

**Invitation For Bid #10-456
Variable Frequency Drive
Public Works Department
Issued: December 28, 2010**

**City of Tulsa,
Oklahoma**
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ADDENDUM

No.	Date	Description								
4	1-5-2011	The project has been cancelled. Any bids received will be returned unopened.								
3	1-3-2011	<p>1. Technical Specifications:</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 15%; text-align: center;">Part 1</td> <td style="text-align: center;">General</td> </tr> <tr> <td style="text-align: center;">1.1</td> <td> <p><u>Changed to read:</u></p> <p>This Specification defines the requirements for a Medium Voltage Variable Frequency Drive System (VFD) for the operation of one (1) 2500HP, 4160V synchronous motor for one (1) High Service Pump, not to exceed 900 rpm, at Mohawk Water Treatment Plant.</p> </td> </tr> <tr> <td style="text-align: center;">8.1</td> <td> <p><u>Changed to read:</u></p> <p>The VFD inverter shall be of the pulse width modulated (PWM) neutral point clamp (NPC) Voltage Source type or Current Source technology will be acceptable. The output devices shall be insulated gate bipolar transistors (IGBT's) or symmetrical gate commutated thyristor (SGCT) with a voltage rating of 3300V/6500V for 4160V outputs. Use of lower voltage rated devices is unacceptable. The inverter shall be a single or paralleled three phase inverter capable of roll in / roll out design to minimize downtime in the event of inverter failure. Multiple single-phase inverters will not be acceptable. <u>Manufacturers current standard design meeting the motor and pump requirements.</u></p> </td> </tr> <tr> <td style="text-align: center;">11.3</td> <td> <p><u>Addendum 2 changed to read:</u></p> <p><u>Requested change not accepted:</u> <u>Change to: The VFD shall be capable of maintaining a minimum true power factor (Displacement P.F. X Distortion P.F.) of .98 from 60-100% load.</u> <u>Not acceptable. The >96% covers this and the device should operate down to 40%</u></p> </td> </tr> </table> <p>2. Questions and answers:</p> <p>A. Form 2: Who attests Form #2 Purchase Agreement?</p> <p>If your entity is organized as a corporation, only the Corporate Secretary or Assistant Corporate Secretary can attest the signature.</p> <p>If an LLC, not required.</p> <p>B. Instructions for signing bid response can be found where?</p> <p>See Instructions, Terms, and Conditions for Bidders, #2D Authorized Agent</p>	Part 1	General	1.1	<p><u>Changed to read:</u></p> <p>This Specification defines the requirements for a Medium Voltage Variable Frequency Drive System (VFD) for the operation of one (1) 2500HP, 4160V synchronous motor for one (1) High Service Pump, not to exceed 900 rpm, at Mohawk Water Treatment Plant.</p>	8.1	<p><u>Changed to read:</u></p> <p>The VFD inverter shall be of the pulse width modulated (PWM) neutral point clamp (NPC) Voltage Source type or Current Source technology will be acceptable. The output devices shall be insulated gate bipolar transistors (IGBT's) or symmetrical gate commutated thyristor (SGCT) with a voltage rating of 3300V/6500V for 4160V outputs. Use of lower voltage rated devices is unacceptable. The inverter shall be a single or paralleled three phase inverter capable of roll in / roll out design to minimize downtime in the event of inverter failure. Multiple single-phase inverters will not be acceptable. <u>Manufacturers current standard design meeting the motor and pump requirements.</u></p>	11.3	<p><u>Addendum 2 changed to read:</u></p> <p><u>Requested change not accepted:</u> <u>Change to: The VFD shall be capable of maintaining a minimum true power factor (Displacement P.F. X Distortion P.F.) of .98 from 60-100% load.</u> <u>Not acceptable. The >96% covers this and the device should operate down to 40%</u></p>
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2	12-29-2010	<p>1. Questions/Answers and changes:</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 15%;"></td> <td style="text-align: center;">Section 1600</td> </tr> <tr> <td style="text-align: center;">Part 1</td> <td style="text-align: center;">General</td> </tr> <tr> <td style="text-align: center;">1.1</td> <td> <p>Is there an AC Excitation panel existing?</p> <p><u>Answer: Yes</u></p> <p>If YES – can the AC Excitation panel accept 4-20mA signal and provide excitation.</p> <p><u>Answer: No, we use potentiometer to manually adjust excitation voltage. This specification expects new device to perform this function automatically. The new VFD unit is to be stand alone unit with capability to bypass VFD and operate existing system as is. Therefore, bid as though the current method of starting/controlling the</u></p> </td> </tr> </table>		Section 1600	Part 1	General	1.1	<p>Is there an AC Excitation panel existing?</p> <p><u>Answer: Yes</u></p> <p>If YES – can the AC Excitation panel accept 4-20mA signal and provide excitation.</p> <p><u>Answer: No, we use potentiometer to manually adjust excitation voltage. This specification expects new device to perform this function automatically. The new VFD unit is to be stand alone unit with capability to bypass VFD and operate existing system as is. Therefore, bid as though the current method of starting/controlling the</u></p>		
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motor does not exist.

2. Added to IFB:

A, Attachment A: Motor Nameplate Data

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12-29-2010

1. Questions/Answers and changes:

If the specification was changed, the change is shown below and every effort was made to show the change in blue in the Technical Specifications section of this IFB.

TECHNICAL SPECIFICATIONS:

	Section 1600
Part 1	General
1.1	<p>This Specification defines the requirements for a Medium Voltage Variable Frequency Drive System (VFD) for the operation of two (2) 2500HP, 4160V synchronous motors for two (2) High Service Pumps, not to exceed 900 rpm, at Mohawk Water Treatment Plant.</p> <p>The specification indicates the drive is for synchronous motor. In case of synchronous motor, along with the drive, one would need exciter panel also. Without the exciter panel the drive cannot work. There is no mention on the exciter panel in the specification. We request for information on the motor name plate and they type of exciter. Synchronous motor that have AC brush or brushless or DC brush type are only able to have speed control. DC brushless synchronous motor cannot be controlled via VFD. As the motor rpm is low, we request for motor full load current.</p> <p>Is it possible that motor is an induction motor?;</p> <p>Answer: The motors are all AC brushless synchronous motors.</p> <p>In case of induction motor request for motor full load current please.</p> <p>Answer: NA</p>
1.6	<p>Coordination of Suppliers. The Seller shall coordinate with each of their suppliers or manufacturers for the rating, physical size selection of the VFDs to insure that the units are compatible, fit the space available, and operate per the Purchase Agreement as a system. The Seller shall be responsible for and coordinate the manufacturing, testing and delivery of all units.</p> <p>We request for information the available space for review.</p> <p>Answer: The space dimensions are 14 deep, 16 feet high and 50 feet long. We are still checking on the weight capacity of the floor. Proceed with your bid.</p>
3.1	<p>Changed to read: The system shall consist of the following main components: one medium voltage adjustable frequency drive (VFD), fused isolation switch, isolation contactor, drive isolation/phase shifting transformers with minimum 24 pulse rectification or active front end (AFE), DC bus pre-charge circuit, output harmonic filter as necessary.</p>
3.3	<p>Changed to read: If equipped with DC bus pre charge circuit DC bus capacitor charging is accomplished by use of a DC bus pre charge circuit. The DC bus capacitors are charged before application of main power, which limits the very high damaging inrush currents to the main rectifier/converter bridge devices. When the proper DC bus voltage is attained, the pre-charge circuit is turned off.</p>
3.6	<p>Changed to read: The input disconnect switch of the VFD shall be rated for 60kV BIL and 50ka short circuit.</p>
3.7	<p>Changed to read: Auxiliary power 480V, 3-phase, 60 Hz shall be provided internal to the integrated Drive. External auxiliary supply voltage sources will not be acceptable. Externally derived power shall not diminish the capacity of the VFD system</p>
Part 2	Design and Construction
7.1/7.2	<p>Acceptable manufacture: We request for Toshiba name to be added to the specification please. Toshiba has more than 10 years of experience in this field.</p>

