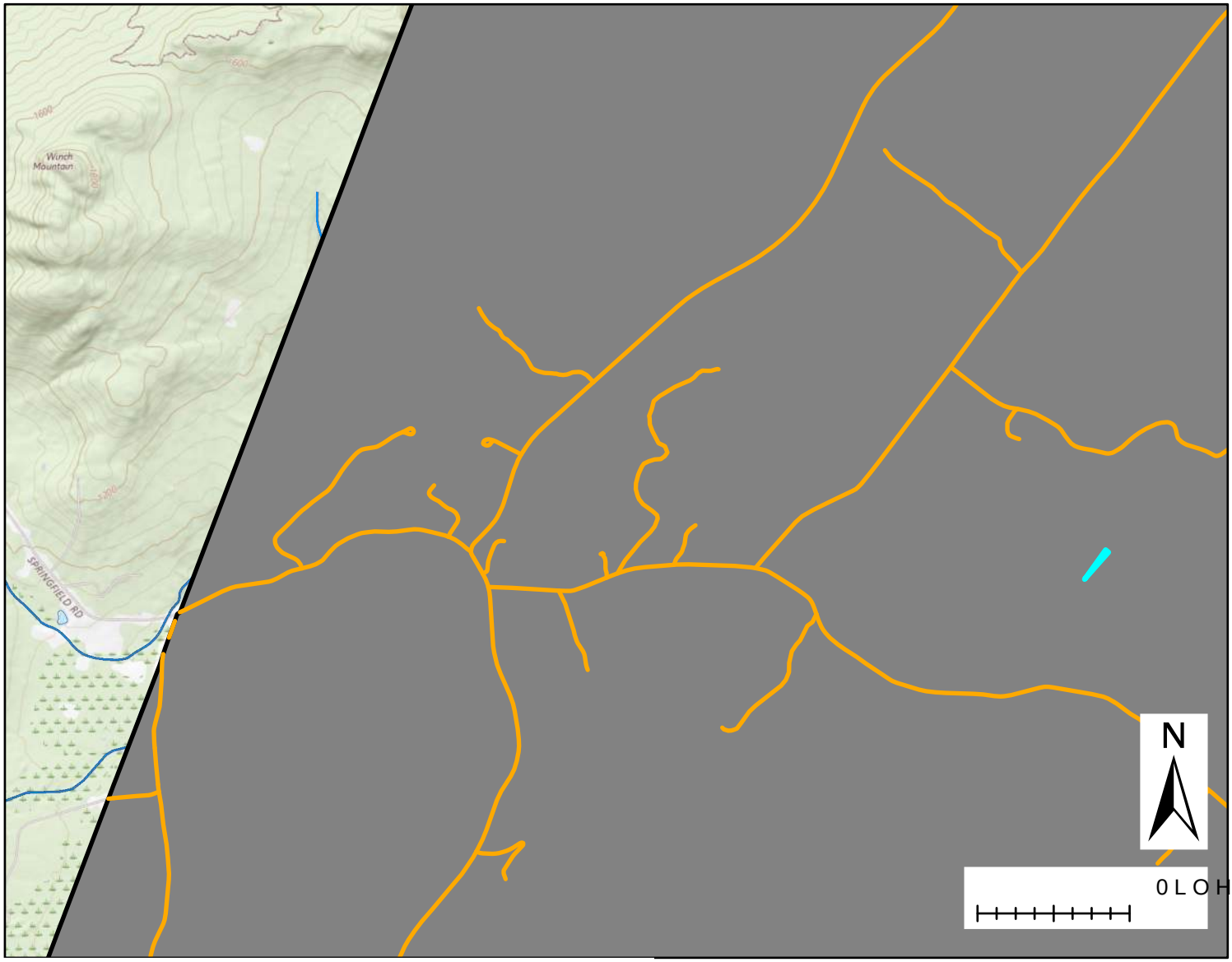

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Appendix B \

NYSDEC Water Withdrawal Permit

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 5
1115 State Route 86, PO Box 296, Ray Brook, NY 12977-0296
P: (518) 897-1234 | F: (518) 897-1394
www.dec.ny.gov

August 4, 2023

Sent Via Email Only

Matthew Stanley, Supervisor
Town of Jay
11 School St
AuSable Forks, NY 12912

Re: Town of Jay Consolidated Water District
DEC #5-1528-00124/00001
WWA # 12,514
Jay (T) Essex County

Dear Permittee:

The Water Withdrawal Permit for the Town of Jay is enclosed. Please read it carefully and note the conditions that are included. Withdrawals beyond the scope of the permit and the approved project plans may be considered a violation of the law and subject to appropriate enforcement action.

Also note that this permit does not eliminate the need to obtain any other federal, state or local permits or approvals that may be required for this project.

Should you have any questions regarding your obligations under the permit, please feel free to contact Michael Kuzia-Carmel in the Division of Water at (518) 402-7231.

Sincerely,

Erin M. Donhauser

Erin M. Donhauser
Deputy Regional Permit Administrator

ec: Derek Thorsland, DEC
Michael Kuzia-Carmel, DEC
Madisen Hetman, DEC
Aaron Love, DEC
Marlene Martin, DOH
Rob Wick, Essex County
Norman Coolidge
Brian Hahn, EFC

PERMIT
Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TOWN OF JAY
11 SCHOOL ST
PO BOX 730
AU SABLE FORKS, NY 12912-0730
(518) 647-2204

Facility:
Town of Jay Consolidated Water District
Grove Rd
Jay, NY

Facility Location: in JAY in ESSEX COUNTY
Facility Principal Reference Point: NYTM-E: 606.742 NYTM-N: 4921.976
Latitude: 44°26'35.6" Longitude: 73°39'31.0"

Authorized Activity: This permit authorizes the withdrawal of a supply of up to 1,080,000 gallons per day (GPD) from the approved sources listed in Condition No. 1 of this permit to serve within the approved service areas in Condition No. 2 of this permit. This permit modification approves the addition of wells 1-12 and 2-12 at the Grove Road Well Field as permanent sources of water supply for the Ausable Forks Water District. This permit consolidates and supersedes all previous permits for the Jay Water and Park District, the Upper Jay Water District, and the Ausable Forks Water District.

Permit Authorizations

Water Withdrawal Public - Under Article 15, Title 15
Permit ID 5-1528-00124/00001 (WWA No. 12,514)
New Permit Effective Date: 8/4/2023 Expiration Date: 8/3/2033

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: ERIN M DONHAUSER, Deputy Regional Permit Administrator
Address: NYSDEC Region 5 Headquarters
1115 NYS ROUTE 86
PO BOX 296
RAY BROOK, NY 12977 -0296

Authorized Signature: Erin M. Donhauser Date 08/04/23

Permit Components

WATER WITHDRAWAL PUBLIC PERMIT CONDITIONS

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

WATER WITHDRAWAL PUBLIC PERMIT CONDITIONS

1. Source Approval Table

This table summarizes all system source approvals				
Well Field or Source of Water Supply	**Status**	**Past WWA Number**	**Individual Source Capacities (GPM)**	**Maximum Permitted Well Field or Supply of Water (GPD)**
Grove Road Well Field	**Ausable Forks Water District**			
Well 1 (8-inch)	Active	7,155	175 gpm	252,000 gpd
Well 3 (8-inch)	Active	7,155	225 gpm	324,000 gpd
Well 1-12	Active	This Permit	450 gpm	648,000 gpd[1]
Well 2-12	Active	This Permit	450 gpm	
Total Approved (AuSable Forks Water District)				648,000 gpd
Nugent Road Well Field	**Jay Water and Park, Upper Jay Water Districts**			
Well # 2	Active	9,054	130 gpm	432,000 gpd
Well # 3	Active	10,432	225 gpm	
Total Approved (Jay Water and Park, Upper Jay Water Districts)				432,000 gpd
Total Approved				**1,080,000 gpd**

1. New Source wells Well 1-12 and Well 2-12 are not authorized for simultaneous use.

2. Map of Approved Water Supply Service Area The approved water service areas of the Jay, Upper Jay, and Ausable Forks Water Districts are shown on three maps submitted with this application entitled, Jay Water District Map, Upper Jay Water District Map, and Ausable Forks Water District Map, by Essex County on behalf of the Town of Jay and dated July 28, 2023.

3. No Distribution Beyond District Without Approval Nothing contained herein shall authorize the permittee to distribute water to any water district extension or out of district user that has not already been approved by the Department or its predecessors without first obtaining a further permit from the Department.

4. Approval of Plans by NYS DOH Contract plans and specifications, or changes thereto, for a public water supply system for which a permit has been issued by the Department are subject to review and approval by the Department of Health prior to the commencement of construction.

5. Approval of Completed Works from NYSDOH The water withdrawal permittee shall submit to the Department a copy of the Approval of Completed Works issued by the Department of Health before the commencement of final operation of the water withdrawal system.

6. NYSDOH Approval of Potable Water Supplies This permit does not authorize the permittee to supply, sell or distribute potable water from any source approved herein, without all necessary approvals from NYSDOH.

7. Water Sampled and Approved by NYSDOH Before any water from the source(s) approved herein may be used for any purpose, the permittee shall collect and analyze a sample of the water from each source and shall submit the results of such analyses to the NYS Department of Health (NYSDOH).

8. Protect Land Around Well All land within 200 feet of any well approved herein shall be protected and controlled, in order to prevent pollution of the ground or groundwater, by direct ownership of the land, by the acquisition of protective easements, or by other appropriate measures. Any lesser distances must be acceptable to the NYS Department of Health. This area shall further be protected from pollution by surface waters originating outside thereof by the construction of suitable diversion ditches or embankments, and the construction of the wells shall so be carried out that there shall be no opportunity for pollution to enter the wells.

9. Abandonment of Sources of Supply Approval of the following sources of supply, as granted previously by the Department or its predecessors, is hereby revoked:

1) Well 2 (8-inch) - initially authorized under WWA # 7,155.

All sources herein this condition shall be permanently disconnected from the permitee's system and decommissioned in a manner satisfactory to the New York State Department of Health. The sources so abandoned shall not again be used for public water supply purposes without a further permit from the Department.

10. Enclose and Protect Pumping Facilities The physical pumping facilities and controls at any well site approved herein shall be protected against damage or tampering either by a fence or other suitable enclosure or by their manner of construction and installation.

11. Diminished Private Drinking Water Wells The permittee shall make provisions to provide an adequate supply of water to those residents whose private drinking water wells are significantly diminished or rendered non-productive by the permittee's use of the sources of water supply approved by this permit.

12. Treatment Before Distribution Nothing contained in this permit shall authorize the permittee to supply, sell or distribute, for any purpose, water from any source approved herein unless all such water is first treated in a manner satisfactory to the NYS Department of Health (NYSDOH).

13. Discharge of Chlorinated Water The permittee shall ensure that water used for disinfecting water mains, storage tanks and other water system appurtenances, if discharged to area streams, has a free chlorine residual not exceeding 0.05 milligrams per liter (mg/l) at the point of discharge.

14. Meter All Sources and Customers The permittee must install and maintain meters on all sources of supply used in the system and on all customer service connections supplied by the system. Source master meters are to be read, and records kept of those readings on a weekly basis. At a minimum, customer service meters are to be read, and records kept of those readings, at least once per year. The permittee must maintain records of production (master meter readings) and consumption (service meter readings) for each calendar year.

15. Metering Compliance Schedule The permittee shall complete the following compliance schedule:

Schedule of Compliance

1) The Department has accepted the schedule for water meter installations on the service to the municipal water system customers in the Jay Water and Park District, the Ausable Forks Water District, and the Upper Jay Water District as provided in the attached letter from the Town of Jay dated May 18, 2023. Requests to modify the Schedule of Compliance shall be directed to the Regional Water Manager. This schedule and any subsequent approved modifications shall be considered an enforceable component of this permit.

2) Within 30 days of the completion of the schedule described in Item 1, the permittee shall provide documentation in the form of a letter that the meter installations were completed with the date of the completion to:

NYSDEC Region 5 Regional Permit Administrator
1115 Route 86
PO Box 296
Ray Brook, NY 12977

16. Meter Calibration for Publicly Owned Systems At least once every fifteen years, the permittee must have all of its small service connection meters (less than 1-inch in diameter) calibrated for accuracy according to standards of the American Water Works Association (AWWA). Larger service meters and all source meters must be calibrated more frequently, based upon the AWWA standards for the size of the meter used.

17. Conduct Water Audits At least once annually, the permittee must conduct a system-wide water audit that utilizes metered water production and consumption data to determine unaccounted-for water.

18. Leak Detection and Repair Program The permittee must develop and implement a leak detection and repair program that uses sonic detection equipment to inspect its entire distribution system in a systematic fashion. At a minimum, this program must cover the entire system in a three-year cycle by inspecting at least one-third of the system each year. Whenever two consecutive annual water audits show that unaccounted-for water is 15% or less of system production, the leak detection and repair program may be modified to cover the entire system in a longer cycle.

19. Annual Water Withdrawal Reports The permittee must submit a Water Withdrawal Reporting Form to the Department's Division of Water, Albany, NY by March 31st of each year. The form is available on the Department's website and includes information regarding approved sources of water supply, source capacities, average and maximum day water use data and water conservation and efficiencies employed during the past calendar year.

20. **Permittee Must Maintain Records** The permittee must retain records of production and consumption, reports of audit results, and summaries of leaks detected and repaired for at least ten years. The permittee must provide copies of such of these records, reports, and summaries as might be requested in writing by the Department within one month of receiving such a request.

21. **Agreements for Sale of Water** The permittee may not sell water to any other municipality or private entity without the execution of a proper agreement or contract that includes: the amounts of water to be sold, a requirement that individual customers are metered and that water conservation measures including water audits and leak detection and repair programs consistent with those practiced by the permittee will be implemented. Such agreements shall be made available to the Department upon request.

22. **Permit Expiration and Renewal** Any permittee who intends to continue to operate a water withdrawal system beyond the period of time covered in the applicable water withdrawal permit must apply for a renewal of the permit at least 30 days prior to its expiration.

23. **Transfer of Ownership of Water Withdrawal Systems** Unless otherwise specified in this permit, a new water withdrawal permit application is required for the acquisition or condemnation of the approved water withdrawal system.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. **Facility Inspection by The Department** The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. **Relationship of this Permit to Other Department Orders and Determinations** Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. **Applications For Permit Renewals, Modifications or Transfers** The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 5 Headquarters
1115 NYS ROUTE 86
PO BOX 296
RAY BROOK, NY 12977 -0296

4. **Permit Modifications, Suspensions and Revocations by the Department** The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

5. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee’s undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision

under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

Appendix C \

Environmental Justice Map

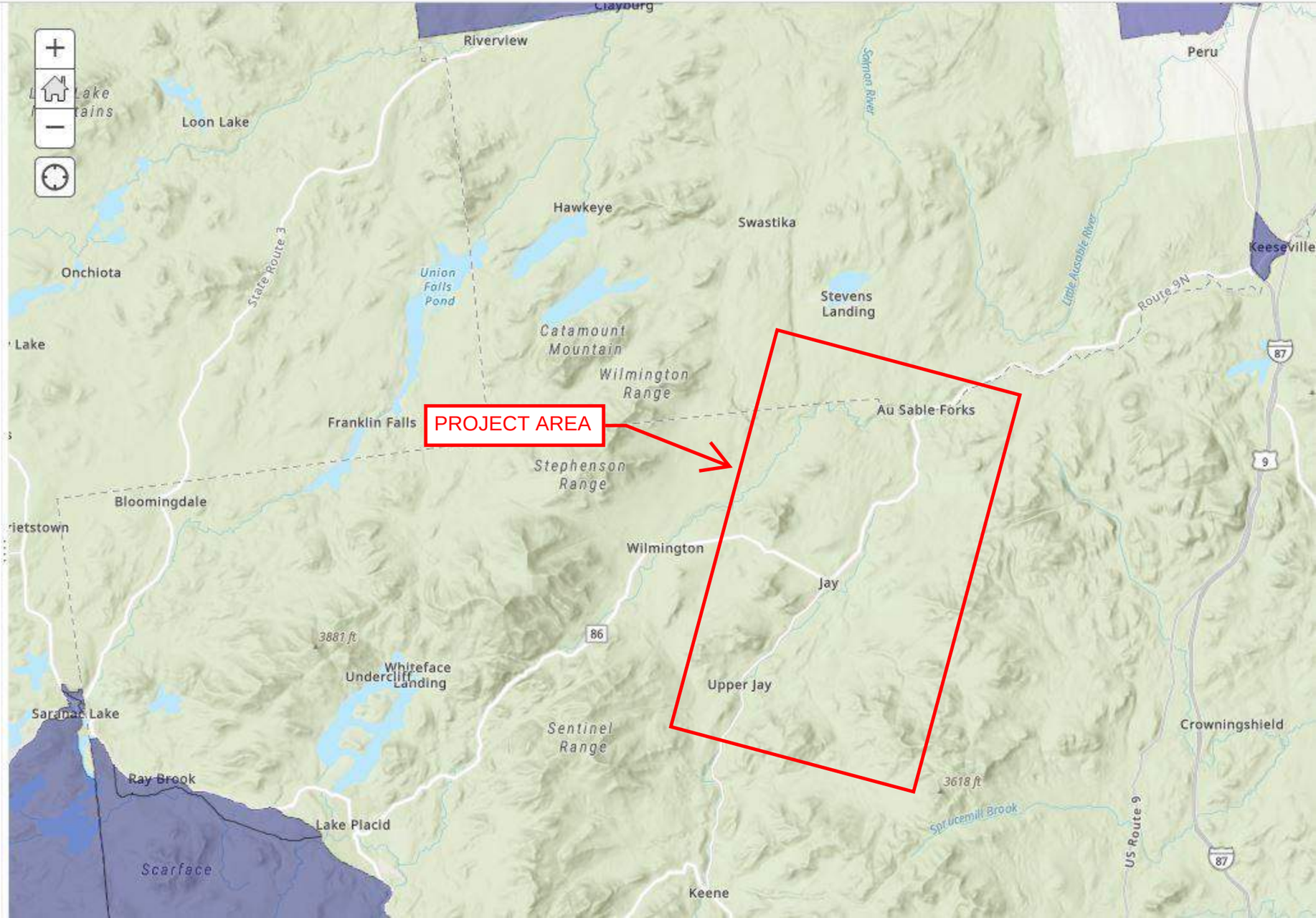
ArcGIS My Map

Details | Basemap | Print | Measure

About | Content | Legend

Legend

Potential_Environmental_Justice_Area__PEJA__Communities
- Potential Environmental Justice Area (PEJA) Communities



Appendix D \

Water Usage Data

2023 - WATER WITHDRAWAL DATA

(in 1,000's of gallons)

Month	**Nugent Road Wells** Jay & Upper Jay Water Districts	**AuSable Forks Wells** AuSable Forks Water District and Black Brook (T)
January	3,791	3,636
February	3,538	3,151
March	4,189	3,591
April	3,838	3,432
May	4,285	3,737
June	4,826	3,993
July	4,826	3,481
August	4,819	3,324
September	5,078	3,390
October	4,487	3,076
November	3,348	2,924
December	3,796	2,962
Average Daily Withdrawal	138.8	109.9
Maximum Daily Withdrawal	263.3	245.3
Daily NYSDEC Permitted Capacity	792	504

Note: Approximately 50% of the water withdrawn from the AuSable forks wells was directed to and purchased by the Town of Black Brook. Beginning in 2024, Black Brook installed an independent water system and is no longer purchasing water from the Town of Jay. Accordingly, the water demand from the AuSable Forks wells will decrease by approximately 50%.

Appendix E \

Capacity Development Evaluation Form

CAPACITY DEVELOPMENT PROGRAM

TECHNICAL, MANAGERIAL, AND FINANCIAL EVALUATION CRITERIA FOR: COMMUNITY PUBLIC WATER SYSTEMS

SYSTEM NAME: Au Sable Forks (1516260), Jay (1500279), Upper Jay (1500294)

COUNTY: Essex **PWSID #:** See above

COMPLETED BY: Paul Mintz **DATE:** 6/5/24

Technical Capacity

A. System Infrastructure

1. Does the system have as-built plans, drawings, or maps of its facilities including source, treatment, storage, and distribution?

   [x] Yes (mostly) [ ] No [ ] Not Applicable

   If the system lacks certain plans, please specify:
   Jay/Upper Jay missing plans for Glen Rd and Valley Rd.

2. Does the system have exact location measurements of all main valves and service shut-offs?

   [ ] Yes [x] No [ ] Not Applicable

3. Can the system's pumping, storage and distribution facilities meet current normal and peak demands and required distribution pressures?

   [x] Yes [ ] No [ ] Not Applicable

4. Does the system have a water conservation plan?

   [x] Yes [ ] No [ ] Not Applicable

5. Are all customers on the water system metered?

   [ ] Yes [x] No [ ] Not Applicable

6. Is the system equipped with "master" meters that measure the amount of water the system produces or purchases for each source of water?

   [x] Yes [ ] No [ ] Not Applicable

B. Source Water Evaluation

1. Does the system have a copy of its Source Water Assessment?

☐ Yes ☒ No ☐ Not Applicable

2. Has a yield analysis been done for the system's source?

☐ Yes ☐ No ☐ Not Applicable x - Unsure

3. Does the system have a description of the existing source-pumping capacity and the system's raw and finished water storage capacity?

☒ Yes ☐ No ☐ Not Applicable

4. For groundwater systems, does your system have a wellhead protection program in place?

☐ Yes ☒ No ☐ Not Applicable

C. Technical Knowledge

1. Has an evaluation of the water system facilities been conducted with respect to its ability to reliably meet current and proposed State and Federal drinking water regulations?

☒ Yes ☐ No ☐ Not Applicable

If system can't meet regulations, please specify:

_____

_____

2. Does the system have monthly water production records or treatment records that show daily and monthly water production for <u>each source</u> used by the system?

☒ Yes ☐ No ☐ Not Applicable

3. Has an evaluation been conducted to document the condition and remaining service life of existing facilities?

☐ Yes ☒ No ☐ Not Applicable

4. Has the system been cited within the past two years for failing to sample and report test results?

☐ Yes ☒ No ☐ Not Applicable

5. Has the system been cited within the past two years for operating deficiencies as a result of a sanitary survey or other inspection conducted by the DOH?

☒ Yes ☐ No ☐ Not Applicable

6. If you answered *"Yes"* to Questions 4 or 5, has corrective action been taken to correct all deficiencies?

☐ Yes ☒ No ☐ Not Applicable

D. Certified Operators

1. Does the water system have a certified water operator(s) and designated an operator in responsible charge?

☒ Yes ☐ No

2. If the water system does not have a state-certified water treatment operator, or lacks the necessary number of operators to safely and reliably operate the system, does the system have a plan to acquire the services of a (additional) state-certified operator?

☒ Yes ☐ No ☐ Not Applicable

Managerial Capacity

A. Staffing and Organization

1. What type of training/continuing education did system personnel attend within the last two years (please specify)?
NY Rural Water Assoc. Technical Conference, 2023.

2. Who is responsible for policy and operational decisions for the water system *(name and title)*?
Policy decisions: Town Board; Operational decisions: Paul Mintz, Superintendent

3. Who is responsible for ensuring compliance with state regulatory requirements *(name and title)*?
Paul Mintz, Superintendent

4. Who is responsible for approving expenditures *(name and title)*?
< $1500: Paul Mintz, Superintendent; >$1500, Town Board.

5. *For systems that contract for system operation or management*: Does the system have a valid (signed) contract that summarizes the duties and responsibilities the contractor must provide to the system?

☐ Yes ☐ No ☒ Not Applicable

B. Ownership

1. *If the system is under temporary ownership*, has a future owner been found for the water system?

   ☐ Yes ☐ No ☒ Not Applicable

   If *"Yes"*, who will the future owner be?

   _____

2. *For systems that use, but do not own, land or facilities that are essential to water system operation:* Is there a valid long-term contract (i.e., lease) between the water system and the owner of the land or facilities essential to the operation of the system?

   ☒ Yes ☐ No ☐ Not Applicable

3. *For systems with a single proprietor:* Does the system have a contingency plan for continuing system operation in the event the owner becomes incapable of carrying out his/her responsibilities?

   ☐ Yes ☐ No ☒ Not Applicable

C. Consolidation/Restructuring

1. Has the system examined the feasibility of:
   a) Incorporating with an existing water system in the immediate proximity?

   ☐ Yes ☒ No ☐ Not Applicable

   b) Selling ownership to an existing water system?

   ☐ Yes ☒ No ☐ Not Applicable

   c) Contracting for the management or operation of the system with an existing system or satellite management/operations agency?

   ☐ Yes ☒ No ☐ Not Applicable

D. Emergency/Disaster Response Plans

1. Has the system developed an Emergency Response Plan?

   ☒ Yes ☐ No ☐ Not Applicable

2. Does the Emergency Response Plan:

   a) Designate responsible personnel in the event of an emergency?

   ☒ Yes ☐ No ☐ Not Applicable

b) Provide for emergency phone and radio capabilities?

☐ Yes ☒ No ☐ Not Applicable

c) Describe public and health department notification procedures?

☒ Yes ☐ No ☐ Not Applicable

3. Does the system have any emergency contract agreements under which it operates (e.g., emergency water interconnections and alternative sources)?

☐ Yes ☒ No ☐ Not Applicable

E. Water System Policies

1. Does the system have a *written* System Operations Manual or Policy?

☒ Yes ☐ No ☐ Not Applicable

F. Record Keeping

1. Does the system keep water utility records including: financial, regulatory, facility, operations and maintenance, data quality, Annual Water Quality Reports, and correspondence with the NYS Department of Health and/or local Health Departments (and where appropriate, the NYSPSC)?

☒ Yes ☐ No ☐ Not Applicable

Financial Capacity

A. Budget Projection – Revenues and Expenses

1. Does the system have a water budget?

☒ Yes ☐ No ☐ Not Applicable

2. Are the system's annual water revenues sufficient to cover the annual water expenses as well as anticipated capital improvements?

☐ Yes ☒ No ☐ Not Applicable

3. Are the system's water rates, when combined with other revenue sources, sufficient to cover all listed expenditures for the water system?

☒ Yes ☐ No ☐ Not Applicable

4. Does the system retain budget information for at least two years?

[x] Yes [ ] No [ ] Not Applicable

B. Reserves

1. Does the system have a reserve account (or funds within a reserve account) dedicated to:

   a) Financing the emergency replacement of critical facilities in the event of their failure?

   [x] Yes [ ] No [ ] Not Applicable

   b) The maintenance of cash flow in the event of an unexpected funding shortfall?

   [x] Yes [ ] No [ ] Not Applicable

2. If the system has a reserve account, how does it determine the amount to put into the account?

   ____ Fixed Amount_____Percentage of Revenues_____Percentage of Expenses

   __x_Other (please specify) Varies by year

3. If the system has a reserve account, what type(s) of reserve account(s) does it have?

   _____Operation and Maintenance__x__Capital Projects_____Debt Service

   _____Other (please specify)_____

C. Capital Improvement Plan

1. How do you finance operation and maintenance costs (Check all that apply)?

   __x__Rates collected from ratepayers _____Rental fees
   _____Other business revenue _____Personal capital
   _____Surcharges _____Reserve account
   _____Other (Please specify) _____

2. How did you finance your LAST major repair or improvement?

   _____Commercial bank loan ____Bonds
   _____ DWSRF __x__Other State or federal loan/grant program
   _____Surcharge ____Personal Capital
   _____Reserve Account ____Revenue from other business
   _____Other (Please specify) _____

3. What options do you have for financing your NEXT major repair or improvement?

_____Commercial bank loan	__x__Bonds
_____DWSRF	__x__Other State or federal loan/grant program
_____Surcharge	____Personal Capital
__x__Reserve Account	____Revenue from other business

_____Other (Please specify) _____

D. Water System Rates

1. Does the water system management review user fee, user charge, or rate system at least once every two years?

☐ Yes ☒ No ☐ Not Applicable

2. What is the frequency of billing (e.g., 12, 6, or 4 times per/year)?__1__times/year

3. Where applicable, what are the system's water rates?
__$50 annual + tax rates ($1.72/$1000 ASF, $1.00/$1000 Jay, $2.93/$1000 Upper Jay

4. What are rates based on?

__x__Capital Improvement Plan and Annual Budget
_____Annual Budget Only
_____Cash on Hand
_____Last year's expenses
_____Not sure
_____Other (Please specify_____)

5. What was the date of the last rate increase? -
__Yearly, determined by budgetary needs_____

END OF DOCUMENT

Appendix B- Examples of Short-Lived Assets

Source Relates	Distribution System Related
Pumps Pump Controls Pump Motors Telemetry Intake/Well Screens Water Level Sensors Pressure Transducers	Residential and Small Commercial Meters Meter boxes Hydrants and Blow-offs Pressure Reducing Valves Cross Connection Control Devices Altitude Valves Alarms & Telemetry Vaults, Lids and Access Hatches Security Devices and Fencing Storage Reservoir Painting/Patching
Treatment Related Chemical Feed Pumps Altitude Valves Valve Actuators Water Level Sensors Pressure Transducers Air Compressor and Controls Pumps Pump Controls Pump Motors Chemical Feed Pumps Granular Filter Media Membranes Field & Process Instrumentation Equipment UV Lamps Back-up Power Generator Chemical Leak Detection Equipment Flow Meters SCADA Systems	

Appendix F \

Opinion of Probable Project Costs

Town of Jay
Meter System Evaluation

Opinion of Probable Cost
Badger AMI Meter System

Item		Estimated Cost
639 Meters, Encoders, and Endpoints	$	275,200
Training	$	3,400
Badger Beacon Engagement Fee and Billing integration	$	11,700
510 Meter Installations in Individual Meter Pits (80%)[1]	$	1,020,000
129 In-house Meter Installations (20%)[1]	$	38,700
SUBTOTAL	**$**	**1,349,000**
Escalation to Construction Start (6%)	$	80,900
General Conditions (10%)	$	134,900
Contractor Overhead & Profit (15%)	$	202,400
Design Contingency / Field Order Allowance (20%)	$	269,800
TOTAL CONSTRUCTION COST	**$**	**2,037,000**
Legal, Admin, Engineering (15%)	$	305,500
TOTAL PROJECT COST[2]	**$**	**2,342,500**

[1] *Assuming $2,000 for each meter and endpoint installation in individual meter pits and $300 for each in-house meter installation.*

[2] *Estimate is as of August 2024. Costs for equipment and materials are subject to change based on market conditions.*

Badger Recurring Annual Fees - $6,750

Town of Jay
Meter System Evaluation

Opinion of Probable Cost
Neptune AMI Meter System

Item		Estimated Cost
639 Meters with Cellular endpoints	$	198,500
One-time Set up and Training Fees	$	6,900
510 Meter Installations in Individual Meter Pits (80%)[1]	$	1,020,000
129 In-house Meter Installations (20%)[1]	$	38,700
SUBTOTAL	**$**	**1,264,100**
Escalation to Construction Start (6%)	$	75,800
General Conditions (10%)	$	126,400
Contractor Overhead & Profit (15%)	$	189,600
Design Contingency / Field Order Allowance (20%)	$	252,800
TOTAL CONSTRUCTION COST	**$**	**1.908,600**
Legal, Admin, Engineering (15%)	$	286,300
TOTAL PROJECT COST[2]	**$**	**2,194,900**

[1] Assuming $2,000 for each meter and endpoint installation in individual meter pits and $300 for each in-house meter installation.

[2] Estimate is as of August 2024. Costs for equipment and materials are subject to change based on market conditions.

Neptune Recurring Annual Fees based - $9,770

Town of Jay
Meter System Evaluation

Opinion of Probable Cost
Sensus AMI Meter System

Item		Estimated Cost
639 iPerl Meters and Endpoints	$	229,250
M400B2 Base Station	$	92,200
One-time Set up and Training Fees	$	19,200
Ancillary System Equipment	$	4,800
510 Meter Installations in Individual Meter Pits (80%)[1]	$	1,020,000
129 In-house Meter Installations (20%)[1]	$	38,700
SUBTOTAL	**$**	**1,404,150**
Escalation to Construction Start (6%)	$	84,250
General Conditions (10%)	$	140,400
Contractor Overhead & Profit (15%)	$	210,600
Design Contingency / Field Order Allowance (20%)	$	280,800
TOTAL CONSTRUCTUON COST	**$**	**2,120,200**
Legal, Admin, Engineering (15%)	$	318,000
TOTAL PROJECT COST[2]	**$**	**2,438,200**

[1] Assuming $2,000 for each meter and endpoint installation in individual meter pits and $300 for each in-house meter installation.

[2] Estimate is as of August 2024. Costs for equipment and materials are subject to change based on market conditions.

Sensus Recurring Annual Fees - $ 6,000

Town of Jay
Meter System Evaluation

Opinion of Probable Cost
Zenner AMI Meter System

Item		Estimated Cost
639 Meters with Encoders	$	137,400
Repeaters and Collectors	$	22,750
One-time Set up and Training Fees	$	14,500
Ancillary System Equipment	$	9,300
510 Meter Installations in Individual Meter Pits (80%)[1]	$	1,020,000
129 In-house Meter Installations (20%)[1]	$	38,700
SUBTOTAL	**$**	**1,246,650**
Escalation to Construction Start (6%)	$	74,500
General Conditions (10%)	$	124,700
Contractor Overhead & Profit (15%)	$	187,050
Design Contingency / Field Order Allowance (20%)	$	249,400
TOTAL CONSTRUCTION COST	**$**	**1,882,300**
Legal, Admin, Engineering (15%)	$	282,300
TOTAL PROJECT COST[2]	**$**	**2,164,600**

[1] Assuming $2,000 for each meter and endpoint installation in individual meter pits and $300 for each in-house meter installation.

[2] Estimate is as of August 2024. Costs for equipment and materials are subject to change based on market conditions.

