

Appendix A

Advanced Metering Infrastructure/Smart Utility Solution - Water & Sewer Technical Specifications

RFP FY2024-01



Sarah Catala

Executive Director

Louis Brunetti

Project Engineer

Program Managers:

Jeff Odoms

Utility Management & Installation Solutions

Charles Casimir

Utility Management & Installation Solutions

Technical Table of Contents

Advanced Metering Infrastructure/Smart Utility Solution - Water & Sewer Request for Proposal FY2024-01 for Immokalee Water & Sewer District	i
INTRODUCTION	5
SECTION 1 - WATER MONITORING	7
1.0 WATER TREATMENT PLANT MONITORING	7
1.1 Water Quality Monitoring	7
1.1.1 Chlorine Monitoring System	7
1.2 Finished Water Monitoring	7
1.2.1 Flow Meter Retrofit	7
1.2.2 Pressure Monitoring	8
SECTION 2 - SMART WATER	9
2.0 Intelligent Water Distribution Monitoring	9
2.1 District Metering	9
2.1.1 Insertion Flow Meter	9
2.2 Water Distribution Pressure & Acoustic Leak Monitoring	10
2.2.1 Service Level Pressure Monitoring	10
2.2.2 Pressure Monitoring for District Metering:	11
2.2.3 Acoustic Leak Detection:	11
2.3 Distribution Water Quality Monitoring	11
2.3.1 Multi-Parameter Water Quality Monitoring (Chlorine & Dissolved Oxygen)	11
2.4 Advanced Meter Infrastructure (AMI) for Water	11
2.4.1 Residential Metering (5/8" – 1")	12
2.4.2 Commercial Metering (1 1/2" – 8")	13

2.4.3 AMI Module Specifications:	14
2.4.4 Interoperability with Different Meter Registers	16
2.4.5 Drive-By System Requirements:	16
2.4.6 AMI Network Specifications	16
2.4.6 AMI Software-as-a-Service/Network-as-a-Service (SaaS/NaaS), SOFTWARE, AND CUSTOMER INTERFACE:	17
SECTION 3 - WASTEWATER	20
3.0 Intelligent Wastewater Monitoring	20
3.1 Gravity Sewer	20
3.1.1 Sanitary Sewer Overflow Monitoring	20
3.1.2 Wastewater Advanced Metering Infrastructure	22
3.2 Pump Stations	25
3.2.1 Emergency Level Monitoring Requirements	26
SECTION 4 - WASTEWATER TREATMENT	28
4.0 Wastewater Treatment Monitoring	28
4.1 Raw WW Influent Monitoring	28
4.2 WW Inflow and Infiltration Balancing	28
SECTION 5 - INSTALLATION REQUIREMENTS	29
5.0 General Installation Scope	29
5.1 Water AMI Installation Requirements:	29
5.1.1 Contractor Specifications:	29
5.1.2 Construction Equipment Specifications:	30
5.2 FIELD TOOLS – Water AMI	32
5.3 FIELD SERVICE SOFTWARE – Water AMI	32
5.4 UTILITY PORTAL – Water AMI	33
5.5 INVENTORY MANAGEMENT – Water AMI	35
5.6 DATA INTEGRATION – Water AMI	35

5.7 QUALITY ASSURANCE – Water AMI	36
5.8 TECHNICIANS – Water AMI	36
5.9 FIELD TOOLS – Water AMI	37
5.10 COMMUNICATIONS AND HISTORY – Water AMI	37
5.11 Wastewater AMI Installation Requirements:	37
5.2 FIELD TOOLS – Wastewater AMI	39
5.3 FIELD SERVICE SOFTWARE – Wastewater AMI	39
5.4 UTILITY PORTAL – Wastewater AMI	39
5.5 INVENTORY MANAGEMENT – Wastewater AMI	41
5.6 DATA INTEGRATION – Wastewater AMI	41
5.7 QUALITY ASSURANCE – Wastewater AMI	42
5.8 TECHNICIANS – Wastewater AMI	42
5.9 FIELD TOOLS – Wastewater AMI	43
5.10 COMMUNICATIONS AND HISTORY – Wastewater AMI	43
SECTION 6 – GIS SOFTWARE	44
6.0 GIS Software / Field Maintenance and Management Software	44

INTRODUCTION

In line with these strategic initiatives, Immokalee Water & Sewer District has developed a comprehensive solution to address unique operational challenges within the District. This sophisticated Smart Utility solution is designed to oversee all the Water & Sanitary sewer assets within the IWSD service area. The recent events surrounding Hurricane Ian have underscored the importance of Resilience as a critical element of this solution. Consequently, all potential solutions must demonstrate reliable operational capabilities before, during, and after all weather conditions, including, but not limited to, flooding, thunderstorms, and hurricanes.

From a Smart Water perspective, the system must enable IWSD to monitor the Flow, Pressure, and Water Quality from our Water Treatment Plant and Water Distribution system. The solution architecture will integrate existing technological principles for Water loss management, Distribution-level water quality monitoring, and advanced pressure monitoring for predictive pipe break analysis. This strategic approach permits the rapid deployment of a Smart Water System, highlighting scalability principles and the requirement for additional research and development resources from the solution provider.

From the standpoint of Smart Wastewater, the system must allow for Flow & Level analysis of the Wastewater collection system, Pump stations, and balancing between the Wastewater Collections system and Wastewater Treatment operations. The solution will encompass near real-time monitoring of Wastewater Inflow & Infiltration, Sanitary Sewer overflow monitoring, and real-time emergency operations monitoring of the sewer pump stations.

The proposed solution must be capable of consolidating all data into a single source platform, necessitating the creation of a centralized Smart Utility data repository. This repository will facilitate seamless data transfer between Smart Utility solutions, providing IWSD with robust digital data resilience.

The District is pursuing a comprehensive, end-to-end solution from a single Smart Utility integrator, herein referred to as the "CONTRACTOR." The CONTRACTOR shall provide all requisite equipment and software for implementing this Smart Utility solution. Furthermore, the CONTRACTOR shall also deliver implementation, installation services & training for the Water and Wastewater system per the stipulated requirements.

SECTION 1 - WATER MONITORING

1.0 WATER TREATMENT PLANT MONITORING

IWSD requires integration with the Water Treatment Plant for Flow, Pressure and Water Quality. Monitoring these parameters leaving the plant will assist the District in monitoring Chlorine levels on the discharge for the Distribution System, the finished water flow on the outlet side of the Water Treatment Plant will provide critical data for the IWSD to balance Water Loss with their District Metering program. Lastly monitoring pressure on the finished water line will allow the District to leverage the planned pressure monitoring in the distribution system to assist in long term hydraulic modeling analysis.

1.1 WATER QUALITY MONITORING

Chlorine monitoring at the Water Treatment plant allows for “Smart” managed processes for the IWSD Water Distribution System. Water Quality monitoring is essential to any public health-minded solution.

1.1.1 Chlorine Monitoring System

The District requires Chlorine monitoring in near real-time monitoring of the Water Treatment Plant's chlorine output. This will allow the District to ensure a proper balance of Chlorine in the Water Distribution network. Additionally, this solution will need to be integrated with the planned distribution chlorine monitoring program.

Technical Requirements:

1. Chlorine Analyzer
2. Telemetry: IOT Telemetry to retrofit to proposed chlorine analyzer
 - a. Configurable 4-20mA Output
 - b. RS-485 Modbus RTU
3. Software requirements:
 - a. API integration with built-in manual Quality control.

1.1.2 Dissolved Oxygen Sensor

This solution monitors various aspects of water quality with flexible parameter options enabling monitoring across a large spectrum of water quality concerns. Significant infrastructure investment and consumer service interruptions are unnecessary, given the ability to hot tap to the existing infrastructure.

Technical Requirements:

1. Dissolved Oxygen Sensor
2. Telemetry:
 - a. Fixed Based AMI Communication Network
3. Software Solution:
 - a. Head-End System to allow for near real-time data analysis.

1.2 FINISHED WATER MONITORING

Monitoring the finished water produced by the water treatment plant allows for proper water balancing between the treatment plant and the IWSD Water Distribution System, enabling the IWSD to accomplish accurate water loss balancing with the district metering system.

1.2.1 Flow Meter Retrofit

IWSD has recently upgraded its Finished Water meter. Therefore, this solution's recommended and most cost-effective approach is a flow meter integration.

Technical Requirements:

1. McCrometer Ultra-Mag with Pro-Comm converter
2. Telemetry: IOT Telemetry to retrofit existing Electro-Magnetic Flow meter
 - a. Configurable 4-20mA Output
 - b. RS-485 Modbus RTU
3. Software Requirements:
 - a. API integration with built-in manual Quality control

1.2.2 Pressure Monitoring

IWSD requires monitoring of the final pressure output from the Water Treatment Plant. This enables proper pressure management and balancing within the IWSD Water Distribution System.

Technical Requirements:

1. Retrofit existing valves with pressure sensors.
2. Install/Tap and Saddle to install pressure sensors.
3. Telemetry: IOT Telemetry to retrofit to existing taps.
 - a. Configurable 4-20mA Output
4. Software Requirements: Must be integrated into an existing Water AMI platform. Must include manual Quality control.

SECTION 2 - SMART WATER

2.0 INTELLIGENT WATER DISTRIBUTION MONITORING

A Water Distribution System is one of the most challenging aspects of a Smart Utility to monitor, evidenced by the fact that there are few usable access points for additional monitoring designed into the current water distribution network.

