SECTION 5
SPECIFICATIONS

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 PROJECT DESCRIPTION

A. The project consists of replacing the Village of Brewster's existing meter reading system with an Advanced Metering Infrastructure (AMI) type system to read both water and electric meters with one system.

B. The project includes furnishing and delivering materials including water meter MTUs and electric meters for Village installation. Materials shall be deliver to the following address:

325 Lincoln SW
Brewster, OH 44613

1.2 SPECIFICATIONS

A. In general, these Specifications describe the work to be performed by the various trades, other than work specifically excluded. It shall be the responsibility of the Contractor and Subcontractors to perform all work incidental to their trade, whether or not specific mention is made of each item, unless such incidentals are included under another Item.

B. It is advised that the Contractor and all Subcontractors familiarize themselves with the contents of the complete Specifications, particularly for the trades preceding, following, related or adjacent to their work.

1.3 WORK BY OWNER

A. The Owner intends to coordinate, manage, store, and install MTUs unless Alternative Bid Items are approved for inclusion in Agreement.

B. The Owner intends to coordinate, manage, store, and install electrical meter replacements.

1.4 CONTRACTOR USE OF SITE

A. Limit use of Site to allow:
   1. Owner occupancy
   2. Work by Owner
   3. Use of Site by the public.

B. Time Restrictions for Performing Work: Follow Section 330908.01.

1.5 OWNER OCCUPANCY

A. Owner will occupy the Site during the entire period of construction for the conduct of normal operations.

B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

END OF SECTION 011100

SECTION 011423 - ADDITIONAL WORK, OVERTIME

PART 1 - GENERAL

1.1 NIGHT, SUNDAY AND HOLIDAY WORK

A. No work will be permitted at night, Sunday or legal holidays except as noted on the plans or in the case of emergency and then only upon written authorization of the Engineer. Where no emergency exists, but the Contractor feels it advantageous to work at night, Sunday or legal holidays, the Contractor shall notify the Engineer at least two (2) days in advance, requesting written permission. Any work performed during the absence of the Engineer will be done at the Contractor's risk and responsibility and may be subject to rejection upon later inspection.

END OF SECTION 011423

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing Alternates.

1.3 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: Immediately following the award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other Work of this Contract.

D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1A: AMI System Integration, Setup, and Training for in-house hosting by Village.
B. Alternate No. 2A: Annual Service or Maintenance Agreements for all products, extended warranties, etc. - Years 6-10
C. Alternate No. 2B: Annual Service or Maintenance Agreements for all products, extended warranties, etc. - Years 11-15
D. Alternate No. 3A: Fixed Network Data Collector and RF antenna on Fire Department Tower (if needed)
E. Alternate No. 4A: Installation of Wall MTU and 3-wire installation kit
F. Alternate No. 5A: Encoder to Outside of Unit
G. Alternate No. 6A: Installation for MTUs for pit mounts (520M) water
H. Alternate No. 7A: Customer Interface Portal Software, First 2 Years

END OF SECTION 012300

SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 MATERIALS AND EQUIPMENT

A. In the specifications and on the Engineer's drawings, are specified and shown certain pieces of equipment and materials deemed most suitable for the service anticipated. This is not done to eliminate other equipment and materials equally as good and efficient. The Contractor shall prepare his bid on the particular materials and equipment specified. Following the award of the contract, should the Contractor desire to use other equipment and materials, he shall submit to the Owner a written request for such change and state the advantage to the Owner and the savings or additional cost involved by the proposed substitution. The determination as to whether or not such change will be permitted rests with the Owner and the Engineer. Use forms included in Specification Section 013323 Paragraph 1.4.

B. Each major item of equipment shall be inspected by a manufacturer's representative during installation and upon completion of the work. The Contractor shall supply the Engineer with a certificate of such inspection.

C. For the purpose of standardization, equipment of any one type shall be the products of one manufacturer.

D. Provide interchangeable components of the same manufacture for components being replace.

END OF SECTION 012513

SECTION 013119 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 PRECONSTRUCTION MEETING

A. Prior to the Contractor beginning any work on the project, the Owner will schedule and hold a preconstruction meeting to discuss all aspects of the contract work.

B. Attendance Required: Owner, Engineer, Contractor, Contractor's Superintendent, and major Subcontractors

C. The Contractor shall be present and be prepared to comment in detail on all aspects of his work.

D. Agenda:
1. Submission of insurance certificates
2. Distribution of Contract Documents
3. Submission of schedule of values, schedule of Shop Drawings and Sample submittals, and progress schedule
4. Designation of personnel representing the parties in Contract, Engineer, and others as appropriate
5. Procedures and processing of field decisions, submittals, substitute and "or-equals", Applications for Payments, Change Orders, and Contract Closeout procedures
6. Scheduling
7. Use of premises by Owner and Contractor
8. Owner's requirements
9. Security and housekeeping procedures
10. Procedures for testing
11. Procedures for maintaining Record Documents
12. Requirements for start-up of equipment
13. Inspection and acceptance of equipment put into service during construction period
14. Contractor's safety representative
15. Safety

E. Included in the construction progress schedule shall be an implementation sequence of the proposed erosion control efforts required by the contract.

1.2 PROGRESS MEETINGS

A. Monthly progress meetings will be held at a location to be determined by the Owner on a regularly scheduled day mutually convenient to the Owner, Contractor, and Engineer.

B. The Contractor shall provide an updated construction progress schedule and be prepared to comment in detail on all aspects of his work.

C. Attendance Required: Contractor's job superintendent and office representative managing job, major Subcontractors and Supplies, Owner, Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:
   1. Review minutes of previous meetings
   2. Review of Work progress
   3. Field observations, problems and decisions
   4. Identification of problems which impede planned progress
   5. Review of submittals schedule and status of submittals
   6. Review of off-site fabrication and delivery schedules
   7. Maintenance of progress schedule
   8. Corrective measures to regain projected schedules
   9. Planned progress during Work period
   10. Coordination of projected progress
   11. Maintenance of quality and Work standards
   12. Effect of proposed changes on progress schedule and coordination
   13. Safety
   14. Other business relating to Work

1.3 PRE-INSTALLATION MEETINGS

A. When required in individual Specification Sections, convene pre-installation meetings at Project Site prior to commencing Work of specific Section

B. Require attendance of parties directly affecting, or affected by, Work of specific Section.

END OF SECTION 013119

SECTION 013216 – CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 PROGRESS SCHEDULE

A. Immediately after signing the Contract, the General Construction Contractor shall prepare a graphic progress schedule, indicating the work to be executed during each month and the rate of expected progress to secure completion on the agreed-upon completion date. The progress schedule shall be approved by the Engineer and Owner prior to starting work on the site. Copies of such graphic progress charts, upon which has been indicated the actual progress, shall be furnished to the Engineer with each requisition for payment.

B. Should the rate of progress fall materially behind the scheduled rate of progress, and unless the delay is authorized by the Engineer, each offending Contractor shall furnish additional labor, work overtime, or take other necessary means required for completion of the work on the scheduled date. No additional compensation beyond the set Contract price shall be paid for action taken or overtime expense incurred in maintaining scheduled progress.

END OF SECTION 013216

SECTION 013323 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 GENERAL

A. The Contractor shall submit detailed drawings, acceptable catalog data, specifications and material certifications for all equipment and materials specified or required for the proper completion of the work.

B. The intent of these items is to demonstrate compliance with the design concept of the work and to provide the detailed information necessary for the fabrication, assembly and installation of the work specified. It is not intended that every detail of all parts of manufactured equipment be submitted, however sufficient detail will be required to ascertain compliance with the specifications and establish the quality of the equipment proposed.

Shop Drawings shall be sufficiently clear and complete to enable the Engineer/Architect and Owner to determine that items proposed to be furnished conform to the specifications and that items delivered to the site are actually those that have been reviewed.

C. It is emphasized that the Engineer/Architect's review of Contractor's submitted data is for general conformance to the contract drawings and specifications but subject to the detailed requirements of drawings and specifications. Although the Engineer/Architect may review submitted data in detail, such review is an effort to discover errors and omissions in Contractor's drawings. The Engineer/Architect's review shall in no way relieve the Contractor of his obligation to properly coordinate the work and to Engineer/Architect the details of the work in such manner that the purposes and intent of the contract will be achieved. Such review by the Engineer/Architect shall not be construed as placing on him or on the Owner any responsibility for the accuracy and for proper fit, functioning or performance of any phase of the work included in the contract.

D. Shop Drawings shall be submitted in proper sequence and with due regard to the time required for checking, transmittal and review so as to cause no delay in the work. The Contractor's failure to transmit appropriate submittals to the Engineer/Architect sufficiently in advance of the work shall not be grounds for time extension.

E. The Contractor shall submit Shop Drawings for all fabricated work and for all manufactured items required to be furnished in the Contract in accordance with the General Provisions and as specified herein. Shop Drawings shall be submitted in sufficient time to allow at least twenty-one (21) calendar days after receipt of the Shop Drawings from the Contractor for checking and processing by the Engineer/Architect.

F. It is the responsibility of each Prime Contractor to furnish to all other Prime Contractors and especially the General Construction Contractor reviewed Shop Drawings for guidance in interfacing the various trades; i.e., sleeves, inserts, anchor bolts, terminations, and space requirements.

G. No work shall be performed requiring Shop Drawings until same have been reviewed by Engineer/Architect.

H. Accepted and reviewed Shop Drawings shall not be construed as approval of changes from Contract plan and specification requirements.

I. The Engineer/Architect will review the first and second Shop Drawing item submittals at no cost to the Contractor. Review of the third submittal and any subsequent submittal will be at the Contractor's expense. Payment will be deducted from the Contract amount at a rate of 2.8 times direct labor cost plus expenses.

1.2 SUBMITTAL PROCEDURE

A. As a minimum, submittals are required for the following items:

Section No.	Equipment or Material	Shop Drawings Required	O&M Manual Required
330908.01	Meter Transmission Units	X	X
330908.01	Data Collection Units	X	X
262700.01	Electric Meters and Electric Meter Endpoint Devices	X	X
330908.01	Web hosted software	X	

Submittals for additional items shall be submitted when required by other specification sections and/or deemed necessary by the Engineer.

B. All required submissions shall be made to the Engineer/Architect by the Prime Contractor(s) only. Any data prepared by subcontractors and suppliers and all correspondence originating with subcontractors, suppliers, etc., shall be submitted through the Contractor.

C. Contractor shall review and approve all Shop Drawings prior to submission. Contractor's approval shall constitute a representation to Owner and Engineer/Architect that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or assumes full responsibility for doing so, and that Contractor has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and the Contract Documents.

D. Submittal Preparation: Mark each submittal with a permanent label or page for identification. Provide the following information on the label for proper processing and recording of action taken:

1. Location
2. Project Name
3. Contract
4. Name and Address of Engineer/Architect

5. Name and Address of Contractor
6. Name and Address of Subcontractor
7. Name and Address of Supplier
8. Name of Manufacturer
9. Number and Title of appropriate Specification Section
10. Drawing Number and Detail References, as appropriate.
11. Submittal Sequence or Log Reference Number.

    a. Provide a space on the label for the Contractor's review and approval markings and a space for the Engineer/Architect's "Action Stamp".

E. Each Shop Drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor:

Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.

_____ _____

Signature Date

_____

Company

F. Shop Drawings shall be submitted in not less than six (6) copies to the Engineer/Architect at the address specified at the Preconstruction Conference. Single mylar or sepia reproducible copies of simple Shop Drawings may be submitted with prior approval of the Engineer/Architect.

