CONSOLIDATED STATEMENT OF WORK (SOW) FOR IWTP SCADA SYSTEM REPLACEMENT LOCATED AT HILL AIR FORCE BASE

1.0 PROJECT DESCRIPTION AND SCOPE

1.1 General System Description

1.1.1 The Contractor shall furnish all labor, materials, tools, equipment, testing, and transportation necessary to deliver a complete, fully integrated, and turnkey Supervisory Control and Data Acquisition (SCADA) system.

1.1.2 The system shall be installed at the Industrial Wastewater Treatment Plant (IWTP) compound located at Hill Air Force Base (HAFB), Utah.

1.1.3 The complete system shall be designed, fabricated, programmed, tested, started up, and warranted by a single supplier to ensure a single source of responsibility and long-term support.

1.2 Detailed Scope of Work

1.2.1 The Contractor shall design, build, and install a replacement SCADA system to automate the monitoring and control of industrial waste treatment processes.

1.2.2 The Contractor shall ensure the replacement system integrates seamlessly with the existing physical infrastructure at the IWTP.

1.2.3 The system must comply with all current cybersecurity directives while allowing long-term sustainment and troubleshooting by 75 CES personnel without vendor dependence.

1.3 Period of Performance and Schedule

1.3.1 The overall Period of Performance (PoP) shall not exceed 180 calendar days from the date of the Notice to Proceed (NTP). This period shall include engineering, material procurement, delivery, physical installation, and final commissioning.
1.3.2 The Contractor's normal working hours shall be restricted to 0700 to 1700 hours, Monday through Friday, excluding Federal holidays.

1.3.3 Overtime and weekend work must be pre-coordinated and approved by the Contracting Officer (CO) and the 75 CES Project Manager (PM) to meet schedule constraints or facilitate required utility outages.

2.0 APPLICABLE CODES, STANDARDS, AND CYBERSECURITY

2.1 Federal, Military, and Industrial Standards

2.1.1 The Contractor shall ensure all design, installation, and materials comply with the National Electrical Code (NEC), National Electrical Manufacturers Association (NEMA) standards, and IEEE standards.

2.1.2 The system configuration and installation must comply with UFC 1-200-01 (General Building Requirements), UFC 3-401-01 (Mechanical Engineering), and UFC 3-430-07 (Water Supply and Wastewater).

2.1.3 All electrical and telecommunications systems shall be designed and installed in accordance with UFC 3-560-01 (Electrical Safety), UFC 3-580-01 (Telecommunications Infrastructure), and the 75th CS TAB K directive dated 1 April 2010.

2.2 Cybersecurity and Risk Management Framework (RMF) Compliance

2.2.1 The SCADA system hardware, software, and network components shall be engineered to achieve Risk Management Framework (RMF) accreditation in accordance with DoDI 8500.01 (Cybersecurity) and DoDI 8510.01 (RMF).

2.2.2 The Contractor shall ensure all configurations comply with AFI 17-101 (Risk Management Framework for Air Force Information Technology) and the AFCEC Control Systems Cybersecurity Requirements Guide (CS-CRG).

2.2.3 The system design must integrate security controls consistent with the Department of Defense (DoD) ICS/OT Cybersecurity Reference Architecture and NIST SP 800-82 (Guide to Industrial Control Systems Security).

2.3 Environmental and Safety Regulations

2.3.1 The Contractor shall comply with all Occupational Safety and Health Administration (OSHA) regulations as outlined in 29 CFR Part 1910 and 29 CFR Part 1926.

2.3.2 All environmental mitigation, waste handling, and emissions control shall comply with Environmental Protection Agency (EPA) regulations in 40 CFR and the State of Utah Administrative Codes.

3.0 GENERAL CONTRACTOR REQUIREMENTS

3.1 Project Management and Site Supervision

3.1.1 The Contractor shall provide a qualified, full-time Superintendent on-site to oversee all daily construction, safety, and quality control activities.

3.1.2 The Contractor shall assign a dedicated Project Manager to coordinate scheduling, submittals, and contract modifications with the 75 CES PM, Dennis Laughlin.