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		<p><i>Answer: We named Cutler Hammer in the IFB because the plant has a lot of Cutler Hammer products. We will not add additional brands without reviewing the brand offering to determine it meets or exceeds the functional/operational needs as described in this IFB. To say it another way: City is open to all brands that meet the Buy American requirement specified in the IFB and meets or exceeds the functional/operational needs as specified in this IFB.</i></p> <p><i>The review of other brands will take place during the review of your IFB response including supporting material.</i></p> <p>7.2 Manufacturer and Equipment Qualifications The VFD manufacturer shall have a minimum of 10 years of experience in the sales and marketing of this type of equipment.</p> <p><i>Answer: Minimum will remain at 5 years.</i></p> <p>8.1 <i>Changed to read: The VFD inverter shall be of the pulse width modulated (PWM) neutral point clamp (NPC) Voltage Source type. Current Source technology will not be acceptable. The output devices shall be insulated gate bipolar transistors (IGBT's) with a voltage rating of 3300V6500V for 4160V outputs. Use of lower voltage rated devices is unacceptable. The inverter shall be a single or paralleled three phase inverter capable of roll in / roll out design to minimize downtime in the event of inverter failure. Multiple single-phase inverters will not be acceptable. Manufacturers current standard design meeting the motor and pump requirements</i></p> <p>9.0 <i>Changed to read: INTEGRATED INPUT ISOLATION TRANSFORMER AND RECTIFIER IF REQUIRED</i></p> <p>11.1 <i>Changed to read: The VFD shall comply with the latest edition of IEEE 519 for total harmonic and current distortion limits and calculations with a minimum of 24-pulse rectification. Anything less than 24 pulse will not be acceptable. The transformer shall contain 12 secondary windings that provide the proper phase shifting to develop a 24-pulse rectification or AFE to reduce harmonic currents and voltages reflected to the primary power system.</i></p> <p>11.3 <i>Requested change not accepted: Change to: The VFD shall be capable of maintaining a minimum true power factor (Displacement P.F. X Distortion P.F.) of .98 from 60-100% load. Not acceptable. The >96% covers this and the device should operate down to 20%</i></p> <p>12.1 <i>Changed to read: Output waveform shall be multi-level PWM switching transients and harmonic content shall have a negligible contribution to motor heating, acoustical noise in the motor, torsional stress in the power train, and motor insulation. DVDT filters shall be added as required</i></p> <p>13 <i>Changed to read: Standard advanced programming and trouble-shooting functions shall be available by using a personal computer's RS-232/Ethernet port and Windows™ based software.</i> <i>Changed to read: The following setups and adjustments, at a minimum and any additional information necessary to operate VFD, are to be available:</i> <i>Changed to read: DC brake current magnitude and time (if required for VFD operation)</i></p> <p>13.1A <i>Changed to read in part: RS232/Ethernet programming and operation interface port</i></p> <p>14.3 <i>Changed to read: The VFD Converter enclosure doors shall include a mechanical interlocking system with a safety-grounding device at the input if required.</i></p> <p>15.1 <i>Changed to read: Include provisions for the monitoring of space heaters if supplied by City.</i></p> <p>15.4 <i>Changed to read: Include a meter and a test circuit on the enclosure door for indication that space heater power is available.</i></p> <p>18.2 No change</p> <p>18.3 <i>Changed to read: VFD noise level shall be no greater than 85 dB (A) at 3 feet distance from the front of the VFD and 4 ft above the floor in front of the VFD. VFD's with higher than 85db will not be acceptable.</i></p>
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18.4	<i><u>Changed to read:</u> The VFD shall have adequate fans internal to insure proper operation in the above referenced ambient. Include a redundant fan to insure operation in the event the primary fan failure.</i>
19.1	<i><u>Changed to read:</u> When necessary, a top mounted bus will be an integral part of the VFD design to be configured as a part of a motor control center or switchgear.</i>
20.1	<i><u>Changed to read:</u> Each VFD shall include an isolation with dedicated fused vacuum type contactor to feed isolation/phase shifting transformer or line reactor. If equipped ac pre-charge dc bus circuit by the VFD manufacturer with ratings as described in Part 1, section 3.0 System Description of this specification.</i>
21.0	<i><u>Changed to read:</u> INTEGRATED DRIVE ISOLATION TRANSFORMER IF REQUIRED</i>
22.0	<i><u>Request to delete:</u> <u>No, spec section does state; "If required" already.</u></i>
23.3	<i>No change</i>
Part 3	Execution
1.2	Each VFD shall be factory load tested with a synchronous motor on a dynamometer or equal test stand for a minimum of (4) four hours at rated load with VFD system full voltage applied. Synchronous motor or Induction Motor? Please refer to item 1.1 in Part 1
1.2	<i><u>Changed to read:</u> Each VFD shall be factory load tested with a synchronous motor on a dynamometer or equal test stand for a minimum of (2) two hours with (1) one hour at cycling loads and speeds with VFD system full voltage applied.</i>
3.3	<i><u>Changed to read:</u> As a minimum, the VFD manufacturer shall include these spare parts as part of the bid:</i> <ul style="list-style-type: none"> a) 100% spares of each type of medium voltage fuse. b) 100% spares of each type of low voltage fuse. c) One (1) of each type of control printed circuit boards. d) Special tools for testing or maintaining equipment. e) One set of rectifier diodes for one phase f) One set of inverter power module for one phase g) One cooling fan

Is installation required?

Answer: No. However, the equipment supplied as a result of this IFB will be a complete package ready for the installation contractor (to be determined) to install. The installation contractor will supply the customary supplies for installation such as wire, conduit, etc. All equipment supplied will be the responsibility of the Seller.

Why is their a provision for "Buy American"?

Answer: The funding for at least part of this project will a grant received from the Department of Energy (DOE). The DOE required Buy American. Bidder to include documentation as required in the Buy American language.

When will the contract be put in place?

Answer: By specification, the City has the right not to enter into a contract.. However, it is our goal to enter into a contract for one or both of the VFD's bid. The grant requires the funding to be encumbered by January 27, 2011 with contract execution prior to that date. It is imperative your bid be complete and all documents signed by the "proper person". The "proper person" is that person who is authorized to bind your entity based on the statutes of the state in which organized.

When will the bids be evaluated?

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Answer: The day of bid opening, Thursday January 6, 2011. Include name, phone, and cell number of the person(s) who can respond to any questions.

What is the last day for asking questions?

Prefer any additional questions be received by project buyer by the end of the day Thursday, December 30th, 2010. Questions received after Thursday, December 30th, 2010, every effort will be made to answer questions received up to 8 AM Monday January 3, 2011.

Besides the cost to be provided in Exhibit A, what detail is required?

Answer: Include as much of a breakdown attached to the bid response as you normally provide. In any event, your bid response must be a complete solution to this IFB.

Specifications indicate payment to be made upon completion of project. Will progress payments be considered?

Answer: Yes, the City will consider progress payments.

Your bid response must be made using the latest addendum.

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NOTICE is hereby given that the CITY OF TULSA, OKLAHOMA will receive sealed Bids for the following:

BID # 10-456

Description: Variable Speed Drive (Commodity Code(s): 691-39

You are invited to submit a Bid to supply the Goods and/or Services specified above. Invitations for Bid (IFB) will be posted on the City's website at www.cityoftulsapurchasing.org or a hardcopy may be obtained at:

City of Tulsa-Purchasing Division
175 East 2nd Street, Suite 865
Tulsa Oklahoma 74103

Bids must be received no later than 5:00 PM (CST) on Wednesday January 5, 2011 and delivered to:

**City Clerk's Office
175 East 2nd Street, Suite 260
Tulsa Oklahoma 74103**

Bids must be sealed and either mailed or delivered. No faxed or emailed Bids will be considered. Bids received after the stated date and time **will not be accepted and will be returned to the Bidder unopened.**

The Bid Packet consists of (1) this Notice of Invitation for Bid, (2) the Summary Sheet, (3) Form #1, (4) Form #2, (5) Form #3, (6) Form #4, (7) Form #5, (8) Form #6, (9) the Instructions, Terms and Conditions for Bidders, (10) Special Requirements, (11) Technical Specifications and (12) Exhibit A.

Use this checklist to ensure you have properly read and completed all Forms.

- _____ Notice of Invitation for Bid
- _____ Summary Sheet
- _____ Form #1: Bidder Information Sheet. Must be completed.
- _____ Form #2: Purchase Agreement. **Complete legal name in first paragraph and Notice provision in Section 17.i. Original signature required.**
- _____ Form #3: Interest Affidavit. Original signature and notarization required.
- _____ Form #4: Non-Collusion Affidavit. Original signature and notarization required.
- _____ Form #5: Affidavit of Claimant. Original signature and notarization required.
- _____ Form #6: Acknowledgment of Receipt of Addenda/Amendments. Must be completed and signed.
- _____ Instructions, Terms and Conditions for Bidders
- _____ Special Requirements (Offer Period; Insurance and Bonding; References)
- _____ Technical Specifications
- _____ Exhibit A: Bid Form including Delivery and Pricing. This is your Bid. It must be completed or your Bid will be rejected.

IMPORTANT NOTE: Write the Bid Number, Bid Description (as listed above), and Bid Opening Date on the lower left corner of the outside of your Bid envelope. You must return the entire completed Bid Packet.

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**FORM #1
BIDDER INFORMATION SHEET**

Bidder's Exact Legal Name: _____
(Must be Bidder's company name as reflected on its organizational documents, filed with the state in which bidder is organized; not simply a DBA)

State of Organization: _____

Bidder's Type of Legal Entity: (check one)

- | | |
|--|---|
| <input type="checkbox"/> Sole Proprietorship
<input type="checkbox"/> Partnership
<input type="checkbox"/> Corporation
<input type="checkbox"/> Limited Partnership | <input type="checkbox"/> Limited Liability Company
<input type="checkbox"/> Limited Liability Partnership
<input type="checkbox"/> Other: _____ |
|--|---|

Bidder's Address: _____

Street
City
State
Zip Code

Bidder's Website Address: _____ **Email Address:** _____

Sales Contact:

Name: _____
Street: _____
City: _____
State: _____
Phone: _____
Fax: _____
Email: _____

Legal or Alternate Sales Contact:

Name: _____
Street: _____
City: _____
State: _____
Phone: _____
Fax: _____
Email: _____

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**FORM #2 (Page 1 of 4)
PURCHASE AGREEMENT**

INSTRUCTIONS: This document **must** be properly signed and returned or your Bid will be **rejected**. This form constitutes your offer and if accepted by the City of Tulsa will constitute the Purchase Agreement under which you are obligated to perform. Your signature on this document indicates you have read and understand these terms and agree to be bound by them.

THIS PURCHASE AGREEMENT is between the CITY OF TULSA, OKLAHOMA, a municipal corporation, 175 East 2nd Street, Tulsa, Oklahoma, 74103-3827 (the "City") and:

(Bidder's company name as reflected on its organizational documents, filed with the state in which bidder is organized; not simply a DBA) (the "Seller").

WITNESSETH:

WHEREAS, the City has approved certain specifications and advertised for or solicited Bids on the following goods or services:

Bid #10-456 Variable Frequency Drives

(the "Goods and/or Services"); and

WHEREAS, Seller desires to provide such Goods and/or Services to City, acknowledges that this document constitutes Seller's offer to provide the Goods and/or Services specified below, and further acknowledges that if executed by the City's Mayor, this document will become the Purchase Agreement for such Goods and/or Services.

