



ENGINEERING
ARCHITECTURE
FIELD SERVICES

**CHESTNUT RIDGE PUBLIC SERVICE DISTRICT
BARBOUR COUNTY, WV**

CONTRACT #3 – TELEMETRY

ADDENDUM #1

NOVEMBER 4, 2022

THRASHER PROJECT #101-010-1052

TO WHOM IT MAY CONCERN:

A non-mandatory Pre-Bid Conference was held on Wednesday, October 26, 2022, for the above-referenced project. The Pre-Bid Conference notes are attached to and made part of this Addendum. A copy of the sign in sheet is included in this Addendum. The following are clarifications and responses to questions for the above reference project.

A. GENERAL

1. **THE BID FORM HAS BEEN REVISED. YOU MUST USE THE REVISED BID FORM WHEN PREPARING YOUR BID PACKAGE FOR THIS PROJECT.**
2. If you wish to perform a visit to any of the locations in the plans, please contact the Chestnut Ridge PSD Office at (304) 457-4935 or Contact Sonny Bolyard at (304) 677-0490 (Operator) between the hours of 8:00 am and 4:00 pm to coordinate a site visit.

B. SPECIFICATIONS

Specification Section 274100 - Satellite Telemetry Supervisory Control and Data Acquisition (SCADA) System. Please discard the version previously provided and use the attached.

C. DRAWINGS

No Changes.

D. QUESTIONS AND RESPONSES

QUESTION

1. What is the Engineer's Estimate for each contract?

RESPONSE

Engineer's Estimate for Contract #3 is \$410,000. Engineer's Estimate for Contracts #2 and #3 will be addressed in their corresponding Addendum.

QUESTION

2. Are AIS or BABA required?

RESPONSE

American Iron and Steel (AIS) requirements are applicable to this project.
Buy America Build America (BABA) requirements are applicable to for this project.

QUESTION

3. How quickly are you looking for this work to start?

RESPONSE

There is a 90-day bid hold for this project.

QUESTION

4. What would be the request for the telemetry system?

RESPONSE

To be considered and or approved as a pre-approved "or equal" for this contract, The Thrasher Group must receive the request within 15 days prior to the bid date of November 16, 2022. The telemetry system must meet the specifications set forth in specification section 274100 – Satellite Telemetry Supervisory Control and Data Acquisition (SCADA) System for a complete and operational SCADA Telemetry system.

E. CLARIFICATIONS

1. The contract time for Contract #3 is being extended to 365 days to substantial completion, 395 days to final completion.
2. Contract #3 bid prices shall include 3 years of communication fees from the date of substantial completion.
3. Federal Davis-Bacon Wage Rates are required for this Contract. Wage Rates were checked on November 4, 2022. No update to Wage Rates have been made since the Wage Rates provided in the Contract Documents and Specifications.

If you have any questions or comments, please feel free to contact me at your earliest convenience. As a reminder, bids will be received until 1:00 pm local time on Wednesday, November 16, 2022, at 20 Columbia Street, Philippi, WV. After 1:00 pm local time on November 16, 2022, bids will be received until 2:00 pm local time at the Philippi City Building, City Council Chambers, 344 South Main Street, Philippi, WV. The bids will then be publicly opened and read aloud at 2:00 pm local time at the Philippi City Building, City Council Chambers. The Bid opening will take place at the same location and room where the Pre-Bid Conference was held. Good luck to everyone and thank you for your interest in the project.

Sincerely,

THE VERASTAR GROUP, INC.

STEVEN V. BUCHANAN, P.E.
Professional Engineer

Enclosures: Pre-Bid Sign-In Sheet
Pre-Bid Meeting Notes
Specification Section 274100 – Satellite Telemetry Supervisory Control and Data Acquisition (Scada) System

**CHESTNUT STREET PUBLIC SERVICE DISTRICT
BARBOUR COUNTY, WEST VIRGINIA
CONTRACT #1 – WATER SYSTEM IMPROVEMENTS
CONTRACT #2 – WATER METER REPLACEMENT
CONTRACT #3 – TELEMETRY**

**PRE-BID CONFERENCE
WEDNESDAY, OCTOBER 26, 2022**

Thrasher Project #010-01052

Name	Representing	Phone #	Email Address
Pete Martin	Gonday Enterprises	304-437-1974	gonday138@gmail.com
JOE PINGLEY	MASSI	740 604-9479	joe@MidAtlanticStorage.com
Jeremy Winans	Brian Vandevender Contracting	304-413-3109	Jeremy.W@BLAllenco.com
Tony Closson	JF Allen Company	304-460-7424	TClosson@JFAllenCo.com
Rob Hoover	AJ Burk	304-614-3166	rhoover@ajburk.com
R. RICHMOND	FAMCO, INC	304-529-3328	r.richmond.famco@gmail.com
Wes Counce	Wand W Excavating/Rising Sun	304-669-0318	Ron@RisingSun.com
DERRICK SEARS	FOSTER SUPPLY	304-553-6565	dsears@fostersupply.com

Name	Representing	Phone #	Email Address
CARY SMITH	REGION VII P3DC	304-472-6564	CSmith@regionvii.com
Bobby Tenney	Specialty Groups, Inc	304-677-2029	btenney@sgivv.com
Eric Sprouse	Bear Contracting	304-326-0160	estimating@bear-contracting.com
Jeremy Haynes	Performance Power Solutions	304-410-1443	jhaynes@performance-ps.com
Mary M. Poling	CRPSD (Board)	304-677-5373	mary.poling46@gmail.com
Shawn Young	IBEW Local 596	304-622-0151 ext. 14	syoung@ibew596.com
Keith Smith	C2G Engineering	304-922-5022	KSmith@C2Geng.com
Patrick Conn	Jennings Excavating Inc	304-288-5333	pconn@jenningsexcavatinginc.com
Vince Huck	NRUSI	724-747-8604	vhuck@nrusi.com
Dan Grafton	Dans Marine Service	304-265-0188	dmsgrafton@aol.com

CHESTNUT RIDGE PUBLIC SERVICE DISTRICT
20 COLUMBIA STREET
PHILIPPI, WV 26416
Phone: (304) 457-4935

THE THRASHER GROUP, INC.
PO Box 940
Bridgeport, WV 26330
Telephone # (304) 624-4108

CONTRACT #1 – WATER SYSTEM IMPROVEMENTS
CONTRACT #2 – WATER METER REPLACEMENT
CONTRACT #3 – TELEMETRY

PRE-BID CONFERENCE NOTES

PROJECT LOCATION:	Barbour County, West Virginia
ENGINEER'S PROJECT #:	010-01052
DATE OF CONFERENCE:	Wednesday, October 26, 2022, at 10:00 A.M., LPT
CONFERENCE LOCATION:	Philippi City Building, City Council Chambers 344 South Main Street Philippi, WV 26416

PRE-BID AGENDA

I. Introductions

The attached sign-in sheet documents all attendees.

