



Invitation for Bid
Remote Terminal Unit Control Panels
#B2019-WTR-10

Town of Seabrook, New Hampshire
Water Department



REMOTE TERMINAL UNIT CONTROL PANELS
INVITATION FOR BID # B2019-WTR-10

You are cordially invited to submit a Bid for the Replacement and Installation of New Remote Terminal Unit Control Panels for the Seabrook Water Department in agreement with the attached specifications, terms and conditions. Prospective respondents are advised to read this information over carefully before submitting a proposal.

Three (3) copies of the Bid must be submitted in a sealed envelope, plainly marked:

***RFP# B2019-WTR-10
Water SCADA
Town of Seabrook
C/o Shaylia Marquis
Chief Procurement Officer
99 Lafayette Road
Seabrook, NH 03874***

All proposals/bids must be received by September 26, 2019, at 2:00 p.m. EST and will be opened publicly at such time



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INSTRUCTION TO BIDDERS

1.1 SCOPE OF WORK

A. General:

1. The Systems Integrator shall provide the Remote Terminal (RTU) replacement and modifications as specified herein, including all Programmable Logic Controller (PLC) and Operator Interface Terminal (OIT) programming. This includes all work except for mounting RTU Panel No. 6.
2. Radio communications between existing/new RTU panels and the existing Master PLC at the Water Treatment Plant must remain active during construction.
3. The Systems Integrator shall supply all RTU components, provide installation supervision and/or installation services, and provides all required and specified ancillary services in connection with the replacement and modified RTU panels. The RTU system includes all materials, labor, tools, and documentation required to furnish, install, test and place in operation the complete and operable RTU panels, including complete start-up, field testing, O&M data, and Owner training. The new RTU panels shall replace/modify the existing RTU panels. The work must be phased to minimum RTU downtime. The RTU panel work also includes a detailed field survey of the current systems to determine input/output (I/O) requirements, panel modification requirements, and ancillary work necessary for a complete and operable system. Record Drawings of the existing RTU panels are not available.

B. Work Included:

1. The work includes the supply and installation of all equipment, which is specified and associated tasks, including:
 - a) The RTU panel work will consist of the following Control Panel modifications:
 - I. RTU 3
 - II. RTU 4
 - III. RTU 5
 - IV. RTU 7
 - V. RTU 8
2. The control system work will include the replacement of RTU Panel 6 in its entirety. RTU 6 must be kept on-line its replacement, with downtime limited to no more than four (4) hours.

C. RTU Panel Components:

1. RTU Panels 3, 4, 5, and seven shall be modified as follows:
 - a) New PLC with sufficient I/O, plus 10 percent spare I/O for a complete and operable system



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- b) Door mounted engineering programming port
 - c) 5-port Ethernet switch
 - d) Ancillary components to provide a functional control panel (i.e., power supplies, terminal blocks, fuses, fuse holders, wire duct, etc.)
2. RTU Panel 8 shall be modified as follows:
- a) New PLC with sufficient I/O, plus 10 percent spare I/O for a complete and operable system
 - b) 7" Color Touch OIT
 - c) Door mounted engineering programming port
 - d) 5-Port Ethernet switch
 - e) Ancillary components to provide a functional control panel (i.e., power supplies, terminal blocks, fuses, fuse holders, wire duct, etc.)
3. RTU Panel 6 shall be replaced with a new control panel with the following components:
- a) Wall-mounted NEMA 12 painted steel enclosure
 - b) Enclosure LED light
 - c) Main control circuit breakers
 - d) Control power surge protection
 - e) Analog surge protection
 - f) Door mounted engineering programming port
 - g) New PLC with sufficient I/O, plus 10 percent spare I/O for a complete and operable system
 - h) 7" Color Touch OIT
 - i) Radio modem as required
 - j) 5-Port Ethernet switch
 - k) 1,000 VA uninterruptable power supply
 - l) Ancillary components to provide a functional control panel (i.e., power supplies, terminal blocks, fuses, fuse holders, wire duct, etc.)
- D. Sufficient I/O shall be provided for a complete and operable system. The required I/O shall be field determined by the System Integrator prior to submitting its bid for the project. Field visit(s) shall be coordinated with the Owner a minimum of 72 hours prior to the site visit.