IWSD shall utilize the existing water distribution network to allow remote monitoring through battery powered Smart IoT devices, supporting an efficient setup without needing additional electrical or solar equipment infrastructure. The solution shall enable the utility to gain insight without the outlay of considerable expense to retrofit the system.

2.1 DISTRICT METERING

The District will be implementing a District Metering Program to assist with water loss identification along with developing a long-term solution for hydraulic modeling analysis. This solution shall also require an integration pressure sensor for every District Metering for regional pressure monitoring to correlate data with the Water Treatment Plant.

2.1.1 Insertion Flow Meter

The solution will need to effectively retrofit the water distribution main lines to assist in identifying branch-off areas and water loss.

Technical Requirements:

1. Required Metering Hardware: Insertion Electro-Magnetic flow meter.
 - a. Accuracy: +/- .5%
 - b. Solution must be battery powered with a 5-year power supply for the flow meter.
 - c. Solution must have an integrated pressure sensor with 10-year power supply.
 - d. Solution must be capable of being installed and removed under pressure.
 - e. Due to environmental conditions the meter must be metallic with a fusion bonded epoxy coating to insure longevity of service life.
 - f. CONTRACTOR must have experience with installing these type of flow meters.
 - g. CONTRACTOR will be responsible for conducting site surveys, digging to access the service line, and installing a meter pit for the proposed insertion mag meter.
 - h. CONTRACTOR will be responsible for conducting a 2" full port service taps on the service line. This tap will be conducted under pressure to avoid any system shutdowns.
2. Required Telemetry: Fixed Base AMI Communication Network
3. Required Software Solution: Software that allows for virtual district metering. These will be permanent installations. As such, the isolation of basins will not be possible as it would interfere with day-to-day operations.

2.2 WATER DISTRIBUTION NETWORK PRESSURE MONITORING

Water Distribution Network pressure monitoring will be a required segment of the solution infrastructure. There is the requirement for the ability for near real-time service level pressure monitoring. The data shall be transmitted into the head-end system which will be used throughout the Water AMI solution.

Water Distribution Network pressure software applications enable remote pressure monitoring from pressure-enabled meters and sensors across your water distribution system to provide visibility of near real-time pressure data and device status, leveraging a map-based platform with trending, charting, alerting, and dashboard capabilities. Better pressure management enables utilities to limit wear and tear on infrastructure, improves customer service, and ensures water quality, while also reducing truck rolls and making better use of utility resources.

Remote pressure monitoring provides a reliable means of leveraging an existing Smart Utility Network alerting you to minor issues before they become serious issues.

2.2.1 Service Level Pressure Monitoring

The solution shall integrate directly with the provided solutions network and shall provide near-real time data.

Technical Requirements:

1. Solution must be capable of setting up alarms based on pressure thresholds to detect abnormal conditions.
2. Solution must be capable of validating field repairs and activities by tracking pressure before, during, and after changes are made.
3. Solution must be capable of accessing 1,000+ days of historical data.
4. No third-party solutions will be accepted.
5. Solution must be capable of exporting pressure and total head data at all sites and sensors to compare with expected values.
6. Solution must assist with calibration & validation of hydraulic models.
7. Solution must seamlessly integrate with IWSD GIS platform and all ESRI solutions.
8. Solution must provide data layers such as property parcels, streets, pressure zones, and the Utility network layer.

2.2.2 Pressure Monitoring for District Metering:

The solution shall integrate with the District Metering Solution to provide distribution line pressure monitoring.

Technical Requirements:

1. Required Hardware: Pressure sensor integrated into Insertion Electro-magnetic flow meter.
2. Required Telemetry: Fixed Base AMI Communication Network
3. Required Software Solution: Head-End System to allow for near real-time data analysis.

2.2.3 Acoustic Leak Detection:

Acoustic Leak detection is an imperative aspect of the pinpointing solutions that the District plans on utilizing once areas of concern are identified by the District Metering and pressure monitoring solutions.

Technical Requirements:

1. The solution must have a fully integrated 2-way acoustic monitoring system that communicates directly to the NaaS Network.
2. The solution calls for a system that utilizes sounds waves to monitor distribution lines and localize leaks.
3. Sensor must activate overnight, to listen to the distribution system when ambient noise is at its lowest to report pipeline condition back to the utility via the NaaS Network.
4. Sensor must attach magnetically to gate valves, meter service connections and other metallic utility assets/access points.
5. The system must have a minimum of a 3-year battery solution with a 3-year warranty and can store up to 29 days of data.

2.3 DISTRIBUTION WATER QUALITY MONITORING

Distribution water quality monitoring is a relatively new concept in the Water Utility Industry. The Immokalee Water & Sewer District has developed a practical approach to monitoring water quality to increase the public health level of service while not burdening utility personnel with significant maintenance requirements.

2.3.1 Multi-Parameter Water Quality Monitoring (Chlorine & Dissolved Oxygen)

2.3.1.a Chlorine Analyzer with Chlorine residual monitoring to balance with Water Treatment Plant.

2.3.1.b Dissolved Oxygen Sensor

This solution monitors various aspects of water quality with flexible parameter options enabling monitoring across a large spectrum of water quality concerns.

Significant infrastructure investment and consumer service interruptions are unnecessary, given the ability to hot tap to the existing infrastructure.

Technical Requirements:

1. Chlorine & Dissolved Oxygen
2. Telemetry: Fixed Based AMI Communication Network
3. Software Solution: Head-End System to allow for near real-time data analysis.

2.4 ADVANCED METER INFRASTRUCTURE (AMI) FOR WATER

Advanced Metering Infrastructure (AMI), an integrated system of equipment, communications, and information management systems to remotely collect usage data in near real-time, is a technology that shall be implemented into the IWSD solution. Immokalee Water & Sewer District is requiring a 20-year solution for the water meter and telemetry systems. The proposed system network should have the ability to easily integrate additional water & sewer assets without network expansion or incurring additional telemetry fees from cellular or other third-party solutions. The solution shall also have the ability to integrate desired third-party sensors and metrology products without the need for additional fees for data “translation” into the head-end system.

IWSD is requiring that the AMI solution shall offer a licensed fixed base, prioritized communication network. The proposed communication network will be required to have the ability to work under emergency operations conditions. The network will not be reprioritized under any conditions, no exceptions will be accepted. IWSD will NOT accept any options that require cellular based communications.

2.4.1 Residential Metering (5/8” – 1”)

2.4.1.a Solid-State Residential Meter

IWSD will require a solid-state electromagnetic flowmeter. The warranty for the meter shall be no less than a 20-year battery and accuracy warranty.

Technical Requirements:

1. Required Metering Hardware: Solid state residential meter.
2. Required Telemetry: Fixed Base AMI Communication Network
3. Required Solution Features:
 - a. 20-year solid state Meter
 - b. 20-year accuracy warranty
 - c. 20-year product warranty (minimum 10 years full & 10 years prorated)
 - d. Ability for Water loss balancing with District Metering Solution

- e. Customer side leak detection ability
- f. Wastewater I&I balancing with Sewer Flow Meter at Pump Station
- g. Inactive account consumption notification
- h. Reverse / Backflow detection
- i. Tamper alarming

4. Required Software Solution: Head-End system to allow for data analysis and ease of use for IWSD.

2.4.1.b Solid-State Residential Meter with Remote Disconnect Features

IWSD will require a solid-state electromagnetic flowmeter with the ability for integrated remote disconnect, pressure sensors, and temperature sensors without the need for retrofitting. The meter shall have an at minimum 15-year accuracy warranty.

Technical Requirements:

1. Required Metering Hardware: Smart Metering Distribution technology.
 - a. Integrated 3-way Valve Remote disconnect.
 - b. Integrated Temperature Sensor
 - c. Integrated Pressure Sensor
 - d. Solid-State Flow measurement
2. Required Telemetry: Fixed Base AMI Communication Network
3. Required Outcomes:
 - a. 3- Way Valve Remote disconnect capability
 - b. Seasonal disconnect capability.
 - c. Temperature monitoring
 - d. Pressure monitoring:
 1. Distribution level pressure monitoring
 2. Leak detection
 3. Etc.
4. Required Software Solution: Head-End system to allow for data analysis and ease of use for IWSD.

2.4.2 Commercial Metering (1 ½” – 8”)

2.4.2.a Commercial Metering

The commercial metering solution shall include high-accuracy water meters for low and high-flow applications amongst IWSD’s commercial and industrial users. The solution shall contain a built-in access point for pressure, temperature, and water quality monitoring. The recommended Commercial Meters shall be an at minimum 10-year commercial rated with replaceable register and measuring element, 20-year capable meter.

Technical Requirements:

1. Required Metering Hardware: Inferential Metering technology for Commercial Metering
2. Required Telemetry: Fixed Base AMI Communication Network
3. Required Outcomes:
 - a. 10 year rated commercial meter with replaceable measure element. Making it a 20-year capable meter
 - b. Water loss balancing with District Metering Solution
 - c. Customer side leak detection
 - d. Wastewater I&I balance with Sewer Flow Meter at Pump Station
 - e. Inactive account consumption notification
 - f. Reverse / Backflow detection
 - g. Tamper alarming
 - h. Distribution pressure monitoring
 - i. Possible through meter test port
4. Software Solution: Head-End system to allow for data analysis and ease of use for IWSD.