II. General Project Description

The project was generally described as per the Advertisement for Bids.

a. Contract #1 – Water System Improvements

- i. Approx 19,000 LF of waterline installation
- ii. Two new prefabricated booster stations, demolish two existing
- iii. Rehabilitation work for four other pump stations:
 1. New Pumps
 2. Control Panel upgrades
 3. Re plumbing
 4. Etc.
- iv. Two New PRV stations, one as solenoid shut off valve also
- v. Six valve vault rehabilitations
- vi. Repaint four tanks with other rehabilitation work
- vii. Construct new Clemtown Tank and demo existing
- viii. Tank access road repairs, stone, ditching, etc.
- ix. Twelve new gate valves throughout the system

b. Contract #2 – Water Meter Replacement

- i. Approximately 1,150 Water Meter Replacements
- ii. Purchase 60 Water Meters

c. Contract #3 – Telemetry

- i. Sixteen Telemetry Units
 1. Seven Tanks
 2. Seven Booster Stations
 3. Bowmar Hill PRV and Sunrise Valve Vaults

III. General Bidding Information

- a. General – As per the Advertisement for Bids, bids will be received by the Chestnut Ridge Public Service District at their office location at 20 Columbia Street, Philippi, WV 26416 until 1:00 pm local time on November 16th, 2022. After 1:00 pm local time on November 16th, 2022, bids will be received until 2:00 pm local time by the Chestnut Ridge Public Service District at the Philippi City Building, City Council Chambers, 344 South Main Street, Philippi, WV 26416. The bids will be publicly opened and read aloud at 2:00 pm local time.
 - i. Two Envelope System – Described on page BOR-1 of Contract Documents and Specifications
 - ii. Envelope 1 shall contain Bid Opening Requirements and be labeled as such
 - 1. Name and address of Bidder on front of envelope
 - 2. Bid for Contract #
 - 3. Project Owner Name – Chestnut Ridge PSD
 - iii. Envelope 2 – Labeled Bid Proposal
 - 1. Placed within Envelope 1
- b. Bid Opening Requirements – Described as per the Contract Documents and Detailed Specifications. These are the blue sheets if you have purchased hard copies.
 - i. Checklist of requirements on page BOR-1
 - ii. Checklist must be completed for bid to be opened
- c. Bid Form – Described as per the yellow sheets in the Contract Documents and Detailed Specifications if hard copies were purchased.
 - i. If addendum changes the Bid Form, the new Bid Form that is included in the Addendum must be used when submitting bids. Prices must be given in written form and in numerical form. Written prices govern over numbers if different. Unit prices will be used to verify the lowest bidder.
- d. Method of Award – Contingent upon sufficient funding for the project, the Owner may elect to award the contract to the lowest qualified Bidder on the basis of the total bid. There are no Deductive Alternates for any of the three contracts.

IV. Details of Project

- a. Construction Sequence of Events – Described as per the Project Notes sheet in the Plans.
 - i. During construction of the New Clemtown Water Storage Tank, it is anticipated that the existing tank be left in operation until the new tank is constructed and ready to be put into operation.
 - ii. While the new package booster stations are constructed, it is anticipated that existing booster stations be left in operation until the new booster stations are constructed and ready to be put into operation.
 - iii. While the existing booster station rehabilitation takes place, it is the contractor's responsibility to maintain flow through the stations. It is understood that there may be some down time in the booster stations while making final connections. It is the contractor's responsibility to mitigate these down times as much as possible as well as make the PSD aware of when these down times will occur to ensure that the associated water storage tanks can be filled prior to these down times to keep customers in service.
 - iv. It will be the responsibility of the contractors for Contracts #1 and #3 to coordinate telemetry installation work associated with Contract #3 in regards to the other work to occur at the associated booster stations, water storage tanks, and valve vaults.
- b. Material and Equipment – A general description was provided as per the Bid Forms. Thrasher worked with Rob Trombold of TEPCO in regards to the package booster stations and telemetry equipment.

- c. In regard to water meter replacement in Contract #2, and coordination with the water line replacement work as a part of Contract #1. Contract #2 will be responsible for replacing every meter in the Chestnut Ridge System. Contract #2 can perform their work at any time in regard to Contract #1. If Contract #2 performs the water meter replacement work in the areas of Plan Sheets 3-24 of Contract #1 before Contract #1 has performed the water line replacement, and all necessary work to switch the customers over to the new waterline, then Contract #1 shall be responsible for switching the new meters from the existing meter wells to the new meter wells set as part of Contract #1. If Contract #2 has not performed the water meter replacement work in the areas of Plan Sheets 3-24 of Contract #1, Contract #1 will be responsible for switching the existing meter from the existing meter well to the new meter well. The existing meter will then be replaced as part of Contract #2.
- d. Contract #1 shall be responsible for providing water meters in booster stations and PRV vaults as noted in the plans. These water meters shall be of the same manufacturer as water meters used for replacement in Contract #2. For bidding purposes on Contract #1, use a value of \$3,500 for purchase of a 3" water meter and \$4,000 for purchase of a 4" water meter.
- e. As per Specification Section 331213 in Contract #2, the radio read water meter system must be approved for usage within the Green Bank Observatory Quiet Zone. Contact Sheldon Wasik at Green Bank Observatory to obtain approval:

Sheldon Wasik
NRQZ Program Administrator
nrqz@nrao.edu
nrqz@gb.nrao.edu
304-456-2107
Reference the Chestnut Ridge Water System Improvements Project as well as **NRQZ ID 221020B**
- f. Prevailing Wages – Federal Davis-Bacon Wage Rates are required for this project.

- V. Submittals – Required for all materials used for the project as per Specification Section 013300. Electronic or hard copies of submittals will be accepted. If hard copies are submitted, provide six (6) copies of all submittals. Three will be returned to the contractor, and one copy each to the Owner, RPR, and Engineer.
- VI. Permits – All required permits have been applied for and received by the owner.
- VII. Land Acquisitions & ROWs – All lands have been acquired and the last ROW is in the condemnation process.
- VIII. B & O Taxes/Building Permits –
 - a. No Business and Occupation taxes are required
 - b. No Building Permits or City Licenses are required
 - c. All work for all Contracts is located outside of the Philippi City Limits
- IX. Addressing Questions – All questions shall be written and provided to Steve Haynes by email at shaynes@thethrashergroup.com. The close of questions shall be 12:00 noon on Wednesday, November 2nd, 2022. All answers shall be provided in writing via Addenda.
Questions will only be accepted via email to shaynes@thethrashergroup.com
- X. Addendum – At least one (1) Addendum will be written and supplied to all plan holders. Any and all Addenda shall be acknowledged by the Contractor on Page BOR-4 as well as Article 3.01 on the Bid Form.
- XI. Funding Agency
 - a. West Virginia Infrastructure Jobs Development Council (WVIJDC)
 - b. Drinking Water Treatment Revolving Fund (DWTRF)
- XII. Project Administrator – Cary Smith, Region VII Planning & Development Council
- XIII. Owner – Chestnut Ridge Public Service District
 - a. Project area cleanup is extremely important. All disturbed area shall be restored to conditions equal to or better than before construction begins. Pre-Construction photo/video documentation will be made by the Engineer for Contract #1 and will be relied upon to establish pre-construction conditions. The contractor is encouraged to document the current conditions of yards, roads, etc. that will be used by the contractor outside of the proposed path of waterline.

- b. Be courteous and cautious to residents in the area. The contractor shall provide two days' notice of when streets/driveways will be closed so arrangements can be made to have vehicles moved prior to the start of work in that area.
- c. The contractor shall provide accurate, red-lined record/as-built drawings. These drawings shall be updated daily and shall be provided to the Owner as part of project close-out. Contract #2 shall provide completed customer list with meter information as noted in the Plan Set.

