Print Form

Sole Source Justification (Reference Article 6, Procurement Source Selection Methods and Contract Awards, § 1-10-56 SOLE SOURCE PROCUREMENT

Vendor: JANUS RESEARCH GROUP **E-Verify Number:** 277124

Commodity: CONSULTANT-ELECTRONIC DESIGNS

Estimated annual expenditure for the above commodity or service: $ 457,339.39

Initial all entries below that apply to the proposed purchase. Attach a memorandum containing complete justification and support documentation as directed in initialed entry. (More than one entry will apply to most sole source products/services requested).

_____ 1. SOLE SOURCE REQUEST IS FOR THE ORIGINAL MANUFACTURER OR PROVIDER, THERE ARE NO REGIONAL DISTRIBUTORS. (Attach the manufacturer's written certification that no regional distributors exist. Item no. 4 also must be completed.)

_____ 2. SOLE SOURCE REQUEST IS FOR ONLY THE AUGUSTA GEORGIA AREA DISTRIBUTOR OF THE ORIGINAL MANUFACTURER OR PROVIDER. (Attach the manufacturer's — not the distributor's — written certification that identifies all regional distributors. Item no. 4 also must be completed.)

_____ 3. THE PARTS/EQUIPMENT ARE NOT INTERCHANGEABLE WITH SIMILAR PARTS OF ANOTHER MANUFACTURER. (Explain in separate memorandum.)

X 4. THIS IS THE ONLY KNOWN ITEM OR SERVICE THAT WILL MEET THE SPECIALIZED NEEDS OF THIS DEPARTMENT OR PERFORM THE INTENDED FUNCTION. (Attach memorandum with details of specialized function or application.)

_____ 5. THE PARTS/EQUIPMENT ARE REQUIRED FROM THIS SOURCE TO PERMIT STANDARDIZATION. (Attach memorandum describing basis for standardization request.)

_____ 6. NONE OF THE ABOVE APPLY. A DETAILED EXPLANATION AND JUSTIFICATION FOR THIS SOLE SOURCE REQUEST IS CONTAINED IN ATTACHED MEMORANDUM.

The undersigned requests that competitive procurement be waived and that the vendor identified as the supplier of the service or material described in this sole source justification be authorized as a sole source for the service or material.

Name: WES BYNE Department: AUD-UTILITIES Date: 06/04/2024

Department Head Signature: _____ Date: 4 Jun 24

Approval Authority: _____ Date: June 24

Administrator Approval: (required – not required) _____ Date: _____

COMMENTS:

Rev. 09/10/12

- Agenda - 5/24

Augusta
GEORGIA

UTILITIES DEPARTMENT

Wes Byne, P.E.
Director

TO: Geri Sams
Director, Procurement Department

THRU: Wes Byne, P.E.
Director, Utilities Department

CC: Steve Little, CPA
Asst Director, Finance and Customer Service

DATE: May 24, 2024

SUBJECT: JUSTIFICATION FOR SOLE SOURCE JANUS RESEARCH

Ms. Sams,

Attached is a request for a sole-source procurement of professional services from the Janus Research group. They have developed a meter reading technology under separate contract with Augusta. This scope includes the further development of that technology, and creation of multiple test units to place the units in the field. Janus is the only vendor that I am aware of that has the collection of skills necessary to complete this task, as well as having experience with federal electronics requirements. This will allow any concepts developed to be available to use on Fort Eisenhower. Janus' skills include electronic design, antenna analysis and certification, capability to manufacture test quantities in-house, and software design and testing for data processing.

I am asking you to review this request, and allow this sole-source selection of services.

