

**VILLAGE OF MANTUA, OHIO
LEGAL NOTICE**

Sealed bids will be received at the Village Administrator's Office, at 4650 West High Street, Mantua, Ohio 44255 until 4:00 pm Eastern Daylight time May 11, 2020 and then will be publicly opened and read over Zoom video conference for:

"500 Automatic Read Water Meters"

Detailed specifications and bid packages are available by calling 274-8776 ext. 150 or at <http://mantuavillage.com>.

Each bid must contain the full name of every person or company interested in said proposal, and a Certified Check or Bid Bond in any amount equal to ten (10%) percent of the bid price. Said check or bid bond shall be made payable to the Village of Mantua, Ohio as a guarantee that if said bid is accepted a contract will be entered into, and its performance properly secured.

Bids are to be submitted on the "BID FORM" provided in the bidding documents, and shall be enclosed in a sealed envelope plainly marked:

"Village of Mantua Water Meters 2020"

The Village retains the right to reject and or all bids, in part or in total. Should any bids be rejected, such check or bid bond will be forthwith returned to the bidder, and should any bids be accepted, such check will be returned to the bidder upon proper execution of the contract.

The Village of Mantua reserves the right to reject any or all bids.

By Order of the Council of the Village of Mantua, Ohio

Jenny August, Clerk-Treasurer

Resolution No. 2020-18

Passed: April 21, 2020

ADVERTISE: APRIL 27 AND MAY 4, 2020

BID FORMS

The bid forms are not available online. Obtain Bid Forms from the Village of Mantua by purchasing a set of plans and specifications at the location indicated in the Advertisement for Bids/Public notice to Bidders.

Automatic Meter Reading & Meter Replacement Project

**Village of Mantua
4650 East High Street
Mantua, OH 44255**

**Contact Information: Linda Clark
Phone: 330-274-8776**

Metering and AMR/AMI projects provide an immediate impact on job creation over a wide range of skill levels including jobs in meter installation, call center management, database administration and project management.

It is our goal to meet the “Buy American” Provision. Please respond to below questions regarding where the meters were made:

Describe where your bronze meters are manufactured?

Describe where your meter registers are manufactured

Describe where your AMI/AMR and Reading Equipment are manufactured

Describe where your Equipment is assembled

Village of Mantua AMR RF Water System

It is the Village of Mantua's intent for a **Compatible Metering Project**. This is a request to complete RF meter transmitter and meter reading system. A complete meter reading system that includes:

1. Completion of the RF Automatic Metering project started in **May 2020**.
2. Purchase of **500** Water Meters Integrated Radio-Frequency (RF) transmitters for all residential and light commercial.
3. Turn-key Installation and Project Management of Water **500** Meters
4. Must be compatible with the Existing Neptune Radio-Frequency Mobile computerized meter reading system
5. Must be compatible with Neptune Reading equipment Software being used by Portage County Water Resources
6. Total Project Financing
7. Guarantee and Warranty Information

It is the Village's intent to have one contract for this project.

All system parts furnished (Integrated RF Meter and RF Reading Equipment,) shall be produced from an ISO 9001 manufacturing facility.

System to be read by the Village of Mantua. Must be fully compatible with the existing Neptune Meter Reading System.

AMR/AMI and SaaS

This document is intended for utilities and consultants and provides specifications for a meter reading system (the System) that operates seamlessly as BOTH an Automatic Meter Reading (AMR) and/or an Advanced Meter Infrastructure (AMI) system.

1. SCOPE OF WORK

The utility issues this RFP to procure a System capable of meeting the current and future meter reading needs within our service area. The scope of work involves, but is not limited to, providing and installing the System which includes software, hardware, and all necessary training and installation support. The reading equipment shall be capable of receiving meter readings while utilizing a handheld reading device.

The System must have the capability to improve meter reading efficiency, increase meter reader safety, and provide data that facilitates resolution of customer bill complaints, water conservation initiatives, and distribution system management efforts. The vendor shall describe the upgrade requirements to incorporate radio frequency (RF) technology.

During upgrade to RF meter reading, the System shall still be able to read probed water meters, direct read water meters via manual keyed entry, and meters equipped with RF meter interface units (MIUs) within the same meter reading route without detaching the receptacle or RF meter interface unit or switching modes within the meter reading equipment.

All System components furnished (software, reading equipment, RF MIUs, meters with absolute encoders) shall be produced from an ISO 9001 certified manufacturing facility.

2. SYSTEM OVERVIEW

The System shall be comprised of RF MIUs, data collection devices, and host software. The System shall be capable of operating simultaneously in a walk-by (handheld), mobile (drive-by), full fixed network (permanently mounted data collectors), or any combination of these data collection methods without the need for reprogramming RF MIUs.

The transition from walk-by, to mobile, to fixed network shall be seamless and allow all meter reading methods to operate together simultaneously. MIUs shall transmit messages required for both mobile AND fixed network operation on an interleaved basis, allowing both mobile AND fixed network data collection capability at the same time. Systems with MIUs that must be configured or programmed to operate in either one “mode” or the other will not be allowed.

The System shall provide 8-digit meter reading resolution capability for encoders using Neptune ProCoder/E-CODER® or Sensus UI-1203 protocol in mobile as well as fixed network data collection applications.

For reliability and meter reading integrity, the vendor shall be the sole manufacturer of the different components of the System (water meters, RF MIUs, meter reading equipment, and meter reading software) and provide a turnkey system offering to the utility.