NOW, THEREFORE, for and in consideration of the terms, covenants and conditions hereinafter set forth, the parties hereto agree as follows:

- Documents Comprising the Agreement.** The Bid Packet includes the Notice of Invitation to Bid, the Summary Sheet, Form #1, Form #2, Form #3, Form #4, Form #5, Form #6, the Instructions, Terms and Conditions for Bidders, the Special Requirements, the Technical Specifications, Exhibit A and any addenda or amendments to the Bid Packet. The Bid Packet is incorporated herein by this reference. In the event of conflicting or ambiguous language between this Purchase Agreement and any of the other Bid Packet documents, the parties shall be governed first according to this Purchase Agreement and second according to the remainder of the documents included in the Bid Packet. Seller may submit as part of its Bid additional materials or information to support the Bid. Additional materials or information submitted by Seller which are not ambiguous and which do not conflict with this Purchase Agreement or the other Bid Packet documents are incorporated herein by this reference.
- Purchase and Sale.** Seller agrees to sell City the Goods and/or Services for the price and upon the delivery terms set forth in Exhibit A hereto. City agrees to pay Seller the price as set forth in Exhibit A based on (a) the quantity actually purchased in the case of goods or services priced by unit, or (b) the total price for a stated quantity of goods or services, upon (i) delivery of the Goods and/or Services to the City, (ii) the City's Acceptance thereof, and (iii) Seller's submission and City's approval of a verified claim for the amount due. City shall not pay any late charges or fees.
- Irrevocable Offer.** Seller understands and acknowledges that its signature on this Agreement constitutes an irrevocable offer to provide the Goods and/or Services. There is no contract unless and until City's Mayor/Mayor Pro Tem executes this Agreement accepting Seller's Bid. No City officer, employee or agent except the Mayor (or Mayor Pro Tem) has the authority to award contracts or legally obligate the City to any contract. Seller shall not provide any Goods and/or Services to City pursuant to this Agreement before this Agreement is executed by City. If Seller provides any Goods and/or Services to City pursuant to this Agreement before this Agreement is executed by City, such Goods and/or Services are provided at Seller's risk and City shall have no obligation to pay for any such Goods and/or Services.
- Term.** The term of this Agreement shall be effective commencing on the date of execution of this Agreement by the Mayor/Mayor Pro Tem of the City of Tulsa and terminating one year from that date, **or shall be effective on [month][day], 20__ and continuing to [month][day], 20__ at the discretion of City.** City in its sole discretion may offer Seller an opportunity to renew this Agreement for an additional ____ () one (1) year term(s). Seller understands and acknowledges that any future contracts or renewals are neither automatic nor implied by this Agreement. The continuing purchase by City of the Goods and/or Services set forth in this Agreement is subject to City's needs and to City's annual appropriation of sufficient funds in City's fiscal year (July 1st to June 30th) in which such Goods and/or Services are purchased. In the event City does not appropriate or budget sufficient funds to perform this Agreement, this Agreement shall be null and void without further action by City.
- Warranties.** Seller shall assure that the Goods and/or Services purchased hereunder are covered by all available and applicable manufacturers' warranties for such Goods and/or Services. Seller expressly agrees that it will be responsible for performing all warranty obligations set forth in the Special Requirements for the Goods and/or Services covered in this Agreement. Seller also warrants that the Goods and/or Services will conform to the Technical Specifications and Special Requirements, and further warrants that the Goods and/or Services shall be of good materials and workmanship and free from defects for either a minimum of one (1) year from the date of Acceptance or installation by City, whichever is later, or as **specified in the Special Requirements**, whichever is later. In no event shall Seller be allowed to disclaim or otherwise limit the express warranties set forth herein.
- Warranty Remedies.** City shall notify Seller if any of the Goods and/or Services fails to meet the warranties set forth above, and Seller shall promptly correct, repair or replace such Goods and/or Services at Seller's sole expense. Notwithstanding the foregoing, if such Goods and/or Services shall be determined by City to be defective or non-conforming within the first thirty (30) days after the date of Acceptance by City, then City at its option shall be entitled to a complete refund of the purchase price and, in the case of Goods, shall promptly return such Goods to Seller. Seller shall pay all expenses related to the return of such Goods to Seller.

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PURCHASE AGREEMENT**

7. **Seller Bears Risk.** The risk of loss or damage shall be borne by Seller at all times until the Acceptance of the Goods or Services by City.
8. **No Indemnification by City.** Seller understands and acknowledges that City is a municipal corporation that is funded by its taxpayers to operate for the benefit of its citizens. Accordingly, and pursuant to Oklahoma law, City shall not indemnify nor hold Seller harmless for loss, damage, expense or liability arising from or related to this Agreement, including any attorneys' fees and costs. In addition, Seller shall not limit its liability to City for actual loss or direct damages for any claim based on a material breach of this Agreement and the documents incorporated herein. City reserves the right to pursue all legal and equitable remedies to which it may be entitled.
9. **Indemnification by Seller.** Seller agrees to indemnify, defend, and save harmless City and its officers, employees and agents from all suits and actions of any nature brought against them due to the use of patented appliances, products or processes provided by Seller hereunder. Seller shall pay all royalties and charges incident to such patents.
10. **No Insurance by City.** If City is leasing Goods herein, City shall not be required to obtain insurance for Seller's property. Seller shall be solely responsible for any insurance it deems necessary. City is self-insured for its own negligence, subject to the limits of the Governmental Tort Claims Act (51 O.S. § 151 et seq.).
11. **No Confidentiality.** Seller understands and acknowledges that City is subject to the Oklahoma Open Records Act (51 O.S. §24A.1 et seq.) and therefore cannot assure the confidentiality of contract terms or other information provided by Seller pursuant to this Agreement that would be inconsistent with City's compliance with its statutory requirements thereunder.
12. **Non-Responsive Bids.** Seller understands and acknowledges that if it adds terms and conditions to its Bid that are different from the terms set forth herein that its Bid may be rejected as non-responsive. Furthermore, if City accepts Seller's Bid and awards a contract to Seller based on such Bid, City shall not be bound to any exceptions, changes or additions made by Seller, and any terms and conditions added by Seller which are not expressly agreed to by City in writing will be void and of no force and effect and the parties will be governed according to the document precedence set forth in Section 1 above.
13. **Compliance with Laws.** Seller shall be responsible for complying with all applicable federal, state and local laws, regulations and standards. Seller is responsible for any costs of such compliance. Seller certifies that it and all of its subcontractors to be used in the performance of this Purchase Agreement are in compliance with 25 O.S. Sec. 1313 and participate in the Status Verification System. The Status Verification System is defined in 25 O.S. Sec. 1312 and includes but is not limited to the free Employee Verification Program (E-Verify) available at www.dhs.gov/E-Verify.
14. **Termination.** City, by written notice, may terminate this Agreement, in whole or in part, when such action is in the best interest of City. If this Agreement is so terminated, City shall be liable only for payment for Goods accepted and Services rendered prior to the effective date of termination. City's right to terminate this Agreement is cumulative to any other rights and remedies provided by law or by this Agreement.
15. **Price Changes.** The parties understand and agree that the variables in Seller's cost of performance may fluctuate, but any change in Seller's cost of performance will not alter its obligations under this Agreement, nor excuse performance or delay on Seller's part. If the IFB provides that Seller may include a price escalation provision in its Bid, Seller's price escalation provision will be evaluated by City as part of Seller's Bid price when awarding the Bid.
16. **Right to Audit.** The parties agree that Seller's books, records, documents, accounting procedures, practices, price lists or any other items related to the Goods and/or Services provided hereunder are subject to inspection, examination, and copying by City or its designees. Seller is required to retain all records related to this Agreement for the duration of the term of this Agreement and a period of three years following completion and/or termination of the Agreement. If an audit, litigation or other action involving such records begins before the end of the three year period, the records shall be maintained for three years after the date that all issues arising out of the action are resolved or until the end of the three year retention period, whichever is later.
17. **Notice.** Any notice, demand, or request required by or made pursuant to this Agreement shall be deemed properly made if personally delivered in writing or deposited in the United States mail, postage prepaid, to the addresses specified below.

i. To Seller:

To CITY:

City Clerk
CITY OF TULSA, OKLAHOMA
175 E. 2nd Street, Suite 260
Tulsa, Oklahoma 74103

With a copy to:

[title] [address] _____

18. **Relationship of Parties.** The Seller is, and shall remain at all times, an independent contractor with respect to activities and conduct while engaged in the performance of services for the City under this Agreement. No employees, subcontractors or agents of the Seller shall be deemed to be employees of the City for any purpose whatsoever, and none shall be eligible to participate in any benefit program provided by the City for its employees. The Seller shall be solely responsible for the payment of all employee wages and salaries, taxes, withholding

**Invitation For Bid #10-456
Variable Frequency Drive
Public Works Department
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**City of Tulsa,
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**FORM #2 (Page 3 of 4)
PURCHASE AGREEMENT**

payments, fringe benefits, insurance premiums, continuing education courses, materials or related expenses on behalf of its employees, subcontractors, and agents. Nothing in this Agreement shall be construed to create a partnership, joint venture, or agency relationship among the parties. No party shall have any right, power or authority to act as a legal representative of another party, and no party shall have any power to obligate or bind another party, or to make any representations, express or implied, on behalf of or in the name of the other in any manner or for any purpose whatsoever.

19. **Third Parties.** This Agreement is between City and Seller and creates no right unto or duties to any other person. No person is or shall be deemed a third party beneficiary of this Agreement.
20. **Time of Essence.** City and Seller agree that time is deemed to be of the essence with respect to this Agreement.
21. **Binding Effect.** This Agreement shall be binding upon City and Seller and their respective successors, heirs, legal representatives and permitted assigns.
22. **Headings.** The headings used herein are for convenience only and shall not be used in interpreting this Agreement
23. **Severability Provision.** If any term or provision herein is determined to be illegal or unenforceable, the remainder of this Agreement will not be affected thereby. It is the intention of the parties that if any provision is held to be illegal, invalid or unenforceable, there will be added in lieu thereof a provision as similar in terms to such provision as is possible to be legal, valid and enforceable.
24. **Governing Law And Venue.** This Agreement is executed in and shall be governed by and construed in accordance with the laws of the State of Oklahoma without regard to its choice of law principles, which shall be the forum for any lawsuits arising under this Agreement or incident thereto. The parties stipulate that venue is proper in a court of competent jurisdiction in Tulsa County, Oklahoma and each party waives any objection to such venue. City does not and will not agree to binding arbitration of any disputes.
25. **No Waiver.** A waiver of any breach of any provision of this Agreement shall not constitute or operate as a waiver of any other provision, nor shall any failure to enforce any provision hereof operate as a waiver of the enforcement of such provision or any other provision.
26. **Entire Agreement/No Assignment.** This Agreement and any documents incorporated herein constitute the entire agreement of the parties and supersede any and all prior agreements, oral or otherwise. This Agreement may only be modified or amended in a writing signed by both parties. Notwithstanding anything to the contrary stated herein or in the attachments to this Agreement, no future agreements, revisions or modifications that may be required under this Agreement are effective or enforceable unless such terms, revisions or modifications have been reduced to writing and signed by City and Seller. Seller may not assign this Agreement or use subcontractors to provide the Goods and/or Services without City's prior written consent. Seller shall not be entitled to any claim for extras of any kind or nature.
27. **Multiple Counterparts.** This Agreement may be executed in several counterparts, each of which shall be deemed an original, but which together shall constitute one and the same instrument.
28. **Interpretive Matters and Definitions.** The following interpretive matters shall be applicable to this Agreement:
 - 28.1 Unless the context otherwise requires: (a) all references to Sections are to Sections of or to this Agreement; (b) each term defined in this Agreement has the meaning assigned to it; (c) "or" is disjunctive but not necessarily exclusive; (d) words in a singular include the plural and vice versa. All references to "\$" or to dollar amounts shall be in lawful currency of the United States of America;
 - 28.2 No provision of this Agreement will be interpreted in favor of, or against, any of the parties hereto by reason of the extent to which such party or its counsel participated in the drafting thereof or by reason of the extent to which any such provision is inconsistent with any prior draft hereof or thereof;
 - 28.3 Any reference to any applicable laws shall be deemed to refer to all rules and regulations promulgated thereunder and judicial interpretations thereof, unless the context requires otherwise;
 - 28.4 The word "including" means "including, without limitation" and does not limit the preceding words or terms; and
 - 28.5 All words used in this Agreement shall be construed to be of such gender, number or tense as circumstances require.
29. **Minority, Female, and Disadvantaged Business Enterprises and Equal Employment Opportunity.** Each bidder agrees to comply with the terms of Title 5 of Tulsa Revised Ordinances relating to Equal Employment Opportunity and to the utilization of minority, female, disadvantaged and BRIDGE program companies.
30. **Authority to Bind.** The undersigned individual states that s/he has authority to bind Seller to this Agreement, that s/he has read and understands the terms of this Agreement, and that Seller agrees to be bound by this Agreement and its incorporated documents.