G. At the time of each submission, Contractor shall in writing identify any deviations that the Shop Drawings or samples may have from the requirements of the Contract Documents.

H. Drawings shall be clean, legible and shall show necessary working dimensions, arrangement, material finish, erection data, and like information needed to define what is to be furnished and to establish its suitability for the intended use. Specifications may be required for equipment or materials to establish any characteristics of performance where such are pertinent. Suitable catalog data sheets showing all options and marked with complete model numbers may, in certain instances, be sufficient to define the articles which it is proposed to furnish.

I. For product which require submittal of samples, furnish samples so as not to delay fabrication, allowing the Engineer reasonable time for the consideration of the samples submitted. Properly label samples, indicating the material or product represented, its place of origin, the names of the vendor and Contractor and the name of the project for which it is

intended. Ship samples prepaid. Accompany samples with pertinent data required to judge the quality and acceptability of the sample, such as certified test records and, where required for proper evaluation, certified chemical analyses.

1.3 REVIEW PROCEDURE

A. Engineer/Architect will review with reasonable promptness all properly submitted Shop Drawings. Such review shall be only for conformance with the design concept of the Project and for compliance with the information given in the plans and specifications and shall not extend to means, methods, sequences, techniques or procedures of construction or to safety precautions or programs incident thereto.

B. The review of a separate item as such will not constitute the review of the assembly in which the item functions. The Contractor shall submit entire systems as a package.

C. All Shop Drawings submitted for review shall be stamped with the Engineer/Architect's action and associated comments.

D. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer/Architect will review each submittal, mark to indicate action taken, and return accordingly. Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Engineer/Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. If Shop Drawings are found to be in general compliance, such review will be indicated by marking the first statement.
2. If only minor notes in reasonable number are needed, the Engineer/Architect will make same on all copies and mark the second statement. Shop Drawings so marked need not be resubmitted.
3. If the submitted Shop Drawings are incomplete or inadequate, the Engineer/Architect will mark the third statement, request such additional information as required, and explain the reasons for revision. The Contractor shall be responsible for revisions, and/or providing needed information, without undue delay, until such Shop Drawings are acceptable. Shop Drawings marked with No. 3 shall be completed resubmitted.
4. If the submitted Shop Drawings are not in compliance with the Contract Documents, the Engineer/Architect will mark the fourth statement. The Contractor will be responsible to submit a new offering conforming to specific products specified herein and/or as directed per review citations.

E. No submittal requiring a Change Order for either value or substitution or both, will be returned until the Change Order is approved or otherwise directed by the Owner.

1.4 APPLICATIONS FOR ALTERNATIVE MATERIALS

A. If equipment or materials are not available as specified, and/or if Contractor believes that the use of different equipment or materials are necessary for any reason as defined above or as included in Specification Section 012513, he may use the applications noted below, as appropriate to request review and approval.
   1. Application for Use of Substitute Item
   2. Application for Use of "Or Equal" Item

END OF SECTION 013323

APPLICATION FOR USE OF SUBSTITUTE ITEM

TO: _____

PROJECT: _____

SPECIFIED ITEM:

_____	_____	_____
Page	Paragraph	Description

A. The undersigned requests consideration of the following as a substitute item in accordance with Article 6.05 of the General Conditions.

_____

B. Change in Contract Price (indicate + or -) $ _____

C. Attached data includes product description, specifications, drawings, photographs, references, past problems and remedies, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. For consideration of the attached data as SHOP DRAWINGS, submittal shall be in accordance with requirements of Section 013323.

D. Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments are correct:

1. The proposed substitute does not affect dimensions shown on Drawings.

2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.

3. The proposed substitution will have no adverse affect on other contractors, the construction schedule, or specified warranty requirements. (If proposed substitution affects construction schedule, indicate below using + or -)

_____ CONSECUTIVE CALENDAR DAYS

4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item, and agrees to reimburse the OWNER for the charges of the ENGINEER for evaluating this proposed substitute item.

E. Signature: _____

Firm: _____

Address: _____

_____

Telephone: _____ Date: _____

Attachments: _____

_____

_____

_____

For use by ENGINEER:

_____Accepted as evidenced by affixed SHOP DRAWING REVIEW stamp.
_____Accepted as evidenced by included CHANGE ORDER.
_____Not accepted as submitted. See Remarks.
_____Acceptance requires completion of submittal as required for SHOP DRAWINGS.
_____Not accepted. Do not resubmit.

By: _____ Date: _____

Remarks: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPLICATION FOR USE OF "OR-EQUAL" ITEM

TO: _____

PROJECT: _____

SPECIFIED ITEM:

_____ _____ _____

Page Paragraph Description

A. The undersigned requests consideration of the following as an "or-equal" item in accordance with Article 6.05 of the General Conditions.

_____

B. Change in Contract Price (indicate + or -) $ _____

C. Attached data includes product description, specifications, drawings, photographs, references, past problems and remedies, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. For consideration of the attached data as SHOP DRAWINGS, submittal shall be in accordance with requirements of Section 013323.

D. Signature:

_____

Firm:

_____

Address:

_____

_____

Telephone: _____ Date: _____

Attachments: _____

_____

_____

_____

For use by ENGINEER:

_____Accepted as evidenced by affixed SHOP DRAWING REVIEW stamp.
_____Accepted as evidenced by included CHANGE ORDER.
_____Not accepted as submitted. See Remarks.
_____Acceptance requires completion of submittal as required for SHOP DRAWINGS.
_____Not accepted. Do not resubmit.

By: _____ Date: _____

Remarks: _____

SECTION 013326 – PRODUCT TESTING AND CERTIFYING

PART 1 - GENERAL

1.1 QUALITY OF MATERIALS

A. Where the specifications call for mill or shop tests, the Contractor shall furnish duplicate copies of attested manufacturer's certificates showing details of quality or performance sufficient to demonstrate conformity to contract requirements. Mill, shop or witness tests shall be subject to view by the Engineer's representative, but the Engineer's representation shall not relieve the Contractor from the necessity of furnishing certificates specified. The Engineer shall be notified by the Contractor in writing, sufficiently in advance of the time of making tests, so that proper arrangements may be made. Waiving of witness of tests by the Engineer may be in writing only by the Engineer. All costs for travel, lodging, food and transportation that are necessary for the Engineer's representative and the Owner's representative to attend witness tests shall be included in the Contractor's bid for those item(s) specifically designated as being subject to witness testing.

B. Unless otherwise specified, all materials, equipment and articles shall be erected, installed, applied, or connected, used, cleaned and conditioned in accordance with the printed instructions and directions of the manufacturer.

C. The installation shall be so made that its several component parts will function together as a workable system. It shall be complete with all accessories necessary for its operation and shall be left with all equipment properly adjusted and in working order.

D. The work shall be executed in conformity with the best practice and to contribute to efficiency of operation, minimum maintenance, accessibility and sightliness. It shall also be executed so that the installation will conform and accommodate itself to the building structure, its equipment and usage.

E. Whenever in the contract documents a particular brand, make of material, device or equipment is shown or specified, such brand, make of material, device or equipment is to be regarded merely as a standard and such trade name shall be followed by "or equal".

1.2 QUALITY ASSURANCE

A. The equipment and materials to be furnished under this Contract shall be the products of well-established and reliable firms, which have had ample experience for at least five (5) years in the manufacture of equipment or materials similar in design and of equal quality to that specified. If required, the manufacturer shall submit a list of installations of similar equipment, which have been in successful operation for at least five (5) years.

1.3 EXPERIENCE CLAUSE REQUIREMENT AND PERFORMANCE BONDS FOR MANUFACTURER

A. For every piece of equipment furnished under this Contract, the manufacturer will be required to have a minimum of five (5) years of experience in providing this specific type of equipment. In lieu of this experience requirement, the manufacturer will be required to provide performance bond(s) for the faithful performance of the equipment and guarantee payment in a sum of not less than one hundred and fifty percent (150%) of the total equipment price for the completed work for that item. In the absence of verifiable experience, the manufacturer will be required to provide the performance bond(s) for the same number of years that the manufacturer was found lacking in experience from the specified five (5) year period. The performance bond(s) shall be from an approved surety company, to the satisfaction of the Owner's Law Director.

B. Agents of bonding companies which write bonds for the performance and payment of the contract shall furnish power of attorney bearing the seal of the company, evidencing such agent's authority to execute the particular type of bond to be furnished, and evidencing also the right of the surety company to do business in the State of Ohio. Copy of this proof shall be attached to each copy of the contract.

C. The bond shall be purchased through a surety company with a local agent upon whom service of process can be made.

D. In event of failure of surety or co-surety, the manufacturer shall immediately furnish a new bond, as required herein. The manufacturer's bond will not be released until all provisions of the contract have been fulfilled.

E. The surety used for the bid bond and performance bond shall be listed in the latest U.S. Treasury Circular 570 and the Penal Sums shall be within the maximum specified for such company in said Circular 570.

END OF SECTION 013326

SECTION 013543 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 UNNECESSARY NOISE, DUST AND ODORS

A. The Contractor's performance of this contract shall be conducted so as to eliminate all unnecessary noise, dust and odors.

1.2 SEWAGE, SURFACE AND FLOOD FLOWS

A. The Contractor shall take whatever action is necessary to provide all necessary tools, equipment and machinery to adequately handle all sewage, surface flows and flood flows which may be encountered during the performance of the work. The entire cost of and liability for handling such flows is the responsibility of the Contractor and shall be included in the price for the appropriate item.

1.3 WORK IN FREEZING WEATHER

A. Written permission from the Engineer shall be obtained before any work is performed which, in the judgment of the Engineer, may be affected by frost, cold, or snow. When work is performed under such conditions, the Contractor shall provide facilities for heating the materials and for protecting the finished work.

1.4 POLLUTION CONTROL

A. It shall be the responsibility of the Contractor to prevent or limit pollution of air and water resulting from his operations.

B. The Contractor shall perform work required to prevent soil from eroding or otherwise entering onto all paved areas and into natural watercourses, ditches, and public sewer systems. This work shall conform to all local ordinances and/or regulations, if any, and if not otherwise regulated by local ordinances or regulations shall at a minimum conform to the Ohio EPA General Storm Water NPDES Permit for Construction Activities and the Ohio Department of Natural Resources Rainwater and Land Development manual. This work may consist of but not be limited to construction and continual maintenance of silt fence, bio bag filters, sedimentation traps, stilling basins, check dams, temporary seeding, temporary mulching, erosion mats and other means to clarify waters containing suspended materials from excavations, embankments, cleared and grubbed or stripped areas, stockpiles, well points, and disposal sites and shall be commensurate with the contractor's schedule, sequence of work, means and methods. If a SWPPP plan is not required for the project, the contractor shall at a minimum submit a plan of his proposed erosion control prevention methods for approval by the Owner and/or other regulatory authorities having jurisdiction prior to starting any construction activities which may cause erosion.

C. The Contractor shall perform work required to prevent dust attributable to his operations from entering the atmosphere. Dust on unsurfaced streets or parking areas and any remaining dust on surfaced streets shall be controlled with water and/or calcium chloride dust palliative as needed.