2.1 MOBILE AMR FUNCTIONALITY

When used as mobile AMR, the System shall provide 96 days of hourly consumption data storage at the MIU, retrievable from mobile data collection devices. Mobile data devices shall facilitate retrieval of consumption data for field presentment on a handheld, laptop, or Android/iOS powered mobile device, as well as storage for later use with the host software application.

The System shall provide capability of mobile retrieval of individual off-cycle (specific date) reads as stored for 96 days in the MIU. Mobile data devices shall facilitate retrieval of off-cycle reads for field presentment on a handheld or Android/iOS powered mobile device, as well as storage for later use with the host software application.

2.2 AMI NETWORK FUNCTIONALITY

When deployed as a fixed network, the System shall provide hourly consumption interval data, time synchronized at the host meter reading software. The host software shall provide individual account consumption interval data displayed in graphical as well as tabular format and readily accessible to utility Customer Service Representatives to facilitate customer bill complaint resolution without the need for a truck roll.

3. METER INTERFACE UNITS (MIUs)

Meters connected to RF MIUs shall collect meter usage from an encoder meter register and shall transmit the meter reading and a unique ID number to the data collection device.

The MIUs must be compact electronic devices connected to the water meters. They shall interrogate the encoder register and transmit the meter reading and other information to a remote reading device. They shall be compatible with encoder registers using either Neptune ProCoder/E-CODER® protocol or Sensus-protocol (UI-1203). MIUs shall feature “auto detect” functionality to detect the type of encoder connected and shall not require reprogramming in the field. The same RF MIUs must be capable of being read by a walk-by handheld computer equipped with a RF receiver, a mobile system with an RF receiver mounted in a vehicle, and a fixed network data collection system. This shall allow an easy migration between the three-meter reading systems without any change to the MIU devices or revisiting the site.

The MIU shall log 96 days of hourly consumption data, available for retrieval via RF activation from the handheld or mobile data collection device.

The MIUs shall be attached to new meters or shall retrofit to existing meters in the field. The MIUs shall be manufactured in both wall and pit models. The wall MIU shall have the ability to be mounted in a basement or on the outside of a house. The pit MIU shall have the ability to be mounted in a pit or an underground vault and offer an optional through-the-pit-lid antenna. The wall and pit MIUs shall have a fully-potted, submersible design.

MIUs shall also be available as integrated devices in which the encoder register, and RF transmitter module are integrated into a single module. The unit shall interrogate the integrated absolute encoder register and transmit the meter reading and other information to a data collection reading device.

The absolute solid-state encoder register with integrated MIU shall be attached to new meters, or they shall retrofit existing meters in the field via a bayonet mount on top of the meter main case. The absolute solid-state encoder register with integrated MIU shall be manufactured in both inside and pit models. The inside MIU shall have a water-resistant enclosure and a permanent internal antenna. The pit MIU enclosure shall be a roll-sealed copper can and glass lens, designed to ensure a watertight seal with a permanent internal antenna and offer an optional through-the-pit-lid antenna to optimize performance in hard-to-read or fixed network applications.

3.1 PHYSICAL/MECHANICAL REQUIREMENTS

3.1.1 WALL UNIT

- The MIU housing shall be constructed of a polycarbonate plastic compound and be capable of mounting both indoors and outdoors on wall or pole or attached directly to the meter. The device must be water resistant and capable of exposure to spray and splash. The device must be able to withstand a 200-hour salt fog test as specified in NEMA 4 standard.
- The device shall provide a location for a tamper-deterrent seal. Tampering with the device functions or connections shall not be possible without causing visible damage to the device exterior or to the seal.
- The device shall be capable of operating at temperatures of -22°F to +149°F (-30°C to +65°C) with operating humidity of 0 to 100% condensing.
- The circuit board and the battery will be protected by a potting material.
- The unit must retrofit to existing installations.
- The MIU device must be protected against static discharge without loss of data per IEC 801-2, issue 2.

3.1.2 PIT UNIT

- For pit or vault applications, the MIU antenna shall be designed to be installed through the industry standard 1¾" hole in the pit lid with no degradation of transmission range. The MIU antenna unit will be capable of mounting to various thicknesses of pit lids from ½" to 2½".
- The device shall be capable of operating at temperatures of -22°F to +149°F (-30°C to +65°C) and operating humidity of 0 to 100% condensing.
- The range will not be affected when the pit is flooded.
- The circuit board and the battery will be protected by a potting material.
- The antenna shall be made of a metallic and polymer material to withstand traffic and shall have a dual seal connection to the MIU housing.
- The MIU device must be protected against static discharge without loss of data per IEC 801-2, issue 2.

3.1.3 INTEGRATED UNIT – INSIDE SET

- The integrated MIU housing shall be constructed of a polycarbonate plastic compound and be capable of mounting indoors.
- The MIU shall be designed with an internal antenna.
- The device shall provide a location for a tamper-deterrent seal. Tampering with the device functions or connections shall not be possible without causing visible damage to the device exterior or to the seal.
- The device shall be capable of operating at temperatures of -22°F to +149°F (-30°C to +65°C) and operating humidity of 0 to 100% condensing.
- The radio circuit board and battery will be protected by encapsulation in a hard potting.
- The unit must retrofit to existing installations.
- The MIU device must be protected against static discharge without loss of data per IEC 801-2, issue 2.