1.2 ACCESS

- A. The Owner shall have the right of access to the Systems Integrator facility to inspect materials, and parts; witness tests and work in progress; and examine applicable design documents during any stage of the design, fabrication, and testing. The Systems Integrator shall furnish office space, supplies, and services required for these surveillance activities.



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The Owner shall schedule such access.

1.3 CODES AND STANDARDS

- A. All work shall be per the National Electric Code, National Electric Safety Code, OSHA, state, local, and other applicable laws. All control panels shall be UL listed assemblies which meet UL 508A technical standards including NEC 2008 article 409 control panel technical requirements. The Systems Integrator's panel shop shall be a UL listed facility with written verification provided upon requested by the Owner.

1.4 SYSTEMS INTEGRATOR REQUIREMENTS

1. The Systems Integrator shall be experienced in programming Allen-Bradley PLCs and related hardware and software and shall have a minimum of 20 similar projects successfully completed in the past five (5) years.
2. The Systems Integrator shall be versed in all hardware and programming languages required to execute the work described herein and shall not use subcontractors to complete the work without written permission from the Owner.
3. Services Response Time. The Systems Integrator's shop shall be located a maximum of 50 miles from the project site and response time shall be less than one (1) hour, including travel time.

1.5 ABBREVIATIONS

Specification abbreviations include the following:

- ADC - Analog to Digital Converter
- AI - Analog Input
- AO - Analog Output
- AVAIL - Available
- CRC - Cyclic Redundancy Check
- CS - Control Strategy
- DAC - Digital to Analog Converter
- DI - Discrete Input
- DIA - Discrete Input Alarm
- DMA - Direct Memory Access
- DO - Discrete Output
- DPDT - Double Pole, Double Throw
- EIA - Electronic Industries Association
- EPROM - Erasable, Programmable Read-Only Memory
- FIFO - First-in, First-out
- FSK - Frequency Shift Keyed
- GUI - Graphical User Interface
- HMI - Human Machine Interface
- I/O - Input /Output
- JIC - Joint Industries Council



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LDFW - Lead-Follow
MA - Mill Amperes
MIPS - Million Instructions per Second
MTBF - Mean Time Between Failures
MTTR - Mean Time to Repair
OIT - Operator Interface Terminal Unit
PI - Pulse Input
PID - Proportional, Integral, and Derivative Control
PC - Process Controller
PIU - Process Interface Unit
PLC - Programmable Logic Controller
PROM - Programmable Read-Only Memory
RAM - Random Access Memory
RC - Regulatory Control
RDY - Ready
RMSS - Root Mean Square Summation
RNG - Running
ROM - Read-Only Memory
RTU - Remote Terminal Unit
SC - Sequential Control
SPDT - Single Pole, Double Throw
SQRT - Square Root
UPS - Uninterruptible Power System

1.6 SCHEDULE OF PAYMENTS

1. The Systems Integrator shall submit a schedule of payment values for review and approval by the Owner. The schedule shall contain the installed value of the component parts of work for the purpose of making progress payments during the construction period.
2. Monthly progress payments will be made in accordance with the Schedule of Payment Values, based on the percent complete the work is for the month.

