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April 10, 2023

ADDENDUM #2
INVITATION FOR BID #23-77

NEWTON PUMP STATION REHABILITATION PROJECT I

THIS ADDENDUM IS TO: ANSWER THE FOLLOWING QUESTIONS:

Q1. When is the proposed walk through to see site conditions?

A1. Site visit schedule was provided in Addendum #1.

Q2. Will a paint schedule be provided?

A2. The paint schedule is provided in Specification 09 90 00 Section 3.06 of the Invitation For Bids. All locations included in the schedule shall be coated with the system identified.

Q3. Specification number 44 31 16 Activated Carbon Absorption Odor Control Equipment is missing. Please advise if this has been omitted or if will be coming in an addendum.

A3. This specification was omitted in error. Specification 44 31 16 in its entirety is set forth in the attached "SECTION 44 31 16 ACTIVATED CARBON ADSORPTION ODOR CONTROL EQUIPMENT."

Q4. Traffic Control / Access to Cul-de-sac. Currently there are only general traffic guidelines that are not specific to the issues that will arise during excavation and sitework on Oldham Rd. Does the town have plans to deal with the impact of the work being done to upgrade the pump stations and relocation of storm water systems?

A4. Access to the 12 homes effected by the construction would need to be restored at the end of each workday. A detailed work schedule will be required for notification to the residents in the area. A detailed plan of how this will be accomplished will be required for review, prior to any work being performed. This could involve a temporary widening of the street to facilitate this work.

A traffic control allowance of \$12,000, sufficient for 20 working days of police detail, will be added to the contract to facilitate these efforts for periods when the work is particularly disruptive.

Q5. SECTION 44 31 16 ACTIVATED CARBON ADSORPTION ODOR CONTROL EQUIPMENT

This section regarding the Odor Control System is completely missing from the specification sections in the supplied documents. Please advise.

A5. See response in A3 above.

All other terms and conditions of this bid remain unchanged.

**PLEASE ENSURE THAT YOU ACKNOWLEDGE ALL ADDENDA ON YOUR
BID FORM. FAILURE TO ACKNOWLEDGE ALL ADDENDA COULD
RESULT IN REJECTION OF YOUR BID AS NONRESPONSIVE.**

Thank you.

A handwritten signature in black ink that reads "Nicholas Read". The signature is written in a cursive, slightly slanted style.

Nicholas Read
Chief Procurement Officer

SECTION 44 31 16

ACTIVATED CARBON ADSORPTION ODOR CONTROL EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

- 1. This section specifies the activated carbon adsorption system for odor control treatment of foul air from the pump station influent channels and wet well at the Quinobequin Road and Elliot Street Pump Stations

B. Type:

1. System Components:

- a. The carbon adsorption system shall include the following components:

- 1) Polyethylene carbon adsorber vessel
- 2) Activated carbon media
- 3) Fan and motor assembly
- 4) Control panel
- 5) Prefilter

- 2. Activated carbon media shall be high surface area, tightly packed granular or pelletized type, specifically manufactured to absorb vapor phase organic and malodorous compounds of the type typically generated from municipal wastewater. Supplier of activated carbon shall be experienced in the supply and operation of activated carbon systems for vapor phase organic and hydrogen sulfide removal at wastewater treatment facilities.

C. Equipment List:

Item	Equipment number
Elliot Street PS carbon adsorption system	ELOC-1
Elliot Street PS grease filter/mist eliminator	ELME-1
Quinobequin PS carbon adsorption system	QOC-1
Quinobequin PS grease filter/mist eliminator	QME-1

D. Operating Conditions:

- 1. Activated carbon shall be specifically manufactured for continuous exposure to moisture-laden foul air containing concentrations of hydrogen sulfide up to 10 parts per million, as well as other malodorous compounds of wastewater solids origin such as ammonia, organic sulfides, indols, skatols, aldehydes, and mercaptans. Foul air will have temperatures ranging from 40 to 95 degrees F and relative humidity up to 100 percent. The odor control system shall meet the design requirements listed in the table below:

Air flow, cfm	500
Maximum temperature in vessel, degrees F	120
Maximum face velocity in bed, fpm	70

Minimum bed thickness, in	30
Minimum H ₂ S removal at >10 ppmv inlet, percent	99
Maximum outlet H ₂ S concentration at 1 to 10 ppmv inlet, ppmv	0.1
Maximum outlet H ₂ S concentration at <1 ppmv inlet, ppmv	0.05

