REQUEST

for

PRICE PROPOSALS

For Engineering/Integrator Services Related to SCADA System Software Replacement at the Treatment, Collection and Distribution Systems

For the

ATHENS UTILITIES BOARD

100 New Englewood Rd
Athens, Tennessee 37303

Note: All questions regarding this RFP should be directed to:

Doug Unger
Director of Engineering (423) 368-8466
dunger@aub.org

Issue Date: **April 10, 2024**

Response Date: **May 7, 2024 by 2:00 PM (EDST)**

INTRODUCTION

The Athens Utilities Board (AUB) Sewer and Water Divisions currently use many outdated PLCs connected by a variety of communication networks. AUB desires to update the PLCs and connect them into a single functioning SCADA system. AUB also plans on updating hardware and software throughout the system including incorporating VTScada software at the HMI/OITs.

AUB monitors 2 wastewater treatment plants, 12 sewer pumping stations, a water filter plant, 3 wells, a spring, 4 water storage tanks, water metering station, 9 water booster stations, and a neighboring utility's water tank that we pump to.

Present SCADA Communication networks are comprised of fiber optic, radio, and broadband cellular. Most systems incorporate Allen Bradley SLC 5/05 PLCs connected via Ethernet then switched to the local communication network available.

AUB's Information Technology (IT) Department will maintain all servers, workstations, network switches, firewalls, OS software, malware prevention software and computer peripherals for the SCADA system software replacement project once installed and accepted by AUB.

PURPOSE OF REQUEST FOR PROPOSALS

AUB invites price proposals from companies that are capable and specialize in the evaluation, design, installation, maintenance, and repair of Supervisory Control and Data Acquisition (SCADA) systems, Human-Machine Interface (HMI), and Operator Interface Terminal (OIT) capable of monitoring and controlling water and wastewater facilities and equipment, including remote sites throughout the system. It is the goal of the AUB to replace and combine their existing independent HMI/SCADA system software at their WWTPs and at the WTP with one Trihedral VTScada system. The respondents to this RFP will be responsible for providing an integrated turn-key solution, consisting of both new and existing equipment/software, including all necessary system design, procurement, programming, configuration, testing, training, commissioning and startup to provide AUB a complete and operable HMI/OIT/SCADA system. Major elements of work could include:

1) Assessing condition of the existing HMI/OIT/SCADA system components including Servers, network devices, and ancillary equipment at various facilities
2) Making recommendations for improvements to the HMI/OIT/SCADA system
3) Procuring and installing necessary HMI/OIT/SCADA software/hardware
4) Updating or reprogramming all PLC logic to meet operational goals
5) Developing new HMI graphics to include High Performance Graphics/Situational Awareness Graphics

6) Developing and implementing alarm management strategy
7) Developing and implementing two factor authentications for HMI/SCADA security
8) Commissioning new systems
9) Providing record drawing and O&M documentation

AVAILABLE INFORMATION

AUB's prime contact for questions regarding this Request for Price Proposals is:

Doug Unger, P.E.
Director of Engineering
(423) 368-8466
dunger@aub.org

Detailed information/site visits regarding the WTP/WWTP and remote sites are available by appointment by contacting:

WWTPs	WTP/Systems
Russell Coleman	Doug Gentry
(423) 506-9080	423) 829-5231
rcoleman@aub.org	dgentry@aub.org

SELECTION PROCESS

Proposers must submit information that shows in detail how their proposed approach to upgrading the HMI/OIT/SCADA system. Proposers may submit information that indicates how their proposal would provide AUB with features and enhancements that exceed the minimum system requirements as set forth in this RFP.

It is the intent of the AUB to utilize an objectively based selection process involving a selection committee of staff. Proposals will be evaluated based on the following criteria as a minimum:

- Qualifications of the team proposed for this project, and the firm.
- Project understanding and approach
- Performance on previous SCADA work completed utilizing new SCADA software.
- Work plan/schedule
- List of similar projects completed by the project team members
- References

SCHEDULE

Each Proposer is required to provide a proposed project schedule for the HMI/OIT/SCADA Upgrade project in their proposal. AUB has not set a timeline for project completion but anticipates this project will be completed within one calendar year after award.

COST OF PROPOSAL PREPARATION

Any costs incurred in the preparation, presentation or return of Proposer's proposal, including time associated with demonstrations, and/or site visits are at the proposer's expense.

WAIVER OF CLAIMS

Each Proposer, in submitting a proposal is deemed to have waived any claims for damage by reason of the selection of another proposal and/or the rejection of his proposal.

INSTRUCTIONS FOR PROPOSAL SUBMISIONS

1. Responses to the request shall be delivered to Athens Utilities Board's Main Office, 100 New Englewood Road, Athens, TN 37303, attention: **Mr. Craig Brymer no later than 2 PM on May 7, 2024, local time**. Proposals arriving or delivered after this time and date cannot be considered.
2. The outer envelope in which proposals are tendered should be marked **SCADA PROPOSAL** and the opening date of the proposals, **May 7, 2024**.
3. Proposals shall be submitted in two parts.
   a. **First part** of the submission shall be a cover letter, with the proposed costs and schedule blanks completed of the "Bid Proposal" form, along with the "Drug-Free Work Place Affidavit" form, and the "Non-Collusion Affidavit" enclosed. Only one copy of the cost proposal documents shall be required.
   b. **Second part** or submission will be the technical portion of the proposal as further described herein. Proposer must submit three (3) copies of the technical portion.
4. The proposal must be signed by an individual with the authority to bind the firm.
5. Nothing herein is intended to exclude any responsible vendor, their product or service, or in any way restrain or restrict competition. On the contrary, all responsible vendors are encouraged to offer a proposal. AUB is compliant with Title VI of the 1964 Civil Rights Act. Specifically, Title VI provides that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance" (42 U.S.C. Section 2000d).
6. AUB reserves the right to reject any and all proposals, and has the right, in its sole discretion, to accept the proposal it considers most favorable to the Utility's interest and the right to waive minor irregularities in procedure.

PROPOSAL FORMAT *(TECHNICAL PORTION)*

Each Proposer's technical proposal shall be styled at the discretion of the submitter. You shall submit three (3) copies of the technical proposal. Your proposal shall address at a minimum the following major elements"

- Cover Letter
- Table of Contents
- Qualifications of the proposed team (please indicate if project experience listed was with another firm)
- Qualifications of the firm
- Understanding of the project
- Approach to the project
- Project schedule including estimated tasks and man-hours to accomplish
- List of similar projects inclusive of projects upgrading SCADA systems to VTScada, that have been completed by the project team members with reference contact information.
- List any previous SCADA work performed for AUB.
- Due to the scope, complexity, and funding regarding the project, the project tasks have been divided into five (5) items listed for pricing and schedule on the "Bid Proposal" form they are as follow:
    1. Oostanaula & North Mouse Creek WWTP's SCADA Systems, PLC's, Network and HMI/OIT Upgrades.
    2. Water Treatment Plant SCADA System Computer Hardware and software.
    3. AUB Main Office/Dispatch PLC1 programing and SCADA System upgrades associated with all remote sites (water/sewer) SCADA upgrades.
    4. Main Control Panel modifications inclusive demolish, installation complete.
    5. Spare Parts.
- AUB's intent is to award to a single proposer.

The major elements, qualifications of team, qualifications of firm, understanding, project approach, schedule, similar projects with references and contact info, previous work with AUB. shall be tabbed accordingly within the proposal to facilitate review. Proposals aren't limited to a maximum but brevity is a plus. Format shall be 8 ½" x 11" sized pages. Printing front and back is acceptable. Advertising material should not be included in the proposal and will not be considered in the review. Additional information above and beyond the bulleted items listed above may be included in the proposal as appendices.

SECURITY AND INSURANCE

- No bid security will be required with the proposal submission.
- Successful Proposer shall be required to obtain 100% performance and payment bonds.
- Successful Proposer shall be required to carry insurance.

BIDS TO REMAIN SUBJECT TO ACCEPTANCE

Bid Proposals remain open for the period of 45 days.

OPENING OF BID PROPOSALS

Bid Proposals will be opened at the time and place indicated and, unless obviously non-responsive, read aloud publicly. A preliminary listing of the amounts of the Bid Proposals and will be made available to Proposers within a reasonable time after the opening of Bids.

PROJECT TIMELINE

Projected Timeline:

RFP Release	April 10, 2024
Proposals due	May 7, 2024; *(2:00 P.M. EDT @ Main Office)*
Staff Proposal Reviews	May 14, 2024
Staff selection of Recommended Firm	May 16, 2024
Recommendation to Board	May 21, 2024
AUB Board Meeting	May 28, 2024

PROPOSAL WITHDRAWAL:

A proposer must notify AUB in writing of its request to withdraw a proposal within twenty-four (24) hours after the proposal opening, not including Saturdays, Sundays, or holidays. In order to justify withdrawal, the bidder must demonstrate that a substantial error exists and that the proposal was submitted in good faith.

GOVERNING LAWS:

All contracts, transactions, agreements, etc., are made under and shall be governed by and construed in accordance with the laws of the State of North Carolina.

BID PROPOSAL FORM

PROJECT: **SCADA SYSTEM INTEGRATION UPGRADES**

WORK ORDER NUMBER: **03-03-356**

ARTICLE 1 – BID RECIPIENT

1.1 This Bid is submitted to: **Mr. Craig Brymer, Superintendent**
ATHENS UTILITIES BOARD
100 New Englewood Road
Athens, Tennessee 37303

1.2 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with AUB and to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions ofthe Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.1 Bidder accepts all of the terms and conditions listed in this document. This Bid will remain subject to acceptance for 45 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.1 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local conditions that may affect cost, progress, and performance ofthe Work.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has considered the information known to Bidder; information commonly known to firms doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of installation expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

E. Based on the information and observations referred to in Paragraph 3.1.D above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

F. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

G. Bidder has given AUB written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by AUB is acceptable to Bidder.

H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.1 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract.

ARTICLE 5 – BASIS OF BID

5.1 Bidder will complete the Work in accordance with the Contract Documents for the following Lump Sum Prices, with the following times indicated:

SCADA SYSTEM INTEGRATION BID PROPOSAL

(as listed in the scope of work and identified in the equipment schedules)

Item No.	*Description*	*Lump Sum*	*Expected Start Date*	*Days to Complete*
(1)	*Oostanaula and North Mouse Creek WWTP's SCADA Systems, PLC's, Network and HMI Upgrades, training, complete*.			
(2)	*Water Treatment Plant SCADA System, Computer Hardware and Software Modifications, training, complete.*			
(3)	*AUB Main Office/Dispatch PLC1 programing and SCADA System upgrades associated with all remote sites (water/sewer) SCADA upgrades, complete.*			
(4)	*Main Control Panel modifications inclusive of demolition, new installation complete.*			
(5)	*Spare Parts*			
Total Bid Price and Total Time (*to complete all Work if all portions of the awarded to a single firm).*				

TOTAL BASE BID, (Items (1) through (5}$ _____

_____ ($_____)

5.2 Bidder acknowledges and agrees that Owner has the right to reject or delete any price deemed by the OWNER to be unbalanced or excessively high, or excessively low, and that rejection of one or more lump prices will invalidate acceptance of this Bid.

