# Attachment B - AMI System Requirements

# Data Collection System

| ID | Sub-Area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
| Instructions: Provide response to each requirement as applicable to proposed solution. If not applicable, state “Not applicable” | | | | | |
|  | Network Design – Min Performance Criteria | The proposed solution shall meet or exceed a minimum system performance as specified below:   * Register Read per meter: 99.5% within a three (3) day period over thirty-five (35) days * Register Read per day: 97.5% of register reads received per day over thirty-five (35) days * Interval Data: 95% of all readings taken hourly within a three (3) day period over thirty-five (35) days * Redundancy: Two (2) Collectors per meter (2:1 redundancy) over thirty-five (35) days (+/-10%) for 100% of the endpoints * Coverage: 100% of meters are covered by the AMI Network * Two-way communications performance:   + High priority actions (e.g., demand read): 98% successful. Indicate the expected time interval between the user’s on-demand read request and the response.   + General reprogramming and configuration: 80% successful within one (1) day and 98% within three (3) days.   + Firmware updates: 80% successful within seven (7) days and 98% within fourteen (14) days | Base |  |  |
|  | Network Design | Respondent shall provide a propagation study and network design that meets the Minimum System Performance requirements. See Requirement (1). Provide a summary of the propagation study results in one of the appendices in your Proposal. | Base |  |  |
|  | Network Design | The Respondent will be allowed three (3) propagation study revisions after award and prior to final. After a final revision is agreed on by the Respondent and FCWS, the Respondent shall be responsible for all additional equipment and installation costs related to further revisions due to lack of coverage necessary to meet the minimum system performance metrics defined in Requirement (1). | Base |  |  |
|  | Network Design | AMI Network shall operate on an FCC licensed or unlicensed frequency spectrum. Describe the frequency spectrum the proposed AMI network operates including advantages, disadvantages. Licensing costs shall be included in the pricing for the life of the solution. | Base |  |  |
|  | Network Installation | Data collection equipment can be located at FCWS-owned facilities or non-FCWS owned locations. The Respondent shall be solely responsible for installation (including electric service and backhaul), site acquisition or use agreements and operations. | Base |  |  |
|  | Network Installation | The Respondent shall be responsible for obtaining FCC licenses (as applicable). Frequencies shall be assigned to FCWS. Licenses must be obtained and assigned radio frequencies verified as suitable for use with the AMI system(s) before any AMI equipment is delivered to FCWS. All applicable AMI system components must comply with FCC regulations 47CFR §15. | Base |  |  |
|  | Network Installation | The Respondent shall provide a data collector site construction plan (SCP) and final as-built drawings, including equipment list for each collector site. The SCP shall include physical diagrams/drawings, materials list, mounting equipment requirements, backhaul details, power connection requirements. | Base |  |  |
|  | Network Life | The Respondent shall provide a network guarantee that the AMI system will operate and remain compatible with proposed meters and endpoints for a minimum of 15 years. | Base |  |  |
|  | Data Collection Equipment | Collectors shall have battery backup with capacity to operate a minimum of 8 hours of continual operation in the event of AC power failure. Describe available battery backup options and expected life. | Base |  |  |
|  | Data Collection Equipment | Collectors shall have the capability to be solar powered. If solar power is not an option, provide AC power requirement details. | Base |  |  |
|  | Data Collection Equipment | Collectors shall have the capability for redundant backhaul. Describe capabilities for automated and manual switch‐over and the options available. | Base |  |  |
|  | Data Collection Equipment | Data collector system equipment shall be electrically isolated to protect against power surges or lightning strikes. Describe how this is accomplished. | Base |  |  |
|  | Environmental Tolerances | All system components (MIUs, Data Collection Equipment, and appurtenances) shall operate over a temperature range of at least ‐30º F to 120º F, and a humidity range of at least 0% to 100% non‐condensing. | Base |  |  |
|  | Environmental Tolerances | All outdoor connections shall be weatherproofed to prevent water intrusion. | Base |  |  |
|  | Data Collection Equipment | Proposed solution must support real‐time flags for intrusion at AMI collector equipment sites. This may include, but is not limited to, door open alarms and data access alarms. | Base |  |  |
|  | Data Transmissions – Accuracy & Validation | AMI system shall ensure data transmission accuracy via validation of retrieved data within the head‐end. Describe how data transmission accuracy and data integrity is performed and measured. | Base |  |  |
|  | Data Transmissions – Accuracy & Validation | The system shall have the capability to prevent loss of stored meter reading and meter alarm data. | Base |  |  |
|  | Data transmission -Interference | AMI system shall include provisions to ensure immunity from outside (electromagnetic) interference as well as fading and other forms of signal degeneration or attenuation (such as multi‐path fading), to prevent accidental loss or interception of customer or meter reading data. | Base |  |  |
|  | Data Collector - Maintenance | Respondent shall provide maintenance services as part of the NaaS deployment. Describe the proposed maintenance services and frequency. Describe any requirements and interaction required from FCWS. | Base |  |  |
|  | Data Collector – Repair services | Respondent shall provide diagnostic and repair services under the proposed deployment. Describe the repair services process from identification of problem to completion, expected response time, etc. Describe any interaction required from FCWS. | Base |  |  |

Data Collection System Questions

| ID | Question | Response |
| --- | --- | --- |
| Q1 | Respondent will provide information on their RF design approach including information on the loss link budget, transmit power, receiver sensitivity, etc. |  |
| Q2 | Discuss coverage approach for hard-to-reach meters. For cellular solutions specifically, identify how Respondent will approach service areas without ubiquitous cellular coverage. |  |
| Q2 | Describe any smart utility or smart city devices and technologies that are supported under the proposed AMI Network. |  |

