

NOTICE TO BIDDERS  
MORRIS COUNTY COOPERATIVE PRICING COUNCIL (6MOCCP)

NOTICE IS HEREBY GIVEN that separate sealed bids will be received by the Purchasing Agent, Township of Randolph, on behalf of the Morris County Cooperative Pricing Council (MCCPC), in the Municipal Courtroom, 502 Millbrook Avenue, Randolph, NJ, on **Tuesday, April 09, 2024, at 10:00 a.m.** (prevailing time) and at that time will be publicly opened and read for:

SPRING CONTRACTS:

- #10: Lumber, Insulation, Hardware, Paint and Paint Supplies
- #13-A: Fire Equipment Services
- #13-B: Fire Water Pumps on Motorized Fire Apparatus
- #20-B: Sporting Goods
- #25: Janitorial Supplies
- #30: Office Paper Supplies
- #34: Tree Spraying
- #35: Light Bulbs
- #40: Personal Protection Items & Equipment for Emergency Personnel
- #42: Landscaping Materials & Supplies
- #43: Propane Gas
- #46: Preventive Maintenance/Repair of Emergency Generators
- #47: Water Meters/Data Recorders & Radio Frequency Meter Interface Units
- #50: Fire Department Uniforms (Purchase)
- #51: Deer Carcass Removal & Disposal
- #52: Fire Alarms, Sprinklers, Standpipe Systems & Fire Pumps

Technical bid specifications **ONLY** are available for review on the MCCPC website ([www.mccpc.org](http://www.mccpc.org)). If after a review of the technical bid specifications bidders are interested in the entire bid package, it may be **picked up** for no cost from the Township Purchasing Office, Township of Randolph, 502 Millbrook Avenue, Randolph, NJ 07869 after leaving necessary contact information **OR** by sending an email to [luhl@randolphnj.org](mailto:luhl@randolphnj.org) with all of the following **REQUIRED** information: (1) Contract #(s), (2) Company Name, (3) Complete Company Address, (4) Company Phone #, (5) Company Fax #, (6) Contact Person Name, (7) email address. Upon receipt of **ALL** required information, the full bid package will be **emailed**. Only those bidders picking up packages or contacting the MCCPC directly and providing the necessary information will be provided with any addenda that are issued in accordance with N.J.S.A. 40A:11-23c. Failure to acknowledge receipt of any addenda that may be issued may result in the rejection of the bid.

Bids shall be submitted in a sealed envelope bearing the name and address of the bidder and plainly marked to indicate the subject of the bid and addressed to the Purchasing Agent, Purchasing Office, Township of Randolph, 502 Millbrook Avenue, Randolph, NJ 07869. **Any envelope that is received that is not properly marked causing it to be opened prior to the**

**bid will be invalidated.** Bids may be received before the hour designated in this office if they are mailed or hand-delivered in person. The Township will not be responsible for any bid that is sent by mail or other form of carrier which is lost or which arrives after the bid deadline date and time.

Bidders are required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq.

Leila Uhl  
MCCPC Coordinator  
Township of Randolph

**INVITATION TO BID**

Date: February 27, 2024

NOTICE is hereby given that separate sealed bids will be received by the Purchasing Agent, Township of Randolph, on behalf of the Morris County Cooperative Pricing Council (MCCPC), in the Municipal Courtroom, 502 Millbrook Avenue, Randolph, New Jersey, on **Tuesday, April 09, 2024, at 10:00 a.m.** (prevailing time) and at that time will be publicly opened and read for:

**Contract #47****Water Meters/Data Recorders/Radio Frequency Meter Interface Units**

Bids shall be submitted in a sealed envelope bearing the name and address of the bidder and plainly marked to indicate the subject of the bid, and addressed to the Purchasing Agent, Township of Randolph, 502 Millbrook Avenue, Randolph, New Jersey 07869. **Any envelope that is received that is not properly marked causing it to be opened prior to the bid will be invalidated.** Bids may be received before the hour designated in this office if they are mailed or hand delivered in person. The Township of Randolph will not be responsible for any bid that is sent by mail or other form of carrier which is lost or which arrives after the bid date and time specified above.

All bids must be submitted on the Bid Proposal Form and must conform to the specifications, terms and conditions for a fair and open contract, all of which are contained therein.

Bidders must review the bid specifications for any applicable bonding requirements. Where required, bids must be accompanied by a certified check, bid bond or cashier's check payable to the Township of Randolph in the amount specified in the bid documents. Bids for contracts that require a Performance Bond must also contain a Consent of Surety.

Bidders must have any and all required approvals, qualifications, certifications, and/or licenses necessary to perform the services or provide the products as contained in the bid specifications.

Bidders are required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. Other requirements as well as these described above are fully detailed in the bid documents.

By Order of the Township Council,

Leila Uhl  
MCCPC Coordinator  
Township of Randolph

**BID SPECIFICATIONS****CONTRACT #47: WATER METERS/DATA RECORDERS & RADIO FREQUENCY METER INTERFACE UNITS****Contract Period: July 1, 2024 – June 30, 2025****THE FOLLOWING ARE MINIMUM SPECIFICATIONS WHICH MUST BE MET OR EXCEEDED.**

**This is an Open-Ended contract, meaning all items are specified with an estimated quantity. THIS IS NOT A REQUIREMENTS CONTRACT. There is no obligation to purchase that quantity during the contract period, and the actual quantity purchased by members of the Morris County Cooperative Pricing Council (MCCPC) may vary. Members of the MCCPC are not required to purchase exclusively from the awarded vendor(s).**

**All quantities may be more or less than estimated.** The successful vendor cannot establish a minimum order requirement. However, the MCCPC may, in certain instances, establish minimum order requirements which will be noted on the Bid Proposal Form.

The estimated quantities listed on the Bid Proposal Form are total quantities anticipated, not total quantities to one location.

**Bidders MUST indicate the brand name they are bidding, otherwise bidders will be held to providing the brand/manufacturer specified.**

**If the MCCPC does not specify a brand or manufacturer and the bidder does not provide a brand or manufacturer, the bid for that particular category will be rejected as non-responsive.**

**All equivalent items being bid must be compatible with Neptune or Sensus operating software/programs.**

**For all meters, the awarded vendor shall include and provide in their bid price ALL required washers, gaskets, flanges, nuts, bolts, etc., required for proper meter installation.**

All water meters, strainers, and components outlined in this specification shall comply with the "Reduction of Lead in Drinking Water Act" as defined under Public Law 111-380.

**Prices are to remain firm for the term of the contract with no exceptions.** All prices are FOB Destination, Freight Prepaid.

Bidders to specify delivery days after receipt of order. Delivery time is not factored into the calculation to determine the successful bidder. Bidders failing to stipulate a guaranteed delivery date will be held to delivery within five (5) business days after receipt of order.

**Delivery Locations (if applicable):** To participating members of the MCCPC at various locations specified at the time of ordering, FOB Destination, Freight Prepaid.

**Bidders must submit a bid on all items within the category or section on which they are bidding.** However, if ALL bidders do not bid on the same item, that particular item will be removed from the list and the remaining items will be used to determine the lowest responsive and responsible bidder. If at least one bidder bids on all items, that bidder will be awarded the contract if they are responsive and responsible.

Bidders are not required to bid on all categories or sections.

**Bidders shall take the current and possible future supply chain cost impacts and inflation into account when putting their bid pricing proposal together. The MCCPC will not entertain requests for price increases during the awarded contract term.**

**Award of Contract:**

One contract will be awarded per category or per section, if a category has more than one, to the lowest responsive, responsible bidder based upon the lowest total aggregate bid for that category or section. (10 awards)

**NO BONDING REQUIREMENTS FOR THIS CONTRACT.**

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**CATEGORY A: WATER METERS (MIUs)**

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**Cold Water Meters Displacement Type with Direct Read Registers – 5/8” – 1” (Sensus SR2 ECR or equivalent):**

The purchase of “MIUs” during the contract period on an as-needed basis according to specifications below.

**Type:** Magnetic Drive, Sealed Register, Positive Displacement Type Oscillating Piston only

**Lead Free Legislation:** All water meters specified within this specification shall conform to the EPA “Reduction of Lead in Drinking Water Act” as defined under Public Law 111-380. All meters provided shall be made of “lead free” alloy as defined by NSF/ANSI 61, Annex G and F. Manufacturer shall provide a letter of compliance from NSF demonstrating compliance with NSF/ANSI 61.

**Size:** Must conform to American Water Works Standard C-700 as most recently revised.

**Length:** Must conform to American Water Works Standard C-700 as most recently revised.

**Cases:** All meters shall have a non-corrosive Bismuth BiAlloy CDA89836 or EnviroBrass™ II C89520 alloy outer case with a separate measuring chamber which can be easily removed from the case. All meters shall have cast on them, in raised characters, the size and direction of water flow through the meter. Cast iron frost bottoms, EnviroBrass II or Bismuth BiAlloy bottoms shall be provided on 5/8”, 3/4”, and 1” meters. Maincase will be marked with a “BA” or “EB” to denote the material used which meets the requirements of ANSI/NSF Standard 61, Annex F and G.

**External Bolts and Washers:** All external bolts and washers shall be of corrosion resistant material and be easily removed from the maincase. All threaded maincase bolt holes must be covered to aid in removal of the bolts for repair.

**Register:** The register must be of the straight reading type with a large red test or sweep hand and shall include a low flow indicator on the dial face. The numeral wheel assembly shall be located at the bottom of the dial face with reading obtained from left to right. All reduction gearing shall be contained in a permanently hermetically sealed, tamper-proof enclosure made from a stainless steel material, covered with a heat tempered glass lens.

The register shall be attached to the meter utilizing a plastic bonnet register box. The register shall be secured to the maincase by means of a tamper-resistant bonnet so that the register cannot be removed with the bonnet being destroyed. The register must be field replaceable.

**Measuring Chamber:** The measuring chamber shall be a suitable synthetic polymer and shall not be cast as part of the maincase. All piston assemblies shall be interchangeable in all measuring chamber assemblies of

the same size. The measuring chamber piston shall operate against a replaceable control roller, allowing for repair to AWWA standards. The control roller shall rotate on a stainless measuring chamber steel pin to provide added strength, wear resistance and corrosion resistance. There shall be an elastomeric seal or seals between measured and unmeasured water, preventing leakage around the measuring element.

**Magnetic Coupling:** The motion of the piston will be transmitted to the sealed register through the use of a magnetic coupling.

**Strainers:** All meters must be provided with a corrosion-resistant strainer with an effective straining area at least twice the bore diameter which can be easily removed from the meter without the meter itself being disconnected from the pipeline.

**Change Gears:** Change gears will not be allowed to calibrate the meter. All registers of a particular registration and meter size shall be identical and completely interchangeable. Should meters arrive with registers containing more than one gear combination, the entire shipment will be returned to the manufacturer freight collect and the next responsive, responsible bidder shall receive the award.

