



Purchasing Department
140 Stonewall Avenue West, Ste 204
Fayetteville, GA 30214
Phone: 770-305-5420
www.fayettecountyga.gov

November 26, 2024

Subject: Request for Quotes 2512-A: Crabapple Booster Pump #2 Motor VFD

Gentlemen/Ladies:

Fayette County, Georgia invites you to submit a quote for the above listed solicitation in accordance with the information and specifications contained herein.

A mandatory pre-quote conference will be held at 10 a.m., Thursday, December 5, 2024, at 451 Crabapple Ln, Peachtree City, GA, 30269 to provide an opportunity for you to become familiar with the site and work conditions, and to ask questions. Companies that attend will be invited to submit quotes for this project.

Address any questions you may have about this request for quotes to Colette Cobb via email to ccobb@fayettecountyga.gov. Questions will be accepted until 3:00 p.m., Wednesday, December 11, 2024.

Quotes will be accepted until 3:00p.m., Wednesday, December 18, 2024. Please provide your quote and other information via email to Colette Cobb, Contract Administrator at ccobb@fayettecountyga.gov or fax to (770) 719-5544.

Purchasing Department office hours are Monday through Friday 8:00 a.m. to 5:00 p.m. The office is in the county complex at 140 Stonewall Avenue West Suite 204, Fayetteville, Georgia, telephone number is (770) 305-5420.

Sincerely,

Ted L. Burgess
Chief Procurement Officer

GENERAL TERMS AND CONDITIONS
RFQ 2512-A: Crabapple Booster Pump #2 Motor VFD

1. **Definitions:**
 - a. **Responder:** A company or individual who submits a quote in response to this RFQ.
 - b. **Successful Responder:** The Responder that is awarded a contract.
 - c. **Contractor:** The Successful Responder, upon execution of the contract.
 - d. **County:** Fayette County, Georgia.
2. **Quote is Offer to Contract:** Each quote constitutes an offer to become legally bound to a contract with the County, incorporating the Request for Quotes and the Responder's quote. The binding offer includes compliance with all terms, conditions, special conditions, specifications, and requirements stated in the Request for Quotes, except to the extent that a Responder takes written exception to such provisions, and the County agrees to the exceptions. All such terms, conditions, special conditions, specifications, and requirements will form the basis of the contract. The Responder should take care to answer all questions and provide all requested information, and to note any exceptions in the quote submission. Failure to observe any of the instructions or conditions in this Request for Quotes may result in rejection of the quote.
3. **Binding Offer:** To allow sufficient time for a contract to be awarded, each quote shall constitute a firm offer that is binding for ninety (90) days from the received by date to the date of award.
4. **References:** Include with your quote a list of three (3) jobs that your company has done that are of the same or similar nature to the work described in this Request for Quotes, on the form provided. Include all information as requested on the form.
5. **Preparation Costs:** The Responder shall bear all costs associated with preparing the quote.
6. **More Than One Quote:** Do not submit alternate quotes or options, unless requested or authorized by the County in the Request for Quotes. If a Responder submits more than one quote without being requested or authorized to do so, the County may disqualify the quotes from that Responder, at the County's option.
7. **Defects or Irregularities:** The County reserves the right to waive any defect or irregularity in any quote received. In case of a discrepancy between unit prices and extended prices, the unit price will govern unless the facts or other considerations indicate another basis for correction of the discrepancy.
8. **Brand Name:** If items in this Request for Quotes have been identified, described or referenced by a brand name or trade name description, such identification is intended to be descriptive, but not restrictive and is to indicate the quality and characteristics of products that may be offered. Alternative products may be considered for award if clearly identified in the quote. Items offered must meet required specifications and must be of a quality

which will adequately serve the use and purpose for which intended.

9. **Prices Held Firm:** Prices quoted shall be firm for the period of the contract, unless otherwise specified in the quote. All prices for commodities, supplies, equipment, or other products shall be quoted FOB Destination, Fayette County or job site.
10. **Responder Substitutions:** Responders offering substitutions or deviations from specifications stated in the Request for Quotes, shall list such substitutions or deviations on the "Exceptions to Specifications" sheet provided, or on a separate sheet to be submitted with the quote. The absence of such list shall indicate that the Responder has taken no exception to the specifications. The evaluation of quotes and the determination as to equality and acceptability of products or services offered shall be the responsibility of the County.
11. **Non-Collusion:** By responding to this Request for Quotes, the Responder represents that the quote is not made in connection with any competing Responder, supplier, or service provider submitting a separate response to this Request for Quotes, and is in all respects fair and without collusion or fraud.
12. **Ethics – Disclosure of Relationships:** Before a proposed contract in excess of \$10,000.00 is recommended for award to the Board of Commissioners or the County Administrator, or before the County renews, extends, or otherwise modifies a contract after it has been awarded, the Contractor must disclose certain relationships with any County Commissioner or County Official, or their spouse, mother, father, grandparent, brother, sister, son or daughter related by blood, adoption, or marriage (including in-laws). A relationship that must be reported exists if any of these individuals is a director, officer, partner, or employee, or has a substantial financial interest in the business, as described in Fayette County Ordinance Chapter 2, Article IV, Division 3 (Code of Ethics).

If such relationship exists between your company and any individual mentioned above, relevant information must be presented in the form of a written letter to the Director of Purchasing. You must include the letter with any bid, proposal, or price quote you submit to the Purchasing Department.

In the event that a Contractor fails to comply with this requirement, the County will take action as appropriate to the situation, which may include actions up to and including rejection of the bid or offer, cancellation of the contract in question, or debarment or suspension from award of a County contract for a period of up to three years.

13. **Evaluation:** Award will be made to the lowest responsive, responsible Responder, taking into consideration payment terms, vendor qualifications and experience, quality, references, any exceptions listed, and/or other factors deemed relevant in making the award. The County may make such investigation as it deems necessary to determine the ability of the Responder to perform, and the Contractor shall furnish to the County all information and data for this purpose as the County may request. The County reserves the right to reject any item, any quote, or all quotes, and to re-solicit for pricing.