3.1.4 INTEGRATED UNIT – PIT SET

- The MIU shall be sealed in a roll-sealed copper can and glass lens to allow for submersion in a flooded pit environment.
- For pit or vault applications, the MIU shall be designed with an internal antenna.
- The device shall provide a location for a tamper-deterrent seal. Tampering with the device functions or connections shall not be possible without causing visible damage to the device exterior or to the seal.
- The device shall be capable of operating at temperatures of -22°F to +149°F (-30°C to +65°C) and operating humidity factor of 0 to 100% condensing.
- The radio circuit board and battery will be protected by a hard-potting material.
- The device shall be designed for an optional remote antenna capable of being installed through the industry standard 1¼” hole in the pit lid for maximum transmission range.
- The optional through-the-lid antenna will be capable of mounting to various thicknesses of pit lids from ½” to 2½” and various distances from meters.
- The optional through-the-pit-lid antenna shall be rigid in design to withstand traffic and shall have a dual-seal connection to the MIU housing.
- The MIU device must be protected against static discharge without loss of data per IEC 801-2, issue 2.

3.2 OPERATING SPECIFICATIONS

3.2.1 FCC LICENSING AND CERTIFICATION

- The MIU shall operate within FCC Part 15.247 regulations for devices operating in the 902 MHz to 928 MHz unlicensed band. The output power of the devices will be governed by their conformance to these relevant FCC standards.
- To minimize the potential for RF interference from other devices, the MIU shall transmit using the frequency hopping, spread spectrum technique comprised of alternating pseudo-random frequencies within the 902 MHz to 928 MHz unlicensed band.
- For ease of implementation, the System shall not require any special licensing, including licenses from the FCC. The System must, therefore, operate in the 902 MHz to 928 MHz unlicensed band.
- The System must be expandable at any time without getting authorization from the FCC.
- No wake-up tone shall be necessary.

3.2.2 FIELD AND INSTALLATION OPERATIONS

- No MIU programming shall be necessary for installation.
- The MIU shall be mounted per the manufacturer's installation instructions to ensure a reliable and quality installation throughout the life of the MIU.
- The handheld reading equipment shall provide a test mode to verify proper operation of the MIU by displaying the MIU ID number and meter reading.
- The handheld reading equipment shall provide a test mode to verify proper operation as well as troubleshooting of the MIU on the AMI network by displaying the MIU ID number and latest meter reading.
- The MIU shall be capable of being received by a handheld receiver, mobile receiver, or fixed network data collector without special configuration, programming of operation modes, or re-manufacture.

3.2.3 DATA TRANSPORT

- The MIU shall provide 8-digit reading resolution from encoded registers using either Neptune E-CODER® or Sensus UI-1203 protocol in mobile as well as AMI network data collection applications, simultaneously, without need for programming.
- The MIU shall read the encoded register at 15-minute intervals to provide accurate leak and reverse flow detection using 8-digit resolution reads.
- The MIU shall transmit readings from the encoder that are not older than 15 minutes.
- The MIU shall transmit the meter reading continuously at a predetermined transmission interval.
- The MIU shall transmit AMI network messages every 7 ½ minutes – standard. No programming shall be necessary to activate transmission of AMI network messages.
- Each AMI network message shall include capability to include 3-meter readings for redundancy to improve read success rates.

- The MIU shall transmit mobile messages every 14 seconds – standard. No programming shall be necessary to activate or revert to transmission of mobile messages.
- In the event of a cut wire, the MIU shall not send the last good read as this can lead to miss-billing. The MIU shall transmit a trouble code in lieu of the meter reading.
- Tamper – If wiring has been disconnected, a “non-reading” shall be provided indicating wire tamper; a reading that gives the last available reading is an incorrect reading.
- Each device shall have unique pre-programmed identification numbers of ten (10) characters. ID numbers will be permanent and shall not be altered. Each device shall be labeled with the ID number in numeric and barcode form. The label shall also display FCC approval information, manufacturer's designation, and date of manufacture.
- The MIU shall transmit the encoder meter reading and a unique MIU ID number.
- The MIU shall interface to encoder registers using Neptune ProRead, Neptune E-CODER® or Sensus UI- 1203 communication protocol via a 3-conductor wire without need for special configuration to the MIU.
- The MIU shall periodically transmit a packet that includes the register information such as register ID, register type, and other status information no less than weekly.

3.2.4 OPERATIONAL CHARACTERISTICS

- Power shall be supplied to the MIU by a lithium battery with capacitor.

- The number of radio-based meter reads performed must not affect the battery life.
- The battery life shall not be affected by outside erroneous wake-up tones (e.g., other water, gas, or electric utilities reading and therefore sending out a wake-up tone).
- The battery shall be a fully potted component of the MIU with no external wires.
- The vendor shall warrant that the MIUs shall be free of manufacture and design defects for a period of twenty (20) years – the first ten (10) years from the date of shipment from factory without prorating and the second ten (10) years with prorating, as long as the MIU is working under the environmental and meter reading conditions specified.

4. DATA COLLECTION DEVICES

The System shall provide a means of communication between the MIU installed at the meter site and the host software. In a walk-by system, it must be a handheld computer capable of reading meters using keyed-entry, inductive encoder probing, or RF communications with an attached receiver device without the need to switch modes within the handheld.

In the case of a mobile application, the data collection device must be a portable tablet, or smartphone that is Android or iOS compatible.

For the fixed network application, the data collection device must be an environmentally sealed control box able to adapt to various installation settings and must have the capability to receive, store, and communicate meter readings to the host software for further use and analysis.