**Accuracy and Headloss Tests:** Meters shall conform to current AWWA C-700, current revision, test flows, headloss and accuracy standards.

**Pressure Capability:** Meters shall operate up to a working pressure of 150 pounds per square inch (psi) without leakage or damage to any parts. The accuracy shall not be affected by variation in pressure up to 150 psi.

**Performance Warranties:** In evaluating bid submittals, warranty coverage will be considered. All bidders are required to submit their most current nationally published warranty statements for water meter maincases, registers and measuring chambers.

**TECHNICAL SPECIFICATIONS FOR IPERL WATER METERS OR EQUIVALENT (Category A, Items #7 and #8):**

**General Scope:** All meters 5/8" to 1", furnished shall exceed the performance required by the "Standard Specifications for Cold Water Meters" – C700, latest revision issued by AWWA or as otherwise stated.

**All cold water meters (small and large) specified shall include gaskets, flanges and bolts.**

**Type - Residential Magnetic Meter:** Magnetic meters with an electronic encoder register shall be provided. Fluidic Oscillator and ultrasonic meters are unacceptable.

Registers must be permanently attached to meter without the ability to remove the register from the magnetic meter flow tube. Sealed register, magnetic meter type only.

**Size & Length:** Must conform to the chart below:

<b><u>Sizes:</u></b>	<b><u>Lay Lengths:</u></b>
5/8"	7-1/2"
5/8" x 3/4"	7-1/2"
3/4" short	7-1/2"
3/4" regular	9"
1"	10-3/4"

**Maincases:** All meters shall have a non-corrosive crystalline engineered resin outer case with an integral flow tube which cannot be removed from the case.

All meters shall have imprinted on them the size and direction of water flow through the meter.

There shall be no removable parts on the meter and all components shall be one piece. The register shall be encapsulated in glass. Screw terminals on the register are not acceptable.

The composite body shall be completely lead-free and meet the AB1953, ANSI/NSF Standard 61 requirements.

**Measuring Chamber:** The measuring chamber shall be a flow tube composed of crystalline engineered resin and shall be cast as part of the maincase.

The measuring chamber shall have no moving parts and utilize a magnetic flow sensor. Positive displacement and velocity meters are unacceptable.

A rectangular measurement section, within the flow tube, shall be utilized to achieve the best physics for measurement accuracy.

A pulse of current within a drive coil inside the measuring chamber shall be used to magnetize a piece of remanent magnetic material. The magnet shall then hold a magnetic field constant. As water flows through the magnetic field, a current is generated and is proportional to the volume of water flowing through the meter.

Sterling electrodes shall be utilized to reverse the electromagnetic field as necessary.

## **Register:**

### **1. Construction:**

All register components shall be contained in a permanently hermetically sealed, tamperproof enclosure made of glass, covered with a composite lid.

The register shall be permanently attached to the meter flow tube. The register, for meter sizes 5/8" thru 1" cannot be removable.

The register must be a liquid crystal display with visual indicators for meter reading, leak indicator and battery indicator.

Registers shall have a published battery warranty lasting 20 years. The first 10 years is a full replacement warranty and the second 10 years is prorated according to manufacturer pro-ration schedule.

An external register box assembly is not acceptable.

Screw terminal connections to the register are not acceptable. The register shall utilize a magnetic coupling technology to connect a 3-wire cable to a touch read, radio read, or fixed base meter reading system. Touch coupler connection shall be encapsulated in glass.

When the meter is to be installed in a vault or pit set installation, screw terminal connections are not acceptable. The register shall utilize a magnetic coupling technology to connect a 3-wire cable to a touch read, radio read, or fixed base meter reading system. The magnetic coupling shall be completely water proof and warranted against water intrusion.

### **2. Performance:**

The register output data format shall be 7-bit ASCII (American Standard Code for Information Interchange) digital, plus an even parity bit.

Upon interrogation with a touch type pad, AMR, or AMI product, the register will transmit an odometer reading containing from 1 to 8 digits (field programmable) and a user defined alphanumeric identification of up to 12 characters (field programmable).

Meter must be capable of transmitting a minimum of 8 digits to the utility's reading system.

Encoders with a mechanical brush contact with the odometer wheel will not be acceptable.

The register shall also have the ability to be programmed to output a factory set, non-programmable identification number, Customer Text of up to 20 alphanumeric characters (field programmable), a reading multiplier (field programmable), and/or a reading measurement unit indicator (for example, US Gallons – field programmable).

Data is to be positive true. The register's ASCII digital output is to be capable of interfacing directly to an AMR transponder.

**Strainers:** All meters must be provided with a corrosion-resistant empty flow tube. Strainers are not acceptable.

**Change Gears:** Change gears will not be allowed to calibrate the meter.

**Performance:** Meters shall conform minimally to current AWWA C-700, current revision, test flows, head loss and accuracy standards.

Meters shall operate up to a working pressure of 150 pounds per square inch (psi), without leakage or damage to any parts. The accuracy shall not be affected by variation in pressure up to 150 psi.

Meters shall meet the flow ranges indicated in the chart below:

<u>Sizes:</u>	<u>Minimum Flow Rates:</u>	<u>Maximum Flow Rates:</u>
5/8"	1/10 GPM	25 GPM
5/8" x 3/4"	1/10 GPM	35 GPM
3/4"	1/10 GPM	35 GPM
3/4" regular	1/10 GPM	35 GPM
1"	1/3 GPM	55 GPM

Meter shall be able to indicate an empty pipe situation. If the meter is by-passed or taken out of service, an alarm shall be sent to the utility via the meter reading system.

Meter shall have the capability to indicate reverse flow conditions within the meter.

Meter shall indicate if sterling electrodes have been damaged at any point during the life of the meter.

Meter shall indicate magnetic failure due to tampering efforts.

Meter shall have the ability to store 5,000 data points for data logging information including peak flow and volume in a predetermined interval.

#### **I. Performance Warranty:**

**All bidders are required to submit their most current nationally published warranty statements for water meter maincases, registers, and measuring chambers.**

#### **WARRANTY COVERAGE WILL NOT BE A DETERMINING FACTOR IN THE AWARD OF CONTRACT.**

**Brass Products:** All water meters, strainers, and components outlined in this specification shall comply with the "Reduction of Lead in Drinking Water Act" as defined under Public Law 111-380.

**Shipment Verifications:** A statistically controlled sample of each meter shipment will be tested by the utility to insure each shipment meets the utility performance and materials qualifications.



**Manufacturer:** Meter suppliers must have been supplying meters for at least 10 years. Manufacturers not complying with the field or production experience shall submit their meters for endurance testing evaluation.

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## **CATEGORY B: T-10 METERS WITH PRO-CODER AND E-CODER REGISTERS OR EQUIVALENT**

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**General:** All cold-water meters (displacement type – magnetic drive 5/8” – 2”) furnished shall be produced from a manufacturing facility whose QMS is ISO 9001 certified, conform to the “Standard Specifications for Cold Water Meters” C700 latest revision issued by AWWA.

**Lead Free Legislation:** There have been federal changes to the acceptable amount of lead in the drinking water system. Knowing that water meters have a life expectancy of approximately twenty (20) years, the utility wishes to ensure that meters purchased today will meet the Safe Drinking Water Act (SDWA) per NSF 372:

- The utility wishes to assure the safety of its drinking water.
- The utility wishes to safeguard its investment in metering infrastructure.
- Meter inventory that does not meet the SWDA (NSF/ANSI 372) lead free requirements will have to be returned to the manufacturer or scrapped at a cost that the utility is not willing to incur.
- Any meters not in compliance with these requirements that are physically removed from service for testing or repair cannot be reinstalled and will have to be scrapped at a cost that the utility is not willing to incur.

As a result, the utility requires that all water meters submitted in this proposal be compliant with NSF/ANSI 61 and NSF/ANSI 372. Specifically:

- Meters shall be made of “lead free” alloy as defined by NSF/ANSI 61 and NSF/ANSI 372.
- Manufacturer shall provide a copy of a letter from NSF International on NSF letterhead documenting compliance with NSF/ANSI 61 and NSF/ANSI 372.

**Type:** Only magnetic-driven, positive displacement meters of the flat nutating disc type will be accepted because of enhanced low flow accuracy performance.

**Size, Capacity, Length:** The size, capacity and meter lengths shall be as specified in AWWA Standard C700 (latest revision). The maximum number of disc nutations is not to exceed those specified in AWWA C700 latest revision.

The meter maincase and cover shall be cast from NSF/ANSI 61 and NSF/ANSI 372 certified lead free alloy containing a minimum of 85% copper. The serial number should be stamped between the inlet or outlet port of the maincase and the register. Maincase markings shall be case raised and shall indicate the size, model, direction of flow, and NSF/ANSI 61 certification. Plastic maincases are not acceptable.

Maincases for 5/8”, 3/4” and 1” meters shall be of the removable bottom cap type with the bottom cap secured by four (4) bolts on 5/8” and 3/4” sizes and six (6) bolts on the 1” size. Intermediate meter maincases shall also be made of the same lead-free brass material in sizes 1-1/2” and 2” with a cover secured to the maincase with eight (8) bolts. Meters with a frost plug, a screw-on design, or no bottom cap shall not be accepted in 5/8” – 1” sizes. The 5/8” meters shall have a synthetic polymer or cast iron bottom cap option.

All lead free maincases shall be guaranteed free from manufacturing defects in workmanship and material for the life of the meter.

All meters must be adaptable to a field programmable absolute encoder register without interruption of the customer’s service.

**Bolts:** All maincase bolts shall be of three hundred (300) series non-magnetic stainless steel to prevent corrosion.

**Measuring Chamber:** The measuring chamber shall be of a two-piece, snap-joint type with no fasteners allowed. The chamber shall be made of a non-hydrolyzing synthetic polymer.

The control block shall be the same material as the measuring chamber and be located on the top of the chamber. The control block shall be located after the strainer.

The measuring chamber outlet port shall be sealed to the maincase outlet port by means of an O-ring gasket.

The flat nutating disc shall be a single piece made from non-hydrolyzing synthetic polymer and shall contain a type 316 stainless steel spindle. The nutating disc shall be equipped with a synthetic polymer thrust roller located within the disc slot. The thrust roller head shall roll on the buttressed track provided by the diaphragm.

The chamber shall be warranted for ten (10) years against freeze damage if the meter has been equipped with a frost-proof cast iron or synthetic polymer bottom cap.

**Strainers:** All meters shall contain a removable polypropylene plastic strainer screen. The strainer shall be located near the maincase inlet port, before the measuring chamber. The strainer shall also function as the device that holds the measuring chamber in place within the maincase. Straps or other types of fasteners shall not be accepted.

**Performance:** To ensure accuracy, each meter must be accompanied by a factory test tag certifying the accuracy at the flows required by AWWA C700.