3.1.3 The Contractor shall implement a three-phase quality control inspection system covering the design phase, physical construction phase, and final closeout phase.

3.2 Site Logistics

3.2.1 The Government will designate an on-site parking area and a designated layout space for the Contractor's equipment and roll-off containers.

3.3 Protection of Government Property and Safety

3.3.1 The Contractor shall protect all existing government property and physical assets from damage during construction. Any damage caused directly or indirectly by the Contractor shall be repaired or replaced to original condition at no cost to the Government.

3.3.2 The Contractor shall maintain active dust control measures to protect sensitive electronic equipment and active processes operating inside the IWTP.

3.3.3 At the conclusion of each daily shift, the Contractor shall secure all tools, equipment, materials, and facility entry points to prevent unauthorized access.

3.4 Outage Coordination and Mishap Reporting

3.4.1 The Contractor shall submit written requests for utility outages to the 75 CES PM a minimum of 21 calendar days prior to the desired start date. Outages must be carefully coordinated with IWTP operations to minimize process disruptions.

3.4.2 In the event of an occupational accident or physical mishap, the Contractor shall immediately secure the scene, take action to prevent further injury or property damage, and notify the Contracting Officer (CO).

3.4.3 The Contractor shall cooperate fully with any subsequent military accident investigation authorities and preserve all physical evidence until formally released.

4.0 DEMOLITION AND HAZARDOUS MATERIALS

4.1 Hazardous Materials Surveys and Compliance

4.1.1 The Contractor shall post and maintain all government-furnished Asbestos Containing Material (ACM) and Lead-Based Paint (LBP) inspection reports in a prominent, weatherproof location on-site.

4.1.2 The Contractor shall utilize only Utah-licensed and certified asbestos and lead abatement subcontractors. Pre-approved specialty contractors include Environmental Abatement Inc. and Eagle Environmental.

4.2 Legacy SCADA System Demolition

4.2.1 The Contractor shall perform the safe, complete isolation and physical removal of legacy PLC hardware, obsolete wiring, unsecured communication adapters, and redundant field programming ports.

4.2.2 Demolition activities must be carefully sequenced to prevent any unplanned interruptions to the active wastewater treatment processes.

4.2.3 All demolished electronics, cabling, and cabinet components shall be sorted and disposed of in accordance with HAFB environmental waste policies.

4.3 Hazardous Waste Abatement Protocols

4.3.1 All asbestos abatement work shall comply with 29 CFR 1926.1101, 40 CFR Part 763 (Subpart G), 40 CFR Part 61 (Subpart M), and Utah Administrative Code R3017-801.

4.3.2 All lead-based paint disturbance, cutting, and containment shall comply with 29 CFR 1910.1025, 29 CFR 1926.62, 29 CFR 1910.134, and Utah Administrative Code R307-840.

5.0 TECHNICAL HARDWARE SPECIFICATIONS

5.1 Central SCADA Server Configuration

5.1.1 The Contractor shall install a central SCADA server utilizing a modern,

currently supported, enterprise-grade server platform running the Windows Server 2022 Operating System (or the most current DoD-approved, STIG-compliant successor). The server hardware platform must be actively supported by the original equipment manufacturer (OEM) for the duration of the performance and warranty periods, explicitly excluding legacy or end-of-life (EOL) hardware configurations such as the Dell PowerEdge T340.

5.1.2 The server hardware shall feature a modern, enterprise-class x86-64 multi-core processor (minimum 4 physical cores, currently in production) and a minimum of 16 GB of system RAM.

5.1.3 The storage array shall consist of a dedicated hardware RAID controller operating in a Physical RAID 1 configuration with dual 1TB Solid State Drives (SSDs) or equivalent enterprise-grade, high-endurance storage.

5.1.4 The server chassis must include dual hot-plug redundant power supplies, a dual-port 1Gb on-board network interface card (NIC), a standard pointing device, and a standard keyboard.

5.2 Operator Workstation (OWS) and Power Protection

5.2.1 The Contractor shall install a dedicated Operator Workstation (OWS) running Windows 11 Enterprise (or the current, DoD-approved, STIG-compliant equivalent) to serve as the primary human-machine interface (HMI).