2.4.2.b Pressure Monitoring

IWSD is requesting the product and ability to retrofit pressure sensors to the proposed commercial meters. The solution shall transmit data into the same head-end system that is used for all other Water Metering AMI solutions.

Technical Requirements:

1. Required Pressure Sensor Solution:
 - a. Capable of retrofitting to existing 3" – 8" Sensus OMNI™+
 - b. Capable of being fitted to proposed commercial metering solution.
 - c. Internal Pressure sensors will not be accepted on Commercial Meters.
2. Required Telemetry: Fixed Base AMI Communication Network
3. Required Software Solution: Head-End System to allow for near real-time data analysis.

2.4.3 AMI Module Specifications:

The AMI Module shall:

1. Receive meter data from water meters equipped with absolute encoder registers. The CONTRACTOR shall state which brands and models of encoder registers are compatible with the proposed radio module.
2. Communicate via a strong, secure, and reliable radio frequency that include provisions to ensure data transmission accuracy, and immunity from outside

interference as well as fading and other forms of signal degradation or attenuation to prevent accidental loss of customer or meter reading data.

3. It is the desire of the IWSD to procure meters separate from the AMI RFP. Please detail connector solutions with outside the proposer's meter lines. Please include whether single or dual connection options are available for transmitting up to two (2) meter readings and alarms per transmission, including any cost savings associated with this orientation.
4. Identify customer leaks, tamper and backflow parameters when connected to an encoded register. The alarm parameters shall be configurable and programmed for each meter. This feature must work with any brand of encoded register. These parameters must be capable of being changed through the network after installation is completed.
5. Please detail any programming adjustments that may be needed to retrofit existing encoder outputs.
6. Be designed and built for installation in meter pits.
7. Housed in a single package designed for rugged, harsh environments and capable of complete submersion in water without damage.
8. Function accurately and not be damaged when an operating temperature range exceeds -40 degree C to +70-degree C.
9. Operate in the above conditions and have a minimum battery life of 20 years.
10. Transmit battery life data to the Host System alerting of low battery levels for preemptive maintenance.
11. Store meter data including date and time stamps in non-volatile memory.
12. Have two-way communication with a minimum capability of on-demand reading from the AMI Network for customer complaint resolution. This shall allow us to obtain real-time data upon request. Receive and process commands from the AMI Network for all firmware updates to eliminate the need to manually perform the update function to each locale. AMI Modules must support group firmware updates to reduce system maintenance time.
13. Please detail how your system accommodates shifts from AMI to Mobile AMR receiver modules if the network is temporarily unresponsive. The AMI Module shall be capable of migrating to both AMR/AMI capable reading without additional visits and equipment.
14. Employ actionable alerts including each of the items listed below:
 - a. Tamper Alert or Meter Disconnected

- b. Bad Read or Communications Failure
 - c. Leak Detected
 - d. No Flow Detected – Specific time period set in the host software
 - e. Reverse Flow/Backflow
 - f. High Flow Rate Detected – Specifics set in host software
 - g. Battery Health
15. Update each AMI Module's clock date & time settings to match reference date & time that shall be regularly provided to the meter stored in the transmitter's memory.
16. Provide data about the AMI Network and handheld collectors in the field for use in diagnostics and maintenance activities.
17. Can deliver smart utility functionality including UOM of:
- a. PSI
 - b. F (temperature)
 - c. Level
 - d. Water Flow
 - e. Sewer Flow
 - f. H2S
 - g. Chlorine Residual
 - h. Dissolved Oxygen
18. Please describe your solution's use of smart devices to connect any digital and / or analog (4-20mA) IO device to the system outside of what standard requirements are.
19. Be warranted free from defects in material and workmanship for a minimum of twenty (20) years. In the event any defects are found within the warranty period, the CONTRACTOR shall correct the defect at its own expense.

2.4.4 Interoperability with Different Meter Registers

Provide a table showing the degree of compatibility of Proposer's MIUs with all makes and models of water meters currently available in the U.S. market, including, at a minimum, the information requested in Table below. The proposed solution must be compatible with at least three registers listed in the table. More compatibility is desirable.

2.4.5 Drive-By System Requirements:

IWSD currently utilizes a Neptune R900 Drive-by system. The Utility wishes to not abandon these assets during the deployment of their Fixed Based Advanced Metering Infrastructure (AMI) project. As such, any proposals submitted must have the technology capable of reading the existing system without the requirement of running a **dual** platform. All reads must come into a single meter reading platform for ease of integration with the District's billing software.

Technical Requirements:

1. Solution must be capable of utilizing a radio frequency-based vehicle collection system for automated meter reading for the Neptune R900 RF Drive by solution.
2. CONTRACTOR must provide ToughPad for easy to view display with an integration to the vehicle collection system.
3. Dual platform systems will not be accepted.

2.4.6 AMI Network Specifications

The intent of the AMI Network Performance specifications is to describe a system of equipment capable of performing specified tasks. Because of the variety of approaches to designing a system of equipment to perform certain tasks, it is not the intent of this description to specify any specific design, but rather to specify features preferred and descriptive data felt to be common to most designs. The Proposer shall submit a price for equipment which is fully capable of performing the specified tasks. Any deviations from the requirements shall be identified on the accompanying appendix.

The Network Performance System shall:

1. Consist of a reliable and tested network to ensure billing data quality along with other Smart Utility capabilities. Please describe how your network meets these specifications.
2. Include a 98.5% billing read success over a 72-hour period.
3. Please explain the custody of control of your network architecture.
4. Does your Network operate before, during and after Emergency Conditions e.g. (Tropical Storms, Hurricanes & Flooding)? If so, please describe how this is accomplished.
5. Please describe how the AMI endpoint stores and frequency of deliver of meter data daily to the AMI Network from all the AMI Modules and how this process can maximize read interval success.
6. Communicate on demand to AMI endpoint and other related endpoint devices. Please describe the two-way command turnaround time between the endpoint and AMI Network. Please explain capability of reading in emergency operations conditions.
7. Use state-of-the-art data security techniques to prevent unauthorized access to the data.
8. Time synchronizes all devices to within five (5) seconds at least once per day and allow daily upload of meter data and system health checks is required.

9. Established architecture to include backup/failover options for the entire communication path from the meter to the Meter Data Management System.
10. Use AC and solar powered units and optional battery backup if applicable.
11. Allow self-diagnosis of any problems associated with the back haul of the communication and the ability to automatically seek an alternate communication path if initial daily or real-time upload is unsuccessful.
12. Accommodate over the air firmware and software upgrades.
13. Have icons that permit viewing operational health of the system components.
14. Be capable of changing read interval sampling, alarm frequency sampling, and communication mode over-the-air.

2.4.6 AMI Software-as-a-Service/Network-as-a-Service (SaaS/NaaS), SOFTWARE, AND CUSTOMER INTERFACE:

1. IWSD requests the following configurations be provided. Any deviations to the request shall be explained on the Compliance table.
2. The CONTRACTOR shall provide a managed hosting service, where it will own and manage the server hardware and software including monitoring to ensure the server continues to work effectively, provide backup services, installation of security patches and various levels of technical support. The CONTRACTOR hosted solution shall utilize a secure web-based application.
3. The CONTRACTOR shall provide software, support and documentation that will enable the IWSD to self-host the data on ISD owned equipment in the future.
4. An upgrade path shall be defined to support the ISD transitioning from one hosting option to another at a time of their choosing.
5. The Host Software solution shall utilize a secure web-based application user interface.
6. The Host Server shall act as the central collection point for the data within the system. The server collects data from all of the remotes and stores the gathered data in a secure database. Once the data is stored and analyzed on the server, the data shall be available for display via an easy-to-use web based graphical interface.
7. The Host Server shall manage and archive data for a minimum of two.
8. (2) years in order to be accessed by any IWSD computers, handheld devices both locally and remotely via the web.

9. The data shall be available via a user interface that will allow for analysis, as well as bill generation.
10. The Host system software shall be web browser based. Standard interfaces shall be available to connect to current and future IWSD applications.
11. The Host Software shall have flexible meter reading data formats that are compatible with IWSD's current billing application, a custom designed Customer Information System. Data transfers shall utilize a secure transfer protocol (SFTP) utilizing American Standard Code for Information Interchange (ASCII) file transfers.
12. The Host Software shall be used to generate reports, view demand graphs, determine usage patterns, and request transfer of readings to billing software.
13. The Host Software shall use information from alerts uploaded in the data and have the ability to generate specific e-mail alerts or short message service (SMS) messages for each status code, configured by the User interface.
14. Each AMI endpoint generated alert shall be accompanied by a duration for which the alert has been active, and which shall be stored and optionally sent out by the server.
15. The User interface shall permit the sending of alert outages, tampering, out-of-range system operating parameters to appropriate utility personnel via cell phone or e-mail.
16. The User Interface shall allow IWSD to correlate consumption with meter data available on the user interface.
17. The CONTRACTOR shall offer an integrated consumer portal for customer access to consumption data.
18. The customers shall have the ability to see their usage, compare their current usage with previous periods, configure individual alerts and set monthly and yearly budget goals.
19. Customers shall have access to simple canned queries and the option to select more advanced queries for more detailed analysis.
20. Reports shall be available in graphical and table views for reading and consumption for various intervals. Graphs shall have the ability to change views, daily/weekly/monthly.
21. The customer portal home page shall include a display that can be configured for IWSD. The display shall have the ability to show informational alerts from IWSD.