All meters shall be warranted as follows:

Size	Low Flow	Low Flow New Meter Accuracy	Low Flo Repaired Meter Accuracy
5/8"	1/8 gpm @ 95%	5 years or 500,000 gallons	15 years or 1,500,000 gallons
3/4"	1/4 gpm @ 95%	5 years or 750,000 gallons	15 years or 2,250,000 gallons
1"	3/8 gpm @ 95%	5 years or 1,000,000 gallons	15 years or 3,000,000 gallons
1-1/2"	3/4 gpm @ 95%	2 years or 1,600,000 gallons	12 years or 5,000,000 gallons
2"	1 gpm @ 95%	2 years or 2,700,000 gallons	12 years or 8,000,000 gallons

Normal meter operating range shall be as follows:

Size	Accuracy Range $\pm$ 1.5%
5/8"	1/2 – 20 gpm
3/4"	3/4 – 30 gpm
1"	1 – 50 gpm
1-1/2"	2 – 100 gpm
2"	2-1/2 – 160 gpm

**Manufacturer:** Meters and meter parts shall be manufactured, assembled, and tested within the United States. Manufacturers may be required to provide proof of where and what percentage of the meter register, chamber, and maincase is manufactured in the United States. Manufacturers shall have a minimum of fifteen (15) years of field and production experience with all sizes and models quoted. Manufacturers shall provide only one (1) model of meter which complies with these specifications. Manufacturers must have been manufacturing meters for at least seventy-five (75) years.

**Registers – E-Coder Solid State Absolute Encoder:** These specifications cover a self-contained solid state absolute encoder register metering system designed to obtain remote simultaneous water meter registration that is guaranteed to exactly match the registration on the register odometer. The metering information shall be obtained through a remotely located receptacle or Meter Interface Unit (MIU) using a compatible data capture system. The above system shall be configured as follows:

- Solid-state absolute encoder meter register – Direct mounting, electromagnetically encoded measuring element into an electronic solid-state odometer. Encoder shall provide value-added flow data including leak, tamper and back flow detection when connected to a compatible RF AMR MIU. Batteries and digital counters using volatile memory are not allowed. Encoder register shall display flow rate information at register.
- Remotely mounted receptacle or MIU providing a communication link for the transmission of information from the register.
- Data acquisition equipment with which the above components can be interrogated. Such equipment shall be configured in two types:
  - A device that captures information and displays it visually to confirm correct system installation and wiring.
  - A device that is pre-programmed with route information and is capable of storing collected data in solid-state memory. This device shall also electronically transfer the data for use by the utility billing computer.

**Encoder Register Unit: Registration**

- The register shall provide at least a nine-digit visual registration at the meter.
- The unit shall provide an eight-digit meter reading for transmission through the radio MIU.
- The dial shall have a high resolution nine-digit LCD display for meter testing.
- The register shall employ a visual LCD leak detection indicator as well as provide remote leak detection through an ASCII format to the RF AMR/AMI MIU.
- The register shall provide reverse flow detection, communicated as ASCII format data to the RF AMR/AMI MIU.
- Reverse flow detection shall be calculated based on 15-minute interval consumption.
- The register shall provide an indication of days of zero consumption, communicated as ASCII format data to the RF AMR/AMI MIU.
- The manufacturer will guarantee that the reading obtained electronically matches the LCD odometer reading on the register.
- The register should accumulate and register consumption without connecting to a receptacle or MIU.
- The register shall display flow rate information.

**Mechanical Construction:** The registers should be manufactured in two different versions: one for inside set application and one for pit set.

**Inside Set Version:**

- The unit must be constructed of high-strength polycarbonate and possess a hermetic sonic weld seal. Registers for inside set applications should be oil-free designs.
- The register shall be attached to the meter case by a bayonet attachment. Fastening screws or nuts shall not be required. A tamperproof seal pin shall be used to secure the register to the maincase.
- The register shall be removable from the meter without disassembling the meter body and shall permit field installation and/or removal without taking the meter out of service.
- Provision shall be made in the register for the use of seal wires to further secure the register.
- Terminal screws must be accessible on the register for transmission wire connection to the remote receptacle or a future AMR system. A permanently potted wire connection shall be available for pit set meter applications.

**Pit Set Version:**

- The unit must be constructed in a roll-sealed copper shell and glass lens assembly.

- The register shall be attached to the meter case by a bayonet attachment. Fastening screws or nuts shall not be required. A tamperproof seal pin shall be used to secure the register to the maincase.
- The register shall be removable from the meter without disassembling the meter body and shall permit field installation and/or removal without taking the meter out of service.
- Provision shall be made in the register for the use of seal wires to further secure the register.
- Terminal connections must be permanently potted so that the terminal cover cannot be removed.

#### Electrical Construction:

- The solid state absolute encoder register shall incorporate an Application Specific Integrated Circuit (ASIC) and firmware designed to verify accurate measurement, information transmission, and data integrity.
- Connection shall be made to the register by three screw-type terminals sonically inserted into the register top. Access to the terminals shall be available to all models of register with the exception of a permanently potted version. A port cover shall be provided to cover the terminals after they have been wired.

#### Meter Reading Information:

- The solid-state absolute encoder register shall provide to the reading equipment an eight-digit meter reading. An identification number of up to 10 digits shall be provided with each reading when read using a probed reading device.
- The solid-state absolute encoder register shall provide additional value-added information remotely when connected to a radio MIU (i.e. detailed leak detection data, days of leak state, days of no consumption, and back flow indication). This information shall be communicated through the encoder protocol and RF MIU to the route management software to allow the seamless integration of data into a CIS package.

#### Registers – Pro-Coder 8 Wheel Absolute Encoder Register:

- The register shall provide at least an 8-digit visual registration at the meter.
- The unit shall provide an 8-digit meter reading for transmission through the radio MIU.
- The dial shall have a red sweep test hand and shall contain 100 equally divided graduations at its periphery.
- The register shall provide remote leak detection through an ASCII format to the RF AMR/AMI MIU.
- The register shall provide reverse flow detection, communicated as ASCII format data to the RF AMR/AMI MIU.
- Reverse flow detection shall be calculated based on 15-minute interval consumption.
- The register shall provide an indication of days of zero consumption, communicated as ASCII format data to the RF AMR/AMI MIU.
- Registers using pulse generation or conversion of pulses to digital output are not permitted. Batteries shall not be allowed.
- The manufacturer will guarantee that the reading obtained electronically matches the mechanical odometer reading on the register.

Mechanical Construction: The registers should be manufactured in two different versions; one for inside set application and one for pit set.

#### Inside Set Version:

- The unit must be constructed of high-strength polycarbonate and possess a hermetic sonic-weld seal. Registers for inside set applications should be oil-free designs.
- The register shall be attached to the meter case by a bayonet attachment. Fastening screws or nuts shall not be required. A tamperproof seal pin shall be used to secure the register to the maincase.
- The register shall be removable from the meter without disassembling the meter body and shall permit field installation and/or removal without taking the meter out of service.
- Provision shall be made in the register for the use of seal wires to further secure the register.
- Terminal screws must be accessible on the register for wire connection to the remote receptacle or a future AMR/AMI system. A permanently potted wire connection shall be available as an option.

**Pit Set Version:**

- The unit must be constructed in a roll-sealed copper shell and glass lens assembly to provide a hermetic seal.
- The register shall be attached to the meter case by a bayonet attachment. Fastening screws or nuts shall not be required. A tamperproof seal pin shall be used to secure the register to the maincase.
- The register shall be removable from the meter without disassembling the meter body and shall permit field installation and/or removal without taking the meter out of service.
- Provision shall be made in the register for the use of seal wires to further secure the register.
- Terminal connections must be permanently potted so that the terminal cover cannot be removed.

**Electrical Construction:**

- The number wheels used in the register assembly shall be provided with light emitting diode (LED) technology to ensure data transmission.
- Connection shall be made to the register by three screw-type terminals sonically inserted into the register top. Access to the terminals shall be available to all models of register, with the exception of a permanently potted version. A port cover shall be provided to cover the terminals after they have been wired.
- The absolute encoder register shall automatically detect between two-wire and three-wire register protocol.

**Meter Reading Information:**

- The absolute encoder register shall provide to the reading equipment an 8-digit meter reading. An identification number of up to 10 digits shall be provided with each reading when read using a probed reading device.
- The solid state absolute encoder register shall provide additional value-added information remotely when connected to a radio MIU (e.g. detailed leak detection data, days of leak state, days of no consumption, and backflow indication). This information shall be communicated through the encoder protocol and RF MIU to the route management software to allow the seamless integration of data into a CIS package.

**Remote Receptacle:**

- Where indicated, a remote receptacle must be provided for attachment to a pit meter lid with another unit also designed for attachment by wall mounting.
- The materials employed shall be corrosion resistant, resistant to ultraviolet degradation, unaffected by rain or condensation, and compatible with rugged service and long life.
- The pit receptacle shall be mounted in a single 1-3/4" hole in the pit lid while not extending more than 4-1/2" into the pit.
- The pit-mounted receptacle shall be provided with a minimum length of six feet of wire connected and sealed at the receptacle without terminal exposure.
- The remote receptacle shall not contain a battery unless it is a radio MIU.

**Systems Guarantee:** All meters shall be guaranteed upgradeable to the following systems without interruption of the customer's service:

- ProRead (ARB VI) AutoDetect Absolute Encoder (or equivalent)
- E-CODER (ARB VII) Solid State Absolute Encoder (or equivalent)
- R900 (or equivalent)
- FLOSEARCH II (or equivalent)
- TRICON/E 3 (or equivalent)
- TRICON (or equivalent)
- ProCoder (or equivalent)

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## CATEGORY C: SOLID STATE COLD WATER METERS

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### Sizes 5/8" - 2":

**General:** All cold water meters (solid state type) furnished shall be produced from an ISO 9001C manufacturing facility and shall meet or exceed the accuracy requirements specified in the "Standard Specifications for Cold Water Meters" C715 latest revision issued by the AWWA.

**Lead Free Legislation:** All water meters shall be compliant with NSF/ANSI 61, which exceeds the requirement of NSF/ANSI 372 that became effective January 2014.

Meters shall be made of "lead free" high-copper alloy as defined by NSF/ANSI 61.

**Type:** Only meters featuring solid state metrology will be accepted because of enhanced low-flow accuracy performance and extended accuracy over meter life.

**Measurement Technology:** The measurement technology shall be based on ultrasonic sensing featuring no moving parts.

**Size, Capacity, Length:** The meter's size, capacity, and length shall be as specified in AWWA Standard C715 (latest revision).

**Maincase:** The meter maincase shall be cast from NSF/ANSI 61 certified lead free alloy containing a minimum of 85% copper. Plastic maincases or flow tubes are not acceptable as the spuds are susceptible to cross-threading or breaking during installation or from pipe stress over time. The serial number should be displayed in a permanent location on the register. Meter markings shall indicate size, model, direction of flow, and NSF 61 certification.