# Meter Interface Unit (MIU)

| ID | Sub-Area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
|  | MIU Type | The MIU shall provide secure two-way communication with authorized systems and devices. Describe the type of RF technology proposed. | Base |  |  |
|  | Alarms/Alerts | MIU shall provide battery end-of-life indicator alarm providing a minimum of 1-year notice that battery is nearing the end of its useful life. Describe how and when alerts are received from proposed MIU. | Base |  |  |
|  | Alarms/Alerts - Backflow | MIU shall have ability to indicate backflow or reverse flow. A timestamped flag or alarm shall indicate that backflow has occurred, even for low-volume events. | Base |  |  |
|  | Alarms/Alerts – Encoder failure | The MIU shall send an alarm in the event of a meter encoder failure, loss of connectivity with the meter encoder, or persistent errors when trying to read the encoded register. | Base |  |  |
|  | Alarms/Alerts - Leak | MIU shall provide automatic alarm for detection of leak (with adjustable trigger parameters). This will include the ability to detect potential on-premises leaks (downstream of meter) making use of low flow meter accuracy with enough reads per day to indicate “no zero flow hours” over a configured period. | Base |  |  |
|  | Alarms/Alerts - Tamper | The MIU shall have security to prevent tampering as well as alerts to indicate potential tamper events. Tamper events shall be logged and timestamped. The MIU shall communicate tamper events to the AMI system as soon as they occur and trigger an alarm at the AMI head end. Meter tamper events shall be sent with a higher priority than normal status messages. Indications and information about the tamper event shall not be deleted or removed from the MIU until they have successfully transferred to the headend over the AMI network. | Base |  |  |
|  | Alarms/Alerts – Time Sync | The MIU’s clock must be capable of synchronization to the national time standard, without visiting the site. Accuracy of better than 30 seconds shall be maintained even if the connection to the AMI network is lost for up to 90 days. Alarms shall be provided should the MIU ever have a time correction exceeding 60 seconds. | Base |  |  |
|  | Backfilling Reads | AMI system shall recover and retransmit missing reads from each endpoint to backfill missing interval data daily. | Base |  |  |
|  | Device ID Number | Each MIU shall have a unique, permanent ID number that is transmitted with the meter readings. | Base |  |  |
|  | Distribution Leak Detection | AMI system shall provide acoustic or pressure-based distribution system leak detection and to transmit this data via the AMI communications network to the control computer. | Base |  |  |
|  | Environmental Tolerance | MIUs must operate in conditions subject to indefinite water submergence (i.e., meter pits/vaults). | Base |  |  |
|  | Environmental Tolerance | MIUs shall be provided in waterproof casing rates IP8 or better (submersion up to 1 meter of depth) in accordance with IP code, IEC standard 60529. | Base |  |  |
|  | Environmental Tolerance | MIU enclosure should be composed of ultraviolet (UV)-inhibiting ABS or similar material. All materials used in the MIU must be non-hazardous under normal conditions. | Base |  |  |
|  | Firmware | Firmware management must meet the following requirements:  (1) MIU shall be able to accept and install software/firmware upgrades provided remotely in batch form via the AMI communications network.  (2) MIU shall be able to accept and install software/firmware upgrades provided locally.  (3) The utility can update and configure when appropriate.  State how many over the air firmware upgrades have been released by Respondent in the past 10 years. State the impact on battery life of firmware upgrades. | Base |  |  |
|  | Interoperability | MIUs must be capable of accepting extended protocols for meter level alarms and over the air register communication from other manufacturers. Indicate which protocols MIU is compatible with. Please list manufacturers you are coordinating with for meter level alarm delivery. | Base |  |  |
|  | Interoperability | The MIU shall be interoperable with other sensor technology such as leak sensors without a major impact on battery life. Provide information on life reduction of the batteries for such applications. | Base |  |  |
|  | Interoperability | MIUs shall be compatible with pressure monitoring sensors. Provide details about other smart utility technologies that the proposed network supports. | Base |  |  |
|  | Labeling | MIUs shall be permanently labeled with manufacturer’s name, model number, owner name, a tamper warning, MIU identification number, required FCC labeling, input/output connections, and date of manufacture. | Base |  |  |
|  | Labeling | MIUs shall be labeled with a bar code of the MIU identification number. The label shall be weatherproof and attached to the MIU where normal installation will not obscure it. | Base |  |  |
|  | MIU - Cellular | The Respondent shall provide a solution that addresses possible challenges in cellular coverage for the MIU (as applicable) and for backhaul AMI communications. | Base |  |  |
|  | MIU - Cellular | For cellular endpoints, the Respondent shall provide a solution that is resilient to cellular network upgrades throughout the life of the AMI solution. | Base |  |  |
|  | MIU - Cellular | Respondent shall propose cellular service for all MIUs and backhaul for the Collectors through the life of the Contract. | Base |  |  |
|  | MIU Installation | MIUs shall have the ability to transmit signals under composite pit lids or have MIUs that are mounted through the lid. Propose pit lid/covers that are compatible with the proposed AMI solution | Base |  |  |
|  | MIU Installation | MIU cabling shall have flexibility in cabling length for non-standard installations (e.g., vaults). | Base |  |  |
|  | MIU Installation | MIUs shall optionally provide multiple ports to handle dual‐register meters or ancillary devices. Describe recommended approach for fitting MIU on compound meters. | Base |  |  |
|  | MIU Operations | The MIU shall provide “wake up” mode operation (or equivalent) to maximize battery life. | Base |  |  |
|  | MIU Operations | The MIU shall store interval meter reads for 90+ days with data integrity until overwritten (i.e., loss of network communications or in the case of disaster). These reading shall be available through the AMI network or by some form of local reading connection. Describe methods to recover data stored and when capacity is exceeded and begins to overwrite old data. | Base |  |  |
|  | MIU Operations | The MIU shall capture consumption data on an hourly basis, at minimum, without impacting stated battery warranties. | Base |  |  |
|  | MIU/Meter Compatibility | The proposed MIU model shall accommodate different meter register manufacturers. Describe how the MIU is made to accept different makes and models of encoder register, and clearly indicate if more than one MIU model is required. | Base |  |  |
|  | Number of Digits | MIU shall transmit the same number of digits provided by the encoder register with no truncation of data. | Base |  |  |
|  | Two-way Capabilities | MIU shall have capability to accept updates or changes to the configuration via the AMI network. | Base |  |  |
|  | Two-way Capabilities | The MIU shall be remotely programmable to capture consumption data at a minimum on an hourly read interval without impact on the 20-year battery life and warranty. | Base |  |  |
|  | Warranty | The MIU shall have a MIU failure rate (including battery failures) of less than 0.5% per year. Provide the failure rates (failures per year) for MIUs sold and installed for the last three years. Explain typical reason for failures for MIU. Indicate is there is a guaranteed maximum failure rate and provide contract language that provides a warranty for MIU failures. | Base |  |  |
|  | Warranty | Warranty for the MIU including batteries must be 20 years with a 15-year full replacement and last 5-years prorated. Specify the proposed warranty and any exceptions to this requirement. | Base |  |  |