D. Any material removed from sanitary or storm sewers shall be disposed in accordance with all applicable regulations.

END OF SECTION 013543

SECTION 014323 – QUALIFICATIONS OF TRADESMEN

PART 1 - GENERAL

1.1 CHARACTER OF WORKMEN AND EQUIPMENT

A. The Contractor shall employ competent and efficient workmen for every kind of work. Any person employed on the work who shall refuse or neglect to obey directions of the Engineer or his representative, or who shall be deemed incompetent or disorderly, or who shall commit trespass upon public or private property in the vicinity of the work, shall be dismissed when the Engineer so orders, and shall not be re-employed unless express permission be given by the Engineer. The methods, equipment and appliances used on the work and the labor employed shall be such as will produce a satisfactory quality of work, and shall be adequate to complete the contract within the specified time limit.

B. In hiring of employees for the performance of work under this Contract, or any Subcontract hereunder, no Contractor or Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of race, sex, creed or color, discriminate against any citizen of the State of Ohio in the work to which the employment relates. No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, sex or color.

END OF SECTION 014323

SECTION 016600 - PRODUCT HANDLING AND PROTECTION

PART 1 - GENERAL

1.1 DELIVERY AND STORAGE OF MATERIALS

A. The Contractor shall be responsible for delivery and storage of all materials.

B. The Contractor shall coordinate with the Engineer on the arrangement for storing construction materials and equipment. Deliveries of all construction materials and equipment should be made at suitable times.

C. The Contractor shall store all materials required for the performance of this contract at sites designated by the Engineer.

D. All stockpiles shall be neat, compact, completely safe, and barricaded with warning lights if necessary.

E. Precautions shall be taken so that no shade trees, shrubs, flowers, sidewalks, driveways or other facilities will be damaged by the storage of materials. The Contractor shall be responsible for the restoration of all stockpile sites to their original condition.

F. Materials, tools and machinery shall not be piled or placed against shade trees, unless they shall be amply protected against injury therefrom. All materials, tools, machinery, etc. stored upon public thoroughfares must be provided with red lights at night time so as to warn the traffic of such obstruction.

G. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, shall again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. Approved portions of the construction site may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required therefore must be provided by the Contractor at his expense. Private property shall not be used for storage purposes without written permission of the property owner or lessee, and copies of such written permission shall be furnished the Engineer. All storage sites shall be restored to their original condition by the Contractor at his expense.

END OF SECTION 016600

SECTION 017517 - STARTING OF SYSTEMS / COMMISSIONING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes general requirements for the commissioning of the Work and start-up and operation of systems and equipment.

1.2 SUMMARY

A. Starting, testing, and operating the completed Work including systems and equipment until Substantial Completion is achieved and operation of the completed Work including systems or equipment are accepted by the Owner. Contractor shall cooperate and coordinate with the Owner in the operation, maintenance, and adjustment of the Work.

1.3 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specifications Sections, apply to this Section.

1.4 DEFINITIONS

A. Commissioning: Commissioning is the series of activities, or process, necessary to ensure that systems and equipment are designed, installed, functionally tested, started up and capable of being operated and maintained to perform in conformity with the design intent for the facility improvements. Commissioning includes, but is not limited to factory testing, field testing, dry testing, wet testing, performance testing, manufacturer's checkout, start-up, and Operational Demonstration.

B. Factory Testing: Factory Testing is performance testing, operation testing, or documentation verification conducted in the production facilities, or specialized test facilities, of the equipment supplier. Such testing shall conform to the requirements of the individual sections of the Contract Documents.

"Witnessed" Factory Testing shall mean that the testing is witnessed by the Owner or his designated representative.

C. Field Testing: Field Testing is performance testing, operation testing, or documentation verification conducted in the field after installation, to provide comparison with the results obtained in the Factory Testing.

D. Dry Testing: Dry Testing is performed by the Contractor without introducing either process material or other test material into the component, system, or unit process.

E. Wet Testing: Wet Testing is testing performed by the Contractor utilizing test material in the component, system, or unit process. Tankage shall be filled with test material to operating level.

F. Performance Testing: Performance Testing is performed by the Contractor to demonstrate system performance in accordance with the Project Manual requirements.

G. Manufacturer's Check-Out: Field inspection, testing, adjustments, and sign off by the approved representative of the Manufacturer, indicating that the component, system, or unit process meets the manufacturer's requirements.

H. Start-Up: Narrowly defined as placing a component, system, or unit process on-line. Start-up can be a commissioning activity or a normal operating activity.

I. Operational Demonstration: A commissioning activity performed by the Contractor wherein the Contractor operates and maintains a fully functional component, system, or unit process for a period of time after stable operation has been achieved.

1.5 SUBMITTALS

A. Quality Control Submittals:

1. Field Installation Reports – Submit reports by Manufacturer's Representative in accordance with Paragraph 3.4 of this Section.

B. Commissioning Documentation: Contractor shall prepare and submit all documentation for review and approval. The documentation shall include, but not be limited to, the following:

1. Certification by the preparer that he/she is the person responsible for the data, and that the data is authentic and accurate.
2. Certification by the Contractor or equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance: and that the equipment or unit process systems are suitable for Performance Testing.
3. Pertinent background information shall include, but not be limited to, the following:

a. Equipment or unit process systems Started-Up and Commissioned
b. Start-Up and Commissioning dates
c. Items or performance criteria tested clearly showing requirements and field data that verify requirements were met.
d. Names of witnesses for Start-Up and Commissioning.
e. Any repairs, corrections, or modifications required for the equipment or unit process systems to successfully complete Start-Up and Commissioning.
f. Loop diagrams accurately depicting the installed condition of instrumentation and controls.
g. Any other important background information.

4. Appendix

a. A summary of all data used in the calculation, including source, formulas with all terms defined.
b. Calculations for all data submitted, fully defined.
c. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.
d. Production and/or operational data.
e. Calibration procedures and worksheets for sampling equipment.
f. Copies of calibration records for instrumentation.
g. PLC Ladder logic documented with comments.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION AND VERIFICATION OF CONDITION

A. The Contractor shall inspect systems and equipment prior to each start-up and verify their readiness for start-up. Conditions hazardous to equipment or personnel shall be corrected by the Contractor prior to start-up of equipment.

1. Start-up operations shall not proceed using temporary power or temporary instrumentation and control wiring. All electrical and control connections shall be permanent and complete, and all such electrical components and equipment fully functional.
2. Use of repair parts during start-up operations shall not be permitted, except in such situations where the actual on-site verification of such repair parts' operability is specified.
3. The Contractor shall verify that all initial copies of the Maintenance and Operating Instructions have received an acceptable disposition as defined in Section 013323, and the only outstanding item is the field verification of the Instructions.

B. On successful completion of Start-up, process flows and solids shall be used for commissioning the equipment and unit process systems to show the equipment and unit process systems function properly. Commissioning shall confirm the proper operation of the equipment and unit process systems with process fluids and process solids, adjustment shall be made, and the equipment or unit process systems shall be optimized and brought into compliance with design criteria in preparation for Operational Demonstration.

C. The Contractor shall coordinate all Start-up and Commissioning activities for equipment and unit processes. The Contractor shall develop a detailed start-up and commissioning plan that includes the following as a minimum:

1. Description of the overall general start-up and commissioning process.
2. List of equipment and unit process systems included for start-up and commissioning activities.
3. Detailed start-up and commissioning sequence of activities.
4. Listing of staff and responsibilities for activities.
5. Contractor shall use a form that will be provided by the Owner.

3.2 PREPARATION

A. Prior to start-up of equipment or systems, all necessary test equipment shall be in place and operable.

B. Approved representative(s) of the Manufacturer and Contractor shall be present for the initial start-up of systems or equipment.

C. The Contractor shall request permission to start-up equipment, including electrical gear, and notify the Owner using a standard Start-Up Request form.

1. The Start-Up Request shall be submitted to the Owner a minimum of 72 hours before the scheduled start-up. Requests shall be made during normal working hours.
2. The Contractor shall provide all information in the first Section of the Start-Up Request form.
3. The Owner will indicate approval or disapproval of the request.
4. Approval of the request is based solely on impact on plant operations. Approval does not relieve the Contractor of any responsibility for plant and personnel safety.
5. The Contractor shall obtain the approved Start-Up Request prior to the system or equipment start-up.
6. If training is to be conducted in conjunction with the start-up this should be indicated on the Start-Up Request form. All requirements of Section 019215, Instruction of Owner's Personnel must be met for training sessions.
7. Start-ups performed at the direction of the Contractor, per paragraph 3.3(G) of this Section, do not require advance notification to the Engineer.

D. Normal installation checks, such as for rotation, are not considered start-ups and do not normally require start-up notification. For all equipment and systems so designated in the Contract Documents, or so designated by the Engineer, such checks shall be under the supervision of the approved representative of the manufacturer, and shall be reviewed by the Engineer.

1. All electrical apparatus which is energized shall be clearly marked.

3.3 CONDUCT OF START-UP AND COMMISSIONING

A. Start-up:

1. All initial start-ups of equipment or systems shall be performed under the technical direction of the approved representative of the manufacturer.
2. Any lack of readiness of associated systems or failure of a system or equipment previously started prior to the date of Final Completion of the Project shall require additional initial start-up service to be performed, under the direction of the approved representative of the manufacturer.
3. The Contractor shall repair, replace or modify any equipment or system which fails to perform as specified in the Contract Documents. Such repair, replacement or modification of deficient work shall be performed under the terms of the General Conditions.
4. Manufacturer's start-up services are required for Data Collector Units and Web Hosted Software. Additional requirements are specified in 330908.01.

B. The Contractor shall be responsible for commissioning all work. Final acceptance shall be by the Owner.

C. The Contractor is responsible for the performance and operation of the systems and equipment during commissioning.

D. When Owner personnel are operating systems or equipment, the Contractor shall make available, at all times, persons knowledgeable about the systems or equipment to direct the Owner personnel in its operation.

E. The Contractor shall make all adjustments and corrections necessary to achieve normal, stable operation of systems. Adjustment and corrections shall be in accordance with the individual Specification Sections.

F. Any failures of equipment or systems operated under the direction of the Contractor shall be considered deficiencies and shall be corrected in accordance with the General Conditions.

3.4 QUALITY CONTROL

A. Reports of the Approved Representative of the Manufacturer:

1. The approved representative of the manufacturer shall prepare a daily report on each site visit for each system or item of equipment inspected, adjusted, started-up, or worked on.
2. The report shall state the purpose of the visit, the representative's observations and conclusions, and recommendations for further visits or action.
3. The reports shall be submitted in accordance with Section 013323, Shop Drawings, Product Data and Samples within three (3) days of the visit.

END OF SECTION 017517

SECTION 017800 - FINAL COMPLIANCE AND SUBMITTALS

PART 1 - GENERAL

1.1 The following forms and related sign-offs shall be documented in accordance with provisions of the contract. These forms shall be completed by the Contractor and approved by the Owner before final retainer is approved for release. Forms for Items A to E will be attached to the Contractor's executed copy of the contract.

A. Certificate of Substantial Completion (To be submitted at time of Substantial Completion).

B. Contractor's Certification of Completion.

C. Contractor's Affidavit of Prevailing Wage.

D. Consent of Surety Company for Final Payment.

E. Affidavit of Final Acceptance Date and Correction Period.

F. Before the OWNER will approve and accept the work and release the retainer, the CONTRACTOR will furnish the OWNER a written report indicating the resolution of any and all property damage claims filed with the CONTRACTOR by any party during the construction period. The information to be supplied shall include, but not be limited to, name of claimant, date filed with CONTRACTOR, name of insurance company and/or adjuster handling claim, how claim was resolved and if claim was not resolved for the full amount, a statement indicating the reason for such action.