4.1 WALK-BY APPLICATION

For Walk-By applications, the System must give user the ability to collect metering data in several ways:

- Keyed entry
- Inductive probing
- RF communication: The handheld must connect via Bluetooth to an RF receiving device

The proposed walk-by data collection system must include:

- Handheld data collector device Bluetooth paired RF receiving device
- Communication cradles for charging and loading the handheld unit (only for devices running Windows Mobile OS)
- Probes for interrogating Neptune ProCoder/E-CODER® or Sensus UI 1203 protocol absolute encoders (optional)

4.1.1 HANDHELD DATA COLLECTOR DEVICE

4.1.1.1 BASIC FUNCTIONS

The handheld data collection device shall have the capability to collect and store meter readings at any time of the meter reading route by any of the following methods:

- Manual use through an alphanumeric keypad.
- Probing of water meters equipped with supported absolute encoders.
- Via radio frequency through a Bluetooth-paired receiver.

The unit shall be able to obtain all types of readings on any particular route without requiring:

- Reprogramming of the handheld computer.

- Physical change of software contained within the unit while in the field.
- Access through special software menus contained within a given route/program.

The handheld data collection device must be able to multitask by collecting data while in keyed entry (manual) meter reading mode.

4.1.1.2 HARDWARE REQUIREMENTS

4.1.1.2.1 OPERATING SYSTEM

The System must support a variety of handheld data collection devices. These devices must run Windows Mobile 6.1 or 6.5 Operating System, Android Operating System, or Apple iOS Operating System.

4.1.1.2.2 CASE (ONLY FOR DEVICES RUNNING WINDOWS MOBILE OS)

- The unit must be able to withstand 26 drops at room temperature from four (4) feet onto plywood over concrete.
- The handheld must meet and exceed MIL-STD 810F standard, method 516.5, procedure IV for drop tests.
- The handheld shall be ergonomically designed to be comfortable for handheld meter reading.

4.1.1.2.3 DISPLAY

- The size of the display characters must be selectable, allowing the use of larger characters that are easier to read. The screen must support a minimum resolution of 480 by 640 pixels or 640 by 480 pixels.
- There must also be a manual contrast adjustment feature which will allow the user to adjust the contrast to his or her satisfaction.

4.1.1.2.4 KEYBOARD (ONLY FOR DEVICES RUNNING WINDOWS MOBILE OS)

- The handheld must support one of the two keyboard options:
- The keyboard must have independent numerical keys with adequate separation for use with a gloved hand. Must have a full-on screen, customizable alphanumeric keyboard.
- Full QWERTY keypad with adequate separation with a gloved hand with number pad as well as directional buttons with four programmable buttons.
- There must be an auto-repeat function on keys and a rapid response between keying and seeing results on the screen.

4.1.1.2.5 BATTERY

- The battery capacity must be sufficient for a minimum of ten (10) hours of meter reading.
- The handheld must come with a power management system designed to conserve power.

4.1.1.2.6 MEMORY

- The handheld data collection device must include a minimum of 128 MB of DDR SDRAM.
- The handheld must have 512MB or greater of on-board non-volatile flash storage.

4.1.1.2.7 CARRYING METHOD (ONLY FOR DEVICES RUNNING WINDOWS MOBILE OS)

- A carrying mechanism must be provided with each unit and must provide ease of use for right- or left-handed operators.

4.1.1.2.8 SIZE

The handheld data collection device dimensions must not be larger than:

- Length: 10.5" (17.6 cm)
- Width: 5.2" (10 cm)
- Height: 1.9" (5.0 cm)
- Or device specific for Android and iOS powered devices

4.1.1.2.9 WEIGHT

The unit's weight must be no more than 2.3lbs with battery installed.

4.1.1.3 ENVIRONMENTAL CHARACTERISTICS (ONLY FOR DEVICES RUNNING WINDOWS MOBILE OS)

The handheld must include but not be limited to the following:

- The unit must operate in a temperature range of -30°C to +60°C (-22° F to +140° F).
- The device shall be water-resistant, capable of unlimited exposure to spray or splash (such as rain or snow).
- The handheld unit must be capable of being immersed in 3.3ft (1 meter) of water for 30 minutes.
- The device must be protected against an 8kV static discharge without loss of data.
- The unit must be resistant to various chemical products and must be sealed to keep out dust, humidity, and water.
- The device must be shock-resistant exceeding IEC 68-2-32 method 1 (a one-meter drop on concrete).
- The unit must be CE and FCC certified.

4.1.1.4 HANDHELD SOFTWARE REQUIREMENTS

4.1.1.4.1 BASIC FUNCTIONS

The handheld software must be easy to use and give the meter reader control over the route in searching for accounts, entering related notes, and manually reading meters.

The handheld software must include entry of meter readings.

In addition, the handheld software shall include but shall not be limited to the following basic features:

- User customizable key assignments.
- Allow manual or automatic entry of meter readings, ID numbers, and note codes.
- Perform high/low test on readings.
- Date and time stamped to each reading.
- Identify type of reading – manual keyed, probed, or RF MIU.
- Perform unread meter search.
- Found meter processing for new accounts.

- Data search capability (display, notes, and ID).
- Auto-search for automatic reading of encoded meters.
- Display the number of read and unread accounts on demand.

4.1.1.4.2 SOUNDS

Successful meter readings must be confirmed by an audible tone.

4.1.2 COMMUNICATIONS / CHARGING EQUIPMENT

4.1.2.1 COMMUNICATION

Communications between the handheld and the PC software must be established using a wireless synchronization or cradle connected via Ethernet or USB. In addition, the following basic features must be included:

- Extensive error checking is provided to ensure data integrity during communications between the handheld and the PC.
- A typical route of 400-500 accounts can be loaded or unloaded in less than one minute with the ability to load more than 5,000 records into a single handheld unit.
- Routes/books can be split at the PC level.
- Once loaded, routes may be individually selected on the handheld.