14. **Payment Terms and Discounts:** The County's standard payment terms are Net 30. Any deviation from standard payment terms must be specified in the resulting contract, and both parties must agree on such deviation. Cash discounts offered will be a consideration in awarding the quote, but only if they give the County at least 15 days from receipt of invoice to pay. For taking discounts, time will be computed from the date of invoice acceptance by the County, or the date a correct invoice is received, whichever is the later date. Payment is deemed made, for the purpose of earning the discount, on the date of the check.
15. **Contract Execution & Notice to Proceed:** After an award is made, and all required documents are received by the County, and the contract is fully executed with signature of both parties, the County will issue a written Notice to Proceed. The County shall not be liable for payment of any work done or any costs incurred by any Responder prior to the County issuing the Notice to Proceed.
16. **Unavailability of Funds:** This contract will terminate immediately and absolutely at such time as appropriated and otherwise unobligated funds are no longer available to satisfy the obligations of the County under the contract.
17. **Insurance:** The Successful Responder shall procure and maintain the following insurance, to be in effect throughout the term of the contract, in at least the amounts and limits as follows:
 - a. **General Liability Insurance:** \$1,000,000 combined single limit per occurrence, including bodily and personal injury, destruction of property, and contractual liability.
 - b. **Automobile Liability Insurance:** \$1,000,000 combined single limit each occurrence, including bodily injury and property damage liability.
 - c. **Worker's Compensation & Employer's Liability Insurance:** Workers Compensation as required by Georgia statute.

Before a contract is executed, the Certificates of Insurance for all required coverage shall be submitted to the County. The certificate shall list an additional insured as follows:

Fayette County, Georgia
140 Stonewall Avenue West
Fayetteville, GA 30214

18. **Unauthorized Performance:** The County will not compensate the Contractor for work performed unless the work is authorized under the contract, as initially executed or as amended.
19. **Assignment of Contract:** Assignment of any contract resulting from this Request for Quotes will not be authorized, except with express written authorization from the County.

20. **Indemnification:** The Contractor shall indemnify and save the County and all its officers, agents and employees harmless from all suits, actions, or other claims of any character, name and description brought for or on account of any damages, losses, or expenses to the extent caused by or resulting from the negligence, recklessness, or intentionally wrongful conduct of the Contractor or other persons employed or utilized by the Contractor in the performance of the contract. The Contractor shall pay any judgment with cost which may be obtained against the County growing out of such damages, losses, or expenses.
21. **Severability:** The invalidity of one or more of the phrases, sentences, clauses or sections contained in the contract shall not affect the validity of the remaining portion of the contract. If any provision of the contract is held to be unenforceable, then both parties shall be relieved of all obligations arising under such provision to the extent that the provision is unenforceable. In such case, the contract shall be deemed amended to the extent necessary to make it enforceable while preserving its intent.
22. **Delivery Failures:** If the Contractor fails to deliver contracted goods or services within the time specified in the contract, or fails to replace rejected items in a timely manner, the County shall have authority to make open-market purchases of comparable goods or services. The County shall have the right to invoice the Contractor for any excess expenses incurred, or deduct such amount from monies owed the Contractor. Such purchases shall be deducted from contracted quantities.
23. **Substitution of Contracted Items:** The Contractor shall be obligated to deliver products awarded in this contract in accordance with terms and conditions specified herein. If a Contractor is unable to deliver the products under the contract, it shall be the Contractor's responsibility to obtain prior approval of the ordering agency to deliver an acceptable substitute at the same price quoted in the Contractor's original bid. In the event any Contractor consistently needs to substitute or refuses to substitute products, the County reserves the right to terminate the contract or invoke the "Delivery Failures" clause stated herein.
24. **Termination for Cause:** The County may terminate the contract for cause by sending written notice to the Contractor of the Contractor's default in the performance of any term of this agreement. Termination shall be without prejudice to any of the County's rights or remedies by law.
25. **Termination for Convenience:** The County may terminate the contract for its convenience at any time with 10 days' written notice to the Contractor. In the event of termination for convenience, the County will pay the Contractor for services performed. The County will compensate partially completed performance based upon a signed statement of completion.
26. **Force Majeure:** Neither party shall be deemed to be in breach of the contract to the extent that performance of its obligations is delayed, restricted, or prevented by reason of any act of God, natural disaster, act of government, or any other act or condition beyond the reasonable control of the party in question.

27. **Governing Law:** This agreement shall be governed in accordance with the laws of the State of Georgia. The parties agree to submit to the jurisdiction in Georgia, and further agree that any cause of action arising under this agreement shall be required to be brought in proper venue in Fayette County, Georgia.

Checklist of Required Documents

***(Be Sure to Return This Checklist and
the Required Documents in the order listed below)***

RFQ 2512-A: Crabapple Booster Pump #2 Motor VFD

Company information – on form provided _____

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1) – on form provided _____

Pricing sheet – on form provided _____

VFD Manufacturer Specification Sheet _____

List of exceptions, if any – on form provided _____

References – on form provided _____

Addenda, if any are issued _____

COMPANY NAME: _____

COMPANY INFORMATION
RFQ 2512-A: Crabapple Booster Pump #2 Motor VFD

A. COMPANY

Company Name: _____

Physical Address: _____

Mailing Address (if different): _____

Website (if applicable): _____

B. AUTHORIZED REPRESENTATIVE

Signature: _____

Printed or Typed Name: _____

Title: _____

E-mail Address: _____

Phone Number: _____

C. PROJECT CONTACT PERSON

Name: _____

Title: _____

E-mail Address: _____

Phone Number: _____

REFERENCES
RFQ 2512-A: Crabapple Booster Pump #2 Motor VFD

Please list three (3) references for current or recent customers who can verify the quality of service your company provides. Projects of similar size and scope are preferable.