XIV. Question and Answer Session – These shall be included in the questions and answers in Addendum #1.

XV. Site Visit – No site visit was performed on this day. Contractors are encouraged to contact Chestnut Ridge PSD to coordinate visiting areas of the project at the contractor's discretion. Chestnut Ridge PSD can be contacted at the following phone numbers:
(304) 457-4935 – Chestnut Ridge PSD Office
(304) 677-0490 – Sonny Bolyard (Chestnut Ridge PSD Operator)

SECTION 274100 – SATELLITE TELEMETRY SUPERVISORY CONTROL AND DATA
ACQUISITION (SCADA) SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

- A. The Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish, install, calibrate, test, start-up, and place in satisfactory operation a complete Cloud based Supervisory Control and Data Acquisition (SCADA) System.
- B. The SCADA system shall consist of three sub-systems: a Central Server, a web-based user interface and the Remote Terminal Units (RTU's) of various sizes.
The SCADA system shall be manufactured by High Tide Technologies, LLC, or engineer pre-approved equal.
- C. The SCADA system shall communicate with the internet via a network of roaming low altitude satellites which constantly circumnavigate the earth from the north pole to south pole, returning from south pole to north pole.
Satellite purveyors which communicate based on satellites which circumnavigate along the equator shall not be considered acceptable for this project.
- D. The scope of the Chestnut Ridge PSD Telemetry project shall include the following Telemetry Remote Terminal Units (RTUs):
 - 1- RTU and accessories for Booster Station #1
 - 1- RTU and accessories for Chestnut Ridge Tank
 - 1- RTU and accessories for Booster Station #2
 - 1- RTU and accessories for Olive Hill Tank
 - 1- RTU and accessories for Bowmar Hill PRV & Solenoid
 - 1- RTU and accessories for Arden Tank
 - 1- RTU and accessories for Clemtown Booster
 - 1- RTU and accessories for Clemtown Tank
 - 1- RTU and accessories for Sunrise PRV Station
 - 1- RTU and accessories for Sunrise Tank
 - 1- RTU and accessories for the Richman Pump Station
 - 1- RTU and accessories for Matlick Tank

1- RTU and accessories for the Moatsville Booster

1- RTU and accessories for the Newlon Booster

1- RTU and accessories for Locust Grove Tank

1- RTU and accessories for the Hiram Pump Station

- E. The telemetry system shall be capable of seamlessly adding an unlimited number of additional pump station sites, tank sites, master meter sites, control valve sites in the future.
- F. The proposals by the telemetry system supplier shall include three (3) years of communication fees in initial system price. The owners shall not be required to pay for the communication package for a period of three years after completion of system start up.

1.2 GENERAL

- A. The Central server shall consist of a cluster of servers providing various data processing, web server and database functions. The system shall be scalable to add more servers as the demands on the system increase.
- B. The web-based user interface software shall provide all the functions necessary for the Owner to interact with the data from the remote units as well as execute configuration and control commands.
- C. RTU's shall be furnished and installed at each of the monitored sites. The Manufacturer shall have available several models of RTU's which will accommodate a wide variety of Input and Output requirements.
- D. Alternation or the booster pumps shall be performed by the pump system control panel, not the telemetry system.

1.3 QUALIFICATIONS

- A. The SCADA System shall be furnished by a single Supplier who shall assume responsibility for providing a complete and integrated system.
- B. Manufacturers Qualifications: Only manufacturers who have been regularly engaged in the supply of SCADA equipment for at least 10 years and capable of meeting the following criteria need respond:
 - a. Have completed a minimum of ten (10) successful combination cellular/satellite telemetry system applications throughout the regions – no exceptions. Each system must have individual cellular RTUs and individual satellite RTUs functioning independently, reporting directly to the system server, and integrated seamlessly into the control system and displayed on the web interface.
- C. The system shall accommodate future system expansion incorporating either satellite RTUs or cellular RTUs without requiring special configuration of either the existing telemetry system or

the future expansion. The future expansion shall be integrated seamlessly into the website display.

- D. Polling type SCADA systems shall not be considered as equal.
- E. Provide the OWNER with references and phone numbers of each of the three satellite telemetry systems. A minimum of two names per each CELLULAR-SATELLITE TELEMETRY SYSTEM reference shall be provided. References will be contacted and completed work verified by the ENGINEER and OWNER
- F. Acknowledge that shipment of the CELLULAR-SATELLITE TELEMETRY SYSTEM RTU nodes and related equipment shall be authorized only by the ENGINEER and OWNER group – no exceptions.
- G. Utilize only UL listed and rated components in enclosure manufacture.
- H. Provide 100 percent of all hardware and software technical manuals to the ENGINEER and OWNER in digital format. The manuals shall be in Adobe pdf format.
- I. Provide all system concept, layout, design, and telemetry setup notes in Microsoft Word or Excel formats to the ENGINEER and OWNER.
- J. Provide all final enclosure layouts and electrical wiring diagrams in Adobe pdf. version 2002 on CD to the ENGINEER and OWNER – no exceptions.
- K. Provide complete bill-of-materials (BOMs) and enclosure layouts that are numerically cross-referenced together for each SATELLITE TELEMETRY SYSTEM node. All BOMs shall contain the standard factory supplied part numbers instead of proprietary numbers – no exceptions.
- L. Provide a warranty and emergency support for a period of not less than one (1) year after the ENGINEER and OWNER accept each satellite telemetry system node.
- M. Provide primary technical support to the OWNER by full-time qualified staff members only. Temporary or part-time staff members do not qualify as full-time employees. Technical support provided by manufactures representatives, salespersons or local distributors is not acceptable - no exceptions.
- N. SECURITY: To assure the security and privacy of customer data, the proposed manufacturer shall be certified in accordance with SOC2 Type2 at a minimum. Developed by the American Institute of Certified Public Accountants (AICPA), SOC 2 certification is widely recognized as a gold standard for data security and requires companies to establish and follow strict information security policies and procedures. By achieving Type 2 certification, an independent third party has validated the design of the manufacturers' controls relevant to security, availability, and confidentiality. Successful Type 2 examination demonstrates their commitment to data security through the practices and procedures it follows for protecting against unauthorized access, maintaining the availability of its service, and protecting the confidential information of its customers. Telemetry supplier must submit a written copy of their SOC 2 security certification to the engineer for approval.

1.4 CUSTOMER SERVICE:

- A. The Manufacturer shall provide 24-hour, seven days a week phone support access to the Owner by the Manufacturer's customer support personnel. Customer support personnel shall provide assistance with software, communications, and hardware as required by the Owner. The Manufacturer shall provide the Owner with a toll-free number to contact their customer support personnel.
- B. The Manufacturer shall charge a maximum monthly service & communication fee of \$50 per month per site.
- C. No additional fees shall be charged by the Manufacturer for configuring the Owner's software for his applications.
- D. No additional fees shall be charged for phone support by the Manufacturer or their service personnel.
- E. The Owner shall not be charged for Software Licenses, Tag Licenses, Software Upgrades, Server Maintenance.
- F. The SCADA system shall archive any and all data which is monitored by the SCADA system and the Owner shall be able to access all data via the web page without assistance by the SCADA provider. The Owner shall be able to view, print out, generate graphs, generate spread sheets of any archived data without assistance of any kind by the Scada provider.