4.1.2.2 COMMUNICATIONS/CHARGING CRADLES

- The communications/charging cradle will be housed in a suitable material that can be wall or tabletop mounted.
- It will have the capability of recharging the handheld unit within four hours and also provide the communication port connection to the computer.
- The cradle will be capable of communicating with the host computer at 10 Mbps.
- The cradle must be capable of both USB and Ethernet communications with a PC.
- The charging units must carry the Underwriters Laboratory (UL) seal of approval.

4.1.3 PROBES

The handheld must be compatible with a wireless probe capable of reading Neptune ProCoder/E-CODER or Sensus UI 1203 protocol absolute encoders.

4.1.4 RADIO FREQUENCY CAPABILITY

The meter reading system must be capable of being upgraded to radio frequency communications. Utility plans to read water meters equipped with radio frequency MIUs. Only absolute encoder registers using Neptune ProCoder/E-CODER® or Sensus UI-1203 communication protocols shall be acceptable. For the radio frequency-based meter reading system, the encoder registers will be connected to an RF MIU that shall provide the radio link from the meter to the handheld interface unit. MIUs shall feature “auto detect” functionality and shall not require reprogramming in the field.

The handheld radio frequency receiver must be separate from the handheld unit itself.

4.1.4.1 RADIO FREQUENCY READING FUNCTION

The function of the handheld and external receiver in radio frequency mode is to provide utility the capability of reading meters via radio signals transmitted by the RF MIUs. The external receiver must be capable of receiving RF readings and transferring those readings to the handheld via Bluetooth connection. All transmissions from supported MIUs will be collected. The reading of any MIU shall be automatically stored in the proper account record without the intervention of the meter reader.

Should any MIU not be able to be read during the route, the software shall support storage of a flag in the account record, indicating clearly that the MIU could not be read. When reading the meters in the RF mode, it should not require the meter reader to activate any wake-up tone.

The handheld with the external receiver reading equipment must provide a test mode to verify operation of the MIU. This test mode must be accessible from within the meter reading application as well as accessible from a handheld's main screen (no login required). The test application must be capable of reporting statistics for an individual MIU or displaying all MIUs within range.

4.1.4.2 WALK-BY RF TRANSCEIVER

- The walk-by RF transceiver must be a separate belt clip, wearable, transmit/receive device which communicates via Bluetooth to the handheld.
- The walk-by RF transceiver must support the ability to remotely command the MIU to transmit data log interval data.
- The walk-by RF transceiver antenna shall be internally mounted.
- The walk-by RF transceiver must meet FCC Class B certification.
- The walk-by RF transceiver must contain an SD card.
- The walk-by RF transceiver must utilize SDR (software-defined radio) technology.
- The walk-by RF transceiver must contain a mini-USB port for both battery charging and PC communications.
- The walk-by RF transceiver must contain a field replaceable battery.
- The walk-by RF transceiver must have four (4) LEDs displaying the following:
 - Battery/Power status
 - RF status
 - Bluetooth status
 - Mode status
- The external RF transceiver must be capable of unattended operations where the receiver is not paired with any handheld device but hears and stores any received reading packets to the SD card. This data must be able to be imported into the host software for use as billing reads.

The following specifications must be met:

4.1.5 RADIO CHARACTERISTICS

- Receiving Frequency: 910-920 MHz unlicensed RF.
- The walk-by RF transceiver must have 50 channels.
- The walk-by RF transceiver must support reading eight (8) channels simultaneously.
- The walk-by RF transceiver must be capable of processing 360 RF packets per second.

4.1.5.1 SIZE AND WEIGHT

Physical specifications of the external RF receiver must be within the following parameters:

Length:	5.75" (14.6 cm)
Width:	1.66" (4.22 cm)
Height:	3.58" (9.1 cm)
Weight:	(with battery): 1.3 lbs. (without battery): 1.1 lbs.

4.1.5.2 ENVIRONMENTAL OPERATING CONDITIONS

- Operating conditions: -4°F to +122°F (-20°C to +50°C)
- Storage temperature: -40°F to +185°F (-30°C to +70°C)
- Designed to and tested to MIL-STD-810F specifications
- Designed to withstand electrostatic discharges per EN61000-4-2

4.1.5.3 RF WALK-BY RECEIVER BATTERY LIFE

The data collection device battery must provide enough power to support RF meter reading for a minimum of eight (8) hours.

4.2 MOBILE DATA COLLECTION SYSTEM

The mobile data collection device must be a portable, compact electronic system mountable in any vehicle.

The mobile data collection device shall be easily transportable from vehicle to vehicle or from vehicle to office.

4.2.1 HARDWARE SPECIFICATIONS

The key components of the mobile data collection device must consist of a portable personal computer (PPC) or Android/iOS mobile device, an integrated radio receiver unit, and remote rooftop magnet mount antenna.

The mobile data collection device must be easily installed in any vehicle that will drive to the field for meter reading. It must be mounted securely in the passenger seat with a standard seat belt. Through a 12V DC plug-in power cord, the unit must be powered from the vehicle's power supply (cigarette lighter).

The mobile data collection device must include a magnetic base antenna and the antenna cord as well as all necessary power and communication cables.

The mobile data collection device shall draw no more than one (1) AMP of power. The mobile data collection device dimensions must be no larger than the following parameters: 11.0" x 8.0" x 3.15". The weight shall not be more than five (5) lbs.