SECTION 3 - WASTEWATER

3.0 INTELLIGENT WASTEWATER MONITORING

Wastewater collections system have historically been one of the most operationally challenging aspects of any utility system. The system designed for the Immokalee Water & Sewer District optimizes its practices in the Wastewater Collection System by utilizing permanent flow monitoring to ascertain Inflow and Infiltration in near real-time. This solution also incorporates manhole level monitoring, allowing sanitary sewer overflow and blockage detection which are the two biggest concerns in a Wastewater Collections system.

3.1 GRAVITY SEWER

Gravity sewer monitoring is one of the more difficult aspects of a wastewater collection system as there is no pressure to ensure that particulate is pushed down the line. As such this system has been designed to be able to identify when issues occur in the system in near real time by identifying blockage and pinpointing sources of inflow and infiltration through micro metering.

3.1.1 Sanitary Sewer Overflow Monitoring

Sanitary Sewer Overflow is one of the most important aspects of the solution that has been designed by IWSD over the past two years. The District has made investments in these solutions to date. As such the District prefers not to abandon existing vetted assets. The solution provided for SSO Monitoring shall be **Smart Cover Systems**.

3.1.1.a Cleaning Optimization

The solution shall provide level data during normal operations and nighttime level monitoring, proactively enabling the District to monitor sanitary sewer overflows and sewer basin maintenance needs.

3.1.1.b Blockage Detection

This solution shall provide level monitoring and triangulation with other level monitoring devices to detect blockages in near real-time by identifying upstream and downstream trends from different level monitoring devices.

3.1.1.c Sensor Requirements

The system remote field units (RFU) shall be capable of using one or more of the following sensors without any physical change in configuration of the system control box:

Ultrasonic sensor:

1. Dual pressure-level sensor that provides a means to measure water levels ABOVE the ultrasonic sensor with the following performance specifications:
 - a. Ultrasonic resolution shall be no more than 0.1.”
 - b. Pressure resolution shall be no more than 0.5.”
 - c. Built-in algorithm to minimize false distance readings.
 - d. Total dynamic range of 0 inches to 30 feet

- e. Fully potted and capable of withstanding 10G of force, and have an IP-68 rating.
- f. Does not require field calibration.
- g. Is temperature compensated?
- h. Small enough (less than 4" x 4" x 6") and independent physically of the system control box
- i. Positioned easily anywhere in a manhole, CSO structure or similar structure with a connecting cable to the system control box up to 300 feet from the system control box.

Hydrogen Sulfide (h₂S) sensor:

1. Hydrogen sulfide (H₂S) is the most known and relevant odorous gas in domestic wastewater collection systems. The District means to build a system of monitoring for cathodic protection with the following specifications:
 - a. Ultrasonic resolution shall be no more than 0.1."
 - b. Pressure resolution shall be no more than 0.5."
 - c. Built-in algorithm to minimize false distance readings.
 - d. Total dynamic range of 0 inches to 30 feet
 - e. Fully potted and capable of withstanding 10G of force, and have an IP-68 rating.
 - f. Does not require field calibration.
 - g. Is temperature compensated?
 - h. Small enough (less than 4" x 4" x 6") and independent physically of the system control box
 - i. Positioned easily anywhere in a manhole, CSO structure or similar structure with a connecting cable to the system control box up to 300 feet from the system control box.

3.1.1.d Network Requirements

1. The system shall provide full two-way, satellite communication between the User and the RFU location.
2. Monitoring data transmitted from the RFU to the User dashboard.
3. Commands can be sent from the User to the remote site to request data or change operational set points.
4. The commands will be received by the RFU and executed within one (1) hour or less.
5. Communications will remain in operation during short- or long-term electrical grid power loss, loss of local cellular networks, loss of local power.
6. Communications to/from remotely monitored sites shall be enabled through a smartphone or smart device application.
7. The system shall communicate using two-way, digital-radio signals directly to orbiting satellites for uninterrupted operations when there are local, regional,

or massive power outages due to weather, forced blackouts or other extraordinary circumstances.

8. The orbiting satellite system shall have 66 active satellites and an additional six (6) back-up satellites in low earth, polar orbit and to assure communication redundancy.
9. No additional terrestrial communications systems shall be required to send or receive information to or from the installed RFU.
10. Satellite communication will be 'backward' compatible with the existing Iridium satellite network and 'forward' compatible with the recently launched Iridium Next satellite network for the next 20 years.

3.1.2 Wastewater Advanced Metering Infrastructure

Wastewater Advanced Metering Infrastructure (WW AMI) is an innovative approach developed by Miami Dade Water and Sewer to implement a long-term solution for Intelligent Wastewater monitoring. It utilizes multiple existing principles for identifying Inflow & Infiltration (herein known as I&I), Sanitary Sewer Overflow Monitoring (herein known as SSO), blockage detection and regulatory compliance monitoring. The most important aspect of Wastewater AMI's development is the ability to use Water consumption data to subtract from domestic usage so the system can go from estimated I&I to a calculated I&I solution.

Lastly, Wastewater AMI is utilizing old principles to develop new technological approaches, one of these principles is Micrometering through an integrated partnership with SmartCover. This is accomplished by leveraging a permanently deployed system & network for monitoring IWSD's system in near real time to isolate where I&I is penetrating the Wastewater Collections System.

3.1.2.a Inflow & Infiltration Analysis:

This solution shall provide permanent sanitary sewer flow meter to monitor inflow and infiltration through rainfall or groundwater. Monitoring the basin during dry weather and wet weather conditions enables the District to monitor flow profiles and detect anomalies proactively.

3.1.2.b Flow Meter Requirements:

1. Flow meters can be submerged area/velocity or non-contact area velocity. Level sensing with Manning's equation will not be acceptable.
2. Flow meters shall be plus or +/- 5% accuracy.
3. Flow Meters must be IP-68 rated for full submersion up to 20 feet.
4. Flow Meters shall have the ability to communicate via Modbus RS-485 protocol. Analog (4-20mA) or digital pulse output shall not be accepted.

5. Flow Meter must be battery powered with a minimum battery life of 6 months at 15-minute sampling intervals with a transmission rate of every 4 hours.
6. Flow Meter must be capable of reading during night flow isolation periods. The sensor must be capable of a level reading of +/- 1".
7. Flow Meter may be either Ultra-sonic or radar for level.
8. Flow Meter must utilize either doppler ultra-sonic (submerged area/velocity) or radar for velocity (non-contact) flow monitoring.
9. Flow Meter must have minimum sample intervals of 15 minutes with the 1-minute interval capability through dynamic data logging during a rain event to ascertain accuracy of the rain derived inflow & infiltration (RDII).

3.1.2.c Gauge Adjusted Radar Rainfall (GARR) Solution

1. Given the inland conditions of the Immokalee Water & Sewer District, this solution utilizes rain gauges and radar data to ascertain rainfall in each sewer basin accurately. The solution enables the District to identify sources of rain-derived inflow and infiltration (RDII) in near real-time without negatively impacting maintenance on other basins that may not require it.

3.1.2.d GARR Data Requirements

1. The solution must have the capability of deploying GARR data in each of the 42 Sewer basins at IWSD. These data points must operate independently from the other, however, must be capable of integrating directly into the Smart Utility software so it can be correlated with the Inflow & Infiltration data.
2. The GARR data solution must utilize a minimum of 10 rain gauges to ensure data integrity.
3. Area covered: Approximately 25 sq. miles.
4. Primary radar coverage must be KAMX (Miami, FL)
5. Secondary radar coverage must be KTBW (Tampa, FL)
6. Primary radar product must be NEXRAD Level II & Level III
7. Spatial resolution must be either .39 square miles (1x1 KM) or basin averaged.
8. Time increments must be in line with flow metering sample rates at 15-minute intervals.
9. Data must be delivered in a 2-way Application program interface (API)

3.1.2.e Micrometering Requirements

1. Micrometering is a tried-and-true concept that has existed in the industry for a few decades. This solution shall provide level monitoring to reduce the additional cost of flow monitoring to isolate the inflow and infiltration issues. Multiple triangulated level sensors and their trending data identify anomalies outside normal operational thresholds. Additionally, IWSD is also looking for solutions that can simultaneously monitor the permanent flow meters and correlate them with the corresponding SmartCovers in that Sewer basin.
2. Flow Meter data and SmartCover data must be converted into a single source platform to organize the data and develop the Micrometering solution.
3. Contractor shall work with IWSD Engineering post contract to develop the full Micrometer project plan. Quantity of SmartCover's required for Micrometering in pricing attachment.

3.1.2.f Regulatory Compliance Monitoring Requirements

1. This solution is designed to monitor the capacity of a sewer basin and utilize existing EPA formulas for capacity management and monitoring. As such, this solution allows the utility to monitor the sewer basin compliance status in near real-time.
2. CONTRACTOR must have LOCAL team member with experience in Inflow & Infiltration analysis while performing as part of a Sanitary Sewer Evaluation Survey (SSES).
3. Smart Utility software must be capable of incorporating EPA formulas in line with EPA guidelines for Sewer capacity evaluation.
4. Smart Utility software must be capable of setting thresholds for monitoring this capacity not only during normal operations but during emergency operations conditions.