5.2.2 The OWS shall be equipped with a high-resolution LCD display and a local audio output device for audible alarm annunciation.

5.2.3 The Contractor shall supply a Standby Uninterruptible Power Supply (UPS) featuring integrated power line filtering and transient surge protection.

5.2.4 The UPS must be engineered to provide a minimum of 20 minutes of continuous backup power to the central server, OWS, network switches, modems, and communication adapters.

5.3 Programmable Controller Hardware

5.3.1 The replacement field controllers shall feature a modular, industrial design suited for wastewater treatment environments. The hardware shall be conformal coated and rated for operation in environments with temperatures ranging from 0°C to 60°C and 5% to 95% non-condensing relative humidity.

5.3.2 Each controller shall feature a local diagnostic interface consisting of a

physical, integrated high-resolution digital display on the face of the enclosure panel (or an approved local diagnostic terminal) to allow real-time local status viewing, IP configuration, troubleshooting, and diagnostic monitoring without the use of an external laptop computer

5.3.3 The controllers shall feature a minimum of one 10/100/1000 Fast/Gigabit Ethernet port and sufficient serial RS-485 ports to support all existing legacy serial field devices at the specific panel location, as determined during the site survey and documented in the approved shop drawings.

5.3.4 All controller I/O modules must be hot-swappable to facilitate field replacement without requiring system wiring removal.
5.3.5 The controllers shall utilize 32-bit or 64-bit microprocessors and include sufficient onboard non-volatile memory (e.g., NVRAM or embedded flash) to retain user programs, control logic, and application data indefinitely during a total loss of power, without reliance on external or replaceable batteries.

5.3.6 The controller firmware must support programming via standard IEC 61131-3 languages (e.g., Ladder Diagram, Function Block Diagram, Structured Text).

5.4 Controller Input and Output Board Limits

5.4.1 Digital Output Modules: 120VAC cards must feature 16 channels with a 90–130 VAC rating and 125 mA per channel maximum. 24VAC cards must feature 8 channels with 300 mA per channel maximum. 12VDC cards must feature 8 channels. Relay output cards must feature 5–8 channels supporting Form A and C configurations rated up to 240 VAC/125 VDC.

5.4.2 Analog Output Modules: 0–20mA modules must feature 4–8 channels with 10-bit resolution and a maximum load impedance of 600 Ohms. 0–10VDC modules must feature 8 channels with 10-bit resolution.

5.4.3 Analog Input Modules: 4–20mA modules must feature 2–16 channels supporting self-powered and loop-powered configurations, 16-bit resolution, and ±20 uA accuracy. 0–10VDC modules must feature 16 channels with 16-bit resolution. 0–2k Ohm resistive modules must feature 16 channels with 16-bit resolution.

5.4.4 Digital Input Modules: 120VAC cards must feature 5–16 channels with a 130 VAC maximum input rating. Dry contact relay inputs must feature 4–16 channels with an open-contact voltage rating of 10–24 VDC.

6.0 SOFTWARE, PROGRAMMING, AND DATABASE ARCHITECTURE

6.1 Unified Software Platform

6.1.1 The SCADA system shall operate on a single, unified software platform that consolidates programming, HMI graphics, alarm management, historical data trending, and system diagnostics into one environment. The system shall utilize a scalable Client-Server architecture supporting concurrent multi-user engineering and runtime operator access.

6.1.2 The software platform must be fully licensed to accommodate a minimum of 100,000 active I/O points, including physical digital/analog channels and calculated control variables.

6.1.3 The platform must natively support simultaneous communication over standard open protocols (e.g., Modbus TCP, BACnet/IP, and OPC UA) to facilitate future system integration.

6.1.4 The software platform shall include an integrated, SQL-compliant Data Historian. The historian must be capable of logging designated process variables at sub-second intervals and must support native data export to standard IT formats (e.g., CSV, PDF) without requiring proprietary vendor extraction tools.

6.1.5 The platform architecture must natively support high-availability or hot-standby server redundancy to ensure zero loss of process visibility or historical data capture during a primary hardware failure.