Thanks,

FWByne

Wes Byne

Agenda Item

24 MAY 2024

Title	Approve Professional Services for Meter Technology Evaluation
Agenda Category	Engineering Services
Caption	Approve a contract with Janus Research to evaluate Automated Metering Infrastructure Technology
Background	JANUS Research Group, LLC (Janus) is a local consultant and contractor that specializes in embedded electronic designs. They have previously performed work for Augusta related related to water metering and environmental monitoring. They have submitted a proposal to evaluate current meter reading technology and investigate a new long-term radio technology known as LoraWAN. This technology is designed to allow for small data transmissions while using very little battery power. This technology is mature, but being actively developed to include new features. We believe that it may be a good solution for remotely monitoring water meters, as well as other smart city applications.
Analysis	AUD staff met with personnel from Janus Research and negotiated the attached scope. We believe that the proposal is fair and reasonable.
Summary Financial	Funding in the amount of $ 457,339.39 is available from accounts: G/L 230-04-3410 / ARP009
Alternatives	No alternatives are recommended.
Recommendation	AUD recommends approval of this contract.
Funds	Funding are available in the following accounts: G/L 230-04-3410 / ARP009

Proposal for Augusta Richmond County Large Scale ERT Pilot Program Development

Submitted May 14, 2024

JANUS RESEARCH GROUP

Prepared by:
JANUS Research Group, LLC
600 Ponder Place Dr
Evans, GA 30809
Kelly Whitener, Sr. Director Contracts, Procurement & Pricing
E: kelly.whitener@janusresearch.com
O: (706) 364-9100
M: (706) 755-0305

Prepared for:
Augusta Richmond County – Utilities Department
Utilities Director: Mr. Wes Byne ; WByne@augustaga.gov

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

Term	Definition
AMI	Advanced Metering Infrastructure
ARC	Augusta Richmond County
AUD	Augusta Utilities Department
ERT	Encoder Receiver Transmitter
LIFEPO4	Lithium Iron Phosphate Battery
MCU	Microcontroller
OTA	Over the Air
RX	Receiver
TX	Transmitter

AUGUSTA RICHMOND COUNTY LARGE SCALE ERT PILOT PROGRAM

1 BACKGROUND

JANUS Research Group, LLC. is pleased to continue work on municipal water meter capture and data distribution. This project originated from a series of discussions held with the Augusta-Richmond County Utilities Director, Wes Byne and Dr. Oscar Flite III, the Stormwater Services Manager, Augusta Engineering Department. In these discusisons, we identified several challenges that JANUS Research Group is uniquely suited to help solve. Through leveraging work done on several multi-year Georgia Environmental Protection Division research seed grants worked in conjunction with the Augusta Utilities department and tapping corporate knowledge suited for an advanced capabilities approach, we've provided a foundation of proven solutions to the remote sensing, distribution and collection of field data.

Prior Success

During our previous Phase I and Phase II project efforts, JANUS was able to meet or exceed all desired technical requirements. These included the clean room reverse engineering of data formats and payloads, reseach and development of data capture and transmission systems, power storage and delivery systems and the design and development of field ready units.

Figure 1 – Prorotype Design

The first area of focus was associated with the gathering and transmission of municipal water consumption data from digital and analog residential meters. Roughly 70% of the 88,000 residential meters in Augusta-Richmond County being digital split roughly 50/50 between two types of meters, pulse counter and rotary encoder types. While commercial systems do exist for extending digital meters into the Automatic Meter Reading environment these systems are costly. These costs associated with the non-homogeneous set of fielded meters, coupled with the need to read analog meters warrants an investigatory project into the potential development of a local solution. Several of the JANUS development efforts for the GA EPD project involve AI/ML approaches to digitizing analog water meters using vision based techniques. Additionally the study of communications approaches and Automatic Meter Infrastructure architectural approaches was another area of research and development that would benefit an informed approach to solving the Augusta-Richmond County water meter reading challenge. Expanding the existing touch, or local communications gathering approach of the digital meters to a fully executed AMI system would change the cost profile of gathering meter data and fundamentally elevate the role of the Augusta-Richmond County Water Utilities staff. Based on JANUS' long track record of fielding large scale cloud based solutions to gather, manage and maintain large data sets, along with our background in secure, robust communications solutions for the U.S. Military and our allies, JANUS was well situated to perform these research areas as well. The need to examine the tradeoffs in power

budget, communications reliability and cost was another aspect of this effort to determine the best, or best mix of solutions for large scale retrofit and deployment across the lifecycle of those devices.