G. DBE Subcontractor Participation Forms SR-EPA.7-8 (Applicable for WPCLF & WSRLA funded projects only).

H. CDBG Subcontractor List 017800 (Applicable for CDBG funded projects only).

END OF SECTION 017800

SECTION 017821 - CLEANING AND PROTECTION

PART 1 - GENERAL

1.1 GENERAL

A. On or before the completion date for the work, the Contractor shall tear down and remove all temporary structures built by him, all construction plant used by him, and shall repair and replace all parts of existing embankments, fences or other structures which were removed or injured by his operations or by the employees of the Contractor. The Contractor shall thoroughly clean out all buildings, sewers, drains, pipes, manholes, inlets and miscellaneous and appurtenant structures, and shall remove all rubbish leaving the grounds in a neat and satisfactory condition.

B. As circumstances require and when ordered by the Engineer, the Contractor shall clean the road, driveway, and/or sidewalk on which construction activity under this contract has resulted in dirt or any other foreign material being deposited with an automatic self-contained mechanical sweeper with integral water spray, vacuum and on-board or supplementary containment.

C. Failure to comply with this requirement when ordered by the Engineer or his representative, may serve as cause for the Engineer to stop the work and to withhold any monies due the Contractor until such order has been complied with to the satisfaction of the Engineer.

D. As the work progresses, and as may be directed, the Contractor shall remove from the site and dispose of debris and waste material resulting from his work. Particular attention shall be given to minimizing any fire and safety hazard from form materials or from other combustibles as may be used in connection with the work, which should be removed daily.

E. The Contractor shall wash all windows and other glass surfaces, leaving all areas free from putty marks, paint, etc.

F. During and after installation, the Contractor shall furnish and maintain satisfactory protection to all equipment against injury by weather, flooding or breakage thereby permitting all work to be left in a new condition at the completion of the contract.

END OF SECTION 017821

SECTION 017839 - PROJECT RECORDS, DRAWINGS

PART 1 - GENERAL

1.1 RECORD DOCUMENTS

A. Maintain on site one set of the following Record Documents:
   1. Drawings (annotated to show all changes made during construction)
   2. Specifications
   3. Addenda
   4. Change Orders and other modifications to the Contract
   5. Reviewed Shop Drawing and Samples
   6. Manufacturers' instructions for assembly, installation, and adjusting
   7. Testing and Inspection Reports
   8. Manufacturers' Service Representative's Reports.

B. Store Record Documents separate from documents used for construction.

1.2 SERVICE CONNECTION RECORDS

A. The Contractor shall record the location of all service and property connections, new or existing, made to utilities constructed under this contract. Such records shall be turned over to the Owner upon completion of the work. The cost of making such records shall be included in the various unit or lump sum prices stipulated for the various items of the work.

END OF SECTION 017839

SECTION 262700.01 - ELECTRICAL METERS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish and deliver electric meters with endpoint devices.

B. The Village of Brewster will install all electrical meter replacements. See Section 011100.

1.2 REFERENCES

A. International Organization for Standardization:

1. ISO 9001 - Standards of Quality Management Systems.

B. Materials and workmanship shall be in accordance with the following Standards:

1. ANSI - American National Standards Institute
2. AWS- American Welding Society
3. CSA- CSA International- Product Testing and Certification Services
4. FCC- Federal Communications Commission
5. MIL-STD-810- United States Military Standard for Environmental Engineering Considerations and Laboratory Test Standards Emphasizing Environmental Design and Test Limits.
6. NEC - National Electrical Code
7. NEMA - National Electrical Manufacturers Association
8. UL- Underwriters Laboratory
9. Regulatory Agencies: Perform all Work in compliance with the requirements of the following regulatory agencies:
   a. OSHA – Occupational Safety and Health Administration
   b. EPA – Environmental Protection Agency
   c. Building Department and Utilities Departments

1.3 DEFINITIONS/ACRONYMS

A. AMI - Advanced Metering Infrastructure.

B. AMR - Automated Meter Reading.

C. FCC - Federal Communications Commission.

D. Manufacturer - Supplier of the materials, products and services under this Section.

E. MIU or MTU - Meter Interface Unit or Meter Transmitter Unit.

F. Owner – synonymous with Village of Brewster.

G. Contractor - synonymous with the term "Vendor."

H. Substantial Completion – Installation of all meters and equipment provided under this Section with acceptable reading from meters achieved rate of 98.5% repeatable over 14 days.

I. Final Completion – Acceptable readings from meters achieved at rate of 100% repeatable over 14 days.

1.4 SYSTEM DESCRIPTION

A. This project includes providing electric meters, together with endpoint devices of the appropriate type and size, capable of being read by the Village of Brewster's meter reading system.

B. Meter reading system shall be as specified in Section 330908.01.

C. The meters and AMI manufacturer - must state where all the meters, RF and collection devices are made. It is preferred that the meters and AMI System are made in the United States, in ISO 9001 manufacturing facilities. Comply with Section 330908.01.

1.5 BID REVIEW AND AWARD BY OWNER

A. Award will be to the lowest and best bid, based on evaluation of the Bid Forms including: Price Proposal; Technical Proposal including meter simplicity, meter life, long-term accuracy and other criteria that the Owner deems relevant to not only life cycle costs, but efficiency of operation and maintenance; and, Bid Proposal Questions Form. Lowest price will not be the sole factor for awarding this project.

B. The specifications are minimum requirements. The Owner reserves the right to choose the Manufacturer which best meets the needs, requirements, budgetary, including projected maintenance costs and delivery necessities of the Owner.

1.6 SUBMITTALS

A. Submittal Procedures: Requirements for submittals: Follow Section 013323.

B. INFORMATION TO BE SUBMITTED WITH THE BID: TECHNICAL PROPOSAL

1. Technical Proposal outline is included as part of the Bid Documents pages TP-1 thru TP-2.
2. Provide copies of all materials required to establish compliance with the specifications. Submittals shall include published documents detailing important details of construction, installation instructions including drawings and descriptive literature, bulletins and/or catalogs of equipment, operating and maintenance instructions, repair manuals, and parts manuals.

3. Provide published terms and conditions of all warranties offered and, if warranty durations are different than specified in Paragraph 1.9, shall so note in the list of exceptions in the Technical Proposal. The Owner will not consider any third-party guarantees or warranties.
4. Provide information on required or optional maintenance programs beyond the warranty period for both hardware and software.
5. Manufacturers must submit any and all exceptions to the specifications. Exceptions must be listed on a sheet as part of the Technical Proposal. All exceptions will be considered with the Owner reserving the right to choose the meters, parts, and accessories which best meet the requirements of the Utility. Non-compliance in listing any exception may result in immediate rejection of the submitted bid.

C. SUBMITTALS AFTER AWARD OF CONTRACT

1. Submit, as provided in Section 013323 of these specifications, copies of all materials required to establish compliance with the specifications. Submittals shall include shop drawings showing important details of construction, installation instructions including drawing and descriptive literature, bulletins and/or catalogs of equipment, operating and maintenance instructions, repair manuals, and parts manuals.
2. Installation Plan. Submit detailed description of proposed installation. Indicate dimensions and tolerances, component connections and details, clearances required and installation requirements and details.
3. Product Data: Submit data on meters and meter setting equipment and accessories. Submit manufacturer's literature and data. Indicate accessories, electrical characteristics and connection requirements, wiring diagrams, and location and sizes of field connections.
4. Samples: Submit two sample meters one of each type (single-phase and 3-phase).
5. Design Data: Submit manufacturer's latest published literature; include illustrations, installation instructions, maintenance instructions, and spare parts lists.
6. Submit an affidavit of compliance from the meter manufacturer or supplier of the meters provided; comply with all applicable requirements of ANSI C12.20 - 2015 (Class 0.2), ANSI C12.1 - 2014, ANSI C12.10 - 2011, ANSI C37.90.1 - 2002, FCC Part 15, Transient/Surge Suppression IEC 61000-4-4 - 2012 and IEEE C62.41.2 - 2002, Category B, Temperature Rise Specifications meet ANSI C12.1 Section 4.7.2.9, ANSI C12.18-R2006 (R2016), and be UL 2735 listed.
7. Submit a Certificate of Testing for accuracy from the manufacturer for each meter furnished, stating that the meter has been tested for accuracy of registration and that it complies with the accuracy requirements of Class 0.2 (ANSI C12.20-2015).
8. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that materials provided meet or exceed ANSI Standards and specification requirements.

D. Manufacturer's Field Reports: Provide field reports for each site and include pre-install and post-install photographs, serial numbers for each component, coordinates, size, type, and other pertinent data.

A. All named manufacturer's Products must meet the applicable specifications in full, regardless of the appearance of the manufacturer's name.

B. The proposed system, including the electric meter and endpoint device, shall be the product of one manufacturer and shall be covered by the same manufacturer's warranty to avoid future problems with product compatibility, problems in determining which component caused the failure, and determining which company the Owner needs to pursue in the event of manufacturing defects. Endpoint device shall be integrally installed "under the glass" and be part of the electric meter.

C. Manufacturing: Meters supplied shall be from a company that has manufactured electric meters for at least ten (10) years and who manufacturers all type and size meters indicated in these specifications. The specific models being supplied must have been in successful and continuous municipal service for at least two (2) years.

D. Meters: Manufacturer's name, model number, and serial number shall be permanently marked on each meter body.

1.8 QUALIFICATIONS

A. Manufacturer: Must be a Company specializing in manufacturing Products and materials specified in this Section with minimum ten years documented experience in this type of manufacturing.

1.9 WARRANTY

A. In evaluating bid submittals, warranty coverage will be considered. The Manufacturer shall be required to state its warranty and/or guarantee policy with respect to each item of proposed equipment. The procedure for submitting warranty claims must also be provided. The procedure shall be outlined in detail with all applicable information including but not limited to addresses, phone numbers, shipping labels, forms, etc.

B. Follow Section 330908.01 Paragraph 1.9 except as noted below.

C. Special Warranty on Materials and Equipment: All warranties shall be extended to a full 5 years from substantial completion by including the cost for extending warranties within the appropriate Bid Items including extended service or maintenance programs/contracts in the Bid Schedule.

1. Provide manufacturer's written warranty, running to the benefit of the Village of Brewster, agreeing to correct, or at option of the Village of Brewster, remove or replace materials or equipment specified in this Section found to be defective during the standard manufacturer's warranty after the date of delivery unless modified below.
2. Meters shall be guaranteed to meet ANSI New Meter Accuracy Standards.

1.10 MAINTENANCE SERVICE AND SUPPORT

A. In addition to warranty periods, Manufacturers are required to supply information on required or optional maintenance programs beyond the warranty period for both hardware and software. The location of and procedures for obtaining such support shall be stated. A toll-free Help Desk number must be provided for system support.

1.11 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver electric meters to 325 Lincoln SW, Brewster, Ohio 44613. The Owner shall be responsible for storage and installation.

B. The Contractor shall be responsible for unloading and loading of products and materials.

C. The Owner reserves the right to inspect ALL and accept all meters, meter components, and AMI system components on site. They shall be in original sealed manufacturers shipping containers with labeling in place.

D. The Contractor shall at his own expense replace all rejected meters and AMI system components. All meters and AMI system components shall be properly boxed to protect them against damage in shipment. Meters and AMI system components may be rejected by the Owner when damages to the container indicate the possibility of damage to the meter or AMI system components.