6.2 Security and Administrative Controls

6.2.1 The software shall enforce role-based access control, offering distinct permissions for Engineering, Supervisory, and Operator levels.

6.2.2 The system shall utilize DoD-compliant Public Key Infrastructure (PKI) multi-factor authentication (MFA) via Common Access Card (CAC) or Personal Identity Verification (PIV) smart card readers to validate user login, in strict accordance with DoDI 8520.03 (Identity Authentication for Information Systems)**.

6.2.3 User accounts shall be temporarily locked out after 3 consecutive invalid login attempts, and accounts must be automatically disabled after a pre-defined period of operational inactivity.

6.3 HMI Graphics and Alarm Management

6.3.1 The Contractor shall develop high-performance HMI graphic displays.

6.3.2 The HMI graphics shall utilize consistent**, situational-awareness-driven** color-coding to denote system alarm states~~, restricted to: High Alarm (Red), Low Alarm (Blue), Failed Alarm (Yellow), and Out of Service/Manual Mode (Green)~~ in accordance with ISA-101 (High-Performance HMI) standards and the final, 75 CES-approval, resolving any legacy color scheme conflicts.

6.3.3 The alarm subsystem must support configurable alarm routing to the base EMCS via a remote, monitor-only network connection.

6.3.4 The software shall maintain four distinct alarm views, including an Alarm Window for acknowledgment, a Recent Alarms view, an Active Alarms view, and a searchable Alarm History database.

7.0 SUBMITTALS AND DELIVERABLES

7.1 Pre-Installation Submittal Requirements

7.1.1 Product Data: The Contractor shall submit manufacturer data sheets for all instrumentation, controllers, network devices, and physical power supplies prior to purchasing.

7.1.2 Shop Drawings: The Contractor shall submit complete wiring diagrams, panel layout designs, and field connection details for approval.

7.1.3 HMI mockups: The Contractor shall submit representative mockups of the HMI menus, process graphic pages, and historical report logs for 75 CES PM review.

7.2 Project Deliverables and Documentation

7.2.1 The Contractor shall deliver a fully functional, programmed, and field-verified SCADA system that executes all specified automatic control loops.

7.2.2 The Contractor shall supply a complete set of As-Built drawings in an industry-standard CAD format (e.g., .DWG or equivalent) covering all architectural, mechanical, electrical, and control system modifications.

7.2.3 The Contractor shall deliver comprehensive Operation and Maintenance (O&M) manuals, including troubleshooting guides, calibration protocols, and software license keys on secure USB media.

8.0 TESTING, COMMISSIONING, TRAINING, AND WARRANTY

8.1 Factory Acceptance Testing

8.1.1 All central server, OWS, and replacement RTU panel assemblies must undergo a comprehensive, continuous factory test for a minimum period of 3 days prior to shipping to HAFB.

8.1.2 The Contractor shall verify correct I/O routing and firmware performance during the factory acceptance testing phase.

8.2 Commissioning and Start-Up

8.2.1 The Contractor shall utilize factory-certified personnel to perform on-site start-up, loop checks, and control sequence validation.

8.2.2 The Contractor shall submit a detailed, written process switchover plan to the 75 CES PM at least two weeks prior to starting active on-site installation work.

8.3 Training Requirements

8.3.1 The manufacturer shall provide factory-certified instructors to conduct a minimum of seven business days of on-site operator and maintenance training.

8.3.2 The initial training must cover HMI navigation, alarm management, historical trending, basic troubleshooting, controller replacement, and secure administrative practices.

8.3.3 The Contractor shall provide a three-month follow-up training session consisting of two business days on-site to review system performance, graphic modifications, and control sequence editing.

8.4 Warranty and Support Program

8.4.1 The Contractor shall provide a comprehensive one-year parts and labor warranty on all installed hardware, software, and cabling. The warranty period shall commence on the Beneficial Occupancy Date (BOD).

8.4.2 The manufacturer must provide 24-hour telephone support and diagnostic assistance to Hill AFB personnel for the one-year warranty.

8.4.3 The manufacturer shall maintain a local inventory of replacement parts to support next-day delivery of critical controller cards and network components during the warranty period.