5.3 Bidder acknowledges and agrees that bid price provided is for a complete and functioning system as provided for in the Contract Documents.

5.4 Bidder acknowledges and agrees that certain line items after *No. 1 (WWTP work)* may be removed from the project to fit the available capital budget funds for the project.

ARTICLE 6 – TIME OF COMPLETION

6.1 Bidder agrees that the time frame for the completion of each section of work, or total time if all work is awarded, shall be within the calendar days listed on the Bid. after the date when the Contract Times commence to run.

6.2 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.1 The following documents are submitted with and made a condition of this Bid:

A. Non-Collusion Affidavit;

B. Drug-Free Work Place Affidavit;

7.2 Defined Terms: The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders and the Contract Documents.

ARTICLE 8 – BID SUBMITTAL

8.1 This Bid is submitted on _____, 20____, by:

BIDDER: _____
(Either the Individual Doing Business as, or Partnership Name, or Joint Venture Name, or Corporation Name)

_____
(State of Incorporation, if Corporation, or Name of General Partner, if Partnership)

BY: _____
(Signature of Person Authorized to Sign)

Name & Title: _____
(Typed or Printed Name and Title of Person Authorized to Sign)

Attest: _____
(Corporate Secretary)

_____ (Corporate Seal)
(Printed or typed name)

Business Address:

For U.S. Mail: _____

For Delivery: _____

Telephone No. _____ Fax No. _____

E-mail Address: _____

Federal Employer's I.D. Number _____

END OF SECTION

NON-COLLUSION AFFIDAVIT

STATE OF _____ COUNTY OF _____

I, _____, being first duly sworn, deposes and says that:

They are _____
(Owner, Partner, Officer, Representative or Agent)

of _____, the Bidder that has submitted the attached Bid;

They are fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this Affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Athens Utilities Board or any person interested in the proposed Contract; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this Affiant.

BIDDER: _____

By: _____
(name signed)

_____
(name printed or typed)

Title: _____

Date: _____

Subscribed and sworn to me this ____ day of _____, 20_____

NOTARY PUBLIC: _____
(name signed)

_____
(name printed or typed)

Commission Expires: _____
(SEAL)

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF _____ COUNTY OF _____

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with the Athens Utilities Board to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____ (hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.
2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the *Tennessee Code Annotated*.
3. The Company is in compliance with T.C.A. § 50-9-113.

Further affiant saith not.

_____

Principal Officer

STATE OF _____
COUNTY OF _____

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.

Witness my hand and seal at office this _____ day of _____, 20____.

_____

Notary Public

My commission expires: _____

(SEAL)

AGREEMENT

This AGREEMENT is made the_____day of_____, 20_____,
Between

ATHENS UTILITIES BOARD ("OWNER") and

_____("CONTRACTOR")

for the purpose of performing the following Work as described in the Bid Proposal Documents entitled:

SCADA SYSTEM INTERGRATION IMPROVEMENTS
for
ATHENS UTILITIES BOARD
ATHENS, TN
PROJECT NO. 03-03-258
May 7, 2024

In connection with performance of the above-described Work, OWNER and CONTRACTOR agree as follows:

(1) OWNER shall pay the CONTRACTOR for performance of the Work on a unit price basis. The total Contract Price, on basis of lump sum values shown on the Proposer's Bid:

SCADA SYSTEM INTEGRATION IMPROVEMENTS,

shall be as follows: $_____, the "Contract Price".

(2) The Contract Price shall be payable as follows:

(a) For all Lump Sum Work, an amount of the actual Work completed on Application for Payment (submitted monthly). The price is determined by a percentage completion of the Lump Sum value.

(b) Actual percentages of Work completed and acceptable will be determined by the Engineer.

(c) CONTRACTOR will, not more often than monthly, prepare an Application-for- Payment on a form approved by OWNER and submit it to OWNER's representative (Engineer).

(d) The Owner shall retain **5%** of each progress payment until the Work is substantially complete and final payment is made.

(e) Engineer will promptly review the Application-for- Payment (or return it to CONTRACTOR for correction) and make payment recommendation to the OWNER.

(f) OWNER will pay the CONTRACTOR within 20 days after receipt of Engineer's approval of the Application-for-Payment.

(3) OWNER shall make the final payment, including retainage, provided the following conditions have been met:

(a) The Contract has been fully performed;

(b) CONTRACTOR has delivered to OWNER, on a form acceptable to OWNER, a complete release of all liens arising out of the Contract, or a bond satisfactory to the OWNER, indemnifying OWNER, its employees and agents against any lien.

(c) All required submittals, as-built drawings, etc. have been received and approved by OWNER.

(d) All claims for Liquidated Damages have been paid to the OWNER.

(4) OWNER shall furnish specifications and drawings, if available, and shall issue all instructions to the CONTRACTOR through the Engineer. Engineer will render a written clarification, interpretation, or decision on questions or issues submitted and may initiate a modification to the Contract Documents. Contractor, and its subcontractors and suppliers, shall not have or acquire any title to or ownership rights to any of the Drawings, Specifications, or other documents (including copies or electronic media editions) prepared by Engineer or its consultants.

(5) CONTRACTOR shall supervise and direct the Work using the best skill and attention and shall be solely responsible for all safety and construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work under the Contract. The term "Work" as used in this Agreement includes all labor, materials, and equipment necessary to produce the construction required by this Agreement except materials, if any, specifically identified herein as being supplied by the OWNER.

(5.1) CONTRACTOR shall provide and pay for all labor, materials, equipment, utilities, transportation and other facilities and services necessary for the proper execution and completion of the Work, unless otherwise specifically provided in this Agreement.

(5.2) CONTRACTOR shall not employ on the Work any unfit person or anyone not skilled in the tasks assigned and shall enforce discipline and good order among employees, and shall be totally responsible for all employees and subcontractors used by CONTRACTOR.

(5.3) CONTRACTOR warrants to OWNER that all permanent materials supplied by the CONTRACTOR and equipment incorporated in the Work will be new and unused, unless otherwise specified, and that all Work will be of good quality free from faults and defects and in conformance with the terms of this Agreement. All Work not conforming to these standards will be considered defective.

(5.4) CONTRACTOR shall pay all sales, consumer use and other similar taxes required by law and secure all permits, fees and license necessary for execution of the Work. CONTRACTOR shall give all notices and comply with all laws, ordinances, rules regulations and orders of any public authority bearing on performance of the Work. CONTRACTOR shall notify OWNER if Drawings or Specifications supplied by OWNER are found to be at variance therewith.

(5.5) CONTRACTOR shall be responsible for the acts and omissions of its employees and all subcontractors' supplies, their agents and employees, and all other persons performing any of the Work under a Contract with CONTRACTOR or with someone having a Contract with CONTRACTOR.

(5.6) CONTRACTOR shall keep the premises of the Work free from accumulation of waste materials or rubbish caused by operations at all times and shall remove all waste materials and rubbish, as well as tools, construction equipment, machinery and surplus materials from the construction area upon completion of the Work.

(5.7) Indemnification: To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts they may be liable.

(6) Time limits, stated in the Agreement or in a Notice to Proceed or Work Order are of the essence of the Agreement. CONTRACTOR and OWNER agree that as Liquidated Damages for delay (but not as a penalty). CONTRACTOR shall pay OWNER **$150.00** for each calendar day that expires after the time specified for completion until the Work is completed.

(6.1) If CONTRACTOR is delayed in the progress of the Work by changes ordered in the Work, fire, unavoidable casualties, or cause beyond CONTRACTOR's control, then the Contract Time will be extended by change order for such reasonable time as OWNER may determine.

(7) SAFETY: CONTRACTOR shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work and shall take all reasonable precautions for or the safety of all employees on the Work and other persons who may be affected thereby, of all the Work and materials and equipment to be incorporated therein, and of other property at the site or adjacent thereto. CONTRACTOR shall comply with all applicable laws, ordinances, rules, regulations and orders of any public authority having jurisdiction for the safety or protection of persons or property. All damage or loss to any property caused in whole or in part by CONTRACTOR, any subcontractor, or anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable shall be remedied by CONTRACTOR.

(7.1) INSURANCE: Before starting Work, Contractor shall furnish evidence of insurance from companies that are duly licensed or authorized in the jurisdiction in which the Project is located with a minimum AM Best rating of A-VII or better. Contractor shall provide insurance in accordance with the following:

(a) Contractor shall provide coverage for not less than the following amounts, or greater where required by Laws and Regulations:

i	Workers' Compensation: State:	Statutory
	Employer's Liability: Bodily Injury, each Accident	$1,000,000
ii	Commercial General Liability: General	$2,000,000
	Products – Completed Operations	$2,000,000
	Each Occurrence (Bodily Injury and Property Damage)	$1,000,000
iii.	Automobile Liability: Combined Single Limit per occurrence:	$1,000,000
iv.	Excess or Umbrella Liability: General	$5,000,000

(b) All insurance policies required to be purchased and maintained will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to the insured and additional insured.

(c) Automobile liability insurance provided by Contractor shall provide coverage against claims for damages because of bodily injury or death of any person or property damage arising out of the use of any motor vehicle.

(d) Contractor's commercial general liability policy shall be written on a 1996 or later ISO commercial general liability occurrence form and include the following coverages and endorsements:

i. Products and completed operations coverage maintained for three years after final payment;

ii. Blanket contractual liability coverage to the extent permitted by law;

iii. Broad form property damage coverage; and

iv. Severability of interest; underground, explosion, and collapse coverage; personal injury coverage.

(8) OWNER may order changes in the Work consisting of additions, deletions or modifications without invalidating the Contract by written change order signed by the OWNER, and the Contract Sum and Contract time will be adjusted accordingly by mutual agreement of the parties.

(9) CONTRACTOR shall correct any Work that fails to conform to the requirements of this Agreement when such failures to conform appear during the progress of the Work and shall remedy any defects due to faulty materials furnished by the CONTRACTOR, equipment or workmanship that appear within a period of one year from the date of substantial completion of this Agreement, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guaranty required by this Agreement. The provisions of this paragraph shall apply to Work done by subcontractors as well as to Work done by direct employees of CONTRACTOR. Payments may be withheld under this Agreement on account of:

(a) Defective Work not remedied;

(b) Claims filed;

(c) Failure of the CONTRACTOR to make payments properly to subcontractors or suppliers or for labor, materials or equipment;

(d) Unsatisfactory prosecution of the Work by CONTRACTOR.