1.5 INSTALLER QUALIFICATIONS:

- A. Only Installers who have been regularly engaged in the installation of SCADA equipment and have completed the Manufacturer's installer certification course need respond.

1.6 DEFINED TELEMETRY SITES:

A. BOOSTER STATION #1

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

SCADA SOFTWARE: HTT Cloud Based

SPECIFIED RTU MODEL; HTT 1100
I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable: 50 feet Mount iridium antenna on top of electrical structure.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

B. CHESTNUT RIDGE TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
- Intrusion alarm -Intrusion switch and wiring by Others

TELEMETRY RTU: HTT1100 utilizing cellular telemetry.

Mount RTU on support structure adjacent to tank.

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL

Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.

- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.
- PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
- SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

C. BOOSTER STATION #2

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included

- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

MODEM: Compatible, MultiTech Dragonfly Modem

SCADA SOFTWARE: HTT Cloud Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable: 50 feet Mount iridium antenna on top of electrical structure.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

D. OLIVE HILL TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.

TELEMETRY RTU: HTT1100 utilizing cellular telemetry.

Mount RTU on support structure adjacent to tank.

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL

Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.

- Antenna: 1- Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.

- PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
- SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

E. BOWMAR HILL PRV & SOLENOID VALVE STATION

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

SCADA SOFTWARE: HTT Telemetry VIEW 2 Web Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Inlet Pressure 4-20mA input from pressure transducer
- Outlet Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Call Valve Open/Close
- Valve Limit Switch
- Power Fail
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o ANTENNA LOCATION: Mount on new pole to be installed next to fence by road.
 - o Co-axial cable: 50 feet Mount antenna on electrical structure
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Include thermostat and heater
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

F. ARDEN TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
 - Intrusion alarm -Intrusion switch and wiring by Others
- TELEMETRY RTU: HTT1100 utilizing cellular telemetry.
Mount RTU on support structure adjacent to tank.

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL

Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.

- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.
- PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
- SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

G. CLEMTOWN BOOSTER

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

MODEM: Compatible, MultiTech Dragonfly Modem

SCADA SOFTWARE: HTT Cloud Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter— 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable: 50 feet Mount iridium antenna on top of electrical structure.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

H. CLEMTOWN TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
- Intrusion alarm -Intrusion switch and wiring by Others

TELEMETRY RTU: HTT1100 utilizing cellular telemetry.

Mount RTU on support structure adjacent to tank.

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL

Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.

- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.
- PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
- SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

I. SUNRISE VALVE STATION

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem

SCADA SOFTWARE: HTT Telemetry VIEW 2 Web Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Inlet Pressure 4-20mA input from pressure transducer
- Outlet Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Call Valve Open/Close
- Valve Limit Switch
- Power Fail
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.

- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o ANTENNA LOCATION: Mount on new pole to be installed next to fence by road.
 - o Co-axial cable: 50 feet Mount antenna on electrical structure
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Include thermostat and heater
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

J. SUNRISE TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
 - Intrusion alarm -Intrusion switch and wiring by Others
- TELEMETRY RTU: HTT1100 utilizing cellular telemetry.
- Mount RTU on support structure adjacent to tank.
- MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem
- POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL
- Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.
 - PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
 - SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

K. RICHMAN BOOSTER

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS
- MODEM: IRIDIUM Satellite Compatible, Iridium 9602 single board transceiver

SCADA SOFTWARE: HTT Telemetry VIEW 2 Web Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Low Temperature
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: 1- M1621HCT-SMA Iridium Certified Antenna
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable: 50 feet Mount iridium antenna on top of booster station building.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

L. MATLICK TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
- Intrusion alarm -Intrusion switch and wiring by Others

TELEMETRY RTU: HTT1100 utilizing Iridium telemetry.

Mount RTU on support structure adjacent to tank.

MODEM: IRIDIUM Satellite Compatible, Iridium 9602 single board transceiver

POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL

Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.

- Antenna: 1- M1621HCT-SMA Iridium Certified Antenna
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.
- PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
- SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

M. MOATSVILLE BOOSTER

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD

- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

- MODEM: IRIDIUM Satellite Compatible, Iridium 9602 single board transceiver

SCADA SOFTWARE: HTT Telemetry VIEW 2 Web Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Low Temperature
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: 1- M1621HCT-SMA Iridium Certified Antenna
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable: 50 feet Mount iridium antenna on top of booster station building.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

N. NEWLON BOOSTER STATION

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

- MODEM: IRIDIUM Satellite Compatible, Iridium 9602 single board transceiver

SCADA SOFTWARE: HTT Telemetry VIEW 2 Web Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Low Temperature
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: 1- M1621HCT-SMA Iridium Certified Antenna
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable; 50 feet Mount iridium antenna on top of booster station building.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

O. LOCUST GROVE TANK

SPECIFIED RTU MODEL: HTT 1100

I/O

- AI Tank Level
 - Intrusion alarm -Intrusion switch and wiring by Others
- TELEMETRY RTU: HTT1100 utilizing cellular telemetry.
Mount RTU on support structure adjacent to tank.
MODEM: CELLULAR Compatible, MultiTech Dragonfly Modem
POWER SUPPLY: SOLAR POWER, MOUNT SOLAR PANEL ON TANK HANDRAIL
Telemetry supplier to include 60W solar panel, 2-23AH Li-ion solar battery, solar convertor, power cable.
- Antenna: Omni Directional Cellular TRA6927M3PBN-001
 - o Length of Coaxial Cable: 50 FT
 - o Mount antenna on top of tank handrail.
 - PRESSURE TRANSDUCER: 4-20 mA pressure transducer mounted in transducer panel to be supplied and installed.
 - SURGE ARRESTORS: Include surge arrestor on each co-ax antenna cable, power supply and each analog input.

P. HIRAM BOOSTER STATION

- Power available: 120 volts, 1 phase, 60 HZ
- Pump alternation to be performed by the pump system control panel.

HTT MODEL: Model HTT-1100

- Input Power: 110/220 VAC or Solar or 18 - 30 VD
- Back Up Power: 12VDC Lead acid battery included
- DIGITAL INPUTS: 8 DRY CONTACTS
- ANALOG INPUTS: 4 + 4 OPTIONAL (4-20 mA or 0-5 VDC)
- DIGITAL OUTPUTS: 4 OPTIONAL RELAY OUTPUTS

- MODEM: IRIDIUM Satellite Compatible, Iridium 9602 single board transceiver

SCADA SOFTWARE: HTT Telemetry VIEW 2 Web Based

SPECIFIED RTU MODEL; HTT 1100

I/O

- Suction Pressure 4-20mA input from pressure transducer
- Discharge Pressure 4-20mA input from pressure transducer
- Flow Meter 4-20 mA input and pulse input
- Pump Room Temperature 4-20 mA
- Call Pump 1
- Call Pump 2
- Pump 1 Running
- Pump 2 Running
- Pump 1 Failure
- Pump 2 Failure
- Power Fail
- Low Temperature
- Intrusion alarm -Intrusion switch and wiring to be supplied and installed.
- 2 - Pressure transducers to be supplied and installed.
- Include 4-20mA surge arrestor on each transducer input circuit.
- POWER SOURCE: Customer Supplied 120 Volt, 1 phase AC Power
- Antenna: 1- M1621HCT-SMA Iridium Certified Antenna
 - o Length of Coaxial Cable: 50 FT
 - o Co-axial cable: 50 feet Mount iridium antenna on top of booster station building.
- Include surge arrestor on each co-ax antenna cable, power supply and each analog input.
- Telemetry supplier shall include 1- analog temperature transmitter to monitor pump room temperature.