1.02 QUALITY ASSURANCE

- A. Unit Responsibility: The Contractor assigns unit responsibility as specified in Section 43 05 11-1.02 Unit Responsibility to the Supplier of activated carbon adsorption system provided under this section. The Supplier has unit responsibility for both the equipment assembly specified in this section and for all other equipment assembly components and system components specified elsewhere but referenced in this section. A completed, signed Certificate of Unit Responsibility (Section 01 33 19-Form 44 00 00-C) shall be provided.
- B. The system supplier shall have process design experience in carbon adsorption systems for wastewater, demonstrating at least 10 years' experience. At least five systems shall have been in operation for over 5 years. Experience should be specific to process design and not component fabrication.
- C. Design Requirements:
1. The fabricator shall perform all calculations necessary to ensure long-term, low risk service of the equipment with minimum reasonable maintenance requirements. The design shall ensure proper functioning of the equipment at the stated operating conditions. The design shall include as a minimum, engineering calculations, materials selection and documented physical and mechanical properties, and all detailed drawings required for fabrication and assembly of the equipment.
 2. The design shall satisfy all applicable national, regional, and local design and building codes. Seismic forces shall be determined in accordance with the Uniform Building Code for both the tank only and the tank full of carbon.
 3. The design shall consider the interaction of the installed system including, but not limited to, thermal expansion of duct, tanks and vessels and the effects of external loading from piping, fans, pumps, platforms, etc.
 4. The design shall allow for the most severe combination of conditions which may include any or all of the following:
 - a. Internal or external pressure.
 - b. Static head of contents (working and test conditions).
 - c. Mass of structure and contents.
 - d. Superimposed loads, such as seismic forces.
 - e. Bending moments due to eccentric loads.
 - f. Localized loads acting at supports, lugs, and other attachments.
 - g. Shock loads.
 - h. Loads due to heating or cooling and thermal gradients.
 - i. Loads applied during transport or erection.
 - j. Loads imposed by personnel during erection and operations.
 - k. Fatigue.

- I. Specifically:
 - 1) Shell overturning due to wind/seismic:
 - a) Critical buckling.
 - b) Design factor on tension side.
 - 2) Anchoring, due to overturning or internal pressure:
 - a) Lug design.
 - b) Analysis of attachment to shell.
 - c) Effect on shell knuckle.
 - d) Maximum pullout forces and moments reported for the foundation design.
 - 3) Appendage support:
 - a) Effect of point loads on shells.
 - b) Interaction between towers under any load.
 - 4) Internal pressure or vacuum:
 - a) Main shells, hoop and axial.
 - b) Cutout reinforcements at nozzles.
 - c) Effect on any discontinuities or special components (such as internal cone).
 - 5) Thermal:
 - a) Differential expansion at temperature extremes.
 - m. There will typically be other aspects, which should be considered. It is the responsibility of the fabricator to identify and consider their effects, and to provide this information to the Owner for review.
 - 5. Motors or devices located within an envelope of 3'-0" around piping and carbon units shall be rated for Class I, Div. 1 per NFPA 820 requirements.
- D. Shipment, Protection and Storage:
- 1. The equipment shall be protected during shipment and storage as specified in Section 01 60 00.

1.03 SUBMITTALS

- A. Action Submittals
 - 1. Comply with procedures described in Section 01 33 00:
 - 2. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. A check mark (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Supplier, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The remaining portions of the paragraph not underlined will signify compliance on the part of the Supplier with the specifications. *Failure to include a copy of the marked-up specification sections, along with justification(s) for any*

requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

3. Completed Certificate of Unit Responsibility attesting that the Supplier accepts unit responsibility in accordance with the requirements of this Section and Section 43 05 11. *No other submittal material will be reviewed until the certificate has been received and found to be in conformance with these requirements.*
 4. The following product data shall be submitted by the carbon adsorption system manufacturer for review and approval by the engineer prior to the fabrication of the system:
 - a. Vessel fabrication details and materials of the components shall be included in shop drawings and submitted for approval before fabrication.
 - b. Catalog information, descriptions, specifications layouts, sketches and other information sufficient to clearly and readily demonstrate compliance with all parts of the specifications and drawings.
 - c. Drawing of general arrangement and major system components
 - d. Major system component information and descriptive literature for the following:
 - 1) Vessel
 - 2) Exhaust fan
 - 3) Carbon media MSDS and specification sheet. Detailed product information for the activated carbon proposed for the job, including verification of all properties specified in paragraph 2.02.
 - 4) Motor starter protector
 - 5) Prefilter
 - e. Installation instructions
 - f. Operating weight of all equipment.
 - g. A list of five recent installations where similar equipment by the manufacturer is currently in service.
 - h. Special shipping, storage, and protection, and handling instructions
 - i. Suggested spare parts list to maintain the equipment in service for a period of 1 year.
- B. Informational Submittals
1. Comply with procedures described in Section 01 33 00.
 2. Provide operation and maintenance information as specified in Section 01 78 23.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The Owner and Engineer believe the following candidate manufacturers are capable of producing equipment and/or products that will satisfy the requirements of this Section. This statement, however, shall not be construed as an endorsement of a particular manufacturer's products, nor shall it be construed that named manufacturers' standard equipment or products will comply with the requirements of this Section. Candidate manufacturers include Purafil, PureAir Filtration, ECS Environmental or approved equal.