1.7 SUBMITTALS

1. Material List:
 - a) The Systems Integrator shall submit for review the name of the manufacturer, identifying trade name and/or model designation, and catalog cuts for all equipment and material proposed under this section. Catalog cuts shall be referenced to the tag numbers of the equipment being supplied. The Systems Integrator shall certify that all ratings and special requirements have been satisfied plus the equipment has been coordinated.
2. Shop Drawings:



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- b) Shop drawings detailing the RTU panel wiring diagrams shall be submitted for review for each RTU panel (new or modified). Shop drawings shall include a bill of materials, front views, assembly drawings, nameplates, schedules, electrical schematics, and electrical connection diagrams.
 - c) Diagrams shall be prepared neatly and legibly on 11-inch by 17-inch sheets (or larger).
 - d) Submittals of all graphics and logs developed under this contract shall be submitted for review as shop drawings.
3. Record Drawings:
- a) The Systems Integrator shall maintain a complete and accurate record set of drawings for the work.
 - b) Upon completion of the work, new and modified RTU panel drawings shall be provided to the Owner as record drawings. Record drawings shall include one hard copy per RTU panel and one electronic copy on compact disk for each RTU panel.
4. Operations and Maintenance Data:
- a) The Systems Integrator shall deliver the equipment supplier's standard operating and maintenance data sheets for all major components. O&M data submittals shall include one hard copy and one compact disk version. The O&M data shall also include one additional hard copy of each RTU panel drawing as described above.

1.8 POWER SUPPLIER, DISTRIBUTION EQUIPMENT, AND CIRCUIT PROTECTION

1. The Systems Integrator shall provide all power supplies for instruments and control equipment. The Systems Integrator shall provide all the necessary power conditioning and distribution equipment necessary to satisfy the requirements of the instrumentation and control system. The Systems Integrator shall determine the sizes of the UPSs from the "as supplied" project equipment.
2. Alternating current power supplies to panel-mounted equipment shall be by cord and plug or hard wired (as required for each instrument). Field mounted units shall be with a power disconnect switch adjacent to the unit. All instruments shall be protected by an individual draw-out "fast blow" fuse regardless of voltage level. The fuses shall be electrically coordinated with the I&C main circuit breaker.

PART 2. PRODUCTS

2.1 HUMAN MACHINE INTERFACE

A. Hardware:

The RTU panel OIT HMIs shall have membrane protected touch screen rated for one million presses. Unit shall be provided with all panel-mounted hardware necessary for mounting. Units shall be rated NEMA 12. Unit shall be programmed with all graphics to be



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installed for each RTU. HMI screens shall replicate the existing HMI screens.

2.2 PROCESS CONTROLLERS/PROGRAMMABLE LOGIC CONTROLLERS

A. Intelligent Devices:

1. PLC's/Process Controllers (PC) shall be intelligent devices that perform both data acquisition and process control functions. Each shall have the ability to function independently; that is, perform its functions without the need for commands from a host processor. The PC shall be able to communicate with both a host processor and other PC's. Throughout these specifications, the terms PLC and process controller may be used interchangeably, and both terms used in these specifications refer to the same device.

B. Each RTU panel shall be provided with an Allen – Bradley Micro Logix 1400 PLC.

C. All OITs provided shall be programmed to match the existing OIT screens unless otherwise requested and/or authorized by the Owner.

D. Process Input /Output Boards shall have the following characteristics:

1. Discrete inputs which are to be supported include:
 - a) 15 to 130 Vdc (on); 0 to 5 Vdc (off)
 - b) 79 to 132 Vac (on); 0 - 20 Vac (off) @ 2.2mA
 - c) Dry contacts, 24 volts dc provided by the PC.
 - (1) DI's shall be (a) optically isolated with 250-volt common mode isolation protection; (b) IEEE 472 - 1974 surge suppression; (c) individually fused.
 - (2) Unless otherwise noted, all Discrete Inputs (DI's) shall be 24VDC (powered from the Process Controller Power Supply) to the primary devices unpowered contacts.
2. Discrete outputs to be supported include:
 - a) Open collector with common ground rated 100 mA @ 24 dc and 200 m@ 48V dc; individual fusing; 130 VRMS surge protection.
 - b) Hermetically sealed relay contacts rated 2A @ 120V ac, 0.2A @ 120Vdc, and 3A @ 24Vdc.
 - c) Provision allowing for manual operation of the discrete outputs from a panel shall be provided.
 - d) Unless otherwise noted, all Discrete Outputs (DO's) shall be 24 VDC for powering external devices.
3. Analog inputs to be supported include: 4 - 20 mA dc, 0 - 10V dc, - 5V dc, 0 -5 Vdc, +/- 10Vdc
 - a) Accuracy at room temperature (25 deg. C +/- 5 deg.) shall be +/- 0.1% for all input ranges.
 - b) Input impedance shall be 2 Megohms for the 1 - 5 volt and 0 - 10volt ranges and 250 ohms for the 4 - 20 mA range.