PART 2 – PRODUCTS

2.1 ELECTRIC METERS - GENERAL

A. General Requirements:

1. It is the intention of these specifications to obtain electric meters complete with endpoint devices that meet the latest revision of ANSI C12.20 - 2015 (Class 0.2), ANSI C12.1 - 2014, ANSI C12.10 - 2011, ANSI C37.90.1 - 2002, FCC Part 15, Transient/Surge Suppression IEC 61000-4-4 - 2012 and IEEE C62.41.2 - 2002, Category B, Temperature Rise Specifications meet ANSI C12.1 Section 4.7.2.9, ANSI C12.18-R2006 (R2016), and be UL 2735 listed.
2. All meter assemblies shall be tested and in compliance with the requirements of the latest revision of the applicable ANSI standard.
3. All meters will be forward and reverse engineered to guarantee future system compatibility.
4. All meters provided under this Contract shall be from a single manufacturer. All meter bodies and registers will be made in an ISO 9001 facility. It is preferred that facility is owned and operated by the meter company, and located within the USA.

B. Single-Phase Electric Meters

1. All meters shall meet the requirements of ANSI C12.19.
2. All meters shall be capable of providing kWh, KVARh, and kVAh energy measurements.
3. Shall be capable of providing load profile data along with line-side and load-side voltage reporting.

4. Meters shall have AES 256-bit encryption security.
5. Shall be capable of maintaining time for 24 hours following an outage.
6. Measurements shall be gathered at a minimum of 8,000 samples per second.
7. Meter features and endpoint devices shall be per Specification 330908.01.
8. All meters shall meet the following specifications. Meter quantities and forms are provided at the end of this Specification.
    a. Power Requirements: 120VAC and 240VAC, 60 Hz
    b. Accuracy: Class 0.2 (ANSI C12.20-2015)
    c. Burden: Power supply 1.2W/6.7VA @ 240VAC, 1.1W/3.0VA @ 120VAC
    d. Device Type: FlexNet Device Type 96, Metrology Device Type 97, ZigBee Device Type 98
    e. Model: Stratus IQ or other approved equal residential electric meters.
    f. Dimensions: 6.95 in diameter, 5.06 in depth
    g. Operating Temperature: -40°C to +85°C under the cover
    h. Operating Humidity: 0% to 95% non-condensing
    i. Starting Current: 20mA (for CL200), 9mA (for CL20)
    j. Display: 6 digit LCD
    k. Remote disconnect:
        1) Rating: 200A, 240VAC, 60 Hz, PF 0.75 lagging
        2) Endurance: Greater than 6,000 cycles, 200A, 240VAC, 60 Hz, PF 0.75 lagging; Greater than 30,000 cycles at no load
        3) Overload: 50 OPS, 300A, 240VAC, 60 Hz, PF 0.75
        4) Current Withstand: Per ANSI C12.1, 7,000A Peak (5,000 Amps rms) 240 VAC, 60 Hz, for 6 cycles with normal operation after exposure; 12,000 Amps rms for 4 cycles with fail safe conditions after exposure.

C. Three-Phase Electric Meters

1. All meters shall meet the requirements of ANSI C12.19.
2. All meters shall be capable of providing kWh, KVARh, and kVAh energy measurements.
3. Shall have programmable sag and swell monitor that logs voltage sag and swell duration down to one cycle.
4. Meter features and endpoint devices shall be per Specification 330908.01.
5. All meters shall meet the following specifications. Meter quantities and forms are provided at the end of this Specification.
    a. Power Requirements: 120 to 480 volts, 50 or 60 Hz
    b. Accuracy: Class 0.2 (ANSI C12.20-2015)
    c. Model: Aclara kV2c or other approved equal commercial electric meters.
    d. Dimensions: 6.94 in diameter, 6.0 in depth
    e. Operating Temperature: -40°C to +85°C under the cover
    f. Operating Humidity: 0% to 95% non-condensing
    g. Mechanical Design: Durable one piece cover, single action reset lever, magnetic alternate switch
    h. Starting Current: typically less than 0.1 amps for SC meters and 0.05 amps for TR meters
    i. Display: six digit LCD
    j. Remote disconnect (16S):
        1) Rating: 200A, 240VAC, 60 Hz, PF 0.75 lagging

2) Endurance: Greater than 6,000 cycles, 200A, 240VAC, 60 Hz, PF 0.75 lagging; Greater than 30,000 cycles at no load
3) Overload: 50 OPS, 300A, 240VAC, 60 Hz, PF 0.75
4) Current Withstand: Per ANSI C12.1, 7,000A Peak (5,000 Amps rms) 240 VAC, 60 Hz, for 6 cycles with normal operation after exposure; 12,000 Amps rms for 4 cycles with fail safe conditions after exposure.

E. EQUIPMENT VENDORS

1. All new meters must be provided from a single meter manufacturer.
2. The meter manufacturers acceptable to the Village of Brewster are as follows: Sensus, Aclara, or as approved.

PART 3 – EXECUTION

3.1 PRE-INSTALLATION MEETINGS

A. Pre-installation meeting to review project, worksites, storage, office, personnel, etc. Follow Section 031119.

3.2 SCHEDULE OF METERS

A. Single-Phase Electric Meters

Forms	QTY
2S	929
3S	6
4S	4
45S/5S	2
6S	1

B. Three-Phase Electric Meters

Forms	QTY
9S/8S	15
12S	1
15S	1
16S	2

END OF SECTION 262700.01

SECTION 330908.01 – AUTOMATIC METER READING INFRASTRUCTURE AMI SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Section includes: Design, provide, install, and implement a fully functional single Advance Metering Infrastructure (AMI) fixed based water and electric meter reading system to include:

1. AMI Endpoints - Furnish and deliver only
2. Fixed Base Automatic Meter Reading System
   a) Wall and Pit Meter Interface Units
   b) Tower Gateway Base Stations - Data Collection Hardware
3. Hosted Software Services
4. Compatible with Sensus, Neptune (ProRead), Badger (ADE), and Elster (Incorporating Sensus protocols) water meters equipped with absolute encoder registers.
5. Compatible with electric meters to be provided under Specification Section 262700.01 and existing water meters.
6. Integration with existing billing software by Government Accounting Solutions.

B. Train Owner personnel in operation and maintenance of the products and systems.

C. The Owner currently has a system comprised of approximately 864 5/8" x 3/4" to 2" recently replaced Sensus water meters. And 961 electric meters to be provided under Specification Section 262700.01.

D. Optical reading of the existing registers is not acceptable.

E. Base station data collectors: furnish, install, complete and hosted software, including project management shall be provided by Installer or Manufacturer. The Installer shall demonstrate that they are an authorized agent for the products proposed and shall be capable of performing the supply of AMI MTUs & collectors, project management, hosting the data, and controlling all aspects of the project. The Contractor shall also be authorized to implement and support the AMI system for its life.

F. Installation of the meter transmission units (MTUs) is not included in the Base Bid. The Owner shall assume all duties included for installation for MTUs unless the Owner accepts the Alternative Bid for installation and project management as well. The cost for installation of the MTUs shall be bid as an alternate.

1.2 REFERENCES

A. American Water Works Association:

1. AWWA C706 -10 Standard for Direct-Reading, Remote-Registration Systems for Cold Water Meters.
2. AWWA C707 -10- Standard for Encoder-Type, Remote-Registration Systems for Cold Water Meters.

B. International Organization for Standardization:

1. ISO 9001 - Standards of Quality Management Systems.

C. National Sanitation Foundation, NSF International:

1. NSF 61 - Standards for Drinking Water System Components.
2. NSF 372 - American National Standard for Lead Content in Plumbing Products.

D. Materials and workmanship shall be in accordance with the following Standards:

1. ANSI - American National Standards Institute
2. AWS - American Welding Society
3. CSA- CSA International - Product Testing and Certification Services
4. FCC - Federal Communications Commission
5. MIL-STD-810 - United States Military Standard for Environmental Engineering Considerations and Laboratory Test Standards Emphasizing Environmental Design and Test Limits.
6. NEC - National Electrical Code
7. NEMA - National Electrical Manufacturers Association
8. UL - Underwriters Laboratory
9. Regulatory Agencies: Perform all Work in compliance with the requirements of the following regulatory agencies:
   a) OSHA - Occupational Safety and Health Administration
   b) EPA- Environmental Protection Agency
   c) Owner's Building Department and Utilities Departments

1.3 DEFINITIONS / ACRONYMS

1. AMI - Advanced Metering Infrastructure
2. AMR - Automated Meter Reading
3. FCC - Federal Communications Commission
4. Installer - Manufacturer's authorized installation contractor
5. Manufacturer - Supplier of the materials, products and services for the AMI system
6. MIU or MTU - Meter Interface Unit or Transmitter
7. RSS - Remote Service Switching
8. OWNER – synonymous with OWNER
9. Water Department - Water Utility Department
10. Contractor - synonymous with the term "Vendor."

11. Substantial Completion – Installation of all MTUs and AMI equipment provided under this Section with acceptable reading from meters achieved rate of 95% repeatable over 14 days.
12. Final Completion: Acceptable readings from meters achieved at rate of 100% repeatable over 14 days. **The completed system shall receive and use signal from 100% of all MTU and DCU devices within the Owner's service area for the length of the project, maintenance period, and the life of the warranty periods as specified in these documents. Reads compromised due to temporary obstructions, solar flares, Acts of God, or as otherwise approved by the Owner will be acceptable to the Owner for short periods of time as accepted by the Owner.**

1.4 SYSTEM DESCRIPTION

A. The project includes a single Advance Metering Infrastructure (AMI) System. Manufacturer is to design and supply a fully functional fixed network system which offers remote monitoring and control functions to both water and electric meters for the Village of Brewster. This work includes installation of a two-way Fixed Base Radio Meter Reading System that is a Fixed Network, Advance Metering Infrastructure (AMI) Service capable of satisfying the current and future electric and water meter reading needs.

B. Product transition is the most important in moving forward from existing handheld system to the new AMI Fixed RF system. The System Supplier shall provide a single meter reading platform that would allow all of the meter reading applications to move from the current Meter Reading Software and the new Fixed RF System under ONE system, allowing the billing office to view all readings with a single software system.

C. Communications, Software and Fixed Base System- Provide a tower-based system that is upgradable and can define a twenty-year life cycle.

D. The following features and capabilities:

1. The system must provide automatic web updates.
2. Multi-level security.
3. Full integration with existing billing software Government Accounting Solutions.
4. Full integration with existing metering system with the new system.
5. Hourly and daily readings.
6. Graphing and consumption data.
7. System health (view daily performance).
8. Hourly and daily system-wide readings.
9. Up-to-the-hour customer usage profile data.
10. On-demand reads. Indicate how your system performs this function.
11. Priority alarms.
12. Mapping.
13. District metered area reporting.
14. Consumption analysis.
15. Grouping functionality.

16. Data back-up and disaster data retrieval ability. Please explain how this is accomplished as part of the Technical Proposal.
17. Broadcast messaging and MTU/endpoint grouping capabilities.
18. Water meter specific feature/capabilities:
    a. Leak detection.
    b. Reverse flow detection.
    c. Empty pipe alarm.
    d. Tamper alarm.
    e. Programmable data logging for peak flows and volumes within intervals.
    f. Programmable data logging for minimum of 5,000 data points.
19. Electric meter specific features/capabilities:
    a. Power outage/restoration reporting and distribution quality monitoring.
    b. Remote service switching (RSS) for turn-on and restoration.
    c. Energy theft detection and reporting.
    d. Support for advanced metering functions (kW demand, kVA demand, time of use (TOU), load profiling, remote disconnect, demand response, automatic outage, distribution quality monitoring)

1.5 BID REVIEW AND AWARD BY OWNER

A. Award will be to the lowest and best bid, based on evaluation of the Bid Forms including: Price Proposal; Technical Proposal including technical support, software hosting service, long-term accuracy and other criteria that the Owner deems relevant to not only life cycle costs, but efficiency of operation and maintenance; and Bid Proposal Questions Form. Lowest price will not be the sole factor for awarding this project.