The mobile data collection device shall support the connection to any mobile device that meets the following minimum system requirements:

- Operating System: Android Operating System 6 and above, iOS Operating System 11 and above
- Communication: Internal 801.11 b/g wireless LAN or Cellular Connectivity
- Bluetooth

4.2.2 ENVIRONMENTAL CONDITIONS

The mobile data collection device must work in the following environmental conditions:

- Operating Temperature: 32° to +122°F (0° to +50°C)
- Storage Temperature: -40°F to +185°F (-40°C to +85°C)
- Operating Humidity: 5 to 95% non-condensing relative humidity

4.2.3 MOBILE DATA COLLECTION SOFTWARE REQUIREMENTS

4.2.3.1 BASIC FUNCTIONS

The software must be a dialog-based, intuitive, easy-to-use meter reading application.

After the meter reader starts the reading process, the software must automatically collect the meter reading data received from the radio receiver unit. The software should capture all readings for any routes loaded without having to select the route for reading.

The software should have an option to wirelessly synchronize meter reading routes and reading data with the host software in real-time or on-demand.

The software shall be touchscreen friendly and operate on Android or iOS devices.

Unit must be capable of optimizing the memory storage space by filtering out duplicate readings from the same MIU and keeping only the last reading received.

Each reading record must contain an MIU ID and a time stamp of the reading.

The software must be capable of performing high/low test on readings.
The software must provide a progress bar that provides route reading status for individual as well as all routes combined.

The software must support retrieval and graphing of 96 days of data logging intervals from the MIU.

The software must contain a test mode used to validate MIU installation. The test mode must provide MIU ID reading, as well as flag status.

The software must have an option to geocode meter reading routes by address.

The software must allow a manual reading to be entered into the account record.

The software must allow freeform notes to be entered to record conditions in the field that require noting and may require an additional work order created to address at a later date.

The software must have a GIS mapping option compatible with ESRI ArcGIS.

The software must have advanced filtering to allow the user to view route mapping data by conditions such as flag type/status, audit status, and read status.

The software must be capable of displaying meter points and read success and unread accounts via GIS mapping interface. The software must be capable of collecting the following information for the host to generate reports; leak detection, tamper detection, and backflow conditions.

The software must allow for GPS location tracking of the meter reading vehicle.

The software must allow for GPS breadcrumb tracking of the meter reading vehicle during the route reading process.

4.2.4 MOBILE DATA COLLECTION DEVICE PERFORMANCE REQUIREMENTS

The magnet mount antenna must be omni-directional and support a gain of 5 dB minimum.

The receiver utilized must operate with a minimum sensitivity of greater than 110 dBm.

The receiver module must process at minimum 72 discreet channels across a 10 MHz bandwidth utilizing a digital signal processor capable of capturing eight-meter readings simultaneously from these channels.

The receiver module must operate with a dynamic range of greater than or equal to 100 dB with a message success rate greater than 50%.

The mobile data collection device must be able to maintain a minimum sustained processing rate of 70 unique meter reading accounts per second.

The mobile data collection device must reject a minimum 45 dB of noise energy above the target message in adjacent channels.

The mobile data collection device must operate effectively at posted speed limits.

5. AMI/AMR UTILITY SOFTWARE APPLICATION OVERVIEW

The utility application must provide all the controls needed in the network for the essential functions of the metering data output received from the communication with field collection devices. The application must present this data within an intuitive user interface that is easy to interpret and understand. It must integrate seamlessly with other third-party applications the utility utilizes such as CIS/billing software applications and work order management systems.

5.1 BASIC FUNCTIONALITY FOR AMR & AMI

- The utility application shall have the capability of interfacing with the utility's CIS/billing software through a file layout that meets the specifications provided by the systems vendor.
- The application must have a method to import and export files for billing processes.
- A method must be available for a user to specify the routes to be exported and for transferring files from the application to the billing system.
- The application must be accessible through an internet web browser for accessibility anywhere.
- The utility application must operate within a Microsoft Windows platform and is hosted by the systems vendor.
- A geographical view of metering assets shall be available within the user interface.
- The utility application must allow Mobile AMR and AMI networks metering processes to be run in parallel within a single user interface.
- Graphical presentation of consumption data must be viewable within the user interface.
- The application must have a method to display individual account consumption based on meter size, meter type and unit of measure.
- Multiple levels of user security access must be available within the utility application.
- A method to search for records matching an MIU ID, Account, Name, or Address must be available within the application.
- The application must support meter readings (4-8 digits) and MIU ID numbers up to 10 digits.
- All metering output data, such as leaks and reverse flow indications, shall be viewable within the application. Granular reporting shall be available that defines all accounts that have triggered the event.
- The utility application shall display the top 10 consumers with the highest consumption within the user interface. A method to view additional high usage consumers should be available.

- Reading performance reports and usage analysis capabilities shall be available within the utility application.
- All available reports shall be exportable to Microsoft Excel or PDF formats.
- The utility application shall present to the user the number of successful, unsuccessful and invalid readings.

5.3 MOBILE AMR SYSTEM FUNCTIONALITY

The cloud platform must provide the capabilities of collecting metering data from the Mobile AMR collection devices and present the data in a user-friendly view for consumption by utility users.

The following functionality shall be provided within the software:

- The utility application must have a method to view, load, and make route assignments for meter readers.
- A method of loading routes to handheld, mobile drive-by handheld, cellular phones and tablet devices shall be viewable within the application.
- The application shall provide a method of data transfer to the mobile drive-by device and accept data from the device.
- The application shall manage the routes that are loaded into the data collection device.
- The application shall have a method to communicate wirelessly to handheld, cellular phones or tablet devices.
- The utility application shall have a method to split routes by collection method or into equal parts for managing meter reading load activities.