During previous work on this project JANUS was able to achieve several of the future phase goals as identified in the previous project scope document. These additional out of scope items included the following achievements,

- Extended Weather Proofing Designs for multi-year deployments
- Extended Long term battery life design 5+ years
- Final Optimization for high volume production costs (PARTIALLY COMPLETED)

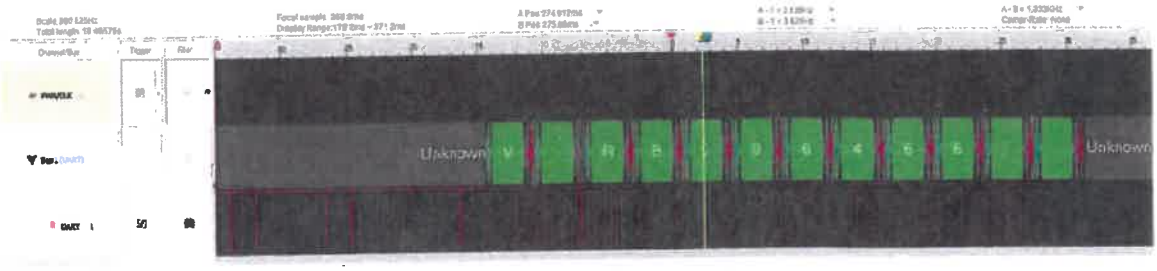

Figure 2 – Decoded Water Meter Signal

The primary component of this work is the Encoder Reader Transmitter (ERT). The ERT is a wireless communication device designed to read residential water meters remotely. The ERT is equipped with the following components:

- **Micro Processing Unit (MCU):** A small computer chip that processes data from the water meter and communicates it to the LoRa transmitter/receiver.
- **Power Management Circuitry**: Circuitry designed to manage the flow of power and the condition of the battery.
- **LoRa Transmitter/Receiver (TX/RX):** A wireless communication module that uses Long-Range (LoRa) technology to transmit and receive data between the ERT and the LoRa base station. This component enables the ERT to send meter readings wirelessly to the LoRa base station, which is connected to a central server.
- **LiFEPO4 Battery**: A rechargeable lithium iron phosphate battery that powers the ERT for extended periods of time. The battery provides reliable and sustainable power to the device, ensuring continuous operation without interruption.

The ERT's MCU component reads data from the residential water meter, which is typically installed at the customer's premises. The MCU processes this data and sends it to the LoRa transmitter/receiver, which then transmits the information wirelessly to the LoRa base station. The LoRa base station receives the data and forwards it to a central server for processing and analysis.

The ERT's compact design and low power consumption make it an ideal solution for residential water meter reading applications. Its wireless communication capabilities enable efficient and

cost-effective monitoring of water usage, allowing utility companies to better manage their resources and provide accurate billing information to customers.

2 OBJECTIVES

The ultimate goal of this project is to deploy a large-scale LoRa-based smart grid solution that provides reliable, efficient, and secure data transmission for Augusta Richmond County's municipal water metering monitoring needs. By starting with a small pilot fielding and gradually expanding to larger numbers of units, we can validate the technology's capabilities and ensure a smooth transition to wide-scale deployment.

This effort is broken into two primary parts. The initial effort is oriented around setting up a LoRa base station with cellular backhaul, installing ERTs, testing the send/receive functionality, and integrating the data into our existing database system. In the near term, we plan to conduct fielding with 20 units to validate the installation, configuration, and operation of the ERTs and LoRa backhaul components. This will involve setting up a small-scale pilot project to test the system's capabilities and identify any potential issues or areas for improvement prior to fielding additional units. This near-term effort is expected to be completed rapidly, within several months of the start of the period of performance.

We will also evaluate long-term performance, secure unit authentication, and implement OTA updates. This will commence once the initial fielding is complete. We anticipate developing an additional units for AUD installation, continuing on the success of the pilot project and giving us the numbers to validate large scale rollout potential. This expansion will require further configuration, and testing of the ERTs and LoRa base station to ensure seamless integration with the existing system.