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FORM #3

INTEREST AFFIDAVIT

STATE OF _____)
)ss.
COUNTY OF _____)

I, _____, of lawful age, being first duly sworn, state that I am the agent authorized by Seller to submit the attached Bid. Affiant further states that no officer or employee of the City of Tulsa either directly or indirectly owns a five percent (5%) interest or more in the Bidder's business or such a percentage that constitutes a controlling interest. Affiant further states that the following officers and/or employees of the City of Tulsa own an interest in the Bidder's business which is less than a controlling interest, either direct or indirect.

By: _____
Signature
Title: _____

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

Notary Public
My Commission Expires: _____
Notary Commission Number: _____
County & State Where Notarized: _____

The Affidavit must be signed by an authorized agent and notarized

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FORM #4

NON-COLLUSION AFFIDAVIT

(Required by Oklahoma law, 74 O.S. §85.22-85.25)

STATE OF _____)
COUNTY OF _____)ss.

I, _____, of lawful age, being first duly sworn, state that:
(Seller's Authorized Agent)

1. I am the authorized agent of Seller herein for the purposes of certifying facts pertaining to the existence of collusion between and among Bidders and municipal officials or employees, as well as facts pertaining to the giving or offering of things of value to government personnel in return for special consideration in the letting of any contract pursuant to the Bid to which this statement is attached.
2. I am fully aware of the facts and circumstances surrounding the making of Seller's Bid to which this statement is attached, and I have been personally and directly involved in the proceedings leading to the submission of such Bid; and
3. Neither the Seller nor anyone subject to the Seller's direction or control has been a party:
 - a. to any collusion among Bidders in restraint of freedom of competition by agreement to Bid at a fixed price or to refrain from Bidding,
 - b. to any collusion with any municipal official or employee as to quantity, quality, or price in the prospective contract, or as to any other terms of such prospective contract, nor
 - c. in any discussions between Bidders and any municipal official concerning exchange of money or other thing of value for special consideration in the letting of a contract.

By: _____
Signature

Title: _____

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

Notary Public

My Commission Expires: _____

Notary Commission Number: _____

County & State Where Notarized: _____

The Affidavit must be signed by an authorized agent and notarized

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FORM #5

AFFIDAVIT OF CLAIMANT

STATE OF _____)
)ss.
COUNTY OF _____)

The undersigned person, of lawful age, being first duly sworn on oath, says that all invoices to be submitted pursuant to this agreement with the City of Tulsa will be true and correct. Affiant further states that the work, services or material furnished will be completed or supplied in accordance with the plans, specifications, orders, requests and/or contract furnished or executed by the affiant. Affiant further states that (s)he has made no payment directly or indirectly to any elected official, officer or employee of the City of Tulsa or of any public trust where the City of Tulsa is a beneficiary, of money or any other thing of value to obtain payment of the invoice or procure the contract or purchase order pursuant to which an invoice is submitted. Affiant further certifies that (s)he has complied with all applicable laws regarding equal employment opportunity.

Company: _____

Remit to
Address: _____

City, State
Zip: _____

Phone: _____

Name (print): _____

Signature: _____

Title: _____

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

Notary Public

My commission expires: _____
My commission number: _____
County and State where notarized: _____

The Affidavit must be signed by an authorized agent and notarized

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FORM #6

ACKNOWLEDGMENT OF RECEIPT OF ADDENDA/AMENDMENTS

I hereby acknowledge receipt of the following addenda or amendments, and understand that such addenda or amendments are incorporated into the Bid Packet and will become a part of any resulting contract.

List Date and Title/Number of all addenda or amendments: (Write "None" if applicable).

Sign Here ► _____

Printed Name: _____

Title: _____

Date: _____

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INSTRUCTIONS, TERMS AND CONDITIONS FOR BIDDERS

1. **PURCHASING AUTHORITY.** City issues this Invitation For Bid pursuant to Tulsa City Charter, Art. XII, §14 and Tulsa Revised Ordinances, Title 6, Ch. 4, the provisions of which are incorporated herein.
2. **DEFINITIONS.** The following terms have the following meanings when used in the documents comprising this Bid Packet.
 - A. **“Acceptance”** with respect to a Bid shall mean the City’s selection of a Bid, and award of a contract to the Bidder/Seller.
 - B. **“Acceptance”** with respect to delivery of Goods and/or Services provided under a Purchase Agreement shall mean City’s written acknowledgement that Seller has satisfactorily provided such Goods and/or Services as required.
 - C. **“Addenda” “Addendum” or “Amendment(s)”** shall mean a clarification, revision, addition, or deletion to this Invitation For Bid by City which shall become a part of the agreement between the parties.
 - D. **“Authorized Agent”** means an agent who is legally authorized to bind the Seller under the law of the State in which the Seller is legally organized. An Authorized Agent must sign all documents in the Bid Packet on behalf of the Seller. Under Oklahoma law, the Authorized Agent for each of the following types of entities is as stated below:
 - **Corporations** – the president, vice president, board chair or board vice chair can sign; others can sign if they have and provide the City with (i) a corporate resolution giving them authority to bind the Seller, and (ii) a recent corporate secretary’s certificate indicating the authority is still valid.
 - **General Partnerships** – any partner can sign to bind all partners.
 - **Limited Partnerships** – the general partner must sign.
 - **Individuals** – no additional authorization is required, but signatures must be witnessed and notarized.
 - **Sole Proprietorship** – the owner can sign. Any other person can sign if s/he provides a recent Power of Attorney, signed by the owner, authorizing him/her to bind the sole proprietorship.
 - **Limited Liability Company (LLC)** – The manager as named in the Operating Agreement can sign. Any person authorized by the Operating Agreement or a member can sign providing the person submits a copy of the authorization with a certificate of the members indicating the authorization is still valid.Entities organized in States other than Oklahoma must follow the law of the State in which they are organized.
 - E. **“Bid”** means the Seller’s offer to provide the requested Goods and/or Services set forth in Exhibit A and any additional materials or information the Seller chooses to submit to support the Bid.
 - F. **“Bidder”** means the legal entity which submits a Bid for consideration by City in accordance with the Invitation For Bid.
 - G. **“Bid Packet”** consists of the following documents (1) the Notice of Invitation for Bid, (2) the Summary Sheet, (3) Form #1, (4) Form #2, (5) Form #3, (6) Form #4, (7) Form #5, (8) Form #6, (9) the Instructions, Terms and Conditions for Bidders, (10) Special Requirements, (11) Technical Specifications, and (12) Exhibit A.
 - H. **“Bid Submission Date”** shall mean the last date by which the City will accept Bids for an Invitation For Bid.
 - I. **“City”** shall mean the City of Tulsa, Oklahoma.
 - J. **“Days”** shall mean calendar days unless specified otherwise.
 - K. **“Primary Seller”** shall mean the Seller whose Bid City selected as the principal supplier of the Goods and/or Services required under this Agreement.
 - L. **“Project Buyer”** shall mean the City’s employee assigned to serve as the contact person for Bidders/Sellers responding to Invitations For Bid or completing contracts herein.
 - M. **“Purchasing Division or Office”** shall mean the City of Tulsa’s Purchasing Division, located at 175 East 2nd Street, Suite 865, Tulsa, Oklahoma 74103
 - N. **“Secondary Seller”** shall mean the Seller whose Bid City selected as a back-up supplier in the event the Primary Seller is unable to provide all the Goods and/or Services required.