3.1.2.g Network Requirements

1. The network architectural requirements for Wastewater AMI are unique. Wastewater AMI has been designed to assist Utilities during some of the worst conditions that nature has to provide. As such, a dual redundancy solution was created to insure critical data capture during the worst environments for data collection. The first redundancy is the Lower Earth Orbit satellite communication requirements with horizontal line of sight capability. This is the solution for SmartCover system. This solution allows SmartCover to operate during moderate to catastrophic storm conditions.
2. The second redundancy is for the Flow metering systems that are monitoring not only the I&I but the real-time flow data to report back to the WWTP to give warning of abnormal flow conditions. This is accomplished through a primary

or secondary licensed radio frequency system. The reasoning behind this came from research of prioritization of networks. It was identified that Primary and Secondary licensed RF networks do not get re-prioritized for first responders as the frequencies are owned by the CONTRACTOR.

3. Consist of a reliable and tested network to ensure billing data quality along with other Smart Utility capabilities. Please describe how your network meets these specifications.
4. Include a 98.5% read rate of Sewer sensors over a 72-hour period.
5. Who holds the ownership/control of your network? If by a third party, please explain.
6. Does your Network operate during Emergency Conditions? If so, please describe how this is accomplished.
7. Please describe how the AMI endpoint stores and frequency of delivery of meter data daily to the AMI Network from all the AMI Modules and how this process can maximize read interval success.
8. Communicate on demand to AMI endpoint and other related endpoint devices. Please describe the two-way command turnaround time between the endpoint and AMI Network. Please explain capability of reading in emergency operations conditions.
9. Use state-of-the-art data security techniques to prevent unauthorized access to the data.
10. Time synchronizes all devices to within five (5) seconds at least once per day and allow daily upload of meter data and system health checks are required.
11. Established architecture to include backup/failover options for the entire communication path from the meter to the Meter Data Management System.
12. Use AC and solar powered units and optional battery backup if applicable.
13. Allow self-diagnosis of any problems associated with the back haul of the communication and the ability to automatically seek an alternate communication path if initial daily or real-time upload is unsuccessful.
14. Have icons that permit viewing operational health of the system components.
15. Be capable of changing read interval sampling, alarm frequency.

3.2 PUMP STATIONS

Pump stations are one of the highest costs that impact the District's monthly budgets, especially during the storm season. The solution, developed with the Immokalee Water & Sewer District, monitors when a pump turns on and off and when a pump needs servicing. This solution also enables the utility to proactively monitor the levels inside their sewer pump stations during emergency operation conditions when power outages occur at the pump station.

3.2.1 Emergency Level Monitoring Requirements

This solution utilizes battery-powered Internet of Things (IoT) devices that enable the utility to monitor should the pump station lose power. This approach enables the utility to proactively identify where maintenance personnel and activities are most needed to help avoid possible overflows at the pump stations during storm events.

3.2.1.a Sensor Requirements:

1. CONTRACTOR must provide a solution that is battery powered as it must operate during blackout conditions.
2. Solution must have a minimum of 5-year battery at 15-minute intervals.
3. Solution must utilize Radar ultra-sonic sensor. Transit time ultra-sonic solution will not be accepted.
4. Solution must be IP-68 and manage high level of Hydrogen Sulfide (h₂S) up to 300 ppm.
5. Solution must be rated for high temperature environments from –4 degrees F to 149 degrees F.

3.2.1.b Network Requirements:

1. Consist of a reliable and tested network to ensure billing data quality along with other Smart Utility capabilities. Please describe how your network meets these specifications.
2. Include a 98.5% read rate of Sewer sensors over a 72-hour period.
3. Please explain the custody of control of your network architecture.
4. Does your Network operate during Emergency Conditions? If so, please describe how this is accomplished.
5. Please describe how the AMI endpoint stores and frequency of delivery of meter data daily to the AMI Network from all the AMI Modules and how this process can maximize read interval success.

6. Communicate on demand to AMI endpoint and other related endpoint devices. Please describe the two-way command turnaround time between the endpoint and AMI Network. Please explain capability of reading in emergency operations conditions.
7. Use state-of-the-art data security techniques to prevent unauthorized access to the data.
8. Time synchronizes all devices to within five (5) seconds at least once per day and allow daily upload of meter data and system health checks are required.
9. Established architecture to include backup/failover options for the entire communication path from the meter to the Meter Data Management System.
10. Use AC and solar powered units and optional battery backup if applicable.
11. Allow self-diagnosis of any problems associated with the back haul of the communication and the ability to automatically seek an alternate communication path if initial daily or real-time upload is unsuccessful.
12. Have icons that permit viewing operational health of the system components.
13. Be capable of changing read interval sampling, alarm frequency.

SECTION 4 - WASTEWATER TREATMENT

4.0 WASTEWATER TREATMENT MONITORING

Wastewater treatment monitoring is imperative in a Smart Utility system to assist in identifying mass inflow and infiltration during storm events. The practice of monitoring flow coming into the wastewater treatment plant is not a new concept. However, the solution that Immokalee Water & Sewer District has developed will allow the utility to automate and assist wastewater treatment operations during dry and wet weather conditions.

4.1 RAW WW INFLUENT MONITORING

This solution monitors the wastewater flow arriving at the treatment plant. The Immokalee Water & Sewer District has two flowmeters to monitor wastewater influent. The District is seeking a solution to integrate this data from these existing devices into one consolidated platform, providing data-driven insight to improve the District's operations. CONTRACTOR must provide telemetry to retrofit to Endress Hauser Pro-Sonic 500 Ultra-sonic transit time Flow Meter.

4.2 WW INFLOW AND INFILTRATION BALANCING

Wastewater Inflow and Infiltration balancing are imperative in understanding the wastewater systems capacity while also allowing the wastewater treatment plant to identify flow conditions in the collections system before arriving at the plant. This enhanced capability results from an integrated network of flowmeters described above.

SECTION 5 - INSTALLATION REQUIREMENTS

5.0 GENERAL INSTALLATION SCOPE

Under this specification a single CONTRACTOR shall supply all equipment and labor necessary to install Water Meters, Wastewater Open Channel Meters, and accompanying sensor IoT Monitoring & Advanced Metering Infrastructure (AMI) system endpoints. While the primary function shall be to provide labor for the installation of meters and endpoints, the installation company shall also provide project management, data integration services, and a field service software with a Utility Portal allowing electronic data uploads to billing software, and full transparency of project progress as described herein. The restoration of all work areas associated with the installation and construction of all aspects of this project shall be the responsibility of the CONTRACTOR.

5.1 WATER AMI INSTALLATION REQUIREMENTS:

This section outlines all the requirements for Residential and Commercial Water Meters installations in the IWSD Service area.

5.1.1 Contractor Specifications:

1. All service staff, technicians, drivers, and field supervisors will be equipped with smart phones and/or tablets. Electronic and Wireless Communication, through a cellular network, must be available to the installation team.
2. The CONTRACTOR vehicles used for work shall have company logos prominently displayed and shall be registered with the District.
3. Competent, skilled personnel shall perform all work, to be conducted in accordance with good trade practices and all applicable codes.
4. CONTRACTOR must be skilled in handling both small and large water meters, both indoors and outdoors, including confined space meter vaults, ranging in size from 5/8" to 12."
5. The CONTRACTOR shall be responsible for the proper care and protection of the work site, for all materials and articles delivered to the site where the CONTRACTOR will perform the work, until completion and final acceptance of the work. The CONTRACTOR shall exercise proper precautions and safety measures in performing the work, which shall be in accordance with all applicable laws, rules, and regulations. The CONTRACTOR shall be responsible for the protection of all persons and/or property at the location in which the work will take place.
6. The CONTRACTOR shall keep the work site free from unnecessary accumulations of waste materials. Upon the completion of all the work, the CONTRACTOR installers will be instructed to remove all tools, equipment, and surplus materials, as well as all rubbish

and waste resulting from the work. Upon the completion of the work, the work area shall be left "broom clean" or its equivalent, to the reasonable satisfaction of the District.

7. Please explain your preferred method of endpoint installation in meter box/lid. Please detail the material of your preferred solution.
8. The CONTRACTOR should explain how they will implement a dual port solution if the meter boxes are in proximity and the meters are not in the same box.