All lead free maincases shall be guaranteed free from manufacturing defects in workmanship and material for the life of the meter. All maincase screws or bolts shall be of 300 series non-magnetic stainless steel to prevent corrosion.

**Electronic Register:** The solid state meter electronic enclosure shall be constructed of a durable engineered composite designed to last the life of the meter. The meter shall provide a fully potted wire connection for use with AMR/AMI devices.

**Environmental:** The solid state meter must feature fully potted electronics and battery as well as carry an IP68 rating for submersion in flooded meter pits.

**Registration:** The register shall provide at least a 9-digit visual registration at the meter. The register shall provide an 8-digit meter reading for transmission through the RF AMR/AMI MIU. The register shall employ a visual LCD leak detection indicator as well as provide remote leak detection through an ASCII format to the RF AMR/AMI MIU. The register shall provide reverse flow detection, communicated as ASCII format data to the RF AMR/AMI MIU. The register shall provide an indication of days of zero consumption, communicated as ASCII format data to the RF AMR/AMI MIU. The register should accumulate and register consumption without connecting to a receptacle or RF AMR/AMI MIU. The register shall display flow rate information (interleaved with the current meter reading). The register shall subtract reverse flow from the total registration.

**Strainers:** Solid state meters shall not require a strainer for accurate operation.

**Performance:** Solid state meters shall exceed AWWA C715 accuracy standards and warrant published accuracy levels for the life of the meter. Each meter must be accompanied by factory test data showing the accuracy of the meter as tested at the factory.

Solid state meter technology provided is to be ultrasonic-based technology featuring continuous measurements (>4x per second) to ensure desired accuracy at low-end flows and during typical start/stop conditions.

### **Sizes 3" - 10":**

**General:** All cold water meters (solid-state meters 3" - 12") furnished shall be produced in a manufacturing facility whose QMS is ISO 9001 certified and meets or exceeds the accuracy requirements specified in the "Standard Specifications for Cold Water Meters" C715 latest revision issued by AWWA.

**Lead Free Legislation:** All water meters shall be compliant with NSF/ANSI 61, which exceeds the requirement of NSF/ANSI 372 that became effective January 2014.

Meters shall be made of "lead free" high-copper alloy as defined by NSF/ANSI 61.

**Type:** Only meters featuring ultrasonic solid-state metrology will be accepted because of enhanced low flow accuracy performance and extended accuracy over meter life.

**Measurement Technology:** The measurement technology shall be based on ultrasonic sensing featuring no moving parts.

**Size, Capacity, Length:** The meter's size, capacity, and length shall be as specified in AWWA Standard C715 (latest revision).

**Maincase:** The meter maincase shall be cast from NSF/ANSI 61 certified lead free bronze alloy containing a minimum of 85% copper. Maincases such as coated steel that are susceptible to corrosion over time are not acceptable. Maincases that do not accommodate inline piping stresses, such as stainless steel or coated steel, are not acceptable. Meter markings shall indicate size, model, direction of flow, and NSF 61 certification. All lead-free maincases shall have a lifetime warranty and be free from manufacturing defects in workmanship and material. All maincase bolts shall be 316 non-magnetic stainless steel to prevent corrosion.

**Electronic Register:** The solid state meter electronic enclosure shall be constructed of a durable engineered composite designed to last the life of the meter. The meter shall provide a fully potted wire connection for use with AMR/AMI devices.

**Environmental:** The solid state meter must feature fully potted electronics and battery as well as carry an IP68 rating for submersion in flooded meter pits.

**Installation:** The meter shall be of common lay lengths to easily retrofit to existing installed turbine and compound meters. It is required that 3" meters shall be available in 12" and 17" lay lengths, 4" meters shall be available in 14" and 20" lay lengths, and 6" meters shall be available in 18" and 24" lay lengths. The meter shall support replacing the electronic measurement assembly without having to recalibrate the meter or remove the meter from service. Solid-state meters shall not require a strainer for accurate operation.

**Unitized Measuring Element (UME):** The meter shall support replacing the electronic measurement assembly (UME) without having to recalibrate the meter or remove the meter body from service. This shall include all electronics, transducers and batteries.

**Registration:** The register shall provide at least a 9-digit visual registration at the meter. The register shall provide an 8-digit meter reading for transmission through the RF AMR/AMI MIU. The register shall employ a visual LCD leak detection indicator as well as provide remote leak detection through an ASCII format to the RF AMR/AMI MIU. The register shall provide reverse flow detection, communicated as ASCII format data to the RF AMR/AMI MIU. Reverse flow detection shall be calculated based on 15-minute interval consumption. The register shall provide an indication of days of zero consumption, communicated as ASCII format data to the RF AMR/AMI MIU. The register should accumulate and register consumption without connecting to a receptacle or RF AMR/AMI MIU. The register shall provide empty pipe detection that is visibly displayed on the meter's

LCD reading. The register shall display flow rate information (interleaved with the current meter reading). The register shall subtract reverse flow from the total registration. The register shall provide and display low battery detection on the LCD and communicated as ASCII format data to the RF AMR/AMI endpoint. The meter endpoint shall provide a minimum of 96 days of downloadable consumption data.

**Performance:** Meter manufacturer's solid-state meters shall exceed AWWA C715 accuracy standards and warrant their published accuracy levels for the life of the meter. Each meter shipment must be accompanied by factory test data showing the accuracy of the meter as tested at the facility.

**Systems Guarantee:** All solid state meters shall be guaranteed compatible to the following AMR/AMI systems: R900 (or equivalent), R450 (or equivalent), and Neptune (or equivalent) cellular endpoints without special programming of the meter.

**Technology Preference:** It is the utility's preference that the solid state meter technology provided be ultrasonic-based technology featuring continuous measurements greater or equal to 4 times per second to ensure desired accuracy at low-end flows and during typical start/stop conditions.

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#### **CATEGORY D: RADIO FREQUENCY METER INTERFACE UNITS – (NEPTUNE OR EQUIVALENT)**

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**General:** Meters connected to RF endpoints 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 endpoints 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 ProRead/E-CODER (or equivalent) protocol or Sensus (or equivalent) protocol (UI-1203). Endpoints shall feature "auto detect" functionality to detect the type of encoder connected and shall not require reprogramming in the field. The same RF endpoints 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 endpoint devices or revisiting the site.

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

The endpoints shall be attached to new meters or shall retrofit to existing meters in the field. The endpoints shall be manufactured in both wall and pit models. The wall endpoint shall have the ability to be mounted in a basement or on the outside of a house. The pit endpoint 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 endpoints shall have a fully-potted, submersible design.

Endpoints 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 endpoint 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 endpoint shall be manufactured in both inside and pit models. The inside endpoint shall have a water-resistant enclosure and a permanent internal antenna. The pit endpoint 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.



**Physical/Mechanical Requirements – Wall Unit:**

- The endpoint 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 endpoint device must be protected against static discharge without loss of data per IEC 801-2, issue 2.
- The endpoint must have the capability of accepting a 2 to 3 wire back-plate converter that retrofits to existing installations and allows the MIU to fully operate in 2 wire applications.

**Physical/Mechanical Requirements – Pit Unit:**

- For pit or vault applications, the endpoint antenna shall be designed to be installed through the industry standard 1-3/4" hole in the pit lid with no degradation of transmission range. The endpoint antenna unit will be capable of mounting to various thicknesses of pit lids from 1/2" to 2-1/2".
- 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 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 endpoint housing.
- The endpoint device must be protected against static discharge without loss of data per IEC 801-2, issue 2.

**Physical/Mechanical Requirements – Integrated Unit – Inside Set:**

- The integrated endpoint housing shall be constructed of a polycarbonate plastic compound and be capable of mounting indoors.
- The endpoint 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) with 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 endpoint device must be protected against static discharge without loss of data per IEC 801-2, issue 2.

**Physical/Mechanical Requirements – Integrated Unit – Pit Set:**

- The endpoint 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 endpoint 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) with operating humidity 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 1-3/4" 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 1/2" to 2-1/2" 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 endpoint housing.
- The endpoint device must be protected against static discharge without loss of data per IEC 810-2, issue 2.
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#### **Operating Specifications – FCC Licensing and Certification:**

- The endpoint 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 endpoint 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.

#### **Field and Installation Operations:**

- No endpoint programming shall be necessary for installation.
- The endpoint shall be mounted per the manufacturer's installation instructions to ensure a reliable and quality installation throughout the life of the endpoint.
- The handheld reading equipment shall provide a test mode to verify proper operation of the endpoint by displaying the endpoint ID number and meter reading.
- The handheld reading equipment shall provide a test mode to verify proper operation as well as troubleshooting of the endpoint on the AMI network by displaying the endpoint ID number and latest meter reading.
- The endpoint 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.

#### **Data Transport:**

- The endpoint shall provide 8-digit reading resolution from encoded registers using either Neptune E-CODER (or equivalent) or Sensus UI-1203 (or equivalent) protocol in mobile as well as AMI network data collection applications, simultaneously, without need for programming.
- The endpoint shall read the encoded register at 15-minute intervals to provide accurate leak and reverse flow detection using 8-digit resolution reads.
- The endpoint shall transmit readings from the encoder that are not older than 15 minutes.
- The endpoint shall transmit the meter reading continuously at a predetermined transmission interval.
- The endpoint shall transmit AMI network messages every 7-1/2 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 endpoint 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 endpoint shall not send the last good read as this can lead to miss-billing. The endpoint 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 endpoint shall transmit the encoder meter reading and a unique endpoint ID number.
- The endpoint shall interface to encoder registers using Neptune ProRead (or equivalent), Neptune E-CODER (or equivalent) or Sensus (or equivalent) UI-1203 communication protocol via a 3-conductor wire without need for special configuration to the endpoint.
- The endpoint shall periodically transmit a packet that includes the register information such as register ID, register type, and other status information no less than weekly.

**Operational Characteristics:**

- Power shall be supplied to the endpoint 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 endpoint with no external wires.

The vendor shall warrant that the endpoints 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 endpoint is working under the environmental and meter reading conditions specified.

Endpoints shall be Neptune R900 (or equivalent) Wall, Pit, and Integrated MIU.

**CATEGORY E: RADIO FREQUENCY METER INTERFACE UNITS – (SENSUS OR EQUIVALENT)**

**A. General Scope:**

Under this specification a single manufacturer shall supply all equipment necessary to furnish SmartPoints or equivalent compatible with the Sensus FlexNet (AMI) system or equivalent. While the primary function shall be to provide accurate and timely meter reading data for billing purposes, the SmartPoints or equivalent shall also furnish consumption and other pertinent data to facilitate enhanced operation and management of the total water distribution system, as described herein.

**B. Communications Parameters**

All equipment must comply with current Federal Communications Commission (FCC) requirements which include proper labeling of the MIU. The bidder must have supporting documentation available upon request to verify compliance. The radio frequency transmission from the MIU to the interrogation unit must utilize a primary-use licensed band operating in 900MHz spectrum.