Zenner Recurring Annual Fees - $4,600

Appendix G \

Life Cycle Costs

BADGER AMI METERING SYSTEM
LIFE CYCLE COST

Initial Expenses - Construction	Qty	Unit	Unit Cost	Total Cost	Present Value
Badger AMI Project Cost	1	LS	$2,342,500	$2,342,500	**$2,342,500**

Future Maintenance Expenses (Non-Annually Recurring Costs)

Equipment	Current Base Cost	# of Years to Occurrence	Inflation Rate	Future Cost [1]	Interest Rate	Present Value [2]
Yr 5 - Replace ten (10) meter assemblies (2 per year)	$4,300	5.00	3.0%	$4,985	3.5%	$4,197
Yr 10 - Replace ten (10) meter assemblies (2 per year)	$4,300	10.00	3.0%	$5,779	3.5%	$4,097
Yr 15 - Replace ten (10) meter assemblies (2 per year)	$4,300	15.00	3.0%	$6,699	3.5%	$3,999
Yr 20 - Replace ten (10) meter assemblies (2 per year)	$4,300	20.00	3.0%	$7,766	3.5%	$3,903
Yr 25 - Replace ten (10) meter assemblies (2 per year)	$4,300	25.00	3.0%	$9,003	3.5%	$3,810
Subtotal - Future Maintenance Costs				$34,233		**$20,005**
					SAY	**$21,000**

Future Operational Costs	Qty	Unit	Current Unit Cost	Current Base Cost	UPV[3]	Present Value
Recurring Annual Fees (software and support)	1	Yr	$6,750.00	$6,750	23.49	$158,551
					SAY	**$159,000**

Total Costs	Present Value
Initial Expense	$2,342,500
Future Maintenance Costs	$21,000
Future Operational Costs	$159,000
Total Life Cycle Cost	**$2,523,000**

Notes

[1] Future Cost = Current Base Cost x $(1+i)^n$ Where; i = inflation rate, n = number of years to occurrence

[2] Present Value = Future Cost x $[1 / (1+d)^n]$ Where; d = interest rate, n = number of years to occurrence

[3] Uniform Present Value (UPV) for determining present value of annual recurring maintenance costs over a 30 year period derived as follows:

$$UPV = \left(\frac{1+e}{d-e}\right)\left[1-\left(\frac{1+e}{1+d}\right)^{N}\right]$$

Where;
e = escalation rate (@ 3%)
d = interest rate (@ 3.5%)
N = number of time periods for annual occurrence (25 years)

NEPTUNE AMI METERING SYSTEM
LIFE CYCLE COST

Initial Expenses - Construction	Qty	Unit	Unit Cost	Total Cost	Present Value
Neptune AMI Project Cost	1	LS	$2,194,900	$2,194,900	**$2,194,900**

Future Maintenance Expenses (Non-Annually Recurring Costs)

Equipment	Current Base Cost	# of Years to Occurrence	Inflation Rate	Future Cost [1]	Interest Rate	Present Value [2]
Yr 5 - Replace ten (10) meter assemblies (2 per year)	$3,100	5.00	3.0%	$3,594	3.5%	$3,026
Yr 10 - Replace ten (10) meter assemblies (2 per year)	$3,100	10.00	3.0%	$4,166	3.5%	$2,953
Yr 15 - Replace ten (10) meter assemblies (2 per year)	$3,100	15.00	3.0%	$4,830	3.5%	$2,883
Yr 20 - Replace ten (10) meter assemblies (2 per year)	$3,100	20.00	3.0%	$5,599	3.5%	$2,814
Yr 25 - Replace ten (10) meter assemblies (2 per year)	$3,100	25.00	3.0%	$6,491	3.5%	$2,747
Subtotal - Future Maintenance Costs				$24,679		**$14,422**
					SAY	**$15,000**

Future Operational Costs	Qty	Unit	Current Unit Cost	Current Base Cost	UPV[3]	Present Value
Recurring Annual Fees (software and support)	1	Yr	$9,770.00	$9,770	23.49	$229,487
					SAY	**$230,000**

Total Costs	Present Value
Initial Expense	$2,194,900
Future Maintenance Costs	$15,000
Future Operational Costs	$230,000
Total Life Cycle Cost	**$2,440,000**

Notes

[1] Future Cost = Current Base Cost x $(1+i)^n$ Where; i = inflation rate, n = number of years to occurrence

[2] Present Value = Future Cost x $[1 / (1+d)^n]$ Where; d = interest rate, n = number of years to occurrence

[3] Uniform Present Value (UPV) for determining present value of annual recurring maintenance costs over a 30 year period derived as follows:

$$UPV = \left(\frac{1+e}{d-e}\right)\left[1-\left(\frac{1+e}{1+d}\right)^{N}\right]$$

Where;
e = escalation rate (@ 3%)
d = interest rate (@ 3.5%)
N = number of time periods for annual occurrence (25 years)

SENSUS AMI METERING SYSTEM
LIFE CYCLE COST

Initial Expenses - Construction	Qty	Unit	Unit Cost	Total Cost	Present Value
Sensus AMI Project Cost	1	LS	$2,438,200	$2,438,200	**$2,438,200**

Future Maintenance Expenses (Non-Annually Recurring Costs)

Equipment	Current Base Cost	# of Years to Occurrence	Inflation Rate	Future Cost [1]	Interest Rate	Present Value [2]
Yr 5 - Replace ten (10) meter assemblies (2 per year)	$3,600	5.00	3.0%	$4,173	3.5%	$3,514
Yr 10 - Replace ten (10) meter assemblies (2 per year)	$3,600	10.00	3.0%	$4,838	3.5%	$3,430
Yr 15 - Replace ten (10) meter assemblies (2 per year)	$3,600	15.00	3.0%	$5,609	3.5%	$3,348
Yr 20 - Replace ten (10) meter assemblies (2 per year)	$3,600	20.00	3.0%	$6,502	3.5%	$3,268
Yr 25 - Replace ten (10) meter assemblies (2 per year)	$3,600	25.00	3.0%	$7,538	3.5%	$3,190
Subtotal - Future Maintenance Costs				$28,660		**$16,749**
					SAY	**$17,000**

Future Operational Costs	Qty	Unit	Current Unit Cost	Current Base Cost	UPV[3]	Present Value
Recurring Annual Fees (software and support)	1	Yr	$6,000.00	$6,000	23.49	$140,934
					SAY	**$141,000**

Total Costs	Present Value
Initial Expense	$2,438,200
Future Maintenance Costs	$17,000
Future Operational Costs	$141,000
Total Life Cycle Cost	**$2,596,000**

Notes

[1] Future Cost = Current Base Cost x $(1+i)^n$ Where; i = inflation rate, n = number of years to occurrence

[2] Present Value = Future Cost x $[1 / (1+d)^n]$ Where; d = interest rate, n = number of years to occurrence

[3] Uniform Present Value (UPV) for determining present value of annual recurring maintenance costs over a 30 year period derived as follows:

$$UPV = \left(\frac{1+e}{d-e}\right)\left[1-\left(\frac{1+e}{1+d}\right)^{N}\right]$$

Where;
e = escalation rate (@ 3%)
d = interest rate (@ 3.5%)
N = number of time periods for annual occurrence (25 years)

ZENNER AMI METERING SYSTEM
LIFE CYCLE COST

Initial Expenses - Construction	Qty	Unit	Unit Cost	Total Cost	Present Value
Zenner AMI Project Cost	1	LS	$2,164,600	$2,164,600	**$2,164,600**

Future Maintenance Expenses (Non-Annually Recurring Costs)

Equipment	Current Base Cost	# of Years to Occurrence	Inflation Rate	Future Cost [1]	Interest Rate	Present Value [2]
Yr 5 - Replace ten (10) meter assemblies (2 per year)	$2,200	5.00	3.0%	$2,550	3.5%	$2,147
Yr 10 - Replace ten (10) meter assemblies (2 per year)	$2,200	10.00	3.0%	$2,957	3.5%	$2,096
Yr 15 - Replace ten (10) meter assemblies (2 per year)	$2,200	15.00	3.0%	$3,428	3.5%	$2,046
Yr 20 - Replace ten (10) meter assemblies (2 per year)	$2,200	20.00	3.0%	$3,973	3.5%	$1,997
Yr 25 - Replace ten (10) meter assemblies (2 per year)	$2,200	25.00	3.0%	$4,606	3.5%	$1,949
Subtotal - Future Maintenance Costs				$17,514		**$10,235**
					SAY	**$11,000**

Future Operational Costs	Qty	Unit	Current Unit Cost	Current Base Cost	UPV[3]	Present Value
Recurring Annual Fees (software and support)	1	Yr	$4,600.00	$4,600	23.49	$108,049
					SAY	**$109,000**

Total Costs	Present Value
Initial Expense	$2,164,600
Future Maintenance Costs	$11,000
Future Operational Costs	$109,000
Total Life Cycle Cost	**$2,285,000**

Notes

[1] Future Cost = Current Base Cost x $(1+i)^n$ Where; i = inflation rate, n = number of years to occurrence

[2] Present Value = Future Cost x $[1 / (1+d)^n]$ Where; d = interest rate, n = number of years to occurrence

[3] Uniform Present Value (UPV) for determining present value of annual recurring maintenance costs over a 30 year period derived as follows:

$$UPV = \left(\frac{1+e}{d-e}\right)\left[1-\left(\frac{1+e}{1+d}\right)^{N}\right]$$

Where;
e = escalation rate (@ 3%)
d = interest rate (@ 3.5%)
N = number of time periods for annual occurrence (25 years)

Appendix H \

Equipment Brochures

Badger AMI Metering System

Badger Meter

Recordall® Disc Meters

Engineered Polymer, Sizes 5/8, 5/8 x 3/4, and 3/4 inch
NSF/ANSI Standards 61 and 372 Certified

DESCRIPTION

Recordall Engineered Polymer Disc Series meters meet or exceed the most recent revision of AWWA Standard C710. Recordall Engineered Polymer Disc Series meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 (Trade Designation: M25 PN) and carry the NSF-61 mark on the housing. All components of the lead-free, engineered polymer meter (disc, chamber, housing, seals, and so on) comprise the certified system.

Applications: For use in measurement of potable cold water in residential, commercial and industrial services where flow is in one direction only.

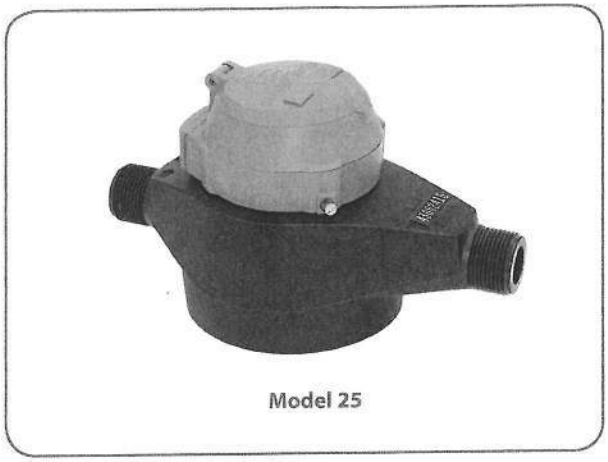
Operation: Water flows through the meter's strainer and into the measuring chamber where it causes the disc to nutate. The disc, which moves freely, nutates on its own ball, guided by a thrust roller. A drive magnet transmits the motion of the disc to a follower magnet located within the permanently sealed register. The follower magnet is connected to the register gear train. The gear train reduces the disc nutations into volume totalization units displayed on the register or encoder face.

Operating Performance: Recordall Disc Series meters meet or exceed registration accuracy for low flow rates (95%), normal operating flow rates (100 ± 1.5%), and maximum continuous operation flow rates as specifically stated in AWWA Standard C710.

Construction: Recordall Disc Series meter construction, which complies with ANSI/AWWA standard C710, consists of three basic components: meter housing, measuring chamber and permanently sealed register or encoder. The water meter is engineered polymer with externally-threaded spuds. A corrosion-resistant engineered polymer material is used for the measuring chamber.

Magnetic Drive: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading or AMR/AMI meter reading options.

Tamper-Proof Features: Unauthorized removal of the register or encoder is inhibited by the option of a tamper detection seal wire screw, TORX® tamper-resistant seal screw, or the proprietary tamper-resistant keyed seal screw. Each can be installed at the meter site or at the factory.



Model 25

Maintenance: Recordall Disc Series meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily, either at the meter installation or at any other convenient location.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters and meter models also minimizes spare parts inventory investment. The built-in strainer has an effective straining area of twice the inlet size.

Connections: Tailpieces/Unions for installations of meters on various pipe types and sizes, including misaligned pipes, are available as an option.

Meter Spud and Connection Sizes

Size Designation in.	×	"L" Laying Length in.	"B" Bore Dia. in.	Coupling Nut and Spud Thread in.	Tailpiece Pipe Thread (NPT) in.
5/8	×	7-1/2	5/8	3/4 (5/8)	1/2
5/8 × 3/4	×	7-1/2	5/8, 3/4	1 (3/4)	3/4
3/4	×	9	3/4	1 (3/4)	3/4

Product Data Sheet

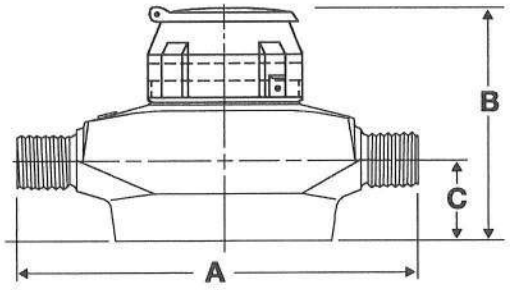
SPECIFICATIONS

	5/8 in.	5/8 x 3/4 in.	3/4 in.
Typical Operating Range (100% ± 1.5%)	1/2…25 gpm (0.11…5.7 m³/hr)	1/2…25 gpm (0.11…5.7 m³/hr)	1/2…30 gpm (1.0…6.8 m³/hr)
Low Flow (Min. 98.5%)	1/4 gpm (0.057 m³/hr)	1/4 gpm (0.057 m³/hr)	1/4 gpm (0.057 m³/hr)
Maximum Continuous Operation	15 gpm (3.4 m³/hr)	15 gpm (3.4 m³/hr)	15 gpm (3.4 m³/hr)
Pressure Loss at Maximum Continuous Operation	4.2 psi at 15 gpm (0.29 bar at 3.4 m³/hr)	2.8 psi at 15 gpm (0.19 bar at 3.4 m³/hr)	2.8 psi at 15 gpm (0.19 bar at 3.4 m³/hr)
Maximum Operating Temperature	80° F (26° C)	80° F (26° C)	80° F (26° C)
Maximum Operating Pressure	150 psi (10 bar)	150 psi (10 bar)	150 psi (10 bar)
Measuring Element	Nutating disc, positive displacement		
Meter Connections	*Available in NL bronze and engineered polymer to fit spud thread bore diameter sizes:*		
	5/8 in. (DN 15 mm)	3/4 in. (DN 15 mm)	3/4 in. (DN 15 mm)

Materials

Meter Housing	Engineered polymer
Housing Bottom Plates	Engineered polymer
Measuring Chamber	Engineered polymer
Disc	Engineered polymer
Strainer	Engineered polymer
Disc Spindle	Stainless steel
Magnet	Ceramic
Magnet Spindle	Engineered polymer
Register Lid and Shroud	Engineered polymer, bronze

DIMENSIONS

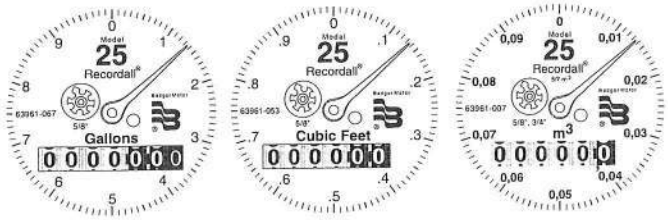


Meter Size	A Laying Length	B Height Reg./RTR	C Centerline Base	Width	Approx. Shipping Weight
5/8 in. (15 mm)	7-1/2 in. (190 mm)	5-1/16 in. (128 mm)	1-3/4 in. (44 mm)	4-13/16 in. (122 mm)	2-1/2 lb (1 kg)
5/8 x 3/4 in.(15 mm)	7-1/2 in. (190 mm)	5-1/16 in. (128 mm)	1-3/4 in. (44 mm)	4-13/16 in. (122 mm)	2-1/2 lb (1 kg)
3/4" (20 mm)	9 in. (229 mm)	5-1/16 in. (128 mm)	1-3/4 in. (44 mm)	4-13/16 in. (122 mm)	3 lb (1.4 kg)

REGISTERS / ENCODERS

Standard—Sweep-Hand Registration

The standard register is a straight-reading, permanently sealed, magnetic drive register. Dirt, moisture, tampering and lens fogging problems are eliminated. The register has a six-odometer wheel totalization display, 360° test circle with center sweep hand, and flow finder to detect leaks. Register gearing is made of self-lubricating engineered polymer, which minimizes friction and provides long life. The multi-position register simplifies meter installation and reading. The register capacity is 10,000,000 gallons (1,000,000 ft³, 100,000 m³).



Meter Model	Gallon	Cubic Feet	Cubic Meter
25	10	1	0.1/0.01
	10	1	0.1/0.01
	10	1	0.1/0.01

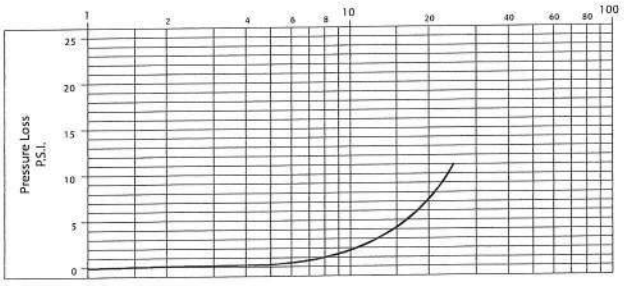
Optional—Encoders for AMR/AMI Reading Solutions

AMR/AMI solutions are available for Recordall Disc Series meters. All reading options can be removed from the meter without disrupting water service. Badger Meter encoders provide years of reliable, accurate readings for a variety of applications and are also available pre-wired to Badger Meter approved AMR/AMI solutions. See details at **www.badgermeter.com**.

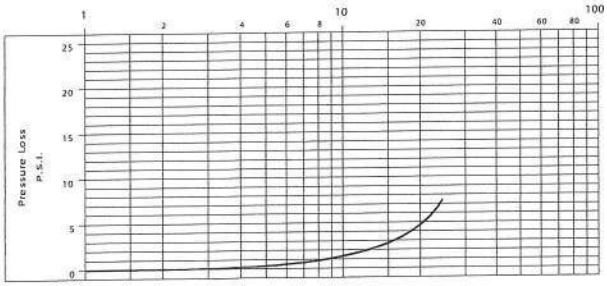
PRESSURE LOSS CHARTS

Rate of Flow in Gallons per Minute

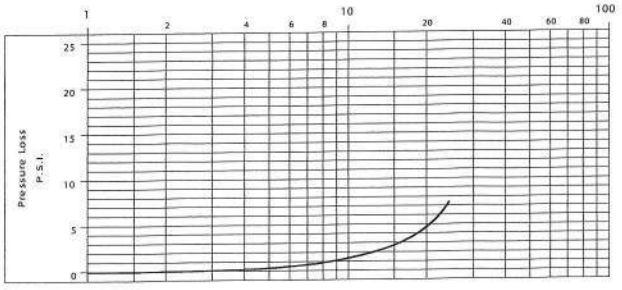
5/8 in.



5/8 x 3/4 in.

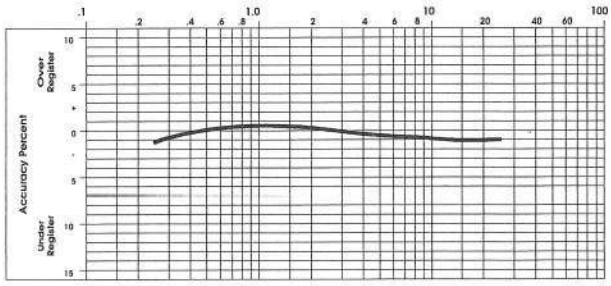


3/4 in.

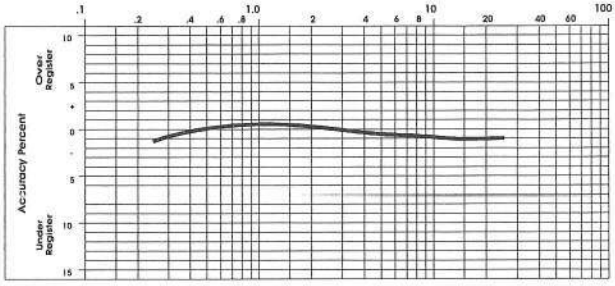


ACCURACY CHARTS

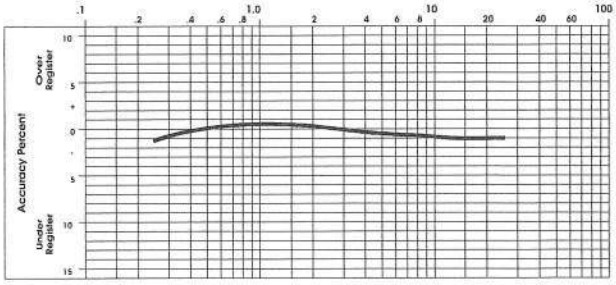
5/8 in.



5/8 x 3/4 in.



3/4 in.



***SMART WATER IS** BADGER METER*

www.badgermeter.com

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Legacy Document Numbers: RDM-DS-00067, 68, 69, 70

Encoders
High Resolution Encoders

HR-E® LCD Encoder

DESCRIPTION

Applications: The High Resolution encoder (HR-E LCD) is a fully electronic, solid-state encoder with no moving parts. It is designed for use with all current Badger Meter Recordall® Disc, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies. The HR-E LCD provides connectivity with Badger Meter ORION® and GALAXY® AMR/AMI endpoints and other AMR/AMI technology solutions approved by Badger Meter.

NOTE: For more detailed information, refer to the document *HR-E LCD Encoder User Manual*, available at *www.badgermeter.com*.

Field Programmable: The HR-E LCD encoder comes standard as factory programmed to customer specifications, with the option for field programming the unit of measure, meter type, meter model, digit resolution from the encoder, billing units, and rate-of-flow time and units. Programming is performed through the IR port via a computer.

Electronic Resolution: Standard encoded output from the HR-E LCD is nine digits.

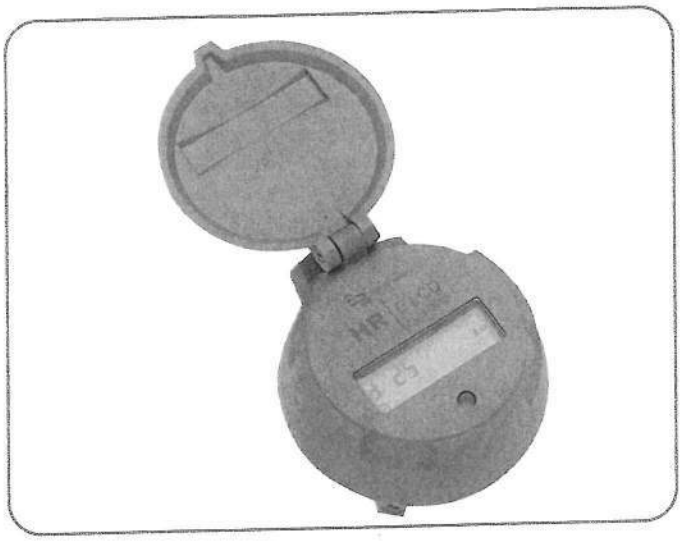
Status Indicators: Status indicators are sent as part of the encoder extended message to AMR/AMI systems such as ORION Cellular, Fixed Network and Migratable endpoints that are capable of receiving an extended message. The details can also be read through an IR interface.

Mounting: Icons on the HR-E LCD encoder face indicate encoder status and alarm conditions. The fully potted encoder assembly has a bayonet mount compatible with all Recordall Disc, Turbo Series, Compound Series, Combo Series and Fire Series meters and assemblies. The bayonet mount positions the encoder in any of four orientations for visual reading convenience. The HR-E LCD encoder can be removed from the meter without disrupting water service.

Magnetic Drive Communication: The HR-E LCD encoder detects movement of the wet side meter magnet with magnetic sensors to provide reliable and dependable encoded communication.

Tamper-resistant Features:
Unauthorized removal of the HR-E LCD encoder is inhibited by a tamper-resistant Torx® seal screw. Torx seal screws are provided as standard accessories. Optional proprietary tamper-proof screws are also available.

Magnetic sensors detect and report an attempted encoder removal. In addition, the HR-E LCD encoder is resistant to magnetic tampering. The encoder detects an attempted tamper—as well as encoder removal—and sends a tamper alarm in either situation. Approved endpoints capable of receiving the alarms, such as ORION Cellular, Fixed Network and Migratable endpoints, can then report the tamper condition to the meter reading software.



SPECIFICATIONS

Encoder type	Straight reading, permanently sealed, electronic LCD absolute encoder with field-programmable option
Encoder display	Status indicators, unit of measure, billing units, automatic toggle between 9-digit and 6-digit consumption (segmented leak detector in this mode), rate of flow, meter model
Unit of measure	U.S. gallons, Imperial gallons, cubic feet, cubic meters, and liters clearly identified on register face
Flow rate	Seconds, minutes, and hours
Numerals	7 mm (0.28 in.) high
Weight	11 ounces
Humidity	0…100% condensing
Temperature	Storage: – 40…60° C (– 40…140° F) Max. ambient for 1 hr: 70° C (158° F) Electronics & Display: –10…60° C (14…140° F)
Status indicators	Electronic and visual icons for: meter functioning correctly, meter alarm (indicates temperature limits exceeded, magnetic tamper or encoder removal), reverse flow, suspected leak, 30-day no usage, end of battery life
Signal output	Industry standard ASCII format
Signal type	Three-wire synchronous for AMR/AMI solutions Red = clock/power; Black = ground; Green = data
Battery	Lithium thionyl chloride AA cell, fully encapsulated within encoder housing
Battery Life	20 years (calculated)

Badger Meter

ENC-DS-01763-EN-06 (January 2021)

Product Data Sheet

Construction: The housing of the HR-E LCD encoder is constructed of an engineered polymer enclosure and a polycarbonate lens. For long-term performance, the enclosure is fully encapsulated, weatherproof, and UV-resistant to withstand harsh environments and to protect the electronics in flooded or submerged pit applications. An epoxy potting (patented design - 8,482,908) comprises the encoder bottom. Due to this unique sealing, the HR-E LCD exceeds all applicable requirements of AWWA Standard C706 and C707.

Wire Connections: The HR-E LCD encoder is available with an in-line connector for easy connection and installation to AMR/AMI endpoints. It is also available with a flying lead for a field splice connection, or fully prewired to an AMR/AMI endpoint.

Operating Characteristics: The HR-E LCD encoder is shipped in storage mode so a meter status alarm is not triggered. In storage mode, the meter model screen is displayed. Upon sensing two revolutions of the meter magnet, the encoder goes into normal operation mode. The display then automatically toggles between these four modes:

- 9-digit consumption displays for 45 seconds.
- 6-digit consumption (segmented leak detector in this mode) displays for 5 seconds.
- Rate of flow displays for 5 seconds.
- Meter model displays for 5 seconds.

DIMENSIONAL DRAWINGS

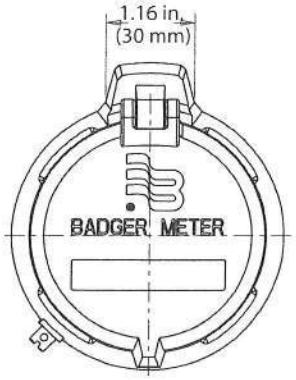


Figure 1: Top view

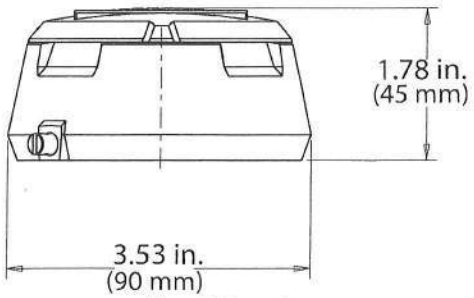


Figure 2: Front view

MEASUREMENT RESOLUTION

The electronic encoder output resolution of the HR-E LCD is as noted below.

Recordall Disc Series	Size (in.)	9-dial encoder output (gal)	9-dial encoder output (ft^3)	9-dial encoder output (m^3)
LP	5/8, 5/8 x 3/4	0.01	0.001	0.0001
M25	5/8 , 5/8 x 3/4	0.01	0.001	0.0001
M35	3/4	0.01	0.001	0.0001
M40	1	0.01	0.001	0.0001
M55	1	0.01	0.001	0.0001
M70	1	0.01	0.001	0.0001
M120	1-1/2	0.1	0.01	0.001
M170	2	0.1	0.01	0.001

Recordall Turbo Series	Size (in.)	9-dial encoder output (gal)	9-dial encoder output (ft^3)	9-dial encoder output (m^3)
T160	1-1/2	0.1	0.01	0.001
T200	2	0.1	0.01	0.001
T450	3	0.1	0.01	0.001
T1000	4	0.1	0.01	0.001
T2000	6	1	0.1	0.01
T3500	8	1	0.1	0.01
T5500	10	1	0.1	0.01
T6200	12	10	1	0.01
T6600	16	10	1	0.01
T10000	20	10	1	0.01

Recordall Compound Series	Size (in.)	9-dial encoder output (gal)	9-dial encoder output (ft^3)	9-dial encoder output (m^3)
High Side T200	2	0.1	0.01	0.001
Low Side M25	2	0.01	0.001	0.0001
High Side T450	3	0.1	0.01	0.001
Low Side M25	3	0.01	0.001	0.0001
High Side T1000	4	0.1	0.01	0.001
Low side M35	4	0.01	0.001	0.0001
High Side T2000	6	1	0.1	0.01
Low Side M35	6	0.01	0.001	0.0001
High Side T3500	8	1	0.1	0.01
Low side M120	8	0.1	0.01	0.001

NOTE: For Fire Service Meters and Assemblies, please refer to appropriate Disc and TSM information provided above.

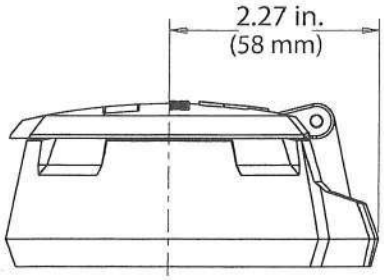


Figure 3: Left side view

SMART WATER IS BADGER METER

ORION®
Mobile Automated Meter Reading Solutions

ORION® Water Endpoints

ME Endpoint

DESCRIPTION

The ORION® ME endpoint is a two-way water endpoint for mobile applications.

In addition to providing the current and snapped daily reading, the endpoint two-way functionality allows users to capture data profile information wirelessly, without having to directly access the endpoint, during the normal reading process.

The ORION ME endpoint is a member of the time-tested ORION family of products from Badger Meter, designed for maximum flexibility. Since 2002, the ORION product family has been providing comprehensive advanced metering analytics (AMA) for interval meter reading and data capture using both one-way and two-way communications.

FUNCTIONALITY

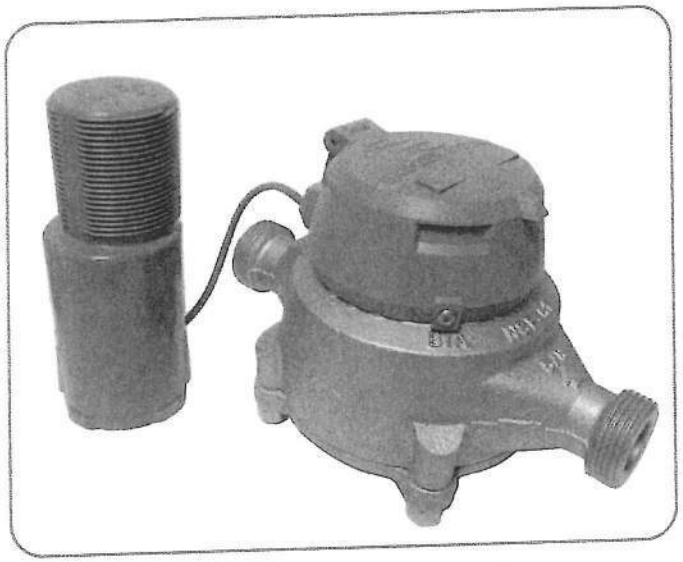
Operation: The endpoint continuously monitors the encoder circuit. At predetermined intervals, the endpoint broadcasts the totalized reading value along with other meter data to the mobile collection devices.

Activation: The endpoints offer a Smart Activation feature. All ORION endpoints are shipped in an inactive, non-transmitting state. After the endpoint is installed, it begins broadcasting data when the encoder senses the first usage of water. No field programming or tools are required to activate the endpoint.

Broadcast Mode: Once activated, the endpoints begin transmitting in mobile priority mode. After installation, using the endpoint two-way communication, an endpoint transmits its meter data every six seconds.

Data Profiling: The endpoints store up to 90 days of hourly historical interval meter data within nonvolatile memory.

Output Message: The endpoint broadcasts its unique serial number, current meter reading, daily snapped meter reading and applicable status indicators for mobile reading collection.



APPLICATION

Configurations: Available in integral, remote or endpoint-only configurations, the endpoint can be deployed in indoor, outdoor and pit applications. The endpoint electronics and battery assembly are fully encapsulated in epoxy for environmental integrity.

Meter Compatibility: When attached to a Badger Meter encoder, the endpoint is compatible with all current Badger Meter Recordall® Disc, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies, and with E-Series® Ultrasonic and ModMag® Electromagnetic flow meters.

Encoder Compatibility: The endpoint is suitable for use with all Badger Meter encoders as well as the following Badger Meter approved three-wire encoder registers that have a manufacture date of 2000 or newer, are programmed into the AMR/AMI three-wire output mode and have three-wires connected: Elster C700 Digital, InVISION and ScanCoder® encoders and evoQ4 meter (encoder output); Hersey® Translator; Master Meter® Octave® Ultrasonic meter encoder output; Metron-Farnier Hawkeye; Mueller Systems 420 Solid State Register (SSR) LCD; Neptune® ProRead, E-Coder® and ARB-V®; and Sensus® Electronic Register encoder (ECR) and ICE.

SPECIFICATIONS

Dimensions	5.125 in. (H); 1.75 in. (W) at top; 2.125 in. (W) at bottom
Broadcast Frequency MHz Band	FCC regulated 902…928 MHz frequency hopping modulation
Operating Temperature Range **Storage and Meter Reading**	-40…60° C (-40…140° F) based on storage and meter reading. RF output may be reduced by extremely low temperatures. The water meter should not be subjected to temperatures below freezing.
Humidity	0…100% condensing
Battery	One (1) lithium thionyl chloride C cell (nonreplaceable)
Battery Life	20 years (calculated)

Construction: All ORION ME endpoints are housed in an engineered polymer enclosure with an ORION RF board, battery and antenna. To assure long-term performance, the enclosure is fully potted to withstand harsh environments and to protect the electronics in flooded or submerged pit applications.

Wire Connections: ORION ME endpoints are available with in-line connectors (Twist Tight or Nicor®) for easy installation and connection to compatible encoders/meters. The endpoints are also available with flying leads for field splice connections. Other wire connection configurations may be available upon request.

Range: Transmission reception depends on a number of factors: topographical features, a building's construction materials and obstacles such as buildings, trees, vegetation and fences. Temporary conditions, such as a vehicle parked near the endpoint or heavy rain or snow, could also affect reception. These factors need to be considered when installing and communicating with the endpoint using a handheld or mobile reading system. For a more in-depth discussion, see the white paper, *Understanding RF Propagation of AMR/AMI Systems*, available at *www.badgermeter.com*.

FEATURES

Communication Type	Two-Way
Application Type	Control/Monitor
Reading Interval Type	Midnight/Now
Encoder Compatibility	Absolute/Incremental
Mobile Reading	✓
Premise Leak Detection	✓
Cut-Wire Indication	✓
Reverse Flow Indication (Absolute Encoder)	✓
No Usage Indication	✓
Encoder Error (Absolute Encoder)	✓
Low Battery Indication	✓
Remote Programming	✓
Remote Clock Synchronization	✓
Firmware Upgrades	✓

License Requirements: ORION ME endpoints comply with Part 15 of the FCC Rules. No license is required by the utility to operate an ORION meter reading system.

Transportation: The Federal Aviation Administration prohibits operating transmitters and receivers on all commercial aircraft. The ORION endpoint is considered an operating transmitter and cannot be shipped by air.

Caution: Changes or modifications to the equipment that are not expressly approved by Badger Meter could void the user's authority to operate the equipment.