PART 2 – PRODUCTS

2.1 CENTRAL SERVER

- A. The Central Server core shall be configured as a cluster of servers, each performing different tasks. Key functions shall be running on multiple servers thus providing redundancy in the event of hardware failures. The entire cluster shall be hosted in a server-hosting center with power, network and hardware redundancy built in.

2.2 WEB-BASED USER INTERFACE SOFTWARE

- A. Compatibility: The system shall be compatible with modern web browsers on various operating systems including computers, tablets, and smartphones.

- B. Access and Security: Access to the customer's user interface shall begin with a username and password screen. The web interface shall utilize fully encrypted data and passwords via standard HTTPS technology – the same level of security used by online banking applications. The person designated by the Owner as the "administrator" shall have authority to manage usernames and passwords as well as control and change certain parameters related to their system.
- C. Levels of Access: Four levels of access shall be provided. VIEWERS shall only have permission to view the system data. OPERATORS shall be able to view and acknowledge alarms. SUPERVISORS shall be able to perform all the functions of the operators as well as change parameters in the system and manually turn pumps on and off. ADMINISTRATORS shall be able to perform all the functions of the supervisors as well as create and delete users from the system. Administrators shall also be able to assign which contacts will receive alarms.
- D. User Limits: The Owner shall be able to create as many users as needed and all users shall be able to be logged in simultaneously. No additional charge shall be assessed on the number of users or viewers.
- E. User Interface Types:
 - 1. The system shall provide options to the Owner for either tabular or graphical status representations of the installations.
 - 2. Larger systems shall be able to be broken down into segments or zones for easy navigation and display. Size, location, and layout of objects on the screen shall be customizable by the software provider upon Owner request.
 - 3. The software shall be capable of showing location and status of each RTU installation on maps, given Owner supplied addresses or coordinates.
- F. The system shall have robust Alarming Capabilities, including the following features:
 - 1. The ability to send alarms via voice calls, text messages or emails.
 - 2. The ability to configure a preferred alarm delivery order with delays between each level and each operator.
 - 3. The ability to accept acknowledgments via voice or text at the time the alarm is delivered or via the web interface at any time.
 - 4. The ability for users to view a list of alarm histories for each installation including which user acknowledged the alarm.
 - 5. The ability to set any alarm recipient to be "Nagged" by calling them every 10 minutes until someone acknowledges the alarm.
 - 6. The ability to set shifts and days off for each alarm recipient and set day and night shift alarm notifications.
 - 7. The ability to have audible and visual alarms pop up on the computer that is logged in to the system.
 - 8. The ability to alarm the user if the RTU has stopped communicating with the host servers.
- G. Auto Refresh: The web interface shall automatically refresh when new data or alarms are reported.
- H. Data Analytics and Graphing: The system shall provide various menus to allow users to view historical data on pop-up graphs. Users shall have the ability to set the time range of the graphs

and zoom in to view events of the past. When a user's mouse is held over a data point, the details of that data point shall appear on the screen.

- I. **Raw Data Downloads:** The user shall be able to dump raw data in tabular format for offline analysis that can be imported into a spreadsheet for further analysis.
- J. **Report Generation:** The user shall have the ability to download formatted spreadsheet reports of various functions, without assistance from the telemetry supplier.
- K. The software shall also provide the ability to automatically fill in the owner's report forms in standard Excel formatted files.
- L. **Screen Configuration:** The Manufacturer shall provide a service to configure graphic and tabular screen layouts, particular locations, and sizes of graphical objects to match the customer's requirements.
- M. **Service History:** The system shall provide a mechanism for the user to enter freeform service history information for all RTU sites.
- N. The system shall be capable of providing Automatic and Manual Controls as listed below:
 - 1. Ability for one Tank to control one or more remotely located pump stations and valves based on tank level or system pressures. This should be performed in either round robin or lead/lag configurations.
 - 2. Ability to automatically cause the digital input from one RTU to be replicated on the digital output of another RTU (when digital outputs are available).
 - 3. Ability to automatically cause the analog input level at one RTU to be replicated on the analog output of another RTU (when analog outputs are available).
 - 4. Ability for the user to set analog threshold alarms and controls and have them downloaded to the RTU. These include levels, pressures, flow rates and any physical sensor that outputs an analog signal. This feature shall apply to RTU's with analog input capability.
 - 5. Ability for supervisors or administrators to manually control digital outputs that are connected to valves or pumps on RTU's that are equipped with outputs.

2.3 REMOTE TERMINAL UNITS (RTU)

- A. **General:** RTU's shall be A/C or Solar powered depending on the model, as designated by the Owner. The RTU's shall be available as either a kit that can be mounted in existing cabinets or supplied in a NEMA 4X enclosure with a raised door supported by stainless steel hinges on the left and a stainless-steel latch configured for a padlock (supplied by Owner). The electronic components provided shall be din-rail mounted for easy replacement without removal of the enclosure. AC power supplies and solar regulators shall be modular and easily replaceable in the field.
- B. The Manufacturer shall have the following types of RTU's available or equivalent:

Option	DIs	AIs	DOs	AOs	Networks	Applications
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HTT1100	8	4 inc. + 4 opt.	4 opt.		Sat, Cell, IP	Lift Stations, Tanks, Meters, Valves, Pressure, Boosters etc.
HTT3100	28	6 inc + 4 opt.	4	2	Sat, Cell, IP	Larger Lift Stations, Boosters, Small Plants
HTT4100	28+	12+	8	opt.	Cell, IP	Plant Monitoring

1. Solar power shall be available as requested for HTT201 and HTT1100.
2. Back-up battery power shall be available for all but HTT4100 and GPG in the event that AC power is lost. When in battery backup mode the unit will at a minimum have enough power to send out a power fail alarm and, on some options, actually maintain full functionality for a small number of days.

C. The Manufacturer shall have the following types of Inputs and Outputs available:

1. Digital inputs compatible with either open collector or dry contact sources. Optional 115V or 230V instrumentation relays to mount in the enclosures when required.
2. Counter inputs. Four of the digital inputs configurable as pulse counters for flow monitoring equipment or rain gauges.
3. Analog inputs configurable to accept either 0-5V or 4-20ma and 0-20ma inputs. For 4-20ma and 0-20ma inputs, the sense resistor shall be 250ohms and removable for voltage sensors. 4-20ma inputs configurable to accept 2-wire, 3-wire, or 4-wire sensors. Battery backed up 24V loop power shall also be available as well as analog inputs with optional integrated surge protection available.
4. Digital Outputs. RTU's with digital outputs configured with din-rail mounted Form-C relays capable of switching up to 5A at 250V.
5. Analog Outputs. RTU's with analog outputs capable of syncing 4-20ma outputs under RTU control.
6. Modbus Master. At least one type RTU shall have an RS-232 port that can be configured as a Modbus Master for reading data from third-party PLC or sensor equipment.