6. MOBILE APPLICATION DEVICE COMPATIBILITY

- The mobile application shall contain a method of completing meter reading tasks via an Android or an iOS mobile phone or tablet device.
- The mobile application shall contain a method to provide data log capabilities via a mobile phone or tablet device.
- When using a mobile device for meter reading, the software platform shall provide a method of real-time synchronization for loading and unloading routes on the device.
- The mobile application shall have a method to data log a meter endpoint, and it shall include graphical and tabular views that include any meter output such as leaks and reverse flow indications.

7. SOFTWARE-AS-A-SERVICE (SAAS)

The utility requires a vendor that is responsible for ownership of the software and all associated hardware to operate the software. The utility shall only be responsible for the computers or laptops needed to access the applications via a web browser. The City shall maintain ownership of all data received by the AMR system or the AMI network and shall be provided online access to all data during an active subscription. In the event the subscription terminates, the vendor shall provide the data to the utility in an agreed upon media format.

- The vendor shall provide the following services to the utility during the subscription:
- The SaaS vendor must have a minimum of two years' experience providing hosting services within the water utility space.
- The SaaS subscription must cover all software patches, operating system updates, security and network monitoring, and platform preventive maintenance.
- The vendor shall provide the utility with a service level agreement that meets 99% application availability during business hours of operation, excluding corporate holidays.
- A disaster recovery plan for any failures at the managed services center to ensure continuity of the utility's data and continued access that meets agreed upon contract SLAs shall be provided by the SaaS vendor.

- The SaaS vendor must have a data backup strategy and process.
- A method of communicating or alerting the utility in the event of system failure or downtime must be provided by the vendor.
- The vendor shall have security and monitoring services in place that ensures the privacy and security of the utility's data.
- The vendor shall ensure that the data and all redundant data is housed in the country in which the utility resides.
- All data in transit to the cloud must be encrypted.

8. TRAINING AND SUPPORT

An approved, detailed training plan must be developed by the vendor with approval by the utility based on results of pre-implementation meetings. The following are items to be determined during these meetings:

- Identify the training personnel and the employees to be trained.
- Identify training schedules for hardware, software, and complete system products.
- Define acceptance criteria for system deployment.

The vendor shall be responsible for fully training utility personnel in the system mapping, deployment planning, and installation of all end-point hardware and reading systems.

9. SUPPORT SERVICES

The vendor shall have a customer support department. The customer support department is required to maintain a telephone help desk and must have the capability of continuing the support through the use of a service agreement. A list of required services to be provided by the help desk includes but is not limited to the following:

- Answer and resolve hardware/operation/maintenance questions and problems.
- Answer and resolve software operation questions and problems.
- Evaluate information for updates or revisions.
- Evaluate personnel for training needs.
- Perform additional on-site training or evaluation as needed.

The help desk must be available weekdays between 8:00 a.m. and 6:00 p.m. EST with after-hours numbers available as needed.

10. INSTALLATION AND TRAINING

Complete installation and operating instructions will be included for all supplied hardware and software equipment. The training must be supplied by the System manufacturer or approved VAR. Proposal must include any additional costs for training and assistance to install and begin operation of the System. The vendor will also inform the customer of what pre-installation activities are to be completed and what support material will be needed for all hardware installation.

11. PERFORMANCE WARRANTIES

In evaluating bid submittals, warranty coverage will be considered. The vendor shall be required to state its warranty and/or guarantee policy in writing with respect to each item of proposed equipment. The procedure for submitting warranty claims must also be provided.

12. SYSTEM MAINTENANCE SUPPORT

In addition to warranty periods, vendors are required to supply information on required or optional maintenance programs beyond the warranty period for both hardware and software.

Vendor must offer multiple-year maintenance contracts, so utility can take advantage of multi-year discounts.

The location of and procedures for obtaining such support shall be stated. A toll-free help desk number must be provided for system support.

13. VENDOR QUALIFICATIONS

The qualified vendor will have a minimum of thirty (30) years' experience with meter reading systems. The selected vendor shall be thoroughly versed in encoder meter and RF AMR/AMI technology and be a major supplier in the marketplace. The proposed System shall be manufactured and maintained by the selected vendor or an equity partner.

All vendors shall document which water meter manufacturers and models with which they are capable of interrogating with the proposed meter reading equipment. A customer reference list shall be enclosed with the proposal.

Meter Installation & Project Management

The following information will be recorded at time of meter installation:

- Meter reading and serial number of removed meter
- Meter reading and serial number of newly installed meter
- Time and date of replacement
- Receptacle Location, ID
- Account number
- Address
- Phone
- Name
- Installation Notes

Installation Practices

Manufacturer Specifications

Installation Contractor will replace existing meters in accordance with Manufacturer's instructions as well as your specifications. The meter shall be installed in a neat and workman-like manner by technicians who have been trained and informed of the technical and procedural requirements of the work.

Customer Notification

All inside meters require appointments before entering the home. Contractor will use a list provided by the Village to send letters for the resident to schedule the appointment for install.

Customer Notification

The water customer will be informed that water service will be shut off to accomplish the meter change-out, and it will be for as short a time as necessary. The Water Department shall provide timely assistance where requested by the installer in locating and operating shut-off valves and/or curb stops for each customer. The contractor will make a minimum of four attempts to contact the customers, including:

- Initial mailing
- At least two telephone attempts
- One door hanger.
- One final letter

After these attempts, the Contractor will notify the Water Department that they are unable to contact the customer. At that time, the contractor will deliver a list of non-responsive customers to the Water Department which will assist in securing the installation according to department regulations.

Pit mounted meters will not require an appointment. The customer will be notified that we will be shutting off the water before the replacement is begun.