5.1.2 Construction Equipment Specifications:

5.1.2.1 Tapping Saddles: examples of acceptable equipment and their installation are:

1. Install tapping saddle and Corp at an angle between 22 ½ degrees and 15 degrees off horizontal.
2. All tapping saddles must be bronze or stainless-steel body with stainless steel bands (IWSD has final approval). The bands shall be a minimum of 2 inches wide for ¾ inch and 1-inch saddles and a minimum of 5 ¼ inches wide for 2 inch and larger saddles. The outlet of the saddle shall have corporation (CC) thread. All stainless-steel bolts and nuts shall have special lubricating molybdenum disulfide coating, such as "Never Gall," on the entire surface of the bolt and nut.
3. Mueller BR 1S Series and Mueller BR 2S Series
4. A.Y. McDonald Model 3835 or 3855
5. Ford 101BS and 202BS
6. Cambridge Brass Series 822 and Series 812 Accepted for use on 16" and larger watermains.
7. Romac Industries Inc. Model#202 NS

5.1.2.2 Corporation Stops: examples of acceptable equipment and their installation are:

1. All ¾ inch and 1 inch corporation stops shall be corporation (CC) thread by pack joint with an external set screw or quick compression. All 2-inch corporation stops shall be corporation thread by male iron pipe thread. All corp stops shall be ball valve style with 360-degree rotation. Mueller ball style CC x pack joint for ¾ and 1 inch
2. Mueller ball style CC x MIP for 2 inches
3. Ford Ballcorp FB1000 style CC x pack joint for ¾ and 1 inch

4. Ford Ballcorp FB1000 style CC x MIP for 2 inches
5. A.Y. McDonald ball style CC x pack joint for ¾ and 1 inch
6. A.Y. McDonald ball style CC x MIP for 2 inch
7. Cambridge Brass ball style CC x CTS for ¾ and 1 inch
8. Cambridge Brass ball style CC x MIP 3011-A7M7 for 2 inch

5.1.2.3 Curb Stops: examples of acceptable equipment and their installation are:

1. All curb stops shall be ball style with full 360-degree rotation. All ¾ and 1 inch curb stops shall have pack joint inlets with external set screws. The ¾ and 1 inch curb stops may have pack joint, MIP, or FIP outlets depending upon the use. 2 inch curb stops shall have a MIP inlet and may have pack joint, MIP, or FIP outlets depending upon the use.
2. Mueller ball style curb stop P-25172-3
3. A.Y. McDonald ball style
4. Ford ball valve curb stop B-44-R Style
5. Cambridge Brass

5.1.2.4 Polyethylene Tubing: examples of acceptable equipment and their installation are:

1. Manufacture must meet or exceed AWWA and ANSI standards.
2. All service line material for 2 inch shall be DR 9 HDPE.
3. Cresline, Hancor, ADS, Endot Industries, Inc.

5.1.2.5 Meter Setters: examples of acceptable equipment and their installation are:

1. All 2" setters shall have dual angle valves with a lockable high bypass. Connectors must be assembled with a setter on delivery. All brass fittings with pack-joint ends shall have external set screws. (2") Ford 70-80 series Copper setter.

5.1.2.6 Yoke Bar Assembly: examples of acceptable equipment and their installation are:

1. Yoke bars shall be 14-4 Iron Yoke bar with yoke parts to complete assembly.
2. A.Y. McDonald Trumble Manufacturing, Muller Company, Ford Company

5.1.2.7 Materials: examples of acceptable equipment and their installation are:

1. The materials for meter and meter box installation and adjustment shall conform to the specifications contained within the IWSD Material Specifications.

5.1.2.8 Meter and Meter Box

1. Meter and meter box configuration shall have the meter set horizontal, approximately 6 inches below the top of meter box, so that the meter is above the bottom of the meter box and in-line with the meter box lid opening. The top of the meter box shall be flush with the existing ground surface. All excess soil above and below the Yoke Bar with assembly inside the meter box shall be removed so that the meter register is clearly visible. After the meter is installed, the area under the meter is to be excavated 6 inches to allow for the installation of filter fabric, and then filled with 57-stone to the bottom of the meter. The Contractor shall exercise special precautions during excavation at the existing meter location to minimize the disturbance of the customer's yard piping. However, if the existing meter elevation is low, the Contractor shall raise the existing meter to conform to the correct configuration indicated herein.

5.2 FIELD TOOLS – WATER AMI

1. All CONTRACTOR technicians must be equipped with tablets/mobile devices that communicate through a cellular network providing a real time paperless solution in the field for every installation.
2. Tablets/mobile devices must be capable of capturing: pictures, meter data, endpoint data, customer information, bar code data, and any other required information through the use of the field service software.
3. The mobile application on the tablet must allow the installation technicians to access all information including installers schedule, office calendar, existing meter and radio data, all account information, and material inventory.
4. CONTRACTOR technicians must be equipped with all equipment and software required by AMR/AMI Manufacturer to program radio endpoints.

5.3 FIELD SERVICE SOFTWARE – WATER AMI

1. The Field Service Software must provide the capability to record, manage, store, retrieve, and access all relevant data for each customer location, including customer signatures.
2. The Field Service Software must allow for scheduling of all appointments if required, logging all customer interactions, and handling of service requests.

3. Notifications: The Field Service Software shall send an email or text message to customer when a required appointment is scheduled as a confirmation, please show a proposed format/Screenshot for this in your response. A second email or text message shall be sent to the customer the day before the appointment as a reminder. Please show a proposed format/Screenshot for this in your response. Finally, a third email should be sent to the customer the day of the appointment, when the technician is enroute to the location. The third email must contain a picture of the technician that will be completing their installation. Please show a proposed format/Screenshot for this in your response.
4. The CONTRACTOR Shall provide the ability for Water Utility customers to schedule appointments online at their convenience. Once the appointment is scheduled, the customer shall receive an email confirmation of their appointment. The email confirmation shall contain an informational video explaining the installation process.
5. All account management is to be completed through the Field Service Software. All relevant customer account information and new product data collected after installation must be accessible by all Utility personnel, and project management using a Utility Portal.

5.4 UTILITY PORTAL – WATER AMI

1. CONTRACTOR must have a cloud-based Utility Portal made accessible, by secure invitation only, for the Water Utility to monitor in real time the complete installation process.
2. Field Service Software utilized by the technicians must be completely integrated with IWSD Portal to provide the Water Utility real-time updates on the progress of installations.
3. There must be five statuses available on IWSD Portal for all users to quickly review the status of entire installation project. Please show a proposed format/screenshot for this in your response to include the following:
 - a. Completed- Job Done
 - b. Validating - Job done awaiting data validation process
 - c. Scheduled - Job scheduled in the future.
 - d. Not Scheduled - Jobs not scheduled
 - e. Assigned – Assigned to a technician.
 - f. In progress – Technician working on meter installation.
 - g. Incomplete - Jobs that cannot be completed.
 - h. Cancelled – Was scheduled but customer canceled.
4. IWSD Portal must have built in search/filter capabilities to provide a status of each individual account as shown. Please show a proposed format/Screenshot for this in your response. IWSD Portal must be able to filter account statuses by day, week, month, etc. to monitor the project.
5. IWSD Portal must be able to provide a list of accounts that are incomplete and indicate the reasons why they cannot be completed as shown below. Please show a proposed format/Screenshot for this in your response. The reasons for an account being incomplete shall include:

- a. Denial of Access
 - b. Meter not Accessible
 - c. Meter not Found
 - d. Plumbing Conditions
 - e. Vacant Property
 - f. Change Order
 - g. No Show
 - h. Miscellaneous
6. Field technicians must have the capability to enter the reason for an account being on hold through the mobile application of the field service software.
 7. All incomplete devices, along with the reason they are incomplete shall be listed within the grid data. Please show a proposed format/Screenshot for this in your response.
 8. When an installation is completed, an electronic work order must be created and added to IWSD Portal with old and new data, before and after pictures, and a customer signature.
 9. SERVICE CALLS - IWSD Portal shall have the ability to track all service calls required when adjustments need to be made to completed installations. Reasons for service calls shall include:
 - a. Leaks – Meter is leaking after complete installation.
 - b. Backwards Meter – Meter installed backwards.
 - c. Endpoint – Radio needs troubleshooting
 - d. Property Condition
 - e. Customer reported Low Pressure.
 - f. Mismatched Data
 - g. Meter box
 - h. No Water – Water service not returned.
 - i. Programming
 - j. Other
 10. All service calls, along with the reason for the service call shall be listed within the grid data. Please show a proposed format/Screenshot for this in your response. An electronic workorder for each service call shall be generated, with associated pictures, and accessible through the grid data. All pictures are expandable by clicking on the image within IWSD portal.
 11. IWSD Portal must be able to create a CSV file with all data to be exported to the Water Utility's billing software. CONTRACTOR shall work with the Water Utility billing software company to ensure the format of the export file from IWSD Portal is compatible with the billing software. This shall allow for the electronic transfer of all new meter data, collected in the field, and uploaded to IWSD Portal, to the billing software. Please indicate the time required to scrub the data and make it available to IWSD for import in your response.

12. Utility Portal must provide a view to the Water Utility of the product inventory throughout the project. Water meter and endpoint quantities shall be monitored by the Water Utility in real-time through IWSD Portal.
13. IWSD Portal must provide a location for, and Water Utility access to project documents such as contracts, Invoices, prevailing wage payroll, and any other documents required by the Water Utility.

5.5 INVENTORY MANAGEMENT – WATER AMI

1. Installation CONTRACTOR shall provide inventory management through the Field Service Software in conjunction with IWSD Portal. Please show a proposed format/Screenshot for this in your response.
2. Field Technicians shall use bar code scanning technology to enter meter and radio endpoint data into the Field Service Software. As meters and endpoints are marked installed through the field technician's mobile app, they shall be deducted from the inventory levels.
3. Installation CONTRACTOR shall be responsible for receiving material deliveries from AMR/AMI and Meter Manufacturer.
4. Routing of product installation shall be coordinated with Water Utility to avoid interruption of billing schedules.
5. Video conferencing on tablets/mobile device shall be available to field technicians for onsite communication and troubleshooting to ensure quality.
6. CONTRACTOR must have dedicated call center (not outsourced) to be able to schedule appointments daily. Call center shall be responsible for contacting customers that Water Utility is able to provide phone numbers for.
7. Regular project progress meetings shall be conducted by the CONTRACTOR with all project constituents to update everyone on project status.

5.6 DATA INTEGRATION – WATER AMI

1. The CONTRACTOR is responsible for uploading existing customer information files into the Field Service Software.
2. The CONTRACTOR is responsible for providing a file to transfer all field data captured by the technicians electronically to the Water Utility billing software. No manual data entry by Utility personnel shall be acceptable.
3. The CONTRACTOR Utility Portal shall provide email notifications to the Water Utility indicating when the billing file is ready for upload to the billing system. All billing file data must be validated by the CONTRACTOR team and confirmed to be correct before notification is sent to Water Utility.