D. Two-way Communications: The RTU shall have capability to both send alarms and scheduled reports up to the server as well as receive commands from the server at any time. All functional configurations and alarm thresholds shall be able to be sent from the server without visiting the RTU.

E. Digital Alarm Functions: The RTU shall be able to report status changes or alarms on any digital input. All analog inputs may be configurable as digital or alarm inputs.

1. Pseudo alarms shall be available to report when two or more selected digital inputs are in the alarm state at the same time.
2. Whenever a digital alarm occurs the status shall be reported to the server after a programmable validation delay.

F. The RTU shall have the following Analog Input Monitoring Functions:

1. Reports analog input levels on programmable schedules ranging from 1 min to several hours.
2. Ability of the user to configure up to four separate alarm thresholds for each analog input. The RTU shall send an extra report to the server whenever the analog level passes through any of the alarm thresholds. Alarm thresholds shall be continuously monitored regardless of the reporting interval.
3. Ability to configure the RTU to sample the analog input only when one or more digital inputs are active. This may be used to monitor pump amps or flow rate only when a pump is running.
4. Ability to report an alarm when an analog reading falls too rapidly such as tank level falling due to system leak.

G. Local Pump Alternator/Controller. The RTU shall include a software pump controller with the following functions built in and configurable over the communications channel:

1. Local control for up to three pumps.
2. Local alternation, lead lag or round robin control behavior.
3. A maximum number of pumps running setting that actively turns off pumps to stay below the maximum.
4. Back up timers that can be set for maximum ON time or maximum OFF time or both. The maximum on setting can be configured to turn all pumps off or to force alternation.
5. Ability to set a time of day where the RTU turns pumps ON for a fixed duration of time.
6. Alarm the server if a pump is called for but does not start.
7. Ability to turn a pump ON or OFF based on local analog input alarm thresholds. This can be used for functions like low suction cut-off, local altitude valve control or local alarm light activation.

H. Flow Meter Functions. The RTU shall support the following features associated with flow meters:

1. Four internal 32-bit pulse counters stored in non-volatile memory.
2. Ability to report the counter totals on intervals ranging from 1 minute to daily.
3. Ability to convert two of the counter inputs pulse rates to a flow rate and report to the server in the form of an instantaneous flow rate reading.
4. Ability to take two of the Analog inputs connected to flow rate outputs of meters and integrate the signal to create a pseudo totalizer simulating a pulse counter. This will be used when pulse outputs are not available from the flow meters.

I. Power Monitoring. The RTU shall support the following power related functions:

1. All units shall have battery backup that keeps the core functions active for at least two days. Depending on what option is installed, some I/O's will continue to function normally.
2. Alarms shall be sent to the server when power loss is detected.
3. For solar RTU's or A/C powered RTU's running on battery, alarms shall be sent to the server when the battery reaches a critical low level. Solar units shall also report if no charging voltage is received for 4 days as an indication that the panel may be stolen or defective.

J. Ease of Replacement. Main electronics' modules shall have the following features:

1. Main electronic modules shall be din-rail mounted for easy removal and replacement.

2. All power and I/O connectors shall be two-part pluggable terminals so that when a module is replaced no wires have to be removed from the terminals.
3. The same basic RTU shall be used for all communications options with no I/O configuration changes.

K. Antenna Options:

1. Cellular options shall include an antenna that is internal to the enclosure, an omnidirectional antenna external to the enclosure or a directional (higher gain) antenna external to the enclosure.
2. Satellite RTU's shall require an external 3-inch stub antenna with a bracket and either a 15, 30 or 50-foot external cable.
3. IP units shall only require standard 10baseT RG6 Internet patch cable connection.

L. Expansion and Accessories. The RTU's shall have the following optional factory-installed accessories available:

1. Din-rail mounted main power surge arrestor.
2. Din-rail mounted Analog or Digital signal surge arrestors.
3. RTU's with four Analog inputs shall have an optional expansion module to add four additional 4-20ma analog inputs.
4. Enclosure heaters and thermostats.
5. Local digital displays for analog inputs.
6. RTU's with a programming port through which qualified installers may upgrade internal software without returning the equipment to the factory.

M. Communication Platforms:

1. RTU's may be configured with either low earth orbit satellite (Iridium), GSM cellular (ATT or International), CDMA cellular (Verizon) or IP (Internet) as designated by the Owner to communicate bi-directionally from the RTU to the Central Server.

2.4 BASIS OF DESIGN

- A. The satellite telemetry system is based on Iridium satellite modems, ANSI C protocol Software – no exceptions.
- B. SECURITY: To demonstrate the security and privacy of customer data, the proposed manufacturer shall be certified in accordance with SOC2 Type1 at a minimum. Developed by the American Institute of Certified Public Accountants (AICPA), SOC 2 certification is widely recognized as a gold standard for data security and requires companies to establish and follow strict information security policies and procedures. By achieving Type 1 certification, an independent third party has validated the design of the manufacturers' controls relevant to security, availability, and confidentiality. Successful Type 1 examination demonstrates their commitment to data security through the practices and procedures it follows for protecting against unauthorized access, maintaining the availability of its service, and protecting the confidential information of its customers.

2.5 MODEM REQUIREMENTS

A. Satellite Modems

1. The modems shall use the mobile frequency designated by the IRIDIUM Satellite System.
2. The modems shall be able to be programmed.
3. The communication protocol shall be IRIDIUM Satellite Communication standard.
4. The modems shall be model IRDM IRIDIUM9602.or approved equal.
5. One modem shall be installed at each of the sites.
6. Antennas
7. Omni-directional antennas shall be tuned specifically for the IRIDIUM Satellite frequency bands, MAXTENA Model M1621HCT-SMA, or approved equal.
8. Proper grounding shall be provided as part of price proposed at each site, including wiring, conduit, clamps, and any other item for state-of-the-art grounding.
9. One antenna shall be installed at each of the sites.

B. Cellular Modems

1. The modems shall use the mobile frequency designated by the AT&T Systems or Verizon Mobile CDMA.
2. The modems shall be able to be programmed.
3. The communication protocol shall be UDP standard.
4. The modems shall be Novatel Wireless Model SA-G+ HPSA/CDMA/1xRTT Telemetry Platform or approved equal.
5. One modem shall be installed at each of the specified sites. See Part 1.4.C.1-6 of this specification.

C. Antenna Cable Lengths

1. The following minimum standard cable lengths shall be used during the bidding process.
2. Tank sites – see individual Tank RTU spec.
3. Booster Pump – See individual Booster Pump RTU spec.
4. The actual as-installed cable lengths may be more or less per site.

D. Antenna Mounting

1. All antennas shall be mounted with stainless steel band clamps to a 1.5" diameter PVC conduit pipe and fastened to a support structure (provided by the Owner) using uni-strut fasteners, per the telemetry supplier's instructions.
2. The mounting of the antennas shall be in such a manner to prevent welding, drilling or other corrosion and stress inducing modifications, or damage to paint systems.
3. All antennas shall utilize non-load bearing structures such as safety rails or new mounting posts for mounting points.
4. Antennas shall be mounted in a manner so that cables and antennas do not interfere with safety equipment or harnesses while climbing up or on the structures.
5. Cutting into a structural member is not acceptable.
6. All antennas shall be mounted to insure the most obstructed view of the sky at the remote sites.