1. Government/Company Name _____

City & State _____

Work or Service Provided _____

Approximate Completion Date _____

Contact Person and Title _____

Phone _____ Email _____

2. Government/Company Name _____

City & State _____

Work or Service Provided _____

Approximate Completion Date _____

Contact Person and Title _____

Phone _____ Email _____

3. Government/Company Name _____

City & State _____

Work or Service Provided _____

Approximate Completion Date _____

Contact Person and Title _____

Phone _____ Email _____

COMPANY NAME: _____

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(l)

The undersigned contractor ("Contractor") executes this Affidavit to comply with O.C.G.A § 13-10-91 related any contract to which Contractor is a party that is subject to O.C.G.A. § 13-10-91 and hereby verifies its compliance with O.C.G.A. § 13-10-91, attesting as follows:

- a) The Contractor has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program;
- b) The Contractor will continue to use the federal work authorization program throughout the contract period, including any renewal or extension thereof;
- c) The Contractor will notify the public employer in the event the Contractor ceases to utilize the federal work authorization program during the contract period, including renewals or extensions thereof;
- d) The Contractor understands that ceasing to utilize the federal work authorization program constitutes a material breach of Contract;
- e) The Contractor will contract for the performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the Contractor with the information required by O.C.G.A. § 13-10-91(a), (b), and (c);
- f) The Contractor acknowledges and agrees that this Affidavit shall be incorporated into any contract(s) subject to the provisions of O.C.G.A. § 13-10- 91 for the project listed below to which Contractor is a party after the date hereof without further action or consent by Contractor; and
- g) Contractor acknowledges its responsibility to submit copies of any affidavits, drivers' licenses, and identification cards required pursuant to O.C.G.A. § 13-10-91 to the public employer within five business days of receipt.

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor

#2512-A Crabapple Booster Pump #2 Motor

VFD

Name of Project

Fayette County, Georgia

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, _____, 20____ in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME

ON THIS THE _____ DAY OF _____, 20_____.

NOTARY PUBLIC

SCOPE AND SPECIFICATION
RFQ #2512-A: Crabapple Booster Pump #2 Motor VFD

Fayette County Water System is seeking quotes from qualified vendors for the installation of a Variable Frequency Drive (VFD) for Crabapple Booster Pump #2 at the Crabapple Tank and Booster Pump Station. The pump station is situated behind the fire station at 451 Crabapple Ln, Peachtree City, GA, 30269.

BACKGROUND

Crabapple booster pump #2 has an existing damaged soft starter that needs replacement. Rather than reinstall a soft starter Fayette County Water System has decided to replace it with a new low harmonics VFD (see attached specifications) to allow for speed/flow control.

SCOPE OF WORK

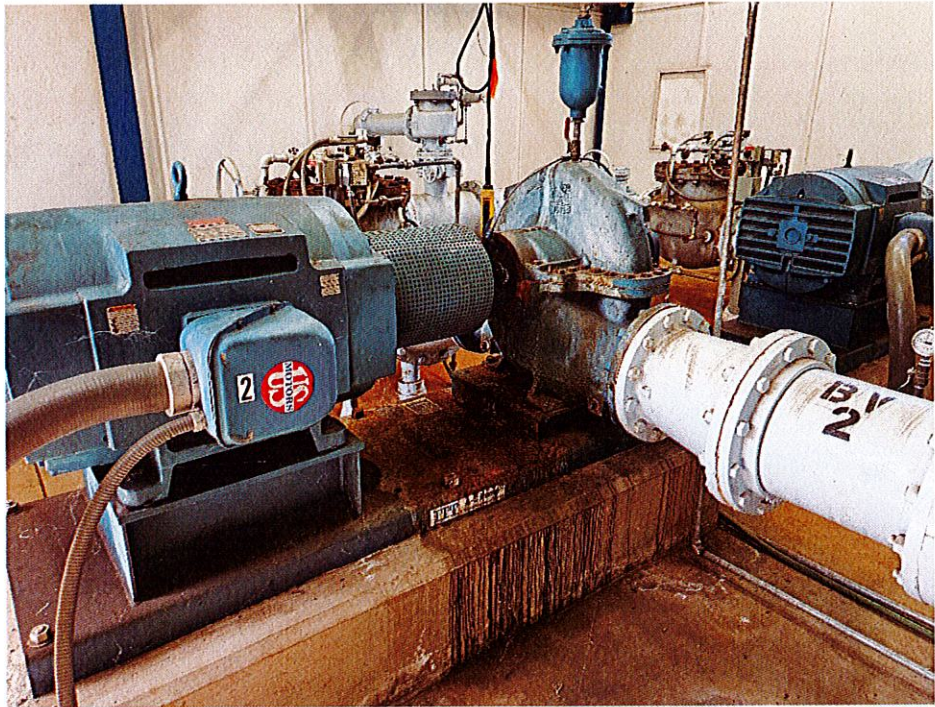
Crabapple Booster Pump #2 Motor VFD

1. Travel to Crabapple Tank and Booster Pump Station.
2. Remove existing soft start from Motor Control Center (MCC) for Pump #2
3. Install 200HP, 235A, 460V VFD, and line reactor in existing MCC cabinet panels (see attached Specification).
4. VFD will include keypad on the door, start, stop and reset PB, run fault indications and HOA selector switch, control transformer with fuses and a customer terminal strip. Set to run locally or through remote SCADA operation.
5. Install transducer cables, controls, and power wiring.
6. Trench and install 2 (two) underground 1-inch conduits between elevated water tower and Crabapple Booster Pump Station/VFD cabinet.
7. Terminate all wiring to new soft starter and components.
8. Communications integration, and related electrical equipment.
9. Inspect and record critical dimensions.
10. Perform all necessary cleanup.
11. Program and set parameters of new soft starter.
12. Provide factory authorized start up and commissioning to assure that Fayette County Water System will be eligible for the Factory Warranty.
13. Verify proper VFD operation with Crabapple Pump #2 (manual and remote SCADA).
14. Coordinate with FCWS integrator, J.K. Duren, to ensure SCADA integration (included with quote).
15. Ensure that all field signals are wired and received correctly.
16. Provide on-site operations training for Fayette County Water System personnel.
17. Provide Onsite thermal Imaging scan and report of the installed VFD and existing pump motors.