Meter Interface Unit (MIU) Questions

| ID | Question | Response |
| --- | --- | --- |
| Q1 | Provide options on installing MIUs for large meters located in vaults. Indicate recommended approach. |  |
| Q2 | Describe the typical MIU operations and impact on battery life. (e.g., firmware update over the air, read rates less than hourly, number of on demand read in a given time period, any other two-way commands) |  |
| Q3 | Describe available options for collecting reads using a mobile solution in the event the fixed network is unable to collect and transmit data. Indicate any impact on expected battery life. |  |

# Water Meters, Meter Box Covers, and Meter Box Equipment



## Water Meters

| ID | Sub-Area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
|  | General – Meter bid 3/4” – 2” | Respondent shall list the manufacturer(s) and model number(s) your firm is proposing and include specification sheets in the proposal submission.  In your Price Proposal,   * All ¾” – 1” meters shall be mechanical meters. Propose static meter as an alternative. * 1.5” and 2” meters shall be static meters. Propose mechanical meter as an alternative * 3” and larger meters shall be static meters | Base |  |  |
|  | Meter bid 3” and larger meters | Respondent shall list the manufacturer(s) and model number(s) your firm is proposing and include specification sheets in the proposal submission.  In your Price Proposal,   * 3” and larger meters shall be static meters. Propose mechanical meter as an alternative if available. | Base |  |  |
|  | General – All Mechanical Meters | All bronze main case meters shall comply with the American Water Works Association (AWWA) Standard C700 Latest Revisions “Cold-Water Meter – Displacement Type, Bronze Main Case.” Provide certifications. | Base |  |  |
|  | General – All Static Meters | All static meters shall comply with standards American Water Works Association AWWA C715 “Cold Water Meters – Electromagnetic and Ultrasonic type, for Revenue Applications,” latest revision. Provide certifications. | Base |  |  |
|  | General – All Meters | All meters shall be certified by the National Sanitation Foundation (NSF) to standard ANSI/NSF 61, Latest revision, “Drinking Water System Components – Health Effects.” These meters shall bear the associated NSF mark on the outer cases. The requirements of the Safe Drinking Water Act shall also apply to these meters. | Base |  |  |
|  | General – All Meters | All Revenue Meters shall sustain a working pressure of 150 psi. For meters intended for fire services applications, the working pressure shall be 175 psi. | Base |  |  |
|  | General – All Meters | Meters shall sustain a maximum environmental temperature of 140° F | Base |  |  |
|  | General – All Meters | Meters shall be supplied with energy using a non‐replaceable battery. All batteries used in the meter shall have a 20-year or greater cycle life. | Base |  |  |
|  | General – All Meters | Meters and meter parts shall have a protection classification of IP68. | Base |  |  |
|  | General – All Meters | Meters shall have a minimum manufacturer/ technology provider warranty of ten (10) years for meters 3/4” to 1” in diameter and two (2) years for meters from 1‐1/2” to 8” in diameter, in precision, construction materials, and labor in all its parts. | Base |  |  |
|  | General – All Meters | All meters shall have a certification of accuracy. Each meter shall contain a label with information on the tolerances for each flow range which shall be greater than the one established in the applicable  standard. | Base |  |  |
|  | General – All Meters – Meter ID | The meter number shall be imprinted upon the register lid and on the meter body or register if register is permanently attached to meter body. Numbers will be numeric and nine (9) digits long. | Base |  |  |
|  | General – All Meters - Barcodes | Individual meters shall be identified with a readable barcode sticker attached to the meter. The box for all ¾” to 2” meters shall have readable barcode attached to the outside giving the meter range contained within the box, i.e.: 100001-100009. Format for the barcode shall be Code 39, and the barcodes shall be clear, legible, scannable and represent the readable numeric code located beneath the barcode. | Base |  |  |
|  | General – All Meters – Meter ship files | Each meter shall be individually factory tested and testing results supplied with an upload file for FCWS to upload the test results to its meter inventory system via a format provided by FCWS. Each meter shall have a sticker showing the accuracy test results at the three AWWA M6 test flow rates of each meter according to meter size and type. | Base |  |  |
|  | General – All Meters, Registers | The register shall be straight reading type with test and low flow indicators and shall be constructed to register in gallons | Base |  |  |
|  | General – All Meters, Registers | Registers shall be capable of being located within a pit (underground) environment and submerged in water. | Base |  |  |
|  | General – All Meters, Registers | All registers shall read in U.S. gallons. Register measurement shall be to the 1 gallon. Meter shall update the endpoint every 1 gallon. | Base |  |  |
|  | General – All Meters, Registers | Encoded registers shall be compatible with a Nicor connector or similar type and shall be supplied with a 3 ft wire for small meters (3/4” – 2”) and 5 ft. wire for large meters. The connector type will be determined by the chosen MIU vendor. Describe all options available with factory fully potted wires and connectors. Also describe options to extend the wire length if needed. | Base |  |  |
|  | General – All Meters, Registers | Encoded registers shall have a minimum battery life of 20 years. It is recognized that failure of battery before 20 years may have a prorated replacement cost. Battery life remaining shall be displayed on the register. | Base |  |  |
|  | General – All Meters, Registers | All registers shall have at minimum 9 digits. The 3/4", 1", 1.5", and 2" registers shall display a minimum of 99.999999 million gallons. It is preferred that FCWS be able to program digits in the field. | Base |  |  |
|  | General – All Meters, Registers | Register shall clearly differentiate which values are being sent to the AMI system and the raw read (1 gallon). | Base |  |  |
|  | General – All Meters, Registers | Registers digital numbers shall be easily distinguishable in low light environment from at least 5 ft. away. | Base |  |  |
|  | General – All Meters, Registers | The register lens shall resist breakage and scoring under standard operating conditions. | Base |  |  |
|  | General – All Meters, Registers | The register/encoder programmer shall be capable of applying the same settings across multiple registers/encoders without requiring re-entry of the settings. | Base |  |  |