(9.1) If OWNER fails to make a progress payment within thirty days (30 days) of due date when no default exists on the part of CONTRACTOR, CONTRACTOR may, upon seven (7) day's written notice to OWNER, terminate the Agreement and recover from OWNER payment for all Work executed and for any proven loss sustained upon any materials, equipment, tools and machinery.

(9.2) If CONTRACTOR defaults or neglects to carry out the Work in accordance with the Agreement or fails to perform any provision of the Agreement, OWNER may, after seven (7) day's written notice to CONTRACTOR and without prejudice to any other remedy it may have at law or in equity, make good such deficiencies and deduct the cost thereof from the payment then or thereafter due the CONTRACTOR, or, at its option, terminate the Agreement and take possession of the site and of all materials, equipment, tools and machinery thereon owned by CONTRACTOR

and finish the Work by whatever method it may deem expedient. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, OWNER will pay the excess to the CONTRACTOR, but if such expense exceeds the unpaid balance, CONTRACTOR will pay the difference to the OWNER.

(10) Guarantee and Correction of Work: The CONTRACTOR shall guarantee all Work to have been accomplished in conformance with the Contract Documents. Neither the final certificate of payment nor any provision of the Contract Documents, nor partial or entire occupancy of use of the Work by the OWNER, shall constitute an acceptance of any part of the Work not done in accordance with the Contract Documents, or relieve the CONTRACTOR of liability of incomplete or faulty materials or workmanship. The CONTRACTOR shall promptly remedy any omission or defect which shall appear within a period of one year from the date of final acceptance, unless a longer period is elsewhere specified. In the event that the CONTRACTOR should fail to make repairs, adjustments, or other remedy that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred.

(11) Venue: The laws of the State of Tennessee shall govern the construction of this Contract. The courts of McMinn County, Tennessee, shall have exclusive jurisdiction to try disputes arising under or by virtue of this Contract.

(12) The following listed documents are incorporated herein by this reference and any default under the terms thereof shall be a default under this Agreement:

(a) Contractor's Bid Proposal, 6 pages.
(b) Non-Collusion Affidavit, 1 page
(c) Drug Free Workplace Affidavit, 1 page.
(d) Technical Specifications, as listed.
(e) Exhibits to this Agreement, if any.

(13) This Agreement shall be binding upon and inure to the benefit of the respective successors and assigns of OWNER and CONTRACTOR and supersedes any prior or contemporaneous oral or written representations of the parties hereto with regard to the matters contained herein.

(14) This Agreement may be modified by written modification only, signed by the parties hereto.

(15) The terms and provisions of this Agreement shall constitute the entire agreement by and between OWNER and CONTRACTOR. Should any term and/or provision of this Agreement conflict with any term and/or provision of the Tennessee Code Annotated (T.C.A.) contracting law(s) as amended, the terms and/or provisions of this Agreement shall prevail and control.

IN WITNESS WHEREOF, the parties by and through their respective authorized Officers have executed this Agreement the date and year first above written.

ATHENS UTILITIES BOARD (OWNER)

By: _____
Signature

Name: Eric T. Newberry, Jr.
Title: General Manager
Address: 100 New Englewood Rd
Athens, TN 37303

ATTEST:

By: _____
Signature

Name: Phil Graves.
Title: Board Secretary

(Seal)

(CONTRACTOR)

By: _____
Signature

_____
Name (typed or printed)

_____
Title

Address _____

_____

_____

ATTEST:

By: _____
Signature

_____
Name (typed or printed)

_____
Title

Address _____

_____

_____

(Seal)

TECHNICAL SPECIFICATIONS

for

AUB SCADA SYSTEM IMPROVMENTS

SCADA SYSTEM IMPROVEMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Summary: For Oostanaula and North Mouse Creek WWTP's, upgrade all the Programmable Logic Controllers "PLC", Operator Interface Terminals "OIT", Human Machine Interfaces "HMI" Servers and Workstations SCADA Systems, communications and network equipment, and improve the SCADA Systems, Process Control Systems and Pump Control Systems to provide a complete functional system for all processes whether currently functional or not. Provide all necessary labor and hardware to correct malfunctioning systems. Provide all design engineering, equipment, software and licenses, physical installation, instrument calibrations, device configurations, adjustments, factory acceptance test, site acceptance test, commissioning of the upgraded systems and new comprehensive accurate documentation for all systems, control panel, network, etc.

B. Oostanaula WWTP has 18 PLC's with network switches and OIT's. All obsolete hardware to be upgraded and PLC programs converted to the latest PLC programming software version and made completely functional to process and interface to the plant network and SCADA System.

C. North Mouse Creek WWTP has 4 PLC's with network switches and OIT's. One new PLC Control Panel. All obsolete hardware to be upgraded and PLC programs converted to the latest PLC programming software version and made completely functional to process and interface to the plant network and SCADA System.

D. North Mouse Creek WWTP Main Control Panel Modifications to the front to remove all the existing devices and console table top and incorporate all the functions into the PLC and SCADA System.

E. Upgrade of all Ethernet network hardware including network switches, fiber optics transceivers, protocol converters, etc.

F. Ethernet communications to all existing Variable Frequency Drives. Provide new communication modules by the VFD manufacturer or protocol converter as necessary for Ethernet/IP protocol.

G. Upgrade of the Human Machine Interfaces "HMI" Servers and Workstations SCADA System at the Water Treatment Plant.

H. Communications to all collection system remote pump stations via AUB Fiber Optic Network, 928-952 Licensed MHz MAS radio, VPN, and or cellular modems. It is the responsibility of the System Supplier to provide a fully operational communications system and to make corrections and adjustments as required to provide a reliable and functional system. Changes to the polling PLC1 at AUB will be required.

I. Coordination of all signal types, protocols, interface, scaling, control sequences and interlocks as required.

J. The System Supplier shall provide all the required network communication cables, fiber optic, and CAT 5e/6, and shall be responsible for pulling the cable into the conduit, terminate and test.

K. The System Supplier shall terminate all analog signal cables, in only the Instrumentation and PLC Control Panels supplied by the System Supplier.
L. The existing Human Machine Interface software, redundant servers and workstation clients will be upgraded for each WWTP. Each plant shall have its own independent redundant servers configured as required to monitor, record, trend, totalize runtimes and flows, control, report, etc. all the plant I/O and remote I/O. Oostanaula WWTP shall be capable of monitoring North Mouse Creek WWTP and likewise N Mouse Creek shall be capable of monitoring Oostanaula.
M. SCADA System HMI Workstation at AUB Dispatch for both plants.
N. Professional Engineer registered in Tennessee to Seal and certify all factory testing.
O. Witnessed Factory Acceptance Test of System.
P. Operations Training, Hardware & Software Maintenance Training.
Q. SCADA, I&C O&M Manuals accessible from all SCADA System HMI computers.

1.02 QUALITY ASSURANCE

A. For standardization and quality purposes CSIA Certified System Suppliers and Certified Rockwell Automation Partners are pre-approved for the hardware integration portion.
B. The following criteria must be met by all approved System Suppliers. For qualification and final acceptance prior to entering into an Agreement, proof of the below requirements must be submitted within 10 days after the bid opening Being pre-approved does not eliminate or discount any of the following requirements.

1. A minimum of eight (8) years' experience providing similar operational systems of which a listing shall be requested. Two (2) previous projects submittals, O&M's and drawings that meet the requirements specified herein in detail must be submitted as proof of prior experience. References, from the consulting engineer and end user, for the same projects must be provided.
2. Shall have been in business a minimum of Ten (10) years operating under the same company name with a minimum of ten full time design personnel specifically for SCADA Systems, Pump Control Systems and Instrumentation.
3. Shall have registered professional engineers, design engineers, service engineers and technicians that are full time employees of the System Supplier. No contract or part time employees shall be used for any portion of the project.
4. Shall employ at least one full time IT Professional that has been trained and "Certified" for ISA/IEC 62443 Standards for Cybersecurity for Industrial Automation and Control Systems.
5. To establish quality and standards, the System Supplier shall be CSIA "Certified" by the Control System Integrators Association, utilizing the "Best Practices and Benchmarks" process to provide performance standards in seven critical business areas for Control System Integrators and have passed all CSIA audits. CSIA Membership only is not acceptable nor is it considered equal to being "Certified". System Supplier must be shown and listed on the CSIA website as "Certified".
6. To ensure proper practices and required experience with Allen-Bradley PLC's the System Supplier shall be a Certified Rockwell Automation Partner listed on the Rockwell website.

7. Must have a full-time control panel assembly shop in-house that is UL-508A and UL-698A certified. Only having UL-508A certification is not acceptable. Third party control panel assembly shops will not be acceptable.
8. A licensed VTScada Certified Advanced Integrator with a minimum of two engineers that have successfully completed the VTScada Advanced Configuration & Scripting Training Course. Submit the two training certificates and company's certification upon request.
9. Be certified and factory trained by Belden/Hirschmann.

C. Must be able to provide all hardware and software specified herein with all required and specified collateral services in connection with the system such as testing, calibration, start-up, operation and maintenance manuals, and operator training without additional cost to AUB.
D. System Supplier shall be responsible to coordinate with AUB personnel to obtain all necessary data from individual process equipment manufacturers supplied controls to determine the necessary transition for operation, control and/or monitoring from the manufacturer's equipment.
E. All materials, equipment sizes, and capacities shall conform to the requirements of the NEC, the National Electric Manufacturer's Association, and to applicable regulations of the local electric codes.
F. All materials and equipment must be UL listed and Control Panels must be UL-508A certified or UL-698A certified for all control panels with intrinsic safety barriers or in hazardous locations.

1.03 RESPONSIBILITY FOR COMPLETE SYSTEM

A. The System Supplier shall be responsible for and shall provide for the design, supply, delivery, installation, certification, calibration and adjustment, software configuration, testing and start-up, of a complete, coordinated system. A single supplier shall provide the all the upgrades, hardware and software. No contract or part time employees shall be used for any portion of the project.
B. The SCADA System Supplier shall design and furnish a complete, integrated, and functionally operational system, warranted to perform the intended functions as herein specified and as directed by AUB personnel during the design phase.
C. The installation of the upgrades must be done in phases and in a way to minimize the disruption of the plant operations and never stop the treatment process. Provisions to maintain proper operations of plant processes must be taken during cutover. Include all costs for temporary controls, etc. during installation and cutover.
D. Include any cost increases, labor and material for the entire duration of the project.