Additional Work

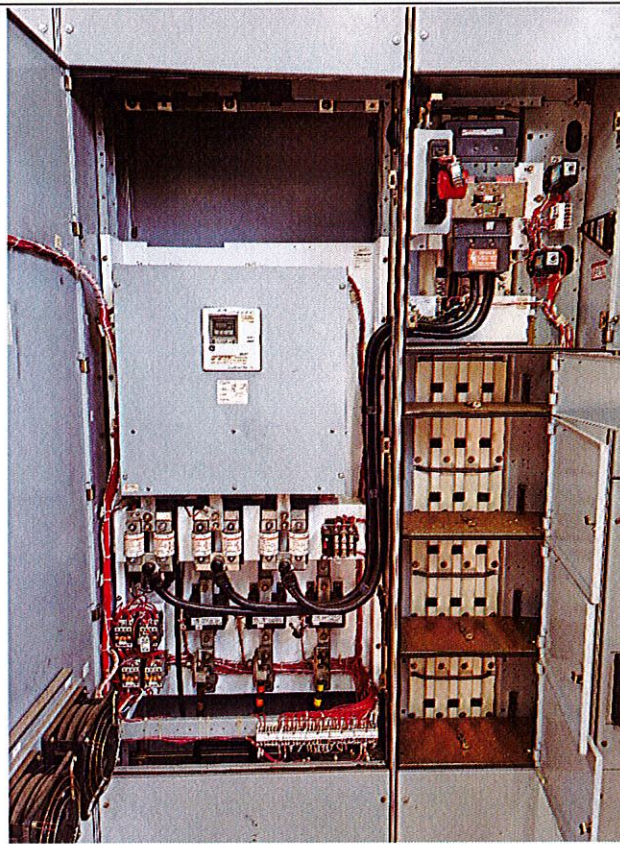
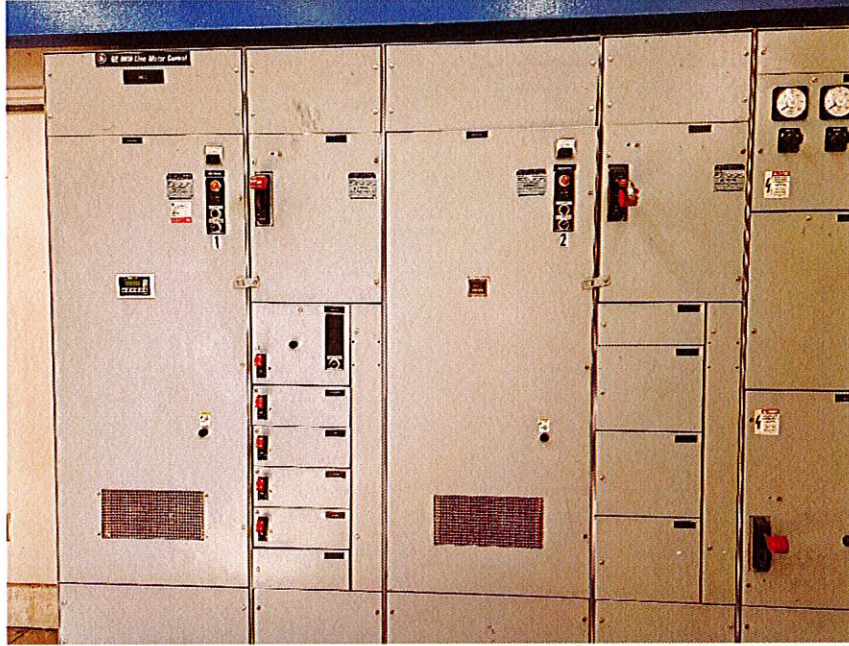
- Vendor must share along with Quote the selected VFD manufacturer specification sheet (for Fayette County Review and Approval). Vendor will coordinate with the representative of selected VFD manufacturer and ensure manufacturer warranty is provided to FCWS.
- Vendor will report to owner any additional work needed not covered above. Vendor agrees that the Contingency Allowance is for the sole use of Owner to cover unanticipated costs. The Contingency Allowance shall only be used with prior written authorization by the County Administrator.
- Vendor will provide the following submittals for FCWS approval, including:
Manufacturer's standard schematic drawings and diagrams modified to delete information that is not applicable to the work and supplement standard information to provide information specifically applicable to the work.
- Vendor will coordinate SCADA integration with J.K. Duren Company. After vendor completes all wiring installation, J.K. Duren will terminate wiring at the Crabapple tank RTU and modify PLCs and Water Plant HMI to operate the VFD remotely.
- Vendor agrees to provide minimum 1-year warranty to all work provided.

Crabapple Booster #2 Motor and Pump

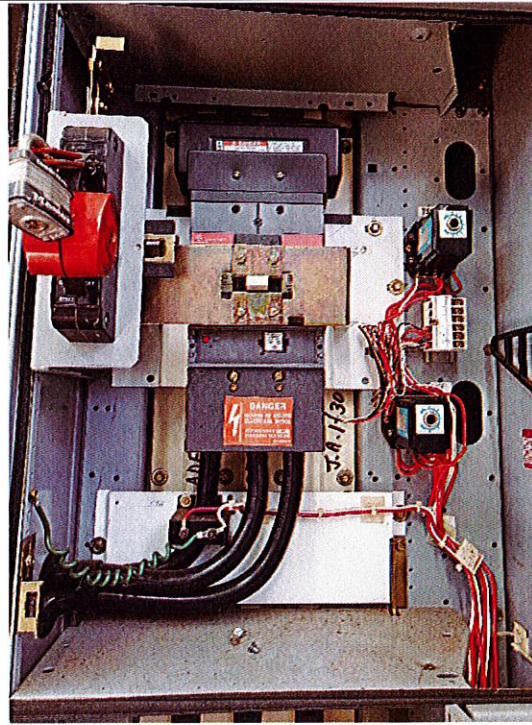
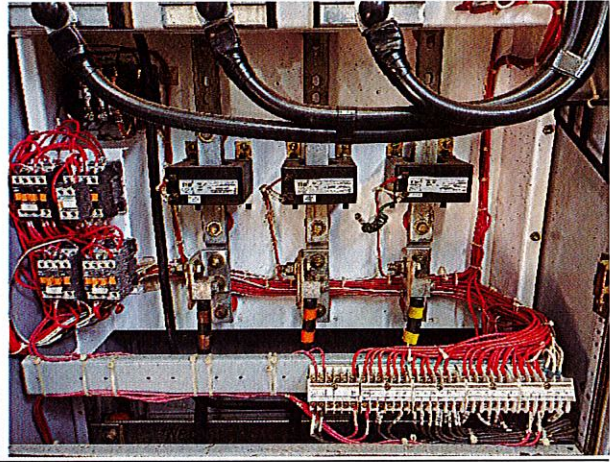
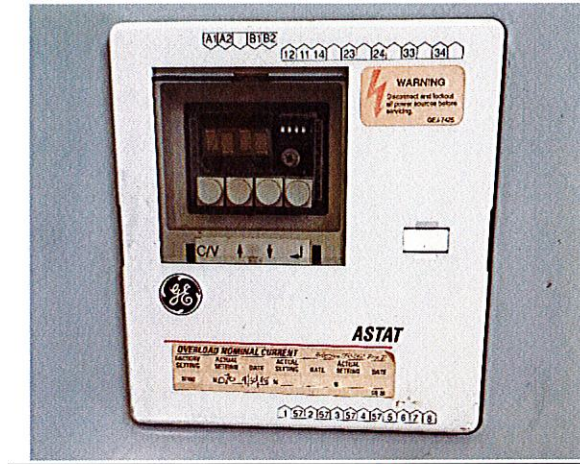