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www.badgermeter.com

Legacy Document Number: Excerpt from ORI-DS-00197-EN

ORION®
Cellular/Fixed Network Solutions

ORION® Water Endpoint

ORION Cellular C Endpoint

DESCRIPTION

The ORION® Cellular C endpoint is an innovative, two-way endpoint for smart water applications. The endpoint utilizes existing IoT (Internet of Things) cellular infrastructure to efficiently and securely deliver meter reading data to the utility in a Network as a Service (NaaS) approach. Leveraging existing cellular infrastructure, the NaaS solution offers all the performance benefits of AMI, while eliminating network-related maintenance and technology concerns and enhancing deployment flexibility.

The Cellular endpoint is a member of the time-tested ORION family of products from Badger Meter, designed for maximum flexibility. Since 2002, the ORION product family has provided comprehensive Advanced Metering Analytics (AMA) for interval meter reading and data capture using both one-way and two-way communications.

FUNCTIONALITY

Operation: The ORION Cellular C endpoint communicates with the encoder and captures 15-minute interval read data and meter status information. The endpoint then automatically broadcasts the information, including endpoint status information, via the cellular network to BEACON AMA. ORION NaaS is powered by the proven ORION system for interval data capture and two-way communication. The solution employs cellular endpoints which, as they leverage the public cellular network and require no proprietary gateways to operate, dramatically reduce infrastructure requirements compared to a traditional fixed network. This speeds installations and simplifies expansion as a system evolves.

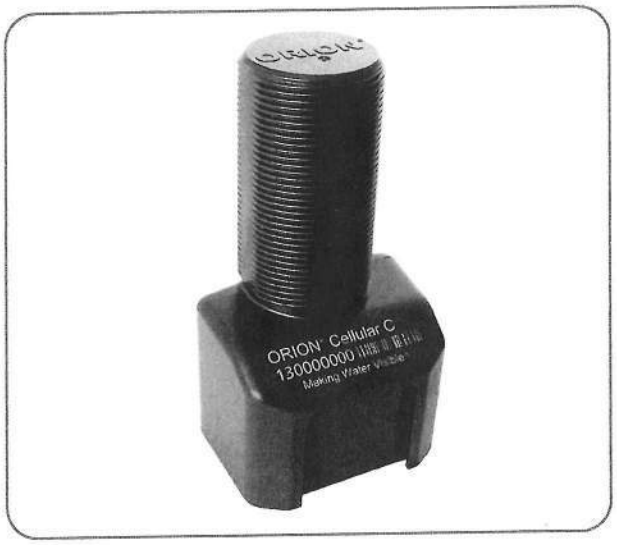
The endpoint is designed to call in four times each workday and features a configurable schedule that enables utility customers to select call-in times that best support their processes.

Activation: All ORION Cellular C endpoints are shipped in an inactive, non-transmitting state. The Badger Meter IR Communication Device can be used to activate the endpoints and verify the encoder connection. Successful endpoint function can be confirmed through a web app demonstrating that communication has been verified to both the encoder and the network.

Alternatively, the endpoints offer a Smart Activation feature. After installation, the endpoints begin broadcasting data when the encoder senses the first usage of water. No field programming or special tools are required.

Broadcast Mode: The ORION Cellular C endpoint broadcasts fixed network reading data through the secure cellular network within the service area. The endpoint also transmits a mobile message to facilitate troubleshooting in the field.

Data Storage: The endpoint stores 42 days of 15-minute data.



Output Message: The ORION Cellular C endpoint broadcasts a unique serial number, meter reading data, and applicable status indicators. As an advanced data security measure, each message is securely transported to the BEACON AMA software only via private network and never over the public internet.

APPLICATION

Configurations: The ORION Cellular C endpoint is a multi-purpose endpoint that can be deployed in indoor, outdoor and pit (non-metal pit lid) applications. The electronics and battery assembly are fully encapsulated in epoxy for environmental integrity. The endpoint is available with a connector assembly for ease of installation.

Meter Compatibility: When attached to Badger Meter High Resolution Encoders, the ORION Cellular C endpoint is compatible with all current Badger Meter Recordall® Disc, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies, and with E-Series® Ultrasonic, E-Series® Ultrasonic Plus, and M-Series® Electromagnetic flow meters.

Encoder Compatibility: The ORION Cellular C endpoint is suitable for use with Badger Meter High Resolution Encoders as well as the following Badger Meter approved three-wire encoder registers that have a manufacture date within 10 years of the current date as long as the encoder has three wires connected to it and is programmed into the three-wire output mode for AMR/AMI: Honeywell® (Elster) ScanCoder® encoder with Sensus® protocol module and evoQ4 meter (encoder output); Master Meter® Octave® Ultrasonic meter encoder output; Metron-Farnier Hawkeye; Mueller Systems 420 Solid State Register (SSR) LCD; Neptune® ProRead, E-Coder®, ARB-V®, and ProCoder; and Sensus iPerl®.

SPECIFICATIONS

Dimensions	5.125 in. (130 mm) (H) 1.75 in. (44 mm) Diameter at top 2.625 in. (W) x 2.875 in. (D) at base (67 mm (W) x 73 mm (D) at base)
Broadcast Network	Cellular LTE-M network (primary) and NB-IoT (Narrow Band-Internet of Things) Mobile backup frequency is FCC-regulated 902…928 MHz frequency hopping modulation
Operating Temperature Range • Storage, Meter Reading and Mobile Backup • Cellular Communications	 –40…60° C (–40…140° F) –20…60° C (–4…140° F)
Humidity	0%…100% condensing
Battery	One (1) lithium thionyl chloride D cell (nonreplaceable)

Construction: All ORION Cellular C endpoints are housed in an engineered polymer enclosure with an ORION RF board, battery and antenna. For long-term performance, the enclosure is fully potted to withstand harsh environments and to protect the electronics in flooded or submerged pit applications.

Wire Connections: ORION Cellular C endpoints are available with in-line connectors (Twist Tight® or Nicor®) for easy installation and connection to compatible encoders/meters. The endpoints are also available with flying leads for field splice connections. Other wire connection configurations may be available upon request.

FEATURES

Smart City Ready	Future-proof technology
Communication Type	Two-way
Application Type	Control/Monitor
Endpoint Communication	Configurable call-in schedule, up to four times each workday
Reading Interval Type	15-minute
Encoder Compatibility	Absolute
Fixed Network Reading	✓
Cut-Wire Indication	✓
Encoder Error	✓
Low Battery Indication	✓
Remote Clock Synchronization	✓
Firmware Upgrades	✓

License Requirements: ORION Cellular C endpoints comply with Part 15, Part 22, Part 24, and Part 27 of the FCC Rules. No license is required by the utility to operate an ORION meter reading system. This device complies with Industry Canada license-exempt RSS standard(s).

Transportation: **WARNING**: The operation of transmitters and receivers on airlines is strictly prohibited by the Federal Aviation Administration. As such, the shipping of radios and endpoints via air is prohibited. Please follow all Badger Meter return and/or shipping procedures to prevent exposure to liability.

Warning: To reduce the possibility of electrical fire and shock hazards, never connect the cable from the endpoint to any electrical supply source. The endpoint cable provides SELV low voltage limited energy power to the load and should only be connected to passive elements of a water meter register.

Caution: The endpoint batteries are *not* replaceable. Users should make no attempt to replace the batteries.
Changes or modifications to the equipment that are not expressly approved by Badger Meter could void the user's authority to operate the equipment.

***SMART WATER IS** BADGER METER*

www.badgermeter.com

Badger Meter

BEACON® Advanced Metering Analytics

With ORION® Network as a Service (NaaS)

OVERVIEW

The BEACON® Advanced Metering Analytics (AMA) Solution with ORION® Network as a Service (NaaS) presents a simple, yet powerful solution to bring a new level of utility optimizing information to light.

The solution combines our intuitive BEACON AMA Software as a Service (SaaS) with a NaaS approach using proven ORION Cellular endpoints to deliver greater visibility and control over utility management.

Built-in infrastructure management services and a system design that keeps you in step with technology advancements, allows you to do what you do best—manage your water utility. Plus, built-in consumer engagement tools help enhance customer service, increase satisfaction and reduce costs.

SOFTWARE APPLICATIONS

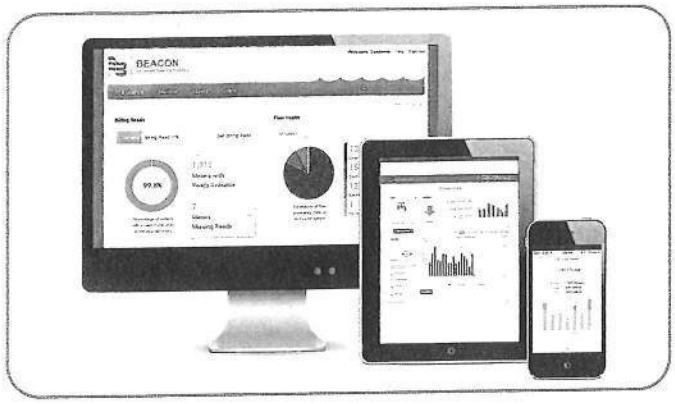
BEACON Advanced Metering Analytics (AMA)

With tools beyond meter reading and network management, BEACON AMA software offers targeted Advanced Metering Analytics. BEACON AMA software puts interval meter data to work to increase efficiency in day-to-day utility operations and address demands for actionable intelligence.

- **Problem solver** – User intuitive data tools place the power of water consumption data at your fingertips, allowing you to rapidly respond to customer inquiries and quickly resolve—and even eliminate—many billing issues.
- **Customized design** – A customizable dashboard delivers information configured to user security access level in a format matched to the utility's individual requirements, providing data management integrity, security and control.
- **Works with you** – Integration with utility systems—billing, work order, inventory, Customer Relationship Management (CRM) and Geographic Information Systems (GIS)—streamlines and improves utility operations without disrupting the current utility billing interface file transfer process.
- **Find out fast** – Alert conditions can be set to monitor and notify users of system exceptions, including continuous flow, for faster leak detection.
- **Innovation at your service** – Secure, hosted platform with automatic software upgrades ensures the latest technology and features are always available.

EyeOnWater®

The BEACON AMA software suite includes informative consumer outreach tools to improve customer service consisting of the EyeOnWater consumer engagement website, smartphone mobile apps, and email or SMS text alerts, providing easy access to personal consumption data and alerts to potential leaks. With these tools, water consumers are able to view their usage activity, and gain greater understanding and control of what they use and the value you provide.



HARDWARE

ORION NaaS is powered by the proven ORION system for interval data capture and two-way communication. The solution employs cellular endpoints which, as they leverage the public cellular network and require no proprietary gateways to operate, dramatically reduce infrastructure requirements compared to a traditional fixed network. This speeds installations and simplifies expansion as a system evolves.

- **High resolution data** – ORION Cellular endpoints are programmed to automatically broadcast 15-minute meter reading and event data to the BEACON software up to four (4) times per day. The high resolution data helps identify potential customer-side leaks and other anomalies in water use, and provides the utility with a potent tool to enhance its customer service.
- **Two-way communication** – BEACON AMA software communicates with ORION Cellular endpoints to accomplish a number of system tasks, including requesting additional information from the endpoint and synchronizing the internal endpoint clock. If needed, the ORION two-way system architecture sends upgrades to the endpoint firmware over the air via the network, utilizing the powerful BEACON AMA software suite.
- **Data integrity** – Each message from the ORION Cellular endpoint is securely transported to the BEACON AMA software only via private network and never over the public internet.

SECURITY

BEACON AMA is ISO 27001 certified and SOC 2 examined for security, availability and confidentiality.

Product Data Sheet

TECHNICAL SUPPORT AND TRAINING

Configured for the utility, safe and secure BEACON AMA SaaS provides utilities with regular software updates, long-term support and maintenance. Comprehensive BEACON AMA training courses are available for online or on-site delivery at the time of system deployment. To maintain best practices, a library of online resources and options for group web-based training and support are also available. Once deployed, our technical support specialists can be contacted by phone, email and web to provide ongoing, customer-friendly support. Customized one-on-one training is available (fee applies) to further enhance user expertise.

Additionally, Badger Meter offers extended customized training to further enhance user expertise.

TECHNICAL REQUIREMENTS

BEACON AMA

Developed as a hosted software platform, BEACON AMA is a cloud-based application accessed through a standard web browser. Internet access is required. User logins provide secure access.

BEACON AMA supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

EyeOnWater Consumer Engagement

The EyeOnWater consumer engagement website is a cloud-based application accessed through a standard web browser. Internet access is required. Water consumer user logins provide secure access to their information.

Supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

EyeOnWater smartphone applications require Android 6.0 or iOS 9.1 or later, and can be downloaded from Google Play or the Apple Store.

Badger Meter

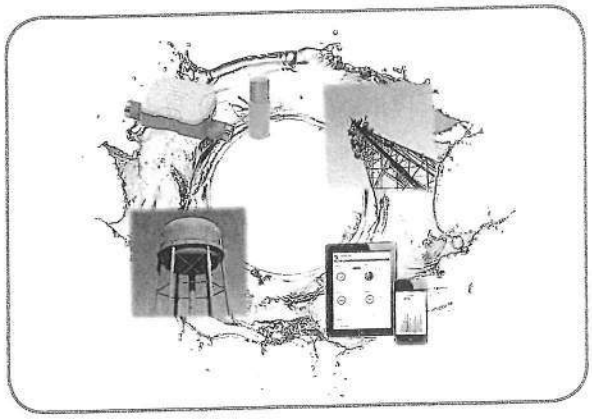
BEACON® Advanced Metering Analytics

Traditional Fixed Network Solution

OVERVIEW

The BEACON® Advanced Metering Analytics (AMA) traditional fixed network solution from Badger Meter combines the power of the intuitive, cloud-based BEACON AMA software with proven ORION® Fixed Network (SE) technology to provide utility management with hourly interval metering data to better manage their utility and resources.

Our traditional point-to-point fixed network system combines two-way smart meter endpoints with fixed network gateway transceivers for efficient collection of meter reading data.



SOFTWARE APPLICATIONS

BEACON Advanced Metering Analytics (AMA)

The BEACON AMA software suite brings greater visibility and utility management control. With tools beyond meter reading and network management, BEACON AMA software offers targeted Advanced Metering Analytics in a secure hosted platform. The innovative software puts metering data to work with easy-to-use data tools for the utility to increase efficiency in day-to-day utility operations and address demands for actionable intelligence.

- Customizable dashboards to deliver information in a format matched to utility requirements
- Ability to set unique alert conditions to define and monitor exceptions
- Automatic software upgrades
- Integration with your utility systems: billing, work order, inventory, Customer Relationship Management (CRM) and Geographic Information Systems (GIS)

EyeOnWater® Consumer Engagement (Optional)

The BEACON AMA software suite includes informative consumer outreach tools to improve customer service, consisting of the EyeOnWater consumer engagement website, smartphone mobile apps, and email or SMS text alerts, providing easy access to personal consumption data and alerts to potential leaks. With these tools, water consumers are able to view their usage activity, and gain a greater understanding and control of what they use and the value you provide.

HARDWARE

ORION Fixed Network (SE) features high-powered meter endpoints and easy-to-use network data collectors to deliver precise daily meter information right to your desktop.

ORION Fixed Network (SE) Endpoints

ORION Fixed Network (SE) endpoints communicate with BEACON AMA software and network gateway transceivers, reporting hourly interval reading data along with the full list of extended status messages and indicators from the water metering system. In addition, the endpoints send a mobile message every few seconds, maintaining communication even if the network is disrupted for an extended period.

ORION Fixed Network (SE) Network Gateway Transceiver

The ORION Fixed Network (SE) network gateway transceiver receives, stores and sends water metering data from surrounding ORION Fixed Network (SE) meter endpoints to the BEACON AMA cloud-based software via a cellular data network or LAN backhaul. Network gateway transceivers deployed under a BEACON AMA traditional fixed network solution are owned, maintained and supported by the utility.

SECURITY

BEACON AMA is ISO 27001 certified and SOC 2 examined for security, availability and confidentiality.

TECHNICAL SUPPORT AND TRAINING

Configured for the utility, the safe and secure hosted BEACON AMA software suite provides utilities with regular updates, long-term support and maintenance. Comprehensive training is provided at the time of system deployment. To maintain best practices, a library of online resources and options for web-based training and support are also available. Once deployed, our technical support specialists can be contacted by phone, email and web to provide ongoing, customer-friendly support.

Additionally, Badger Meter offers extended customized training to further enhance user expertise.

TECHNICAL REQUIREMENTS

BEACON AMA

Developed as a hosted software platform, BEACON AMA is a cloud-based application accessed through a standard web browser. Internet access is required. User logins provide secure access.

BEACON AMA supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

EyeOnWater Consumer Engagement

The EyeOnWater consumer engagement website is a cloud-based application accessed through a standard web browser. Internet access is required. Water consumer user logins provide secure access to their information.

Supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

EyeOnWater smartphone applications require Android 6.0 or iOS 9.1 or later, and can be downloaded from Google Play or the Apple Store.

Making Water Visible®

www.badgermeter.com

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Neptune AMI Metering System

A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

T-10 Meter

SIZES ⅝", ¾", AND 1"

Every T-10® water meter meets or exceeds the latest AWWA C700 Standard. Its nutating disc, positive displacement principle has been time-proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

The T-10 water meter consists of three major assemblies: a register, a lead free, high-copper alloy maincase, and a nutating disc measuring chamber.

The T-10 meter is available with a variety of register types. For reading convenience, the register can be mounted in one of four positions on the meter.

The corrosion-resistant maincase will withstand harsh service conditions; internal water pressure, rough handling, and in-line piping stress.

The innovative floating chamber design of the nutating disc measuring element is unaffected by meter position of in-line piping stresses while the unique chamber seal extends the low-flow accuracy by sealing the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion-resistant materials throughout and a thrust roller to minimize wear.

KEY FEATURES

REGISTER

- Magnetic-driven, low-torque registration ensures accuracy
- Impact-resistant register
- High-resolution, low-flow leak detection
- Bayonet-style register mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

LEAD FREE MAINCASE

- NSF/ANSI 372, NSF/ANSI 61
- Lifetime guarantee
- Resists internal pressure stresses and external damage
- Handles in-line piping variations and stresses
- Provides residual value vs. plastic or composite
- Electrical grounding continuity

NUTATING DISC MEASURING CHAMBER

- Positive displacement
- Widest effective flow range for maximum revenue
- Proprietary polymer materials maximize long-term accuracy
- Floating chamber design is unaffected by in-line piping stresses

Specifications

- NSF/ANSI 372, NSF/ANSI 61
- National Type Evaluation Program (NTEP) certification

Application

- Cold water measurement of flow in one direction in residential service applications

Maximum Operating Water Pressure

- 150 psi (1034 kPa)

Maximum Operating Water Temperature

- 80°F

Measuring Chamber

- Nutating disc technology design made from proprietary synthetic polymer

Options

Sizes

- 5/8", 5/8" x 3/4"
- 3/4", 3/4" SL, 3/4" x 1"
- 1", 1" x 1¼"

Units of Measure:

- U.S. gallons, imperial gallons, cubic feet, cubic metres

Register Types

- Direct reading: bronze box and cover (standard)

Remote Reading:

- ProCoder™, E-CODER®, E-CODER®)R900i™, ProCoder™)R900i™
- Reclaim

Bottom Caps

- Synthetic polymer (5/8" only)
- Cast iron
- Lead free, high-copper alloy

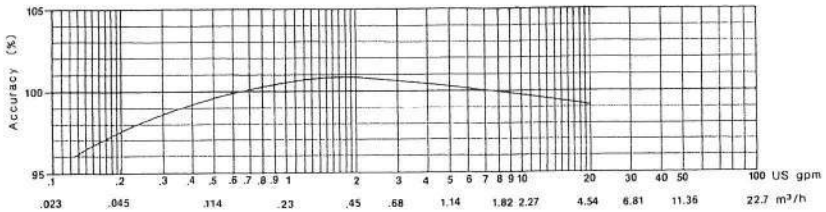
Connections

- Lead free, high-copper alloy, straight or bent

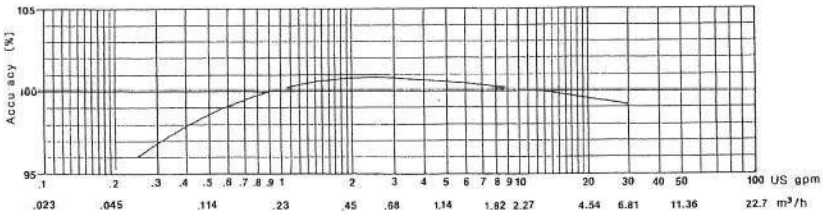
Environmental Conditions

- Operating temperature: +33° F to +149° F (0° C to +65° C)
- Storage temperature: +33° F to +158° F (0° C to +70° C)

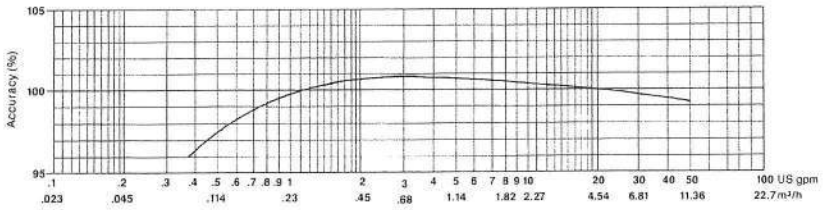
5/8" ACCURACY



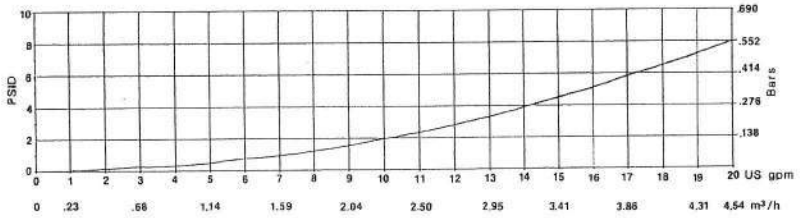
3/4" ACCURACY



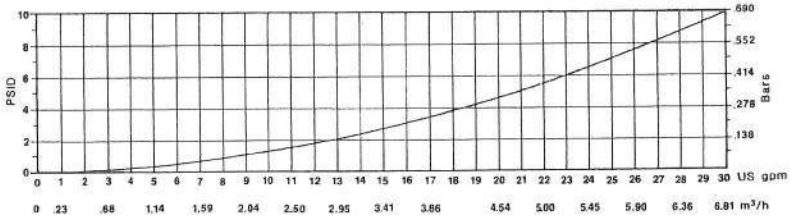
1" ACCURACY



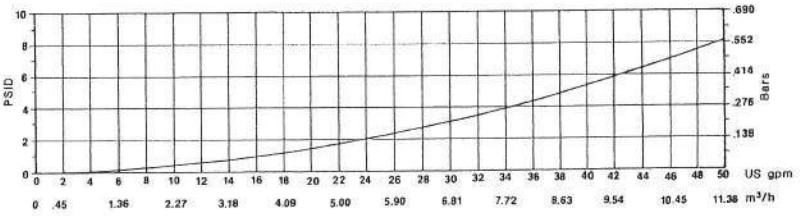
5/8" PRESSURE LOSS



3/4" PRESSURE LOSS



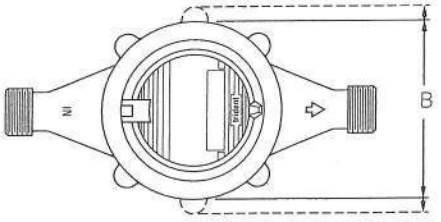
1" PRESSURE LOSS

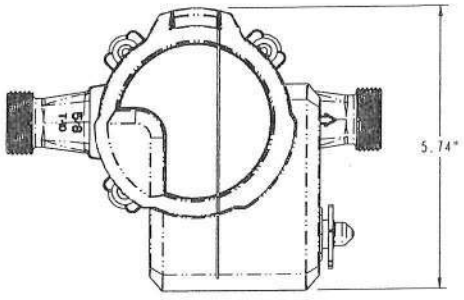


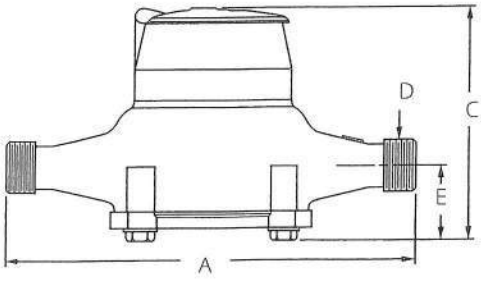
These charts show typical meter performance. Individual results may vary.

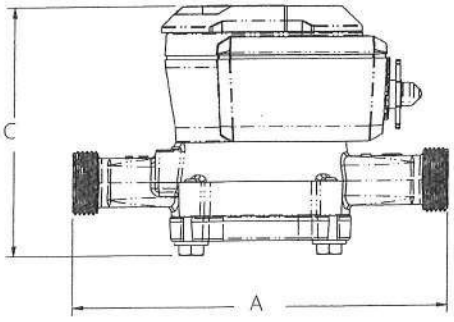
Dimensions

Meter Size	A	B	C					D-	E-	Weight lbs/kg
	in/ mm	in/ mm	Std. in/mm	ARB in/mm	ProCoder™ or E-CODER®	ProCoder™) R900i™ or ProCoder™) R450i™	E-CODER®) R900i™or E-CODER®) R450i™	NPSM Thread	in/ mm	
⅝"	7½ 191	3⅝ 92	4⅜ 111	5¼ 133	5¼ 133	5¼ 133	5¼ 133	¾" - 14"	1½ 38	3¼ 1.4
⅝" x ¾"	7½ 191	3⅝ 92	4⅜ 111	5¼ 133	5¼ 133	5¼ 133	5¼ 133	1" - 11½"	1½ 38	3⅜ 1.5
Pre 2011 ⅝"	7½ 191	3⅝ 92	4⅞ 124	5½ 146	5½ 139	5½ 139	5½ 139	¾" - 14"	1⅝ 41	3¾ 1.7
Pre 2011 ⅝" x ¾"	7½ 191	3⅝ 92	4⅞ 124	5½ 146	5½ 139	5½ 139	5½ 139	1" - 11½"	1⅝ 41	4 1.8
¾"	9 229	4⅜ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1" - 11½"	1⅞ 48	6 2.7
¾" SL	7½ 191	4⅜ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1" - 11½"	1⅞ 48	5½ 2.5
¾" x 1"	9 229	4⅜ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1¼" - 11½"	1⅞ 48	6½ 2.9
1"	10¾ 273	6½ 165	6⅜ 162	7 178	7 178	7 178	7 178	1¼" - 11½"	2⅛ 54	9¾ 4.4
1" x 1¼"	10¾ 273	6½ 165	6⅜ 162	7 178	7 178	7 178	7 178	1½" - 11½"	2⅛ 54	10¼ 4.6









Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	AWWA Standard	Low Flow @ 95% Accuracy
5/8"	1/2 to 20 US gpm 0.11 to 4.55 m³/h	1 to 20 US gpm 0.23 to 4.5 m³/h	1/8 US gpm 0.03 m³/h
3/4"	3/4 to 30 US gpm 0.17 to 6.82 m³/h	2 to 30 US gpm 0.45 to 6.8 m³/h	1/4 US gpm 0.06 m³/h
1"	1 to 50 US gpm 0.23 to 11.36 m³/h	3 to 50 US gpm 0.68 to 11.4 m³/h	3/8 US gpm 0.09 m³/h

Registration

ProRead Registration (per sweep hand revolution)		5/8"	3/4" & 1"
10	US Gallons	√	√
10	Imperial Gallons	√	√
1	Cubic Foot	√	√
0.1	Cubic Metre	√	√
Register Capacity ProRead, ProCoder, and E-CODER		**5/8"**	**3/4" & 1"**
10,000,000	US Gallons	√	√
10,000,000	Imperial Gallons	√	√
1,000,000	Cubic Feet	√	√
100,000	Cubic Metres	√	√
ProCoder and E-CODER High Resolution (8-digit reading)		**5/8"**	**3/4" & 1"**
0.1	US Gallons	√	√
0.1	Imperial Gallons	√	√
0.01	Cubic Feet	√	√
0.001	Cubic Metres	√	√

Warranty

Neptune® provides a limited warranty for performance, materials, and workmanship. See warranty statement for details.

Guaranteed Compatibility

All T-10 water meters are guaranteed adaptable to our ProRead™, AutoDetect, ProCoder™, E-CODER®, E-CODER®)R900*i*™, E-CODER®)R450*i*™, ProCoder™)R900*i*™, TRICON®/S, TRICON/E®3, and Neptune meter reading systems without removing the meter from service.

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Tallassee, AL 36078
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AMI Your Way

Neptune® R900® System: Cellular Endpoint

Neptune's cellular endpoint allows you to progress at your own pace to AMI when integrated into your Neptune® R900® System. Neptune's cellular endpoint provides all of the benefits of an advanced meter reading solution without the operational burden of network infrastructure while allowing you to protect existing asset investments. An easily deployable AMI solution, the cellular endpoint allows you to start collecting actionable meter data immediately. Powered by the FirstNet® cellular network, you are assured a reliable, highly secure, and easy-to-deploy AMI data solution for both current and future needs.

- No AMI fixed network infrastructure installation, maintenance, operations, or upgrade costs for the life of the deployment.
- Seamless integrations with existing R900 technology for a flexible AMI solution.
- Access all of your meter data from anywhere at any time with Neptune® 360™.
- Improve operations and customer service with real-time, high-resolution AMI data and advanced analytics.
- Automatically recover from network outages with 96 days of stored data.

FirstNet®, Built with AT&T

- Two-way solution using the FirstNet® LTE-M cellular technology helps ensure robust coverage.
- Prioritized connectivity, even during natural disasters, protects against commercial traffic congestion.
- Network resources and mobile cell sites can be dispatched during disaster recovery to support network connectivity.
- Sensitive information is highly secure on the FirstNet® network.

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Specifications

Environmental Conditions

- Operating temperature: -22°F to +149°F (-30°C to +65°C)
- Storage temperature: -40°F to +158°F (-40°C to +70°C)
- Operating humidity: 100% condensing

Antennas

- Wall: standard internal antenna
- Pit: internal or external antenna

Encoded Register Compatibility

- Neptune® MACH 10®, ARB®V, ProRead™, E-CODER®, and ProCoder™
- Sensus ECR II, ICE, iPerl, Electronic Register and OMNI
- Hersey/Mueller Translator
- Badger ADE, HR E|LCD, E-Series
- Elster/AMCO InVision (Sensus protocol version)

Operation

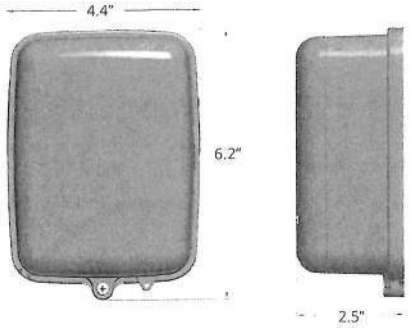
- Regular cellular LTE-M transmissions with configurable transmission windows
- Mobile 900 MHz backup transmissions
- Verify installation via the cellular endpoint manager tool
- 15-minute interval data with automatic back-fill
- Priority alerts

Warranty

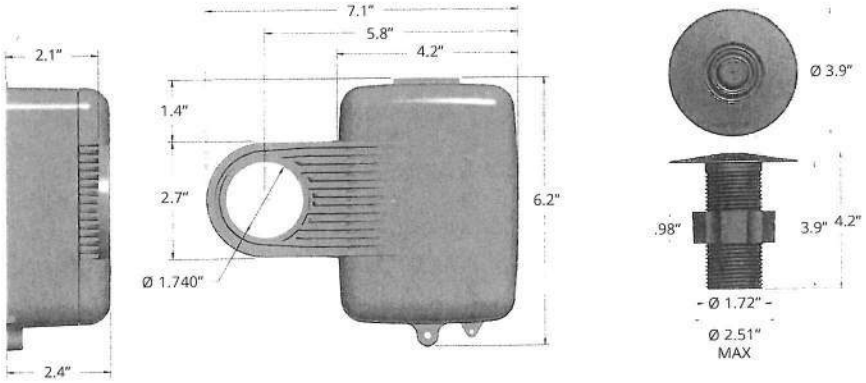
- Neptune provides a limited warranty for performance, materials, and workmanship. See warranty statement for details.