1.04 SUBMITTALS

A. Provide and submit new as built drawings for all control panels. Complete with all mechanical layout and electrical wiring, etc..
B. Provide a detailed cutover plan documenting all coordination with AUB personnel for the installation of the upgrades and improvements. Indicate the phases and methods

utilized to minimize the disruption of the plant operations. Submit provisions required to maintain proper operations of plant processes during cutover of all the upgrades.

C. Provide all submittals in a PDF file format on a USB drive and a cloud-based service for download and upload for approval and to be uploaded after review.
D. Submittals have a detailed index and easy to use tabs and bookmarks for BOM's, PLC I/O lists, drawings, Equipment Data Sheets, software or equipment manufacturer's literature, etc.
E. For all new hardware and software, include manufacturer's technical published data descriptive literature with product specifications with a cover called an Equipment Data Sheet. The Equipment Data Worksheet is to be developed by the SI to show the exact part or model number with descriptive break down of the model number and specific information like supply voltage, size, options, etc. All pertinent information for the equipment or software shall be included on the Equipment Data Sheet.
F. Submit manufacturer's schematics and system layout drawings which shall include the following:
G. Hardware Submittals:

1. Provide a block diagram and description of the system configuration showing all components and their interconnections etc. Label each diagram and specify all external power and communications interfaces. All diagrams shall be 11 X 17 format and be developed in Autocad DWG file format, no exceptions.
2. Provide an equipment list, bill with descriptive literature identifying component name, manufacturer, model number, a description of the operation, quantity supplied and any special characteristics.
3. Drawings of equipment to be supplied shall include, as a minimum, overall dimension details for each panel, console, etc., including internal and external arrangements and door mounted operator devices with nameplate designations. Elementary and wiring diagrams of equipment including field device connections shall be included with specific installation/wiring requirements identified. Provide detailed bills of materials with spare parts provided.

F. Control Panels, PLC Submittals:

1. System Network Diagram: Provide a NEW updated diagram showing the system network of all PLC network components, VFD's, etc. Show the details of the cabling or wireless connections for the entire system. Show all fiber and copper terminations including spares in fiber patch panels, network hubs/switches, routers, modems, wireless repeaters, etc. and necessary routing between PLC's, OIT's and HMI workstations.
2. PLC System Diagram: Provide a new diagram showing all PLC and network components for each Control Panel, PLC/RTU and patch panel. Show the exact PLC rack layout with details of the actual modules used and filler plates for spare slots. Identify components by manufacturer and model number. Show interconnecting cables with pin out details or model numbers of PLC manufacturers cables.

3. Bill of Materials: A list of all components. Group components by type and include:
    a. Component manufacturer, model number and part number.
    b. Component description.
    c. Quantity supplied.
    d. Reference to tag on drawings.

4. Descriptive Information: Provide catalog information, descriptive literature, performance specifications, internal wiring diagrams, power and grounding requirements, power consumption, and heat dissipation for all the equipment. Clearly mark all options and features proposed for this project.
5. Interconnecting Wiring Diagrams: Provide diagrams shall show all PLC and control panel components, their interconnecting cables, wiring terminations, and terminations to all interacting elements and subsystems. Terminations shall be numbered.
6. Outline Drawings: Provide equipment drawings showing: external dimensions, enclosure materials, conduit connections, and installation requirements.
7. Installation Details: Provide any modifications or further details as may be required to supplement the Contract Documents and adequately define the installation of the Control Panel or PLC/RTU.
8. Input/Output List: Provide for each I/O point list point type, tag number of the source or final control element, equipment description, PLC/RTU number, terminal identification, and address.

G. HMI Graphics and Reports Submittals:

1. Pre-submit sample process graphics screens and or charts with suggested colors for all piping and equipment, etc. to be displayed on the HMI's and or OIT's. Include in the pre-submittal; I/O lists, alarms lists including internally generated and diagnostics alarms and ranges of all variables.
2. Provide one (1) day for a software submittal meeting with AUB and engineer at the time that the graphics, code, reports, etc. for the submittal are at 90% completion. This will allow for owner preferences to be included prior to final submission. Final software submittal shall be within fourteen (14) days after the meeting.
3. Submittal shall contain at a minimum but not limited to all color graphics, database, control faceplates, alarm levels, alarm summary, historical configuration, live and historical trends, reports, diagnostics and help screens, scripts, configuration, communications, etc. Provide submittal in pfd file format or other agreed upon media and a physical personal demonstration.

1.05 SCADA SYSTEM OPERATION & MAINTENANCE MANUALS

A. Provide **new** O&M for the upgraded system including all components of the system, control panels, networks, HMI's, etc. Complete with all mechanical layout and electrical wiring of all control panels, communication and patch panels, etc., etc.

B. All O&M's will be provided in a PDF file format submitted for approval on a USB drive and a cloud-based service for download and upload for and after review.
C. At a minimum the O&M shall include:
    1. Component Manufacturers' O&M Manuals: Include manuals to cover installation, operations, maintenance, troubleshooting, and calibration.
    2. Operating instructions shall incorporate a functional description of the entire system, including the system schematics that reflect "as-built" drawings.
    3. Provide system architecture diagram showing network communications including but not limited to all PC's, PLC's, RTU's hubs, switches, cables, radio paths, etc.
    4. All Control Panel drawings.
    5. List of spare parts and expendables provided.
    6. Panel equipment, field devices, and instruments data sheets, including complete "Bill of Materials" of PLC's, RTU's, control panel devices, computers, printers, software, field equipment, etc.
    7. Provide manufacturer's O&M literature and product specifications with a cover called an Equipment Data Sheet. The Equipment Data Worksheet is to be developed by the SI to show the exact part or model number with descriptive break down of the model number and specific information like supply voltage, options, etc. All pertinent information for the equipment or software shall be included on the Equipment Data Sheet.
    8. Communication Network Cable Testing documentation with the actual tests of each fiber after terminations. All cable data shall be included on the form including but not limited to cable manufacturer, part number, cable tag and location, fiber number and color, testing procedures, test equipment utilized, actual readings and results, and personnel name with time and date the testing was performed.
    9. Instrument Calibration Worksheets showing actual calibration procedures performed with reading and results signed and dated by the Service Technician or Engineer.
    10. Provide a USB Drive containing final PC configuration, backups of system files, HMI application, RTU, PLC and OIT (Operator Interface Terminal) programs. Drive shall be professionally labeled for their content, purpose, date and version number.
    11. Final copy of PLC/RTU programs USB drive and loaded on AUB servers shall have descriptive documentation and explanation for each ladder rung or and sub routine within ladder programs.
    12. Complete operator instructions for all PC, HMI, PLC's and OIT's including download instructions and OIT menu map with details for functions and data entry.
    13. Point lists for all PLC inputs/outputs. Identify point number (tag), point description, point type, range in engineering units (if analog point), PLC number, rack and slot number, and point address.
    14. The complete O&M shall be provided with an easy-to-use pdf file with a detailed index with tabs and bookmarks for BOM's, PLC I/O lists, drawings, Equipment Data Sheets, software or equipment manufacturers O&M literature, etc. A compact disk shall be provided with O&M files including the drawings, Equipment Data Sheets, software or equipment manufacturers O&M literature, etc. The Software O&M may be printed by the end user if desired. Clicking on an item on the index shall immediately display the Equipment Data Sheet and software or equipment manufacturers O&M for the item. Likewise clicking on a drawing shown on the

index shall display the drawing. Other functions at a minimum shall include search, zoom and print page or selection features. All contents of the O&M may also be displayed with thumbnails. Clicking on the thumbnail shall immediately display the item, i.e. drawing, Equipment Data Sheet, instruction literature, etc.

15. The final O&M Manual shall be loaded on the AUB SCADA System servers and be accessible from the SCADA HMI with a designated button labeled O&M.

1.06 HMI & PLC PROGRAMS, AND DOCUMENTATION

A. All programs and configuration files developed and utilized for the project shall be owned by AUB. All final programs and configuration files shall be provided AUB in their documented form and in their native file format. This includes but is not limited to: PLC's, HMI's, OIT's, Network switches, VFD's, instrumentation configurations, etc.
B. PLC programs shall be documented. Each rung and sub-routine shall be described for its function.
B. Provide all PLC I/O lists in Excel XLS file format to AUB.

1.07 SOFTWARE LICENSES

A. Purchase any and all software packages (PLC Programming, HMI, OIT, Network Management, Report Generation, etc.) required for the system in the name of the authorized end user. All software shall be delivered to AUB with original disks and in its original box.

1.08 FACTORY TESTING WITH PROFESSIONAL ENGINEER APPROVAL AND SEAL

A. The factory testing will be observed and certified by a registered Professional Engineer "PE" registered in Tennessee that is a full-time employee of the Hardware Systems Integrator.

B. Develop and submit a test plan, testing documentation and QA/QC check lists specific to the project requirements and each control panel or PLC/RTU. Test all specific functions, I/O and control loops, etc.. Test all specific functions including, but not limited to, the following:
    1. Failure mode and backup procedures: power failure, auto restart, disk backup and reload, retentive outputs.
    2. All network communications.
    3. Human Machine Interface (HMI), all functions.
    4. Operator Interface Terminal (OIT), all functions.
    5. Completely simulate all possible field conditions and run in full automatic and manual.
    6. Simulate all existing systems being interfaced to with new programs and configurations. System supplier must own or acquire all hardware required for the simulation.
    7. Provide certified factory testing documents showing all tests performed and results achieved.

D. Submit the completed Professional Engineer "PE" certified factory testing documents showing all tests performed and results achieved plus all QA/QC check lists prior to shipment of the system, control panels and or PLC/RTU's. The documents will be "stamped" with the employee's PE's seal. The certified documents must be approved prior to shipment.

E. AUB personnel will be invited to observe the factory testing of the system. A two-week notice of the testing date shall be provided.

1.09 PROCESS CONTROL STRATEGY DESIGN WORKSHOP

A. A one-day process control strategy design meeting and a one-day follow-up meeting shall be held with AUB personnel to discuss specific details of the upgrades, cutover plan and any changes to the existing control strategies that are to be developed and included for the system. The meeting shall be held at the WWTP.

B. Prior to the meeting the System Supplier shall submit a draft of the detailed narrative for each process and proposed control strategies to AUB for review.

1.10 REPORT DESIGN WORKSHOP

A. A one-day report strategy design meeting shall be held with AUB personnel to discuss specific details of the various historical data reports and operation reports that are to be developed for the system.

1.11 OPERATIONS TRAINING

A. After the project substantial completion, provide two (2), for two (2) shifts instructor days of training for AUB personnel in the operation of the System. Training shall include:
   1. Standard operational features of PC, HMI, OIT, PLC, RTU and VFD equipment provided.
   2. Operation of each function or mode: For example, AUTO/MANUAL control, control set point settings, control mode selection, alarm acknowledgment and Constant Speed modes.
   3. Interfaces with other controls and systems.
   4. Report Software functions and creation of additional reports.
   5. Emergency procedures.