3 SCOPE OF WORK

3.1 Period of Performance

The period of performance for this project is six (6) months from project commencement. The project will be divided into two phases, with regular reporting to ensure progress and address any issues that may arise. The first phase will run approximately two (2) months and will involve a joint coordinated effort to field West Augusta, or National Hills to run a street level scale test with 30 total units. During this phase JANUS will: Verify operations after hardware is installed by Richmond County, and test send and receive functionality

The second phase or approximately four (4) months will expand the number of test units and roll out a larger neighborhood scale test for range and installation parameters. Additionally during the second phase work will be done to refine the fielded units, research and present proposals for enhancements and improve the backend data store and dashboard software. During this phase JANUS will: Verify operations after hardware is installed by Richmond County, and test send and receive functionality. Perform data reception evaluation, database integration, antenna design, gateway source selection, dashboard and data visualization, and reporting.

3.2 Phase 1: Near Term Development and Fielding (2 Months)

As outlined above, this project will be broken into two phases. The first work scope segment will span approximately two (2) months and include the following work scope items,

3.2.1 Base Station Installation

- Install one LoRa base station with backhaul capabilities (cellular networks via gateways and fiber connection as needed) in West Augusta or RWPS/National Hills.
- Hardware installation: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT
- Verification of operation: JANUS

3.2.2 ERT Installation

- Replace 10 manual read meters or radio read devices with new ERTs (Electricity Read Technologies).
- Install and configure the ERTs: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT and JANUS

3.2.3 ERT Assembly and Range Testing

- JANUS will build 10 additional ERT units to test reliable range (street scale).
- JANUS will use two mobile units for drive based range testing: JANUS

3.2.4 Send/Receive Testing

- Test send/receive functionality, including antennas and batteries.
- Send hourly data for the first two weeks: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT and JANUS. This is intended to test transmission reliability and battery performance.

3.2.5 Data Reception and Evaluation

- Receive 4x/day data and evaluate long-term performance.
- Determine if reprogramming is required or if settings can be sent manually: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT and JANUS

3.2.6 Database Integration

- Set up a virtual environment for database integration and meter reader data exportation (manually)
- Login with authentication, using VPN/RDP or replicating the database to a public-facing hourly instance: JANUS

3.3 Phase 2: Mid-Term Development and Fielding (4 Months)

The mid term fielding will commence once the initial 2 month fielding has been compelted. It is expected to take up to four months to complete the tasks identified in the mid-term fielding. This fielding is intended to test the scale and scope of one to two large neighborhoods within Richmond County. Specific testing and debugging will be made for network collision and congestion as well as large scale reliability figures. Several time phased changes to transmission

rate will be made to obtain experiemental figures from which extrapolations of county wide performance can be made. The following work scope items are included in this segment,

3.3.1 Additional Base Station Installation

- Install up to 4 additional LoRa base stations with dual-backhaul capabilities in West Augusta and RWPS/National Hills.
- Procurement and Hardware installation: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT
- Verification of operation: JANUS

3.3.2 ERT Installation

- Replace remaining manual read meters or radio read devices with new ERTs.
- Install and configure the ERTs: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT

3.3.3 Range Testing

- Expand range testing to cover a larger area (multiple large neighborhood scale).
- Use multiple mobile units for drive testing: JANUS

3.3.4 Send/Receive Testing

- Continue send/receive functionality testing, including antennas and batteries.
- Send hourly data for the first six weeks: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT and JANUS

3.3.5 Data Reception and Evaluation

- Initially receive 24x a day (hourly) data reception during first two weeks of deployment with reduced frequency to 8x/day for an additional two weeks followed by 4x a day after that. This is intended to test transmission congestion and help with debugging transmissions.
- Evaluate long-term performance and identify areas for improvement.