**Invitation For Bid #10-456
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- O.** “**Seller**” shall mean the Bidder whose Bid City selected and awarded a contract.
- P.** “**You**” or “**Your**” shall mean the Bidder responding to this Invitation For Bid or the Seller whose Bid the City selected and awarded a contract.
- Q.** “**Website**” shall mean the City of Tulsa’s website for the Purchasing Division: www.cityoftulsapurchasing.org.
- 3. QUESTIONS REGARDING INVITATION FOR BID.** Questions regarding any portion of this Invitation For Bid must be submitted in writing (sent by mail, fax or email) to the Project Buyer indicated on the Summary Sheet herein. You should submit questions as early as possible and preferably before the pre-Bid conference. Questions and concerns must be received no later than seven (7) days prior to the Bid Packet due date. Any oral responses to questions before the contract is awarded are not binding on City. At City’s discretion, any information or clarification made to you may be communicated to other Bidders that notified City of their intent to Bid if appropriate to ensure fairness in the process for all Bidders. You must not discuss questions regarding the Invitation For Bid with anyone other than the Project Buyer or other Purchasing Division staff or your Bid may be disqualified, any contract recommendation or Acceptance may be rescinded, or any contract may be terminated and delivered Goods returned at your expense and City refunded any payments made.
- 4. ORAL STATEMENTS.** No oral statements by any person shall modify or otherwise affect the provisions of this Invitation For Bid and/or any contract resulting therefrom. All modifications, addenda or amendments must be made in writing by City’s Purchasing Division.
- 5. EXAMINATION BY BIDDERS.** You must examine the specifications, drawings, schedules, special instructions and the documents in this Bid Packet prior to submitting any Bid. Failure to examine such documents and any errors made in the preparation of such Bid are at your own risk.
- 6. ADDENDA OR AMENDMENTS TO INVITATIONS FOR BID.** City may addend or amend its Invitation For Bid at any time before the Bid Submission Date, and any such addenda or amendments shall become a part of this Agreement. City will attempt to send a notification (by fax or email) of any addenda or amendments to those Bidders who have responded to the City’s Project Buyer of their intent to respond to the Invitation For Bid. However, it is your responsibility to inquire about any addenda or amendments, which will be available from the City’s Purchasing Division and its website. You must acknowledge receipt of any addenda or amendments by signing and returning the Acknowledgment of Receipt of Addenda/Amendments form and attaching it to this Invitation For Bid with your Bid. City may reject any Bid that fails to acknowledge any addenda or amendments.
- 7. SPECIFICATIONS/DESCRIPTIVE TERMS/SUBSTITUTIONS.** Unless the term “no substitute” is used, the City’s references to a brand name, manufacturer, make, or catalogue designation in describing an item in this Bid Packet does not restrict you to that brand or model, etc. The City may make such references to indicate the type, character, quality and/or performance equivalent of the item desired. However, you are required to furnish the exact item described in your Bid unless a proposed substitution is clearly noted and described in the Bid.
- The parties recognize that technology may change during the period Bids are solicited and subsequent contracts are performed. Therefore, City may at its option accept changes or substitutions to the specifications for Goods of equal or better capabilities at no additional cost to City. In the case of existing contracts, you shall give City 30 days advance notice in writing of any such proposed changes or substitutions. City shall determine whether such items are acceptable as well as any proposed substitute.
- All Goods shall be new unless otherwise so stated in the Bid. Any unsolicited alternate Bid, or any changes, insertions, or omissions to the terms and conditions, specifications, or any other requirements of this Bid, may be considered non-responsive and the Bid rejected.
- 8. PRICES/DISCOUNTS.** Prices shall be stated in the units and quantity specified in the Bid Packet documents. In case of discrepancy in computing the Bid amount, you guarantee unit prices to be correct and such unit prices will govern. Prices shall include transportation, delivery, packing and container charges, prepaid by you to the destination specified in the Specifications. Discounts for prompt payment will not be considered in Bid evaluations, unless otherwise specified. However, offered discounts for prompt payment will be taken if payment is made within the discount period.
- 9. DELIVERY.** All prices quoted shall be based on delivery F.O.B. Tulsa, Oklahoma or to any other points as may be designated in the Technical Specifications, with all charges prepaid by Seller to the actual point of delivery. Bids must state the number of days required for delivery under normal conditions.

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10. **TAXES.** City is exempt from federal excise and state sales taxes and such taxes shall not be included in the Bid prices.
11. **BID SUBMISSION.** The Bid Packet forms must be prepared in the name of Bidder and properly executed by an Authorized Agent with full knowledge and acceptance of all provisions, in ink and notarized. Bids may not be changed or withdrawn after the deadline for submitting Bids (the "Bid Submission Date"). A Bid is an irrevocable offer and when accepted by City (as evidenced by City's execution of the Purchase Agreement) shall constitute a firm contract.
- A. BIDS MUST BE SUBMITTED ONLY ON THE BID PACKET FORMS AND SIGNED BY AN AUTHORIZED AGENT. THE ENTIRE BID PACKET MUST BE RETURNED AS RECEIVED WITH ALL FORMS COMPLETED. YOU MAY ATTACH, AFTER EXHIBIT A, ANY DOCUMENTS NECESSARY TO COMPLETELY AND ACCURATELY RESPOND TO THE REQUEST. BIDS MUST BE IN STRICT CONFORMANCE WITH ALL INSTRUCTIONS, FORMS, AND SPECIFICATIONS CONTAINED IN THIS BID PACKET.**
- B.** Sealed Bids may be either mailed or delivered, but must be received at:
City of Tulsa – Office of City Clerk
175 East 2nd Street, Suite 260
Tulsa, Oklahoma 74103
- C.** Bids will be accepted at the above address from 8:00 a.m. to 5:00 p.m., Monday thru Friday except for City holidays. City is not responsible for the failure of Bids to be received by the City Clerk's Office prior to the due date and time.
- D.** Late Bids will be **rejected**. The Purchasing Agent, in his sole discretion, may make exceptions only for the following reasons:
1. City Hall closed for business for part or all of the day on the date the response was due;
 2. If the City deems it appropriate due to large-scale disruptions in the transportation industry that may have prevented delivery as required.
 3. If documented weather conditions caused the late delivery. You must provide documentation of such weather to the satisfaction of the Purchasing Agent.
- E.** **City will not accept faxed Bids**, nor will City accept Bids faxed to the City Clerk, Purchasing Division or Office, or any other City office or employee.
- F.** City is not responsible for any of your costs in preparing the Bid response, attending a pre-Bid conference, or any other costs you incur, regardless of whether the Bid is submitted, accepted or rejected.
- G.** All Bids must be securely sealed and plainly marked with the Bid Number, Bid Title, and Bid Opening Date on the lower left corner of the outside of the Bid envelope. Your name and address must also be clearly indicated on the envelope.
- H.** If submitting multiple options ("Option(s)") to the Invitation for Bid, each will be considered separately requiring each response to be complete and accurate. Each Option must be clearly marked as Option 1 of 3, Option 2 of 3, etc.
- I.** The number of copies you must submit is listed on the Summary Sheet in the front of the Bid Packet. However, at a minimum, there will be (1) an original, clearly labeled as such in 1" red letters on the Bid Packet cover page, and (2) a copy for City's Purchasing Division, clearly labeled as such in 1" red letters on the Bid Packet cover page. If binders are used, they must also be labeled.
- J.** Multiple boxes or envelopes are permissible, but must not weigh more than 50 pounds. Each box must be labeled as instructed herein and numbered (i.e., Box 1 of 3; Box 2 of 3). **The original must be in Box #1.**
- K.** The original and all copies (either paper or electronic) must be identical in all respects. Bids must be completed and submitted in ink or typewritten. Bids written in pencil will be rejected. Any corrections to the Bids must be initialed in ink.
12. **BID REJECTION OR WITHDRAWL.**
- A.** City may reject any or all Bids, in whole or in part.
 - B.** **A Bid may be rejected if it contains additional terms, conditions, or agreements that modify the requirements of this Invitation For Bid or attempts to limit Bidder's liability to the City.**
 - C.** A Bid may be rejected if Bidder is currently in default to City on any other contract or has an outstanding indebtedness of any kind to City.
 - D.** City reserves the right to waive any formalities or minor irregularities, defects, or errors in Bids.
 - E.** Bid withdrawal may only be accomplished by an Authorized Agent requesting the withdrawal in person at the City Clerk's office before the City's close of business on the Bid Submission Date.
13. **BID RESULTS.** A tabulation of Bids received will be made available on the City's Purchasing Division website generally within 5 working days after the Bid Opening Date. After a contract award is recommended to the Mayor, a copy of the Bid summary will be available in the City Clerk's Office. Bid results are not provided in response to telephone or email inquiries.
14. **PURCHASE ORDER.** In the event that the successful Bid is for an amount less than One Hundred Thousand Dollars (\$100,000), and it is determined by the City to be in the best interests of the City, the City, in its sole discretion, may issue a Purchase Order rather than execute the Purchase Agreement to purchase the Goods. If a Purchase Order is issued, however, the terms of the Bid

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Packet documents, including the Purchase Agreement, will govern the transaction and be enforceable by the City and Bidder/Seller.

15. **CONTRACT AWARD.** If a contract is awarded, it will be awarded to the Bidder that City determines is the lowest secure Bidder meeting specifications. Such Bid analysis will consider price and other factors, such as Bidder qualifications and financial ability to perform the contract, as well as operating costs, delivery time, maintenance requirements, performance data, history of contract relations with City, and guarantees of materials and equipment, as applicable. A complete list of the factors that are considered is set forth in Tulsa Revised Ordinances, Title 6, Ch. 4, §406E. Unless otherwise noted, City reserves the right to award a contract by item, one or more groups of items, or all the items in the Bid, whichever is in City's best interest.
16. **IRS FORM W-9.** If City selects your Bid and awards a contract to you, you will have ten (10) days from notification of the award to provide City with your complete IRS Form W-9.
17. **NOTICE TO PROCEED.** If City accepts your Bid and executes the Purchase Agreement, you shall not commence work until authorized to do so by the Purchasing Agent or his representative. Receipt of a Purchase Order from the City is notice to proceed.
18. **PAYMENTS.** Invoices should be mailed to: City of Tulsa – Accounts Payable
175 East 2nd Street, 8th floor
Tulsa, Oklahoma 74103

Payment will be made Net 30 days after receipt of a properly submitted invoice or the City's Acceptance of the Goods and/or Services, whichever is later, unless City decides to take advantage of any prompt payment discount included in the Bid.

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SPECIAL REQUIREMENTS

1. Irrevocable Offer Period. You understand and acknowledge that the offer submitted as your Bid is firm and irrevocable from the City's close of business on the Bid Submission Date until 120 days after the Bid Opening Date.

2. General Liability/Indemnification. You shall hold City harmless for any loss, damage or claims arising from or related to your performance of the Purchase Agreement. You must exercise all reasonable and customary precautions to prevent any harm or loss to all persons and property related to the Purchase Agreement. You agree to indemnify and hold the City harmless from all claims, demands, causes of action or suits of whatever nature arising out of the Goods, Services, labor, or materials furnished by you or your subcontractors under the provisions of the Bid Packet documents.

3. Liens. Pursuant to City's Charter (Art. XII, §5), no lien of any kind shall exist against any property of City. Bidder shall deliver all goods to City free and clear of liens. Delivery by Seller to City of goods which are subject to liens under the Purchase Agreement shall be a material breach of the Purchase Agreement and all damages and costs incurred by City as a result of the existence of such liens shall be paid to City by Seller. At City's option, City may return such goods to Seller and Seller shall pay the cost of returning such goods and reimburse City for any payments made for such goods.

4. Insurance. If checked "Yes," the following insurance is required: No: X

Seller and its subcontractors must obtain at Seller's expense and keep in effect during the term of the Purchase Agreement, including any renewal periods, policies of General Liability insurance in the minimum amounts set forth below and Workers' Compensation insurance in the statutory limits required by law.