E. Antenna Connection Sealing

1. All weather exposed antenna co-ax cable connections shall be sealed with Scotch 2228 Rubermastic Rubber Tape in accordance with the manufacturer's recommendations, no exceptions.

F. Antenna Cable Surge suppression.

All antennas shall include 1- CITEL P8AX Series Model P8AX09 bulkhead mounted antenna co-ax surge suppressor.

G. Anti-Condensation Heater

1. All tank site RTUs (except solar) shall include 1- Genesis Automation Model RC016 Small Heater anti-condensation heater.

2.6 SITE COMMUNICATIONS

A. Methods

1. Each RTU shall be capable of communicating with the High Tide Technologies central server.

2.7 SITE CONTROL

A. Control Methods

1. The control of the typical remote booster pump shall be based upon the comparison of adjustable setpoints and dynamic tank levels. The pump shall be able to be controlled by the tank of interest. Provide override pump control from the web-based software.
2. Each booster pump location shall have an operator interface on the web-based software for display of local alarm messages, pump status, relevant remote tank levels, and setpoints.
3. The ability to operate pumps manually will be by Owner provided Hand-Off-Auto (H-O-A) switches.
4. When the switch is in the "Hand" position, the pump shall be manually controlled by the switch and without the aid of a functioning RTU controller.
5. When the switch is in the "Auto" position, the RTU or controller shall automatically control the pump.
6. The status of all H-O-A switches shall be observed on the web-based software interface.

2.8 PROGRAMMABLE RTU PROCESSOR

- A. Provide a High Tide Technologies system, or equal. The control system shall consist of individual RTUs located at each monitoring location. The capability shall exist to allow for expansion of the system by the addition of hardware and/or software. Program development is the responsibility of the Manufacturer of the satellite telemetry system.
- B. All hardware of the RTU shall operate at an ambient temperature of minus 25 to 60 degrees C (-4 to 140 degrees F), with an ambient temperature rating for storage of minus 40 to plus 60 degrees.

C. All RTU hardware shall function continuously in the relative humidity range of 5 to 95 percent with no condensation.

D. Each RTU shall have at least one dedicated serial port.

E. Processor Hardware

1. The user program, data, and operating system shall include EEPROM or equivalent for backed memory storage.
2. Each processor shall contain enough base memory for at least 30% growth room after the program has been completed and tested.
3. The front enclosure of the processor shall include a serial port.
4. All system modules, local and remote chassis shall be designed to provide for free airflow convection cooling. No internal fans or other means of cooling, except heat sinks, shall be permitted.

F. RTU Power Supplies

1. The RTU power supplies shall operate in compliance with an electrical service of 85-265 VAC, single phase, in the frequency range from 47 to 63 Hz.
2. The manufacturer shall, if electrical power is unavailable, provide a solar powered RTU.
3. The RTU shall have an integral AC to DC power converter unless solar power is required.
4. The power supply shall monitor the incoming line voltage for proper levels. When the power supply is wired to utilize AC input, the system shall function properly within the range of 85 to 265 VAC. In addition, the power supply shall provide surge protection and isolation.
5. In addition to the electronic protection described above the power supply shall offer a failsafe fuse that is not accessible by the customer.
6. The RTU shall include Phoenix Contact Model PT 2-PE/S-120AC-ST SURGE ARRESTORS.

G. RTU Networking and Communications

1. RTUs in the satellite telemetry system shall have standard communications that support ASCII or Modbus protocols(3000only).
2. The RTU shall standard programming instructions that allows bi-directional satellite messaging with the central server.
3. The RTUs shall support both scheduled and unscheduled communications between the central server.

H. Digital Inputs

1. Number of Digital Inputs: SEE SITE DESCRIPTIONS in Part 1.4.C.1-6 of this specification
2. All digital inputs shall be optically isolated
3. Ambient Operating Temperature Rating: Minus 20° C to 60° C.

I. Digital Outputs

1. Number of Digital Outputs: SEE SITE DESCRIPTIONS in Part 1.4.C.1-6 of this specification

2. Digital outputs shall be Dry Contact Relays.
3. Ambient Operating Temperature Rating: 0° C to 60° C.

J. Analog Inputs

1. Input Type: voltage.
2. Number of Analog Inputs: (**) See Part 1.4.C.1-6 of this specification.
3. Input Power: Loop Power.
4. Current/Voltage Ranges: 0-5 dc or 4-20 mA
5. Resolution: 10 bits.
6. Ambient Operating Temperature Rating: Minus 20° C to 60° C.

2.9 RTU SYSTEM ENCLOSURES

- A. The system enclosure shall contain the RTU, complete with inputs/outputs, power supplies, surge protection, terminals, and all associated wiring. The enclosures shall come pre-assembled with all associated components mounted and wired.
- B. Remote Terminal Enclosures:
 1. One (1) molded NEMA 4 rated enclosures. Enclosures shall be lockable, PVC NEMA 4X, unless specifically specified as NEMA 4X stainless steel.

2.10 DC POWER SUPPLIES

- A. Regulated: Solid-State
- B. Input: 85-230 volts ac, single phase, 60 hertz.
- C. Output: 13.8 VDC
- D. Output Current: 3.0 A
- E. Ambient Temperature Range: Minus 20 to 50° C.
- F. Mounting: Din Rail
- G. Primary Protection: Internal fuse
- H. Additional Protection: Over-current protection for secondary
- I. Shielded Twisted Pair
 1. Tinned, soft copper and insulated with nylon-jacked polyvinyl chloride.
 2. Color code each conductor pair.3. Twist conductors into pairs with a 1-1/2-to 2-1/2-inch lay.
 3. Code each pair with a unique pair number.

4. 100 percent shielded coverage, aluminum-polyester.
5. No. 22 AWG.
6. No. 22 AWG stranded copper drain wire.
7. Rated 300 volts, 60 degrees C.

J. Conductors: General internal wiring of specified electrical enclosures. Group and neatly route conductors within enclosures.

1. All wiring internal to the supplied enclosures/enclosures shall be machine tool wiring rated MTW/AWM/TFF with an insulation rating of at 600-volts and UL approved - no exceptions.

2.11 OUTPUT RELAYS

- A. Mounting: Din Rail
- B. Relay Rating: 24- 240 volts, 5 amperes.
- C. Contacts: SPDT.
- D. Coil Voltage: 24 Volt.

2.12 ANALOG SURGE PROTECTION

- A. Provide surge protector on 4-20mA inputs and outputs to each RTU. Provide the following:
- B. Shall be CITEL DLA-243 DC Signal Line Surge Protector

2.13 AC SURGE PROTECTION

- A. Provide surge protector on 120 AC incoming power to each RTU. Provide the following:
Shall be Phoenix Contact Model PT 2-PE/S-120AC-ST with PT-BE/FM Base

2.14 CO-AX SURGE PROTECTION

- A. Provide bulkhead mounted surge protector on Antenna Co-ax to each RTU. Provide the following:
Shall be Citel Model P8AX09-B/MF.