Installation Details

The following summary describes the general steps of the installation work to be done. The actual work may differ from this description, and will not be limited to these actions:

- Make entry to the property after greeting with resident
- Replace old meter with new meter with Integrated Meter Interface Unit (IMIU)
- Verify RF installation with Manufacturer's tester or equivalent
- Clean work area
- Complete paperwork
- Inform homeowner of actions

Sealing the Installation

The installer will seal meter inlet coupling and meter head according to your specifications.

Additional Work

Any additional work requested by the Water Department will be performed on a negotiated time and material basis.

Inoperative Valves

If the inside valve is not capable of shutdown, we shall shut off service at the curb stop. If the curb stop cannot be located or service frozen, we will need the Water Department to assist with shut down.

Installation Defects

It will be presumed that any leaks or defects at the meter reported by the customer to either the Project Manager or the Water Department within ten (10) calendar days after completion of the replacement are the result of the replacement efforts, and we will repair the damage at no additional cost. This presumption will not apply to leaks or other pre-existent conditions noted by the installer during the replacement.

Faulty Installations

All faulty installations within the warranty period shall be repaired by Installation Contractor at no extra cost to the utility.

Damages

During the replacement program, some breakages are likely to occur to customer service lines. We recommend that the Water Department repair damages to services, billing us for their time and materials. This mutual level of cooperation will insure minimal time a customer would be without water service and further accelerate completion of installation project.

Faulty Plumbing

If, in the installer's opinion, the condition of the customer's existing service piping is such that significant damage would result from attempting to remove and replace the existing water meter, our manager will so inform the Water Department. If the Water Department does not concur with the installer's judgment, and directs the installer to perform the meter replacement, and the customer's service piping is damaged as a result, then the Water Department will bear any and all costs of such damage.

Verification

The MIU must be tested at the time of installation to ensure a reading is captured. The Contractor must provide each technician with the required equipment capable of reading the MIU at the time of installation. Specifically, the Village requires that each technician capture a read from the street level or

at the end of the driveway for the installation to be deemed complete. Verifying a read from the street at the time of the installation provides assurance that the system is functional.

The Contractor must immediately correct at the time of installation any defects observed during the testing procedures. Proponents must minimize the need to return to the site at a later date to correct equipment and installation deficiencies.

Proponents are included with their details of the procedure for checking the operation of the MIU at the time of the installation. Data integrity is of the highest importance to the Village. Proponents are also required to detail in their proposal submission their methodologies for data integrity at the time of installation.

Preference will be given to those Contractors whose installers are factory trained in the installation and operation of radio frequency technology (specifically in MIU proposed).

Testing Installation

The radio meter interface unit assembly shall also be tested for continuity according to the Manufacturer's instructions. An installation is determined to have been successfully completed when a valid reading and ID is obtained through the radio meter interface assembly from the street or end of driveway. The Contractor shall correct immediately any defects observed during the foregoing testing procedures.

Data Recording

The MIU Identification number will be recorded along with the current reading. The existing touch pad reading will be verified. To ensure data integrity the decal with the ID # will be peeled from the MIU and placed on the work-order sheet. At the end of the day all the accounts will be updated to the billing system by means of a work order sheet deemed by the Utility office.

BID FORMS

The bid forms are not available online. Obtain Bid Forms from the Village of Mantua by purchasing a set of plans and specifications at the location indicated in the Advertisement for Bids/Public notice to Bidders.

CONTRACT

NOTE: The bidder is warned not to fill in any of the following blanks. After the contract has been awarded, the blanks will be filled in under the direction of the Village of Mantua.

ARTICLES OF AGREEMENT

Between the VILLAGE OF MANTUA, Ohio, Party of the First Part, and _____ Party of the Second Part, for _____ to the VILLAGE OF MANTUA.

1. Resolution declaring it necessary to receive bids passed by Council _____, 20____ Resolution No. _____.
2. Bids duly advertised for in **Record Courier** commencing on _____ 20____ and _____, 20____.
3. Bids publicly opened at Village Hall _____.
4. Determination by Village Council that _____ is the lowest and best bidder.
5. Contract awarded _____.

This agreement made and entered into the _____ day of _____, 20____ by and between the VILLAGE OF MANTUA, Ohio, Party of the First Part, and Contractor, Party of the Second Part.

WITNESSETH: That said Party of the Second Part has agreed, and by these presents does agree with said Party of the First Part, _____ for the consideration hereinbefore mentioned and contained, and under the penalty expressed in a bond bearing even date with these presents, and hereto annexed, to furnish at his own expense all the necessary materials of every description, and to carry out and complete the supplying of the VILLAGE OF MANTUA with _____ in accordance with the specifications at such times as hereto before mentioned.

The provisions contained in the Legal Notice, Information to Bidder, Proposal, Bond, and Specifications are also embodied as part of this agreement.

IN WITNESS WHEREOF, the said VILLAGE OF MANTUA, Ohio has caused its name and corporate seal to be affixed by the Mayor, and the said Party of the Second Part set my hand and seal the day and year aforesaid.

Name of Individual, Firm or Corporation
TAX ID. NO. _____

BY _____
VILLAGE OF MANTUA, OHIO

Member of firm or officer of Corporation

BY _____

ATTEST: _____
Secretary (Seal)

CERTIFICATE OF FISCAL OFFICER

As Fiscal Officer of the VILLAGE OF MANTUA, Ohio I hereby certify that funds in the amount of \$ _____ have been lawfully appropriated for the purpose of meeting the obligations of the contract with:

duly authorized by Ordinance or Resolution No. _____ are in the Treasury or in the process of collection to the credit of the _____ Fund free from any previous encumbrances.

Signed this _____ day of _____, 20____.

Clerk-Treasurer