A. Provide a one (1) day of training after system has been in operation for a period of three (3) months.
B. Training sessions shall be video recorded in a mp4 video file format with a minimum resolution of 1080P and provided on a USB Drive and shall be capable of playing in a PC or smart TV.
C. Submit a training outline and agenda of specific topics and time to be used for each topic.

1.12 HARDWARE & SOFTWARE MAINTENANCE TRAINING

A. After the project substantial completion, provide Two (2) instructor days of onsite hardware training for AUB personnel in the maintenance of the system hardware and software. Training shall include:
   1. Standard hardware features of the PC, HMI, PLC, RTU, OIT and field instrumentation, etc.
   2. Specific training for the actual hardware configuration provided.
   3. Test, adjustment, and calibration procedures.
   4. Hardware troubleshooting, component removal and replacement, and periodic maintenance.
   5. Standard software features of all software provided, including but not limited to HMI, PLC, RTU and OIT programming software.
   6. Software troubleshooting, backups, restores, loading software and periodic maintenance.
   7. Software O&M functions and features.

C. Training sessions shall be video recorded in a mp4 video file format with a minimum resolution of 1080P and provided on a USB Drive and shall be capable of playing in a PC or smart TV.

D. Submit a training outline and agenda of specific topics and time to be used for each topic.

1.13 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Schedule the delivery of the equipment to coordinate with AUB personnel and the project schedule.
B. Each item of equipment shall be tagged with identifying number shown on the Shop Drawings visible after packaging.
C. Equipment has delicate components and extreme care shall be taken in handling to avoid internal and/or external damages.
D. Damaged equipment will not be accepted.
E. Equipment not for immediate use shall be stored inside a building, with enclosures under protective coverings and shall be fully protected from moisture, extreme heat and vibration.

1.14 SPARE PARTS AND TEST EQUIPMENT

A. Include all spare parts and specialized test equipment as shown in the equipment lists in Part 3 of this section.

1.15 FIELD TERMINATIONS AND COMMUNICATION NETWORK CABLE INSTALLATION AND TESTING

A. Any conduit and wiring required for the upgrades shall be provided.
B. Existing conduits may be utilized as needed.

C. All fiber optic cable fibers shall be terminated and tested by the SI. SI must provide certified training documentation for the SI personnel performing the terminations and testing. Testing documentation shall be provided to prove the actual tests of each fiber after terminations. All cable data shall be included on the form including but not limited to cable manufacturer, part number, cable tag and location, fiber number and color, testing procedures, test equipment utilized, actual readings and results, and personnel name with time and date the testing was performed.
D. The completed Record Documentation shall be included in all forms of the O&M Manuals.

1.16 INSTRUMENTATION CALIBRATION

A. All instrumentation supplied by the System Supplier shall be placed into proper operation and calibrated to the specified ranges and requirements of the project.
B. Any instrumentation requiring re-calibration, new scaling, communications configuration, etc., shall be performed and included.
C. Documentation in the form of an Instrument Calibration Worksheet shall be provided to prove the actual calibration of all instrumentation. All instrument data shall be included on the worksheet including but not limited to make, model, tag, zero, span, range, service, process, calibration procedures with actual readings and results. Worksheet shall be signed and dated by the service technician or engineer that performed the calibration.
D. The completed Instrument Calibration Worksheets shall be included in all forms of the O&M Manuals.

1.17 SERVICE REPORTS

A. Service reports shall be provided for each day that a representative of the System Supplier is on site. The service reports shall include all tasks performed, settings make, instruments calibrated, issues, time on site including arrival and departure, individual's that are present while on site and items to be addressed, etc.
B. Instrument Calibration Worksheets shall be provided with the report for all instruments calibrated during the visit.
C. Service reports will be provided in pdf file format.

1.18 WARRANTY

A. Systems supplier shall furnish a one-year onsite warranty for the system, providing for a 24-hour response time in normal working hours, five days per week for the length of a one-year warranty period. For any service visit during this period, provide the Owner and Engineer with a written report stating the reason for equipment failure and recommendations to prevent recurrence.
B. At the end of the warranty period of one year, a maintenance contract proposal shall be made available to AUB for the system.

1.19 SERVICE AGREEMENT

A. After project completion a service agreement will be made available. The Systems supplier shall furnish a hardware and software maintenance agreement for the system, providing for one (1), eight (8) hour day in normal working hours, per month for the length of a one year for preventive maintenance, training and miscellaneous additions to the system, etc. A daily written report shall be provided describing all work performed during the visits.
B. The service agreement will begin upon acceptance of the system. Provide written notification of the start and end date.
C. At the end of the one year a maintenance agreement an extension price shall be made available to AUB.

PART 2 – PRODUCTS

2.01 GENERAL

A. All equipment and materials shall be new, unused and proven by previous use of similar products to be completely suitable for the service intended.
B. All of the equipment shall be the manufacturer's latest and proven design. Specifications and drawings call attention to certain features but do not necessarily cover all details for the design of the System.
C. Mount process indicators and Operator Interface Terminals (OIT) at eye level, approximately 60", when possible, from finished floor to centerline of instrument.
D. Panel wiring for all 4-20mA analog input signals shall be two-conductor, shielded cable with drain. Cable and connectors shall be Belden No. 8760, UL Style 2092, 20 AWG minimum, or equal. Single conductors shall be tinned copper with 600V insulation, gauge as required.
E. PVC wiring duct shall be provided as required and shall have removable non-slip covers. Wiring duct shall contain 50% spare space. Wiring duct must be mounted with machine grade screws. Plastic and/or aluminum rivets are not acceptable. For consistency and standardization, wiring duct shall be by Panduit Corporation, no exceptions, color gray. All wiring in control enclosures not in wiring duct shall be bound with continuous type spiral windings or neatly bound with tie wraps not less than two inches apart consistently and shall not allow the shown wires to cross each other within the bundle.
F. All equipment mounted within the PLC/RTU enclosure shall be mounted on the enclosure back panel, neatly organized, labeled with a tag as shown on engineer-approved control panel drawings and shall be in accordance with the manufacturer's recommendations.
G. All fields wiring shall be mounted either at the bottom or side of the enclosure back panel, depending on where the I/O conduits penetrate the enclosure.
H. The field wiring terminals and panel wires shall be clearly labeled and identified and shown on the panel drawings.
I. Jumpers between adjacent terminal blocks shall be tinned copper jumper bars supplied by the terminal block manufacturer.

J. Interconnection drawings shall be provided along with wire numbers, terminal numbers, equipment tag numbers and panel physical layout drawings.
K. All systems and individual components, whether panel or field mounted units, that are located in different areas of the plant, one inside building to device outside of building, shall be protected from voltage and/or current surges.
L. Provide surge protectors for 120VAC power Phoenix Contact, Model PT 2 –PE/S 120AC-ST or equal by Edco. Units shall be DIN rail mounted with status LED.
M. Provide surge protectors for analog 4-20mA signals as Surge Cop, Model SCSP-30VDC-20mA or equal by Innovative Technologies or Transtector. All components, MOV's, Transzorbs, Silicon Avalanche Diodes, RF chokes, and resistors in the unit shall be redundant. Units shall be DIN rail mounted.
N. Control and instrumentation power supplies shall be adequately sized to provide 150% of that as required by the equipment served.
O. The input and output of each separate DC power supply shall be individually fused with easily accessible DIN-rail mounted fused switch. Provide separate fused disconnects for each PLC, OIT, each DC power supply, etc.
P. All power supplies shall be DIN Rail mounted and shall have screw terminals for all connections. Solder type connections will not be allowed. All screw terminal connections shall be finger safe.
Q. All pushbuttons, selector switches, and pilot light units shall be heavy duty, 30.5mm, NEMA type 4/4X, corrosion resistant, bulletin 800H by Allen-Bradley or equal by Square D. No exceptions, no other manufacturers shall be considered.
R. Terminal strips shall be mounted using DIN rails. Terminal strips shall be as manufactured by Wiedmueller, Phoenix, Entrelec, or approved equal.
S. All digital inputs and outputs, including spares, shall be isolated from field wiring through terminal strips and 24 VDC, interposing mechanical relays if necessary.
T. All mechanical control relays shall be DIN rail mounted. Minimum contact rating for mechanical control relays shall be 10 Amps at 250 VAC. All control and auxiliary relays shall have indicating LED's.
U. For all field Instrumentation provide surge protectors for 120VAC power mounted in a NEMA 4X junction box. Surge protector shall be Surge Cop, Model SCSP-120VAC-10A or equal by Innovative Technologies or Transtector. All components, MOV's, Transzorbs, Silicon Avalanche Diodes, RF chokes, in the unit shall be redundant. Units shall be DIN rail mounted with status LED.

V. For all field Instrumentation provide surge protectors for signals mounted in a NEMA 4X junction box. Surge protectors for analog 4-20mA signals shall be Surge Cop, Model SCSP-30VDC-20mA or equal by Innovative Technologies or Transtector. All components, MOV's, Transzorbs, Silicon Avalanche Diodes, RF chokes, and resistors in the unit shall be redundant. Units shall be DIN rail mounted.
W. Provide Control Panel with UL-508A certification as a minimum. Provide UL-698A as required for hazardous locations.

2.02 CONTROL PANEL ENCLOSURES

A. Provide NEMA rated enclosures with 3-point locking latch. NEMA rating and material as shown in the equipment schedules and or shown on the drawings. For outdoor

installations provide stainless steel rain shields and sun shields. Provide units as freestanding or wall mounted according to drawings and based on physical limitations. Enclosures shall be manufactured by Hoffman or equal.

B. Sun shields shall be made of 0.125" aluminum or stainless steel that extends at least 12" past exterior top and sides of enclosure.
C. For outdoor enclosures provide a dead front panel for OIT and all switches and status indicators.
D. For outdoor enclosures with a PLC and or an operator interface terminal (OIT): Provide sun shield to inhibit glare from sunlight and to promote better viewing of OIT and provide protection from the heat from the sun. Viewing hood shall be made of 304 stainless steel or aluminum and shall extend from the enclosure approximately 18" and shall shroud the top and sides of OIT viewing area.
E. Mount process indicators and Operator Interface Terminals (OIT) at eye level, 60" from floor to centerline of instrument.
F. Provide an LED cabinet light with door switch for all control panels larger than 24" x 24".
G. For outdoor enclosures provide a condensation heater properly sized with sufficient wattage for the enclosure provided. Provide a disconnect/breaker for the heater.

2.03 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. Programmable logic controllers shall be Allen-Bradley CompactLogix 5380 Series, 5069-L320ER with 2MB memory, capability up to 16 I/O modules, 40 EtherNet/IP devices, 2 IP addresses, 1 GB of secure digital memory card, dualport Ethernet DLR and USB communication ports.