|  | General – All Meters, Registers | Register shall be removable from the meter and must have a lid that covers/protects the register display. | Base |  |  |
|  | General – All Meters, Registers | Registers shall offer support for remote programming of alarm and meter configurations through the Endpoint via 2-way communication. Describe any corresponding hardware requirements, and any efforts made to comply to open standards for cross-platform compatibility of this feature. | Base |  |  |
|  | General – All Meters, Registers | The register shall support localized interval data history storage and retrieval for all available measurements (consumption, temperature, pressure, etc.), with configurable interval periods down to 5 minutes or less and a minimum storage capacity of 288 consecutive intervals. Describe the retrieval process. | Base |  |  |
|  | General – All Meters, Registers | Registers shall be able to record and relay temperature and pressure measurements. Describe measurement accuracy and data transmission methods. | Optional |  |  |
|  | General – Shutoff | Remotely actuated shutoff valves shall be integrated with the meter and support on-demand state changes and confirmation via Endpoint communications. Valve states shall include open, closed, and reduced flow. FCWS plans to use meters with integrated shutoff in limited quantities. | Base |  |  |
|  | General – All Meters, Registers | The register shall offer empty pipe alarms and configurable thresholds for temperature and pressure high/low alarms. | Base |  |  |
|  | General – All Meters, Registers | The register shall provide configurable alarms for leak, broken pipe, reverse flow, and tamper conditions. Describe the parameters available for each alarm. | Base |  |  |
|  | Mechanical Meters - Operating Characteristics ¾” – 1” | Normal operating range accuracy shall be 100 +/- 1.5% at water temperature less than 80°F as shown below for all meter sizes:   |  |  |  | | --- | --- | --- | | SIZE  (inches) | NORMAL FLOW RATE  (gallons per minute) | ACCURACY  (percentage) | | ¾” | 2 - 30 | 98.5 – 101.5 | | 1” | 3 - 50 | 98.5 – 101.5 | | Base |  |  |
|  | Mechanical Meters - Operating Characteristics ¾” – 1” | Minimum Flow Rate (at accuracy 95% -101%) at water temperature less than 80°F shall be as shown below for all meter sizes:   | SIZE  (inches) | MIN FLOW RATE  (gallons per minute) | ACCURACY  (percentage) | | --- | --- | --- | | ¾” | 0.5 | 95 – 101.5 | | 1” | 0.75 | 95 – 101.5 | | Base |  |  |
|  | General – All Static Meters | Meters shall use solid state technology in a totally encapsulated, waterproof housing. Meter and register shall be a single unit with no moving parts in the flow path, however, meters with removable and replaceable electronics are allowable. | Base |  |  |
|  | General – All Static Meters | Metallic, polymer, or composite bodies or meter threads may be allowed. Bolts that attach the bottom plate to the meter case shall be stainless steel, as applicable. All nuts, washers, and bolts in meter and on meter body shall be stainless steel. | Base |  |  |
|  | Static meters -Operating Characteristics ¾” – 8” | Normal operating range at accuracy 100 +/- 1.5% at water temperature less than 80°F shall be at minimum as shown below for all meter sizes:   |  |  |  | | --- | --- | --- | | SIZE  (inches) | NORMAL FLOW RATE  (gallons per minute) | ACCURACY  (percentage) | | ¾” | 0.5 - 30 | 98.5 – 101.5 | | 1” | 0.75 - 50 | 98.5 – 101.5 | | 1.5” | 2 - 100 | 98.5 – 101.5 | | 2” | 2.5 - 160 | 98.5 – 101.5 | | 3” | 7.5–350 | 98.5 – 101.5 | | 4” | 10–600 | 98.5 – 101.5 | | 6” | 20–1,350 | 98.5 – 101.5 | | 8” | 40–1,600 | 98.5 – 101.5 | | 10” | 150–4,500 | 98.5 – 101.5 | | Base |  |  |
|  | Static meters -Operating Characteristics ¾” – 10” | Minimum Flow Rate at water temperature less than 80°F shall be as shown below for all meter sizes:   |  |  |  | | --- | --- | --- | | SIZE  (inches) | MIN FLOW RATE  (gallons per minute) | ACCURACY  (percentage) | | ¾” | 0.15 | 98.5 – 105 | | 1” | 0.30 | 98.5 – 105 | | 1.5” | 0.60 | 98.5 – 105 | | 2” | 1 | 98.5 – 105 | | 3” | 2.5 | 98.5 – 105 | | 4” | 3.5 | 98.5 – 105 | | 6” | 9 | 98.5 – 105 | | 8” | 19 | 98.5 – 105 | | 10” | 50 | 98.5 – 105 | | Base |  |  |
|  | Large meters – Testing in service | All large meters (3” and greater) shall have test ports to test meter as needed. Describe if any equipment or additional piping is required to test large meters. | Base |  |  |
|  | Warranty – All Meters | Manufacturer shall warrant materials and workmanship of all meters and meter parts to be free of defects for a period of twenty years after receipt of meters. FCWS understands components with batteries may have replacement costs prorated after year ten. Upon request by FCWS, the manufacturer shall submit a certificate and/or lab analysis on a shipment indicating the copper content and alloys in any bronze part of the meter to verify' compliance with these specifications. | Base |  |  |
|  | Warranty – All Meters | Where meters fail to operate accordingly within the designated warranty period, the parts to replace such defects shall be supplied by the awarded Respondent without charge (piece for piece) upon the return of such defective parts to the awarded Respondent OR upon the proper proof of such defects. Where meters, or a portion thereof, shall be factory repaired, the awarded Respondent(s) shall assume all shipping charges, replace all defective parts, and make necessary repairs required to replace such defective meters in suitable condition and return repaired meters at no cost to FCWS. | Base |  |  |
|  | Receiving Meter Shipments – Sample testing | Each meter shall be individually factory tested and testing results supplied with an upload file for FCWS to upload the test results to its meter inventory system via a format provided by FCWS. Each meter shall have a sticker showing the accuracy test results at the three AWWA M6 test flow rates of each meter according to meter size and type. Any meter failing to register accurately according to these test specifications shall be rejected and returned to the Respondent. Rejected meters shall be repaired or replaced by the Respondent at no cost to FCWS. | Base |  |  |
|  | Receiving Meter Shipments – Sample testing | ~~If more than 3% of any order placed fails to pass inspection and tests, FCWS reserves the right to reject the entire order.~~  **Revised Requirement Addendum 3, Question 22.**  Random sample testing of received meter shipments shall follow these requirements:   * Random sample size is 5% of a shipment * If 10% or more of the random sample fails, then the Respondent shall randomly select another 5% sample for additional testing. * If 10% or more meters fails again, then FCWS has the option to reject the entire shipment | Base |  |  |