2.02 CARBON MEDIA

A. Materials

Activated Carbon	
Substrate	Bituminous coal
Butane activity, percent by weight minimum	26
Particle size (U.S. Sieve)	4 mm pellet
Hardness number minimum (per ASTM D3802)	95
Maximum moisture content percent by weight (per ASTM D2867)	5
Apparent density, gms/cc (per ASTM D2854)	0.46 – 0.60
Maximum head loss through bed at max flow rate, inches w.c./ft ¹	4
H ₂ S breakthrough capacity minimum, gms H ₂ S removal/gm carbon ²	0.3

Notes:

1. Head loss shall be determined by passing dry air at 70 degrees F and 1 atm. Pressure through a 2-inch diameter by 12-inch deep bed of carbon placed in a dense packed arrangement per ASTM D2854.
2. The determination of H₂S breakthrough capacity shall be made by passing a moist (70 percent RH) air stream containing 1 percent H₂S at 1,450 cubic centimeter per minute flow through a test bed of uniformly packed activated carbon of the following dimensions: depth—9 inches, diameter—0.725 to 1.0 inch. The test shall be monitored to a 10 ppm breakthrough and the results expressed in gms H₂S removal/gm carbon which is calculated from the carbon sample weight uncorrected for moisture.

- B. Candidate carbon media manufacturers are: Evoqua Water Technologies, Haycarb Activated Carbon, Jacobi Carbons, Purafil, PureAir Filtration, or approved equal.

2.03 VESSEL

- A. The vessel shall be constructed of corrosion-resistant polyethylene with a minimum thickness of ¼-inch.
- B. The vessel shall be shop assembled to assure proper fit. Subassemblies shall be numbered and mating flanges or elements shall be match marked to assure correct alignment and correct field assembly.
- C. Carbon support system shall include a polypropylene carbon support membrane, as recommended by carbon supplier, supported by fiberglass grating, supported by fiberglass beams. Carbon support system shall have a design safety factor of 300 percent.
- D. Fittings shall be provided as shown on the Contract Drawings.
- E. Design criteria:

Description	
Maximum Vessel Diameter, ft	3
Maximum Vessel Height, in (including fan)	69
Wind load, mph	As Required
Seismic Zone	As Required
Max. Internal Positive Pressure, in w.c.	+ 20

Description	
Max. Internal vacuum, in. w.c.	-12
Weight of Carbon Bed, lbs	VTF

VTF: Vendor to furnish

- F. Sampling Ports: Each adsorption unit shall have three 1 1/2-inch diameter sample ports which extend into the carbon bed 1 foot minimum, suitable for extracting carbon samples. Provide one grain thief that is capable of extracting a core sample of the in-place carbon through the sample ports. Ports shall be adequate to provide suitable extraction of air samples from the carbon bed and be nonbinding. Each port nozzle shall extend outside the vessel wall and be blocked off with a 1 1/2-inch ball valve. One additional 1 1/2-inch diameter air sampling port shall be provided above the carbon bed.

2.04 FOUL AIR FAN

- A. Fan housing and wheel shall be of aluminum construction and conform to the requirements of this section.
- B. Fan shall be mounted on top of the carbon vessel and provide suction of the foul air through the media bed.
- C. The fan shall be designed for the following performance:

Airflow Rate, cfm	500
Max Static Pressure, in W.C.	8.0
Max Motor, HP	1.5
Motor Type	XPRF (Class I, Division 1)
Max. Sound Pressure Level, dBA	71 ¹

XPRF: Explosion proof

Notes:

1. At 5 ft. from fan when both inlet and outlet are ducted

- D. Fan shall be provided by the same manufacturer as the drum scrubber.