**C. AMI Transmitters (SMARTPOINTS) or Equivalent**

**1. Function:**

The SmartPoint shall transmit the reading data to the Tower Gateway Base Station (TGB) at least four (4) times per day.

The SmartPoint shall be capable of collecting hourly readings and transmitting that information four (4) times per day.

Each transmission shall contain the past 8-168 readings in order to provide redundancy. If a transmission is missed, the system shall be capable of recovering the missed reading information from the endpoint on the next transmission.

After being transmitted from the meter endpoint, transmissions must be immediately received at the back-end software for review. No “storing and forwarding” of readings on collectors shall be acceptable. Low power endpoints, under 1.5 watts, originally designed for walk-by/drive-by applications shall not be acceptable due to low power and range capabilities, and undesirable quantity of required “collectors”.

## **2. Construction:**

The water transmitter shall be enclosed in a two-piece molded plastic housing capable of being mounted on a wall or installed through the meter/vault lid.

The SmartPoint plastic housing shall incorporate a tamper resistant, waterproof connection, known as TouchCoupler technology, allowing SmartPoints to be installed utilizing an existing Sensus or equivalent Metering Systems touchpad with a two (2) wire connection. Three (3) wire connections to SmartPoints shall not be necessary.

The electronics of the transmitter shall be hermetically sealed in a high density polyethylene (HDPE) enclosure that is waterproof and provides an operating temperature range of -22 degrees F to 185 degrees F (-30 C to 85 C).

Pit set transmitters shall have the ability to be completely submerged in water for the life of the product without any internal damage or malfunction.

The two-piece enclosure must contain the unit components including, HDPE enclosure, battery and wire connections.

The unit shall be available with TouchCoupler technology that eliminates the need for wire connectors.

## **D. Performance Requirements:**

The water SmartPoint shall be a two-way device that transmits at a power level of two (2) watts in primary-use licensed band in the 900 MHz spectrum. The SmartPoint shall provide inbound and outbound access to water measurement and ancillary device diagnostics via radio signal.

The SmartPoint shall also be required to transmit at least eight (8) reading digits from the encoded register in a resolution of at least 0.1 gallon or 0.01 cubic feet for meters up to 1 inch.

Water SmartPoint must also have the ability to provide leak detection capability. Water transmitter must also provide the ability for field replaceable batteries.

The SmartPoints/transmitters shall be FCC Part 90, 101, and 24 approved for licensed band operation, and shall transmit on a primary use (unshared) licensed band in the 890-960 MHz spectrum.

The SmartPoints shall communicate with the TGB using an RF modulation designed specifically for AMR/AMI applications. Furthermore, the modulation shall use CRC-32 error detection and Viterbi forward error connection scheme capable of recovering up to one bit error out of every time bits. The receiver will have a sensitivity of -109 dBm or better in order to provide adequate range for minimal infrastructure.

SmartPoints shall be capable of providing an instantaneous notification of a successful installation and successful communication with the Tower Gateway Base Station (TGB).

The SmartPoint shall receive input from the meter register and remotely send "top of the hour" data to a collection device, based on its system configuration (walk-by/drive-by or fixed base).

The SmartPoint shall have the ability to migrate from walk-by/drive-by to fixed base system by simply installing a Tower Gateway Base Station (TGB).

In walk-by/drive-by mode, the SmartPoint shall collect data and await an activation signal from the vehicle collection system or a hand held reading unit. Upon signal receipt, the SmartPoint interrogates the meter's encoder; and transmits the most current information, including the identification number and meter reading, as well as any alarms.

As a fixed base endpoint, the SmartPoint shall interact with the strategically placed Sensus or equivalent Tower Gateway Base Station located in the utility service area. Readings and other diagnostics are instantly forwarded to the Regional Network Interface (RNI) at time of transmission.

**E. Performance Warranties Coverage:**

The vendor shall be required to state its warranty and/or guarantee policy with respect to each item of the proposed equipment. As a minimum, the transmitter electronics shall be warranted for twenty (20) years from the date of shipment for defects in materials and workmanship. Battery warranty shall be twenty (20) years from date of factory shipment.

**WARRANTY COVERAGE “WILL NOT” BE A DETERMINING FACTOR IN THE AWARD OF CONTRACT.**

**A. System Maintenance and Support (Extending Beyond the Warranty Period):**

The successful bidder is to supply any optional maintenance programs beyond the normal warranty period to any of the individual MCCPC members requesting such information. These optional programs are not a part of bid proposal. It will be up to the individual members ordering the products.

**B. Manufacturer:**

SmartPoint transmitters shall be Sensus Model #510-M or equivalent for non-meter pit applications and Sensus Model #520-M or equivalent for meter pits.

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**CATEGORY F: CABLE ANTENNA**

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6” and 20” cable antenna shall be capable of mounting to the various thicknesses of pit lids from 0.5 inches to 2.5 inches. The optional through 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.

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**CATEGORY G: LOCKING HIGH STRENGTH POLYPROPYLENE LID WITH ANTENNA WITH ERT MOUNTING BRACKET**

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Plastic lid shall have locking lid and pentagon bolt with special worm lock. Lid shall be constructed of black polypropylene based ultraviolet resistant and shall be 12.5 inches in diameter to fit an 11.5 inch lid opening. ERT bracket shall be mounted to underside of lid to accommodate ERT devices. All lids shall be capable of withstanding a traffic load of 40,000 lbs., tested in accordance with AASHTO M-306.

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**CATEGORY H: LARGE COLD WATER METERS (Neptune or Equivalent)**

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**1. Cold Water Meters/Compound Type Specifications (Neptune Tru/Flo Compound or Equivalent)**

**General:** All meters furnished shall be manufactured by a registered ISO 9001 quality standard facility. Acceptable meters shall have a minimum of fifteen (15) years of successful field use. All specifications meet or exceed the latest revision of AWWA C702.

**Lead Free Legislation:** All water meters specified within this specification shall conform to the EPA “Reduction of Lead in Drinking Water Act” as defined under Public Law 111-380. All meters provided shall be made of “lead free” alloy as defined by NSF/ANSI 61, Annex G and F. Manufacturer shall provide a letter of compliance from NSF demonstrating compliance with NSF/ANSI 61.

**Type:** Compound meters shall consist of a combination of an AWWA Class II turbine meter for measuring high rates of flow and a nutating disc type positive displacement meter for measuring low rates of flow enclosed in a single maincase. An automatic valve shall direct flows through the disc meter at low flow rates

and through the turbine meter at high flow rates. At high flow rates, the automatic valve shall also serve to restrict the flow through the disc meter to minimize wear.

**Operating Characteristics:** The meters shall comply with the operating characteristics shown below:

Size	Normal Operating Range (gpm)	Maximum Continuous Flow (gpm)	Maximum Loss of Head at Max Cont Flow (psi)	Maximum Intermittent Flow (gpm)	Low Flow (gpm)
2"	1/2 - 200	160	8	200	1/8
3"	1/2 - 450	350	8	450	1/8
4"	1 - 1000	700	8	1000	1/2
6"	1-1/2 – 2000	1400	8.5	2000	3/4
6" x 8"	1-1/2 – 2000	2000	10.5	2000	3/4

**Size:** The size of meters shall be determined by the nominal size (in inches) of the opening in the inlet and outlet flanges. Overall lengths of the meters shall be as follows:

Meter Size	Laying Length
2"	15-1/4"
3"	17"
4"	20"
6"	24"
6" x 8"	55 3/8"

**Case and Cover:** The maincase and cover shall be cast from an NSF/ANSI 61, Annex G and Annex F certified lead free high copper alloy containing a minimum of 85% copper. The size, model, NSF certification and arrows indicating direction of flow shall be cast in raised characters on the maincase or cover. The covers all contain a stainless steel calibration vane for the purpose of calibrating the turbine measuring element while the meter is inline and under pressure. A test plug shall be located in the maincase or the cover for the purpose of field testing of the meter.

**External Bolts:** Casing bolts shall be made of AISI Type 316 stainless steel.

**Connections:** Maincases shall be flanged. The 2" meters shall be oval flanged and 3" through 6" sizes shall be round flanged per Table 4, AWWA C702.

**Registers:** Separate magnetic-drive registers shall record the flow of the turbine and disc meters and their total will be the registration of the compound meter. The registers shall be permanently roll-sealed, straight reading indicating in cubic feet, gallons, or cubic meters. Registers shall include a center-sweep test hand, a low flow indicator, and a glass lens. The registers shall be serviceable without interruption of the meter's operation. Registers shall be guaranteed for at least ten (10) years.

**Register Boxes:** Register boxes and covers shall be of bronze composition. The name of the manufacturer shall be clearly identifiable and located on the register box covers.

**Register Box Sealing:** Registers shall be affixed to the cover by means of a plastic tamperproof seal pin that must be destroyed in order to remove the register.

**Meter Serial Number:** The meter serial number shall be imprinted on the meter flange or cover as well as the register box covers.

**Measuring Chambers:** The turbine measuring chamber shall be a self-contained unit, attached to the cover for easy removal. The turbine shaft shall be tungsten carbide with tungsten carbide inserts and shall rotate in removable graphite bushings. Thrust bearings shall be tungsten carbide.

The nutating disc chamber shall be a self-contained unit mounted on the cover and easily removable from the cover. It shall conform to AWWA Standard C700 for the following sizes: 2" and 3"-5/8" disc, 4"-3/4" disc, 6"-1" disc. The inlet to the disc chamber shall be a "single" opening of adequate size not to be susceptible to plugging and water restriction by water-borne debris.

**Unitized Measuring Element (UME):** A UME is a complete assembly, factory calibrated to AWWA standards that includes the cover, registers, and both a turbine measuring element and a nutating disc chamber assembly. It shall be easily field removable from the meter body without the requirement of unbolting flanges.

**Intermediate Gear Train - Turbine Section:** The intermediate gear train shall be directly coupled from the turbine rotor and magnetically coupled to the register through the meter cover. The gear train shall be housed in the turbine measuring chamber. All moving parts of the gear train shall be made of a self-lubricating polymer or stainless steel for operation in water.

**Automatic Valve:** The automatic valve shall be of the spring-loaded, poppet type. All valve parts shall be made of lead free high copper alloy containing a minimum of 85% copper, stainless steel, or a suitable polymer with a replaceable semi-hard EPDM rubber seat.

Only the cover must be removed to gain access to the valve for inspection or service.

The disc meter shall include a self-actuated valve that directs flow through the disc meter at low flow rates and through the turbine meter at high flow rates. At high flow rates, the self-actuated throttle valve shall restrict the flow through the disc meter to minimize wear.

**Strainer:** A strainer shall be provided for the disc meter. It shall be easily removable and have an effective straining area of double the disc meter inlet.