2.15 ANTI-CONDENSATION HEATERS

- A. AC POWERED TANK RTUs: Stego 011469-00
- B. EXTERIOR SOLENOID VALVE STATION RTUs: Stego 011469-00
- C. INTERIOR BOOSTER STATION RTUs: Not Required

2.16 SPARE PARTS

- A. 2 – Spare Cellular Modem stack ups

- B. 2 – Satellite Modem Stack ups
- C. 10 – AC Surge Arrestors
- D. 10 – DC Surge Arrestors
- E. 6 – Coax Surge Arrestors

2.17 FIELD INSTRUMENTS

- A. All of the OWNER's existing field instrumentation shall be integrated into the manufacturer's satellite telemetry system. Any broken or malfunctioning instrumentation shall be brought to the attention of the ENGINEER and the OWNER'S attention immediately for replacement by the OWNER.

PART 3 – COMPUTER AND DISPLAYS

3.1 HMI COMPUTER HARDWARE

- A. Provide an HMI desktop computer system to be installed at the existing Chestnut Ridge PSD office in Philippi, WV. The system shall include HMI desktop computer, 2- 50" displays, and accessories. Each system shall be provided and programmed with the specified HMI, alarm notification and remote-control software specified herein. The computer shall be designated in this section as the "HMI PC". The computer shall connect to the customer's existing internet service. The computer shall contain the following components and performance standards as a minimum:
 - 1. Operating System(s): Windows 10 Professional, with Virtual XP Mode, No Media, 64-bit, English
 - 2. Processors: 10th Gen Intel® Core™ i5-10400 processor (6-Core, 12M Cache, 2.9GHz to 4.3GHz)
 - 3. Memory: 12GB, 8Gx1 + 4Gx1, DDR4, 2666MHz
 - 4. Removable Media Storage Device: 16X DVD+/-RW and 16X DVD, SATA
 - 5. Hard Drive: 256GB M.2 PCIe NVMe Solid State Drive + 1TB 7200 rpm 3.5" SATA Hard Drive
 - 6. Graphics Bus Interface: Intel® UHD Graphics 630 with shared graphics memory
 - 7. Back-up and Recovery Manager for Windows 10 Resource DVD - contains Diagnostic and Drivers
 - 8. Displays: Two (2) 50" Class C350 Series LED 4K UHD Smart Fire TV
 - 9. Hardware Support Services: 5 Year ProSupport Service with 5 Year NBD Onsite Service after Remote Diagnosis
 - 10. Accidental Damage Service 5 Year Accidental Damage Service
 - 11. Keyboard & Mouse: Wireless Keyboard and Mouse - KM7120W
 - 12. Inspiron Desktop w/ Standard Power Supply
 - 13. Speakers: Internal Dell Business Audio Speaker
 - 14. Networking: 2 x 10/100/1000 Ethernet port and One (1) Wireless Card
 - 15. Ports: 1 USB 3.2 Gen 1 port (front); 1 USB 3.2 Gen 1 Type-C® port (front);

2 USB 2.0 ports (front); 2 USB 3.2 Gen 1 ports (rear); 2 USB 2.0 ports (rear);
1 global headset jack (front); 1 Line-out port (rear); 1 HDMI 1.4b port (rear);
1 VGA port (rear); 1 RJ-45 ethernet port (rear).

- B. Power provided to the computer and its peripherals will be 120 VAC, 3 wire, 60 Hz. Computer shall be capable of operating satisfactorily in an ambient temperature range of 60 to 90 F with a relative humidity of 5 to 85% non-condensing.
- C. All necessary communications and power cabling and/or cords between the PC, Master PLC, UPS and all peripheral equipment shall be included. Provide surge protected power bar(s) as required.
- D. The computer installed at the Chestnut Ridge PSD office shall include 2- 50" displays including HDMI cables to connect the displays. The computer/displays shall be capable of displaying the entire Chestnut Ridge PSD SCADA system.

3.2 PRINTER

- A. Computer shall be provided with one wireless multifunction "all-in-one" Black-n-White laser printer. The unit shall be capable of print, scan, fax and copy with auto document feeder, auto duplex printing, and dual function panel. The printer shall be a Canon MF644Cdw Color Laser Printer or equal.

3.3 UNINTERRUPTIBLE POWER SUPPLY

- A. An uninterruptible power supply shall be furnished to continuously provide a reliable source of power to the HMI computer and peripherals. Unit shall provide no-break sine wave power, lightning and surge protection, isolation per FIP Standard 94, voltage regulation and be switch-mode power supply rated. Standby Power Supplies which allow a break in power when transferring to battery are not acceptable.
- B. The UPS shall be sized to accommodate 125 percent of the maximum load of the PC, monitor, and all local peripherals. UPS shall utilize sealed, maintenance-free batteries to provide a minimum of 20 minutes of backup power at full load in the event of a failure of the normal AC source.
- C. Unit shall include LED indicators for AC line ready, charging, battery power and alarm.

PART 4 - EXECUTION

4.1 INSTALLATION, GENERAL

- A. Install all equipment in accordance with ANSI C2, ANSI/NFPA 70 and the requirements specified herein.

4.2 WIRING

- A. Install conductors and cables in conduit, unless indicated otherwise.
- B. Complete raceway systems and remove obstructions before pulling conductors into place. Avoid damaging insulation during conductor installation. Use an approved lubricating compound as required to facilitate pulling wires.

4.3 SPLICES AND TERMINATIONS

- A. Make up both mechanically and electrically tight.
- B. Provide with a flashover or insulation value at least 100 percent in excess of wire insulation.
- C. Make splices and terminations in junction boxes.
- D. Make connections in No. 10 AWG and smaller conductors with insulated pressure connectors or wire nut connections.
- E. Use terminal blocks of the proper voltage for interconnecting or splicing control cables, communication cables, and other conductors. Mount terminal blocks in a cabinet and label terminals properly.

5.1. TESTING

- A. Performance Verification Test: Conduct performance verification tests to demonstrate that control system maintains set-points, and that system is programmed for the correct sequence of operation. Conduct performance verification test one day after work is installed of continuous RTU systems operation and before final acceptance of work. Performance verification test shall demonstrate the following:
 - 1. Field Testing: Calibrate field equipment and verify equipment and system operation before placing the system on-line.
 - 2. Calibration Accuracy and Operation of Inputs Test: Check for proper calibration and operation of each input instrument. Document each reading for the test report.
 - 3. RTU Startup and Memory Test: Demonstrate that programming is not lost after a power failure, and RTU controllers automatically resume proper control after a power failure.
 - 4. Surge Protection: Show that surge protection, meeting the requirements of this specification, has been installed on incoming power to the digital controllers and on communications lines.

5.2 FIELD TESTS

- A. Demonstrate compliance of the control system with the contract documents. Furnish personnel, equipment, instrumentation, and supplies necessary to perform calibration and site testing. Ensure that tests are performed by competent employees regularly employed in the testing and calibration of instrumentation systems.
- B. Notify the Owner of any defective products and workmanship disclosed by the tests.
- C. Testing will include the field and the performance verification tests. Field tests shall demonstrate proper calibration of input devices, and the operation of specific equipment. Performance

verification test shall ensure proper execution of the sequence of operation and proper tuning of control loops.

- D. Test each device such that each item will function not less than five times.
- E. Tests are subject to oversight and approval by the Owner.

END OF SECTION