Dimensions

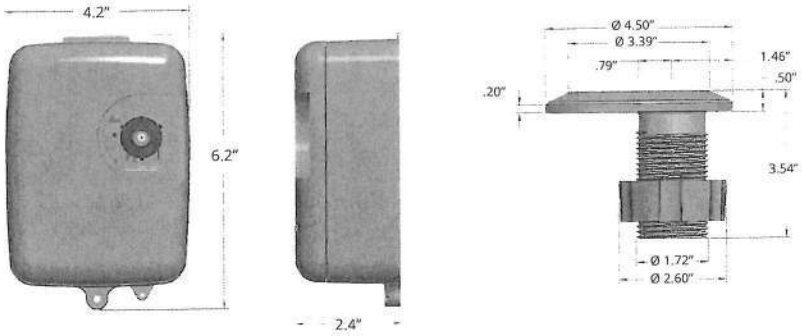
Wall Endpoint



Pit Endpoint (Internal Antenna)



Pit Endpoint with External Through-the-Lid Antenna



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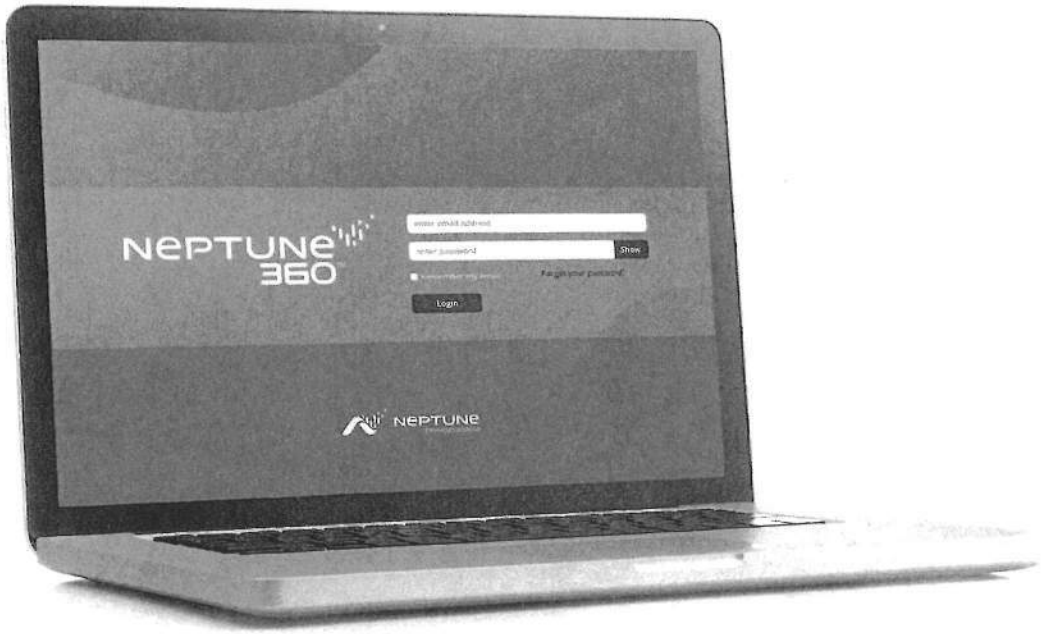
Neptune® 360™
Meter Data Management Platform

A Product of Neptune Technology Group



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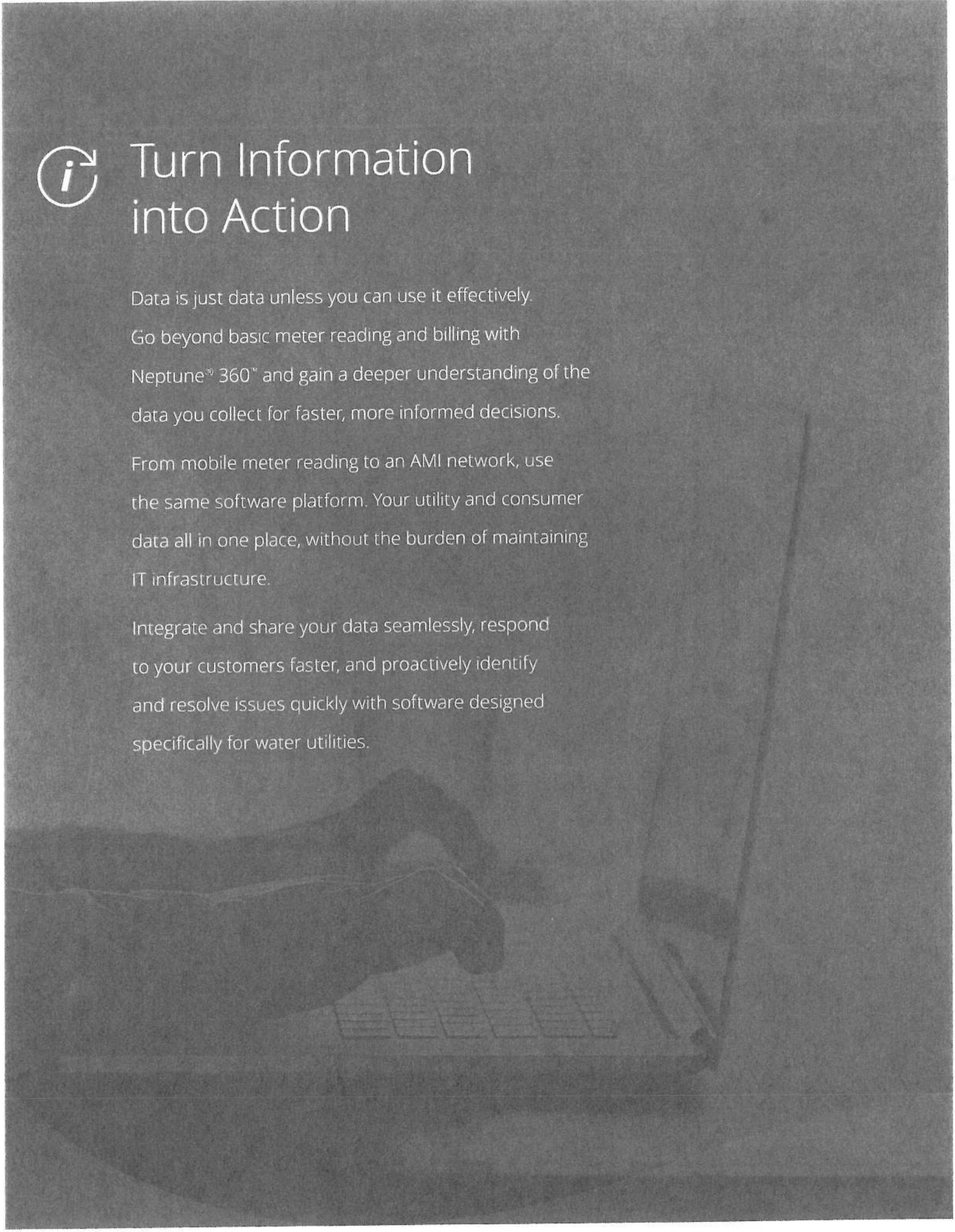
Turn Information into Action

Data is just data unless you can use it effectively. Go beyond basic meter reading and billing with Neptune® 360™ and gain a deeper understanding of the data you collect for faster, more informed decisions.

From mobile meter reading to an AMI network, use the same software platform. Your utility and consumer data all in one place, without the burden of maintaining IT infrastructure.

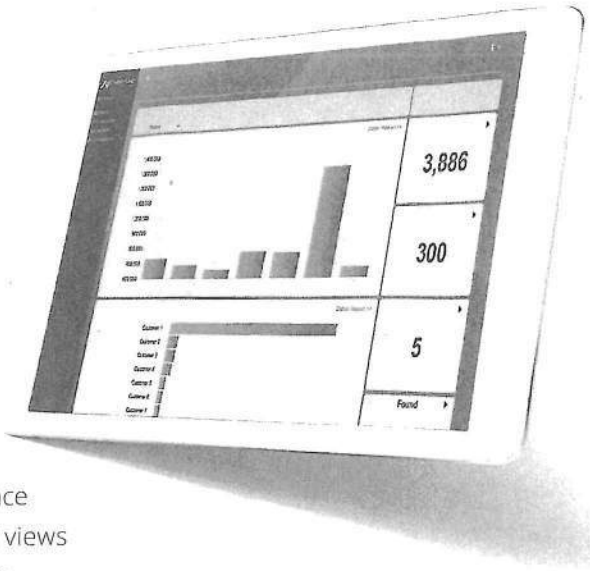
Integrate and share your data seamlessly, respond to your customers faster, and proactively identify and resolve issues quickly with software designed specifically for water utilities.



Putting Your Data in View

Having data is one thing, making sense of it is another. Neptune 360 delivers an intuitive, user-friendly design, making data clear and easy to interpret. Examining your entire AMI network using system-wide Key Performance Indicators and geographical views assists with identifying areas of concern and finding ways to maximize operational efficiencies.

Quickly access a dashboard view of your largest water customers while also providing consumers self-service access to their water consumption. Analysis of individual trends and usage patterns helps resolve customer service calls with confidence. Detailed reporting of consumption activity, potential leaks, and reverse flow will keep you ahead of issues that could impact your utility's revenue.



Lift Your IT Burden with a Cloud-Based Solution

Boost utility efficiency with Neptune 360. No longer install servers or perform upgrades. All you need is an Internet browser to log on from anywhere at any time.

Share Information

Your management, maintenance, customer service, water conservation, and other departments all need fast, easy access to information. Share and leverage actionable data captured by Neptune 360, empowering collaboration and helping predict impacts on your utility. The platform seamlessly integrates meter data, event data, and alerts directly with third-party work order systems, customer portals, hydraulic modeling applications, and other systems through Application Programming Interfaces (APIs).

A True Sense of Security

Ease your security concerns and stay focused on the critical work of water. Neptune 360 is SOC-certified and operates from a continuously-monitored world-class data center, providing the highest level of security, redundancy, and disaster recovery services.

An Application that Grows as You Grow

From mobile meter reading today, to moving to an AMI network tomorrow, the same software platform is utilized. Apply trend analysis in rate structure planning and usage initiatives. The modular-based platform makes it easy to turn on new features as your needs evolve, bringing you critical data to proactively plan for tomorrow.

Trust the Data

Data accuracy and dependability matter. By implementing the highest-level architecture, Neptune ensures data integrity with processes and tools to maintain quality from the meter to the platform as part of routine business operation.

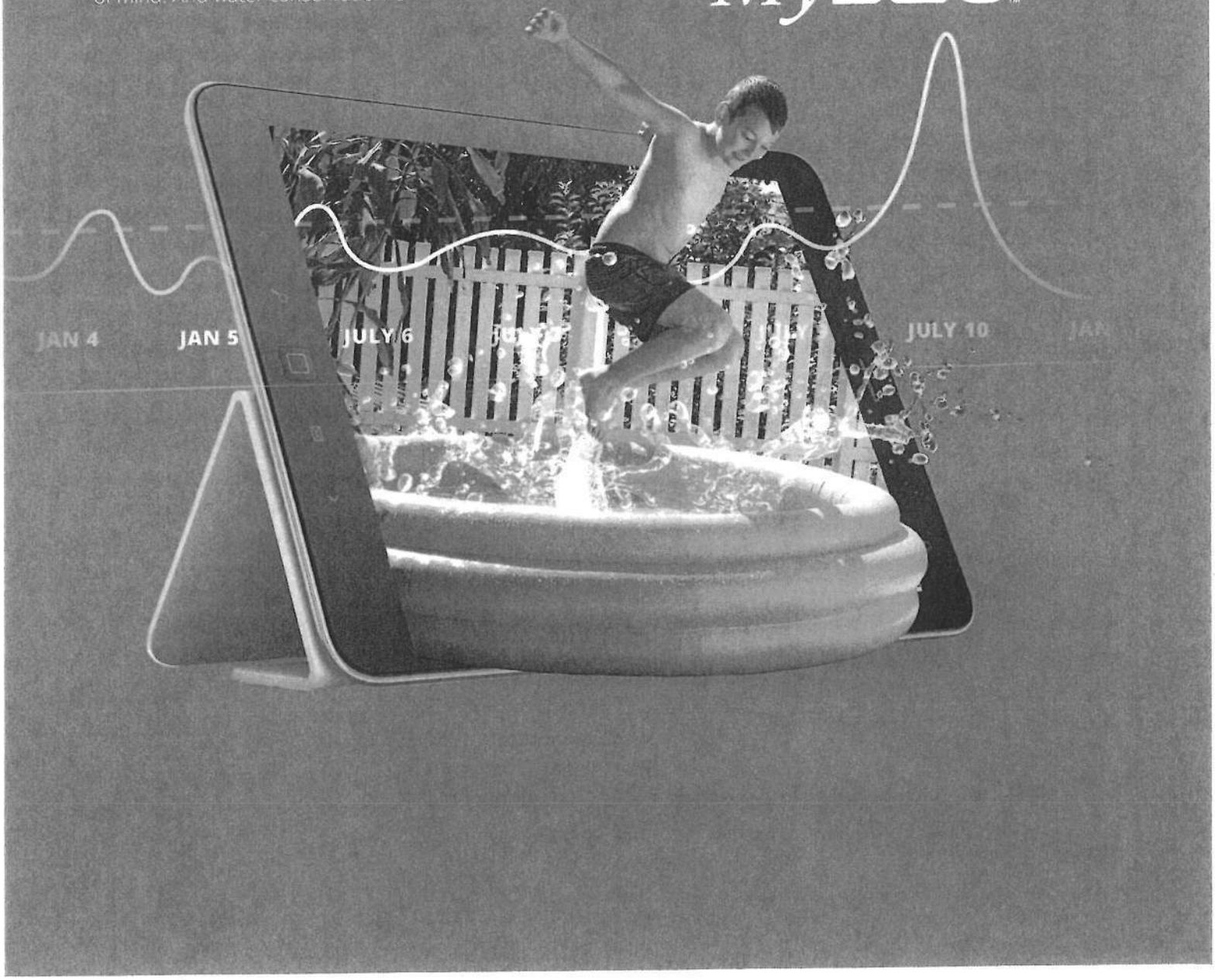
Neptune® My360™ Consumer Portal

Enhance utility customer service and operational efficiency by providing consumers with a convenient, proactive way to monitor their own water consumption 24/7. Users no longer have to wait for a bill to detect possible issues, which means less water lost and fewer high bill complaints.

Users can set water thresholds and out-of-town alerts for greater peace of mind. And water conservation is encouraged when consumers can see how much they actually use with easy-to-read charts and graphs.

Neptune My360 is web-based to work on all devices and is always up-to-date. Easily customize to your utility's branding and get up and running quickly without the need for complex integrations.

My360™



NEPTUNE 360

Analyze and share meaningful data with a platform that empowers utilities. Actionable insights help you achieve your goals and objectives.

METERS MATTER

Stream accurate actionable data right into Neptune® 360™.

WALK-BY DATA

Sync collected data easily.

FUTURE PROOF AMI

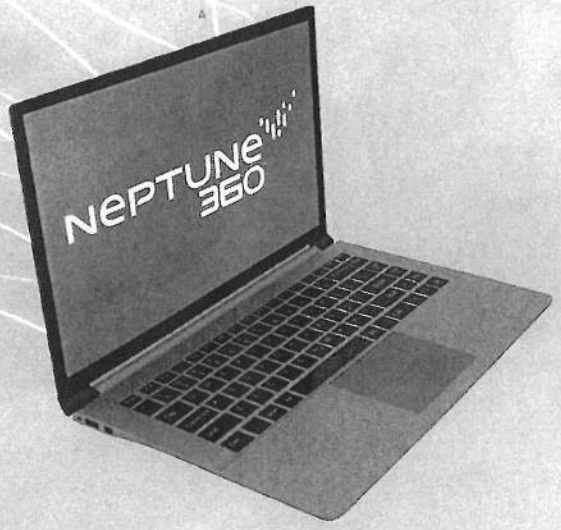
Connect AMI network data.

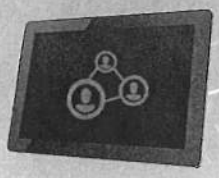
BRING YOUR OWN DEVICE

Eliminate specialized devices and communicate efficiently.

MOBILE

Incorporate mobile data collection.





THIRD PARTY SOFTWARE

Link data with third party applications (such as CIS and ESRI).

CONSUMER PORTAL

Intuitive self-service solution to view consumption and encourage conservation.

+ ACT QUICKLY
+ PLAN FOR THE FUTURE
+ MANAGE GROWTH

Specifications

Neptune 360

- Google Chrome and Microsoft Edge web browsers supported
- When using touch screen monitors, Neptune recommends Microsoft Edge web browser for optimal viewing and performance

Neptune 360 Mobile

Neptune 360 Mobile supports Android, iPhone, and iPad devices running the following operating systems:

- Android:
  - Recommended device manufacturers: Samsung, Nexus, or Motorola
  - Supported OS Versions: 5.1 – 11
- iOS:
  - Versions 10.3.1 – 15

Neptune My360

- A web browser with Internet connectivity is required
- Responsive design with capability to run on desktop, laptop, tablet and mobile devices

AICPA SOC
aicpa.org/soc4so
Service Organizations
™

Neptune® 360™ Mobile

Neptune 360 Mobile provides direct communication via wireless from the field without the need to go back into the office, yielding data on demand for more efficient customer service. Other application capabilities include RF Test, Off-Cycle Read, and Data Log to capture 96 days of hourly historical consumption — addressing customer issues faster.

96
days of hourly historical consumption

Bring Your Own Device to Field Operations

Save money and time with Neptune 360 Mobile — use your utility's existing Android or iOS cell phones or tablet devices to perform meter reading. Pair with a Neptune R900® System belt clip transceiver or mobile data collector and expand your field device options when performing re-reads, reading monthly routes or even responding to high water bill complaints.

Neptune® 360™ Benefits

- Neptune-managed system with no installation required
- Cloud-based solution in a world-class data center with the highest level of security and disaster recovery/redundancy
- 24/7 software system monitoring
- Retain data ownership in a system designed exclusively for water utilities
- Integrate and access Data Analytics across departments — helping your utility achieve goals and objectives
- Identify potential leaks, excessive consumption, and reverse flow to proactively resolve issues faster
- Migrate easily from mobile to fixed network
- Aid Non-Revenue Water reduction, conservation, and rate planning
- A single platform across devices that can be accessed anywhere at any time

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Sensus AMI Metering System

xylem
Let's Solve Water

DATA SHEET
WDS-10006-08

iPERL Smart Water Meter

Electromagnetic Flow Measurement System

Sensus iPERL® smart water meters are designed to capture both lost water and lost revenue. The innovative magnetic technology delivers unmatched low flow registration and minimal pressure loss. With no moving parts, iPERL maintains its accuracy over a 20 year lifetime and is equipped with smart water alarms – delivering the intelligence you need to quickly resolve issues in the field.

FEATURES

- 5/8", 5/8" x 3/4", 3/4" and 1" sizes available in potable and reclaim versions
- 3/4" and 1" available in residential fire service (UL 327b)
- Starts registering flow as low as 0.03 gpm (0.007 m^3/hr)
- Can be installed horizontally, vertically or diagonally
- Compatible with current Sensus AMI/ AMR systems

BENEFITS

- Maximize investment with iPERL's electromagnetic technology, which delivers a 20-year accuracy warranty, with no required maintenance, and no loss in accuracy over 20 years
- Smart alarms detect issues such as leaks, reverse flow, empty pipe, etc.
- Improve low flow accuracy to drive additional revenue

Industry Leading Performance

The patented measurement technology of the iPERL water meter provides continuous and enhanced accuracy ranges at both low and high flows and perpetual accuracy over the life of the product. The iPERL meter has a 20-year accuracy warranty and a 20-year battery life guarantee. Over this 20-year lifespan, your iPERL will measure just as accurately as the day it was installed.

Construction

The iPERL has a flow tube that is comprised entirely of composite polymer, a thermal polymer shell, and an electronic register inside.

Electronic Register

The 9-digit hermetically-sealed electronic register with LCD display was designed to eliminate dirt, water, and moisture contamination in pit settings. The large, easy-to-read display includes AMI/AMR digits, direction of flow, units of measure, and empty pipe detection. The AMI/AMR digits and units of measure are fully programmable. The register also provides user configurable data logging.

Solid State Electromagnetic Technology

By avoiding the use of a mechanical measuring element inside the flow tube, metering performance is linear over the entire flow range – ensuring no reduction in accuracy at any flow rate over the life of the meter. The iPERL meter uses our patented remanent magnetic field technology – requiring far less energy and delivering superior accuracy.

Tamperproof

The integrated construction of the iPERL water meter prevents removal of the register to obtain free water. The magnetic tamper and low field alarms will both indicate any attempt to tamper with the magnetic field of the iPERL meter. The meter communication alarm indicates a possible cut cable.

Alarms

Quick resolution of field issues is made possible with smart water alarms including leak detection, reverse flow, empty pipe, magnetic tamper and low battery. When integrated with our FlexNet® communication network, remotely gathering and transmitting data has never been more reliable or profitable.

SENSUS
a xylem brand

iPERL Smart Water Meter

Electromagnetic Flow Measurement System

Smart Alarms

iPERL meters have many configurable smart alarms designed to protect your utility's investment, enhance customer service, and monitor/optimize distribution systems. These alarms include:

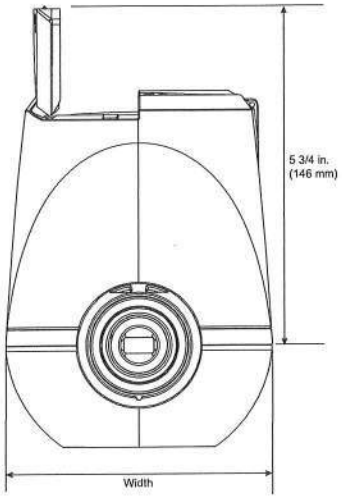
- Empty Pipe
  Detects the absence of water in the flow tube and sends an alert. Allows you to identify main breaks downstream and water shortages for quicker resolution to ensure water availability. This alarm can also indicate the water meter has been removed from service, or notify you of potential tamper.
- Tampering
  Detect magnetic interference to reduce apparent water losses and protect against unauthorized activities.
- Customer Leak
  Detect continual consumption of water over a period of time to indicate downstream leaks. This protects your utility, infrastructure and customers through alarm notifications that can reduce water loss and leak adjustment costs.
- Low Battery
  Replace your meters before they stop recording consumption through alerts indicating battery capacity to the meter or valve is running low.
- Reverse Flow
  Keep untreated water from re-entering your distribution system and deter tampering attempts through an alarm triggered when reverse flow is detected at the meter.

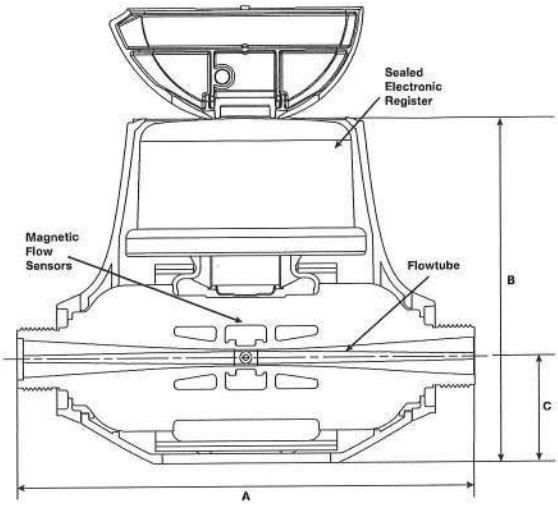
SPECIFICATIONS

Service	Measurement of potable and reclaim water, and Residential Fire Service (UL 327b). 0-100% humidity. Fully submersible. IP68+ rated.			
Temperature Ranges	Water operating: Ambient air operating: Storage air:	33 °F (0.55 °C) to 80 °F (26.7 °C) -22 °F (-30 °C) to 140 °F (60 °C) -30 °F (-34.4 °C) to 158 °F (70 °C)		
Starting Flow	5/8" (DN 15 mm) size: 0.03 gpm (0.007 m^3/h)	5/8" x 3/4" (DN 15x20 mm) size: 0.03 gpm (0.007 m^3/h)	3/4" (DN 20 mm) size: 0.03 gpm (0.007 m^3/h)	1" (DN 25 mm) size: 0.11 gpm (0.025 m^3/h)
Low Flow Range (±3%)	5/8" (DN 15 mm) size: >0.10 gpm (0.025 m^3/hr) to <0.18 gpm (0.041 m^3/hr)	5/8" x 3/4" (DN 15 mm) size: >0.10 gpm (0.025 m^3/hr) to <0.18 gpm (0.041 m^3/hr)	3/4" (DN 20 mm) size: >0.10 gpm (0.025 m^3/hr) to <0.18 gpm (0.041 m^3/hr)	1" (DN 25 mm) size: >0.3 gpm (0.068 m^3/hr) to <0.4 gpm (0.09 m^3/hr)
Normal Water Operating Flow Range (±1.5%)	5/8" (DN 15 mm) size: 0.18 to 25 gpm (0.04 to 5.7 m^3/hr)	5/8" x 3/4" (DN 15x20 mm) size: 0.18 to 35 gpm (0.04 to 8.0 m^3/hr)	3/4" (DN 20 mm) size: 0.18 to 35 gpm (0.04 to 8.0 m^3/hr)	1" (DN 25 mm) size: 0.4 to 55 gpm (0.09 to 12.5 m^3/hr)
Maximum Operating Pressure	5/8", 5/8" x 3/4", and 3/4" size: 200 psi (13.8 bar) 1" size: 175 psi (12.1 bar)			
Measurement Technology	Solid state electromagnetic flow			
Register	Hermetically sealed, 9-digit programmable electronic register			
Capacity	10,000,000 gallons, 1,000,000 cubic feet or 100,000 m3 capacity			
Register Resolution	.01 gallons/imperial gallons, .001 cubic foot, or .0001 m3			
Conformance to Standards	Meets the requirements of NSF 61, Annex G and NSF 372. Exceeds the most current revision of AWWA Standard C-715.			
Materials	External housing - Thermal polymer Flowtube - Composite polymer or a bronze alloy flowtube with a composite polymer internal core		Electrode - Silver/silver chloride Register cover - Hermetically sealed glass	

iPERL Smart Water Meter

Electromagnetic Flow Measurement System





DIMENSIONS AND NET WEIGHTS

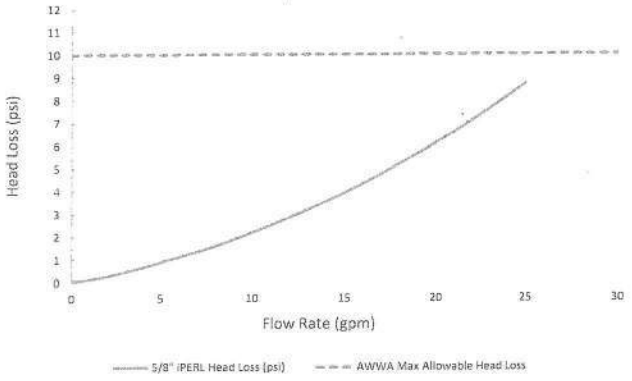
Meter Size	A	B	C	Spud Ends	NPSM Thread Size	Width	Net Weight
5/8" (DN 15 mm)	7-1/2" (190 mm)	6-1/10" (155mm)	1-3/4" (44 mm)	5/8" (15 mm)	3/4" (20 mm)	4-1/2" (114 mm)	3.1 lb. (1.4 kg)
5/8" x 3/4" (DN 15mm x 20 mm)	7-1/2" (190 mm)	6-1/10" (155mm)	1-3/4" (44 mm)	3/4" (20 mm)	1" (25 mm)	4-1/2" (114 mm)	3.1 lb. (1.4 kg)
3/4"Short (DN 20 mm)	7-1/2" (190 mm)	6-1/10" (155 mm)	1-3/4" (44 mm)	3/4" (20 mm)	1" (25 mm)	4-1/2" (114 mm)	3.1 lb. (1.4 kg)
3/4" (DN 20 mm)	9" (229 mm)	6-1/10" (155 mm)	1-3/4" (44 mm)	3/4" (20 mm)	1" (25 mm)	4-1/2" (114 mm)	3.2 lb. (1.45 kg)
1" (DN 25 mm)	10-3/4" (273 mm)	6-1/10" (155 mm)	1-3/4" (44 mm)	1" (25 mm)	1-1/4" (32 mm)	4-1/2" (114 mm)	3.3 lb. (1.5 kg)

iPERL Smart Water Meter

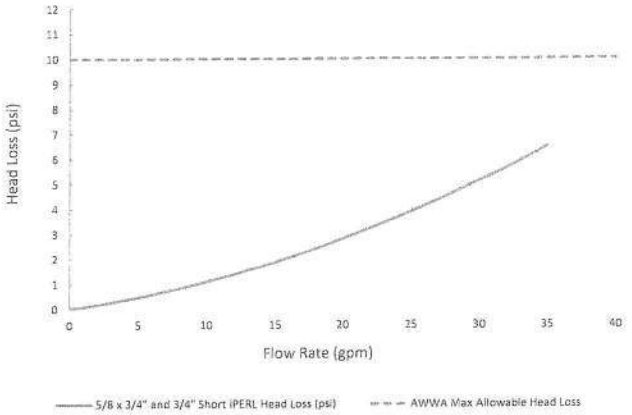
Electromagnetic Flow Measurement System

Head Loss Curves

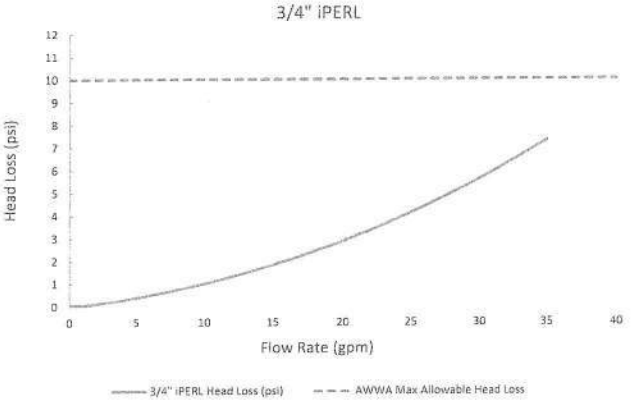
5/8" iPERL



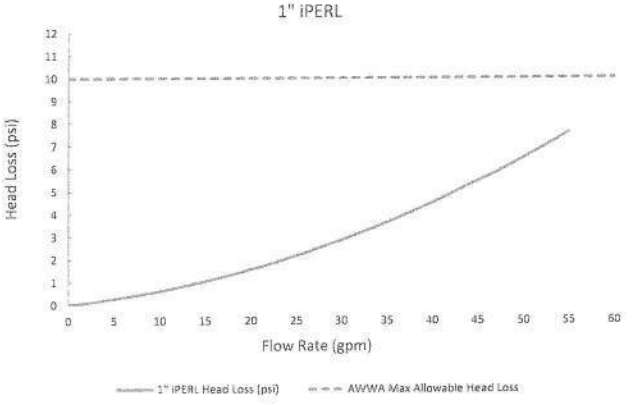
5/8" x 3/4" and 3/4" Short iPERL



3/4" iPERL



1" iPERL



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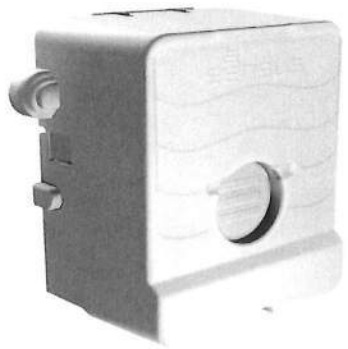
DATA SHEET
WDS-10025-04

SmartPoint 510M

Non-Pit Set Module



The SmartPoint® 510M Non-Pit Set Module is a radio transceiver that provides water utilities inbound and outbound access to water measurement and ancillary device diagnostics via radio signal. The SmartPoint 510M Module is designed for non-submersible/non-pit installations.

TouchCoupler Design

The SmartPoint 510M Module utilizes TouchCoupler, the patented Sensus inductive coupling communication platform, to interface with the encoded meter. With TouchCoupler, the SmartPoint 510M Module can connect to the meter using existing two-wire AMR installations instead of requiring utilities to access the home to install a new three-wire system. This results in a fast, efficient and reliable connection at minimal cost.

BENEFITS

- Easily receives input from either walk-by/drive-by or fixed-base collection device
- Controls both deployment and lifetime operation costs
- Compact installation that saves time, space and money - without reducing system performance
- Delivers a fast, efficient, reliable connection at minimal cost
- Minimizes new infrastructure investment
- Enables effective leak detection

Operation

With its migratable, two-way communication ability, the M-Series SmartPoint functions as a walk-by/drive-by endpoint, fixed-base endpoint, or combination of the two. This flexibility increases utility data collection capabilities and streamlines operations. The SmartPoint 510M Module receives input from the meter register and remotely sends data to a walk-by/drive-by or fixed-base collection device. The SmartPoint 510M Module easily migrates from walk-by/drive-by to fixed base by simply installing a Base Station.

In walk-by/drive-by mode, the SmartPoint 510M Module collects data and awaits an activation signal from the Vehicle Gateway Basestation (VGB) or Hand-Held Device (HHD). Upon signal receipt, it transmits readings, the meter identification number and any alarms.

As a fixed-base endpoint, the SmartPoint 510M Module interacts with one or more strategically placed Base Stations located in the utility service area. Top of the hour readings and other diagnostics are instantly forwarded to the Regional Network Interface (RNI)™ at time of transmission. The FlexNet® communication network provides unmatched reliability by using expansive tower receiver coverage of metering end points, data/message redundancy, failover backup provisions and operation on FCC primary use (unshared) RF spectrum.

Powerful Transmission, Flexible Platform

The SmartPoint® 510M Non-Pit Set Module offers several advantages that control both deployment and lifetime operation costs. Its powerful, industry leading two watt transmitter broadcasts over large distances and minimizes collection infrastructure. And after the SmartPoint 510M Module is installed, its migratable, two-way system platform can be updated without requiring personnel to visit each meter and/or inconveniencing customers.

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SmartPoint 510M

Non-Pit Set Module

Additional SmartPoint 510M Module Features

The SmartPoint 510M Module obtains hourly readings and can monitor continuous flow over a programmable period of time, alerting the utility to leak conditions. In addition, the SmartPoint 510M Module stores up to 840 consumption intervals (35 days of hourly consumption), providing the utility with the ability to extract detailed usage profiles for consumer information and dispute resolution. The SmartPoint 510M Module also incorporates a two-port design, allowing the utility to connect multiple registers and ancillary devices (such as acoustic monitoring) to a single SmartPoint. This results in a compact installation that saves time, space and money – without reducing system performance.

SPECIFICATIONS

Service	Wall mounted (non-pit/non-submersible) installation interfacing the utility meter to the Sensus FlexNet system.
Physical characteristics	Width: 5 9/16" x Height: 5 1/2" x Depth: 3"
Weight	1.13 lbs/18.08 oz
Color	Tan
Frequency range	900 - 950 MHz, 8000 channels X 6.25 kHz steps
Modulation	Proprietary Narrow Band
Memory	Non-Volatile
Power	Lithium Thionyl Chloride batteries
Approvals	US: FCC CFR 47: Part 24D, Part 101C, Part 15 Licensed operation Canada: Industry Canada (IC) RSS-134, RSS-119
Operating temperature	- 22° F to +185° F - 30° C to + 85° C
Options	Dual or single port availability; TouchCoupler only, wired only
Installation environment	The 510M is designed for side-of-home applications where it is not subject to submergence.
Compatibility	TouchCoupler and Wired Version: Sensus Encoder Registers, Badger ADE water registers, Master Meter AccuLinx, and Hersey Translator (approved TR/PL Lead) Wired Version Only: Elster Encoder (Sensus protocol), Neptune ARB VI (ProRead), Hersey Translator, Zenner PMN Nitro 01, McCrometer flowcom FC100-00M, and Kamstrup flowIQ 2100 Refer to the 510M/520M SmartPoint® Module Water Meter and Ancillaries Compatibility Quick Guide for the latest compatibility information.
Warranty	20 years – Based on six transmissions per day. Refer to Sensus G-500 for warranty.

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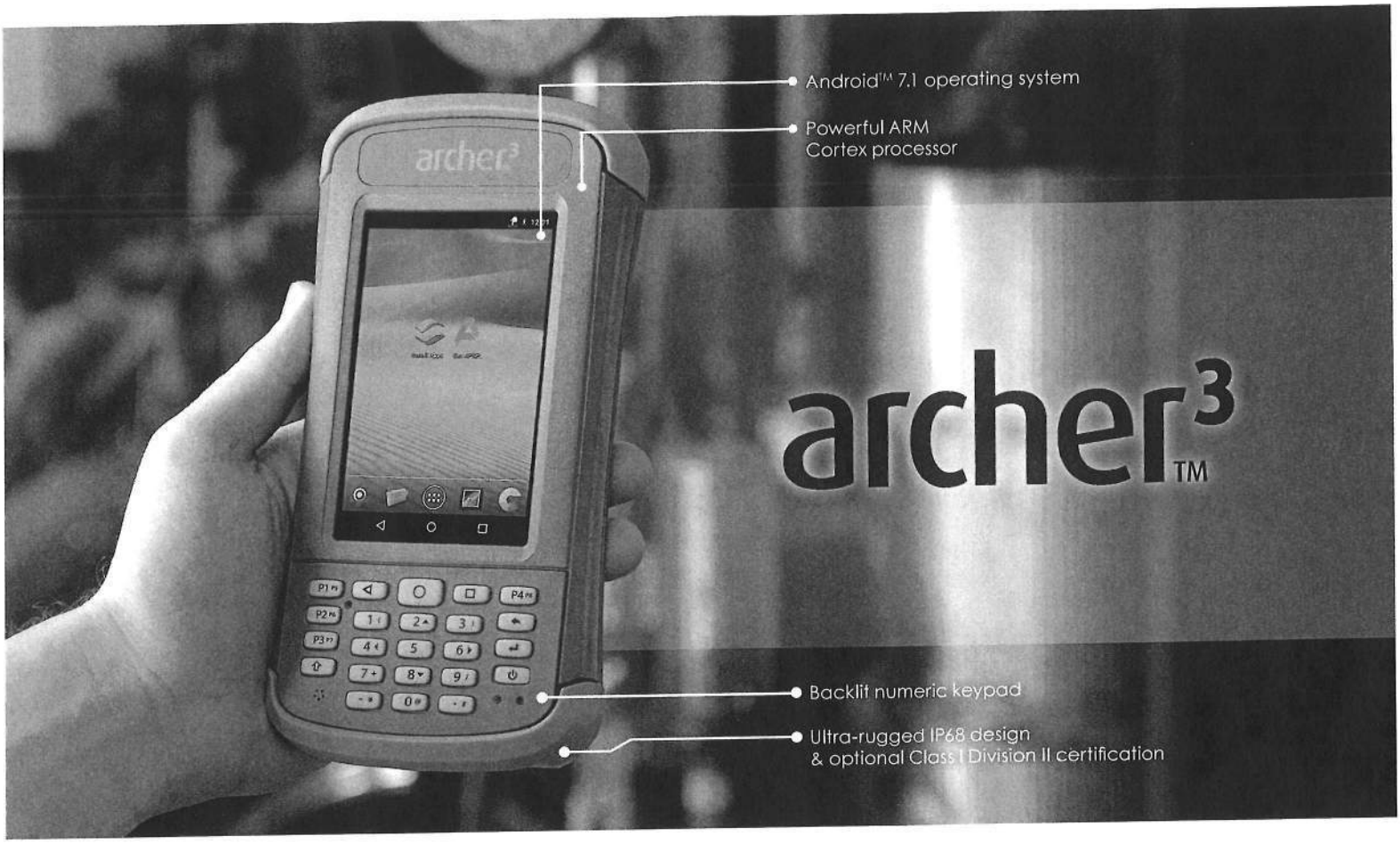


Designed to work. Built to last.