3.3.6 Database Integration

- Integrate data from multiple LoRa base stations into a single database instance.
- Implement authentication and authorization protocols: JANUS

3.3.7 Antenna Design

- Design and test custom antennas for optimal signal reception and transmission.
- Conduct antenna placement testing to ensure maximum coverage: AUGUSTA RICHMOND COUNTY UTILITIES DEPARTMENT

3.3.8 Gateway Source Selection

- Research and select suitable gateways for cellular backhaul.
- Configure gateways for seamless integration with LoRa base stations: JANUS

3.3.9 Dashboard and Data Visualization

- Develop visualizations for review, use and comment by ARC Subject Matter Experts
  - Individual meter consumption over time
  - Consumption on a per road basis
  - Deviation from norm views
  - Management of fielded unit operational status

3.4 Reporting

The following reports will be provided during the period of performance,

3.4.1 Weekly Progress Reports

- Provide weekly stauts updates on project progress, including installation, testing, and configuration of ERTs and LoRa base stations. Transmitted via email.

3.4.2 Monthly Status Reports

- Deliver monthly reports summarizing project milestones, achievements, and challenges.

3.4.3 Bi-Monthly Review Meetings

- Schedule bi-monthly (once every two months) review meetings with stakeholders to discuss project progress, address concerns, and set new goals.

3.4.4 Evaluations Reports

- Evaluation Reports as specified in the deliverables table. These reports will include an Evaluation of FSK/Spread Specturm Approaches, Evaluation of Secure unit authentication and management plan and an Evaluation of OTA updates and end to end encryption plan.

3.4.5 Final Report

- Prepare a comprehensive final report detailing the project's outcomes, lessons learned, and recommendations for future improvements.

3.5 Deliverables

The following table outlines the deliverables that are included with this proposal,

Deliverable Item	Quantity / Rate	Description
LoRa Base Station	1	A LoRa base station with relay capability to Internet (cellular or NW)
Developmental ERTs	20	Fielded ERT for street level testing (manufacture of 10 additional units)
Range Testing Report	2	One report per phase to determine anticipated range from basestation. These tests will be conducted from mobile units
Transmission Reliability Test Report	2	One report per phase to determine transmission reliability - Send/receive testing results, including hourly data for the first two weeks.
Database Schema	1	Published, Integrated database schema with ERT/register/meter numbers, address, account number, premise number, service/maintenance date.

Developmental ERTs	30	Ready to Field ERT for neighborhood testing
Data Visualization Report	1	Data visualization reports for usage by account by road prior to end of contract.
Daily meter readings	Daily	Daily meter read reports transmitted from system for billing import
FSK/Spread Spectrum Evaluation Report	1	An evaluation and implementation plan for enhancing fielded unit communications reliability
Secure Unit Authenticaiton Method Evaluation Report	1	An evaluation and implementation plan for enhancing communications security
OTA update Evaluation Report	1	An evaluation and implementation plan for providing Over the Air (OTA) updates to fielded units and encrypting these transmissions.
Final Report	1	A summarizing report of all activities, research and findings

Table 2 – Deliverables Table

3.6 COST

The following table provides a summary of the estimated costs for this project, broken down by Contract Line Item (CLIN):

CLIN	Task	Cost
0001	INITIAL NEAR TERM DEVELOPMENT AND DEPLOYMENT (2 MONTHS – 10 Units Add'l)	$ 71,591.35
0002	MID-TERM DEVELOPMENT AND DEPLOYMENT (4 ADD'L MONTHS – 30 Units)	$ 385,748.04
	TOTAL	$ 457,339.39

Assumptions:

- Material costs are based on buildups from quotes received from reputable suppliers as of the date of submission of this proposal. If material costs at time of purchase are greater than quoted costs, Augusta Richmond County will be responsible for any additional costs.
- The project will be completed within the estimated overall Period of Performance timeframe of six months.
- The ERT devices will operate within the specified environmental conditions.

Exclusions:

- Warranty or maintenance services after the period of performance are not included.
- Travel and accommodation expenses for project team members are not included in the cost summary.
- Any additional costs incurred due to unforeseen circumstances or changes in the project scope will be billed separately.