4. Digital work orders shall be generated by IWSD Portal, based on information provided from the Field Service Software. All work orders shall contain existing account information from the Water Utility database, new meter, and endpoint data, before and after pictures, and any other pertinent account data. Work orders shall be stored on the Installation Contractor's servers for an agreed upon period after project completion.

5.7 QUALITY ASSURANCE – WATER AMI

1. CONTRACTOR must provide a data validation team responsible for confirming information from the Water Utility database matches the information field technician finds on location. This is accomplished by data validation team comparing data in field pictures to the data entered by the field technician.
2. Field data shall also be validated by uploading a file from the head end system of the Advanced Metering Infrastructure to the Field Service Management software. The Field Service Management software shall then compare field data collected to the data captured by the AMI system, ensuring they match.
3. CONTRACTOR shall be responsible for confirming AMI endpoints successfully communicate back to the head end of the AMI system.
4. CONTRACTOR must conduct mandatory monthly workshops incorporating revised safety procedures, municipality updates, reinforcing Occupational Safety Health Administrative (OSHA) standards in the field and confined space rules and regulations.
5. Field Technician must spend 40 hours in the field and home office including the call center to be crossed trained in all functional areas of the business.
6. Field Supervisors must have 30 hours of Occupational Safety Health Administration (OSHA) training and 8 hours specifically in confined space entry training.
7. Field technicians must have minimally 10 hours of Occupational Safety Health Administration (OSHA) training and 8 hours specifically in confined space entry training
8. To assure quality, CONTRACTOR must randomly call customers and conduct field inspections on completed installations.
9. CONTRACTOR must prepare Standard Operating Procedures, (SOPs) for AMI system utilization for District personnel at project close and training completion.

5.8 TECHNICIANS – WATER AMI

1. The CONTRACTOR shall employ competent, efficient employees skilled in the work assigned to them.

2. The CONTRACTOR will provide a list to Water Utility of names, photo identification, background checks, vehicle information and other required information for the employees performing work.
3. All service staff, technicians, drivers, and field supervisors will be equipped with smart phones and/or tablets and will be using the CONTRACTOR's proprietary software.
4. The CONTRACTOR technicians shall be skilled in handling both small and large water meters, both indoors and outdoors, including confined space meter vaults, ranging in size from 5/8" to 12".

5.9 FIELD TOOLS – WATER AMI

1. All CONTRACTOR technicians will be equipped with tablets/mobile devices that communicate through a cellular network providing a real time paperless solution for every installation.
2. Tablets/mobile devices with a mobile app will be used for capturing before and after pictures, meter data, endpoint data, customer information, bar code data, and any other required information asked for by the Water Utility.
3. The mobile app will allow the technicians to access all information including installers schedule, office calendar, existing meter and radio data, all account information, and material inventory.
4. The CONTRACTOR technicians will be equipped with all equipment and software required by the meter manufacturer to program the radio endpoints.

5.10 COMMUNICATIONS AND HISTORY – WATER AMI

1. Field Service Software shall provide the Water Utility with the ability to email, text, or send a voice message to a single customer or a group of customers.
2. A History of all notifications sent to customers through the Field Service Software via email, text, or voice message shall be stored. The Water Utility shall have the ability to access notification history by customer account. That history shall store the date and time of the communication, the subject matter, the content of the notification, and the contact information the notification was sent to.
3. The Field Service Software shall also provide the ability for Water Utility customers to update their contact information electronically. A secure URL shall be provided to the Water Utility's Customers through a method of communication suitable to the Water Utility. That

secure URL shall capture at a minimum the customer's email, phone, cellular phone, mailing address, and the customer's preferred method of communication.

5.11 WASTEWATER AMI INSTALLATION REQUIREMENTS:

1. This section outlines all of the requirements for the installation of Sewer flow monitoring and Sanitary Sewer Overflow monitoring devices in the Wastewater Collections system.
2. The CONTRACTOR shall employ competent, efficient employees skilled in the work assigned to them. The CONTRACTOR shall provide the Water Utility with a list of names, photo identification, background checks, vehicle information and other required information for the employees performing work.
3. The CONTRACTOR employees shall always display in a clear manner, photo identifications. Each photo identification shall have the CONTRACTOR name, employee's name, title, and signature.
4. All service staff, technicians, drivers, and field supervisors will be equipped with smart phones and/or tablets. Electronic and Wireless Communication, through a cellular network, must be available to the installation team.
5. All the CONTRACTOR employees shall be neat and presentable always to present a professional appearance. All Employees shall have the same color uniforms including shirts, pants, and jackets. The CONTRACTOR logo shall be permanently attached to shirts and jackets.
6. Competent, skilled personnel shall perform all work, to be conducted in accordance with good trade practices and all applicable codes.
7. CONTRACTOR must be skilled in handling both small and large water meters, both indoors and outdoors, including confined space meter vaults, ranging in size from 5/8" to 12."
8. The CONTRACTOR shall be responsible for the proper care and protection of the work site, for all materials and articles delivered to the site where the CONTRACTOR will perform the work, until completion and final acceptance of the work. The CONTRACTOR shall exercise proper precautions and safety measures in performing the work, which shall be in accordance with all applicable laws, rules, and regulations. The CONTRACTOR shall be responsible for the protection of all persons and/or property at the location in which the work will take place.
9. The CONTRACTOR shall keep the work site free from unnecessary accumulations of waste materials. Upon the completion of all the work, the CONTRACTOR installers will be instructed to remove all tools, equipment, and surplus materials, as well as all rubbish and waste resulting from the work. Upon the completion of the work, the work area shall be left "broom clean" or its equivalent, to the reasonable satisfaction of the Water Utility.

10. Please explain your preferred method of endpoint installation in meter box/lid. Please detail the material of your preferred solution.
11. The CONTRACTOR should explain how they will implement a dual port solution if the meter boxes are in proximity and the meters are not in the same box.

5.2 FIELD TOOLS – WASTEWATER AMI

1. All CONTRACTOR technicians must be equipped with tablets/mobile devices that communicate through a cellular network providing a real time paperless solution in the field for every installation.
2. Tablets/mobile devices must be capable of capturing: pictures, meter data, endpoint data, customer information, bar code data, and any other required information through the use of the field service software.
3. The mobile application on the tablet must allow the installation technicians to access all information including installers schedule, office calendar, existing meter and radio data, all account information, and material inventory.
4. CONTRACTOR technicians must be equipped with all equipment and software required by Sewer Flow & AMR/AMI Manufacturers to program radio endpoints and verify communication with the network.

5.3 FIELD SERVICE SOFTWARE – WASTEWATER AMI

1. The Field Service Software must provide the capability to record, manage, store, retrieve, and access all relevant data for each customer location, including customer signatures.
2. The Field Service Software must provide the minimum details required for the deployment of a Sewer IoT asset:
 - a. Meter serial number
 - b. Endpoint serial number
 - c. Pipe size
 - d. Manhole depth
 - e. H2S reading.
 - f. Confined space entry required? Yes or No.
 - g. Manhole antenna installation?
 - h. Street antenna installation?
 - i. Grass antenna installation?
 - j. MOT required?

5.4 UTILITY PORTAL – WASTEWATER AMI

1. CONTRACTOR must have a cloud-based Utility Portal made accessible, by secure invitation only, for the Water Utility to monitor in real time the complete installation process.

2. Field Service Software utilized by the technicians must be completely integrated with IWSD Portal to provide the Wastewater Utility real-time updates on the progress of installations.
3. There must be five statuses available on IWSD Portal for all users to quickly review the status of entire installation project. Please show a proposed format/screenshot for this in your response to include the following:
 - a. Completed- Job Done
 - b. Validating - Job done awaiting data validation process
 - c. Scheduled - Job scheduled in the future.
 - d. Not Scheduled - Jobs not scheduled
 - e. Assigned – Assigned to a technician.
 - f. In progress – Technician working on meter installation.
 - g. Incomplete - Jobs that cannot be completed.
 - h. Cancelled – Was scheduled but customer canceled.
4. IWSD Portal must have built in search/filter capabilities to provide a status of each individual account as shown. Please show a proposed format/Screenshot for this in your response. IWSD Portal must be able to filter account statuses by day, week, month, etc. to monitor the project.
5. IWSD Portal must be able to provide a list of sites that are incomplete and indicate the reasons why they cannot be completed as shown below. Please show a proposed format/Screenshot for this in your response. The reasons for an account being incomplete shall include:
 - a. Manhole surcharges (RTU)
 - b. Manhole too corroded
 - c. Hydraulics are not functional for Sewer flow meter installation.
 - d. Manhole will not open (sealed or paved over)
6. Field technicians must have the capability to enter the reason for an account being on hold through the mobile application of the field service software.
7. All incomplete devices, along with the reason they are incomplete shall be listed within the grid data. Please show a proposed format/Screenshot for this in your response.
8. When an installation is completed, an electronic work order must be created and added to IWSD Portal with old and new data, before and after pictures.
9. IWSD Portal must be able to create a CSV file with all data to be exported to the Water Utility's billing software. CONTRACTOR shall work with the Water Utility billing software company to ensure the format of the export file from IWSD Portal is compatible with the billing software. This shall allow for the electronic transfer of all new meter data, collected in

the field, and uploaded to IWSD Portal, to the billing software. Please indicate the time required to scrub the data and make it available to IWSD for import in your response.