The Archer 3™ Rugged Handheld blends new technology with time-tested features from the Archer 2™ Rugged Handheld to create a powerful new force for efficient mobile data collection. Its lightning-fast quad-core ARM Cortex processor, Android™ 7.1 operating system, and ultra-rugged ergonomic design combine to offer users a powerful option for frequent single-handed data entry.

Features

Built Juniper Rugged™

Designed to meet IP68 and MIL-STD-810G standards, the Archer 3 is built waterproof, dustproof, and shockproof. Rest assured rain, cold temperatures, and dust won't stop a productive workday.

All-day usability

From its ergonomic enclosure, to its sunlight-readable display, down to its 20-hour battery life, the Archer 3 is built for long workdays wherever the job takes you.

Greater speed

Users can expect impressive load speeds all day long with the Archer 3's lightning-fast ARM Cortex processor.

Reliable mobile operating system

Compatible with most Android applications, its Android 7.1 AOSP operating system provides users with a reliable platform for running popular data collection software.

JUNIPER® systems

archer³™

Designed and manufactured in the United States, the Archer 3 Rugged Tablet is built to perform for years and years. The Archer product line has long been favored across several industries as the ultimate mobile data collection device. And with customization options available, it's tough to beat this data collection powerhouse.

PROCESSOR
- 1.2GHz quad-core ARM Cortex A9 i.MX6 processor

OPERATING SYSTEM AND SOFTWARE
- Android 7.1 AOSP
- Multiple languages (English, French, Spanish, German, Portuguese)

MEMORY AND DATA STORAGE
- 2GB RAM
- 16GB flash storage
- User-accessible micro SD/SDXC slot

DISPLAY
- Active viewing area: 4.3" (109 mm) WVGA LCD TFT (800x480)
- High visibility backlit LCD
- Portrait or landscape orientation

TOUCHSCREEN
- Projected capacitive touch interface "optically bonded" to display for increased visibility
- Chemically-strengthened glass
- Scratch-resistant screen

KEYBOARD
- Adjustable LED backlit keys
- Numeric keypad (6 user-reassignable)
- OEM configurable/customizable

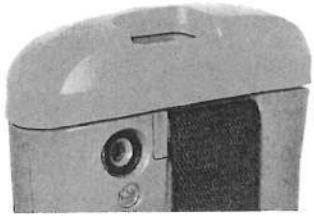
PORTS
- COM1, RS-232C 9-pin D connector with 5VDC power output on pin 9 software-enabled
- USB host (Full A), USB client (Micro B)
- 12, 24VDC input 10-36V unregulated
- 3.5 mm audio jack, supports speaker/microphone or stereo output (pin detect)
- I/O module OEM configurable/customizable

BATTERY
- Intelligent Li-Ion battery 3.6VDC @ 12000mAh, 42.2Whr
- Operates for up to 20 hours on one charge
- Charges in 5.5 hours
- Battery easily changeable in field
- Optimized for excellent performance in cold temperatures

PHYSICAL
- Size: Standard models: 3.6" w x 7.25" l x 1.5" d (91 mm x 184 mm x 38 mm)
- Weight: 1.3 lbs (590 g), with battery
- Durable hardened plastic in a shear-proof and shock-resistant design
- Strong chemical resistance
- Comfortable, wide hand strap
- Easy-to-grip, impact-absorbing bumpers

JUNIPER RUGGED™
- IP68 waterproof and dustproof 1.4m for 30 min)
- Operating temperature: –22F to 140F (–30C to 60C)
- Storage temperature: –22F to 158F (–30C to 70C)
- Shockproof: multiple drops from 5' (1.5 m) onto concrete
- MIL-STD-810G test procedures: Method 500.5 Low Pressure (Altitude); Method 501.5 High Temperature; Method 502.5 Low Temperature; Method 503.5 Temperature Shock; Method 506.5 Rain; Method 507.5 Humidity; Method 510.5 Sand and Dust; Method 512.5 Immersion; Method 514.6 Vibration; Method 516.6 Shock

WIRELESS CONNECTIVITY OPTIONS
- Bluetooth® wireless technology, 4.2 BR/EDR/BLE "Smart Ready." Class 1.5, range greater than 100 feet (30m)
- Wi-Fi 802.11b/g/n



CAMERA
- 5MP resolution with autofocus and LED illuminator + video capture
- Embed photo with date, time, and GPS position

GPS/GNSS (GEO MODELS)
- High-sensitivity GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS receiver
- User settings for enhanced performance under canopy
- Accuracy: SBAS 2 meters; autonomous 5 meters
- NMEA-0183 ver. 4.0 output
- 72 channel u-blox M8 engine
- Concurrent GNSS constellation resolution

BARCODE 1D/2D IMAGER (BC MODELS)
- Built-in barcode imager and decoder
- Symbologies: all common 1D and 2D (PDF417, MicroPDF417, Composite, RSS, TLC-39, Data matrix, QR code, Micro QR code, Aztec, MaxiCode, Postal codes, etc.)
- Programmable trigger buttons
- Visible aiming crosshair with low-light illumination
- Barcode Connector: Utility, wedge and configuration, SDK support available

CERTIFICATIONS AND STANDARDS
- FCC Class B
- CE Marking (applicable EMC, R&TTE, and LVD directives)
- Industry Canada
- EN60950 Safety
- Optional Class I, II, III Division 2 for hazardous locations

STANDARD ACCESSORIES
- 12000mAh battery
- AC wall charger with international plug kit
- Micro USB client sync cable
- Quick Start Guide
- Ultra-wide hand strap
- Shipping box
- Screwdriver
- Stylus with tether
- 2-year warranty

JUNIPER® systems

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Phone: 435.753.1881
Email: sales@junipersys.com

Juniper Systems Ltd. Bromsgrove, UK
Phone: +44 (0) 1527 870773
Email: infoemea@junipersys.com

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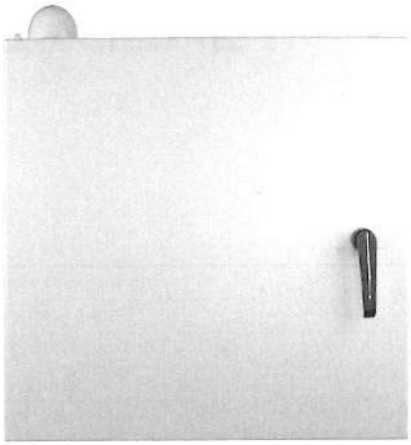

FlexNet M400B2 Base Station

Compact Point-to-Multipoint Base Station

The Sensus FlexNet® M400B2 Base Station offers a strategic communications option for public service providers with endpoints deployed in remote or densely populated areas.

FEATURES

- GPS receiver for time synchronization
- Duplexer for single antenna
- IP-addressable power supply with hot-swap capability
- 8-hour battery backup
- Alarms and reporting capability
- Backhaul via Ethernet/IP
- Heated battery for cold weather environments
- Modular construction for easy serviceability

APPLICATIONS

- Two-way Advanced Meter Infrastructure (AMI)
- Distribution Automation (DA)
- Demand Response (DR)
- Home Area Networks (HAN)
- Sensus VantagePoint® Lighting Control

The efficient transceiver can transmit and receive in a 200kHz band of spectrum. 200kHz enables more dedicated channels, resulting in higher network capacity, allowing more granular data and more channels of data. And the Sensus FlexNet communication network delivers double the transmit power of competitive systems over primary-use licensed spectrum - ensuring reliability for mission critical applications.

The tower-based architecture enables reliable communication of status and usage information with fewer access points than other network architectures. These compact, efficient base stations fit in space-constrained environments and require no air conditioning.

Licensed Radio Spectrum

In North America, FCC/IC protected primary-use spectrum avoids competition with other wireless services, interference from other radio devices and the risk of being taken over by emergency service providers

Fewer Access Points

Our point-to-multipoint architecture directly connects base stations to endpoints over large geographic areas - greatly reducing the number of network backhaul connections as well as O&M costs

Resilient Network Design

Sensus Base Stations continue to provide real time data during outages and emergencies because of eight hour plus battery backup - enabling better workforce management and faster service restoration

Small Footprint

Flexible pole or wall-mounting options enable strategic deployment with a discreet appearance

Industry Leading Security

Sensus has achieved GE/Wurldtech™ Achilles® communications certification for critical infrastructure security against cyber threats

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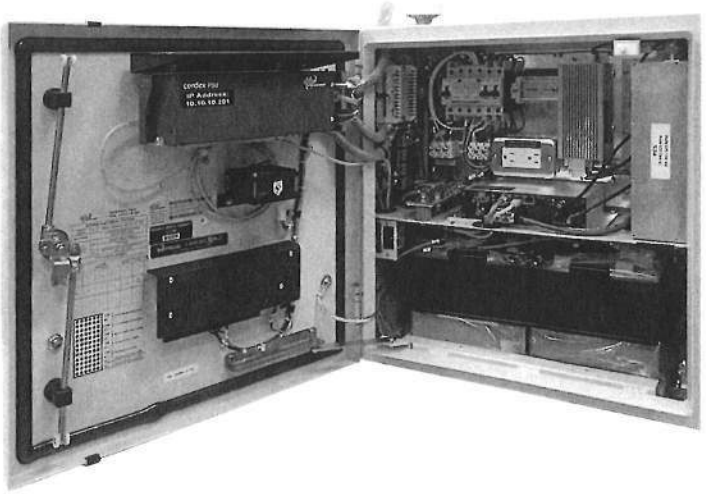
FlexNet® M400B2 Base Station

Compact Point-to-Multipoint Base Station



Properties

Receive bandwidth	200 KHz
Transceivers	Single
Spectrum	Licensed 900 MHz PCS/MAS
Duplexing	Single transmit Sixteen receivers - simultaneous/dedicated
Applications	Single
Expandability	No
Compatibility	SNMP
FlexNet	Requires RNI 3.x or newer

Enclosures - Outdoor - Pole/Wall Mount

Height	22" (55.9 cm)
Width x Depth	22" (55.9 cm) x 10.5" (26.7 cm)
Capacity	One transceiver
Temperature	-40° to +122° F (-40° to +50° C)
Voltage	120 VAC
Battery backup	8 hours
NEMA rating	4
Air conditioned	No

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1-800-638-3748
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Zenner AMI Metering System

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ZENNER
Multi-Jet Type Magnetic Drive Cold Water Meters NITRO I

Model PMN
Sizes: 5/8", 3/4", 1", 1-1/2", 2"

INTRODUCTION: ZENNER PMN Water Meters utilize a magnetically driven multi-jet design. They are designed to measure cold potable water where flow is in one direction only in residential, commercial, and industrial settings.

OPERATION: Water flows through the meter's strainer and into the measuring chamber where it drives the impeller. A drive magnet transmits the motion of the impeller to a driven magnet located within the hermetically sealed register. Powerful rare earth magnets eliminate slipping and uncoupling to increase overall accuracy. The magnet is connected to a gear train which translates the impeller's rotation into volume totalization displayed on the register dial face.

CONSTRUCTION: ZENNER PMN Water Meters consist of three basic components: main case, measuring chamber and sealed register. The main cases are constructed using either C89833 or C89850 Brass Alloys. Measuring Chambers are constructed of a durable synthetic polymer. Registers are available as either direct read or electronic output.

MAINTENANCE: ZENNER PMN Water Meters are engineered and manufactured to provide long-term service and operate virtually maintenance free. The precise simple design allows for interchangeable parts, reducing parts inventory.

REGISTRATION: ZENNER PMN Water Meters utilize a magnetically driven, hermetically sealed design. The sealed design eliminates dirt, moisture infiltration, and prevents fogging. The register includes a large odometer-type totalization display, center sweep hand (360°) test circle, low flow leak detector. All ZENNER Meters have electronic output capabilities for easy conversion to Automated Meter Reading. 5/8" through 1" capacities are: 10,000,000 Gallons, 1,000,000 Cubic Feet, 100,000 Cubic Meters, 6 odometer wheels. 1 1/2" and 2" registration capacities are: 100,000,000 Gallons, 10,000,000 Cubic Feet, 1,000,000 Cubic Meters, 6 odometer wheels.

CONFORMANCE: ZENNER PMN Water Meters are tested and comply with AWWA C708, ISO 4064, and G13IT19001-ISO9000 performance standards. These Meters comply with the lead-free provisions of the Safe Drinking Water Act and are certified to NSF/ANSI Standards 61 and 372.

TAMPERPROOF FEATURES: Customer removal of the register to obtain free water is prevented through the use of a locking device that requires a special tool, only available to water utilities.

CONNECTIONS: These meters have been designed with ease of installation in mind through the use of built-in wrench pads on meter sizes 5/8" through 1". Tailpiece/Unions for installations of meters are available as an option for various pipe types, sizes, and misaligned pipes. The 1-1/2" PMN09 and 2" PMN12 flanged meters come with a built-in 1" test port.

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15280 Addison Rd #240, Addison, TX 75001
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www.zennerusa.com

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MODEL		PMN01	PMN02	PMN03	PMN04	PMN05	PMN07	
SIZE		5/8 x 1/2	5/8 x 3/4	3/4" Short	3/4 x 3/4	3/4 x 1	1"	
High Flow Rate	USGPM	20	20	30	30	30	50	
Continuous Flow	USGPM	10	10	15	15	15	25	
Starting Flow	USGPM	3/64	3/64	5/64	5/64	5/64	5/64	
Normal Flow	USGPM	1 - 20	1 - 20	2 - 30	2 - 30	2 - 30	3 - 50	
Low Flow	USGPM	1/8	1/8	1/2	1/2	1/2	3/4	
Extreme High Flow (Intermittent)	USGPM	25	28	32	32	32	60	
Maximum Working Pressure	P.S.I.	175	175	175	175	175	175	
Maximum Temperature	Deg. F	122	122	122	122	122	122	
Length	Inches	7 1/2	7 1/2	7 1/2	9	9	10 3/4	
Length with Couplings	Inches	12 1/2	12 1/2	12 1/2	14 1/2	14 1/2	16 1/2	
Height	Inches	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	5	
Weight	Pounds	4.5	4.5	4.5	6	6.3	7	

MODEL		PMN08	PMN08M	PMN09	PMN10	PMN11	PMN11M	PMN12
SIZE		1-1/2" Female Threads	1-1/2" Male Threads	1-1/2" Flanged	2" Flanged 10" LL	2" Female Threads	2" Male Threads	2" Flanged
High Flow Rate	USGPM	100	100	100	160	160	160	160
Continuous Flow	USGPM	50	50	50	80	80	80	80
Starting Flow	USGPM	1/2	1/2	1/2	3/4	3/4	3/4	3/4
Normal Flow	USGPM	5-100	5-100	5-100	8-160	8-160	8-160	8-160
Low Flow	USGPM	1 1/2	1 1/2	1 1/2	2	2	2	2
Extreme High Flow (Intermittent)	USGPM	120	120	120	180	180	180	180
Maximum Working Pressure	P.S.I.	175	175	175	175	175	175	175
Maximum Temperature	Deg. F	122	122	122	122	122	122	122
Length	Inches	12 5/8	12 5/8	13	10	15 1/4	15 1/4	17
Length with Couplings	Inches	-	18 5/8	-	-	-	21 1/2	-
Height	Inches	7	7	7	7	7	7	7
Weight	Pounds	15	15	20	19	21	21	25

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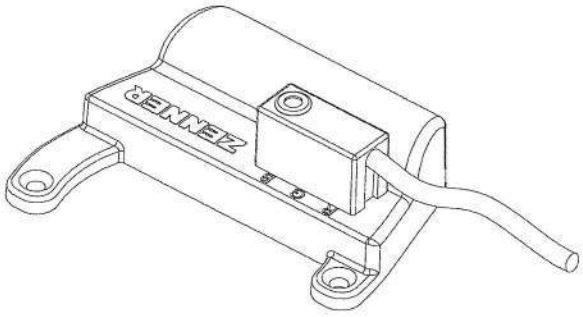
ZENNER ETRU Encoded Type Register
Technical Brief



APPLICATION: The Encoded Type Register (ETRU) is designed for use with ZENNER PMN (MTK), PPD (RTK), ZTM, ZTMB and FHZ meter series registers to provide either an encoded or pulse output. **The ZENNER ETR is not designed for systems that require M-Bus or 4-20mA outputs.**

MOUNTING: The ETRU mounts onto the mounts onto the meter shroud using two flat head tamper screws that are provided. A special tool is required to install or remove the ETRU. The ETRU can be removed from the meter without disrupting water service.

MAGNETIC PICKUP: Magnetic pickup from the register pointer ensures reliable positive readings.

SEALED ETRU: The ETRU is completely sealed and approved for pit conditions.

CONSTRUCTION: The housing of the ETRU is constructed of an environmentally safe plastic and resin. Internal construction materials are designed for long-life and reliability. The potting compound provides an impenetrable barrier against water and natural contaminants.

TEMPERATURE: The operating range of the ETRU is -20° C to 76° C (-4° F to 169°F). The water meter should not be exposed to temperatures below freezing.

WIRE CONNECTIONS: The ETRU is provided as a factory pre-wired assembly or an individual unit that can be wired in the field. Length of the connecting wires is limited by the limitations of the connected AMR device.

TAMPER-PROOF FEATURES: Customer removal of the ETRU can be detected by a built in electronic feature of the unit.

ELECTRONCS: The circuit board is completely sealed against moisture and humidity.

OPERATING CHARACTERISTICS: The ETRU has an output every revolution of the pointer. The ETRU generates one count for every rotation of the sweep hand. It will not decrement the count with reverse rotation, and will internally count up to 50 consecutive reverse rotations. This feature is provided to ensure that if a forward rotation is followed by a reverse rotation, the reverse flow will not cause the forward flow to be counted twice. A maximum of 50 consecutive reverse rotations is allowed for.

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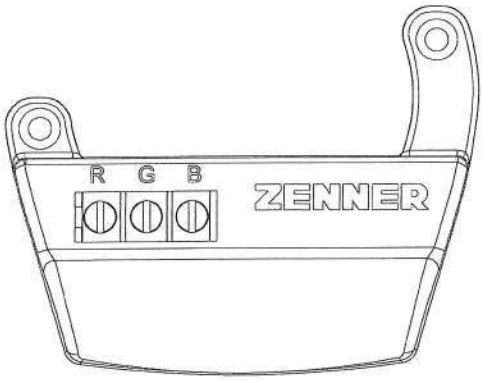
MODE: The ETRU can be configured in one of two modes of operation from the factory. AMR/AMI solution uses three wires. The Digital Switch solution uses two wires.

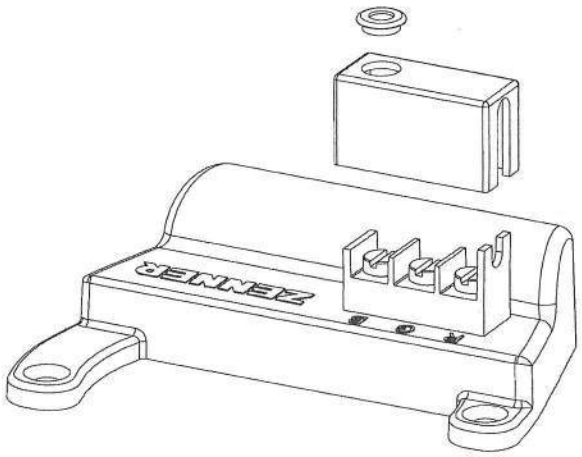
- **Encoded Mode (Using Three Wires) Sensus Compatible.**

  Connections for the ETRU are clearly marked R = Red (Clock), G = Green (Data) and B = Black (Ground) for Encoded Mode Operation.

- **Digital Switch Output Mode (Using Two Wires)**

  The digital output is an 'open-collector' transistor between the Green and Black terminals. The black terminal is to be attached to the ground, or most negative terminal of the switch counter and the Green terminal to the input, or most positive terminal of the switch counter. The maximum current that the ETRU output can switch is 20mA. The active signal is on for 9ms.





Specifications

Terminals	Three
Weight	3 oz.
Temperature	-20° C to 76° C (-4° F to 169°F)
Signal Output	Industry Standard ASCII Format or Digital Output
Signal Type	Two wire asynchronous for touch Solutions Three wire synchronous for AMR Solutions
Power Source	Internal battery with 15 plus years lifetime

Specifications

Repeater		
Dual Function	Range Extender High Speed Backbone	▪ High transmit power and high-gain antennas bridge gaps between sections of a mesh. (e.g. across lakes, on peaks between valleys) ▪ Powered repeaters make a "fast-lane" for data in your water/gas fixed networks
Installation	Controls Location Indicators	▪ LCD Panel w/menu buttons for common actions ▪ GPS receiver auto-detects and reports location ▪ Status LED's confirm successful installation
User Interface	USB RF Network	▪ Graphical User Interface ▪ Remote and local management

General	
Power Requirements	▪ 120 VAC or 240 VAC +/- 10%
Surge Protection	▪ ANSI C62.41 Surge Compliant Surge Rated to 6000 V at 3000 A
Dual Battery Backup	▪ Maintains full operation for up to 24 hours ▪ Mesh control and data collection for up to 3 months of outage
Enclosure	▪ IP67 Rated Die-Cast Aluminum
Physical Size	▪ 11"H x 9"W x 4"D
Mounting	▪ Pole or Wale Mount
Environmental	▪ -40 C to +85 degrees C
Radio	
Frequency	▪ 902 MHz to 928 MHz license free ISM brand
Spread Spectrum	▪ Frequency Hopping
Transmit Power	▪ 27 dBm
Receiver Sensitivity	▪ -112 dBm
Encryption	▪ 128 Bit Symmetric Key
Antenna	▪ Up to 8dBi – N-type Connector

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Stealth Repeater®

High-speed Range Extender

ZENNER
All that counts.

Add a High Speed Backbone to your Water Fixed Network to extend its range.

Simple

- Automatically discovers and joins network
- Endpoint meters automatically discover repeater
- Easy-to-read pushbutton/LCD controls
- Graphical installation software
- Integrated antenna analyzer
- Integrated GPS
- Local programming via USB or wireless tablet
- OTA (Over-the Air) firmware updates

Secure

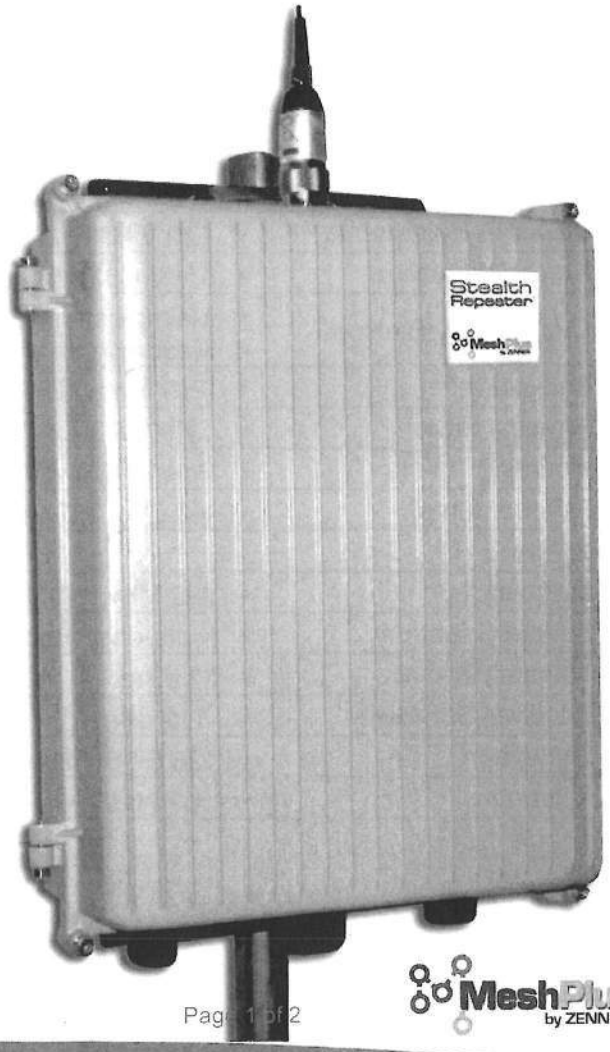
- Mesh: 128-bit symmetric-key encryption
- Management: Password protected
- Physical: intrusion detection/reporting

Rugged

- D IP67 waterproof
- Operating temperature: -40C to +85C
- Hinged aluminum chassis
- Stainless captive hardware
- 120V or 240V AC power
- 6000V/3000A AC surge suppression
- DC/Solar power options
- Gore-Tex pressure vent
- Integral heater for extended temperature ranges

Reliable

- Dual batteries for up to 3 months
- 5-year backup battery service life
- Redundant configurations with fail-over
- Automatic battery monitoring and maintenance
- Hot swappable batteries



MeshPlus by ZENNER

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Specifications

Collector		
Data Collection	1GC Standard Non-Volatile Flash Storage	• Collects data from thousands of remote devices • Retains up to 6 months of data • All data time stamped when generated and received • Options for up to 8GB
Monitoring and Control System Interface	Wired and Wireless	• Standard-based interfaces support wired and wireless connections, up to 1 mile.
Mesh Coordinator	Mesh Timing	• GPS disciplined TCXO for ultra-stable timing • Redundant configurations with auto-failover
User Interface	USB RF Network	• Graphical User Interface • Revote and local management

General	
Power Requirements	• 120 VAC or 240 VAC +/- 10%
Surge Protection	• ANSI C62.41 Surge Compliant Surge Rated to 6000 V at 3000 A
Dual Battery Backup	• Maintains full operation for up to 24 hours • Mesh control and data collection for up to 3 months of outage
Enclosure	• IP67 Rated Die-Cast Aluminum
Physical Size	• 11"H x 9"W x 4"D
Mounting	• Pole or Wall Mount
Environmental	• -40°C to +85°C

Radio	
Frequency	• 902 MHz to 928 MHz license free ISM brand
Spread Spectrum	• Frequency Hopping
Transmit Power	• 27 dBm
Receiver Sensitivity	• -112 dBm
Encryption	• 128 Bit Symmetric Key
Antenna	• Up to 8dBi — N-type Connector

ZENNER USA
15280 Addison Rd #240, Addison, TX 75001
Phone (972) 386-6611, Fax (972) 386-1814
www.zennerusa.com

Stealth Reader™ By ZENNER

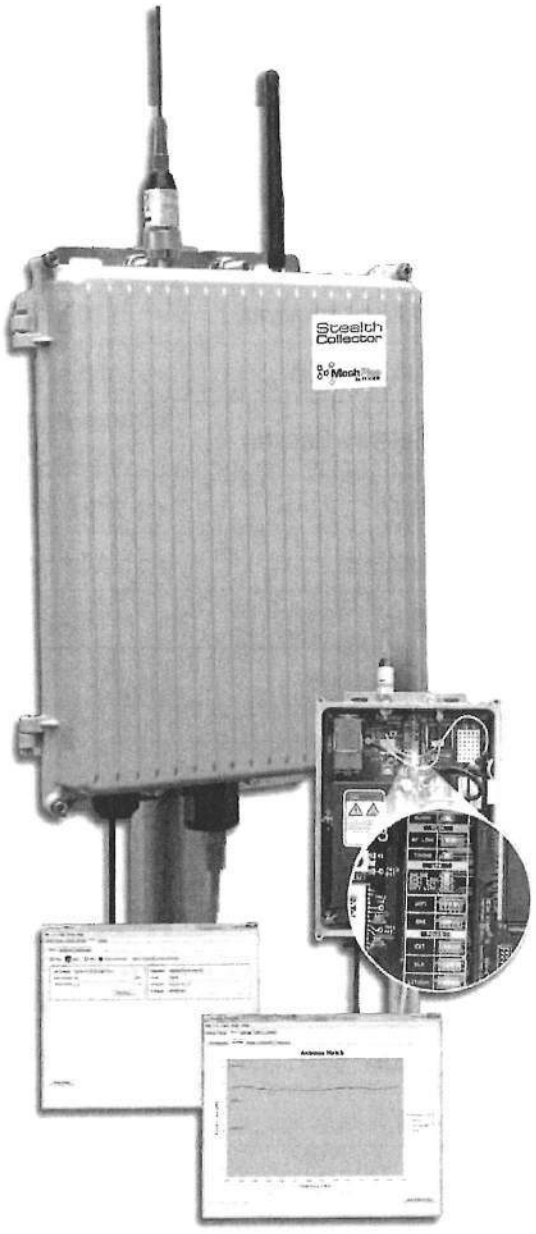
ZENNER All that counts.

ZENNER Stealth Collector Network Controller

Each Collector manages and connects thousands of Stealth Reader MIU devices to the monitoring and control computer system. Designed from the ground up for utility and industrial applications, the Stealth Collector is rugged, flexible, secure and reliable.

Rugged

- IP67 Waterproof
- Operating temperature: -40°C to +85°C
- Hinged aluminum chassis
- Stainless steel captive hardware
- Silicone rubber gasket seals
- Pole and structure mounts included
- Waterproof antenna connectors
- 6000V/3000A surge suppression
- Integral heater for humidity control
- Gore-Tex pressure vent



Flexible

- Wired and wireless connectivity
- Standards-compliant interfaces
- 120-240VAC 50/60Hz operation (<4W)
- External DC/POE/Solar power options

Meter Agnostics

- 128-bit encryption
- Digitally signed firmware
- Encrypted password authentication
- Physical intrusion detection/reporting

Reliable

- Dual batteries for up to 3 months continuous operation during extended power outages
- Redundant configurations with hot-failover
- Automatic battery monitoring and maintenance
- 5-year backup battery service

Simple

- At-a-glance LED status panel
- Integrated antenna analyzer
- Integrated GPS for location and timing
- Graphical installation software

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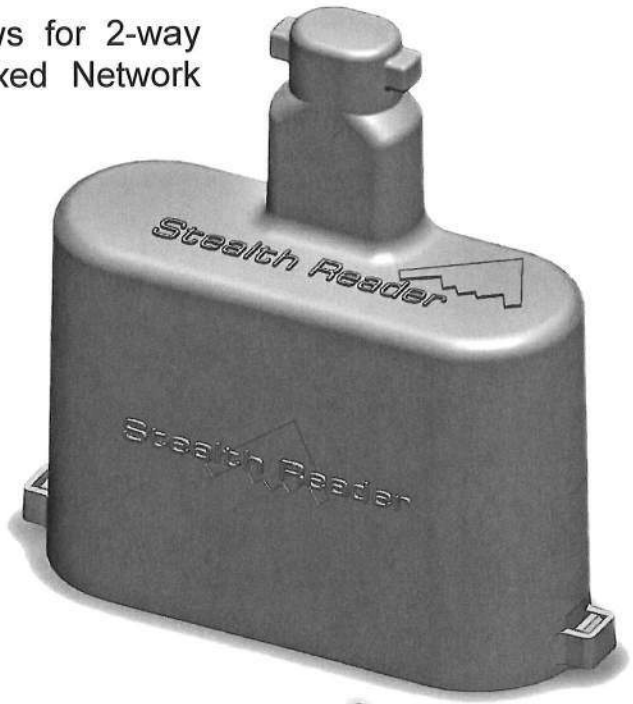
Stealth Reader®

Meter Interface

ZENNER
All that counts.

The Stealth Reader Meter Interface Unit allows for 2-way communication, migration from Drive-by to Fixed Network mode and is meter agnostic.



Hybrid 2-way Drive-by and Fixed Mesh Network

- A Deploy first as drive-by and later upgrade to fixed mesh network using the same meter interfaces/inserts.
- Two-way 902-928MHz FHSS drive-by delivers maximum range and penetration.
- True battery fixed mesh network eliminates the need for towers and AC-powered repeaters.
  - Every meter is also a repeater!
- Fixed mesh network is self-forming and self-healing.
  - Meters automatically discover and join the network.

AMR Capabilities

- Log meter readings hourly or daily
- Stores up to 1 year of hourly readings
- Configurable reporting: hourly, 4 hours, daily, etc.
- Detect/report leak, tamper, low battery
- Water conservation monitoring and reporting

Meter Agnostics

- Pulse registers
- Dual-pulse registers
- Encoded registers using most common protocols
  - ABB, Actaris, AMCO, Badger, Neptune, Sensus
- Utilities can mix new meters with installed bases

MeshPlus by ZENNER

Zenner USA | 15280 Addison Road, Suite 340, Addison, Texas 75001 | 888.766.1253 | zennerusa.com

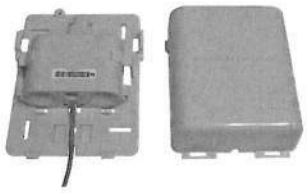
ID Number
Each MIU has a digit numeric unique serial number (32-bit address) that is marked permanently with a bar code on the outside of the MIU housing. This serial number is included in each transmission from each MIU. This serial number is tied to a meter number in the back office software database at installation.

Programmability
After connecting an MIU to a meter the user will use an Android tablet or phone to setup the MIU. The process typically takes about two minutes during which time the wired connection to the meter is confirmed, GPS coordinates are loaded into the MIU to store its location, and the MIU serial number is being recorded to be synched with the website. The synching of MIU numbers with account and meter numbers is how meter reading data is associated with the accounts.

Tampering
The Stealth Reader MIU will detect a cut or shorted wire to the encoder and any tamper fault recognized at the MIU hourly. The MIU transmits any encoder wiring short at every scheduled transmit window. In addition, all other standard encoder errors and faults will also be read from the encoder and transmitted by the MIU at each scheduled encoder update interval.

Environmental Tolerance
MIU is rated for immersion in liquids (IP68); each internal piece is separately encapsulated, UV inhibiting material is used for the enclosure. Unit is built with RoHS compliant components.

Mounting
There are multiple ways to mount the MIU but typically they are installed outside of the structures where the meters are located and mounted in an enclosure as pictured below.