2.04 OPERATOR INTERFACE TERMINAL (OIT)

A. Operator Interface Terminals shall be Allen-Bradley PanelView 5000 Series, PV5510, 2715P-T10CD color touchscreen or equal by Red lion or Maples Systems. Size as shown in the Control Panel Schedules.

B. Operator Interface Terminals that are to be an HMI client with an Industrial PC as shown in the Control Panel and HMI Schedules shall be manufactured by Allen-Bradley or Maples Systems shall have the minimum requirements and features:

   a. Intel® 6th Gen Core™ i5-6300U CPU processor
   b. System Memory 1x DDR4 260-pin SO-DIMM 2133MHz RAM **(16 GB)**
   c. USB 2 x USB 3.0 type A
   d. LAN 2 x GbE RJ-45
   e. Power 3-pin connector header, DC power input
   f. Remote Power Switch 2-pin connector header
   g. Touch Screen Type: Projected Capacitive Touch with Light Transmission 80+%
   h. Display Type FHD TFT LCD
   i. Max. Resolution 1366 x 768 for 19" or 1920 x 1080 for 22"
   j. Max. Color 16.7 M
   k. Luminance (cd/m²) 300 (19"), 250 (22")

l. View Angle (H°/V°) 170/160 (19”), 178/178 (22”)
m. Contrast Ratio 1000:1 (19”), 3000:1 (22”)
n. Display Backlight Lifetime hours: 50,000+
o. Solid State Drive Type 1 x 2.5” SATA III, MLC, **512 GB**
p. Construction aluminum front bezel and chassis, panel mounting
q. Operating Temperature 32~122°F [0~50°C]
r. Storage Temperature -22~158°F [-30~70°C]
s. Relative Humidity 10 to 90% @ 40°C, non-condensing
t. Rating IP66 / NEMA 4 when panel mounted
u. Environmental
v. Certification cULus / CE / FCC Class A / RoHS
w. Microsoft Windows® 10 IoT Enterprise Embedded LTSC 64-bit (EPKEA)

2.05 PLC & OIT PROGRAMMING SOFTWARE

A. PLC Programming Software shall be required for the maintenance personnel to download the program, develop ladder logic and/or reprogram the programmable logic controller (PLC) supplied under the scope of this project.
B. The PLC and OIT software will be loaded on the development HMI Workstation with all current PLC programs and OIT applications.
   1. For programming the Allen-Bradley processors provide if needed the Rockwell Software RS Logix 5000, with appropriate cables for communications with the PLC processors being supplied.
   2. For programming the Operator Interface Terminals provide the latest version of the manufacturer’s software with appropriate cables for communications with the OIT being supplied.

2.06 HUMAN MACHINE INTERFACE SOFTWARE (HMI)

A. All HMI software shall be the latest VTScada by Trihedral as shown in the equipment schedules included with one year support. Provide any additional software required for interface to hardware or software for a complete SCADA System. Provide all the required process graphic screens, database tags with at least 25% spare capacity and HMI cyber security additions and interface report generation software.

2.07 SCADA SYSTEM SERVERS, WORKSTATIONS HARDWARE AND MISCELLANEOUS SOFTWARE

A. The SCADA System shall be supplied with complete personal computer workstations and or servers as indicated on the Equipment Schedule in 3.02 of this section. The servers and personal computer workstations shall be provided with features, software, hardware performance and accessories as shown in this spec, the equipment schedules. Primarily the servers shall interface to the networked connected PLCs, and/or remotely connected PLCs. The SCADA System Servers shall store, distribute and gather data. The SCADA System Servers shall be configured in a redundant server system configuration with the local HMI Workstations at the Plants.
B. Redundant Servers are virtual at AUB and North Mouse Creek.

C. The personal computer workstation shall at a minimum incorporate the following:

1. Dell Precision Workstation 3660 Tower with 500W Chassis with 13th Gen Intel® Core™ i7-13700 (36 MB cache, 24 cores, 32 threads, 2.00 GHz to 5.60 GHz Turbo, 65 W)
2. Operating System: Microsoft® Windows 11 Professional 64-bit English
3. Warranty: 3 Years ProSupport **Plus** with Next Business Day Onsite Service
4. Video Card: NVIDIA® RTX™ A2000 12GB, 12 GB GDDR6, 4 mDP to DP adapters
5. Memory: 32 GB, 2 x 16 GB, DDR5, 4400 MT/s, V2
6. Storage: 512 GB, M.2, PCIe NVMe, SSD, Class 40
7. Network Card: In addition to the onboard Ethernet provide an additional and separate network card for the SCADA network; Intel I210 1Gb Ethernet Adapter (1X1GbE)
8. Monitors: **Two (2)** monitors; Dell 24 inch (Two (2) monitors for each Workstation)
9. System Documentation: Resource DVD - Contains Diagnostics and Drivers.
10. Keyboard: For office locations: Standard USB.
11. Mouse: Dell USB 2-Button Optical Mouse with Scroll.
12. Speakers: Dell Sound Bar Flat Panel Displays.
13. Productivity: Microsoft® Office Business.
14. Security: 12 months of Internet Security™
15. Provide computers manufactured by Dell or engineer approved compatible product.

D. Wall Mounted Monitors:

1. Provide 65" Class QLED 4K Flat Panel Display Monitor, as manufactured by Samsung, Model QN65Q60CAFXZA at locations shown on the equipment schedule.
2. Provide wall mount bracket with adjustable tilt and built in electrical boxes as required.

H. A UPS shall be supplied for each SCADA System Workstation. The UPS shall protect the system from surges, spikes, noise and brownouts. The UPS shall be rated for a minimum of 1500 VA, 1050 watts and shall power the Workstations for a minimum of 60 minutes upon loss of power. The UPS shall provide continuous On-Line Protection. Conventional Stand-by and line interactive UPS shall not be acceptable. UPS shall be by Liebert, UPStation GXT, model GXT2-1500RT120 with optional Ethernet communications for monitoring and diagnostics, Intellislot Ethernet SNMP with MIB and cable, P/N OCWEBCARD.

2.08 MANAGED NETWORK COMMUNICATIONS EQUIPMENT

A. The Managed Ethernet switches and Fiber Optic Transceivers shall be an industrial, managed switch compliant to IEEE 802.3 and shall include the following features:

1. Manufactured by Belden/Hirschmann, BRS “Bobcat” series.

2. Provide single-mode or multi-mode fiber optic transceivers as required at the specified locations.
3. The switches health, diagnostics and status shall be PLC addressable in the PLC data tables and monitored by the SCADA System and displayed continuously. Any alarms from the units shall be displayed, shown in the alarm summary and historically recorded.
4. Manufacturer shall offer a family of similar switches that vary based on the port type and quantity similar to Hirschmann Compact OpenRail. Switches will have a web based graphical user interface for configuration that is common to all products in the family. The family will include switches of 4, 8, 16 & 24 port varieties at 10/100 M baud. Two (2) additional Giga-Bit ports shall be optional for high speed backbone or ring configurations on the 8, 16 & 24 port versions.
5. Switches will employ "line speed" switching fabric to ensure full bandwidth capacity.
6. Switches shall be designed for DIN-rail mounting
7. Redundant 24 VDC power supply inputs; power supply failure is indicated by LED and fault relay
8. Fanless design
9. Supports a device discovery protocol which provides the following functionality:
    - Windows-based utility to list all supported switches on the network
    - Set the switch's IP address through the Ethernet network (serial connection to each switch is not required)
    - Launch the configuration web page for the switch
    - Read/write or read-only access
10. Capable of ring-based media redundancy with the following functionality:
    - Network recovery within 300 ms in case of media failure with up to 50 switches in the ring. 30 ms update for Giga-Bit rings.
    - Redundant link configured by DIP switch – no software configuration changes are required
    - Any ring ports may be connected together (to prevent wiring errors)
    - One time configuration (redundant link does not change if switches are added to the ring)
11. Other media redundancy protocols shall include RSTP
12. Configuration of switch may be accomplished via:
    - Web interface (with built-in help files)
    - SNMP-based network management software
    - Auto-configuration adapter (external flash memory device)
    - Command Line Interface (CLI)
13. Broadcast limiter to prevent broadcast storms and protect network devices
14. Packet Prioritization using COS and QOS with 8 priorities and 4 queues
15. IGMP snooping (multicast filtering) with IGMP querier V1, 2 & 3.
16. Diagnostics include RMON and up to eight (8) trap management stations. Fault conditions can be independently reported to the management station, including: cold/warm start, link up/down, power supply failure, redundancy mechanisms, authentication violation, RMON thresholds, port security, indicator contact
17. Supports port-based and overlapping VLANs
18. MAC based port security

19. RJ45 ports shall be 10/100/1000 BASE-TX and support auto-negotiation and auto-crossover based on end device speed requirements.
20. Fiber optic ports shall be available in a variety of fiber and connector types as required by the application. (Multimode or Singlemode fiber with SC, ST or SFP (LC)(Giga-Bit) style connectors)
21. Input voltage range: 9.6 - 60 volt DC and 18 – 30 volt AC
22. Minimum operating temperature range: 0°C to +60°C
23. Optional operating temperature range must be available at: -40°C to +70°C
24. Humidity: 10% to 95% (non-condensing)
25. Protection Class: IP 20
26. Approvals: cUL508, cUL1604 Class I Division 2

2.09 NETWORK INTERCONNECTING CABLES AND HARDWARE

A. Provide Cat-6 UTP Ethernet Cable as required. Cable shall be equal to Belden #6NP4P24-BL-P-V (blue).
B. Provide 62.5/125 micron 6-fiber loose-tube, gel-free type Altos© Gel-free Cable construction fiber optics cable suitable for outdoor lashed aerial and duct and direct-buried. Cable shall be Corning 006KUC-T4130D20 or equal. Provide 5 addition feet of fiber optic cable coiled up in the CP before terminating.
C. Provide Fiber Optics Patch Panel Interconnect Box for each location where fiber optics terminations are to be made. Provide a strain relief and protection for up to 12 fiber terminations via LC-style adapters. For control panels provide Modular Industrial Patch Panels with necessary accessories and number of ports for all fibers and CAT6 cables.
D. Provide rack mounted type patch panels where applicable.
E. Provide Fiber Optics Jumpers between the fiber optics interconnect box and the Fiber Optic Transceivers. Jumpers shall be 2-fiber prefabricated jumper cable assemblies ceramic connectors. Length as required.
F. Terminations: All fiber optics terminations shall be the responsibility of the System supplier. Provide 5 addition feet of fiber optic cable coiled up in the Control Panel before terminating.
G. The System Supplier shall furnish all cables required for interconnections between the computer system, servers, workstations and all peripherals.