Personal injury, each person	\$ 175,000.00
Property damage, each person	\$ 25,000.00
Auto Liability, each occurrence	\$ 1,000,000.00
Personal injury and property damage, each occurrence	\$ 1,000,000.00
Workers' Compensation	(Statutory limits)

SELLER'S INSURER MUST BE AUTHORIZED TO TRANSACT BUSINESS IN THE STATE OF OKLAHOMA.

Seller's insurance policy and all certificates of insurance must state that the insurer cannot change or cancel coverage without the insurer first giving 30 days written notice to City of such change, cancellation or termination. You will have 10 days after notification that your Bid was selected for contract award by City to provide proof of such coverage. The Certificate of Insurance must be completed with the following information:

- A. Your name
- B. Insurer's name and address;
- C. Policy number;
- D. Liability coverage and amounts;
- E. Commencement and expiration dates;
- F. Signature of authorized agent of insurer;
- G. Invitation For Bid number.

The completed Certificate of Insurance form should be sent to the assigned Project Buyer reflected on the Summary Sheet of this Bid Packet. An endorsement from the insurer must be obtained by Seller which adds City as an Additional Insured to the policy and states that the insurer will provide City with notice thirty days in advance of termination, cancellation or change in the coverage of the policy. The cancellation clause on your certificate must conform to the endorsement. Any conflict between the endorsement and the certificate is a material breach of the Purchase Agreement and can result in the retraction by City of the award of the Bid to Seller

5. Bonding.

A. Bid Bond. If the box is checked "Yes," the Bid Bond is required:

Yes: No:

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B. **Performance Bond.** If the box is checked "Yes," the Performance Bond is **required**:

Yes: No:

6. **References.** If the box is checked "Yes," References are **required**: UPON REQUEST

For each reference, the following information must be included: Company Name, Contact Name, Address, Phone Number, E-Mail Address, and the nature of their relationship with the Bidder.

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TECHNICAL SPECIFICATIONS

INTENT:

The intent is to purchase two Medium Voltage Variable Frequency Drive Systems (VFD). The quantity purchased will be dependent upon your pricing, City need, and City funding.

All references to any responsibility of the manufacturer will be the sole responsibility of the Seller to insure compliance.

If seeing the area where the equipment will be installed by others is necessary, please email project buyer byoungblood@cityoftulsa.org or call cell 918-521-2397 to make arrangements.

Submit all questions to project buyer byoungblood@cityoftulsa.org . Please no questions by phone.

SPECIFICATION SECTION 16000 FOR MEDIUM VOLTAGE ADJUSTABLE FREQUENCY DRIVES

PART 1 GENERAL

1.0 SCOPE

- 1.1 This Specification defines the requirements for a Medium Voltage Variable Frequency Drive System (VFD) for the operation of one (1) 2500HP, 4160V synchronous motors for one (1) High Service Pumps, not to exceed 900 rpm, at Mohawk Water Treatment Plant.
- 1.2 The Seller shall prepare the bid to be in complete compliance with this specification.
- 1.3 The Seller shall attach to bid response a complete description of solution bid including descriptive literature.
- 1.4 The Seller shall furnish all tools, equipment, material, supplies and perform all labor required after VFD is installed by "Installation Contractor" to test that VFD operates satisfactory.
- 1.5 Without intending to limit or restrict the extent of the Work in accordance with the Purchase Agreement, the Work includes procurement of a VFD system package with the following principal elements:
 - a) A medium voltage variable frequency drive complete, including design, submittals, factory testing, and Seller's services.
 - b) Provide structural calculations and drawings for the anchoring requirements for each type of equipment supplied. Anchoring requirements shall include the required anchor bolt diameter and embedment depth, and the anchor bolt templates. All structural calculations shall be signed and stamped by a licensed Professional Engineer currently registered in the State of Oklahoma as a Structural Engineer.
 - c) All equipment and materials shall be delivered by the Seller to Mohawk WTP, Tulsa, Oklahoma
 - d) The Seller shall be responsible for and be present during the unloading of all equipment and materials, subject to a joint inspection prior to unloading.
 - e) Actual Installation of the specified pumping equipment will be accomplished by the Installation Contractor (to be bid separately) under a separate contract initiated by City.
- 1.6 Coordination of Suppliers. The Seller shall coordinate with each of their suppliers or manufacturers for the rating, physical size selection of the VFDs to insure that the units are compatible, fit the space available, and operate per the Purchase Agreement as a system. The Seller shall be responsible for and coordinate the manufacturing, testing and delivery of all units.

2.0 CODES AND STANDARDS

Institute of Electrical and Electronic Engineers
IEEE 519 Guide for Harmonic Control and Reactive Compensation of Static Power Converters

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IEEE 1100 – Powering and Grounding Sensitive Electronic Equipment
National Electrical Manufacturers Association (NEMA)
NEMA ICS 6 – Industrial Control and Systems Enclosures
NEMA ICS 7 – Industrial Control Systems Adjustable Speed Drives
National Fire Protection Association (NFPA)
NFPA 70 – National Electrical Code (NEC)
Underwriters Laboratory
UL 347 – Medium Voltage Power Conversion Equipment

3.0 SYSTEM DESCRIPTION

- 3.1 The system shall consist of the following main components: one medium voltage adjustable frequency drive (VFD), fused isolation switch, isolation contactor, drive isolation/phase shifting transformers with minimum 24 pulse rectification or active front end (AFE), DC bus pre-charge circuit, output harmonic filter as necessary.
- 3.2 The integrated dedicated fused contactor with isolation switch will be rated to protect the VFD from specified short-circuit levels. The minimum interrupting rating of the input contactor shall be 8500A @ 400A and 12,500A @ 800A. The VFD enclosure doors shall be interlocked to prevent opening when main power is available.
- 3.3 If equipped with DC bus pre charge circuit DC bus capacitor charging is accomplished by use of a DC bus pre charge circuit. The DC bus capacitors are charged before application of main power, which limits the very high damaging inrush currents to the main rectifier/converter bridge devices. When the proper DC bus voltage is attained, the pre-charge circuit is turned off.
- 3.4 The VFD shall meet the requirements of IEEE 519. The point of common coupling shall be located at the utility. The harmonic current distortion shall not exceed the limits listed in table 10.3 of IEEE 519. The harmonic voltage distortion shall not exceed the limits listed in table 11.1 of IEEE 519.
- 3.5 The VFD shall be supplied with 4160V, 3-phase, 60 Hz power and shall be able to operate with a +/-10 % voltage variation.
- 3.6 The input disconnect switch of the VFD shall be rated for 60kV BIL and 50ka short circuit.
- 3.7 Auxiliary power 480V, 3-phase, 60 Hz shall be provided internal to the integrated Drive. External auxiliary supply voltage sources will not be acceptable. Externally derived power shall not diminish the capacity of the VFD system
- 3.8 The VFD will be suitable for the motor 4160V, 3-phase, 60 Hz, 2500 hp.
- 3.9 For variable torque applications the overload capacity shall be 110% of rated current for 1 minute repeated every 10 minutes. For constant torque applications the overload capacity shall be 150% of rated current for 1 minute repeated every 10 minutes.
- 3.10 The VFD shall be suitable for use with a new or an existing standard squirrel cage motor with 1.0 service factor and standard medium-voltage insulation.

4.0 ENVIRONMENT

- 4.1 3,300-ft altitude and less than 95% relative humidity, non-condensing.

5.0 QUALITY ASSURANCE

- 5.1 All equipment furnished under this section shall be warranted by the Seller for a minimum period of one year after completion of start-up or 18 months after shipment, whichever occurs first.
- 5.2 The VFD manufacturer shall have ISO 9001 certification.
- 5.3 The VFD manufacturer shall be able to provide start-up service, 24-hour/day emergency call service, repair work, maintenance and troubleshooting training of customer personnel.
- 5.4 The VFD shall meet the following:
ANSI / NEMA Standards
UL
CSA

6.0 SUBMITTALS

- 6.1 City shall approve final ship drawings prior to release for manufacturing. These drawings shall be provided for all the equipment included in this specification. The VFD Manufacturer shall provide four (4) copies of:
 - a) Dimensional outline and plan arrangement drawings including clearance requirements, foundation details and weights.
 - b) Electrical schematics, wiring and interconnection drawings.
- 6.2 The Manufacturer shall provide overall efficiency data at 25%, 50%, 75% and 100% speed with load connected.
- 6.3 The VFD manufacturer shall provide system total power factor data at 25%, 50%, 75% and 100% load at normal

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operating speeds.

- 6.4 The Seller shall provide harmonic calculations to the 49th harmonic with the bid when requested. The calculations shall show total harmonic voltage and current distortion at the designated Point of Common Coupling (PCC)
- 6.5 The VFD manufacturer shall provide four (4) copies of:
- a) "As built" drawings shall be furnished. These drawings may also be furnished in electronic format.
 - b) Part lists and bill of material.
 - c) User manuals including storage, installation, operation and maintenance instructions for the equipment provided.

PART 2 DESIGN AND CONSTRUCTION

7.0 ACCEPTABLE MANUFACTURERS

- 7.1 The adjustable frequency drive (VFD) shall be manufactured by Eaton/Cutler-Hammer or approved equal, meeting or exceeding the requirements of this specification.
- 7.2 Manufacturer and Equipment Qualifications
The VFD manufacturer shall have a minimum of 5 years of experience in the sales and marketing of this type of equipment.

8.0 INVERTER DESIGN

- 8.1 The VFD inverter shall be of the pulse width modulated (PWM) neutral point clamp (NPC) Voltage Source type or Current Source technology will be acceptable. The output devices shall be insulated gate bipolar transistors (IGBT's) or symmetrical gate commutated thyristor (SGCT) with a voltage rating of 3300V/6500V for 4160V outputs. Use of lower voltage rated devices is unacceptable. The inverter shall be a single or paralleled three phase inverter capable of roll in / roll out design to minimize downtime in the event of inverter failure. Multiple single-phase inverters will not be acceptable. [Manufacturers current standard design meeting the motor and pump requirements](#)

9.0 INTEGRATED INPUT ISOLATION TRANSFORMER AND RECTIFIER IF REQUIRED

- 9.1 The VFD shall contain an incoming isolation transformer whose primary voltage shall be as specified on the data sheet.
- 9.2 The transformer shall contain 12 secondary windings that provide the proper phase shifting to develop a 24-pulse rectification to reduce harmonic currents and voltages reflected to the primary power system.
- 9.3 The transformer shall be copper wound and shall have a 220°C insulation system to operate at 115° C rise at full load conditions.
- 9.4 The transformer and rectifier shall be an integral part of the VFD assembly along with primary disconnect switch, input vacuum contactor and secondary fusing eliminating the need for separate components, field installation, or wiring.