**Registration Accuracy:** Registration accuracy over the normal operating range shall be 98.5% to 101.5%. Registration at the crossover shall be not less than 95% with direct reading registers. Registration at the crossover shall not be less than 90% with absolute encoder or generator remote registers. Registration at the extended low flow rate shall be not less than 95%.

**Remote Capability Options:** All meters shall be equipped with encoder remote registers per AWWA C707 and shall meet all AWWA C702 performance standards.

## **2. Cold Water Meters / 1-1/2" – 10" Class II Turbine Type (Neptune HP Turbine or Equivalent)**

**General:** All meters furnished shall be manufactured by a registered ISO 9001 quality standard facility. Acceptable meters shall have a minimum of fifteen (15) years of successful field use. All specifications meet or exceed the latest revision of AWWA C701.

**Lead Free Legislation:** All water meters specified within this specification shall conform to the EPA "Reduction of Lead in Drinking Water Act" as defined under the Public Law 111-380. All meters provided shall be made of "lead free" alloy as defined by NSF/ANSI 61, Annex G and F. Manufacturer shall provide a letter of compliance from NSF demonstrating compliance with NSF/ANSI 61.

**Type:** Meters shall be of the inline horizontal-axis type per AWWA Class II.

**Capacity:** The capacity of the meters in terms of normal operating range, maximum continuous flow, maximum loss of head, and maximum intermittent flow shall be as shown below:

Size	Normal Operating Range (gpm)	Maximum Continuous Flow (gpm)	Maximum Loss of Head at Max Cont Flow (psi)	Maximum Intermittent Flow (gpm)
1-1/2"	4 - 160	160	4	200
2"	4 - 200	200	4.5	250
3"	5 - 450	450	5	560
4"	10 - 1200	1200	5.5	1500
6"	20 - 2500	2500	5	3100
8"	35 - 4000	4000	5	5000
10"	50 - 6500	6500	3.5	8000

**Size:** The size of the meters shall be determined by the nominal size (in inches) of the opening in the inlet and outlet flanges. Overall lengths of the meters shall be as follows:

Meter Size	Laying Length	Meter/Strainer Combined Length
1-1/2"	10" (13" w/test spool)	---
2"	10"	17"
3"	12"	18"
4"	14"	21-1/2"
6"	18"	27"
8"	20"	30"
10"	26"	41"

**Case and Cover:** The maincase and cover shall be cast from an ANSI/NSF 61, Annex G and Annex F certified lead free alloy containing a minimum of 85% copper. The size, model, NSF 61 certification and arrows indicating direction of flow shall be cast in raised characters on the maincase or cover. The cover shall contain a calibration vane for the purpose of calibrating the turbine measuring element while the meter is in-line and under pressure. The calibration vane shall be mounted under the register or shall be covered by a protective cap that is attached in a tamper-resistant device.

**External Bolts:** Casing bolts shall be made of AISI Type 316 stainless steel.

**Connections:** Maincases shall be flanged. 1-1/2" and 2" sizes shall be oval flanged and 3" through 10" sizes shall be round flanged as per Table 3, AWWA C701.

**Registers:** Registers shall be permanently roll-sealed, straight reading, indicating in cubic feet, gallons, or cubic meters. Registers shall include a center-sweep test hand, a low flow indicator, and a glass lens. Registers shall be serviceable without interruption of the meter's operation. Registers shall be guaranteed for at least ten (10) years.

**Register Box:** Register boxes and covers shall be of bronze composition. The name of the manufacturer and the meter serial number shall be clearly identifiable and located on the register box cover.

**Register Box Sealing:** The register box shall be affixed to the top cover by means of a plastic tamper-proof seal pin that must be destroyed in order to remove the register.

**Meter Serial Number:** The meter serial number shall be imprinted on the meter maincase or cover as well as the register box cover.



**Measuring Chamber:** The turbine measuring chamber shall be a self-contained unit attached to the cover for easy removal. The turbine spindles shall be stainless steel; turbine shafts shall be tungsten carbide.

**Unitized Measuring Element (UME):** A UME is a complete assembly, factory calibrated to AWWA standards that includes the cover, registers, and both a turbine measuring element assembly. It shall be easily field removable from the meter body without the requirement of unbolting flanges.

**Intermediate Gear Train:** The intermediate gear train shall be directly coupled to the turbine rotor and magnetically coupled to the register through the meter cover. All moving parts of the gear train shall be made of a self-lubricating polymer or stainless steel for operation in water.

**Registration Accuracy:** Registration accuracy over the normal operating range shall be 98.5% to 101.5%.

**Remote Capability Options:** All meters shall be equipped with encoder remote registers per AWWA C707 and meet all AWWA C701 performance standards.

**Acceptable meters shall be Neptune HP Turbine or approved equivalent**

### 3. Cold Water Meters/Fire Hydrant Meter Type

**General:** All meters furnished shall be manufactured by a registered ISO 9001 quality standard facility.

**Type:** All meters shall be of the horizontal-axis, high-velocity type per AWWA Class II and shall be designed for portability in metering cold water flow from fire hydrants.

**Capacity:** The capacities of the meter in terms of normal operating range and maximum intermittent flow rates are as follows:

<u>Size (in)</u>	<u>Normal Operating Range (gpm)</u>	<u>Max. Intermittent Flow Rate (gpm)</u>
3"	5 – 450	560

**Size and Weight:** The overall length of the meter shall be as follows:

<u>Meter Size (in)</u>	<u>Meter Length (in)</u>	<u>Weight (lbs)</u>
3 "	15-1/2" less Couplings	23
	19-1/4" with Couplings & Gate Valve	29

**Case and Cover:** The maincase shall be cast aluminum. The cover shall be cast from a no-lead high copper alloy containing a minimum of 85% copper. The maincase shall be finished with a thermoplastic coating for corrosion resistance. The size, model, arrows indicating direction of flow, and "AWWA Class II" shall be cast in raised characters on the maincase or cover. The case shall be equipped with a single easily replaceable "balanced handle" for ease of carrying and installation. The handle shall not be integral with the meter body. The cover shall contain a calibration vane for the purpose of calibrating the turbine measuring element during testing and maintenance. The calibration vane shall be mounted under the register or be covered by a protective cap that is attached in a tamper-resistant manner.

**External Bolts:** Casing bolts shall be made of AISI Type 316 stainless steel.

**Connections:** The maincase shall be equipped with a standard 2-1/2" NST brass female swivel fire hose coupling assembly on the inlet side. On the outlet side, it shall include a standard brass male hose coupling. The assembly shall also include a 2" brass gate valve.

**Registers:** Registers shall be permanently roll-sealed, straight-reading, indicating in cubic feet, gallons, or cubic meters. Registers shall include a center-sweep test hand, a low flow indicator, and a glass lens. Registers shall be serviceable without interruption of the meter's operation.

**Register Box:** Register boxes and covers shall be of bronze composition. The name of the manufacturer and the meter serial number shall be clearly identifiable and located on the register box cover.

**4. Cold Water Meters/Water Meter Strainers (Neptune or equivalent)**

**General:** All strainers furnished shall be manufactured by a registered ISO 9001 quality standard facility. Acceptable strainers shall have a minimum of fifteen (15) years of successful field use. This specification covers 150 psi working pressure plate-type strainers for use with water meters of 1-1/2" through 20" pipe size. The strainer is to be mounted upstream of the meter to prevent debris such as stones or pebbles greater than 3/16" in diameter from entering or damaging the meter.

**Lead Free Legislation:** All water meters specified within this specification shall conform to the EPA "Reduction of Lead in Drinking Water Act" as defined under Public Law 111-380. All meters provided shall be made of "lead free" alloy as defined by NSF/ANSI-61, Annex G and F. Manufacturer shall provide a letter of compliance from NSF demonstrating compliance with NSF/ANSI 61.

**General Requirements:** The strainer shall be designed for minimum weight and pressure loss and shall be in conformance with the data shown below:

<u>Pipe Size (in)</u>	<u>Laying Length (in)</u>	<u>Maximum Height Base to Center of Flange (in)</u>
1-1/2"	7"	2-1/8"
2"	7"	2-1/8"
3"	6"	3-3/4"
4"	7-1/2"	4-1/2"
6"	9"	5-1/2"
8"	10"	6-3/4"
10"	15"	8"

The strainer screen shall be made of perforated AISI Type 18-8 stainless steel plate and be shaped for maximum rigidity against forces exerted by the flow stream.

The effective straining area shall be at least double that of the meter maincase inlet area.

The 1-1/2" and 2" strainers shall be furnished with oval two-bolt flanged connections. Strainers 3" and larger shall be furnished with round flanged connections. Bolt circle, bolt hole diameters, and flange dimensions shall be in compliance with meter connection specifications contained in ANSI/AWWA C701.

The strainer bodies and covers in sizes 1-1/2" through 10" shall be made from NSF/ANSI 61, Annex G and Annex F certified lead free nylon-coated ductile iron or a bronze alloy containing a minimum of 85% copper. The manufacturer's name, strainer pipe size, and direction of flow (if required) shall be cast in raised letters and shall be clearly visible.

Bodies and covers for 12", 16" and 20" strainers shall be epoxy-coated steel. The manufacturer's name, strainer pipe size, and direction of flow (if required) shall be clearly marked on the strainer. Strainers of this size shall be equipped with flush ports.

Cover bolts for the 1-1/2" – 10" sizes shall be made of AISI Type 316 stainless steel.

Cover bolts for the 12" – 20" sizes shall be made of AISI Type 316 stainless steel.

Strainer cover shall be equipped with a vent screw to remove trapped air at installation.

## 1. COLD WATER METERS / WATER METER STRAINERS SPECIFICATIONS

### GENERAL

All strainers furnished shall be manufactured by a registered ISO 9001 quality standard facility. Acceptable strainers shall have a minimum of fifteen (15) years of successful field use. This specification covers 150 psi working pressure plate-type strainers for use with water meters of 1 1/2" through 20" pipe size. The strainer is to be mounted upstream of the meter to prevent debris such as stones or pebbles greater than 3/16" in diameter from entering or damaging the meter.

### GENERAL REQUIREMENTS

The strainer shall be designed for minimum weight and pressure loss and shall be in conformance with the data shown below:

Pipe Size (in)	Laying Length (in)	Maximum Height Base to Center of Flange (in)
1 1/2"	7"	2 1/8"
2"	7"	2 1/8"
3"	6"	3 3/4"
4"	7 1/2"	4 1/2"
6"	9"	5 1/2"
8"	10"	6 3/4"
10"	15"	8"
12"	16 7/8"	9 1/2"
16"	24 1/4"	11 3/4"
20"	18 5/8"	13 3/4"

The strainer screen shall be made of perforated AISI Type 18-8 stainless steel plate and be shaped for maximum rigidity against forces exerted by the flow stream.

The effective straining area shall be at least double that of the meter maincase inlet area.