## Meter Box Covers and Meter Boxes

| ID | Sub-area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
|  | Meter Box Covers | Meter pit covers shall be non‐metallic and constructed of high‐impact, no break approved polymer or composite. Proposed lid shall be approved by AMI vendor. Specify the covers proposed (brand, make, model, etc.) | Base |  |  |
|  | Meter Box Covers | Meter pit covers in areas not expected to be exposed to vehicular traffic shall be rated to withstand at least a 20,000‐pound load, plus impact, as measured via testing in accordance with AASHTO M306 without any damage of permanent deformation. | Base |  |  |
|  | Meter Box Covers | Meter pit covers in areas exposed to vehicular traffic shall be rated to withstand at least a 40,000‐pound load, plus impact, as measured via testing in accordance with AASHTO M306 without any damage of permanent deformation | Base |  |  |
|  | Meter Box Covers | Meter pit covers described in this specification come in a variety of shapes and sizes:   * 10.5-inch rectangular * 12-inch rectangular – Standard size ¾” and 1” * 15-inch rectangular – Standard size 1-1/2” and 2”   See Appendix 2 for specifications. | Base |  |  |
|  | Meter Box Covers | The cover shall withstand a temperature range of ‐40‐degree F to 190‐degree F and shall be resistant to ultraviolet light degradation, corrosion, and be unaffected by rain or condensation, frost‐proof, and  compatible with rugged service and long life. | Base |  |  |
|  | Meter Box Covers | All covers shall have a slip‐resistant surface having a molded tread pattern for skid resistance | Base |  |  |
|  | Meter Box Covers | Respondent to verify the fit of each cover size by field testing a sample lid to verify dimensions and compatibility with existing meter boxes | Base |  |  |
|  | Meter Box Covers – Labeling | Each meter pit lid shall have a generic label “Water” in its superior part of its body. The word shall be legible and shall be engraved permanently in the body of the cover. | Base |  |  |
|  | Meter Box Covers – AMI | Each meter pit lid shall be furnished with a recess and hole to accommodate the selected AMI  transmitter. Covers shall optionally be available with mounting brackets to facilitate under‐the‐cover installation of an MIU if that is the installation method preferred by the AMI vendor. | Base |  |  |
|  | Meter Boxes | Meter boxes shall AMI ready for the proposed MIU and be equivalent to FCWS current meter boxes which are DFW Plastics DFW1200.12.1T.   * Size: 12x17x12 (standard for ¾” and 1”) * Size: 34-1/8x21-1/4x18 (standard 1-1/2” – 2”)   Product specifications for these meter boxes are included in Appendix 2 | Base |  |  |

Water Meters, Meter Box Covers, and Meter Box Equipment Questions

| ID | Question | Response |
| --- | --- | --- |
| Q1 | Do static meters need a test port? If so, how often do they need to be tested? |  |
| Q2 | What can malfunction with a static meter? |  |
| Q3 | FCWS has some meter makes and types of various sizes that are less than 5 years old. Are retrofits (meter register and endpoint or endpoint only) an option for the proposed AMI solution? Describe or provide a recommendation. See Section 6 of the RFP for meter makes and types. |  |
| Q4 | Clearly indicate which pit lid types will require through the lid mounting vs. which can be under the lid. Provide a standard detail with a section view showing the elevation of the lid with respect to the antenna. |  |