B. It is the intention of the Owner to install all MTUs on the outside of the building receiving water service. Under the Base Bid, the Owner's forces will install the MTUs and be responsible for all project management activities in this regard.

C. The specifications are minimum requirements. The Owner reserves the right to choose the Manufacturer which best meets the needs, requirements, budgetary, and delivery necessities of the Owner.

1.6 SUBMITTALS

A. Submittal Procedures: Follow Section 013323.

B. INFORMATION TO BE SUBMITTED WITH THE BID: TECHNICAL PROPOSAL

1. Technical Proposal outline is included as part of the Bid Documents pages TP-1 thru TP-2.
2. Propagation Study: Manufacturer must submit a complete propagation study identifying the ability to adequately send/receive data within the service area. Determine the locations best suited for installation of the collectors and to ensure proper communications with end point transmitters and the head end system. Include locations/addresses of each collector. 100% of the system must be read by the collectors.

3. Provide Life Cycle Cost Analysis for the AMI system with MTUs including hosted software (software as a service – SAAS) and maintenance programs and technical support for a full 20 year period. Provide replacement and/or repair costs for all components of the AMI system as part of this life cycle cost analysis.
4. Provide a full description of the AMR/AMI system and its individual components, including response to all questions included in the "Bid Proposal Questions Form."
5. Provide documentation regarding the full functionality of the software which Contractor will provide. Indicate the nearest location where the Owner can view a demonstration of the software functionality currently in use.
6. Provide copies of all materials required to establish compliance with the specifications. Submittals shall include published documents detailing important details of construction, installation instructions including drawings and descriptive literature, bulletins and/or catalogs of equipment, operating and maintenance instructions, repair manuals, and parts manuals.
7. Provide published terms and conditions of all warranties offered and, if warranty durations are different than specified in Paragraph 1.09, shall so note in the list of exceptions in the Technical Proposal. The Owner will not consider any third-party guarantees or warranties.
8. In addition to warranty periods, supply information regarding required or optional maintenance programs beyond the warranty period for both hardware and software. Features of those maintenance programs shall also be included. The Technical Proposal shall list any additional charges for the maintenance programs, such as hourly rate for on-site and/or remote support. The location of and procedures for obtaining such support shall be stated. A toll-free Help Desk number must be provided for system support.
9. Provide the Support and Maintenance Contract pricing for the Product and Software Support on Fixed Network System for the two years after the system is installed including:
    a. Hardware Support – Fixed Collectors & other hardware
    b. Software support, licensing, etc.
    c. FCC primary use licensing
    d. Hosting Charges – if necessary
    e. If your system has monthly/per unit reading charges, please fully explain the reading and maintenance charges for using the system.
10. Manufacturers must submit any and all exceptions to this specification. Exceptions must be listed on a sheet as part of the Technical Proposal. Exceptions to other portions of this Project Manual are not acceptable and will not be considered valid. All exceptions will be considered with the Owner reserving the right to choose the meters, parts, and accessories which best meet the requirements of the Utility. Non-compliance in listing any exception may result in immediate rejection of the submitted bid.

C. SUBMITTALS AFTER AWARD OF CONTRACT

1. Submit, as provided in Section 013323 of these specifications, copies of all materials required to establish compliance with the specifications. Submittals shall include shop drawings showing important details of construction, installation instructions including drawing and descriptive literature, bulletins and/or catalogs of equipment,

collector towers, operating and maintenance instructions, repair manuals, and parts manuals.

2. Installation Plan: Submit detailed description of proposed installation. Indicate dimensions and tolerances, component connections and details, clearances required and installation requirements and details.
3. Product Data: Submit data on MTUs and accessories and AMI data collectors. Submit manufacturer's literature and data indicating rated capacities, dimensions, weights and point loads. Indicate accessories, electrical characteristics and connection requirements, wiring diagrams, and location and sizes of field connections.
4. Samples: Submit two sample MTUs one of each type representing a wall mount and a pit installation mount illustrating materials of construction and finishes.
5. Design Data: Submit manufacturer's latest published literature; include illustrations, installation instructions, maintenance instructions, and spare parts lists.
6. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

D. Manufacturer's Field Reports: Provide field reports for each site and include pre-install and post-install photographs, serial numbers for each component, coordinates, size, type, and other pertinent data, follow Paragraph 3.9.

1.7 QUALITY ASSURANCE

A. All named manufacturer's Products must meet the applicable specifications in full, regardless of the appearance of the manufacturer's name.

B. The meters and AMI manufacturer - must state where all the meters, RF and collection devices are made. It is preferred that the meters and AMI System are made in the United States, in ISO 9001 manufacturing facilities.

C. The proposed system, including the MTUs, DCUs and repeaters (AMR/AMI hardware), and host software shall be the product of one manufacturer, and shall be covered by the same manufacturer's warranty to avoid future problems with product compatibility, problems in determining which component caused the failure, and determining which company the Owner needs to pursue in the event of manufacturing defects. The AMR equipment vendor may be, but does not have to be, the meter manufacturer.

D. Manufacturing: MTU's and AMI equipment supplied shall be from a single AMR equipment vendor, a company that has manufactured AMR/AMI equipment for at least ten (10) years and who manufacturers all type and size meters indicated in these specifications. The specific models being supplied must have been in successful and continuous municipal service for at least two (2) years.

1.8 QUALIFICATIONS

A. Manufacturer: Must be a Company specializing in manufacturing Products and materials specified in this Section with minimum ten years documented experience in this type of manufacturing.

B. Installer: Company specializing in performing Work with minimum five years documented experience or as approved by manufacturer.

C. Contractor must be the factory authorized distributor for the AMI system proposed and be capable of processing the warranty claims for the Owner.

D. Manufacturer must have an on-staff, factory, AMI support specialist whose sole responsibility is providing AMI system support and sales. Emails, phone numbers and all contact information must be provided.

1.9 WARRANTY

A. In evaluating bid submittals, warranty coverage will be considered. The Manufacturer shall be required to state its warranty and/or guarantee policy with respect to each item of proposed equipment. The procedure for submitting warranty claims must also be provided. The procedure shall be outlined in detail with all applicable information including but not limited to addresses, phone numbers, shipping labels, forms, etc.

B. Except as noted below, all products furnished under this Contract shall be warranted for at least one year from the date of delivery to the Owner, for defects in materials and workmanship. The warranty services shall include, at no additional cost to the Owner, all parts and labor needed for normal operation of the system and for any warranty repairs that may be needed. Coverage shall include MTUs, data collectors, repeaters and appurtenances. In the event of a non-functioning item, Contractor shall assist by telephone with troubleshooting, and shall promptly respond to emergency calls. For warranty-related problems, loaner equipment shall be provided to the Owner at no additional cost to the Owner, while the failed equipment is repaired or replaced by the Contractor.

C. Warranty period shall restart at time = 0 for any replaced components and will commence on date of placing into service.

D. General Warranty: The special warranty specified in this Article shall not deprive Buyer of other rights or remedies; buyer may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Seller under the Contract Documents. The obligations of Seller under the Contract Documents shall not be limited in any way by the provisions of the specified special warranty.

E. Special Warranty on Materials and Equipment: All warranties shall be extended to a full 10 years from substantial completion by including the cost for extending warranties within the appropriate Alternate Bid Items including extended service or maintenance programs/contracts in the Bid Schedule. Alternative Bid Prices for years 5-6, 7-8, and 9-10 of this program are included in the Bid Schedule, and may or may not be selected as part of this project.

1. Provide manufacturer's written warranty, running to the benefit of Buyer, agreeing to correct, or at option of Buyer, remove or replace materials or equipment specified in this Section found to be defective during the standard manufacturer's warranty after the date of delivery unless modified below.

2. MTUs shall be guaranteed for at least twenty (20) years from the date of delivery based on hourly reads with multiple data transmissions per day.
   a) Battery shall be free of manufacture and design defects for a period of twenty (20) years.
3. Data collector and repeaters shall be warranted for two (2) years from the date it is placed in service for defects in material and workmanship, extended to 10 years if selected as noted above.

1.10 MAINTENANCE SERVICE AND SUPPORT

A. Furnish service and maintenance of Automatic Meter Reading System for five (5) years, with optional cost up to 10 years from Date of Substantial Completion.

B. Minimum support for Fixed Base Collectors shall include:

1. Include all upgrades for equipment manufacturers licensed software.
2. Include securing primary-use fixed base license annually or as needed.

1.11 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver electric meters, meter components and MTUs to 325 Lincoln SW, Brewster, Ohio 44613. The Owner shall be responsible for storage and installation.

B. The Contractor shall protect meters, meter components, MTUs and all DCUs and AMI system components from weather, moisture, possible damage, and theft while under his control.

C. The Contractor shall be responsible for unloading and loading of products and materials.

D. The Owner reserves the right to inspect and accept all meters, meters components, MTUs DCU and AMI system components on site. They shall be in original sealed manufacturers shipping containers with labeling in place.

E. The Contractor shall at his own expense replace all rejected items. All items shall be properly boxed to protect them against damage in shipment. Items may be rejected by the Owner when damages to the container indicate possibility of damage to the unit.

1.12 OWNER PROVIDED SERVICES/RESPONSIBILITIES

A. The Owner will provide an area at the collector site(s) for installation, if the collector is installed at a site under the Owner's control/Ownership.

B. The Owner will provide padlocks at collector location for security purposes.

C. The Owner will provide network access (backhaul) at the site where the collector is located. The Owner will consult with Manufacturer representative regarding the available options for network connections between collector and the hosted system.

D. The Owner will provide the installer with a master account document, indicating account number, site address, customer name, meter size, and location for each meter scheduled for addition or replacement of MTU, if known.

E. The Owner will provide the installer with one meter reading system to collect final reads from meter and endpoint. Additional reading equipment shall be provided by installer and formatted with OWNER database to permit multiple teams.

F. Utility Data Integration - The Owner shall provide Installer with an Import/Export file format for its billing software, and ensure it makes any necessary upgrades to its billing system to enable it to accept data from and push necessary data to the proposed AMI and implementation system. The Owner's responsibility shall be to ensure that its billing system has the necessary file Import/Export capability so that data collected in the field can be accepted by the billing software.

PART 2 - PRODUCTS

2.1 AMI SYSTEM GENERAL REQUIREMENTS

A. General Requirements AMI Overview

1. The AMI system shall be a fully automated system that does not require the effort of any Owner staff to obtain a meter reading; and shall provide daily metering data at the network control computer at least once per day without having to interrogate the endpoint or data collector.
2. The system shall be capable of remotely collecting numeric meter identification, hourly readings, premise leaks and tamper information from the Owner's existing and water meters.
3. The meter reading data must interface with the Owner's billing system in a process whereby the Owner has the ability to produce meter bills at any given time interval or on any given day. The interface must be tested prior to replacing meters to ensure a smooth transition.
4. All hardware and software supplied by the Contractor must be on the market today – the Owner will not accept new products that do not yet have successful field applications. The system shall be comprised of all new equipment of current manufacture and most current models of each type of equipment. All equipment shall have been manufactured within one year of the date of installation, unless otherwise detailed in the Technical Proposal and as approved by the Owner prior to contract execution.
5. The Proposer must provide local service and provide documentation that vendor has been in business for more than 5 years.
6. The AMI system shall be true, two-way communication enabled for advanced metering infrastructure (AMI). The Fixed Base AMI System must provide communication from the Fixed Base Host Software/computer to the Data Collectors and to the MTUs to allow programming and software upgrades over-the-air. The communication from the Collectors to the MTUs/endpoints must utilize an approved FCC frequency.