The 1 1/2" and 2" strainers shall be furnished with oval two-bolt flanged connections. Strainers 3" and larger shall be furnished with round flanged connections. Bolt circle, bolt hole diameters, and flange dimensions shall be in compliance with meter connection specifications contained in ANSI/AWWA C701.

The strainer bodies and covers in sizes 1 1/2" through 10" shall be made from NSF/ANSI 61, Annex G and Annex F certified lead free nylon-coated ductile iron or bronze alloy containing a minimum of 85% copper. The manufacturer's name, strainer pipe size, and direction of flow (if required) shall be cast in raised letters and shall be clearly visible.

Bodies and covers for 12", 16" and 20" strainers shall be epoxy-coated steel. The manufacturer's name, strainer pipe size, and direction of flow (if required) shall be clearly marked on the strainer. Strainers of this size shall be equipped with flush ports.

Cover bolts for the 1 1/2" - 10" sizes shall be made of AISI Type 316 stainless steel.

Cover bolts for the 12" - 20" sizes shall be made of AISI Type 316 stainless steel.

Strainer cover shall be equipped with a vent screw to remove trapped air at installation.

**Acceptable strainers shall be Neptune Strainers or approved equal.**

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**CATEGORY I: LARGE COLD WATER METERS (Sensus or Equivalent)**

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**1. 1-1/2", 2", 3", 4", 6", 8" and 10" SIZES (SENSUS OMNI C2 OR EQUIVALENT)**

**General:** These specifications set forth the minimum acceptable design criteria and performance requirements for compound-type cold water meters including the following potential service applications and general considerations:

- Intended where a wide flow range is anticipated
- Measurement of water usage for critical billing applications
- Measurement intended for typical commercial and industrial applications requiring lower flow sensitivities
- Measurement of low flow usage below OMNI T2 meter threshold levels
- Measurement of constant low to medium flows up to high flow usage

**Lead Free Legislation:** All water meters specified within this specification shall conform to the EPA "Reduction of Lead in Drinking Water Act" as defined under Public Law 111-380. All meters provided shall be made of "lead free" alloy as defined by NSF/ANSI 61, Annex G and F. Manufacturer shall provide a letter of compliance from NSF demonstrating compliance with NSF/ANSI 61.

**Conformance to Standards:** The meter package shall meet or exceed all requirements of ANSI/AWWA Standard C701 and C702 for Class II compound and turbine meter assemblies. Each meter assembly shall be performance tested to ensure compliance.

The meter package shall meet or exceed all requirements of NSF/ANSI Standard 61, Annex F and G.

**Maincases:** The meter maincase shall be of epoxy-coated ductile iron composition. The epoxy coating shall be provided as standard fusion-bonded and adhere to NSF for non-lead regulation compliance.

**Performance:** The meter assembly shall have performance capability of continuous operation up to the rated maximum flows as listed below without affecting long-term accuracy or causing any undue component wear. The meter assembly shall also provide a 25% flow capacity in excess of the maximum flows listed for intermittent flow demands. Maximum headloss through the meter/strainer assembly shall not exceed those listed in the following table per meter size:

<b>Meter Size</b>	<b>Low Flow (95% Min.)</b>	<b>Operating Range (98.5 – 101.5%)</b>	<b>Intermittent Flows (98.5 – 101.5%)</b>	<b>Pressure Loss (Not to Exceed)</b>
1-1/2"	.25 GPM	.5 to 160 GPM	200 GPM	6.9 psi @ 160 GPM
2"	.25 GPM	.5 to 160 GPM	200 GPM	4.3 psi @ 160 GPM
3"	.5 GPM	1.0 to 400 GPM	500 GPM	3.2 psi @400 GPM
4"	.75 GPM	1.5 to 800 GPM	1000 GPM	6.4 psi @ 800 GPM
6"	1.5 GPM	3.0 to 1600 GPM	2000 GPM	5.5 psi @ 1600 GPM
8"	2.5 GPM	4 to 2700 GPM	3400 GPM	4 psi @ 2700 GPM
10"	3.5 GPM	5 to 4000 GPM	5000 GPM	4.5 psi @ 4000 GPM

**Measuring Chamber:** The measuring chamber shall consist of a measuring element, removable housing, and all-electronic register. The measuring element shall be mounted on a horizontal stationary stainless steel shaft with sleeve bearings and be essentially weightless in water. The measuring element comes integrated with the

advanced floating ball technology design. The measuring chamber shall be capable of operating within the above listed accuracy limits without calibration when transferred from one maincase to another of the same size. The measuring shall be so configured to capture all flows as specified above, without the requirement of an automatic valve.

**Direct Magnetic Drive System:** The direct magnetic drive shall occur between the motion of the measuring element blade position and the electronic register. The OMNI direct drive system with floating ball technology is designed to extend service life, enhance low flow sensitivity and provide extended flow capacity and overall accuracy of the meter assembly. Any and all additional intermediate, magnetic or mechanical drive couplings are not acceptable.

**Electronic Register:** The meter’s register is all-electronic and does not contain any mechanical gearing to display flow and accurate totalization. The electronic register includes the following partial list of features:

- AMR resolution units fully programmable
- Pulse output frequency fully programmable
- Integral data logging capability
- Integral resettable accuracy testing feature
- Large, easy-to-read LCD display
- 10-year battery life guarantee

**Maximum Operating Pressure:** The meter assembly shall operate properly without leakage, damage or malfunction up to a maximum working pressure of 200 pounds per square inch (psig).

**Strainers:** The meter strainer shall be integral and cast as part of the meter’s maincase. The strainer’s screen shall have a minimum net open area of at least two (2) times the pipe opening and be a V-shaped configuration for the purpose of maintaining a full, unobstructed flow pattern. The strainer body shall be a coated ductile iron fusion-bonded epoxy identical to that of the meter’s maincase. All fasteners shall be stainless steel capable of maintaining the following static pressure ratings and physical dimensions:

<u>METER SIZE</u>	<u>MAXIMUM WORKING PRESSURE</u>	<u>CENTERLINE TO STRAINER BASE</u>	<u>OVERALL LENGTH (NOT TO EXCEED)</u>
1-1/2"	200 PSIG	2-5/16"	13"
2"	200 PSIG	2-5/16"	15-1/4"
3"	200 PSIG	4-1/8"	17"
4"	200 PSIG	4-3/4"	20"
6"	200 PSIG	5-3/4"	24"
8"	200 PSIG	6-3/4"	30-1/8"
10"	200 PSIG	8-1/2"	41-1/8"

**Straightening Vanes:** A straightening vane assembly is mandatory and shall be positioned directly upstream of the measuring element. The straightening vane assembly shall be an integral component of the measuring chamber.

**Connections:** Flanges for the 1-1/2" and 2" size meter assemblies shall be of the 2-bolt oval flange configuration. The 3", 4", 6", 8" and 10" size meter assemblies shall have flanges of the Class 125 round type, flat faced and shall conform to ANSI B16.1 for specified diameter, drilling and thickness.

**Certifications and Markings:** All sizes of meter packages shall display the sizes, model, manufacturer name, and direction of flow. Such display shall be cast on the side of the meter maincase.

**Guarantee and Maintenance Program:** Meters shall be guaranteed against defects in material and workmanship for a period of one (1) year from date of shipment. In addition, the meter supplier shall submit

nationally published literature clearing outlining its factory maintenance program and current price schedule covering complete measuring chamber exchange.

**2. 1-1/2", 2", 3", 4", 6", 8" AND 10" SIZES (SENSUS OMNI T2 OR EQUIVALENT)**

**General:** These specifications set forth the minimum acceptable design criteria and performance requirements for turbine-type cold water meters including the following potential service applications and general considerations:

- Intended where a moderately wide flow range is anticipated
- Measurement of water usage for typical billing applications
- Measurement intended for typical commercial and industrial applications
- Measurement of low flow usage below OMNI C2 meter threshold levels
- Measurement of constant medium to extended high flow usage

**Lead Free Legislation:** All water meters specified within this specification shall conform to the EPA "Reduction of Lead in Drinking Water Act" as defined under Public Law 111-380. All meters provided shall be made of "lead free" alloy as defined by NSF/ANSI 61, Annex G and F. Manufacturer shall provide a letter of compliance from NSF demonstrating compliance with NSF/ANSI 61.

**Conformance to Standards:** The meter package shall meet or exceed all requirements of ANSI/AWWA Standard C701 for Class II compound and turbine meter assemblies. Each meter assembly shall be performance tested to ensure compliance.

The meter package shall meet or exceed all requirements of NSF/ANSI Standard 61, Annex F and G.

**Maincases:** The meter maincase shall be of epoxy-coated ductile iron composition. The epoxy coating shall be provided as standard fusion-bonded and adhere to NSF for non-lead regulation compliance.

**Performance:** The meter assembly shall have performance capability of continuous operation up to the rated maximum flows as listed below without affecting long-term accuracy or causing any undue component wear. The meter assembly shall also provide a 25% flow capacity in excess of the maximum flows listed for intermittent flow demands. Maximum headloss through the meter/strainer assembly shall not exceed those listed in the following table per meter size:

<b>Meter Size</b>	<b>Low Flow (95% Min.)</b>	<b>Operating Range (98.5 – 101.5%)</b>	<b>Intermittent Flows (98.5 – 101.5%)</b>	<b>Pressure Loss (Not to Exceed)</b>
1-1/2"	.75 GPM	1.25 to 160 GPM	200 GPM	6.9 psi @ 160 GPM
2"	1.0 GPM	1.5 to 200 GPM	250 GPM	7.0 psi @ 200 GPM
3"	1.5 GPM	2.5 to 500 GPM	650 GPM	5.1 psi @ 500 GPM
4"	2.0 GPM	3.0 to 1000 GPM	1250 GPM	8.7 psi @ 1000 GPM
6"	2.5 GPM	4.0 to 2000 GPM	2500 GPM	8.2 psi @ 2000 GPM
8"	4 GPM	5 to 3500 GPM	4700 GPM	5.1 psi @ 3500 GPM
10"	5 GPM	6 to 5500 GPM	7000 GPM	7.2 psi @ 5500 GPM

**Measuring Chamber:** The measuring chamber shall consist of a measuring element, removable housing, and all-electronic register. The measuring element shall be mounted on a horizontal, stationary stainless steel shaft with sleeve bearings and be essentially weightless in water. The measuring element comes integrated with the advanced floating ball technology design. The measuring chamber shall be capable of operating within the above listed accuracy limits without calibration when transferred from one maincase to another of the same size. The measuring shall be so configured to capture all flows as specified above.

**Direct Magnetic Drive System:** The direct magnetic drive shall occur between the motion of the measuring element blade position and the electronic register. The OMNI direct drive system with floating ball technology

is designed to extend service life, enhance low flow sensitivity and provide extended flow capacity and overall accuracy of the meter assembly. Any and all additional intermediate, magnetic or mechanical drive couplings are not acceptable.