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- c) IEEE 472-1974 surge suppression; individually fused.
 4. Analog outputs to be supported are 4 - 20 mA dc into 1K ohm maximum load, and they shall be individually fused.
 5. Power Supply shall be from either 24V dc or 120V ac 60 Hz. It shall provide a 24V dc output for powering external devices.
 6. Enclosures. Sealed, corrosion-resistant NEMA 12 enclosures shall be provided utilizing standard EIA 19-inch rack and with operating range of 0 deg. C to +50 deg. C and 5% to 95% relative humidity non-condensing. Refer to Section 2.4 for additional panel requirements.
 7. Terminal strips for both process I/O and communication cables shall be capable of accommodating up to #12 AWG cable.
 8. Off-line diagnostics shall provide CPU integrity and fault detection to the I/O channel level.
- E. PLC/Process Controller Uninterruptible Power System
1. Each PLC/process controller, not otherwise protected by a UPS, shall be provided with one. Such UPS shall consist of a UPS module and battery module. Under normal operation, the AC power shall be converted to DC. The DC power from the battery charger shall supply an inverter and maintain the battery module at full charge. The AC output from the inverter shall be fed to the process controller power supply unit. Upon loss of the AC supply, the inverter shall continue to supply normal power to the process controller, drawing power from the batteries.
 2. Each UPS shall meet the following requirements:
 - a) Input voltage shall be 120/208 VAC, single-phase, 60Hz.
 - b) Voltage regulation shall be +/- 5% for line and load changes.
 - c) The output frequency shall be phase-locked to the input AC line on AC operation and shall be 60 Hertz +/- 0.5 percent when on battery operation.
 - d) The batteries shall be of the sealed, lead-calcium gelled electrolyte type. The battery module shall have a minimum full-load backup time of 20 minutes (minimum). Batteries shall be hot-swappable types.

2.3. APPLICATIONS

A. Logs and Reports:

1. The Systems Integrator shall configure OIT Alarm Logs and Reports to replicate the existing RTU systems. The Systems Integrator shall field verify the logs and reports required prior to submitting its bid.

B. Control Strategies:

1. The Systems Integrator shall program control strategies to replicate the existing RTU systems. The Systems Integrator shall field verify the control strategies required prior to submitting its bid.
2. The Systems Integrator shall develop and provide programming for all of the



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required control strategies.

C. Alarm Management:

1. The Systems Integrator shall program alarm condition management to replicate the existing RTU systems. The Systems Integrator shall field verify the alarm condition management required prior to submitting its bid.

2.4. CONTROL PANELS

A. A new NEMA 12 rated control panel shall be provided for RTU 6.

B. The control panel shall be detailed designed by the Systems Integrator with the as supplied project equipment. The panel layout and wiring shall be UL 508A compliant.

C. Hoffman shall manufacture the Control Panel.

D. Materials of Construction. Control Panels shall be cubicles fabricated of 3/16" sheet steel (unless otherwise noted), hand selected for finish and levelness. Frame shall be 3/16" angle iron; and top, sides, and doors shall be 1/8" sheet steel.