2.10 SOLID STATE DC POWER SUPPLY WITH INTEGRAL BATTERY BACKUP

A. A DC UPS shall be supplied for each PLC Control Panel and Communications Panels.

B. The UPS shall convert 480VAC, 240VAC or 120VAC, according to Control Panel power circuit, to 24 VDC with a solid state power supply to power PLC, network hardware, control signals, etc. The DC power supply shall be equipped with an integral battery backup provided a minimum of 3 hours standby time of the PLC and OIT

C. The DC Power UPS and batteries shall be DIN Rail mounted.

D. The 24 VDC uninterruptible power system wide operational temperature range with an input voltage range of 22.5 to 30.0 VDC.

E. The unit shall have finger safe screw terminations for all connections.

F. The unit shall have an automatic self-test feature that checks the UPS and battery functions. Battery charging occurs automatically when input DC power is applied. When power fails, the DC UPS will switch to battery back-up. If the battery is no longer useful, the UPS will sound an alarm and an LED indicator will illuminate and provide a contact output to the PLC.

G. DC Power System shall be by PULS, UB10.241 UPS Control Unit and CS10.241 24VDC 10 Amp Power Supply or equal by Phoenix Contact.

PART 3 – EXECUTION

3.01 GENERAL

A. The System Supplier shall furnish all Ethernet cables and all associated fiber optics cables and parts including DIN rail mounted cable management and patch panel systems, wall mounted WIC fiber optics cable interface boxes, fiber optics connectors, fiber optics cable termination kits, etc.

B. The System Supplier shall furnish all cables required for interconnections between the computer system and all peripherals.

C. The System Supplier shall install all required terminations and make all final signal cable connections at field devices and at PLC control panels.

D. Electrical schematics of the instruments submitted for approval to the Engineer shall indicate where the surge protection will be provided for that particular instrument. For all surge protection, provide Equipment Data Sheets and identify the items on the drawings and bill of materials.

E. Interconnection information between system components and equipment found in other sections of these Specifications shall be complete with all necessary interconnection information including terminal strip numbering, process item description, etc. Notes that refer to equipment manufacturer's drawings for proper interconnection will not be acceptable.

H. Indicator lights on the Control Panels and HMI Graphics shall conform to the following color convention or ISA High Performance Graphics as determined in the Workshop meetings:

Status / Alarm	Lens or Screen Color
Running or Open	Red or (HPG White)
Ready, Stopped, Off or Closed	Green or (HPG Gray)
Failure or Alarm	Amber or (HPG Red)
Generic Status	Blue, White

I. The control panels shall be supplied complete including all necessary equipment to provide a complete and functioning system. All control by the SCADA System shall be distributed to the local PLC and shall be capable of operating in an automatic mode completely independent of the HMI. All accumulative total values (i.e. Flow Total) and runtimes shall reside and be computed in the PLC and "read" by the HMI.

J. Running status shall be provided from auxiliary contacts provided with the motor contactors and/or Variable Frequency Drives or via remote type I/O for intelligent devices, VFD's RVSS and starters. Auto status shall be defined as H-O-A switch in the Auto position. Ready status shall be defined as in auto mode with all interlocks

satisfied (no failure conditions present). Failed status shall be defined as motor overload, over temperature, seal water failure, VFD failure, failure to run, etc.

K. Where setpoints, operating limits, and other control settings are provided by the functional descriptions, these settings shall be initial settings only and shall be used for assistance in the initial startup of the System and/or Pump Station. All such settings shall be fully adjustable and based on actual operating conditions, the System Supplier shall make all necessary adjustments to provide smooth, stable operation.

L. All setpoint control shall be by PID control algorithms when applicable. All PLC controlled equipment shall be provided with individual PID instructions in the PLC and all associated variables/parameters shall be cascaded or repeated for each PID instruction set as required. All setpoints, sequence times, sequence orders, dead bands, PID tuning parameters, internal timers, range limits shall be accessible and alterable, with proper code or password, from local Operator Interface Terminal "OIT" or the SCADA System Computer. AUB shall confirm the desired operator adjustable parameters before the final factory staging of the System. It is the responsibility of the System Supplier to coordinate these items.

M. Provide PLC programming for a plant wide standardization communication data table for addressing all discrete and analog signals.

N. Maintain the current existing spare I/O for all PLC's to be upgraded and wired.

O. The System shall provide the following minimum features:

1. Graphical presentation of all processes and equipment monitored by the system. Graphics shall be 2-dimensional and upgraded to utilize ISA High Performance Graphics standards. Graphics shall be developed and modifiable by the HMI application and development software. The requirement or use of third-party graphical development or rendering software will not be utilized or acceptable.
2. Graphical overview screen for entire plant, each process in the plant and remote site, pump station, etc. Direct link from overview to each sub-screen for all remote locations, plant process and piece of equipment. Provide easy to use screen navigation throughout the HMI.
3. Main graphic screen menu showing all graphical screens and sub-screens with clickable link to each.
4. Provide Historical and Live trends for all analog variables. Single click selectable for time span at a minimum, 30 seconds, 1 hour, 12 hour, 24 hours, 7 days, 14 days, 30 days, 120 days, etc. up to 5 years, and adjustable to any desired timespan. Trend groups shall be selectable.
5. For **all analog variables**, flows, level, pH, turbidity, free chlorine residual, etc., signals will be read and displayed at a **default rate of every one second and historically recorded every 5 minutes** or can be configured to log data upon only a change in the value based on a predetermined and adjustable deadband. These settings are adjustable to needed rates as required.
6. Motor Runtimes, Display for all monitored motors and equipment: Last Run, Daily, Yesterday, Current Week, Last Week, Current Month, Last Month and Accumulative Total, in hours and tens of hours for all monitored motors. Runtimes are calculated, accumulated and stored in the PLC memory. The HMI will only display the values.

7. Motor Starts, Display for all monitored motors and equipment: Daily, Yesterday, Current Week, Last Week, Current Month, Last Month and Accumulative Total, in hours and tens of hours for all monitored motors. Starts are calculated, accumulated and stored in the PLC memory. The HMI will only display the values.
8. Monitor and display Hand-Off-Auto/Remote selector position for each motor.
9. Flow Totalizer, Display for all monitored flow signals: Flow Volume for Daily, Yesterday, Weekly, Last Week, Monthly, Last Month and Accumulative Total. Flow Totalizers are calculated, accumulated and stored in the PLC memory. The HMI will only display the values.
10. Display Tank Level and Volume for all chemical storage tanks and clearwells. Volumes are calculated and stored in the PLC memory. The HMI will only display the values.
11. Alarm summary and history screen with silence of audible alarm and acknowledge of alarms.
12. Password protection for entering vital set points.
13. For redundant hardware, PLC's, power supplies, networks, etc., continuously indicate status of primary and secondary units. Failure of a unit will create an alarm that can be silenced and will remain in the alarm summary until the failure is corrected or the unit is replaced.
14. Provide a Network Health graphics screen(s) showing the status and health of all devices and equipment on the network, including but not limited to PLC's, VFD's, Network Switches and PC's. Any failure of communications or a device will create an alarm that can be silenced and will remain in the alarm summary until the failure is corrected.
15. For self-healing ring networks, continuously indicate status of primary and secondary paths. Failure of the primary path will create an alarm that can be silenced and will remain in the alarm summary until the failure is corrected.
16. Provide Cyber and Network Security with Two Factor Authentication compliant with ISA/IEC 62443 standards and best practices. Train operations, maintenance on the proper security technics and methods.
17. VPN Connectivity: A secure Virtual Private Network shall be configured for remote HMI connectivity to the HMI Server from any Internet access location.

P. Reports. The following variables and data shall be reported. Custom reports will be determined during the design meetings. Include the following:
   1. Replicate and update all existing reports and required flow trends to be printed daily for each plant and remote sites
   2. 2 custom daily operation reports for each plant
   3. custom weekly operation reports for each plant
   4. custom monthly operation reports for each plant

Q. System Security shall be configured for HMI Workstations. Three different levels of security shall be provided and made selectable with name entries for logon and logoff ID and historical logging of the operator activities during that login period.
   1. Supervisor/Admin Level: Provide for two names and unique password entries for each plant

2. Operator Level: Provide for eight names and unique password entries for each plant
3. Guest Level: Provide for four names and unique password entries for each plant

R. The installation of the new upgraded SCADA System and Process Control Systems must be done in phases and in a way to minimize the disruption of the plant operations and never stop the treatment process. Provisions to maintain proper operations of plant processes must be taken during cutover. Include all costs for temporary controls, and electrical to maintain plant operations, etc. during installation, cutover and startup.

S. All Control Panels will be cleaned up and made free from and dirt, debris, rust, etc. All wiring, Panduit covers, etc., will be brought to like new condition and documented. All devices, whether new or existing, will be properly mounted, properly wired, labeled and shown on the new control panel drawings and new O&M Manuals.

T. All existing Remote Sites will be added to the newly upgraded SCADA System. Include all new graphics, database tags, alarms, alarm notification, etc. for all pump stations, metering, tanks, spring and wells sites.

3.02 EQUIPMENT SCHEDULES

TABLE A

Oostanaula WWTP PLC Control Panels, Network Comm Panels to be Upgraded or Replaced				
TAG	**LOCATION**	**ENCLOSURE**	**PLC & COMMUNICATIONS**	**NOTES**
PLC-101 Influent Pump Station	*Influent Pump Station*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*Provide new communications to all four (4) existing Sq D VFD's via new compatible comm module for Ethernet/IP protocol. And make necessary changes for new operation.*
PLC-201	*Electrical Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT replaced with a 19" IPC with VTScada Client* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics* *Comm to the Modicon PLC for the switchgear. Provide comm module to convert the Modbus TCP/IP to Ethernet/IP*	*Replace communications converter to the Power Logic Monitor*

PLC-202 Grease and Grit	*Headworks*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics* *Remove existing Modicon PLC utilized for communication. Provide comm module to convert the Modbus TCP/IP to Ethernet/IP*	
PLC-203 Grease and Grit Blower	*Headworks*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics* *Remove existing Modicon PLC utilized for communication. Provide comm module to convert the Modbus TCP/IP to Ethernet/IP*	
COMM/FOP P PANEL 200	*Blower Building*		*Plant LAN.*	*Fiber and CAT 5/6 patch panels, network switch*
PLC-301 Turblex Main Control Panel MCP1	*Blower Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and new IPC and VTScada Runtime.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*Make necessary changes for new operation.*
PLC-302 Turblex LCP1	*Blower Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*Make necessary changes for new operation.*
PLC-303 Turblex LCP2	*Blower Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*Make necessary changes for new operation.*
PLC-310	*RAS/WAS Pump Station*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.*	*Provide new communications to all six (6) existing Sq D*