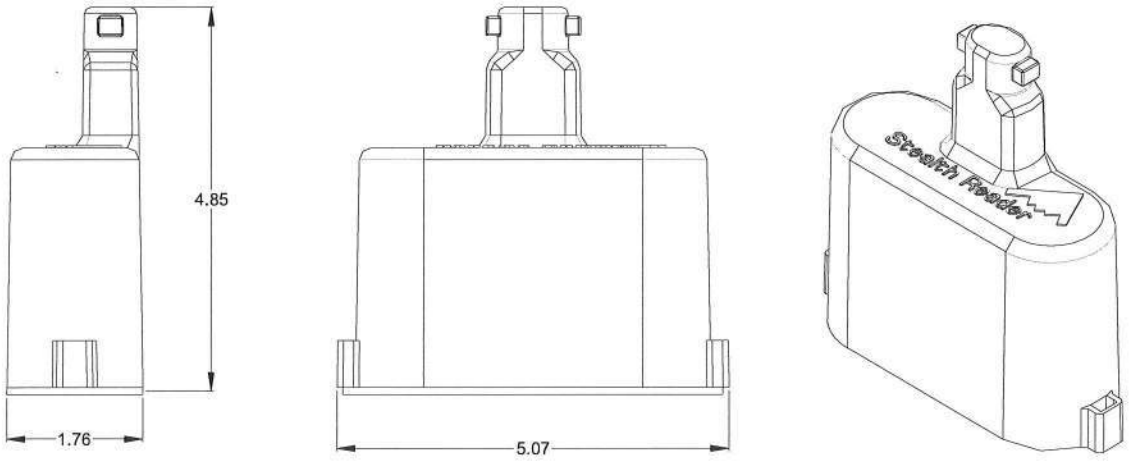


Ease of Installation
For a wire-end connection, the wires are clearly labeled and color coded for each meter. An Android device with the Zenner App installed is used to setup the MIUs and log data during the installation.

Interoperability
The Stealth Reader MIU recognizes all industry standard encoded registers automatically, upon proper wiring connection (via schematic). The encoded register will transmit the encoder serial number to the MIU automatically.

Other Detection Features
The MIU will sense and send a trouble code when its on-board battery has reached a critically low voltage. This should allow approximate six months to replace the batteries or change the MIU.
A temperature sensor allows the MIU to provide critical temperature data.
Provided the meter can detect both forward and reverse flow, the MIU is capable of transmitting this data as well.
The MIUs can also be connected to other devices such as acoustic leak detectors and remote shutoff valves.

Physical Characteristics
The Stealth Reader MIU is 4.85" High x 5.07" Wide x1.76" Deep and weighs approximately 1 lb. It has an attached cable for connections to meters and other devices. It has been designed for use in meter pit, indoor, and outdoor installations. The current model has a wired cable to connect to the meter. An option to this model incorporates a Nicor cable attachment. Accessories are available to produce a professional installation appearance in all mounting applications. These accessories include lid locks and a wall/pole mount kit. All Stealth Readers contain the same electronics packages designed to operate one Stealth Reader per Meter.



MIUs for Different Meter Types and Installation Circumstances
The Stealth Reader MIU can automatically distinguish between different makes and models of meter registers upon connection.

Batteries
The Stealth Reader MIU uses two D cell batteries totaling almost 40 amp-hours of Lithium-Thionyl Chloride power providing over 10 years of battery life. Battery life is calculated with 20 minute synch/hourly transmission of readings. The batteries are removable and field replaceable. Low battery voltage indicator is sent as an alarm during each reading transmission when a threshold of 2.8V is achieved. Batteries should be disposed of in accordance with state and local requirements for devices containing lithium thionyl chloride materials.

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The proposed system uses 128-bit encryption to secure the customer and meter data in all transmissions. The system also uses Reed Solomon Forward Error Correction (FEC) techniques to both extend the range of the transmissions as well as verify data integrity, for lost packets due to range limits or excessive attenuation. The radio inside the MIU and Data Collector has a RF Shield that blocks most EM interference. The FCC Part 15 testing verifies that the units will work within specified noise environments.

The Zenner Stealth AMI system is a fully two-directional self-forming mesh networking system integrated with backend database systems to provide billing, reporting and network management. The backend systems are accessible using a web browser and SSL. The data is available to CIS type systems with a secure web portal interface.

The benefit of a mesh system is that the end points do not have to have direct connectivity to the Data Collection Units or DCUs, also referred to as collectors or gateways. The self-healing portion of the mesh uses the automated self-forming methods to find paths back to the DCU. There are no routing tables or specific associations to setup to form and have the mesh function. If a mesh DCU goes offline completely, the MIUs will look for another path to get back to a different DCU. The self-forming and self-healing functionality removes some of the need for an extensive on-site propagation study.

The mesh network radios are designed to use the unlicensed ISM 902-928MHz band. They use frequency hopping spread spectrum across 50 channels in this band. Following the FCC requirements in the ISM band, allows the system to accept interference from other devices and still function while not causing undue interference with other items operating in this band. The Stealth radios are set at 500 mW in power. All radio units are FCC certified.

Meter Reading Interval
The Stealth Reader MIU collects the current meter reading hourly and transmits them through the mesh network back to the DCUs.

Consumption Profiling
Meter reading consumption data can be viewed in hourly, daily, weekly, monthly formats or displayed over a specified date range.

Stored Data System Integrity and Security
Security features include user accounts with configurable privilege levels and passwords, 128-bit encrypted network communications, and database encryption.

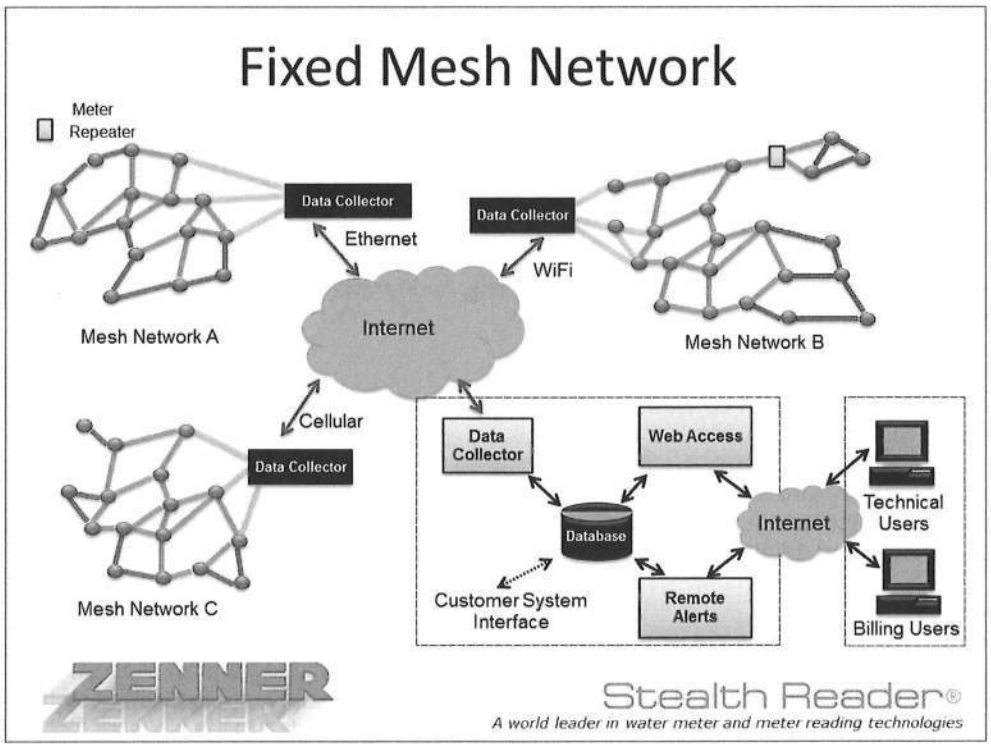
Tamper Detection
The Stealth Reader MIU will detect a cut or shorted wire to the encoder and any tamper fault recognized at the MIU hourly. The MIU transmits any encoder wiring short at every scheduled transmit window. In addition, all other standard encoder errors and faults will also be read from the encoder and transmitted by the MIU at each scheduled encoder update interval. The tamper & fault codes are provided to the Network Collector and back-office software by the individual MIUs until the attached encoder no longer transmits these error conditions. If the encoder faults are cleared, the MIU will no longer send the trouble code in the meter reading. The historical readings in the back-office software will show trouble codes associated with time stamped reads for each meter.

Leak Detection
24 consecutive hours of usage will trigger an alarm at any MIU. The back office software will monitor abnormal usage via a high-low audit report; this looks for 24 hour periods with usage above a preset amount. Custom reports can also be configured to monitor high levels of consumption.

ZENNER AMI SYSTEM OVERVIEW

The Stealth Reader AMI system begins with the endpoint, which is referred to as the Stealth Reader Meter Interface Unit or MIU. Once activated, the Stealth Reader MIU automatically connects to the meter and then starts probing the airwaves for local neighbors and establishes communications with the mesh network. Once on the mesh network, all of the installed Stealth Reader MIUs will work together passing either their own information, the information of other MIUs, or network settings which assure that all the MIUs remain on the network. Logging of the installation is achieved by using an Android device with the Zenner APP which stores the initial read, the MIU serial number as well as the customers billing information for installation verification and synchronizes this data with the Stealth Reader website. Each Stealth Reader MIU is capable of full two-way communications, allowing utilities to:

- Send over-the-air firmware updates for adding new features/functionality
- Update monitoring, reading schedules as seasons/conditions change
- Change monitoring parameters - usage thresholds, permitted days, etc.



The Stealth Reader MIU stores up to one year of hourly consumption data on board and continually updates this data every hour (oldest reading is replaced with newest once limit has been reached). The Stealth Reader system stores all data collected indefinitely with the most recent two years being active. Older data is archived and can be provided by request to the Zenner AMI support team. The Stealth Reader MIUs and Network Collectors communicate using proprietary methods, but the basic protocol is Frequency Hopping Spread Spectrum (FHSS) in the 902-928 MHz range, referred to as the ISM band and does not require a license.

Manufacturer	AMI-Compatible register model	Degree of compatibility • 1-no programming req'd • 2-routine programming of MIU or meter req'd • 3-Different MIU req'd • 4-Technically feasible, non-routine modification (describe) • 5-Infeasible	Functionality 1-All features operational 2-Some functions inoperable (describe)	Support 1. Cross-licensed 2-Not licensed or supported; no effect on warranties. 3-Warranties voided
AMCO	Absolute Encoder	1	1	1
Badger	ADE	1	1	2
Hersey	Translator	1	1	1
Neptune	E-Coder	1	1	2
Neptune	Pro-Read	1	2-3 wire AMR mode only	2
Sensus	ICE	1	1	2
Zenner	Encoder	1	1	2

Fixed Radio Data Collection Unit
The Stealth Reader Network Collector transmits the RF data it receives to the Zenner servers using a cellular backhaul. If the backhaul is unavailable, the Network Collector will store information and transmit when backhaul is operational. The Network Collector can retain over a year's worth of meter reading data. The Network Collector receives data from the MIU during the MIU's standard "wake up cycle" which is every 20 minutes.

Communication
Network Collectors utilize cellular backhaul to consistently transmit meter reading data to the Zenner Stealth AMI database.

The hardware components of the system are as follows:

- Stealth Collector
  - This is the DCU.
  - The Stealth Collector is capable of collecting data from MIUs, storing that data, and then transmitting the data back over Ethernet or Cellular connections.
  - Rated for up to a 8dBi antenna with N type connector.

- The Stealth Collector contains 1GB of storage for MIU data capable of storing more than a year of mesh messages.
- The Stealth Collector contains 2 backup batteries making it able to remain unpowered but able to maintain the mesh for long periods of power outages.
- The unit contains a bank of LEDs to show the status of the system including the connectivity of the backhaul and the mesh, batteries and antenna link.
- The unit contains a USB connection to allow for configuration and troubleshooting thru the System Manager application on a computer.
- Designed to be wall or pole mounted
- AC or DC powered DC 12V-28V.
- GPS chipset for location and timing.

- Stealth Powered Repeater
  - This is a powered repeater used to communicate data directly back to a Stealth Collector or thru another Powered Repeater.
  - The powered repeater is a high bandwidth path for MIUs to get their data back to a Collector. Main usage is to lower latencies or to extend the range of the Collector to pull in more MIUs within good latencies.
  - The Stealth Repeater contains 2 backup batteries making it able to remain unpowered but able to maintain the mesh for long periods of power outages.
  - The unit contains a bank of LEDs to show the status of the system including the connectivity of the mesh, batteries and antenna link.
  - Rated for up to a 8dBi antenna with N type connector
  - LCD panel and control pushbuttons for configuration without requiring a laptop.
  - The unit contains a USB connection to allow for configuration and troubleshooting thru the System Manager application on a computer.
  - Designed to be wall or pole mounted
  - AC or DC powered DC 12V-28V.
  - GPS chipset for location.

- Stealth Battery Enhanced Repeater
  - Four cell battery operated device with field replaceable cells.
  - Runs on the same duty cycle as the MIUs.
  - Uses high gain antenna to provide connectivity at a distance for MIUs.
  - Designed to be wall or pole mounted.
  - Rated for up to a 8dBi antenna with N type connector.

- Stealth Reader MIU
  - Operates on current AMR ready registers and passive pulse registers.
  - Operates on PermaLog acoustic leak detection devices.
  - Operates on remote shut off valves.
  - MIU generated alarms include leak, tamper, battery, no-consumption(optional).
  - Pit operation includes ability to withstand full submersion for extended periods.
  - Electronics are fully encapsulated.
  - Can be programmed from daily reporting down to 15 minute reporting. Normal reporting is daily with 24 bins of hourly data.
  - Normal duty cycle is 20 minutes for maximum life.
  - Can be set to fixed network or in Drive-by mode for radio operator direct read.

- Can be used specifically as a repeater without a MIU attached.
- Field replaceable batteries.
- Accessories
  - Short and long lid lock adapters for mounting in pit lids.
  - Riser plate to enhance range by moving the antenna slightly above the lid.
  - Wall mount enclosure for use as a wall mount or a pole mount. Can be used for basement installs or as a mounted enclosure for when a MIU is used in repeater only mode.
    - Has the option for security tamper tags.
    - Has mounting holes for standard brick spacing's.
    - Has slots for using bands on large poles.

Stealth Reader networks are used for remote monitoring of commercial, industrial, and municipal equipment such as automatic utility meter reading. Millions of devices are currently being monitored by Stealth Reader networks. The Stealth Reader network is a mesh of connections between different equipment and technology. The data flows to the management system and is stored in the Database. From the Database, applications can access the data and present it to the users. The data is first gathered by the Stealth Readers in the field. The data then travels across the mesh through other Stealth Readers until it reaches the Collector(s). The Collector passes the data through the internet using existing ethernet connections or cellular connections as a backhaul to the Stealth Server. In the Stealth Server the data is saved to the database and is accessible in the System Manager or Stealth Reader Web cloud applications. Supplementing the database on the server is the Remote Notification Service which sends alerts to cellphones and email as a self-monitoring system. Both the Stealth Reader Network Monitor and the Stealth Reader Web Application access the database and provide visibility and functionality to utility users.

Key Benefits

- Modular, fully integrated Meter Data Management Solution
- Scalable & flexible architecture enables multi-protocol and multi-communication technology support
- Secure, multitenancy architecture supports solution as a service delivery
- Interoperable using open standard protocols to communicate with third party meters
- Enhanced consumer engagement via customer portal provided by Dropcountr
- Automatic alarm generation for utility notification. The ZENNER Mesh delivers detailed interval meter reading data for every meter.

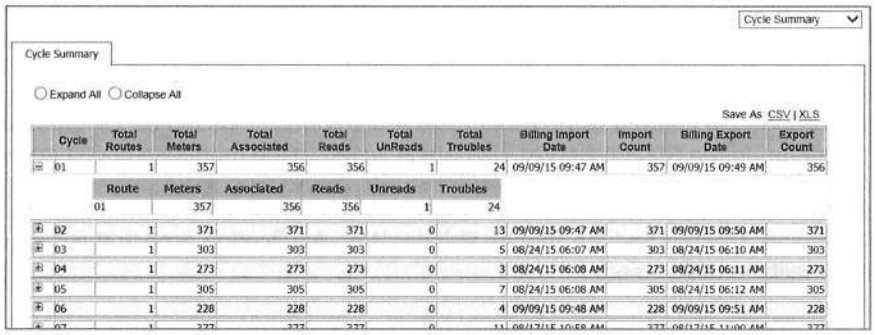
Hourly Meter Profile data can be used to:

- Curb water losses
- Detect leaks
- Identify theft-of-service/tampering
- Settle usage disputes
- Monitor/Enforce Conservation compliance
- Right-size meters
- Perform load studies
- Eliminate off-cycle reads (virtual turn-off)
- Deliver detailed billing for premium customers
- Support Time-of-Use billing programs
- Develop resource/infrastructure master plans

The software components of the system are as follows:

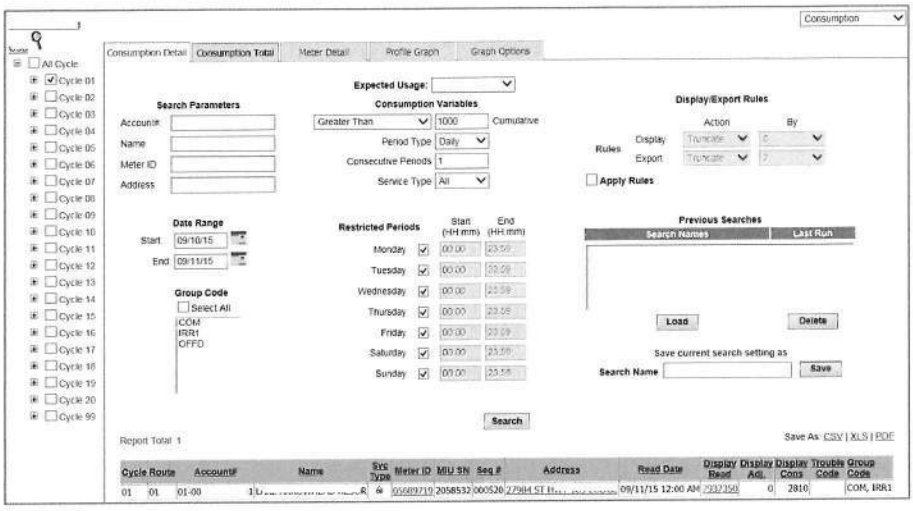
- Stealth Reader Web – This is the main web application for billing, meter reading, and reporting on utility water interests. It contains all information on the accounts, meters, meter associations, and meter reading data. The application will generate reports on the system health, consumption, reading, alarms, billing files and more. Screens containing data will have the ability to download that data in .csv or .xls format for further external analysis. Most screens have multiple filter capabilities to be able to retrieve and sort the data you want, how you want. Different filters on screens based on type of screen include; alarms, groups, cycle, route, time/date, hi/low audit fail and many more.

    - File based data transfer for billing systems to allow billing data flow to the billing system and update data to flow from the billing system to the Stealth Reader platform.
    - Cycle summary gives overview, cycle by cycle or you can actually look at each route. Gives the total meters, total reads, total unread, total alarms, last billing import and export dates and the export counts.

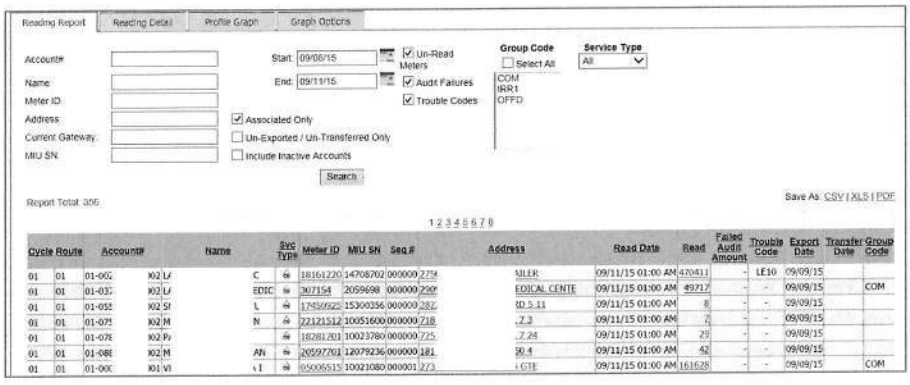


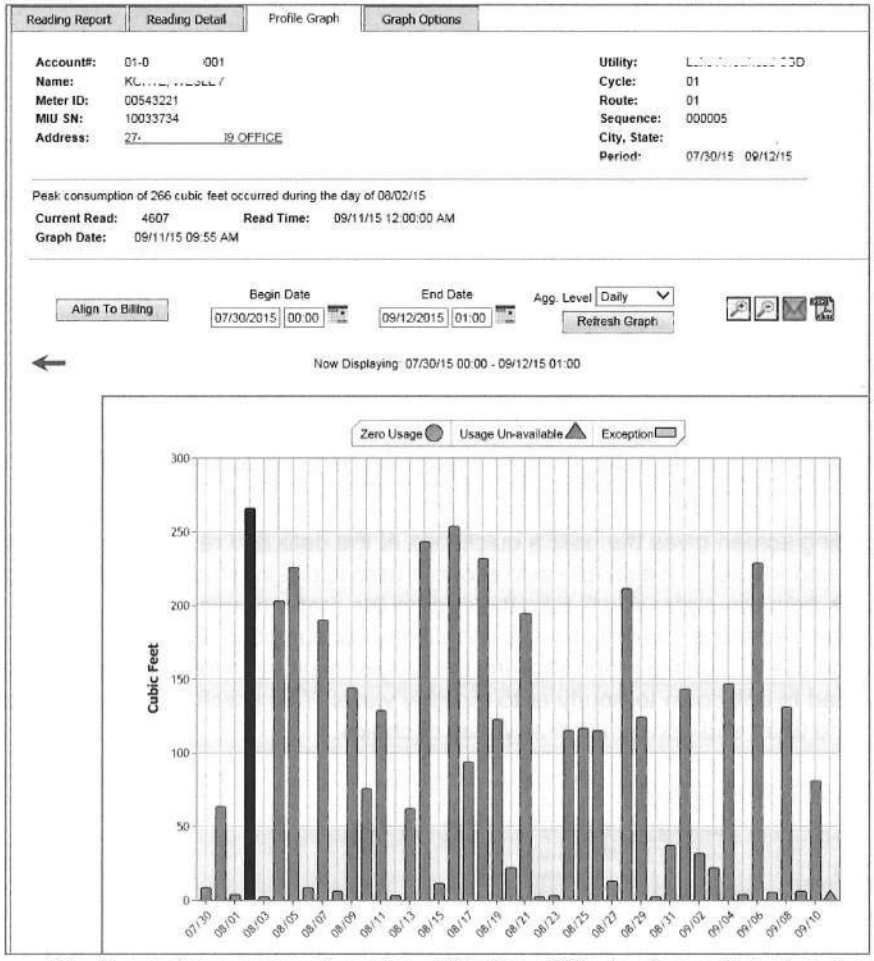
Cycle	Total Routes	Total Meters	Total Associated	Total Reads	Total UnReads	Total Troubles	Billing Import Date	Import Count	Billing Export Date	Export Count
01	1	357	356	356	1	24	09/09/15 09:47 AM	357	09/09/15 09:49 AM	356
Route	Meters	Associated	Reads	Unreads	Troubles					
01	357	356	356	1	24					
02	1	371	371	371	0	13	09/09/15 09:47 AM	371	09/09/15 09:50 AM	371
03	1	303	303	303	0	5	08/24/15 06:07 AM	303	08/24/15 06:10 AM	303
04	1	273	273	273	0	3	08/24/15 06:08 AM	273	08/24/15 06:11 AM	273
05	1	305	305	305	0	7	08/24/15 06:08 AM	305	08/24/15 06:12 AM	305
06	1	228	228	228	0	4	09/09/15 09:48 AM	228	09/09/15 09:51 AM	228

    - The Consumption screen gives the utility a way to look at either total consumption for a period or the details of consumption. This can be searched on by cycle, route, account, name, meter id or address. Groups can be used to filter for a specific type of account that was user defined for that group. Has filters for min or max consumption amounts, what period the consumption is over as well as many more option to drill down to the information the utility needs. You can also save the searches to be able to recall and use them. Consumption values can be searched to show accounts with consumption over or under a value or zero consumption. The reports are completely user definable.

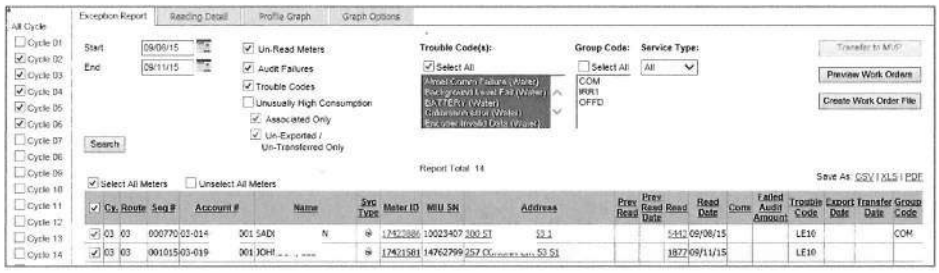


- The Reading screen gives the user a quick look at the data and readings to see what might need to be addressed. This screen also allows a user to drill into the readings on an account. Hyperlinks from the meter id will take the user to the meter reading details for that account showing the read times, reading, trouble coded, and consumption. Hyperlink from the reading will take the use to a profile graph showing the daily consumption for this account. The Graph can be used to drill down to hourly or to monthly views. This graph can also be made into a .pdf to send to an end-consumer or anybody of choice.





- The Exception screen gives the utility the ability to view a list of meters that are un-read, failed audit, reporting trouble codes, and/or are showing unusually high consumption over a specified date range. One or more troubles codes can be selected for viewing at anytime. Clicking on the meter id hyperlink opens a reading detail screen for that displays read time, reading, trouble code(s), and previous period consumption. Hyperlink from the reading detail with take the user to a profile graph showing the daily consumption for this account. The Graph can be used to drill down to hourly or to monthly views. This graph can also be made into a .pdf to send to an end-consumer or anybody of choice.



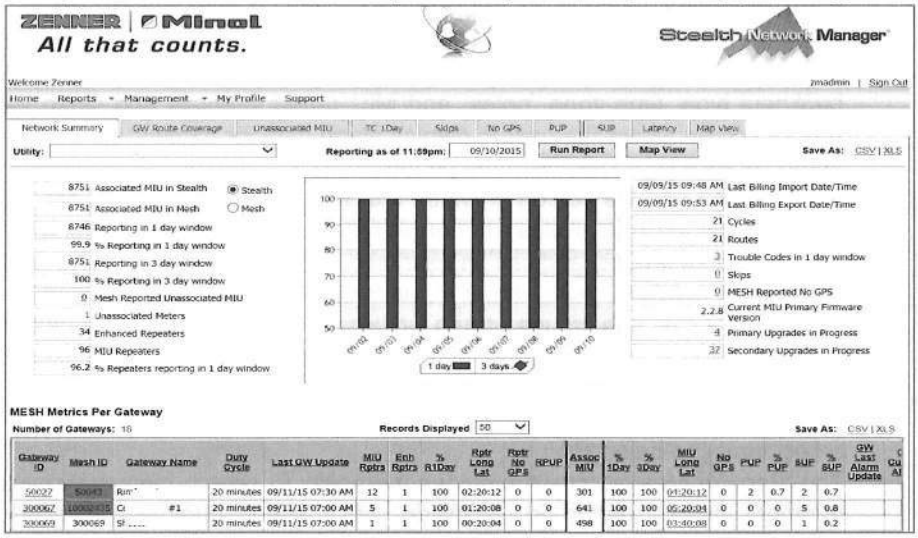
- Billing import screen provides the interface to import account information for billing cycles or for account updates, as well as a listing of previous billing import runs showing import date, cycle, # of routes, start and end dates, users that ran previous imports, and a count of associated, un-associated, and total meters in the import run. The billing import detail can be exported and saved as and a.xls file or a .csv file.
- Billing export screen provides the interface to export billing information to send back to the utility billing software. Data can be exported to a custom format for the billing system or as an .xls file. The screen also displays all previous billing export runs on a cycle by cycle basis listing billing import date, billing import user, counts of meters imported, transferred and exported, export date, export user, end date, and whether or not the billing cycle has been closed.
- The Manage Codes screen allows the utility to add, remove and customize account codes and code descriptions for status, instructions, locations, read method, read type, skip codes and trouble codes. It also allows customization of Stealth Reader MIU trouble codes and code descriptions.
- The system allows for management of devices other than meter interface units such as acoustic leak detection and remote shutoff valves that can be monitored and operated through the Stealth Reader Web platform.
- The Manage Gateways screen provides for management of all system gateways / collectors. All gateways can be shown (default view), or gateways can be searched by gateway serial number, name, public IP address, public port, backhaul type (GPRS), and time zone. There is an option to include Out of Service gateways in the gateway list. The gateway list includes gateway serial number, name, public IP address, public port, backhaul type, last report date/time, last alarm date/time, current alarms reported, time zone, and notes. Clicking on a gateway serial number in the listing takes the user to the Gateway Profile screen. Here, the user can enter and edit gateway specific information including serial number, name, out of service date, latitude and longitude, altitude, private and public IP addresses and ports, backhaul type, time zone, notes, and MIU report intervals and sleep intervals. An alarm history screen allows the user to display alarm data for gateways that reported one or more alarm codes over a specified time period.
- The Manage Groups screen provides the ability to create groups, set groups as active or inactive, and exclude groups from exception reports by trouble code. Meters can be added to one or more groups, and can be searched on by group. Additionally, meters can be filtered by account number, name, meter id, address, and service type and read type. The meter listing on the manage groups screen includes cycle, route, account number, name, address, meter id, service type, read time and group code. Groups would be used to group accounts by meter size, residential or commercial, irrigation, etc. to meet the needs of the utility. There are no limit to the number of groups that can be created and no limit to the number of groups an account can belong to.
- The Manage Meters screen provides the ability to search meters by cycle, route, account number, name, meter id, address, MIU serial number, associated/un-associated, active/inactive, group code, profile and service type. The search results include cycle, route, sequence, address, MIU serial number, service type, meter id, group code, profile, account number, name, last import date and association date. Clicking on the meter id link takes the user to the meter detail screen where meter information can be viewed or updated. Information on this screen includes account number, name, and meter id, read type, account status, MIU serial number, address, sequence, cycle, route, location, and notes. Meters can be associated to MIU's from this screen. Meter association files can be uploaded and

processed to perform bulk associations, and a list of previous associations is provided which includes import date, user, counts of associated, previously associated, no match found, duplicate meter ids errors, and total imported.

- The Manage Users screen allows the utility to search for, set up, and management of system user accounts. Users can be searched by user id, first name and last name and limited to show only active users. The user list can be exported as either a .csv file or as an .xls file. Clicking on the user id hyperlink takes you to the User Profile screen where user information such as role level, first and last name and contact info can be updated. New passwords are also set from this screen, and the user can be set to active or inactive from here as well. The User Right screen sets the privileges for the user defining which screens and reports they can access, if the can perform imports and exports, update their profile, etc.
- The Support Page provides contact information for Zenner/Minol support including help desk support hours of operation. Links to download system documentation are available which include Release Notes and the Stealth Reader User Guide, as well as documentation on legacy equipment.

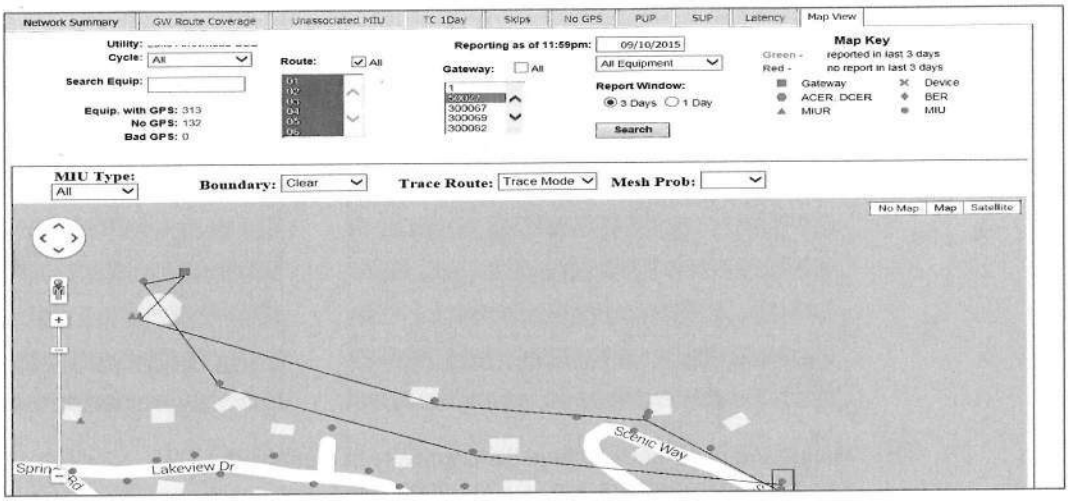
- Stealth Network Manager is a web application that is centered on the mesh performance and managing the mesh. This system is designed to monitor network health and performance, where as, Stealth Reader Web which is designed to view and analyze the data coming across the network.

  - Network Summary Screen is a high-level overview of the health of the mesh network(s). It shows summary information and graphs at the top and details mesh by mesh below. The important information is normally the 1-day and 3-day reading percentages.



    - There are many hyperlinks to be able to quickly pull up the relevant information such as trouble codes, unassociated MIUs that are reporting and more.

- Map View allows the mapping of the nodes and the ability to see node connectivity. Options include showing load balance squares, selection of the type of equipment, dates, map/satellite view. You can also see transmit and receive signals as well as distances being communicated.



- All data report screen allows reporting on associated and mesh only items. It can be run on the entire system or scaled down to a mesh or specific account/MIU. The columns include the account/meter information, readings, alarms, and MIU programming details for the register interface, firmware versions, GPS location and comments.
- Exception report gives the network personnel the ability to see the exceptions on nodes in the mesh. This is from a mesh perspective, not a billing perspective so concerns are on non-reporting, encoder errors, and tamper.
- MIU History screen allows the user to pull up a history over time of the MIU reporting. The resulting data will show the readings, consumption, alarms and programming details.
- Historical Summary screen shows four charts starting from the day of the report and each following chart is a week back in time. Each charts show the changes in the meshes when compared to the preceding week.

Records Displayed 50 Save As: CSV | XLS

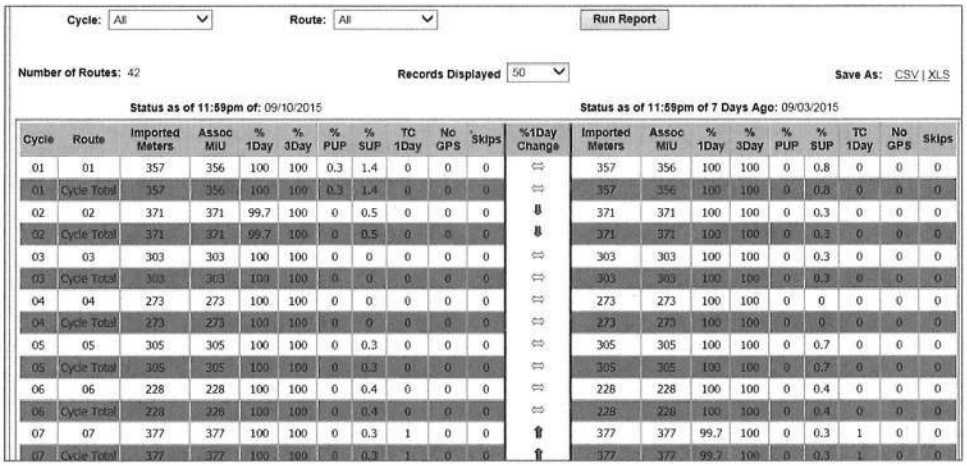
As of: 09/10/2015 Num. of Gateways: 18

Overall Reporting (%3Day) Difference from Previous:	7 Days	0
	30 Days	0

Gateway ID	Gateway Name	Duty Cycle	Assoc MIU	Assoc MIU Change 7 Day	%3Day	%3Day Change 7 Day		%PUP	%SUP	MIU Rptrs	Enh Rptrs	%R1Day	RPUP
50027	RI t	20 minutes	301	0	100	0	⇔	0.7	0.7	12	1	100	0
300067	C #1	20 minutes	641	0	100	0	⇔	0	0.7	5	1	100	0
300069	Sh	20 minutes	498	1	100	0	⇔	0	0.2	1	1	100	0

- Repeater reports show the current reporting of the repeaters for the utility or broken down to mesh grouping. This report includes the report date/time, alarms, firmware on the repeaters, the number of strong, moderate and weak neighbors, GPS location

- Route Summary is similar to the historical summary except it is based specifically on the routes. Each cycle and routs are detailed and the difference from the previous week is show.