E. Construction

1. Panels shall be of all-welded construction so that the unit is completely enclosed and self-supporting. All seams and corners shall be welded and ground smooth.
2. One side of the panel unit shall be enclosed for the full length with a flush pan type door which is supported by piano hinges and furnished with a locking handle and three-point catch. All door locks shall meet the Owners standard requirements.
3. Interior panel stiffeners shall be furnished as required. Stiffener locations shall be determined by the size of the panel enclosure and cutout arrangement. All cubicles shall be furnished with lifting eyebolts.
4. The panel's field-wiring conduits locations shall be clearly indicated on the panel shop drawings including any required segregation of line and low voltage field wiring.

F. Finishing

1. After fabrication, all areas of the panel will be washed with solvent to remove all oil and grease.
2. The exterior of the panel shall be surface ground to remove all dirt, corrosion and mill scale, and filler will be applied to all pits and blemishes.
3. After the filler has dried, the panel shall be ground and finish ground to remove the excess filler and any high spots on the surface.
4. After grinding, the interior of the panel will be wired brushed to remove welding scale and corrosion.
5. All interior and exterior surfaces will be steam cleaned and phosphatized prior to application of primer.
6. One coat of primer shall be applied to interior and exterior surfaces and allowed to dry for one-half hour. A coat of primer surfacer shall be applied to the exterior of



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the panel and allowed to dry for a minimum of three hours.

7. The exterior of the panel shall be finely sanded and wiped down to remove dust and a second coat of surface primer applied. The process of sanding and applying additional applications of primer surfacer will be continued until a Grade 1 Finish (super smooth finish, completely free from imperfections) can be produced on the finish coat.
8. A minimum of three finish coats on the exterior and two on the interior of the panel will be applied with sufficient drying time between coats. The finish shall be completely free from any imperfections such as streaking, runs, orange peel, pitting, etc. The Engineer shall select a panel color.

G. Nameplates

1. Nameplates shall be provided for each recorder, analog instrument, and switch, and they shall be attached securely to the panels with the use of two mounting holes in each plate. Engineering units shall also show with each nameplate when appropriate.
2. Nameplates shall be of a phenolic type (minimum thickness of 3/32-inch) with a black surface and white engraving. Plates shall be 3 inches wide and 1-3/4-inches high. Letters shall be 3/16 inches high.

2.5. Miscellaneous Equipment

A. Panel Lights

1. One LED light shall be provided with On/Off door switch for RTU 6.
2. The light shall be Hoffman Model LEDA1M35 or equal.

B. Engineering Programming Port

1. Provide one Engineering Programming Port for each RTU specified herein.
2. Engineering programming ports shall be manufactured by Hubbell, model P155E.

C. Ethernet Switch

1. Provide one unmanaged Ethernet switch for each RTU specified herein.
2. Ethernet switch shall be Moxa model EDS-205A.

D. Lightning Arrestors

1. Provide one lightning arrestor for each RTU specified herein.
2. Lightning arrestors shall be manufactured by Polyphaser, Model VHF50HN.

PART 3. EXECUTION

3.1. DELIVERY AND STORAGE

- A. Special care shall be exercised during delivery, distribution, and storage of the materials to prevent damage. Damaged materials will be rejected and shall be replaced at the Contractor's expense. Storage of instrumentation and control equipment, prior to use, shall be in such manner as to keep the material clean and dry. Air conditioning shall be provided



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for storage of all digital equipment and ancillary devices to maintain temperatures between 20 and 25 degrees C and relative humidity 40 to 60percent without condensation. The storage area shall be free of corrosive contaminants and moisture.

3.2. WARRANTY

- A. The Systems Integrator shall warrant for one (1) year from acceptance by the Owner all equipment supplied in this Section to be free from defects in material or workmanship, and all programming to be free from errors.
- B. Equipment provided and installed by or under the direction of the Systems Integrator which is found to be defective in material or workmanship shall be repaired or replaced as directed by the Owner, free of charge. The Systems Integrator shall bear all costs necessary to achieve these repairs or replacements, including parts, labor, travel, and living expenses.