10.0 RELIABILITY

- 10.1 Importance is given for trouble free operation, reliability and availability of the equipment.
- 10.2 The manufacturer shall list any control or power components that require recommended maintenance or replacement before 50,000 hours of operation. Information must be available in the manufacturer's maintenance manual and available for submittal.
- 10.3 The mean time between failure (MTBF) of the VFD shall be greater than 50,000 hours.
- 10.4 The VFD shall be capable of continuous operation ("ride-through") in the event of a power loss of up to 5 cycles.
- 10.5 The VFD shall be able to safely operate, without tripping, with up to 30% voltage sag on the rated input voltage.
- 10.6 The inverter shall use IGBT type switches, which shall be rated for at least 130% of the full motor voltage.
- 10.7 The City intends to purchase a medium-voltage VFD system. All power semiconductors and passive power components in both the rectifier and inverter part shall be medium voltage rated components. Low voltage components are not acceptable in the power sections.

11.0 INPUT POWER QUALITY

- 11.1 The VFD shall comply with the latest edition of IEEE 519 for total harmonic and current distortion limits and calculations with a minimum of 24-pulse rectification. Anything less than 24 pulse will not be acceptable. The transformer shall contain 12 secondary windings that provide the proper phase shifting to develop a 24-pulse rectification or AFE to reduce harmonic currents and voltages reflected to the primary power system.
- 11.2 The VFD total harmonic voltage distortion (THD) contribution at each point of common coupling between the drives and other loads within the facility (Load PCC) shall not exceed the 5% THD limit recommended for General Systems as listed in Table 11.1 of IEEE 519, throughout the speed range.
- 11.3 The total power factor at the VFD input shall be > 0.96 for the load range of 20 to 100% at normal operating speeds.

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The VFD manufacturer shall provide a power factor correction filter if the VFD does not meet this requirement. The VFD including power factor correction and/or harmonic filter shall never have a leading power factor.

12.0 OUTPUT POWER QUALITY

- 12.1 Output waveform shall be multi-level PWM switching transients and harmonic content shall have a negligible contribution to motor heating, acoustical noise in the motor, torsional stress in the power train, and motor insulation. DVRT filters shall be added as required.
- 12.2 Common mode voltages on the VFD output shall be isolated from the motor.
- 12.3 The VFD output shall produce sinusoidal voltage output waveform with less than 5% voltage total harmonic distortion (THD) throughout the speed range of 30 – 100% speed.
- 12.4 The audible motor noise shall not increase while powered by the VFD's.

13.0 CONTROL FUNCTIONS

Frequently accessed VFD programmable parameters shall be adjustable from a digital operator keypad located on the front of the VFD. The VFD's shall have a three line alphanumeric programmable display with status indicators. Keypads must use plain English words for parameters, status, and diagnostic messages. Keypads that are difficult to read or understand are not acceptable, and particularly those that use alphanumeric code and tables. Keypads shall be adjustable for contrast with large characters easily visible in normal ambient light.

The keypad shall include a local/remote pushbutton selection. Both start/ stop source and speed reference shall be independently programmable for keypad, remote I/O, or field-bus.

The keypad shall have copy/paste capability.

Upon initial power up of the VFD, the keypad shall display a start up guide that will sequence all the necessary parameter adjustments for general start up.

Standard advanced programming and trouble-shooting functions shall be available by using a personal computer's RS-232/Ethernet port and Windows™ based software. In addition the software shall permit control and monitoring via the VFD's RS232/Ethernet port. The manufacturer shall supply a diskette with the required software. An easily understood instruction manual and software help screens shall also be provided. The computer software shall be used for modifying the drive setup and reviewing diagnostic and trend information as outlined in this section through section 18.

The operator shall be able to scroll through the keypad menu to choose between the following:

- Monitor
- Operate
- Parameter setup
- Actual parameter values
- Active faults
- Fault history
- Liquid crystal display (LCD) contrast adjustment
- Information to indicate the standard software and optional features software loaded.

The following setups and adjustments, at a minimum and any additional information necessary to operate VFD, are to be available:

- Start command from keypad, remote or communications port
- Speed command from keypad, remote or communications port
- Motor direction selection
- Maximum and minimum speed limits
- Acceleration and deceleration times, two settable ranges
- Critical (skip) frequency avoidance
- Torque limit
- Multiple attempt restart function
- Multiple preset speeds adjustment
- Catch a spinning motor start or normal start selection
- Programmable analog output
- DC brake current magnitude and time (if required for VFD operation)
- PID process controller

13.1 THE VFD SHALL HAVE THE FOLLOWING SYSTEM INTERFACES:

- A. Inputs – A minimum of six (6) programmable digital inputs, two (2) Analog inputs and serial communications interface shall be provided with the following available as a minimum:

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Remote manual/auto
Remote start/stop
Remote forward/reverse
Remote preset speeds
Remote external trip
Remote fault reset
Process control speed reference interface, 4-20mA dc
Potentiometer and 1-10Vdc speed reference interface
RS232/[Ethernet](#) programming and operation interface port
Serial communications port

- B. Outputs – A minimum of two (2) discrete programmable digital outputs, one (1) programmable open collector output, and one (1) programmable analog output shall be provided, with the following available at minimum.

Programmable relay outputs with one (1) set of Form C contacts for each, selectable with the following available at minimum:

Fault
Run
Ready
Reversed
Jogging
At speed
Torque Limit Supervision
Motor rotation direction opposite of commanded
Over-temperature

Programmable open collector output with available 24Vdc power supply and selectable with the following available at minimum:

Fault
Run
Ready
Reversed
Jogging
At speed
Torque Limit Supervision
Motor rotation direction opposite of commanded
Over temperature

Programmable analog output signal, selectable with the following available at minimum:

Motor current
Output frequency
Frequency reference
Motor speed
Motor torque
Motor power
Motor voltage
Dc-bus voltage
AI1
AI2
PT100 temperature
FB digital input 4

- C. Monitoring and Displays

The VFD's display shall be a LCD type capable of displaying three (3) lines of text and the following thirteen (13) status indicators:

Run
Forward

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Reverse
Stop
Ready
Alarm
Fault
I/O terminal
Keypad
Bus/Comm
Local (LED)
Remote (LED)
Fault (LED)

The VFD's keypad shall be capable of displaying the following monitoring functions at a minimum:

Output frequency
Frequency reference
Motor speed
Motor current
Motor torque
Motor power
Motor voltage
Dc-bus voltage
Unit temperature
Calculated motor temperature
Voltage level of analog input
Current level of analog input
Digital inputs status
Digital and relay outputs status
Analog out

D. Protective Functions

The VFD shall include the following protective features at minimum:

Over current
Over voltage
Inverter fault
Under voltage
Input phase loss
Output phase loss
Under temperature
Over temperature
Motor stalled
Motor over temperature
Motor under load
Logic voltage failure
Microprocessor failure

The VFD shall provide ground fault protection during power-up, starting, and running. VFD's with no ground fault protection during running are not acceptable.

E Diagnostic Features

Fault History
Record and log faults
Indicate the most recent first, and store up to 30 faults.
An Emergency-stop (E-Stop) shall be provided on the VFD door in addition to inputs for customer supplied E-Stop command.

F. ABB Compatibility. The VFD systems shall be able to interface with the ABB plant SCADA system.

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14.0 VFD CONSTRUCTION

- 14.1 Indoor enclosures shall be NEMA 1A with gasket and filters.
- 14.2 The VFD Converter shall require front access only.
- 14.3 The VFD Converter enclosure doors shall include a mechanical interlocking system with a safety-grounding device [at the input if required](#). A grounding device is used to connect the plus and minus DC bus to ground to ensure all stored VFD and motor energy is discharged.
- 14.4 Enclosures shall be configurable separately or in a continuous line-up. VFD's shall be capable of being integrated with conventional motor starters, load break switches, circuit breakers, and reduced voltage starters into a seamless continuous control-gear assembly.
- 14.5 The drive isolation transformer, fused input contactor, isolation switch, ac pre-charge circuit contactor, output filter if required, and input harmonic filter and power factor correction filter if required shall be factory mounted wired by the manufacturer and integrated into the VFD enclosure.
- 14.6 All painted surfaces shall have an exterior finish of ANSI 61 Gray.
- 14.7 The enclosure must be designed to avoid harmonic and inductive heating and eliminate radio frequency interference.

15.0 VFD ENCLOSURE SPACE HEATERS

- 15.1 [Include provisions for the monitoring of space heaters if supplied by City.](#)
- 15.2 The space heater circuit shall turn on automatically when the drive is not operating.
- 15.3 A fused switch or circuit breaker for space heater circuit shall be provided for overload protection and as a disconnecting means.
- 15.4 [Include a meter and a test circuit on the enclosure door for indication that space heater power is available.](#)
- 15.5 Space heaters elements shall be rated 240 Vac and operated at 120 Vac, single-phase.

16.0 CONTROL POWER TRANSFORMERS (CPT'S)

- 16.1 A control power transformer (CPT) shall be provided within the enclosure.
- 16.2 The kilovolt-ampere rating of the CPT shall be determined by the manufacturer and shall have a minimum of 25% spare capacity.
- 16.3 The CPT secondary voltage shall be 120 Vac.
- 16.4 The CPT primary shall be fused with current limiting fuses with an interrupting rating no less than 100,000 amperes.
- 16.5 The CPT secondary shall be fused and have one terminal grounded.

17.0 VFD ENCLOSURE

- 17.1 The VFD enclosure shall be as per UL 347 standards suitable for installation in an indoor, unclassified area.
- 17.2 All enclosure openings exceeding 0.25 inch (6 mm) in, width shall be provided with screens to prevent the entrance of snakes, rodents, etc. The maximum screen mesh opening width shall be 0.25 inch (6 mm).
- 17.3 Air filters shall be of a reusable type that can be easily cleaned. All doors or front panels will be fully gasketed. Air exhaust from cooling fans will be at the top of the enclosure and direct exhaust airflow away from personnel in front of the equipment.