7. The proposed system must provide for leak detection for water meters on the customer side, and help support leak detection capabilities on the distribution side.
8. The AMI system must provide the ability to capture & display the following electrical readings on the User Interface and migrated to billing:
   a. KVAh
   b. KVA Demand
   c. Energy Net (KWH)
   d. kW Demand
   e. Instant Voltage (Instant current readings for three phase meters) & Consumption.
   f. Power Factor (average from previous month, and peak PF from current reads). Peak Power Factor can be a calculated value from Peak KW and Peak KVA reads.
   g. Presentation of the engineering information must be able to be customizable to present the data to suit the Utility's needs.
9. The proposed system shall provide unsolicited power outage (last gasp) and power restoration notifications on all electric devices.
10. The proposed system shall provide energy theft detection and reporting such as high/low consumption monitoring.
11. Contractor shall coordinate development of, pay all costs of, and provide the transfer file to allow communications between the meter reading software and Owner's existing billing system. Transfer file use shall be validated before the training program specified elsewhere herein begins.
12. The System shall allow data collection (manual, probed, mobile RF and fixed Base) to operate together seamlessly in a hybrid system with a common interface with the Utility's current Billing Software.
13. AMI System shall be capable of collecting data from 100% of the area currently serviced by the Owner. The AMI System must provide system-wide readings from all MIUs. It must also provide hourly consumption data for each meter.
14. The software must have the capability to transmit all Owner meters at least 1 time daily, and enabled to read at a peak rate of four times per day. Software shall supports operator-based security allowing the Owner to define operator users with varying authorization levels. The system shall log all operator changes and activities, so that a determination of specific operator responsibilities can be made.

B. FCC Requirements

1. AMI shall operate on a primary-use FCC licensed, frequency in the 450 MHz or 900 MHz narrowband PCS/or MAS radio spectrum. Minimum power output shall be 1 watt. Assist the Owner in obtaining said FCC license; Contractor shall bear all costs associated with the license, including application fees. Contractor's Life Cycle Cost Analysis submitted with the Technical Proposal shall state the estimated cost of said costs and fees on an annual or other basis. Cost of licensing fee shall be included in any annual Maintenance or Service Agreement included in this Project.
2. The AMI system must comply with all applicable Federal Communication Commission (FCC) Rules & Regulations. All AMI equipment and system components shall be labeled in accordance with the FCC. The output power of the AMI system will be governed by the relevant FCC standards for the operating frequencies used. Provide supporting documentation in the Technical Proposal to verify compliance.

C. Data Collection Units (DCUs) for Fixed-Network AMR Systems

1. The AMI system will employ a star structure without the use of signal hopping devices with data collectors mounted in a manner to provide redundancy in meter reading. In order to reduce the total number of collectors needed in the field, the Village shall not allow the use of repeaters.
2. The fixed-base network AMR system shall utilize a series of DCUs/repeater antennas to convey the meter data from each MTU back to the Fixed Base Host Software. Equipment must be as unobtrusive as possible and nearly invisible to the community. The number of DCUs shall achieve reliable coverage of 100% of the meters in the Owner's system and provide such functionality as priority alarms and over-the-air updates. The Owner would prefer no DCUs to be mounted on utility poles, nor on private property or at any locations which would lead to rental fees being assessed to the Owner during long-term use of the AMR system. If Vendor intends to utilize such property, it must be clearly stated in the Technical Proposal and any associated costs included in the Life Cycle Cost Analysis. Transceivers shall be mounted in NEMA 4X enclosures.
3. **Contractor is responsible for providing as many DCUs as needed to attain 100% reads across the water system at all times. No additional payment beyond the bid quantity will be provided if additional DCUs are required.**
4. Provide DCU in a NEMA 4X enclosure with battery back-up. Battery back-up must be capable of operating, for 8 hours during power failure. Enclosures shall be configured such that they can be secured with an Owner provided padlock.
5. The DCU/repeater units shall be powered by being hardwired into the structure's electrical system, to retrieve and relay meter readings to the base station. The DCU must be powered via 110 - 110V AC. Upon start-up after power failure, the DCU must restore databases, tables, and logs to the previous operational state. Upon power failure, the DCU shall retain the past three (3) days of meter data in a non-volatile memory. All costs associated with providing power to each unit are to be included in the Technical Proposal. If other arrangements for powering the DCUs/repeaters are being proposed, they must be listed in the Technical Proposal as an exception, and all costs associated with providing power to each unit are to be included in the Price Proposal.
6. DCUs shall be electrically isolated and protected against static discharge, electrical surges, and indirect lightning strikes. Antenna systems shall have electromagnetic pulse (EMP) protection. Data transmissions between MTUs and DCUs, and between DCUs and the Base Station, shall be in a proprietary format to reduce the risk of deciphering by outside entities.
7. The DCUs must have the capability of using Ethernet, or GPRS modem to carry the data to the host server. The proposed method of backhaul communications from the DCUs to the base station shall be presented in the Technical Proposal, primary method desired to use Ethernet/IP if/where available.
8. The DCU must provide memory back-up, three (3) days minimum. It must be able to process up to 50,000 data packets per day.
9. Other Characteristics required, DCU must:
   a. Have an operating temperature of -22°F to +I40°F (-30°C to +60°C.
   b. Have a storage temperature of -40°F to+185°F (-40°C to +70°C).
   c. Have an operating humidity of 0 to 95% non-condensing.

d. Have a NEMA 4X enclosure and pass the UL50 (Underwriter's Laboratory) rain test.
e. Meet vibration requirement of MIL-810F.

10. DCU shall be UL, CSA and FCC Part 90 approved. Manufacturer shall be FlexNet M400B by Sensus, N-Sight R450 by Neptune, or approved equal.

2.2 AMI SYSTEM SOFTWARE SERVICES

A. VENDOR HOSTED

1. The AMI Host Software must provide all the control needed in the network and provide for the essential functions of network management, meter communications, reporting, database configuration and alarms monitoring. It shall comply with prevailing industry standards.
2. Follow Paragraph 2.6.

2.3 WATER METER TRANSMISSION UNITS (MTUs)

A. The Meter Transmission Units must be a compact electronic device connected to an absolute encoder registers of a water meter. The MTU shall interrogate the encoder register and transmit the meter reading and other information to a tower-based Data Collector. The MTU shall be compatible with meter absolute encoder registers featuring 8-digit high resolution. The MTUs shall be manufactured in both wall and pit models. The wall MTU shall have the ability to be mounted in a basement or on the outside of a house. The pit MTU shall have the ability to be mounted in a pit or an underground vault. The wall and pit MTUs shall be a fully potted waterproof design. The MTU shall support communication with the data collector and Fixed Base Host Software. MTUs shall be capable of being retrofit to Village's existing water meters.

B. The MTU shall utilize direct communications with the Data Collector to allow for over-the-air communications between the two devices. Power shall be supplied to the MTU by at least a C-cell lithium battery with capacitor. Battery warranty shall be as specified in Paragraph 1.9.E.

C. Each MTU will be housed in a molded plastic housing that is resistant to rain, ice, moisture, and temperature changes from -22 to +140 degrees Fahrenheit. The enclosure must house the complete unit which includes electronics, battery compartment, and wire connections. The unit will also have an internal antenna. If the MTU has field-replaceable batteries, they must be made up of a chemistry and design which is readily available and appropriate for consumer use and be of low toxicity. The expended batteries must be currently disposable without special permits. Each unit shall provide a location for a tamper deterrent seal.

D. The MTU shall have the capability of sending priority alarms for leak, tamper, and backflow when connected to an encoder register and leak alerts when connected to an monitoring detection device using sound waves (acoustical vibrations) such as an AMI leak sensing device.

E. Reading from the meter register shall not be impacted by a battery failure with the MTU.

F. MTUs shall be FlexNet Smart Point M2 by Sensus, Inc. or R450RF MIUs by Neptune, Inc. or approved equal.

2.4 SINGLE-PHASE ELECTRIC METER ENDPOINTS

A. Single-phase residential electric endpoints shall:
1. Be an integral component of, and contained "under the glass" for electric meters provided in Section 262700.01.
2. Provide daily kWh reading(s) with time stamp.
3. Provide daily maximum kW demand (15-, 30- or 60-minute; rolling or block) with time stamp.
4. Provide time-of-use functionality with remote reconfiguration and rate specification for at least two seasons as well as weekday, Saturday, Sunday and holiday exclusions. Time-of-use billing data shall not be lost in the event of a WAN or collector failure.
5. Provide number of momentary outages and events as defined by IEEE 1366-2003.
6. Provide duration of sustained outages in minutes as defined by IEEE 1366-2003.
7. Report endpoint health diagnostics (i.e., hot-socket detection).
8. Be preprogrammed for standard single-phase residential meters and require no programming prior to installation (plug and play).
9. Have the ability to be installed on any substation or feeder or phase without reprogramming
10. Accommodate switching of power source to alternate substations without loss of billing data. Switching of power source should not interfere with AMI functionality of meters.
11. Bidders must supply single-phase electric meter compatibility specifications for both existing and future single-phase residential endpoint devices. Equipped meters must provide an indication of energy consumption that the customer can easily read.
12. Must have ability to read bidirectional and show energy delivered, energy received, and net on meter display.
13. Allow interrogation and reprogramming over the AMI system without interruption of the service connection.
14. Synchronize to a single host system time source (e.g., National Institute of Standards and Technology) and shall not exceed a one-minute time drift.
15. Provide optical communications through the meter glass without breaking the meter seal for purposes of maintenance and troubleshooting. In the absence of an optical port, a means to locally communicate with the meter is required without breaking the meter seal for purposes of maintenance and troubleshooting.
16. Data displayed on the single-phase residential electric meter must match the reading provided by the AMI system.
17. Endpoints must be certified to comply with all FCC rules.
18. Single-phase residential electric endpoints shall have data storage capability to store over 30 days of hourly load profile data; this data shall not be lost during power outages.

19. The proposed remote disconnect/reconnect device on electric devices shall:
    a. Be capable of operating continuously at 200 amps.
    b. Provide verification of the device's status after operation.
    c. Fit inside standard form 2S residential meters with no modifications.
    d. Have provisions to prohibit reconnection of service if voltage is present on the load side of the meter.
    e. Have the ability to recognize a hot socket/meter base if a heat source is detected; then open or disconnect autonomously after that detection.

2.5 POLYPHASE ELECTRIC METER ENDPOINTS

1. Be an integral component of, and contained "under the glass" for electric meters provided in Section 262700.01.
2. Utilize a direct register read function to read any register found in an ANSI C12.18-19 compliant polyphase meter. These direct register reads include, but are not limited to:
    a. Daily kWh, kVARh, kVAh readings with time stamp.
    b. Daily maximum kW demand (15-, 30- and 60-minute rolling and block) with time stamp.
    c. Time-of-use billing data using the meter's TOU calculator, with the ability to remotely activate a TOU schedule stored in the endpoint.
    d. Hourly load profile data
    e. Access to all meter diagnostics registers (i.e., tamper detection, reverse energy flow detection, health diagnostics, site diagnostics, power quality diagnostics).
    f. Number of momentary outages and events.
3. Be preprogrammed for standard polyphase meters and require no programming prior to installation (plug and play).
4. Allow interrogation and reconfiguration over the AMI system without interruption of the service connection.
5. Synchronize to a single host time source (e.g., National Institute of Standards and Technology) and shall not exceed a one-minute time drift.
6. Allow data displayed on the polyphase electric meter to match the reading provided by the AMI system.
7. Be preprogrammed at the factory; describe the process to reconfigure in the field, should this be necessary.
8. Allow optical field programming through the meter cover without breaking the meter seal .
9. Be fully enclosed under meter cover.
10. Endpoints must be certified to comply with all FCC rules.