2.05 GREASE FILTER/MIST ELIMINATOR

- A. A grease filter/mist eliminator shall be provided to remove grease and mist. Grease filter/mist eliminator housing shall be of the same construction material as the vessel and installed in the inlet duct immediately upstream of the carbon unit. Grease filter/mist eliminator housing shall have flanged ends and shall be serviced through an access door. A differential pressure gauge shall be provided on the grease filter/mist eliminator to monitor pressure drop.
- B. Packing material pad assembly shall consist of 2" thick 316 SS mesh pad, followed by a 4" thick polypropylene mesh pad. A 1" thick 316 SS support frame shall be included on each side of the polypropylene pad. Pad assembly shall be ACS Industries combination pad 8P/7CA or approved equal. Differential pressure across the pad assembly shall not exceed 0.5 in. w.c. with clean filters.

2.06 INSTRUMENTATION

A. Pressure Differential Gauge:

1. Furnish and install one (1) differential pressure gauge for indication of pressure loss across the carbon bed. Pressure differential gauge shall be magnehelic style with a range of 0-10 in. W.C. Gauge taps shall be ½" NPT half couplings. Tubing shall be bonded to a solid acrylic plastic block that contains safety traps. Magnehelic shall be Dwyer or equal.
2. Furnish and install one (1) differential pressure gauge for indication of pressure loss across the prefilter. Pressure differential gauge shall be magnehelic style with a range of 0-5 in. W.C. Gauge taps shall be ½" NPT half couplings. Tubing shall be bonded to a solid acrylic plastic block that contains safety traps. Magnehelic shall be Dwyer or equal.

PART 3 EXECUTION

3.01 INSTALLATION

1. The carbon media shall be installed in strict accordance with manufacturer's recommendations. Media bed shall be packed uniformly to the density specified with sample probes installed in accordance with manufacturer's recommendations. The packed bed shall contain no void pockets including bed areas around the sampling probes and near the vessel walls. Carbon media shall have a smooth surface with uniform bed depth throughout.

3.02 TESTING

A. Functional Testing:

1. Functional testing shall be conducted after the installation of the carbon vessels and the foul air system has been balanced in accordance with Section 23 05 93. Each carbon vessel shall be subject to field functional tests under actual operating conditions to determine that operation is satisfactory and in compliance with the Specifications.
2. The Contractor will provide, calibrate, and install all temporary gauges and meters, and install all temporary piping and wiring required for the functional tests.
3. The functional tests shall include the following:
 - a. Alignment: Test complete assemblies for correct and proper alignment and connection, and quite operation
 - b. Flow Throughput: Measured by system or temporary instrumentation.
 - c. Discharge and Inlet Static Pressure: Measured by system instrumentation or temporary measurement devices.
 - d. Test all system components for proper adjustment and operation in both manual and automatic operating modes.

B. System Start-up

1. Shall be performed by qualified representative of the manufacturer.

C. Performance Test

1. After completion of the commissioning period, activated carbon system shall be subjected to performance tests conducted over the course of one day. Performances test shall be accepted if operating conditions listed above are met and the H₂S and odor removal rates listed above are met or exceeded.
2. Performance tests shall be conducted by the manufacturer representative, coordinated by the Contractor.
3. Contractor shall supply a performance testing protocol to the Owner and the protocol shall be accepted prior to commencing performance testing.
4. Performance testing shall occur during normal operation of the odor control system and during normal operation of the pump stations.
5. Performance tests shall be conducted by measuring air from the inlet and outlet sampling ports of the carbon scrubber.
6. Continuous carbon scrubber H₂S inlet and outlet concentrations, measured in units of ppmv or ppbv, shall be collected by the manufacturer's representative using Acrulog data loggers with an appropriate measurement range given the projected inlet and outlet H₂S concentrations. One Acrulog will continuously measure H₂S concentrations at the inlet sampling port and the second Acrulog will continuously measure H₂S concentrations at the outlet sampling port.
7. Inlet and outlet H₂S concentration data collection shall last for at least 24 continuous hours.
8. H₂S removal efficiency for this performance testing is defined as:

$$\text{percent removal} = (\text{inlet H}_2\text{S concentration} - \text{outlet H}_2\text{S concentration}) \div \text{inlet concentration} \times 100$$

The performance test will be deemed successful if the average percent removal through the carbon scrubber as measured by the Acrulog data loggers meets performance requirements in Paragraph 1.01.D when measured during the 24-hour testing period.

9. Manufacturer representative shall record field H₂S data in a performance test report that verifies sufficiency of operating conditions. Report shall be reviewed and must be accepted by the Owner and/or designated representative to conclude performance testing.
10. If operating requirements for H₂S and odor removal efficiency listed above are not met, Contractor shall make corrections to the odor control system, including media replacement, as needed to meet operating conditions at no cost to the Owner.

END OF SECTION