10. Utility Portal must provide a view to the Wastewater Utility of the product inventory throughout the project. Sewer flow meter and endpoint quantities shall be monitored by the Wastewater Utility in real-time through IWSD Portal.
11. IWSD Portal must provide a location for, and Wastewater Utility access to project documents such as contracts, Invoices, prevailing wage payroll, and any other documents required by the Wastewater Utility.

5.5 INVENTORY MANAGEMENT – WASTEWATER AMI

1. Installation CONTRACTOR shall provide inventory management through the Field Service Software in conjunction with IWSD Portal. Please show a proposed format/Screenshot for this in your response.
2. Field Technicians shall use bar code scanning technology to enter meter and radio endpoint data into the Field Service Software. As meters and endpoints are marked installed through the field technician's mobile app, they shall be deducted from the inventory levels.
3. The installation CONTRACTOR shall be responsible for receiving material deliveries from Sewer flow, SmartCover, AMR/AMI and Meter Manufacturer.
4. Routing of product installation shall be coordinated with Wastewater Utility to avoid interruption of billing schedules.
5. Video conferencing on tablets/mobile devices shall be available to field technicians for onsite communication and troubleshooting to ensure quality.
6. CONTRACTOR must have dedicated call center (not outsourced) to be able to schedule appointments daily. Call center shall be responsible for contacting customers that Wastewater Utility is able to provide phone numbers for.
7. Regular project progress meetings shall be conducted by the CONTRACTOR with all project constituents to update everyone on project status.

5.6 DATA INTEGRATION – WASTEWATER AMI

1. The CONTRACTOR is responsible for uploading existing customer information files into the Field Service Software.
2. The CONTRACTOR is responsible for providing a file to transfer all field data captured by the technicians, electronically to the Water Utility billing software. No manual data entry by Utility personnel shall be acceptable.

3. The CONTRACTOR Utility Portal shall provide email notifications to the Water Utility indicating when the billing file is ready for upload to the billing system. All billing file data must be validated by the CONTRACTOR team and confirmed to be correct before notification is sent to Wastewater Utility.
4. Digital work orders shall be generated by IWSD Portal, based on information provided from the Field Service Software. All work orders shall contain existing account information from the Water Utility database, new meter, and endpoint data, before and after pictures, and any other pertinent account data. Work orders shall be stored on the Installation Contractor's servers for an agreed upon period after project completion.

5.7 QUALITY ASSURANCE – WASTEWATER AMI

1. CONTRACTOR must provide a data validation team responsible for confirming information from the Water Utility database matches the information field technician finds on location. This is accomplished by data validation team comparing data in field pictures to the data entered by the field technician.
2. Field data shall also be validated by uploading a file from the head end system of the Advanced Metering Infrastructure to the Field Service Management software. The Field Service Management software shall then compare field data collected to the data captured by the AMI system, ensuring they match.
3. CONTRACTOR shall be responsible for confirming Wastewater AMI endpoints successfully communicate back to the head end of the AMI system.
4. CONTRACTOR must conduct mandatory monthly workshops incorporating revised safety procedures, municipality updates, reinforcing Occupational Safety Health Administrative (OSHA) standards in the field and confined space rules and regulations.
5. Field Technician must spend 40 hours in the field and home office including the call center to be crossed trained in all functional areas of the business.
6. Field Supervisors must have 30 hours of Occupational Safety Health Administration (OSHA) training and 8 hours specifically in confined space entry training.
7. Field technicians must have minimally 10 hours of Occupational Safety Health Administration (OSHA) training and 8 hours specifically in confined space entry training
8. To assure quality, CONTRACTOR must randomly call customers and conduct field inspections on completed installations.
9. CONTRACTOR must prepare Standard Operating Procedures, (SOPs) for AMI system utilization for District personnel at project close and training completion.

5.8 TECHNICIANS – WASTEWATER AMI

1. The CONTRACTOR shall employ competent, efficient employees skilled in the work assigned to them.
2. All service staff, technicians, drivers, and field supervisors will be equipped with smart phones and/or tablets and will be using the CONTRACTOR's proprietary software.
3. The CONTRACTOR technicians shall be skilled in handling both small and large water meters, both indoors and outdoors, including confined space meter vaults, ranging in size from 5/8" to 12."

5.9 FIELD TOOLS – WASTEWATER AMI

1. All CONTRACTOR technicians will be equipped with tablets/mobile devices that communicate through a cellular network providing a real time paperless solution for every installation.
2. Tablets/mobile devices with a mobile app will be used for capturing before and after pictures, meter data, endpoint data, customer information, bar code data, and any other required information asked for by the Water Utility.
3. The mobile app will allow the technicians to access all information including installers schedule, office calendar, existing meter and radio data, all account information, and material inventory.
4. The CONTRACTOR technicians will be equipped with all equipment and software required by the meter manufacturer to program the radio endpoints.

5.10 COMMUNICATIONS AND HISTORY – WASTEWATER AMI

1. Field Service Software shall provide the Water Utility with the ability to email, text, or send a voice message to a single customer or a group of customers.
2. A History of all notifications sent to customers through the Field Service Software via email, text, or voice message shall be stored. The Water Utility shall have the ability to access notification history by customer account. That history shall store the date and time of the communication, the subject matter, the content of the notification, and the contact information the notification was sent to.
3. The Field Service Software shall also provide the ability for Water Utility customers to update their contact information electronically. A secure URL shall be provided to the Water Utility's Customers through a method of communication suitable to the Water Utility. That

secure URL shall capture at a minimum the customer's email, phone, cellular phone, mailing address, and the customer's preferred method of communication.

SECTION 6 – GIS SOFTWARE

6.0 GIS SOFTWARE / FIELD MAINTENANCE AND MANAGEMENT SOFTWARE

1. GIS Solution must be capable of integrating a District Metering Solution
2. GIS Solution must be capable of integrating with a Wastewater AMI Solution
3. GIS Solution must be capable of creating boundaries for both Water and Wastewater designated areas e.g. (Water District Metering Areas/Sectors & Wastewater Basin boundaries)
4. GIS Solution must be hosted in Microsoft Azure.
5. GIS Solution must function in a Real-Time environment in the Office or Field.
6. GIS Solution must be optimized for touch-screen computers on Android, iOS, and Windows Tablets.
7. GIS Solution must work with Google Street View and built in Routing.
8. GIS Solution must be a fully functioning GPS navigation system.
9. GIS Solution must feature easy to use forms to display and input maintenance data.
 - a. Tasks can be preassigned to staff.
 - b. Supports re-occurring tasks for ease of scheduling maintenance tasks.
10. GIS Solution must display facility attributes and customer information.
11. GIS Solution must support QR and Barcode scanning to find facilities easily on the map as well as scanning barcodes on Meters for improved data input.
12. GIS Solution must display maintenance history from the office or out in the field.
13. GIS Solution must feature field specific quality assurance / quality control:
 - a. Supports validation for required fields.
 - b. Input forms can guarantee numeric values and consistent data.
 - c. Automatically calculate Flushing, Water Loss, Fire Flow rates and volume.
14. GIS Solution must track Equipment, Materials, Parts, Tools, and Work along with compounding costs.
15. GIS Solution must include intuitive Redline functionality.

16. GIS Solution must Centralized Administration:
 - a. Customize forms in the Form Designer for any asset.
 - b. Configure Users, Roles, and Software Functions.
 - c. Connect to Esri Feature Services and Map Services.
17. GIS Solution must feature advanced Document Storage:
 - a. As-builts and other documents can be pulled up quickly and easily.
 - b. Intuitive document navigation allows for quick zooming and panning.
 - c. Ability to attach Photos and Videos to assets and viewable by all users.
18. GIS Solution must manage One-Call tickets from Sunshine 811:
 - a. Tickets can be visually displayed and organized for the field crew.
 - b. Supports optimization and routing of tickets.
 - c. Also supports attaching images, videos, and documents to a specific ticket.
 - d. Provide Positive Response in Real-Time from the Field or Office.
19. GIS Solution must contain extensive reports for instant answers:
 - a. Customizable queries allow for simple display of critical information.
 - b. Reports can be generated on the fly in Word and Excel.
20. GIS Solution must supports locked down functionality for field users through a Centralized Administration Application:
 - a. Administrator can define departments, roles, and groups.
 - b. GIS Solution must support configurable database and application through the Administration Application.
 - c. Flexible configuration tools to update all users.
 - d. Supports Azure Active Directory Services.
 - e. GIS Solution must support extending the application without the need for custom programming.
 - f. Queries, reports, and forms can be configured quickly and easily.
 - g. GIS Solution must Form Designer allows the creation of custom inspection forms with unlimited possibilities.
21. GIS Solution must be GIS-Centric, 10.6.1 and higher:
 - a. GIS Solution must be compatible with Esri ArcGIS Server, Portal and ArcGIS Online.
 - b. GIS Solution must support Feature Services for Feature Classes and Tables.
 - c. GIS Solution must feature two-way communication for Real-Time Operations with ArcGIS.
 - d. GIS Solution must support ArcGIS Dashboards with ArcGIS Server, Portal and ArcGIS Online.
22. GIS Solution must support import and export functionality with other business system when APIs are not readily available.