MODEL N2255D FR 4.5A TYPE FR ENCL DP		SHAFT 6220-J DPT 6313-J	
PH 3 MAX 406°C ID# B03 96009446-001R- 02		INSUL CLASS D DUTY CONT USABLE ON 208V 60HZ AT MAX AMPS	
60 HERTZ DATA	HP 200	RPM 1780	HP 200 RPM 1473
	VOLTS 460		VOLTS 380
	FL AMPS 221		FL AMPS 273
	SF AMPS 257		SF AMPS
	SF 1.15 DESIGN B CODE F		SF 1.0 DESIGN CODE D
	NEMA NOM EFFICIENCY 95.4	NOM PF 88.7	NEMA NOM EFFICIENCY 92.0 NOM PF 88.0
50 HERTZ DATA	GUARANTEED EFFICIENCY 94.5	MAX KVAR 32.0	GUARANTEED EFFICIENCY 92.4 MAX KVAR 26.1
	U.S. ELECTRICAL MOTORS DIVISION OF EMERSON ELECTRIC CO. ST. LOUIS, MO MADE IN U.S.A.		ENERGY EFFICIENT MOTOR 967685

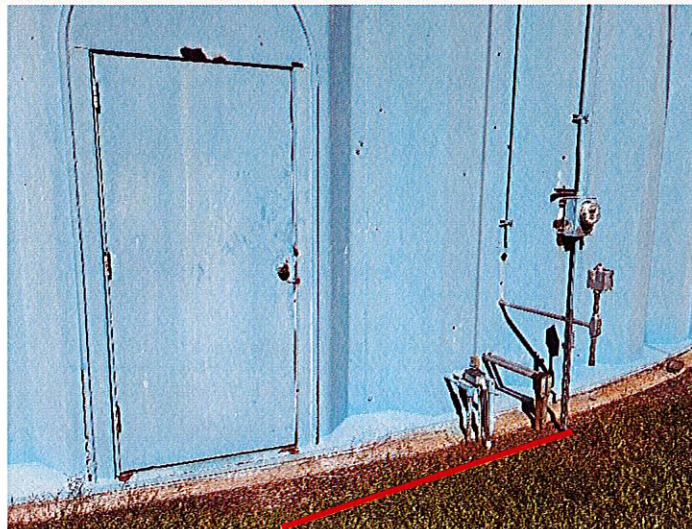
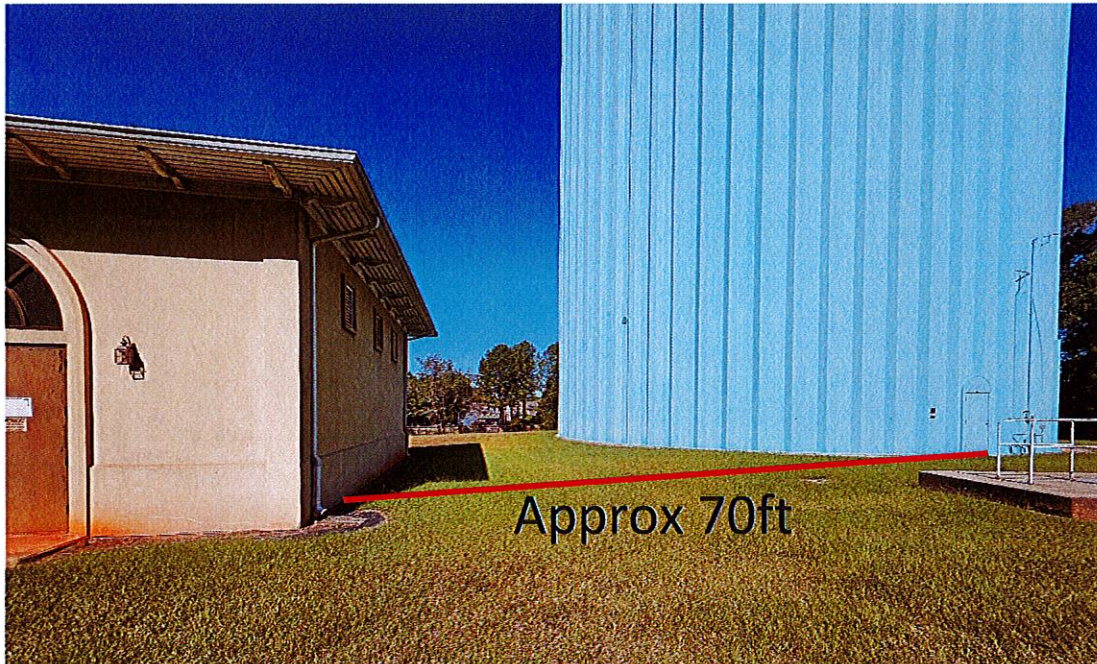
Crabapple Booster #2 Motor Control Center & Panel