2.6 MANUFACTURER HOSTED (SOFTWARE) SERVICES

A. The Owner desires the Vendor to provide hosted service for the AMI Fixed Network System. Include what off-site hosting services that shall be provided to host the reading data and reporting data.

B. The Owner shall retain ownership rights of the meter reading data at all times.

C. The proposed system must provide powerful analytics based software that informs the utility of utility defined exception conditions via email or through the systems interface.

D. Host Software Specifications:

1. The Fixed Base Host Software must provide all the control needed in the network and provide for the essential functions of network management, meter communications, reporting, database configuration and alarms monitoring. It shall comply with prevailing industry standards and should run on a Windows compatible PC.
2. The software must support Fixed Base, Drive By, Hand Held- touch pad and manual readings under one software platform. The system must be able to operate as a hybrid, interfacing with the hand held meter reading system.
3. The software must be the latest analytical software package compatible with the AMI network and shall have a web-enable interface.
4. The System must allow for MTU/endpoint message success rate and Data Collector performance to be monitored daily with system diagnostic information readily available on a "System Health" or Dashboard type screen. The Fixed Base Host Software must produce a DC download report for all DC units in the network. The report must list each DC unit by ID Number, Name and summary of the download statistics. The System must allow Utility personnel to configure key system critical alarms such as reverse flow, 24-hour continuous leak and distribution main leaks. The Software must be able to forward these alarms via email or text message to maintenance personnel that are assigned by the Utility.
5. In addition to obtaining the meter reading from an MTU/endpoint the DC and Fixed Base Host Software, the System must also support the following information requirements:
   a) The software shall show and retain a minimum of one year of hourly usage history.
   b) The software shall be provided as a perpetual license to use the software with the supplied system, provided the annual maintenance agreement is upheld.
   c) A minimum of 5 user licenses shall be included in the software pricing section. Cost for additional licenses shall be detailed in the Life Cycle Cost Analysis provided.
   d) Ability to generate error reports identify which endpoints and data collectors have been inactive for a certain period of time. The software must support operator-based security allowing the Owner to define operator users with varying authorization levels and capabilities. Additionally, all aspects of that operator customization must be available (what screens they have access to, what data they can change, etc.).
   e) The software should include the following standard reports for water meters: Meter Reading History, Daily Leak Detection, Daily No-Use Meter, Daily Tamper Detection, and Backflow.
   f) The software should include the following standard reports for electric meters: Tamper Detection, High Temperature, High/Low Voltage, and Power Failure.
   g) The software must provide for proactive exception alarms that can notify utility personnel via email or SMS text of desired exception conditions.

h) Storing additional water meter readings and status flag information from other monitoring devices (such as distribution line leak noise loggers).
i) Must support single and dual register water meters.
j) Must support water meter readings (6-8 digits) and MTU ID numbers up to 10 digits.
k) Must support the encoder leak and backflow detection output information (applicable to water meters).
l) Must interface with mobile meter reading software to support hybrid system operation.
m) Must support GPS type data to identify locations of account graphically.
n) Must have the capability to store all meter data information obtained from the Data Collectors (DC) for a minimum of two (2) years, with immediate access to 12 months of hourly readings.
o) Must be able to retain the past three (3) rolling days of collected water meter data in the case of a power outage or interruption in the communication link with the software.
p) Must be able to monitor the status of the WAN and alert the user in the event of a problem impacting communication between the DC(s) and Fixed Base Software (Server receiving alarm information about signal strength, etc.).
q) The supplier must provide the service of remotely monitoring the system and have controls in place to ensure optimized system operation.
    1) Must have the capability to monitor status/performance of the DC units in the network.
    2) Must generate a report of DCs that have not downloaded information by day or date range. The report must list DC ID number.
r) Diagnostics must be available such that operators can evaluate performance and send instructions over the air to optimize performance of the DC(s) and the network.

E. Customer Interface Portal Software

1. As an option, the Owner wants to consider a Logic Customer Portal, by Sensus or N-Sight IQ by Neptune, or approved equal, including web based, security protocols, graphical mapping, and other functions beneficial to provide transparency to customers.
2. Provide information including cost for this software as part of the Life Cycle Cost Analysis, including licensing fees, support, maintenance, etc. for OWNER consideration. An Alternative Bid Price for the first two years of this program is included in the Bid Schedule, and may or may not be selected as part of this project.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION MEETINGS

A. Pre-installation meeting to review project, worksites, storage, office, personnel, etc. Follow Section 013119.

3.2 COORDINATION

A. Coordinate integration of AMI system with the Owner's IT department and billing software system's company.

3.3 INSTALLATION-FIXED BASE AMI SYSTEM (COLLECTORS)

A. Installer shall install DC Collectors as part of the contract. Installer shall be qualified to install the collector equipment and run all data and power cables between the antennae and the collector.

B. Install equipment on Owner's existing water tower. Additional sites as needed must be proposed by Contractor as part of the Technical Proposal and approved by OWNER. Installer will be responsible for getting access/permission to any structure that is not owned by the Owner, bear all costs for same, and provide necessary access agreements, easements, etc. to the Owner.

C. Install equipment in accordance with manufacturer's instructions and Laws and Regulations, to provide a complete, functional AMI System. System shall be capable of reading all water meters in the Utility that are equipped with appropriate transceiver equipment, and shall transmit the collected data to the Owner's billing department and to web hosted storage.

D. Contractor shall install DCU/repeater devices per the manufacturer's installation instructions. All costs for such installation, including provision of power and communications, shall be included in the Contractor's Price Proposal. Contractor shall use the utmost caution with installation personnel and practices when working at elevated locations or near power lines.

E. All necessary electric requirements including trenching, conduit, and cabling needed to supply power from the power source outlet to the base station cabinet will be the responsibility of the Installer. All electrical equipment shall be installed in accordance with local codes. It is the installers responsibility to obtain easements (if necessary) approved by the Owner's Law Department.

F. Install grounding material at the location of the collector installation. At a minimum, the material should consist of #4 or #2 stranded copper wire which will connect to the collector. Properly ground the collector and the antenna equipment.

G. Provide sufficient foundation to secure the outdoor cabinet should an outdoor cabinet be required to house the collector. This foundation will consist of a concrete pad or steel structure that is designed to hold 600 lbs. per square inch.

H. For installations requiring poles, the poles, installation, and related appurtenances shall be provided by the Manufacturer/Installer.

I. Installer will make all data and power terminal, and antennae connections at the collector cabinet, this includes the connection from the power source, connection of the data line (supplied by the Owner) from the network access point at the site.

J. Installer will provide all bracketing needed to mount the antennae at the site.

K. Mount the collector cabinet (if needed) to the structure provided and identified by the Owner.

L. Installer will provide all strapping hardware needed to run the data and power cables from the base of the collector site to the antennae if needed.

M. Installer will provide the collector and antennae sufficient to receive meter data and provide the meter data to the head-end system via the wireless network connection provided by the Owner.

N. Installer shall not weld on any water tanks for the purpose of mounting antennas. If water towers are used for antenna mounting, other means of mounting shall be utilized. Parties will mutually agree to the scope of work prior to the installation.

3.4 ADDITIONAL WORK AS AUTHORIZED

A. Any additional Work requested by the Owner will be performed on a negotiated time and material basis.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished work until it is placed into service, inspected by, and turned over to, the Owner.

3.6 FIELD QUALITY CONTROL

A. Field Tests:

1. Upon completion of installation, perform field testing in presence of Owner to verify complete functionality of the system.
2. Field testing shall include test readings of a minimum of 100 electric and 100 water meters and MTUs to demonstrate to Owner the satisfactory operation of the system including all DCUs, Base Station, and software. MTU locations for the test shall be selected by Owner, shall be distributed around the utility, and shall include expected areas of difficult radio transmission to the furthest point in the Owner's distribution system from each AMI station provided.
3. Criteria for Acceptance: Satisfy OWNER that system performs as intended.

B. Manufacturer's Services: Provide services for equipment manufacturer's factory-trained service representative to supervise installation of the equipment, field testing of the system, and training of Owner's personnel.

C. Conditional acceptance shall not relieve Contractor of the responsibility to ensure that 100% of water meters in the utility are read by the fixed-network AMR system at project completion.

3.7 DATABASE MANAGEMENT

A. Provide a parallel test of existing system read and bills vs. new AMI system and bills produced to verify accuracy of bills produced. Over the course of this project, a total of 6 parallel tests at quarterly intervals will be required.

3.8 CLEANING AND DISPOSAL

A. The Installer will be responsible for keeping the Project areas free from the accumulation of waste materials or trash that result from the Project-related Work. Upon completion of the initial Project-related Work, the Installer will remove all waste materials, trash, tools, construction equipment and supplies, and shall remove all surplus materials associated with the Project.

3.9 TRAINING

A. Complete installation and operating instructions will be included for all of the supplied hardware and software equipment. The training must be supplied by the system manufacturer or approved Distributor. Bid must include any additional costs for training and assistance to install and begin operation of the system. The Installer will also inform the customer of any pre-installation activities that are to be completed and the support material that will be needed for the initial installation.

B. The Contractor shall provide no less than four (4) 8-hour training days to Owner field and office staff on all aspects of product installation, AMI system hardware and software operation, AMI system maintenance, and the interface with the Owner's billing system. Contractor should expect a minimum of seven and a maximum of 12 Owner staff to attend training sessions. This training will take place at an Owner-designated location and at times coordinated with the Owner. The Owner reserves the right to videotape the training sessions for use in training other Owner personnel.

C. The manufacturer must support new and ongoing training sessions and material that relates to the operation and maintenance of the fixed base system. Manufacturer will provide a detailed schedule of training options and also perform on-site training sessions for various employees of the utility. The manufacturer must also include other remote training alternatives for new and existing employees. The manufacturer must also support a user's conference/forum in which users of the fixed base system have the ability to provide feedback for new products and best practices.

3.10 TECHNICAL SUPPORT AND SYSTEM MAINTENANCE

A. Contractor shall supply toll-free telephone support to the OWNER during OWNER's normal business hours and after hours, for the purpose of answering OWNER questions and troubleshooting operational issues with the meters and AMI system.

B. Support Services: The manufacturer shall have a fully trained technical support department. The utility must have access to technical questions through a telephone based support desk. The trained technicians should be capable of answering and responding to various requests such as, but not limited to:

1. Hardware, operational maintenance questions and problems.
2. Software operational questions and problems.
3. Assisting customer with configuring reports.
4. Assisting with software updates.
5. Troubleshooting hardware issues.
6. Providing 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.
7. The manufacturer will provide a complete set of installation and operating instructions for all the components of the fixed base system. Onsite training by authorized manufacturer personnel or their representatives must be provided.
8. Identify the critical path items for installation and training needs.
9. A Spanish-speaking interpreter may be needed in some instances.

END OF SECTION 330908.01