RAS/WAS Pump Station			*New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*VFD's via new compatible comm module for Ethernet/IP protocol.* *Make necessary changes for new operation.*
PLC-0401 Sludge Transfer Pump Station	*Transfer Pump Station*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*120VAC Power* *DC UPS* *Add I/O hardwired from Effluent PS CP*
PLC-501 or 502 Tertiary Filter #1	*Filter Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	
PLC-502 or 503?? Tertiary Filter #2	*Filter Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	
COMM/FOP P PANEL 600	*Effluent*		*Plant LAN.*	*Fiber and CAT 5/6 patch panels, network switch*
PLC-601 UV System	*Effluent*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	
PLC-702 Belt Filter Press	*Dewatering Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	
PLC-710 Sludge Drying	*Dewatering Building*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	

PLC-901 Plant Drain Pump Station	*Plant Drain Pump Station*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	
PLC-1001 Plant Water System Pump Station	*Plant Water System Pump Station*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	

TABLE B

Oostanaula WWTP SCADA System Computer Hardware and Software:			
TAG	**LOCATION**	**MONITOR/PRINTERS**	**NOTES OR OPTIONS**
HMI-1 Redundant Servers	*AUB Main Office VMware Servers*		*SCADA HMI Servers in redundant Dual Server Premium. VTScada license with 25K I/O tags (or as required to provide 25% spare tags), Full Development HMI, Historian, Webserver, Trending, Alarm Notification Software, Report Generator for live and historical data (i.e. XLReporter Pro)* *The Redundant Servers at AUB and N. Mouse Creek will have all graphics, database tags and functionality for both WWTP's, WTP and all remote sites.*
HMI-1 Mobile Clients (Unlimited)	*AUB Main Office*	*Owner Mobile Phones and Remote PC Clients*	*HMI Clients with full capabilities*
HMI-2 Workstation (Local Redundant Server)	*WWTP Control Room*	*65" LED Display/TV with Mount* *(2) 24" LED on desk*	*Local Redundant Server SCADA HMI Workstation with 25K I/O tags, Full Development Runtime HMI, Historian, Webserver, Trending, Alarm Notification Software, Report Generator for live and historical data (i.e. XLReporter Pro)* *The Local Redundant Server at Oostanaula will have the ability to access all graphics, database tags and functionality for both WWTP's, WTP and all remote sites*
HMI-2 Mobile Clients	*WWTP*	*Owner Mobile Phones and Remote PC Clients*	*HMI Browser with full capabilities*
HMI-201 Client	*Electrical Building (PLC-201)*	*19" IPC*	*HMI Browser with full capabilities*

TABLE C

North Mouse Creek WWTP PLC Control Panels, Network Comm Panels to be Upgraded or Replaced				
TAG	**LOCATION**	**ENCLOSURE**	**PLC & COMMUNICATIONS**	**NOTES**
PLC-101 Influent Pump Station	*Influent Pump Station*	*Existing*	*Upgrade Allen-Bradley SLC 5/05 to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*Make necessary changes for new operation.* *Replace communications FO media converter with Fiber optic network switch*
PLC-MCP	*Electrical Building*	*Existing*	*Upgrade existing CL 33ER to Allen-Bradley CompactLogix 5069-L320ER* *65" Samsung TV Display* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*Remove all existing chart recorders, meters, switches, pilot lights and Large Graphics Panel. Replicate all functions and control with the same functionality from the SCADA System. Remove the large console table front of the MCP. Cover all openings from the removal of the equipment and console with a black anodized aluminum, or powered coated paint, cover. Mount the new 65" SCADA Display in the center on the MCP.* *New I/O for all existing control switches and status'.* *Replace communications FO media converter with Fiber optic network switch*
PLC-Thickener	*Thickener Building*	*Existing*	*Upgrade Allen-Bradley ML1100 to Allen-Bradley CompactLogix 5069-L320ER* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	
PLC-Effluent	*Effluent*	*New Nema 4X*	*New Control Panel with Allen-Bradley CompactLogix 5069-L320ER* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	*120VAC DC UPS* *New FOPP*

PLC- UV System	*Effluent*	*Existing*	*Upgrade Allen-Bradley CL 35E to Allen-Bradley CompactLogix 5069-L320ER and OIT to the PV 5510.* *New Ethernet switch(s) communication to VFD's and Plant LAN via fiber optics*	

TABLE D

North Mouse Creek SCADA System Computer Hardware and Software:			
TAG	**LOCATION**	**MONITOR/PRINTERS**	**NOTES OR OPTIONS**
HMI-1 Redundant Servers	*North Mouse Creek VMware Servers*		*SCADA HMI Servers in redundant Dual Server Premium. VTScada license with 25K I/O tags (or as required to provide 25% spare tags), Full Development HMI, Historian, Webserver, Trending, Alarm Notification Software, Report Generator for live and historical data (i.e. XLReporter Pro)* *The Redundant Servers at AUB and N. Mouse Creek will have all graphics, database tags and functionality for both WWTP's, WTP and all remote sites.*
HMI-1 Mobile Clients (Unlimited)	*North Mouse Creek*	*Owner Mobile Phones and Remote PC Clients*	*HMI Browser Clients with full capabilities*
HMI-2 Workstation (Local Redundant Server)	*WWTP Control Room*	*65" LED Display/TV Mounted on MCP Front* *(2) 24" LED on desk*	*Local Redundant Server SCADA HMI Workstation with 25K I/O tags, Full Development Runtime HMI with additional Alarm Notification, Historian, Webserver, Trending, Software, Report Generator for live and historical data (i.e. XLReporter Pro)* *The Local Redundant Server at Oostanaula will have the ability to access all graphics, database tags and functionality for both WWTP's, WTP and all remote sites*
HMI-2 Mobile Clients	*Anywhere*	*Owner Mobile Phones and Remote PC Clients*	*HMI Browser Clients with full capabilities*

TABLE E

Water Treatment Plant SCADA System Computer Hardware and Software:			
TAG	**LOCATION**	**MONITOR/PRINTERS**	**NOTES OR OPTIONS**
HMI-2 Workstation (Local Redundant Server)	*WTP Control Room*	*65" LED Display/TV Mounted on MCP Front* *(2) 24" LED on desk*	*Local Redundant Server SCADA HMI Workstation with 25K I/O tags (or as required to provide 25% spare tags), Full Development Runtime HMI with additional Alarm Notification, Historian, Webserver, Trending, Software, Report Generator for live and historical data (i.e. XLReporter Pro)* *The Local Redundant Server at the WTP will have the ability to access all graphics, database tags and functionality for both WTP and all water remote sites*
HMI-2 Mobile Clients	*Anywhere*	*Owner Mobile Phones and Remote PC Clients*	*HMI Browser Clients with full capabilities*

TABLE F

AUB Main Office/Dispatch PLC Control Panels, Network Comm Panels to be Upgraded or Replaced				
TAG	**LOCATION**	**ENCLOSURE**	**PLC & COMMUNICATIONS**	**NOTES**
PLC-1 Dispatch	*AUB Main Office*	*Existing*	*Allen-Bradley MicroLogix 1400*	*Add all sites to the new Upgraded SCADA System. Make any necessary programming changes for new operations and or changes to polling, communications and network as shown below*
Sewer Division Remote Sites:				
1. Denso Drive Pump Station			*AUB Fiber Optic Network*	
2. Park Village Pump			*MDS 928-952 MHz MAS Radio*	*Polled by PLC1*
3. Co Rd 172 Pump			*Ethernet radio*	
4. Sterling Road Pump- Currently on PLC1 and MDS Will be on Fiber of Verizon			*Existing MDS 928-952 MHz MAS Radio to be changed AUB Fiber Optic Network*	*Remove from PLC1 polling and tables*
5. Cedar Spring Pump Currently on PLC1 and MDS Will be on Fiber of Verizon			*Existing MDS 928-952 MHz MAS Radio to be changed AUB Fiber Optic Network or Verizon Broadband*	*Remove from PLC1 polling and tables*
6. Railroad Ave currently on PLC1 and MDS- Will be on Fiber and need to be removed from PLC1			*Existing MDS 928-952 MHz MAS Radio to be changed AUB Fiber Optic Network*	*Remove from PLC1 polling and tables*
7. Mt Verd pump station			*Existing MDS 928-952 MHz MAS Radio to be changed AUB Fiber Optic Network after PCP is updated*	*Remove from PLC1 polling and tables*

8. Mayfield on PLC1 and MDS	*MDS 928-952 MHz MAS Radio*	
9. Riceville School on PLC1 and MDS	*MDS 928-952 MHz MAS Radio*	
10. Coile Road pump on PLC1 and MDS	*MDS 928-952 MHz MAS Radio*	
11. Co Rd 249 pump station	*Existing MDS 928-952 MHz MAS Radio to be changed AUB Fiber Optic Network after PCP is updated*	*Remove from PLC1 polling and tables*
12. I-75 pump Station	*Ethernet radio*	
Water Division Remote Sites:		
1. Water Treatment Plant	*AUB Fiber Optic Network*	
2. Well 12	*AUB Fiber Optic Network*	
3. Spring	*AUB Fiber Optic Network*	
4. Well 7	*MDS 928-952 MHz MAS Radio*	*Polled by PLC1*
5. Well 4	*MDS 928-952 MHz MAS Radio*	*Polled by PLC1*
6. Reservoir 5	*Existing MDS 928-952 MHz MAS Radio to be changed to Ethernet Radio*	*Remove from PLC1 polling and tables*
7. Hiwassee Utilities	*MDS 928-952 MHz MAS Radio*	*Polled by PLC1*
8. Reservoir 1	*MDS 928-952 MHz MAS Radio*	
9. Reservoir 2	*MDS 928-952 MHz MAS Radio*	
10. SpringPlace	*MDS 928-952 MHz MAS Radio*	
11. Co Rd 182	*Verizon Broadband*	
12. Highlands PS	*AUB Fiber Optic Network*	
13. Co Rd 126	*MDS 928-952 MHz MAS Radio*	
14. Co Rd 100 PS	*Verizon Broadband*	
15. Co Rd 100 meter	*AUB Fiber Optic Network to Co Rd 100 PS*	
16. Co Rd 194	*Ethernet radio*	
17. Niota Pump Station	*AUB Fiber Optic Network*	
18. Niota Tank	*AUB Fiber Optic Network*	
19. Co Rd 207	*MDS 928-952 MHz MAS Radio*	
20. Reservoir 4	*MDS 928-952 MHz MAS Radio*	

TABLE G - SPARE PARTS

Include the following spare parts and specialized test equipment:

1. One PLC processor for each type used.
2. One PLC I/O module for each type used.
3. One PLC power supplies for each type used.
4. One DC power supplies for each type used. (Loop Power, PLC I/O, etc.).
5. One Network Switch for each type and size used, fiber optic, etc.

END OF SECTION