3.3. TRAINING OF OWNER'S PERSONNEL:

- A. All costs of providing the training courses shall be borne by the Systems Integrator. As used herein, the term "day" shall mean an eight-hour period. All training courses shall be conducted under the direction of qualified personnel. The training shall be based on the O&M manuals to be provided under Paragraph 1.7.4 and supplemented with typed hand-outs, as necessary, for operator reference during the course and for future use.
- B. Systems Integrator shall provide up to two (2) one-half day training courses for up to six persons at each training session. Training shall include familiarity with the overall system and its operation. This is to include an explanation of features and functions available from the system, explanation of basic system interactions including sign-on, calling up graphics, viewing logs and starting and stopping equipment.

PROPOSAL TERMS

The Town of Seabrook reserves the right to accept or reject any, and all proposals in whole or in part received as a result of this IFB. If a proposal is selected, it will be the most advantageous regarding price, quality of service, the contractor's qualifications and capabilities to provide a particular service. The Town reserves the right to consider proposals for modifications at any time before a contract be awarded, and negotiations would be undertaken with that contractor whose proposal is deemed to meet the Town's specifications and needs best. There will be no reimbursement to any candidate if the selection process is terminated. The Town of Seabrook reserves the right to waive defects and informalities of the proposals.

All bids must be received no later than 2:00 pm EST on September 26, 2019. The submittal package shall include three (3) copies of the proposal. No telephone, email, or



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facsimile proposals will be accepted. All proposals received after the deadline will not be accepted and will be returned unopened.

INTENTION TO BID / ADDENDA

Bidders that want to participate in the IFB are urged to submit an intention to bid form to receive addendums and possibly additional information. Intention to Bid forms can be found on the town website at www.Seabrooknh.info/procurement. Completed Intention to Bid forms and questions may be emailed to the Chief Procurement Officer at Smarquis@seabrooknh.org. All questions shall be submitted in writing to only the Chief Procurement Officer at the above address, a minimum of 7 days prior to the scheduled bid closing. The Chief Procurement Officer will then forward both the question and the Town's response to the question to all prospective bidders. In the event it becomes necessary to revise any part of the IFB, addenda will be provided by email and on the Town website at www.Seabrooknh.info/procurement. Deadlines for submission of IFB's may be adjusted to allow for revisions. To be considered, original proposals with amended proposals must be submitted before the date and time specified.

WITHDRAWAL OF BID PROPOSAL

A bidder will be permitted to withdraw his/her proposal unopened after it has been deposited if such request is received in writing prior to the time specified for opening the proposals.

CONSIDERATION OF PROPOSALS

Bids will be made public at the time of opening and may be reviewed only after they have been properly recorded. In the case of discrepancy between prices written in words and those written in figures, the prices written in words shall govern. In the event of a discrepancy between the total shown in the proposal and that obtained by adding the products of the quantities of items and bid prices, the latter shall govern.

AWARD OF CONTRACT

The successful bidder will be notified, by mail to the address on his/her proposal, that his/her bid has been accepted and that he/she has been awarded the contract.

CANCELLATION OF AWARD

The Town reserves the right to cancel the award of any contract at any time before the execution of such contract by all parties without any liability against the Town.



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EXTRAS

Except as otherwise herein provided, no charge for any extra work or material will be allowed unless the Town Manager has ordered the same, in writing.

*The Town of Seabrook is a Tax Exempt Organization.

BID SUBMISSIONS

Bids must be signed by an official authorized to bind the contractor to its provisions for at least a period of 90 days. Failure of the successful bidder to accept the obligation of the contract may result in the cancellation of any award.

“The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section, the word "person" means any natural person, joint venture, partnership, corporation, or other business or legal entity.”

(Authorized Signature)

(Date)

(Company) & (Title)

CONTRACT TERMS

The Town of Seabrook will negotiate contract terms upon selection. All contracts are subject to review by Town of Seabrook legal counsel and will be awarded upon signing of a commitment or contract, which outlines terms, scope, budget, and other necessary items.

Approved by:



William M. Manzi III 8/20/19
Town Manager