**Electronic Register:** The meter’s register is all-electronic and does not contain any mechanical gearing to display flow and accurate totalization. The electronic register includes the following partial list of features:

- AMR resolution units fully programmable
- Pulse output frequency fully programmable
- Integral data logging capability
- Integral resettable accuracy testing feature
- Large, easy-to-read LCD display
- 10-year battery life guarantee

**Maximum Operating Pressure:** The meter assembly shall operate properly without leakage, damage or malfunction up to a maximum working pressure of 200 pounds per square inch (psig).

**Strainers:** The meter strainer shall be integral and cast as part of the meter’s maincase. The strainer’s screen shall have a minimum net open area of at least two (2) times the pipe opening and be a V-shaped configuration for the purpose of maintaining a full, unobstructed flow pattern. The strainer body shall be a coated ductile iron fusion-bonded epoxy identical to that of the meter’s maincase. All fasteners shall be stainless steel capable of maintaining the following static pressure ratings and physical dimensions:

<u>METER SIZE</u>	<u>MAXIMUM WORKING PRESSURE</u>	<u>CENTERLINE TO STRAINER BASE</u>	<u>OVERALL LENGTH (NOT TO EXCEED)</u>
1-1/2"	200 PSIG	2-5/16"	13"
2"	200 PSIG	2-5/16"	17"
3"	200 PSIG	4-1/8"	19"
4"	200 PSIG	4-3/4"	23"
6"	200 PSIG	5-3/4"	27"
8"	200 PSIG	6-3/4"	30-1/8"
10"	200 PSIG	8-1/2"	41-1/8"

**Straightening Vanes:** A straightening vane assembly is mandatory and shall be positioned directly upstream of the measuring element. The straightening vane assembly shall be an integral component of the measuring chamber.

**Connections:** Flanges for the 1-1/2" and 2" size meter assemblies shall be of the 2-bolt oval flange configuration. The 3", 4", 6", 8" and 10" size meter assemblies shall have flanges of the Class 125 round type, flat faced and shall conform to ANSI B16.1 for specified diameter, drilling and thickness.

**Certifications and Markings:** All sizes of meter packages shall display the sizes, model, manufacturer name, and direction of flow. Such display shall be cast on the side of the meter maincase.

**Guarantee and Maintenance Program:** Meters shall be guaranteed against defects in material and workmanship for a period of one (1) year from date of shipment. In addition, the meter supplier shall submit nationally published literature clearing outlining its factory maintenance program and current price schedule covering complete measuring chamber exchange.

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**CATEGORY J: METER READING EQUIPMENT/SOFTWARE (Mfg. Neptune or Equivalent)**

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**SPECIFICATIONS FOR ALL R900 SYSTEM COMPONENTS**

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.

**Scope:** 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.

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 and/or a mobile reading unit (collectively as "AMR" or "mobile") and/or permanently mounted data collector units (collectively "AMI" or "fixed network").

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 endpoints within the same meter reading route without detaching the receptacle or RF endpoints or switching modes within the meter reading equipment.

All System components furnished (software, reading equipment, RF endpoints, meters with absolute encoders) shall be produced in a manufacturing facility whose QMS is ISO 9001 certified.

**System Overview:** The System shall be comprised of RF endpoints, 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 endpoints.

The transition from walk-by, to mobile, to fixed network shall be seamless and allow all meter reading methods to operate together simultaneously. endpoints 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 endpoints 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 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 endpoints, meter reading equipment, and meter reading software) and provide a turnkey system offering to the utility.

**Mobile AMR Functionality:** When used as mobile AMR, the System shall provide 96 days of hourly consumption data storage at the endpoint, 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 endpoint. 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.

**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.

When deployed as a fixed network, the System shall provide priority alarm notification of potential leak and/or reverse flow events with user configurable email or text messages for notification to utility personnel. When operating as a fixed network, the System shall provide the capability for a demand read initiated from the host software application. The number of on demand read requests made over the lifetime of an endpoint shall not impact the battery life or warranty.

**Data Collection Devices:** The System shall provide a means of communication between the endpoint 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.

**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 ProRead/E-CODER or Sensus UI 1203 protocol absolute encoders (optional)

**Handheld Data Collector Device: 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.

**Hardware Requirements: 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.

*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.

*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.

*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.

*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.

*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.

*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.

*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

*Weight:*

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

*Environmental Characteristics (Only for devices running Windows Mobile OS):*

- 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.

*Handheld Software Requirements: 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 endpoint.
- 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.

*Sounds:*

Successful meter readings must be confirmed by an audible tone.

*Communications / Charging Equipment-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.

*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.

*Probes:*

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

**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 endpoints. Only absolute encoder registers using Neptune ProRead/E-CODER (or equivalent) or Sensus (or equivalent) UI-1203 communication protocols shall be acceptable. For the radio frequency-based meter reading system, the encoder registers will be connected to an RF endpoint that shall provide the radio link from the meter to the handheld interface unit. Endpoints 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.

**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 endpoints. The external receiver must be capable of receiving RF readings and transferring those readings to the handheld via Bluetooth connection. All transmissions from supported endpoints will be collected. The reading of any endpoint shall be automatically stored in the proper account record without the intervention of the meter reader. Should any endpoint 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 endpoint 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 endpoint. 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 endpoint or displaying all endpoints within range.

**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 endpoint 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:

**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.

**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.

**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

*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.

**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.

*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

*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

*Mobile Data Collection Software Requirements: 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 endpoint and keeping only the last reading received.
- Each reading record must contain an endpoint 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 endpoint.
- The software must contain a test mode used to validate endpoint installation. The test mode must provide endpoint 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.

*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.

*Fixed Network Compatibility: Basic Requirements:*

The fixed network functionality must be able to operate in parallel with other meter reading technologies such as walk-by, handheld, and mobile systems and utilize a common interface to the CIS/billing software system.

The fixed network functionality must also support the migration of technologies (example: handheld to mobile, mobile to fixed network).

The fixed network functionality is comprised of two major components; data collection software and fixed network data collection units.

The fixed network functionality must be capable of automatically retrieving reading information from the same endpoints being read by walk-by and mobile data collection devices to manage customer account and meter reading data, to provide usage analysis, and to provide a flexible host interface to utility's CIS system.

The fixed network functionality must be capable of retrieving consumption information from endpoints via walk-by, mobile drive-by, and fixed network data collection without the need for mode changes or reprogramming.

The host software must be capable of storing meter readings with the capability to store up to 96 readings per day per meter. The host software must also provide meter reading management reports, usage analysis reports (flow profiling, leak detection, tamper detection, and reverse flow conditions), off-cycle reads, and system management diagnostics. Must provide comprehensive coverage for all selected strategic commercial and industrial customers, including indoor, outside, and in pits/vaults, utilizing a single or hybrid technology solution. The network architecture should provide scalability and adequate bandwidth to provide hourly reading requirements.

The WAN architecture must be flexible to allow communications via common public communication networks such as CDMA, GSM, and LTE cellular systems.

The fixed network functionality must utilize an unlicensed radio frequency band for LAN communications.

Network management tools must be available to properly monitor the performance of the system to ensure reliable data delivery to utility for all billing and/or other customer service applications.

Both the fixed network WAN and host software shall remain the property of utility. All costs associated with the ongoing operation of the system will be the responsibility of utility.

Utility shall be responsible for the operation and maintenance of the fixed network infrastructure.

*Hardware Requirements:*

Fixed network data collection must support flexible installation configurations for rooftop, pole, and wall installations.

The fixed network data collection units must utilize a 50-channel, software-defined radio (SDR) capable of processing up to 360 readings per second and eight (8) readings simultaneously. The fixed network data collector must support a web service connection to the host software.

The fixed network data collection units must provide USB flash drive data retrieval in the event of a backhaul outage. All data stored to the USB flash drive must be encrypted via AES128.

The fixed network collector shall utilize an SD card for flash memory storage.

The fixed network shall encrypt all stored reading files via AES128.

The fixed network data collection units with AC power must have an uninterruptible power supply (UPS) capable of powering the data collector for eight (8) hours in the event of a power outage.

The fixed network data collection units must support the following backhaul options:

- EVDO Rev A (CDMA)
- UMTS/HSPA (GSM)
- 4G LTE
- Fiber
- Ethernet

The data collection units shall consist of the following:

- NEMA 4X enclosure
- 100-140V power supply with UPS or solar cell with battery backup
- LAN: Receiver shall support unlicensed communication protocol from endpoints and comply with FCC part 15.247
- WAN: Multi-carrier cellular modem or Ethernet

Must be able to provide a minimum daily meter reading resolution.

Must be able to store a minimum of seven (7) days of data in the fixed network data collector.

The data collection unit must meet the following environmental operating requirements:

- Temperature range: -20° F to +140° F (-30° C to +60° C)
- Humidity: 0 to 95% non-condensing inside enclosure

**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.

*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 endpoint ID, Account, Name, or Address must be available within the application.
- The application must support meter readings (4-8 digits) and endpoint 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.

*AMI Network Software Functionality:*

- The application must have the capability to store all meter data information obtained from the AMI Data Collection Devices.
- The application must provide system critical alarms, such as reverse flow and potential continuous consumption, in a statistical view within the utility application and provide notification to utility personnel.
- The utility application shall have a method to clone a specific AMI collection device for a replacement device when required.
- The application must have the capability to monitor endpoints that have transmitted for the first time to identify reading success.
- Monthly, daily and hourly consumption shall be viewable within the user interface in a tabular and graphical data presentment.
- Daily and hourly readings shall be viewable within the user interface in a tabular format.

*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.

**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.

**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.

**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.

**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.

**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.

**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.

**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

**VENDOR QUALIFICATIONS:** The qualified manufacturer 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.



MORRIS COUNTY COOPERATIVE PRICING COUNCIL

A SHARED SERVICES SUCCESS STORY SINCE 1974

## EST. QUANTITY INFORMATION

### MCCPC Contract #47 (Water Meters/Data Recorders & Radio Frequency Meter Interface Units)

The following members of the MCCPC submitted estimated quantities and are eligible to participate in this contract without written approval:

#### Essex County:

East Orange  
Fairfield Township  
Glen Ridge  
North Caldwell  
Roseland Borough  
Verona  
West Caldwell

#### Union County:

Warren County:  
Hackettstown MUA

#### Hunterdon County:

#### Morris County:

Boonton Town  
Boonton Township  
Denville Township  
Dover  
Florham Park  
Jefferson Township  
Lincoln Park  
Montville Township  
Mount Arlington Borough  
Mount Olive Township  
Mountain Lakes Borough  
Parsippany  
Randolph Township  
Riverdale Borough  
Rockaway Township  
Roxbury Township  
SE Morris MUA  
Washington Township MUA  
Wharton Borough

#### Passaic County:

Hawthorne Borough  
Totowa Borough  
Wayne Township

#### Somerset County:

Franklin Township

#### Sussex County:

Hopatcong  
Sparta Township