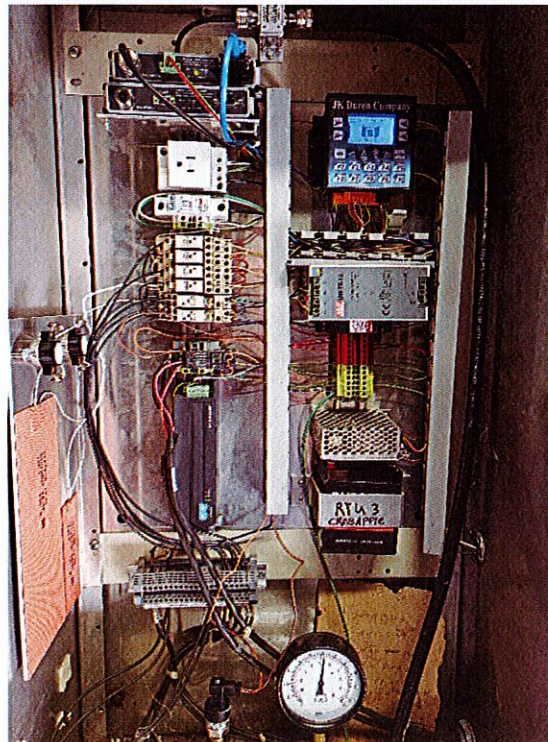
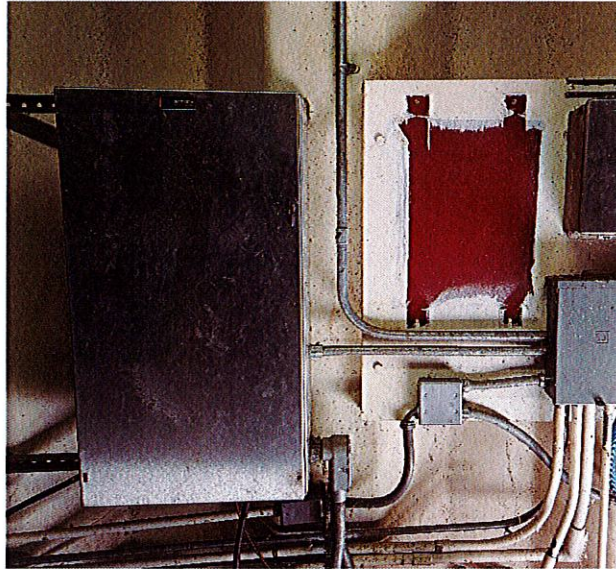
Crabapple Booster #2 Motor Control Center & Panel cont'd



Crabapple Booster Station & Tank Remote Terminal Unit



— Two underground conduits for (1) 4/20mA wiring and (2) spare



Remote terminal unit and Horner for 4/20mA (SCADA Integration)

LOW HARMONICS VARIABLE FREQUENCY DRIVE SPECIFICATIONS

Part 1 – General

1.1 Description

- A. This specification sheet covers a complete Low Harmonics Variable Frequency Drive (VFD) consisting of a pulse width modulated (PWM) inverter and Active Harmonic Filter (AHF) in order to meet IEEE-519-2014 electrical system requirements for harmonic current limits to use for standard induction motor.
- B. The VFD manufacturer shall supply the VFD, and all necessary options as herein specified.
- C. The Low Harmonics VFD will increase the lifetime of the electrical equipment and increase the customer's electrical energy efficiency by reducing harmonic current in the network.

1.2 Submittals

- A. Standard brochure sheets showing voltage, horsepower, and maximum current ratings shall be available.
- B. Recommended spare parts, layout drawings with part numbers shall be available.
- C. An instruction manual shall be included with each VFD at the time of shipment.

1.3 Quality Assurance

- A. Referenced standards
 - 1. Institute of Electrical and Electronic Engineers (IEEE)
 - a. Standard 519-2014, IEEE Guide for Harmonic Content and Control
 - 2. Canadian Safety standard (CSA)
 - a. CSA C22.2 No. 274-17 - Adjustable speed drives
 - 3. IEC/UL 61800-5-1
 - a. Safety standard for Adjustable speed electrical power drive systems.
 - 4. CE (EN 50178:1997, EN 61800-3:2004+A1:2012, EN 61800-5-1:2007, EN 61800-5-2:2007)
- B. The manufacturer shall have quality system certified as per ISO 9001-2015
- C. The manufacturer shall have minimum 20 years of experience in the Engineering, Construction and Application of variable frequency drives and active harmonic filter.

1.4 Testing

- A. All printed circuit boards shall be completely tested before being assembled into the VFD/AHF. The VFD and AHF shall be suitably tested for cold test and heat run test for minimum 2 hours.

1.5 Delivery, Storage and Handling

- A. Contractor shall coordinate the shipping of equipment with the manufacturer.

- B. Contractor shall store the equipment in a clean and dry space at an ambient temperature range of -4°F to 158°F (-20° to 70° C).
- C. The contractor shall protect the units from dirt, water, construction debris and traffic.

Part 2 – Product

2.1 Manufacture

- A. The Low Harmonic VFD shall be manufactured by:
 - 1. Allen-Bradley
 - 2. Amtech Drives
 - 3. Danfoss
 - 4. Other – Provide manufacturer datasheet with quote for review and approval.

2.2 General Description

- A. The Low Harmonic VFD shall be the fixed dc bus type with a full wave diode/thyristor-diode bridge rectifier and latest generation Insulated Gate Bi-Polar Transistors (IGBTs) inverter. VFD converts three phase, 50 or 60 Hz input power to three phase adjustable voltage and adjustable frequency output power using Pulse Width Modulation (PWM) switching techniques.
- B. The VFD shall be capable of operating any standard squirrel cage induction motor (including submersible motor) with a full load current rating or less than the full load current rating of the VFD.
- C. The AHF shall inject current into the AC line that will cancel undesirable harmonic currents drawn by the VFD load. A DC bus shall store power for power semiconductor switching device.
- D. The AHF shall measure all three phases of line current in real time and generate measured harmonic currents in opposite phase to cancel undesirable harmonic currents.

2.3 Harmonic Distortion Control

- A. The Low Harmonic VFD System shall incorporate the Active Harmonic Filter. The AHF shall consist of self commutated IGBT switches. AHF shall analyze continuously the harmonic currents drawn by the VFD load, and inject the same harmonic current with the appropriate phase. As a result, the current supplied by the source shall remain virtually sinusoidal under all operating conditions. AHF shall maintain supply side harmonic distortion within IEEE 519 limit. AHF shall also improve power factor at supply side by injecting reactive current into the grid.
- B. 6-Pulse, 12-Pulse, 18-Pulse, Passive Harmonic filter and Hybrid Harmonics filter is not acceptable. Only Active Harmonic filter will be considered.
- C. The AHF shall be capable of measuring the network currents from either the supply side or the load side using suitable rating Class 1 or better accuracy CT.
- D. The AHF shall be capable of filtering simultaneously from the 2nd to the 51st

harmonic including even harmonics and inter harmonics.