# AMI Software

| ID | Sub-area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
|  | Integrations | Respondent will provide integrations with the Headend System (HES) to Tyler Munis –   * + - Account / meter sync (1 way) - – this interface from CIS to HES will provide updated customer account information (meter and premise). Data includes meter details including but not limited to read channels, multipliers, etc.), Meter location, billing schedule, account details, customer contact information     - Bill reads - this interface will provide a request and response data flow for billing determinants. Trigger upon request from FCWS billing specialist in MUNIS by bill cycle. Bill read by premise / meter ID is provided from the HES to MUNIS.     - Alarms/Alerts - leak and usage alerts for use in customer engagement processes. | Base |  |  |
|  | Integrations | Respondent will provide integrations with the HES to Customer Portal –   * AMI Usage for customer portal presentment | Base |  |  |
|  | Integrations | Respondent will provide integrations with the Head-end System (HES) to Esri Geographic Information System (GIS)   * Key inbound data transfer to the HES include GIS and Asset data. This will enable the map visualizations in the HES for the AMI System administrator(s). | Base |  |  |
|  | Integrations | Respondent will provide integration between the installer work order system and Tyler Munis CIS and Billing system for the transfer of installed meter data at a minimum daily. | Base |  |  |
|  | Integrations | Respondent will ensure that the meter ship file provided by the meter manufacturer successfully integrates with the Tyler Munis or other vendor-maintained meter inventory database. | Base |  |  |
|  | Data Retention | The AMI system shall provide the ability to set a data retention schedule. Describe the default data retention policies. | Base |  |  |
|  | Capabilities | The headend shall be capable of requesting on-demand read and status inquiry of individual meter devices or defined groups of meters. | Base |  |  |
|  | Capabilities | The headend shall be able to remotely upgrade meter, MIU, and collector software and firmware. | Base |  |  |
|  | Capabilities | The headend shall monitor the performance of the AMI meters, collectors, and network. Describe how the system provides key diagnostics and statistics from all AMI meters, devices, and field communication network elements. Reports shall include (at a minimum) meter read status reports, event/transaction status reports, trouble reports, and meter additions/removals. | Base |  |  |
|  | Capabilities | The headend shall support mapping capabilities to provide an intuitive view of all event alarms (at the meter, MIU, and collector level). | Base |  |  |
|  | Capabilities | The headend system shall provide for regular time synchronization using the simple network time protocol (SNTP) or other means to keep the system clock accurate to at least 2.5 seconds. | Base |  |  |
|  | Capabilities | AMI software shall provide the ability to gather time synchronized meter readings from a grouping of meters. | Base |  |  |
|  | Capabilities | The headend shall support the ability to gather data including but not limited to equipment status, diagnostics, and event logs related to all the components (meter, MIU, collector, etc.) of the AMI solution. | Base |  |  |
|  | Capabilities | The headend system shall be able to detect installation of new meters onto the communications network and shall also detect when existing AMI meters have been removed. This information shall be available as a report that can be periodically produced. | Base |  |  |
|  | Capabilities | As meters self-register, the headend system shall initially place them into an unscheduled read group. | Base |  |  |
|  | Capabilities | The headend system shall be able to remotely configure the meter's read interval. | Base |  |  |
|  | Capabilities | The headend system shall be able to issue an on-demand read request initiated from authorized users. | Base |  |  |
|  | Capabilities | The headend system shall collect and log all tamper detection events sent by meters (logged with event timestamp, tamper event type, and meter ID). | Base |  |  |
|  | Capabilities | The headend system shall provide comprehensive remote testing and diagnostic capabilities for each system component (meters, MIUs, and backhaul communications) based on a (periodic) schedule or on demand. Remote testing and diagnostic alarm messages are to be considered high priority. | Base |  |  |
|  | Capabilities | The headend system shall be able to remotely test meters for communication status, battery status, and flow status on-demand. | Base |  |  |
|  | Capabilities | The headend system shall be able to remotely detect network communications problems, including loss of redundant communications pathways, diminishing signal strength, repeated delays in reporting, etc. | Base |  |  |
|  | Capabilities | The headend system shall have configurable alert levels and notifications based on the severity of a problem detected and the number of endpoints affected. | Base |  |  |
|  | Capabilities | The headend system shall be configurable to allow it to classify specific testing/diagnostic results as either requiring or not requiring human intervention in the determination of issuing trouble reports. | Base |  |  |
|  | Capabilities | The headend system shall have the ability to identify the probable cause of a communications failure within the AMI system (i.e., bad cable, failed MIU, backhaul issues, etc.). | Base |  |  |