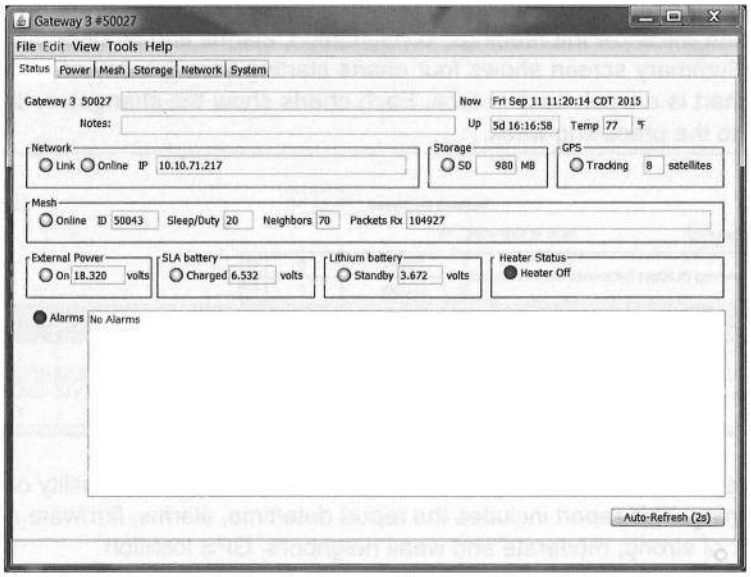
Cycle: All Route: All Run Report

Number of Routes: 42 Records Displayed: 50 Save As: CSV | XLS

		Status as of 11:59pm of: 09/10/2015										Status as of 11:59pm of 7 Days Ago: 09/03/2015								
Cycle	Route	Imported Meters	Assoc MIU	% 1Day	% 3Day	% PUP	% SUP	TC 1Day	No GPS	Skips	%1Day Change	Imported Meters	Assoc MIU	% 1Day	% 3Day	% PUP	% SUP	TC 1Day	No GPS	Skips
01	01	357	356	100	100	0.3	1.4	0	0	0	⇄	357	356	100	100	0	0.8	0	0	0
01	Cycle Total	357	356	100	100	0.3	1.4	0	0	0	⇄	357	356	100	100	0	0.8	0	0	0
02	02	371	371	99.7	100	0	0.5	0	0	0	⇩	371	371	100	100	0	0.3	0	0	0
02	Cycle Total	371	371	99.7	100	0	0.5	0	0	0	⇩	371	371	100	100	0	0.3	0	0	0
03	03	303	303	100	100	0	0	0	0	0	⇄	303	303	100	100	0	0.3	0	0	0
03	Cycle Total	303	303	100	100	0	0	0	0	0	⇄	303	303	100	100	0	0.3	0	0	0
04	04	273	273	100	100	0	0	0	0	0	⇄	273	273	100	100	0	0	0	0	0
04	Cycle Total	273	273	100	100	0	0	0	0	0	⇄	273	273	100	100	0	0	0	0	0
05	05	305	305	100	100	0	0.3	0	0	0	⇄	305	305	100	100	0	0.7	0	0	0
05	Cycle Total	305	305	100	100	0	0.3	0	0	0	⇄	305	305	100	100	0	0.7	0	0	0
06	06	228	228	100	100	0	0.4	0	0	0	⇄	228	228	100	100	0	0.4	0	0	0
06	Cycle Total	228	228	100	100	0	0.4	0	0	0	⇄	228	228	100	100	0	0.4	0	0	0
07	07	377	377	100	100	0	0.3	1	0	0	⇧	377	377	99.7	100	0	0.3	1	0	0
07	Cycle Total	377	377	100	100	0	0.3	1	0	0	⇧	377	377	99.7	100	0	0.3	1	0	0

- Management screens include the capability to manage the GWs, manage user access, name and manage repeaters, log GW changes.
- Support page includes contact information and the user guide and release notes download.

- System Manager for Collectors and Powered Repeaters is used by the utility when they have USB access to the units. Zenner has access to this utility remotely and can pull up the screen at the back office for Collectors. This utility provides information on the setup, health, and performance of the units.
  - Status Screen shows a quick overview of the Collector



- The Power screen allows the user to look at the different power options and to put a load on the batteries to see that they are in good working order.
- The mesh screen shows the mesh configuration, graphs the antenna VSWR, graphs the power out across the frequency, shows the neighbors and their RSSI and percent transmit/receive values.
- The storage screen shows the status of both the primary and secondary flash storage.
- The network screen shows the status of the network settings and has a tab for setting the configuration.
- The system tab allows the user to see the system status, view and upload firmware, view the date/time settings on the system, see the location, check the system log and has an expert user command line interface.

WILLIAMSON

Established 1870

A Leading Supplier of Municipal Software
Exclusively Developed for Local NYS Government

Water & Sewer Billing Software

Program Overview

Williamson's Water & Sewer Billing Software is a record keeping system designed to reduce your workload while documenting compliance with sound governmental accounting practices. It is a full-featured, powerful database solution designed to provide:

- Increased efficiency
- Improved time management
- Cost savings
- Easy, accurate reporting

Advantages of Williamson's Water & Sewer Billing Software include the following.

- *Customization options*

  Any rate and penalty system is easily accommodated. Bills and late notices are customized at installation.
- *Meter Reading Compatibility*

  Interfaces with automatic meter reading systems from Sensus, Badger, Shlumberger, Itron, Viena, Psion and Boson are built-in, and any others may be programmed.
- *Account Ledgers*

  Data is automatically posted from transaction journals so that each account's history and balance is controlled and may be easily viewed.

The special features outlined in the following sections manage all aspects of the utility billing clerk's responsibilities.

Program Features

- **Customer File**

  All owner, user and meter data is easily viewed on one screen form. Conveniently access meter readings, customer ledger details and print post bills from a single location.

Program Features

- **Payments**

  The payment form features many useful defaults, simplifying data entry. Payments may be entered in multi-user environments with the system maintaining a separate journal for each user. Import online payments as own journal. NO DOUBLE ENTRIES.
- **Adjustments**

  Adjustments may be made to charges and penalties and are automatically posted to the account ledger.
- **Meter Readings**

  Data is imported from mobile meter reading devices, and route data may be exported by "book."
- **Bills/Penalties**

  The system controls the billing process to ensure the correct procedure is followed to calculate bills, print reports, check for errors, make corrections, print bills and then post data to the individual account records. Penalties are calculated and posted before bills are printed for the next period.
- **Additional Billing Charges**

  Additional charges may be applied to all or specific accounts, ie debt service charge, O&M, and turn on and off fees.
- **Relevy**

  Unpaid bills may be relevied to the county with flat or percentage penalties automatically calculated.
- **Lockbox at your Bank**

  Lockbox payments at your Bank can be uploaded. NO DOUBLE ENTRIES.
- **Custom Reports**

  Excel spread sheets based on customer data.

With over 2600+ installed programs, Williamson is the Leading Supplier of Municipal Software Developed Exclusively for Local NYS Government

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Email Billing

- Save resources with less time and postage
- Automatic notification of new bills, no extra work for you.
- 24/7 account access for Residents to view and pay their current amount due.
- Convenient online payments with the Water Quick Pay included.
- Compare usage by both consumption amount billed for the last four months.

Water Quick Pay

Quick Pay for Water & Sewer Billing is an online lookup service that allows residents to view and pay to pay the current balance on their account. Account information is updated daily and payments are suspended during penalty assessment periods. Payments are quickly and easily uploaded in the Water & Sewer Billing program with no manual entry needed.

Manual Read Interface

- Simple to use program for manual meter reads in the field
- Eliminated the need to manually enter reads into the billing program helping to reduce error in reading entries
- Save valuable time with readings being imported into all accounts at one time
- Tablet with glass screen protector and leather case included.

Reporting

- Open Accounts Report
- Trial Balance
- Final Bills Posted
- Consumption Graphs and Reports
- Previous Owners
- Demographics Report
- Customer List
- Meter Reader Report
- Consumption Report
- District Trial Balance
- Outside Customers
- Billing Card
- Inactive Accounts
- Open Final Bills
- Mailing Labels
- Meter Book Labels
- Complete Transaction Reports
- Hi Lo Meter Reading Report
- Owner's Statements

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Cloud Program or Local Program

All WLB Software may be installed locally on a municipal server, individual computer, peer-to-peer, or hosted on our Microsoft Azure's Cloud Infrastructure.

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Benefits of Williamson

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- Committed, professional staff who provide our customers with a personalized service.
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- Programs which are designed to meet NYS requirements and your role as a Municipal Administrator or Department Head.
- Our own in-house technical support staff, developers and programmers.
- A comprehensive annual support package that includes all program updates and enhancements along with unlimited phone and web-based remote support
- New features that are continually developed according to users' requests and NYS reporting mandates.
- Our Windows-based programs work with Windows 10 operating system or newer.

NOW AVAILABLE

Williamson has partnered with Microsoft's Azure Cloud Platform to be able to host your Williamson Software on the Cloud. Access your software from **ANY** device with an Internet connection!

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Automate the process of billing and collecting payments for all your essential utility services

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Maintain infrastructure by streamlining processes for public works, fleet, permits, and building maintenance

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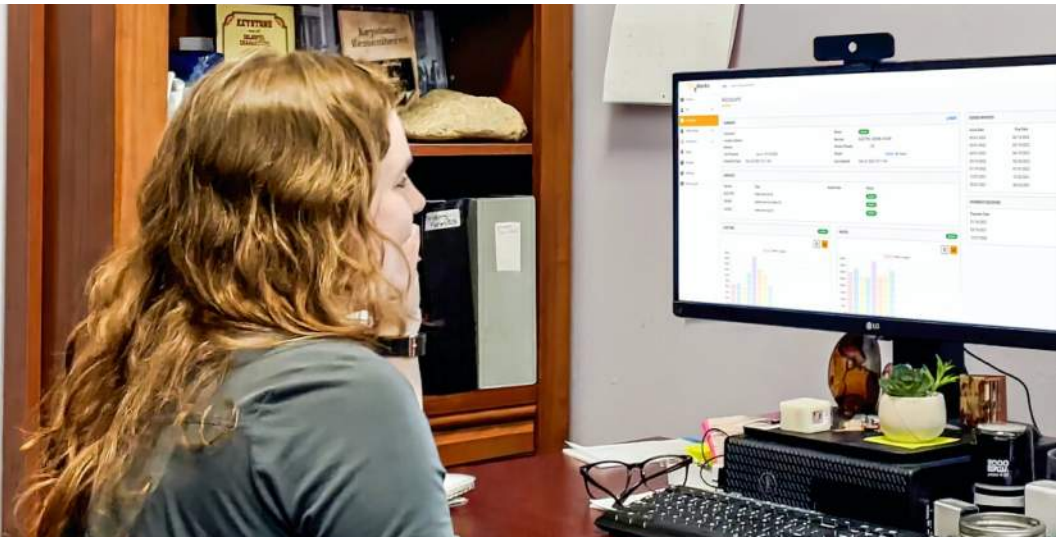
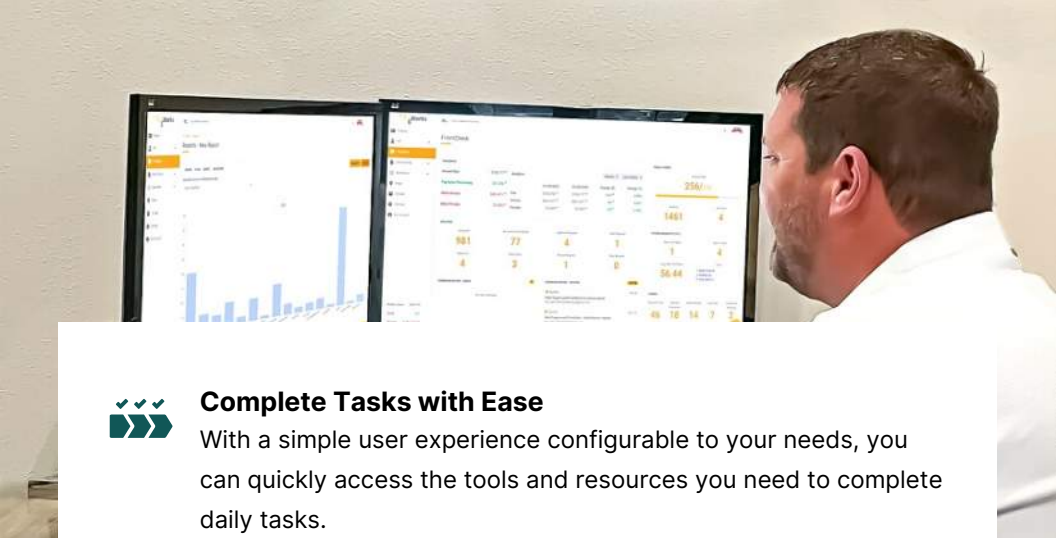
Access asset and property location details to make informed decisions based on geographic data





Complete Tasks with Ease

With a simple user experience configurable to your needs, you can quickly access the tools and resources you need to complete daily tasks.

Work Efficiently in One Integrated System

With a single unified platform, streamline administrative tasks and reduce manual entry errors so you can spend more time making a positive impact in your community.

Get the Reports You Need

Flexible reporting and dashboards allow you to create tailored reports so your government can make confident data-driven decisions based on accurate, real-time data.

Keep Your Data Secure

Security measures, like data encryption, give you peace of mind that your government's data and sensitive information is protected and secure.

Stay Ahead of the Curve

Software updates and innovations keep you equipped with modern, reliable, and efficient tools to meet the needs of your community now and in the future.

Backed By Reliable & Friendly Support

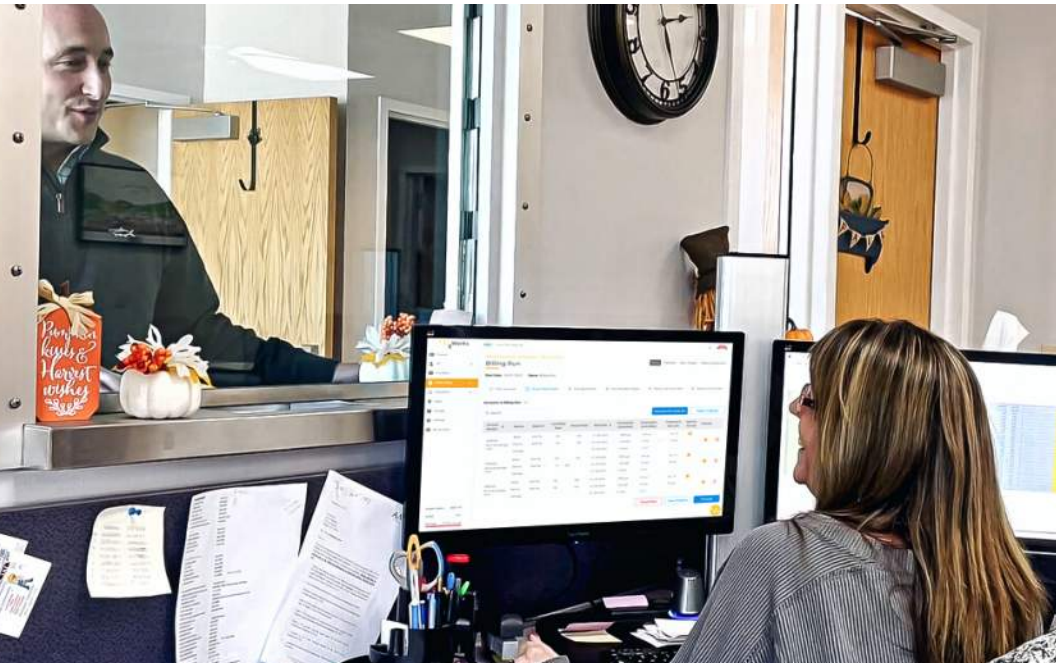
Keep your government running smoothly with a dedicated team focused on client success.

Work with support that understands your needs featuring former municipal employees, just like you!

Feel at ease knowing you are talking with reliable & friendly experts who understand the challenges of your day-to-day work and are driven to help you succeed.

Get Help Right When You Need It

With a 98.6% client support satisfaction score, rely on a team that answers each of your phone calls and resolves your issues right the first time - documented at 99.8% of the time.



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Access educational & training resources so you can stay current on the latest software updates & best practices for local government.

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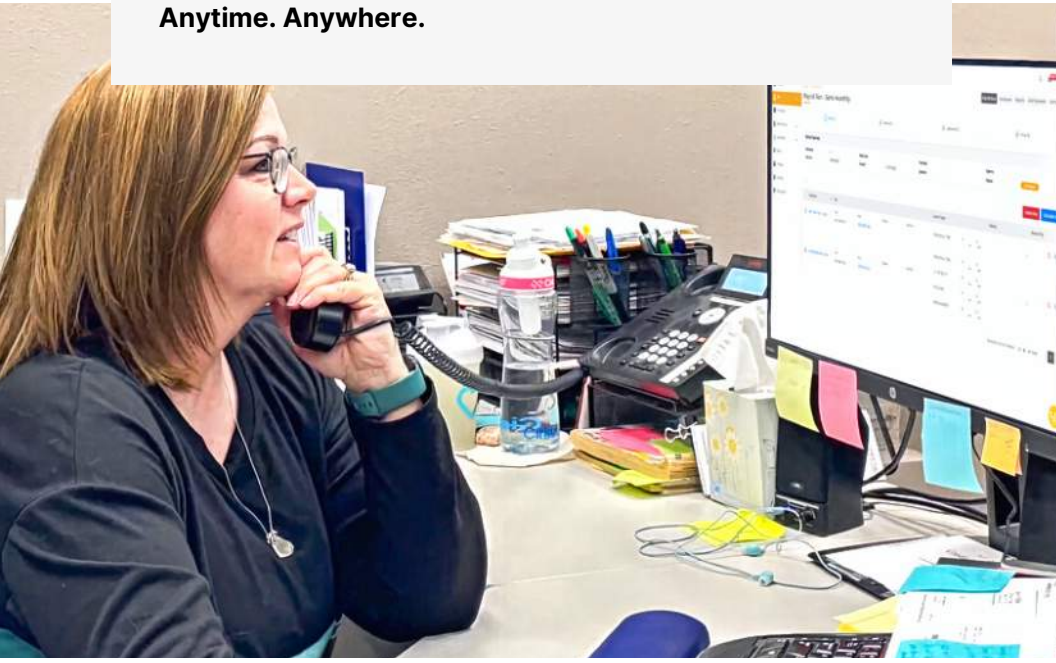
- **Software News & Updates**

Access all the resources you need at your fingertips.
Anytime. Anywhere.



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99%
SATISFACTION RATE

“We have seen a huge impact with gWorks in our office. Just the efficiencies and being able to get twice as much done in the day. And it doesn't stop with what happens in the finance office. We can integrate this into other city departments.”

Jason LaFayette
Finance Officer, City of Belle Fourche

“I think our biggest thing is just transparency. The ease of usability and pulling up a whole slew of reports. All the information we need is there at our fingertips. We're just incredibly happy with gWorks, with the staff, with the reporting, with the whole system.”

Sheila Coss
Finance Officer, City of Miller

“To have everything in one system is really helpful. As the only person in my office, I can't stop to figure something out so having a support team there to make sure everything runs smoothly is huge. We highly recommend gWorks to any city considering it!"

Kristi Fliss
City Clerk, City of Everly

"We accomplish more in the same amount of time, and it is better, more productive work. We can obtain the answers to questions that would undoubtedly arise later. And with gWorks being web-based, this information is centralized and available anywhere!"

Jason Rabe
City Manager, City of Beloit

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gWorks Cloud

Utility Billing Hub Features

Web-Based Solution	✓

Features	Accounts	Billing	Meters	Reports	Settings	Integrations
Service Requests - Move In, Move Out, Start/Stop Service, Pause Service, and Meter Changeouts	✓					
Customer Management	✓					
Landlord Management	✓					
Automatically charge deposits for new accounts & services	✓					
Flexible Invoice Configuration for postcards or full page bills	✓					
Energy Assistance	✓					
Payment Agreements	✓					
Budget Billing		✓				
Statement Billing		✓				
Fuel Adjustments		✓				
Import & Review Meter Readings		✓				

gWorks Cloud

Utility Billing Hub Features

Features	Accounts	Billing	Meters	Reports	Settings	Integrations
Service Averaging		✓				
Tax Exemption by Account, Services, or Partial Exemption		✓				
Penalty Calculations		✓				
Miscellaneous Charges with the option to charge automatically for Reconnect or Disconnect Notices		✓				
Delinquent Account Management & Delinquent Notices via mail or email		✓				
Adjustments & Corrections		✓				
Bad Debt Management		✓				
Shutoff Accounts & Notices		✓				
Penalty & Shutoff Waivers		✓				
Mailing Label Generation		✓				
Easy Payment Entry		✓				
Supports various meter types - Demand, Subtract, Net			✓			

gWorks Cloud

Utility Billing Hub Features

Features	Accounts	Billing	Meters	Reports	Settings	Integrations
Meter Data Management with support for multiple Meter Interface Vendors			✓			
Deposit Report				✓		
Mailing Labels				✓		
Billing Summary Report				✓		
Cash Summary Report				✓		
Accounts Receivable Audit Report				✓		
Consumption Report				✓		
Trial Balance Report				✓		
Meter Readings				✓		
Rate Table Report				✓		
Sales Tax Report				✓		
Customer History Report				✓		
View Summarized & Expanded Versions of Reports				✓		

gWorks Cloud

Utility Billing Hub Features

Features	Accounts	Billing	Meters	Reports	Settings	Integrations
Custom Report Builder				✓		
Flexible Settings					✓	
Unlimited Rate Tables					✓	
Unlimited Tax Tables					✓	
Integration with Finance Hub Lite & Finance Hub						✓
Integration with FrontDesk for Online Payments & Electronic Payments						✓
Integration with Operations Hub for Work Order Generation						✓

Appendix I\

2025 Adopted Water Budget

TOWN OF JAY

2025 ADOPTED BUDGET

Code	FUND	Appropriations and Provisions for Other Uses	Less Estimated Revenues	Less Unexpended Balance	AMOUNT TO BE RAISED BY TAX
A	General	$ 1,416,836.40	$ 470,200.00	$ 200,000.00	$ 746,636.40
DA	Highway - Town Wide	$ 1,657,150.00	$ 679,740.00	$ 50,000.00	$ 927,410.00
S	SPECIAL DISTRICTS				
SW1	Au Sable Forks Water	$ 81,725.00	$ 22,640.00	$ 10,000.00	$ 49,085.00
SW1	Bond and Interest	$ 51,366.00			$ 51,366.00
SW2	Jay Water	$ 74,825.00	$ 33,200.00		$ 41,625.00
SW2	Bond and Interest	$ 11,706.00			$ 11,706.00
SW3	Upper Jay Water	$ 71,740.00	$ 24,530.00		$ 47,210.00
SW3	Bond and Interest	$ 61,028.00			$ 61,028.00
SS	Au Sable Forks Sewer	$ 175,510.00	$ 89,950.00		$ 85,560.00
SS	Bonds and Interest	$ 18,966.00			$ 18,966.00
SM	Ambulance District	$ 430,600.00	$ 150,000.00		$ 280,600.00
				SUBTOTAL	$ 2,321,192.40
SF1	Au Sable Forks Fire Dis	$ 286,145.42			$ 286,145.42
SF2	Jay Fire District	$ 224,300.00			$ 224,300.00
SF3	Upper Jay Fire District	$ 110,881.00			$ 110,881.00
	TOTALS	$ 4,672,778.82	$ 1,470,260.00	$ 260,000.00	$ 2,942,518.82

GENERAL FUND APPROPRIATIONS -- GOVERNMENT SUPPORT					
Accounts	*Code*	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
TOWN BOARD					
Personal Services	A1010.1	$ 25,200.00	$ 25,200.00	$ 25,960.00	$ 25,960.00
Equipment	A1010.2	$ -	$ -	$ -	$ -
Contractual Expense	A1010.4	$ 2,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00
TOTAL		**$ 27,700.00**	**$ 28,700.00**	**$ 29,460.00**	**$ 29,460.00**
JUSTICES					
Personal Services	A1110.1	$ 12,500.00	$ 12,875.00	$ 12,875.00	$ 12,875.00
Clerk	A1110.1	$ 5,000.00	$ 5,150.00	$ 5,150.00	$ 5,150.00
Equipment	A1110.2	$ -			$ -
Contractual Expense	A1110.4	$ 6,000.00	$ 6,700.00	$ 6,700.00	$ 6,700.00
TOTAL		**$ 23,500.00**	**$ 24,725.00**	**$ 24,725.00**	**$ 24,725.00**
SUPERVISOR					
Personal Services	A1220.1	$ 52,000.00	$ 52,000.00	$ 53,560.00	$ 53,560.00
Deputy Supervisor	A1220.1	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Equipment	A1220.2	$ 500.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
Contractual Expense	A1220.4	$ 12,500.00	$ 13,500.00	$ 13,500.00	$ 13,500.00
TOTAL		**$ 66,500.00**	**$ 68,000.00**	**$ 69,560.00**	**$ 69,560.00**
INDEPENDENT AUDITING & ACCOUNTING					
Contractual Expense	A13204.1	$ 21,000.00	$ 21,000.00	$ 21,000.00	$ 21,000.00
TOTAL		**$ 21,000.00**	**$ 21,000.00**	**$ 21,000.00**	**$ 21,000.00**
TAX COLLECTION					
Personal Services	A1330.1	$ 8,400.00	$ 8,600.00	$ 8,600.00	$ 8,600.00
Equipment	A1330.2	$ -			$ -
Contractual Expense	A1330.4	$ 6,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
TOTAL		**$ 14,400.00**	**$ 12,600.00**	**$ 12,600.00**	**$ 12,600.00**
BUDGET					
Personal Services	A1340.1	$ 2,000.00	$ 3,500.00	$ 2,000.00	$ 2,000.00
Equipment	A1340.2	$ -			$ -
Contractual Expense	A1340.4	$ 250.00	$ 250.00	$ 250.00	$ 250.00
TOTAL		**$ 2,250.00**	**$ 3,750.00**	**$ 2,250.00**	**$ 2,250.00**
ASSESSORS					
Personal Services	A1355.1	$ 50,000.00	$ 51,500.00	$ 51,500.00	$ 51,500.00
Clerk One	A1355.1	$ 1,500.00	$ 500.00	$ 500.00	$ 500.00
Clerk Two	A1355.1	$ -	$ 500.00	$ 500.00	$ 500.00
Equipment	A1355.2	$ 500.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
Contractual Expense	A1355.4	$ 7,500.00	$ 7,500.00	$ 7,500.00	$ 7,500.00
TOTAL		**$ 59,500.00**	**$ 61,000.00**	**$ 61,000.00**	**$ 61,000.00**

GENERAL FUND APPROPRIATIONS -- GOVERNMENT SUPPORT					
Accounts	*Code*	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
TOWN CLERK					
Personal Services	A1410.1	$ 14,000.00	$ 14,450.00	$ 14,450.00	$ 14,450.00
Deputy Clerk	A1410.1	$ 1,000.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Equipment	A1410.2	$ 750.00	$ 750.00	$ 750.00	$ 750.00
Contractual Expense	A1410.4	$ 2,000.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
TOTAL		**$ 17,750.00**	**$ 19,200.00**	**$ 19,200.00**	**$ 19,200.00**
ATTORNEY					
Personal Services	A1420.1	$ -			$ -
Equipment	A1420.2	$ -			$ -
Contractual Expense	A1420.4	$ 15,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
		$ 15,000.00	**$ 10,000.00**	**$ 10,000.00**	**$ 10,000.00**
PERSONNEL-SUPR. OFFICE					
Personal Services-Clerk1	A1430.1	$ 45,900.00	$ 47,240.00	$ 47,240.00	$ 47,240.00
Clerk 2	A1430.1	$ 20,160.00	$ 22,500.00	$ 22,500.00	$ 22,500.00
Clerk 3	A1430.1	$ 42,000.00	$ 43,250.00	$ 43,250.00	$ 43,250.00
Longevity	A1430.1	$ 300.00	$ 600.00	$ 600.00	$ 600.00
Equipment	A1430.2	$ 2,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
Contractual Expense	A1430.4	$ 8,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00
TOTAL		**$ 118,360.00**	**$ 120,590.00**	**$ 120,590.00**	**$ 120,590.00**

GENERAL FUND APPROPRIATIONS -- GOVERNMENT SUPPORT					
Accounts	*Code*	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
BUILDINGS					
Personal Services 1	A1620.1	$ 23,775.00	$ 17,760.00	$ 17,760.00	$ 17,760.00
Personal Services 2	*A1620.1*		$ 21,840.00	$ 22,006.40	$ 22,006.40
Equipment	A1620.2	$ 50,000.00	$ 40,000.00	$ 40,000.00	$ 40,000.00
Contractual Expense	A1620.4	$ 80,000.00	$ 80,000.00	$ 80,000.00	$ 80,000.00
TOTAL		**$ 153,775.00**	**$ 159,600.00**	**$ 159,766.40**	**$ 159,766.40**
SPECIAL ITEMS					
Unallocated Insurance	A1910.1	$ 60,000.00	$ 85,000.00	$ 85,000.00	$ 85,000.00
Municipal Assoc. Dues	A1920.2	$ 2,100.00	$ 2,100.00	$ 2,100.00	$ 2,100.00
Taxes & Assess.	A1950.4	$ 5,500.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
Judge/Claims	A1930.4	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
Other Gen. Gov't Support	A1989.4	$ 40,000.00	$ 40,000.00	$ 40,000.00	$ 40,000.00
TOTAL		**$ 112,600.00**	**$ 137,100.00**	**$ 137,100.00**	**$ 137,100.00**
TOTAL GENERAL SUPPORT		**$ 632,335.00**	**$ 666,265.00**	**$ 667,251.40**	**$ 667,251.40**

GENERAL FUND APPROPRIATIONS -- PUBLIC SAFETY					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Public Safety-Codes					
Personal Services	A3010.1	$ 25,000.00	$ 25,750.00	$ 25,750.00	$ 25,750.00
Equipment	A3010.2	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Contractual Expense	A3010.4	$ 4,500.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
TOTAL		$ 31,000.00	**$ 31,750.00**	**$ 31,750.00**	**$ 31,750.00**
Traffic Control-Signs					
Contractual Expense	**A3310.4**	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
TOTAL		$ 1,000.00	**$ 1,000.00**	**$ 1,000.00**	**$ 1,000.00**
Animal Control					
Personal Services	A3510.1	$ 4,410.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
Contractual Expense	A3510.4	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
TOTAL		$ 9,410.00	**$ 9,500.00**	**$ 9,500.00**	**$ 9,500.00**
Amnesty Day					
Contractual Expense	A3650.4	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
TOTAL		$ 10,000.00	**$ 10,000.00**	**$ 10,000.00**	**$ 10,000.00**
Total Public Safety		$ 51,410.00	**$ 52,250.00**	**$ 52,250.00**	**$ 52,250.00**

GENERAL FUND APPROPRIATIONS -- HEALTH					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Board of Health					
Vital Stats	40201.1	$ 500.00	$ 520.00	$ 520.00	$ 520.00
TOTAL		**$ 500.00**	**$ 520.00**	**$ 520.00**	**$ 520.00**
Public Health - Other					
Contractual Expense	A4050.4	$ 400.00	$ 400.00	$ 400.00	$ 400.00
TOTAL		**$ 400.00**	**$ 400.00**	**$ 400.00**	**$ 400.00**
Insect Control					
Contractual Expense	A4068.4	$ 19,360.00	$ 19,900.00	$ 19,900.00	$ 19,900.00
TOTAL		**$ 19,360.00**	**$ 19,900.00**	**$ 19,900.00**	**$ 19,900.00**
TOTAL HEALTH		**$ 20,260.00**	**$ 20,820.00**	**$ 20,820.00**	**$ 20,820.00**

GENERAL FUND APPROPRIATIONS -- TRANSPORTATION					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Superintendent of Highways					
Personal Services	A5010.1	$ 70,000.00	$ 70,000.00	$ 72,100.00	$ 72,100.00
Clerk 1	A5010.1	$ 28,828.00	$ 29,690.00	$ 29,690.00	$ 29,690.00
Deputy Superintendent	A5010.1	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
Longevity	*A5010.1*	$ 300.00	$ 1,200.00	$ 1,200.00	$ 1,200.00
Equipment	A5010.2	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
Contractual Expense	A5010.4	$ 4,500.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
TOTAL		**$ 108,128.00**	**$ 109,890.00**	**$ 111,990.00**	**$ 111,990.00**
Garage					
Personal Services	A5132.1	$ -			$ -
Equipment	A5132.2	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
Contractual Expense	A5132.4	$ 60,000.00	$ 60,000.00	$ 60,000.00	$ 60,000.00
TOTAL		**$ 65,000.00**	**$ 65,000.00**	**$ 65,000.00**	**$ 65,000.00**
Street Lighting					
Contractual Expense	A5182.4	$ 15,000.00	$ 17,500.00	$ 17,500.00	$ 17,500.00
TOTAL		**$ 15,000.00**	**$ 17,500.00**	**$ 17,500.00**	**$ 17,500.00**
Sidewalks					
Contractual Expense	A5410.4	$ 40,000.00	$ 40,000.00	$ 40,000.00	$ 40,000.00
Street Paint	A5680.4	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
TOTAL		**$ 42,500.00**	**$ 42,500.00**	**$ 42,500.00**	**$ 42,500.00**
Total Transporation		**$ 230,628.00**	**$ 234,890.00**	**$ 236,990.00**	**$ 236,990.00**

GENERAL FUND APPROPRIATIONS -- ECONOMIC ASSISTANCE AND OPPORTUNITY					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
PUBLICITY					
Personal Services	A6410.1	$ -			$ -
Equipment	A6410.2	$ -			$ -
Event Promo	64204.46	$ 30,000.00	$ 30,000.00	$ 30,000.00	$ 30,000.00
Consult Contract	64204.46	$ 9,000.00	$ 9,000.00	$ 9,000.00	$ 9,000.00
TOTAL		**$ 39,000.00**	**$ 39,000.00**	**$ 39,000.00**	**$ 39,000.00**
VETERANS SERVICES					
Contractual Expense	A6510.4	$ -			$ -
TOTAL		**$ -**	**$ -**	**$ -**	**$ -**
PROGRAMS OF AGING					
Personal Services	A6772.1	$ -			$ -
Equipment	A6772.2	$ -			$ -
Contractual Expense	A6772.4	$ 1,550.00	$ 1,550.00	$ 1,550.00	$ 1,550.00
TOTAL		**$ 1,550.00**	**$ 1,550.00**	**$ 1,550.00**	**$ 1,550.00**
Total Economic Assistance and Opportunity		**$ 40,550.00**	**$ 40,550.00**	**$ 40,550.00**	**$ 40,550.00**