- E. The AHF shall be capable of filtering selective compensation from 3rd to 51st order with settable amplitude harmonic.

2.4 Low Harmonic VFD Ratings

- A. The Low Harmonic VFD shall be designed for operation with the following input voltages.
 - 1. Input Line Voltage ranging from 380~480 VAC, 500~600 VAC, 600~690 VAC, -15%, +10%.
- B. The input voltage frequency range shall be 47 Hz to 63 Hz.
- C. The speed range shall be from a minimum of 0.1 Hz to a maximum of 599 Hz, adjustable by increments of 0.01 Hz.
- D. The efficiency of the Low Harmonic VFD at 100% speed and load shall not be less than 97%.
- E. Frequency setting resolution shall be 0.012 Hz/50 Hz analog (12 bit) with analog reference and 0.01 Hz with digital reference.
- F. The VFD shall minimize the audible motor noise through the use of an adjustable carrier frequency. Carrier frequency range shall be 2~10 kHz up to 250 Hp and 2~6 kHz for above 250 Hp.

2.5 Construction

- A. The VFD shall be UL/CSA certified
- B. Conformal coating on electronic boards shall be standard.
- C. All components listed shall be integral to the Low Harmonic VFD lineup, factory wired and tested as a complete system.
- D. The Low Harmonic VFD system shall be NEMA1 enclosed with proper cooling arrangement
- E. The VFD shall have latest generation IGBT in inverter section.
- F. The VFD shall have current sensing from all the three phases to have better short circuit and earth fault protection.
- G. The VFD's DC bus shall have connections for dc link choke installation and allow for customer common DC Bus for multiple drive.
- H. The VFD shall employ built-in RS-485 communication via terminal block.
- I. The VFD shall employ a graphical display with built-in parameter copy functionality.
- J. The VFD shall employ a removable control terminal block and shall be of the clamp / vibration resistant type.
- K. The VFD shall have Real Time Clock with configurable date & time formatting.
- L. The VFD shall have a detachable graphical LCD keypad with back light & membrane type Keypad with 8~12 keys.
- M. The VFD shall have on board option mounting slot within the VFD for the below options:

1. Modbus TCP
2. Ethernet IP
3. ProfiNet
4. Ethercat
5. DeviceNet
6. Profibus-DP
7. Additional Input/output module

2.6 Environmental Rating

- A. The VFD shall be designed to operate in the ambient temperature from 5 °F to 122 °F (-15 °C to 50° C), non-freezing.
- B. The VFD storage temperature shall be -4°F to 158°F (-20° to 70° C), non-condensing. Applicable for short periods, such as during transit.
- C. The relative humidity shall be 0~95% maximum, non-condensing.
- D. The VFD shall be operate at altitudes less than or equal to 3,300 feet (1000 meters) above sea level without de-rating.
- E. The VFD Enclosure shall be constructed from such material that provide better bonding, safe and good performance against corrosion and EMI/EMC.

2.7 Operational Feature

- A. VFD shall have open loop v/f, close loop v/f, sensor less vector & close loop vector control modes to operate induction motor for industrial application.
- B. The VFD shall be configurable for normal duty & heavy duty to meet over load requirement of variable and constant torque application. The VFD allows overload current 120% for 60 sec and 140% for 2.5 sec in normal duty and 150% for 60 sec and 175% for 2.5 sec in normal duty.
- C. The VFD shall have two independently adjustable acceleration and deceleration time, settable up to 600000 seconds with a linear ramp or an s-curve shaped ramp.
- D. The VFD shall have v/f selection for linear curve, s-curve and custom setting with three different points for the curve to get the profile suitable for the application.
- E. The VFD shall have power loss ride through (PLCT) function that allows up to 5 seconds for smooth operation of system during power loss with no output torque.
- F. The VFD shall have auto-restart functions with adjustable restarts up to 10 times with individual fault conditions. The time between restarts shall be adjustable from 1 second to 30 seconds.
- G. The VFD shall have fully functional built-in PID controller.
- H. The VFD shall have multi-pump controlling function.
- I. The VFD shall have has built-in PLC with functional block based programming for creating sequential logic as per the requirement.
- J. The VFD shall have Heatsink/IGBT over temperature alarm functions.
- K. The VFD shall have pre-configured macro for general industrial application like fan, pump and compressor to reduce programming time.

- L. The VFD shall have built-in function macros for optional peripherals control devices connection to VFD.
- M. The VFD shall have commissioning mode to guide the user step by step to set basic parameters as per application.
- N. The VFD shall have panel debug mode for the logic verification without rotating motor. The IGBT firing pulses shall not generate during this mode, but all the other functions shall work as it is.
- O. The VFD shall have self diagnosis mode to identify faulty components like current sensor, IGBT etc.
- P. The VFD shall have diagnosis functions like Load Analyzer, Peak monitoring, fault counters etc
- Q. The VFD shall store last 20 faults with date & time, status and 8 operational parameters (Output frequency, Output current, DC bus voltage, Heatsink/IGBT temperature, Input voltage, Total power ON time, kWh, MWh) information at the time of fault.
- R. The VFD shall record critical events/faults since product shipment. This includes No. of Power ON, No. of Over Temperature Fault, No. of Over Voltage Fault, No. of Over Current Fault, No. of Earth Fault, No. of Over Load Fault, No. of Auto Restart
- S. The VFD shall have built-in energy meter and ability to calculate and display the approximate cost of electricity consumed by the VFD over a given period of time (kWh and MWh).
- T. The VFD shall have high efficiency operation mode to minimize flux current in a lightly loaded motor thus reducing kW usage. When the load increases, the drive shall automatically return to normal operation.
- U. The VFD shall have programmable cooling fans' operation. The VFD shall be programmable to turn ON/Off fan of VFD (internal fan) and/or panel (external fan) with run command, heat sink temperature and time base.
- V. The VFD shall have user programmable DC injection braking to stop the motor's rotation. DC injection braking current is adjustable between 15 to 150%.

2.8 Signal Interface

The VFD shall have terminal block of different color for the signal interface for easy identification and prevent mistake.