|  | Capabilities | The headend system shall provide mechanisms for remotely correcting system/component problems, which at a minimum shall include the ability to remotely reset (or restart) a component. | Base |  |  |
|  | Capabilities | The headend system will detect incompatible hardware/software (firmware) combinations between meters, MIUs, collectors, and the headend itself. | Base |  |  |
|  | Capabilities | The headend system will collect all interval data and logs from premises and communications network components at a configurable frequency (at least once per day). Provide details on how many times per day reads are transmitted and how many hours of interval data are transmitted per occurrence. | Base |  |  |
|  | Capabilities | The headend system shall have the ability to remotely configure (set/update/cancel) each meter's default read interval for a specified or ongoing duration (for all AMI meters). | Base |  |  |
|  | Capabilities | The headend system shall have the ability configure the read interval for individual meters or a selected group of MIUs. Describe this process to set a new meter reading interval and if there is an automatic reset to the default setting. | Base |  |  |
|  | Capabilities | The headend system shall have a default transmitting interval for MIU readings. Describe the default transmission interval and the user’s ability to change and reset the transmission interval. Indicate any impact of battery life. | Base |  |  |
|  | Capabilities | The headend system shall successfully collect interval and all log data for previous day (midnight to midnight) | Base |  |  |
|  | Capabilities | The headend system shall be able to issue a re-read request for all meters that have failed to report their default read (e.g., in mass on demand read) for up to 10% of total AMI meter population. | Base |  |  |
|  | Capabilities | The headend system shall be able to handle various types of events and device health messages (e.g., low battery, tampering, leak, etc.). Respondent shall provide a list all events/alarms supported for relevant meter manufacturers. Note all available alarms, and which alarms are available based on FCWS’ existing meter population. | Base |  |  |
|  | Capabilities | AMI system shall allow meters to be grouped into multiple different configurable groups for meter reading and data analysis. Examples of groups  include routes, customer types, billing cycle, pressure districts, and geographic areas. This management can occur in multiple software applications but must be thoroughly described here. Grouping must be able to manage in the User Interface, including adding and removing meters from the group. Automation of group creation by designated field(s) is preferred. | Base |  |  |
|  | Capabilities | AMI system shall provide the ability to gather time synchronized meter readings from a grouping of meters. | Base |  |  |
|  | Capabilities | AMI System shall provide the ability to create a virtual meter from a grouping of meters. Virtual Meters should sum the consumption of interval reads for a grouping of meters and present the total consumption in a report for each interval period. Virtual Meters must be able to managed in the User Interface, including adding and removing meters from the group. Automation of group creation by designated field(s) is preferred. | Base |  |  |
|  | Architecture | The headend system shall have an overall architecture and system design that is sufficiently distributed so that no single point of failure causes a system performance degradation so severe that the system no longer serves its intended purpose. | Base |  |  |
|  | Reporting and Analytics | AMI system shall have standard reports that can be run on demand or scheduled and distributed via email or saved to a SharePoint site/Network drive.  Provide a list with brief descriptions and report purpose. Include screenshots in an appendix of the submitted proposal. | Base |  |  |
|  | Reporting and Analytics | FCWS users shall have the capability to exports standard reports in standard CSV format. | Base |  |  |
|  | Reporting and Analytics | AMI system shall indicate when there is an extended period of no flow through the meter, or an unusually low consumption over a regular reading interval | Base |  |  |
|  | Reporting and Analytics | The software shall be able to create user‐defined account groups and aggregate consumption profiles. | Base |  |  |
|  | Reporting and Analytics | The system shall flag and report any unauthorized usage, if the customer account record indicates that service has been shut off. | Base |  |  |
|  | Reporting and Analytics | System shall alert possible continuous high consumption events at individual customers’ premises. | Base |  |  |
|  | Reporting and Analytics | System shall monitor for usage on inactive accounts, consisting of registered reads above configurable thresholds without an active customer account. | Base |  |  |
|  | Reporting and Analytics | Identification of accounts where usage violates temporary restrictions (e.g., apparent outdoor irrigation usage during non‐allowed times or days) | Base |  |  |
|  | Reporting and Analytics | The headend system shall be able to run reports on a predefined schedule and distribute by email or saved to a designated network drive. | Base |  |  |
|  | Reporting and Analytics | The headend system shall have adhoc reporting capabilities for users to create their own reports. Provide details on reporting flexibility. | Base |  |  |