GENERAL FUND APPROPRIATIONS -- CULTURE AND RECREATION					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
PARKS					
Personal Services 1	A7110.1	$ 36,950.00	$ 17,760.00	$ 17,760.00	$ 17,760.00
Personal Services 2	A7110.1		$ 21,840.00	$ 21,840.00	$ 21,840.00
Equipment	A7110.2	$ 65,000.00	$ 30,000.00	$ 30,000.00	$ 30,000.00
Contractual Expense	A7110.4	$ 7,500.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
TOTAL		**$ 109,450.00**	**$ 79,600.00**	**$ 79,600.00**	**$ 79,600.00**
JAY PLAYGROUND					
Contractual Expense	A7140.4	$ -			$ -
TOTAL		$ -			$ -
JOINT REC. PROJECT					
Contractual Expense	A7140.4	$ -			$ -
TOTAL		$ -	$ -	$ -	$ -
GROVE ENHANCEMENT					
Contractual Expense	A7180.4	$ -			$ -
TOTAL		$ -	$ -	$ -	$ -
BAND CONCERTS					
Contractual Expense-R*	A7270.4	$ 1,500.00	$ 7,500.00	$ 7,500.00	$ 7,500.00
TOTAL		**$ 1,500.00**	**$ 7,500.00**	**$ 7,500.00**	**$ 7,500.00**
YOUTH PROGRAM					
Personal Services	A7310.1	$ 17,500.00	$ 15,000.00	$ 15,000.00	$ 15,000.00
Equipment	A7310.2	$ -			$ -
Contractual Expense	A7310.4	$ 6,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
TOTAL		**$ 23,500.00**	**$ 19,000.00**	**$ 19,000.00**	**$ 19,000.00**
LIBRARY					
Contractual Expense	A7410.4	$ 17,500.00	$ 20,000.00	$ 20,000.00	$ 20,000.00
TOTAL		**$ 17,500.00**	**$ 20,000.00**	**$ 20,000.00**	**$ 20,000.00**
HISTORIAN					
Personal Services	A7510.1	$ 1,550.00	$ 1,600.00	$ 1,600.00	$ 1,600.00
Equipment	A7510.2	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Contractual Expense	A7510.4	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
TOTAL		**$ 4,050.00**	**$ 4,100.00**	**$ 4,100.00**	**$ 4,100.00**
Total Culture & Recreation		**$ 156,000.00**	**$ 130,200.00**	**$ 130,200.00**	**$ 130,200.00**

GENERAL FUND APPROPRIATIONS -- HOME AND COMMUNITY SUPPORT					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
PLANNING					
Personal Services	A8020.1	$ 1,200.00	$ 1,200.00	$ 1,200.00	$ 1,200.00
Equipment	A8020.2	$ -			$ -
Contractual Expense	A8020.4	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
TOTAL		**$ 2,700.00**	**$ 2,700.00**	**$ 2,700.00**	**$ 2,700.00**
REFUSE & GARBAGE					
Contractual Expense	A8160.4	$ 1,500.00	$ 3,000.00	$ 3,000.00	$ 3,000.00
TOTAL		**$ 1,500.00**	**$ 3,000.00**	**$ 3,000.00**	**$ 3,000.00**
BEAUTIFICATION					
Contractual Expense-R*	A8510.4	$ -			$ -
		$ -			**$ -**
Total Home & Community		**$ 4,200.00**	**$ 5,700.00**	**$ 5,700.00**	**$ 5,700.00**

GENERAL FUND APPROPRIATIONS -- UNDISTRIBUTED					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Employee Benefits					
State Retirement	A9010.8	$ 37,550.00	$ 40,000.00	$ 40,000.00	$ 40,000.00
Social Security	A9030.8	$ 37,750.00	$ 39,500.00	$ 39,800.00	$ 39,800.00
Worker's Compensation	A9040.8	$ -		$ 45,000.00	$ 45,000.00
Unemployment Insurance	A9050.8	$ -			$ -
Disability Insurance	A9055.8	$ 275.00	$ 275.00	$ 275.00	$ 275.00
Hospital and Medical Insurance	A9060.8	$ 138,000.00	$ 138,000.00	$ 138,000.00	$ 138,000.00
TOTAL		**$ 213,575.00**	**$ 217,775.00**	**$ 263,075.00**	**$ 263,075.00**
Debt Service Principal					
Bond Anticipation	A9730.6	$ -			$ -
TOTAL		**$ -**	**$ -**	**$ -**	**$ -**
Interest					
Bond Anticipation	A9730.7	$ -			$ -
TOTAL		**$ -**	**$ -**	**$ -**	**$ -**
Total Debt. Service	**A9899**	**$ -**	**$ -**	**$ -**	**$ -**

GENERAL FUND APPROPRIATIONS -- UNDISTRIBUTE		0	0	0	
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Interfund Transfers					
Transfer to:					
Other Funds	A9901.9	$ -			$ -
TOTAL		$ 1,135,383.00	$ 569,260.00	$ 1,153,761.40	$ 1,153,761.40
Total Undistributed		$ 213,575.00	$ 217,775.00	$ 263,075.00	$ 263,075.00
Total Appropriations		$ 1,348,958.00	$ 787,035.00	$ 1,416,836.40	$ 1,416,836.40

GENERAL FUND -- ESTIMATED REVENUES					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Other Tax Items					
Real Property Taxes Prior Years	A1020	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Other Payments in Lieu of	A1081	$ -			$ -
Interest & Penalties on Real Property Taxes	A1090	$ 8,000.00	$ 8,500.00	$ 8,500.00	$ 8,500.00
Non-Property Tax Distribution by County	A1120	$ 120,000.00	$ 120,000.00	$ 120,000.00	$ 120,000.00
Francises Fees	A1170	$ 30,000.00	$ 30,000.00	$ 30,000.00	$ 30,000.00
TOTAL		**$ 159,500.00**	**$ 160,000.00**	**$ 160,000.00**	**$ 160,000.00**
DEPARTMENT INCOME					
Tax Collection Fees (Not Interest on Taxes	**A1232**	$ -			$ -
Clerk Fees	A1255	$ 750.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
Dog Control Fees	A1550	$ 50.00	$ 50.00	$ 50.00	$ 50.00
Park & Recreation Charges	A2001	$ -			$ -
Planning Board Fees	A2115	$ 750.00	$ 500.00	$ 500.00	$ 500.00
Tax and Assessment Services for Other Govt.	A2210	$ -			$ -
DEPARTMENT INCOME					
TOTAL		**$ 1,550.00**	**$ 1,550.00**	**$ 1,550.00**	**$ 1,550.00**

GENERAL FUND -- ESTIMATED REVENUES					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Programs for Aging-Other Gov'ts	**A2351**	$ -			
Youth Rec Serv. Other Gov't	**A2350**	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
TOTAL	**2380**	**$ 1,500.00**	**$ 1,500.00**	**$ 1,500.00**	**$ 1,500.00**
USE OF MONEY AND PROPERTY					
Interest and Earnings	**A2401**	$ 70,000.00	$ 70,000.00	$ 70,000.00	$ 70,000.00
Rental of Real Property	A2410	$ 11,400.00	$ 11,400.00	$ 11,400.00	$ 11,400.00
Commissions	**A2450**	$ -			$ -
TOTAL		**$ 81,400.00**	**$ 81,400.00**	**$ 81,400.00**	**$ 81,400.00**
LICENSES & PERMITS					
Games of Chance License	A2530	$ -			$ -
Bingo License	A2540	$ -			$ -
Dog License	A2544	$ 150.00	$ 150.00	$ 150.00	$ 150.00
Licenses & Permits	A2555	$ 15,000.00	$ 18,700.00	$ 18,700.00	$ 18,700.00
TOTAL		**$ 15,150.00**	**$ 18,850.00**	**$ 18,850.00**	**$ 18,850.00**
FINES & FOREITURES					
Fines & Forfeited Bail	A2610	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Fines & Pen Dog Cases	A2611	$ -			$ -
Forfeiture of Deposits	A2620	$ -			$ -
TOTAL		**$ 1,500.00**	**$ 1,500.00**	**$ 1,500.00**	**$ 1,500.00**

Accounts	Code	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
SALES OF PROPERTY AND COMPENSATION FOR LOSS					
Sale of Forest Products	A2652	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
Minor Sales, Other	A2655	$ -			$ -
Sales of Real Property	A2660	$ -			$ -
Sales of Equipment	A2665	$ -			$ -
Insurance Recoveries	A2680	$ 20,000.00	$ 15,000.00	$ 15,000.00	$ 15,000.00
TOTAL		**$ 22,500.00**	**$ 17,500.00**	**$ 17,500.00**	**$ 17,500.00**
MISCELLANEOUS					
Refunds of Prior Years Expenditures	***A2701***	$ -			$ -
Gifts and Donations	**A2705**	$ 2,500.00	$ 2,400.00	$ 2,400.00	$ 2,400.00
Endowment and Trust Fund Income	A2755	$ -			$ -
Roost	2089.1	$ 98,000.00	$ 100,000.00	$ 100,000.00	$ 100,000.00
Other Unclassified Revenues	A2770	$ 500.00	$ 500.00	$ 500.00	$ 500.00
TOTAL		**$ 101,000.00**	**$ 102,900.00**	**$ 102,900.00**	**$ 102,900.00**
INTERFUND REVENUE					
Interfund Revenue	**A2801**	$ -			$ -
TOTAL		$ -			$ -
STATE AID					
AIM	**A2750**	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00
Mortgage Tax	A3005	$ 80,000.00	$ 60,000.00	60000	$ 60,000.00
Tax Map Assessments	A3040	$ -			$ -
Insect Control	A3468	$ -			$ -
Youth Programs	A3820	$ -			$ -
TOTAL		**$ 105,000.00**	**$ 85,000.00**	**$ 85,000.00**	**$ 85,000.00**

GENERAL FUND -- ESTIMATED REVENUES					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
INTERFUND TRANSFER					
Interfund Transfers	A5031	$ -			$ -
TOTAL		$ -			$ -
Estimated Revenues Total		**$ 489,100.00**	**$ 470,200.00**	**$ 470,200.00**	**$ 470,200.00**

Highway Appropriations					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
GENERAL REPAIRS					
Personal Services	DA5110.1	$ 259,200.00	$ 275,000.00	$ 275,510.00	$ 275,510.00
Contractual Expense	DA5110.4	$ 70,000.00	$ 70,000.00	$ 70,000.00	$ 70,000.00
TOTAL		**$ 329,200.00**	**$ 345,000.00**	**$ 345,510.00**	**$ 345,510.00**
IMPROVEMENTS					
Capital Outlay	DA5112.02	$ 306,591.00	$ 261,240.00	$ 261,240.00	$ 261,240.00
TOTAL		**$ 306,591.00**	**$ 261,240.00**	**$ 261,240.00**	**$ 261,240.00**
BRIDGES					
Personal Services	DA5120.1	$ -			$ -
Capital Outlay	DA5120.2	$ -			$ -
Contractual Expense	DA5120.4	$ -			$ -
TOTAL		**$ -**	**$ -**	**$ -**	**$ -**
MACHINERY					
Personal Services	DA5130.1	$ -			$ -
Equipment	DA5130.2	$ 110,000.00	$ 440,000.00	$ 110,000.00	$ 110,000.00
Contractual Expense	DA5130.4	$ 135,000.00	$ 135,000.00	$ 135,000.00	$ 135,000.00
TOTAL		**$ 245,000.00**	**$ 575,000.00**	**$ 245,000.00**	**$ 245,000.00**
BRUSH & WEEDS					
Personal Services	DA5140.1	$ -			$ -
Equipment	DA5140.2	$ -			$ -
Contractual Expense	DA5140.4	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
TOTAL		**$ 2,500.00**	**$ 2,500.00**	**$ 2,500.00**	**$ 2,500.00**
SNOW REMOVAL (Town Highways)					
Personal Services	DA5142.1	$ 195,000.00	$ 205,120.00	$ 205,500.00	$ 205,500.00
Contractual Expense	DA5142.4	$ 158,000.00	$ 160,000.00	$ 160,000.00	$ 160,000.00
TOTAL		**$ 353,000.00**	**$ 365,120.00**	**$ 365,500.00**	**$ 365,500.00**

HIGHWAY APPROPRIATIONS TOWNWIDE					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
SERVICES FOR OTHER GOVERNMENTS					
Personal Services	DA5148.1	$ 51,750.00	$ 54,525.00	$ 54,700.00	$ 54,700.00
Contractual Expense	DA5148.4	$ 42,000.00	$ 44,000.00	$ 44,000.00	$ 44,000.00
TOTAL		**$ 93,750.00**	**$ 98,525.00**	**$ 98,700.00**	**$ 98,700.00**
EMPLOYEE BENEFITS					
State Retirement	DA9010.8	$ 42,225.00	$ 45,000.00	$ 45,000.00	$ 45,000.00
Social Security	DA9030.8	$ 40,000.00	$ 43,000.00	$ 43,000.00	$ 43,000.00
Unemployment Insurance	DA9050.8	$ -			$ -
Disability Insurance	DA9055.80	$ 250.00	$ 250.00	$ 250.00	$ 250.00
Hospital & Medical Insurance	DA9060.8	$ 120,750.00	$ 125,000.00	$ 125,000.00	$ 125,000.00
TOTAL		**$ 203,225.00**	**$ 213,250.00**	**$ 213,250.00**	**$ 213,250.00**
OTHER EMP BENEFITS					
Longevity	51101.2.1	$ 1,400.00	**$ 1,600.00**	**$ 1,600.00**	$ 1,600.00
Clothing Allowance	51101.2.1	$ 2,700.00	**$ 3,000.00**	**$ 3,000.00**	$ 3,000.00
Safety Equipment	9089.9	$ 2,700.00	$ 3,000.00	$ 3,000.00	$ 3,000.00
SPECIAL ITEMS		$ -			$ -
Judge/Claims	1930.4	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
TOTAL		**$ 10,800.00**	**$ 11,600.00**	**$ 11,600.00**	**$ 11,600.00**
Debt Service					
BAN - Principal	9710.6	$ 40,000.00	$ 201,236.00	$ 40,000.00	$ 40,000.00
BAN - Interest	9710.7	$ -	$ 23,850.00	$ 23,850.00	$ 23,850.00
TOTAL		**$ 40,000.00**	**$ 225,086.00**	**$ 63,850.00**	**$ 63,850.00**
Transfer to:					
Capital Project Fund	DA9950.9	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00
TOTAL		**$ 50,000.00**	**$ 50,000.00**	**$ 50,000.00**	**$ 50,000.00**
Appropriations Total		**$ 1,634,066.00**	**$ 2,147,321.00**	**$ 1,657,150.00**	**$ 1,657,150.00**

HIGHWAY REVENUES -- TOWNWIDE					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
LOCAL SOURCES					
Non-Property Tax Distribution by County	DA1120	$ -			$ -
Services for Other Governments	DA2300-2399	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00
Interest and Earnings	DA2401	$ 45,000.00	$ 45,000.00	$ 45,000.00	$ 45,000.00
Rental of Equipment -	DA2414	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ 15,000.00
Sales of Scrap & Excess	DA2650	$ 500.00	$ 200,000.00	$ 200,000.00	$ 200,000.00
Unclassified	DA2770	$ 500.00	$ 500.00	$ 500.00	$ 500.00
Insurance Recovery	DA2680	$ 30,250.00	$ 8,000.00	$ 8,000.00	$ 8,000.00
Interfund Revenues	DA2801	$ -			$ -
TOTAL		**$ 241,250.00**	**$ 418,500.00**	**$ 418,500.00**	**$ 418,500.00**
STATE AID					
Consolidated Highway	DA3501-3099B	$ 306,591.00	$ 261,240.00	$ 261,240.00	$ 261,240.00
State Aid - General Government	DA3089	$ -			$ -
TOTAL		**$ 306,591.00**	**$ 261,240.00**	**$ 261,240.00**	**$ 261,240.00**
FEDERAL AID - SPECIFY					
Interfund Transfer	DA5031	$ -			$ -
TOTAL					
Revenues Total		**$ 547,841.00**	**$ 679,740.00**	**$ 679,740.00**	**$ 679,740.00**

Au Sable Forks Water District SW1

DISTRICT APPROPRIATIONS PART I AND PART II

Accounts	Code	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
ADMINISTRATION					
Personal Services	SW8310.1	$ 2,855.00	$ 2,925.00	$ 2,925.00	$ 2,925.00
Equipment	SW8310.2	$ 5,000.00	$ 2,850.00	$ 2,850.00	$ 2,850.00
Contractual Expense	SW8310.4	$ 4,000.00	$ 7,500.00	$ 7,500.00	$ 7,500.00
TOTAL		**$ 11,855.00**	**$ 13,275.00**	**$ 13,275.00**	**$ 13,275.00**
SOURCE OF SUPPLY, POWER & PUMPING					
Personal Services	SW8320.1	$ -			$ -
Equipment	SW8320.2	$ -			$ -
Contractual Expense	SW8320.4	$ 18,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00
TOTAL		**$ 18,000.00**	**$ 16,000.00**	**$ 16,000.00**	$ 16,000.00
PURIFICATION					
Personal Services	SW8330.1	$ -			$ -
Equipment	SW8330.2	$ -			$ -
Contractual Expense	SW8330.4	$ 5,500.00	$ 5,500.00	$ 5,500.00	$ 5,500.00
TOTAL		**$ 5,500.00**	**$ 5,500.00**	**$ 5,500.00**	**$ 5,500.00**
TRANSMISSION AND DISTRIBUTION					
Personal Services	SW8340.1	$ 24,000.00	$ 27,600.00	$ 27,650.00	$ 27,650.00
Longevity			$ -	$ -	$ -
Equipment	SW8340.2	$ -			$ -
Contractual Expense	SW8340.4	$ 500.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
TOTAL		$ 24,500.00	$ 32,100.00	$ 32,150.00	$ 32,150.00
EMPLOYEE BENEFITS					
State Retirement	SW9010.8	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Social Security	SW9030.8	$ 2,550.00	$ 2,200.00	$ 2,200.00	$ 2,200.00
Disability Insurance	SW9055.8	$ 400.00	$ 100.00	$ 100.00	$ 100.00
Hospital & Medical Insurance	SW9060.8	$ 3,000.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
TOTAL		**$ 7,450.00**	**$ 6,300.00**	**$ 6,300.00**	**$ 6,300.00**
Transfer to Capital Projects	**SW9950.9**	$ -	$ 5,000.00	$ 5,000.00	$ 5,000.00
SPECIAL ITEMS					
Attorney	**1420.4**	$ 2,500.00	$ 2,500.00	**$ 2,500.00**	$ 2,500.00
Judge/Claims	**1930.4**	$ 1,000.00	$ 1,000.00	**$ 1,000.00**	$ 1,000.00
Total		**$ 3,500.00**	**$ 3,500.00**	**$ 3,500.00**	**$ 3,500.00**
Total Part 1 Au Sable Forks Water		**$ 70,805.00**	**$ 81,675.00**	**$ 81,725.00**	**$ 81,725.00**

Au Sable Forks Water District SW1

DISTRICT APPROPRIATIONS PART I AND PART II

Accounts	Code	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
DEBT SERVICE PRINCIPAL					
Serial Bonds	SW9710.6	$ 30,000.00	$ 30,000.00	$ 30,000.00	$ 30,000.00
Statutory Bonds	SW9720.6	$ -			$ -
Bond Anticipation	SW9730.6	$ -			$ -
TOTAL		**$ 30,000.00**	**$ 30,000.00**	**$ 30,000.00**	**$ 30,000.00**
INTEREST					
Serial Bonds	SW9710.7	$ 21,489.00	$ 21,366.00	$ 21,366.00	$ 21,366.00
Statuatory Bonds	SW9720.7	$ -			$ -
Bond Anticipation	SW9730.7	$ -			$ -
TOTAL		**$ 21,489.00**	**$ 21,366.00**	**$ 21,366.00**	**$ 21,366.00**
Total Part1 + Transfer		**$ 70,805.00**	**$ 81,675.00**	**$ 81,725.00**	**$ 81,725.00**
Total Part II		**$ 51,489.00**	**$ 51,366.00**	**$ 51,366.00**	**$ 51,366.00**
Total Part I & Part II		**$ 122,294.00**	**$ 133,041.00**	**$ 133,091.00**	**$ 133,091.00**

Au Sable Forks Water District SW1

ESTIMATED WATER REVENUES

Accounts	Code	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
Unmetered Water Sales	SW2142	$ 17,700.00	$ 17,450.00	$ 17,450.00	$ 17,450.00
Water Service Charges	SW2144	$ -	$ 40.00	$ 40.00	$ 40.00
Interest & Penalty	SW2148	$ 50.00	$ 50.00	$ 50.00	$ 50.00
Water Services Other Governments	SW2378	$ -			$ -
Debt Charges Other Governments	SW2392	$ -			$ -
Interest & Earnings	SW2401	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
Insurance Recoveries	SW2680	$ 1,725.00	$ 100.00	$ 100.00	$ 100.00
Miscellaneous Revenues	SW2770	$ -			$ -
Total Est. Revenue		**$ 24,475.00**	**$ 22,640.00**	**$ 22,640.00**	**$ 22,640.00**

Jay Water District SW2-Appropriations-Part 1

Accounts	Code	2024 Budget	2025 Tentative	2025 Preliminary	2025 Adopted
Adminstration					
Personal Services	SW8310.1	$ 2,855.00	$ 2,925.00	2925	$ 2,925.00
Equipment	SW8310.2	$ 12,000.00	$ 2,900.00	$ 2,900.00	$ 2,900.00
Contractual Expense	SW8310.4	$ 5,000.00	$ 11,000.00	$ 11,000.00	$ 11,000.00
Total		**$ 19,855.00**	**$ 16,825.00**	**$ 16,825.00**	**$ 16,825.00**
SPECIAL ITEMS					
Attorney	1420.4	$ 100.00	**$ 100.00**	**$ 100.00**	$ 100.00
Judge/Claims	**1930.4**	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Total		**$ 1,600.00**	**$ 1,600.00**	**$ 1,600.00**	**$ 1,600.00**
Source Power Pump					
Personal Services	SW8320.1	$ 24,000.00	$ 27,600.00	$ 27,650.00	$ 27,650.00
Contractual Expense	SW8320.4	$ 11,000.00	$ 11,000.00	$ 11,000.00	$ 11,000.00
Total		**$ 35,000.00**	**$ 38,600.00**	**$ 38,650.00**	**$ 38,650.00**
Purification					
Personal Services	SW8330.1	$ -			
Contractual Expense	SW8330.4	$ 4,500.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
Total		**$ 4,500.00**	**$ 4,000.00**	**$ 4,000.00**	**$ 4,000.00**
Trans/Distribution					
Personal Services	SW8340.1	$ -			
Contractual Expense	SW8340.4	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
Total		**$ 2,500.00**	**$ 2,500.00**	**$ 2,500.00**	**$ 2,500.00**
State Retirement	SW9010.8	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Social Security	SW9030.8	$ 2,525.00	$ 2,120.00	$ 2,200.00	$ 2,200.00
Disability	SW9055.8	$ 50.00	$ 50.00	$ 50.00	$ 50.00
Medical Insurance	SW9060.8	$ 3,000.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
Total		**$ 7,075.00**	**$ 6,170.00**	**$ 6,250.00**	**$ 6,250.00**
Transfer to Capital	**SW9950.9**	$ -	**$ 5,000.00**	**$ 5,000.00**	$ 5,000.00
Total Part 1 SW2		**$ 70,530.00**	**$ 74,695.00**	**$ 74,825.00**	**$ 74,825.00**

Jay Water District SW2-Appropriations-Part 2					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Debt Service Principal					
Serial Bonds	SW9710.6	$ 8,600.00	$ 8,600.00	$ 8,600.00	$ 8,600.00
Statutory Bonds	SW9720.6	$ -			
Bond Anticipation	SW9730.6	$ -			
TOTAL		**$ 8,600.00**	**$ 8,600.00**	**$ 8,600.00**	**$ 8,600.00**
Interest					
Serial Bonds	SW9710.7	$ 3,600.00	$ 3,106.00	$ 3,106.00	$ 3,106.00
Statutory Bonds	SW9720.7	$ -			
Bond Anticipation	SW9730.7	$ -			
Total		**$ 3,600.00**	**$ 3,106.00**	**$ 3,106.00**	**$ 3,106.00**
TOTAL PART 2		**$ 12,200.00**	**$ 11,706.00**	**$ 11,706.00**	**$ 11,706.00**
					$ 23,412.00
Total Part 1 & Part 2 SW2		**$ 82,730.00**	**$ 86,401.00**	**$ 86,531.00**	**$ 86,531.00**

Jay Water SW2					
ESTIMATED WATER REVENUES					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Unmetered Water Sales	SW2142	$ 29,420.00	$ 28,190.00	$ 28,190.00	$ 28,190.00
Water Service Charges	SW2144	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00
Interest & Penalties	SW2148	$ 10.00	$ 10.00	$ 10.00	$ 10.00
Interest & Earnings	SW2401	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
Misc. Refunds	SW2701	$ -			$ -
Misc.Revenues	SW2770	$ -			$ -
Total		**$ 33,430.00**	**$ 33,200.00**	**$ 33,200.00**	**$ 33,200.00**

Upper Jay Water District SW3 - Appropriations Part 1					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Adminstration					
Personal Services	SW8310.1	$ 2,855.00	$ 2,925.00	$ 2,925.00	$ 2,925.00
Equipment	SW8310.2	$ 12,000.00	$ 2,840.00	$ 2,840.00	$ 2,840.00
Contractual Expense	SW8310.4	$ 4,500.00	$ 7,500.00	$ 7,500.00	$ 7,500.00
Total		**$ 19,355.00**	**$ 13,265.00**	**$ 13,265.00**	**$ 13,265.00**
Power & Pumping					
Personal Services	SW8320.1	$ 24,000.00	$ 27,600.00	$ 27,650.00	$ 27,650.00
Equipment	SW8320.2	$ -			$ -
Contractual Expense	**SW8320.4**	$ 12,500.00	$ 12,500.00	$ 12,500.00	$ 12,500.00
Total		**$ 36,500.00**	**$ 40,100.00**	**$ 40,150.00**	**$ 40,150.00**
Purification					
Personal Services	SW8330.1	$ -			$ -
Equipment	SW8330.2	$ -			$ -
Contractual Expense	SW8330.4	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
Total		**$ 4,000.00**	**$ 4,000.00**	**$ 4,000.00**	**$ 4,000.00**
Special Items					
Attorney	1420.4	$ 100.00	$ 100.00	**$ 100.00**	$ 100.00
Transfer to Capital			$ 5,000.00	**$ 5,000.00**	$ 5,000.00
Judge/Claim	1930.4	$ 150.00	$ 1,000.00	$ 1,000.00	$ 1,000.00
Total		**$ 250.00**	**$ 6,100.00**	**$ 6,100.00**	**$ 6,100.00**
Transmission & Distribution					
Personal Services	SW8340.1	$ -			$ -
Equipment	SW8340.2	$ -			$ -
Contractual Expense	SW8340.4	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
Total		**$ 2,000.00**	**$ 2,000.00**	**$ 2,000.00**	**$ 2,000.00**
State Retirement	SW9010.8	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00
Social Security	SW9030.8	$ 2,525.00	$ 2,120.00	$ 2,200.00	$ 2,200.00
Disability	SW9055.8	$ 25.00	$ 25.00	$ 25.00	$ 25.00
Medical Insurance	SW9060.8	$ 3,000.00	$ 2,500.00	$ 2,500.00	$ 2,500.00
Total		**$ 7,050.00**	**$ 6,145.00**	**$ 6,225.00**	$ 6,225.00
Total Part 1 SW3		**$ 69,155.00**	**$ 71,610.00**	**$ 71,740.00**	**$ 71,740.00**
Debt Service Principal					
Serial Bonds	SW9710.6	$ 60,226.00	$ 61,028.00	$ 61,028.00	$ 61,028.00
Bond Anticipation	SW9730.6	$ -			$ -
Total		**$ 60,226.00**	**$ 61,028.00**	**$ 61,028.00**	**$ 61,028.00**
Interest					
Serial Bonds	SW9710.7	$ -			$ -
Bond Anticipation	SW9730.7	$ -			$ -
Total		$ -	$ -	$ -	$ -

Total Part 2		$ 60,226.00	$ 61,028.00	$ 61,028.00	$ 61,028.00
Total Part 1 & Part 2 SW3		$ 129,381.00	$ 132,638.00	$ 132,768.00	$ 132,768.00

Upper Jay Water SW3					
ESTIMATED WATER REVENUES					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Unmetered Water Sales	SW2142	$ 15,700.00	$ 20,730.00	$ 20,730.00	$ 20,730.00
Interest & Penalties	SW2148	$ 100.00	$ 50.00	$ 50.00	$ 50.00
Water Service charges	SW2144	$ 250.00	$ 250.00	$ 250.00	$ 250.00
Interest & Earnings	SW2401	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00
Refunds	SW2701	$ -			$ -
Misc. Revenues	SW2770	$ -			$ -
Interfund Transfer	SW5031	$ -			$ -
Total Est. Revenues		**$ 19,550.00**	**$ 24,530.00**	**$ 24,530.00**	**$ 24,530.00**

Au Sable Forks Sewer District Appropriations					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
SANITATION					
Admin. Personal Services	SS8110.1	$ 3,750.00	$ 3,760.00	3760	$ 3,760.00
Equipment	SS8110.2	$ 20,000.00	$ 18,500.00	$ 18,500.00	$ 18,500.00
Contractual Expense	SS8110.4	$ 7,000.00	$ 11,000.00	$ 11,000.00	$ 11,000.00
Total		**$ 30,750.00**	**$ 33,260.00**	**$ 33,260.00**	**$ 33,260.00**
Sanitary Sewer					
Personal Services	SS8120.1	$ 71,600.00	$ 81,550.00	$ 82,500.00	$ 82,500.00
Equipment	SS8120.2	$ 4,000.00	$ -	$ -	$ -
Contractual Expense	SS8120.4	$ 5,000.00	$ 9,000.00	$ 9,000.00	$ 9,000.00
Total		**$ 80,600.00**	**$ 90,550.00**	**$ 91,500.00**	**$ 91,500.00**
Sewer Treat/Disp					
Contractual Expense	SS8130.4	$ 30,000.00	$ 30,000.00	$ 30,000.00	$ 30,000.00
Total		**$ 30,000.00**	**$ 30,000.00**	**$ 30,000.00**	**$ 30,000.00**
Special Items					
Attorney	SS1420.4	$ 150.00	**$ 500.00**	**$ 500.00**	$ 500.00
Judge/Claims	SS1930.4	$ -			$ -
Total		$ 150.00	$ 500.00	$ 500.00	$ 500.00
Employee Benefits					
State Retirement	SW9010.8	$ 4,500.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
Social Security	SS9030.8	$ 7,025.00	$ 6,000.00	$ 6,200.00	$ 6,200.00
Disability			$ 50.00	$ 50.00	$ 50.00
Hospital/Medical Insurance	9060.8	$ 4,500.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
Total Employee Benefits		**$ 16,025.00**	**$ 15,050.00**	**$ 15,250.00**	**$ 15,250.00**
Transfer to Capital	SS9950.9	$ 26,500.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
TOTAL PART I		**$ 184,025.00**	**$ 174,360.00**	**$ 175,510.00**	**$ 175,510.00**
Debt Service Principal					
Serial Bonds	SS9710.6	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ 15,000.00
Bond Anticipation	SS9730.6	$ -			$ -
Total		**$ 15,000.00**	**$ 15,000.00**	**$ 15,000.00**	**$ 15,000.00**
Debt Service Interest					
Serial Bonds	SS9710.7	$ 4,847.00	$ 3,966.00	$ 3,966.00	$ 3,966.00
Bond Anticipation	SS9730.7	$ -			$ -
Total		**$ 4,847.00**	**$ 3,966.00**	**$ 3,966.00**	**$ 3,966.00**
TOTAL PART II		**$ 19,847.00**	**$ 18,966.00**	**$ 18,966.00**	**$ 18,966.00**
TOTAL SS PART I & II		**$ 203,872.00**	**$ 193,326.00**	**$ 194,476.00**	**$ 194,476.00**

Au Sable Forks Sewer District Revenues					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Home & Community Services					
Sewer Rents	SS2120	$ 73,400.00	$ 72,800.00	$ 72,800.00	$ 72,800.00
Interest & Penalties	SS2128	$ 150.00	$ 150.00	$ 150.00	$ 150.00
Water Services Other Governments	SS2378	$ 12,000.00	$ 13,500.00	$ 13,500.00	$ 13,500.00
Use Of Money & Property					$ -
Interest & Earnings	SS2401	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00
					$ -
Insurance Recoveries	SS2680	$ 2,500.00	$ 500.00	$ 500.00	$ 500.00
Total		**$ 91,050.00**	**$ 89,950.00**	**$ 89,950.00**	**$ 89,950.00**

Au Sable Forks Ambulance District SM					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Other Health					
Ambulance Contractual	SM4540.4	$ 411,000.00	$ 430,600.00	$ 430,600.00	$ 430,600.00
Total		**$ 411,000.00**	**$ 430,600.00**	**$ 430,600.00**	**$ 430,600.00**
Ambulance Reimbursement		$ 148,500.00		**$ 150,000.00**	$ 150,000.00
Revenue Total		**$ 148,500.00**	**$ -**	**$ 150,000.00**	**$ 150,000.00**

Au Sable Forks Fire District Appropriations					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Fire Prevention & Control SF1					
Fire Protection	SF3410.4	$ 250,562.00		$ 286,145.42	$ 286,145.42
					$ -
Total		**$ 250,562.00**	**$ -**	**$ 286,145.42**	**$ 286,145.42**

Jay Fire District					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Fire Prevention & Control SF2					
Fire Protection	SF3410.4	$ 196,000.00	$ 224,300.00	$ 224,300.00	$ 224,300.00
					$ -
Total		**$ 196,000.00**	**$ 224,300.00**	**$ 224,300.00**	**$ 224,300.00**

Upper Jay Fire District					
Accounts	**Code**	**2024 Budget**	**2025 Tentative**	**2025 Preliminary**	**2025 Adopted**
Fire Prevention & Control SF3					
Fire Protection	SF3410.4	$ 105,140.00	$ 110,881.00	$ 110,881.00	$ 110,881.00
					$ -
Total		**$ 105,140.00**	**$ 110,881.00**	**$ 110,881.00**	**$ 110,881.00**

Appendix J\

Engineering Report Certification

NEW YORK STATE | Environmental Facilities Corporation

Engineering Report Certification

To Be Provided by the Professional Engineer Preparing the Report

During the preparation of this Engineering Report, I have studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which assistance is being sought from the New York State Clean Water State Revolving Fund. In my professional opinion, I have recommended for selection, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation, and energy conservation, taking into account the cost of constructing the project or activity, the cost of operating and maintaining the project or activity over the life of the project or activity, and the cost of replacing the project and activity.

Title of Engineering Report: Town of Jay Water Meter Feasibility Study

Date of Report: 2/7/25

Professional Engineer's Name: Michael D. Panichelli, PE

Signature: 

Date: 2/7/25