A. Digital Inputs

1. The Low Harmonic VFD shall have ten (10) digital inputs. Two (2) inputs shall be dedicated for the Safe Torque Off (STO) function and the other eight (8) inputs shall be user programmable.
2. All digital inputs shall be +24V operated and configurable as sink/source logic with normally open/close position.

B. Digital Outputs

1. The VFD shall have four (4) open collector type digital outputs, 24 VDC

operated and normally open/close selectable.

C. Relay Outputs

1. The VFD shall have three (3) relays outputs.
2. Relays shall be a voltage free "form C" contact rated min. 120 VAC at 5 amps.
3. Relays shall be programmable to multiple conditions including: Fault, Warning, timer At Speed, Drive Ready and PLC output.

D. Analog Inputs

1. The VFD shall have three (3) analog inputs for speed/torque reference, two (2) inputs are configurable as voltage or current input and one (1) as +/-10 V input.
2. Each analog input shall be user programmable and scalable proportional to speed and torque reference.

E. Analog Outputs

1. The VFD shall have three (3) analog outputs, two (2) outputs shall have configurable as voltage or current output and one (1) as +/-10 V output.
2. Each analog output shall be user programmable and scalable proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference and other data.

2.9 Network Interfacing Configuration

- A. The VFD shall have a RS-485 port with Modbus-RTU connectivity as a standard.
- B. The VFD shall operate through WiFi connectivity with smart phone.
- C. The VFD shall have optional Protocols; Profibus-DP(Slave), ProfiNet, Ethercat, Ethernet IP, Modbus-TCP and DeviceNet.
- D. The VFD shall be compatible to connect with Mobile through mobile app.

2.10 Operator Interface Unit shall be;

- A. Graphical Displays with backlit to improve the visibility of the display
- B. Built-in RTC (Real Time Clock) with replaceable lithium battery
- C. Keypad with self-explanatory 8~12 function keys
- D. LED indication for Run, Stop and Fault
- E. Bar graphs for source side and load side harmonic display
- F. Waveform display of voltage and current of each phase source side and load side simultaneously
- G. At least 8 selectable parameters can be seen in a single screen
- H. All normal screens can be auto rotational facility with settable time
- I. The Low Harmonic VFD display shall monitor at least parameters like Output

Frequency (Hz), Motor Speed (RPM, %), Motor Current (% , A), Motor Power (kW), DC Bus Voltage, Output Voltage, Heatsink/IGBT Temperature (°C and/ or °F), PID Reference Values, PID Output Values, kWh meter, mWh meter, Total Run Time, Total Power Conducting Time, Total harmonic current distortion THD(i) on selected phase, Each individual harmonic current 1..51st on each phase, Total harmonic voltage distortion THD (V) on selected phase, Active Harmonic Filters Current, Harmonic energy, Fundamental reactive energy, Network currents

2.11 Protective Feature

- A. The VFD shall have minimum protective functions like current limiting that reduce output frequency, DC bus voltage control function that hold output frequency in ramp down stop condition and avoid VFD tripping in DC bus over voltage, Speed Search Function to smoothly restart the rotating motor and PLCT / KEB to prevent the tripping of the VFD in case of momentary power fluctuations.
- B. STOP key on the keypad shall be functional at all time.
- C. The Low Harmonic VFD shall have minimum protections like, Over current, Adjustable Overcurrent, Under current, Drive Over Load, Motor Over Load, Input & Output Phase Loss, Output Current Unbalance, Ground Fault, DC bus overvoltage, DC bus Undervoltage, Drive over temperature, Motor PTC short fault, Motor over temperature, External fault, EEPROM error, 4...20mA Reference missing, Communication loss, Control Power fault, IGBT Driver fault, Current Sensor fault, Charging fault, Over speed fault, Speed deviation fault, CPU Error, CT detection fault

Part 3 – Execution

3.1 Installation

- A. Installation shall be in compliance with all manufacturer requirements, instructions and drawings.
- B. The contractor shall install the VFD in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.
- C. Power wiring shall be completed by the contractor based on the VFD input current. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

3.2 Start-Up

- A. The VFD start-up shall be provided by VFD manufacturer. A Start up report shall be filled out for each VFD with a copy provided to the customer and a copy kept on file at service center.
- B. At a minimum, the start-up service shall include:
 - 1. Perform pre-power check
 - 2. Verify power and signal grounds

3. Check connections
4. Check environment
- C. Low Harmonic VFD Power-up and Commissioning:
 1. Measure Incoming Power Phase-to-Phase and Phase-to-Ground
 2. Measure DC Bus Voltage
 3. Measure AC Current Unloaded and Loaded
 4. Measure Output Voltage Phase-to-Phase
 5. Verify input reference signal
 6. Measure the input current harmonics and power factor at rated load
- D. All measurements shall be recorded
- E. Low Harmonic VFD parameters shall be tuned for process requirement
- F. Low Harmonic VFD parameter listing shall be provided.
- 3.3 Product Support
 - A. Manufacturer's trained application engineering and/or service personnel shall provide technical support on call and on site location.
- 3.4 Training
 - A. Manufacturer shall provide on-site training that includes the operational and preliminary maintenance requirements of the Low Harmonic VFD.
- 3.5 Warranty
 - A. The manufacturer shall provide 12 months product warranty against manufacturing defect from date of startup or 18 months of shipment date, whichever occurs first.

END OF SECTION

PRICING SHEET
RFQ #2512-A: Crabapple Booster Pump #2 Motor VFD

Responder agrees to perform all the work described in the Contract documents for the following prices:

Quote, HSP #1 Control Valve Replacement: \$ _____

Contingency Allowance* \$ 3,000.00

Total Quote \$ _____

*To be used only with prior written authorization from the County.

NOTES:

1. All applicable charges shall be included in your total quoted amount, including but not limited to materials, equipment, installation, labor, and any other amounts. No additional charges will be allowed after the quote received by date.
2. All warranties shall be included in your total quoted amount.

State time needed to commence work after notice to proceed is issued _____ Days.

State length of time needed to complete project _____ Days.

State, List or Attach the terms of your warranty, if applicable: _____

COMPANY'S NAME _____

RFQ #2512-A: Crabapple Booster Pump #2 Motor VFD

Please list below any exceptions or clarifications to the specifications of this bid. Explain any exceptions in full.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page.

COMPANY NAME: _____