AMI Software Questions

|  | Question | Response |
| --- | --- | --- |
| Q1 | Describe the steps a user performs to obtain meter readings using the AMI Software and prepare to send to the Billing system. Provide a flow diagram and screenshots to illustrate how this process works. |  |
| Q2 | Describe the key activities and processes required to proper maintain and administer the AMI system. Provide a flow diagram and screenshots to illustrate the key tasks. |  |
| Q3 | Does the AMI Headend have any user configurable dashboard capabilities? Please describe. |  |
| Q4 | Does the AMI Headend have any meter data management capabilities to support the billing process, such as verification, estimation, editing (VEE)? Please describe. |  |
| Q5 | Describe how the data in the AMI Headend can be used to right size meters? Are there data analytics helpful for this use case? Please describe. |  |
| Q6 | Describe how AMI usage is “cleaned” prior to sending AMI usage to a customer portal for web presentment. |  |
| Q7 | Describe any water analytics offerings that provides long term data storage |  |

# Customer Portal

| ID | Sub-area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
|  | Architecture | The system web applications shall follow responsive design practices to dynamically organize content to best suit the users form-factor (mobile, tablet, and desktop at minimum). | Base |  |  |
|  | Architecture | Customer portal shall provide the ability to be branded with FCWS’ name and logo in the mobile application, web portal, mobilized application, and knowledgebase. |  |  |  |
|  | Architecture | Customer portal application shall be capable of being integrated into the County’s website for a seamless customer experience. |  |  |  |
|  | Architecture | The system shall be accessible to customers using commercially available web browsers. Provide details on supported browsers including versions. |  |  |  |
|  | Deployment | The Customer portal shall be a hosted solution from data centers located in the continental US. | Base |  |  |
|  | Capabilities | Customer portal to provide a dashboard so customers to get a quick view of their current bill, daily usage, notifications, recommendations to conserve, etc. | Base |  |  |
|  | Capabilities | Customer portal shall display interval usage information in user friendly, user selected graphs and tables. Consumption graphs to be presented in hourly, daily, or monthly usage for a default period of time or a user defined period of time. | Base |  |  |
|  | Capabilities | Customer portal shall provide the capability to download or export AMI usage data to csv format. | Base |  |  |
|  | Capabilities | Customer portal shall provide an analysis of a customer’s bill to help understand a high bill | Base |  |  |
|  | Capabilities | Customer portal shall provide the capability for customers to integrate an online bill pay service, view current balance and due date, view their current and previous bills in PDF, submit a customer service request (new account, turn on / turn off, etc.), and update customer account information. | Base |  |  |
|  | Capabilities | Customer portal shall provide customers the ability to enroll in customer service programs such as autopay, budget billing, paperless billing, etc. | Base |  |  |
|  | Capabilities | Customer portal shall provide customer the ability to analyze their water consumption behaviors and identify opportunities to conserve. | Base |  |  |
|  | Capabilities - Security | Customer portal shall require customers to setup an account using configurable password criteria based on the County’s security requirements. | Base |  |  |
|  | Capabilities - Security | Customer portal shall be accessible by a customer from the County’s website or e-billing page. Describe to what extent the proposed portal solution can accept existing authentication tokens from another system. |  |  |  |
|  | Capabilities - Security | Customer portal shall allow customer to retrieve, or re-set forgotten username and password. Additionally, the portal shall provide a County user to help a customer manage a forgotten username and password. Describe capabilities. |  |  |  |
|  | Capabilities | End Customer notification from the Customer Portal must include user-configurable threshold alerts based on meter consumption data and forecasted bill | Base |  |  |
|  | Capabilities | End Customer accounts must be able to have access to more than one meter under one account. Additionally, if a customer’s meter has more than one register, the system shall be able to aggregate the consumptions into a single view with proper multipliers. | Base |  |  |
|  | Capabilities | Customer portal shall have the capability to provide End Customer with notifications of high and unusual patterns of water consumption. | Base |  |  |
|  | Capabilities | Customers shall be able to enroll in consumption alerts or bill alerts for multiple per an account (e.g., multiple emails, texts, SMS) | Base |  |  |
|  | Capabilities | Customers shall be able to view and analyze customer analytics such as consumption this month compared to any previous month or previous year | Base |  |  |
|  | Capabilities | Customer portal shall provide tools and information for a CSR to respond to customer questions regarding a high bill. The view of the portal information should look similar to what the customer is seeing from their log in. | Base |  |  |

Customer Portal Questions

| ID | Question | Response |
| --- | --- | --- |
| Q1 | Does the proposed portal have a mobile app? Describe capabilities. |  |

# Portable Interrogation, Field Programming and Testing Devices

| ID | Sub-Area | Requirement Description | Type  (Base/ Optional) | Compliance  (Meets; Does Not Meet; Not Applicable) | Compliance Description |
| --- | --- | --- | --- | --- | --- |
|  | Mobile reading options | System shall be capable of reading meters in walk by, mobile drive by or via AMI network. | Base |  |  |
|  | Bar Code Reader | The handheld field data collection unit shall contain an integral optical character reader or other device or function to capture meter and MIU numbers from bar codes or other machine-readable information contained attached to the units. | Base |  |  |
|  | Handheld Operations | The handheld shall have the ability to temporarily disable encryption on the endpoint without intervention from the head end for maintenance and configuration.  Describe how this is accomplished. | Base |  |  |
|  | Handheld Operations | The handheld shall be capable of reading and downloading data from the MIUs. | Base |  |  |
|  | Handheld Operations | The handheld shall be capable of programming the MIU with any information required for operation and not pre-programmed at the factory. It shall be capable of providing instructions to the MIU concerning the make, model and data protocol of the meter being connected, should the MIU not be able to determine this itself. | Base |  |  |
|  | Handheld Operations | The handheld unit shall be able to program a programmable meter register. Describe how this is accomplished. | Base |  |  |
|  | Handheld Operations | The handheld unit shall remotely be able to locate and diagnose problems with a meter register or MIU unless the system incorporates an alternate way to make such diagnoses. Please describe. | Base |  |  |
|  | Handheld Operations | The handheld unit shall be able to ascertain the condition or remaining life of the battery in an MIU. | Base |  |  |
|  | Handheld Operations | The handheld unit shall collect GPS coordinates at time of installation. These coordinates shall be stored for export to other systems; describe this functionality and how this will get to the FCWS’ systems. | Base |  |  |
|  | Handheld Operations | All handheld units shall ensure against accidental data loss in case of a dead battery. Please describe. | Base |  |  |
|  | Handheld Operations | The programming/installation field tool shall provide immediate feedback of MIU programming success and signal strength to the network. Describe how this works and how long this takes. | Base |  |  |
|  | Handheld Operations | Field applications shall be made available in Android, iOS, or Windows compatible installers for use with the utility's own hardware. Describe supported platforms and hardware requirements if so. | Base |  |  |
|  | Handheld Operations | Programming field tools shall support cellular and/or wireless connectivity. | Base |  |  |
|  | Handheld Operations | The field tool shall retain a log or have the capability to export programming and read history in a common format.  Describe the format(s) available, the fields they record, and the methods of transferring this data to other devices. | Base |  |  |
|  | Warranty | All field tools, including handhelds and mobile collection devices, shall be covered by a warranty.  List the warranty period and for proposed field tools, including handheld and mobile collection devices (if they differ). In the event of warranty claim, are devices replaced or repaired, and are loaner units provided at no charge? | Base |  |  |

Portable Interrogation, Field Programming and Testing Devices Questions

| ID | Question | Response |
| --- | --- | --- |
| Q1 | If respondent's AMI System can support additional applications beyond metering such as smart utility and smart city IoT sensors and devices, provide details on other IoT product offerings that are interoperable under the proposed network. Include pricing in the pricing templates. |  |