18.0 COOLING

- 18.1 A "loss of cooling" fault shutdown shall be furnished with forced-cooled equipment. In the event of clogged filters or fan failure, the drive will shut down safely without electronic component failure.
- 18.2 Fan motors shall be protected by an input circuit breaker. Metal squirrel cage ball bearing 460V three phase fan motors with 50,000 hour life are to be used in the drive design. Plastic muffin fans are not acceptable. As specified on the data sheet, fan power will be obtained from the primary 2400/4160V power through a 480V, 3-phase, 60 Hz internal auxiliary power supply. In the event of a fault or opening of the main contactor feeding the drive, the fans will continue to run for a time to allow for sufficient cooling of the drive. Convection cooling in the case of fault or main contactor opening is unacceptable as a method to insure proper cooling of the drive.

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- 18.3 VFD noise level shall be no greater than **85 dB** (A) at 3 feet distance from the front of the VFD and 4 ft above the floor in front of the VFD. VFD's with higher than **85db** will not be acceptable.
- 18.4 The VFD shall have adequate fans internal to insure proper operation in the above referenced ambient. **Include a** redundant fan to insure operation in the event the primary fan failure.

19.0 INTEGRATED CONTROL-GEAR TOP BUS

- 19.1 When **necessary**, a top mounted bus will be an integral part of the VFD design to be configured as a part of a motor control center or switchgear.
- 19.2 Bus bars shall be braced to withstand short circuit currents at a minimum of 50k AIC.

20.0 INTEGRATED INPUT ISOLATION SWITCHGEAR

- 20.1 Each VFD shall include an isolation with dedicated fused vacuum type contactor to feed isolation/phase shifting transformer **or line reactor**. **If equipped** ac pre- charge dc bus circuit by the VFD manufacturer with ratings as described in Part 1, section 3.0 System Description of this specification.
- 20.2 The integrated control-gear shall be suitably rated for 115% of the load current in accordance with NEC 430-2.

21.0 INTEGRATED DRIVE ISOLATION TRANSFORMER **IF REQUIRED**

- 21.1 A drive isolation transformer shall be integrated in the VFD enclosure to provide power conversion from the line voltage to the required VFD voltage and to isolate the line from harmonics and common mode voltages. The transformer shall conform to ANSI/IEEE C57 or to corresponding IEC standards
- 21.2 The transformer shall be designed to withstand a short circuit. It shall maintain electromagnetic symmetry when only one secondary winding is in short circuit in order to minimize the resulting short circuit forces. The transformer shall be capable of thermally withstanding a short circuit for 2 seconds.
- 21.3 Transformers shall be of a high efficiency type with full load losses of no greater than 2%.
- 21.4 Transformer winding material shall be copper.
- 21.5 The transformer shall include electrostatic shielding between the windings to carry high frequency capacitive currents to ground.
- 21.6 Transformer designs shall be open type mounted
- 21.7 The transformer shall be of the air-cooled type and be forced ventilated.
- 21.8 Only rectifier grade K-factor transformers shall be utilized, with K-Factor of 6 for diode rectifiers. VFD manufacturers providing scr type rectifiers shall include K Factor of 12 transformers for variable torque applications and K Factor of 20 for constant torque applications.

22.0 HARMONIC FILTERS AND POWER FACTOR CORRECTION

- 22.1 If required to meet the specification, the VFD manufacturer shall provide a harmonic filter and power factor correction equipment on the input and output of the VFD.
- 22.2 Power factor correction equipment shall be provided if necessary to maintain a constant input power factor of 0.96 lagging throughout the entire load range at normal operating speeds.
- 22.3 Filters shall be contained and mounted in the VFD enclosure when required.
- 22.4 Capacitors shall be environmentally safe. Discharge resistors and a method of shorting the phases shall be provided.
- 22.5 Inductors may be air or iron core. Inductors shall have Class F insulation with Class B temperature rise.

23.0 EFFICIENCY

- 23.1 Overall efficiency of the VFD shall include the drive isolation transformer, VFD and all VFD auxiliaries, output filter, power factor correction and harmonic filter.
- 23.2 VFD system efficiency calculations shall be in accordance with IEEE 995.
- 23.3 The overall efficiency shall be not less than 96% at full load and full speed.

PART 3 EXECUTION

1.0 TESTING

- 1.1 The VFD System shall undergo standard manufacturing testing.

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- 1.2 Each VFD shall be factory load tested with a synchronous motor on a dynamometer or equal test stand for a minimum of (2) two hours with (1) one hour at cycling loads and speeds with VFD system full voltage applied.

2.0 COMMISSIONING

- 2.1 The VFD Manufacturer shall provide the services of a factory engineer for the start-up of the VFD after it is installed according to the manufacturers recommendations. Functional testing, commissioning and first parameter adjusting is carried out by the factory engineer.
- 2.2 Testing, final parameter adjustment and performance tests are carried out by the factory engineer with the customer present.
- 2.3 Consecutively after commissioning, the factory engineer shall review the customers operating procedures and provide (2) two hours of basic hands-on maintenance and operation training to the customer's personnel.
- 2.4 Typical commissioning will be at (3) consecutive eight-hour man-days per VFD. Rate schedule for commissioning, travel to the jobsite and living expenses during the period of work shall be included with the bid proposal.
- 2.5 Microsoft Windows based software shall be provided for VFD commissioning, parameters setup, fault log viewing, diagnostic analysis, monitoring and control. The software shall provide real time graphical displays of VFD performance.

3.0 SPARE PARTS

- 3.1 The VFD manufacturer shall provide a complete list of spare parts for the VFD.
- 3.2 The VFD manufacturer shall provide local support for renewal parts and stock spares within the Continental USA.
- 3.3 As a minimum, the VFD manufacturer shall include these spare parts as part of the bid:
- a) 100% spares of each type of medium voltage fuse.
 - b) 100% spares of each type of low voltage fuse.
 - c) One (1) of each type of control printed circuit boards.
 - d) Special tools for testing or maintaining equipment.
 - e) One set of rectifier diodes for one phase
 - f) One set of inverter power module for one phase
 - g) One cooling fan
- 3.4 All spare printed circuit boards shall be conformally coated and individually packed:

4.0 PREPARATION FOR SHIPMENT

- 4.1 Equipment shall be individually crated and tagged with proper identification of the assembly to which it belongs.
- 4.2 Materials, including detailed wiring diagrams and instructions for reassembling shipping sections and making bus connections at shipping splits, shall be provided.
- 4.3 Terminal strips shall be provided for all interconnecting wiring at shipping splits. Each wire terminal shall be identified with permanent wire markers.
- 4.4 Each shipping section shall be furnished with lifting angles, eyes, or plates suitable for lifting hooks or slings.

Buy American:

Section 1605 of the American Recovery and Reinvestment Act states, "None of the funds appropriated or otherwise made available by this Act may be used for a project for the construction, alteration, maintenance, or repair of a **public building or public work** unless all of the iron, steel, and manufactured goods used in the project are **produced in the United States**" The U.S. Office of Management and Budget (OMB) has issued guidance to assist in implementing the Recovery Act at 2 CFR Part176. The OMB guidance defines "manufactured good" as a "good brought to the construction site for **incorporation into the building** or work that has been processed into a specific form and shape; or combined with other raw material to create a material that has different properties than the properties of the individual raw materials." 2 CFR § 176.140(a) (1) (emphasis added). Produced in the United States means "substantially transformed" in the United States or its territories(See http://www1.eere.energy.gov/recovery/pdfs/eere_substantial_transformation_guidance.pdf). Contractors and vendors must be able to supply documentation verifying that the "manufactured goods" as defined above have been manufactured in the United States. That documentation must include the city and state of manufacture and the processes undergone in the United States.

This project is valued at less than \$7,804,000, as a result no international agreements affect this project, and no exceptions

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for those agreements (WTO, NAFTA, etc.) apply. **Thus all manufactured goods as defined above must be manufactured in the United States or its territories.** Contractors and vendors must be able to supply documentation verifying that the "manufactured goods" as defined above have been manufactured in the United States. That documentation must include the city and state of manufacture and the processes undergone in the United States.

The Buy American provisions have been waived for electronic fluorescent ballasts, see the details of this waiver here: http://www1.eere.energy.gov/recovery/pdfs/buy_american_waivers.pdf. All waivers issued by the EERE are blanket waivers and apply to this project if covered items are included, the complete list of waivers is here: http://www1.eere.energy.gov/recovery/ba_waivers.html; please clarify in your bid if you will be using an item covered by an existing waiver.

Must Submit with your bid the following:

- 1. Attach product literature to your bid.*
- 2. Bidders must supply documentation verifying that the "manufactured goods" as defined above have been manufactured in the United States. That documentation must include the city and state of manufacture and the processes undergone in the United States.*

Note:

All bid documents must be signed in accordance with the statutes of the state in which the entity bidding is organized. See Instructions, Terms, and Conditions for Bidders; D. Authorized Agent.

	Invitation For Bid #10-456 Variable Frequency Drive Public Works Department Issued: December 28, 2010	City of Tulsa, Oklahoma Page 33 of 33
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**EXHIBIT A
BID FORM INCLUDING DELIVERY AND PRICING**

1. Delivery. If your Bid is accepted and a contract is executed, state the number of days you need to deliver the Goods and/or to begin providing Services:

You must be able to deliver the Goods and/or Services as specified in your Bid. Failure to do so may result in City terminating your contract or canceling the Purchase Order, pursuing collection under any performance bond, as well as seeking any other damages to which it may be entitled in law or in equity.

2. Pricing

(ESTIMATED QUANTITIES FOR EVALUATION PURPOSES ONLY)

Item	Item Description	Qty	Unit Cost	Extended Cost
1	Medium Voltage Variable Frequency Drive System (VFD)	2		
All costs must be included in your bid.			Total Delivered Cost:	

Bidder's Company Name _____

Authorized Signature Here ► _____

Printed Name: _____

RETURN THIS ENTIRE BID PACKET

ATTACHMENT A

MOTOR NAMEPLATE DATA

The motor will have a series of nameplates. The main rating nameplate will have the following information

NAMEPLATE DATA

NO : 217183-1,-2,-3,-4	FRAME : 9124S	MODEL : 217183	TYPE : TS
KVA : 1928	HP/KW : 2500 / 1865	VOLTS : 4000	AMP : 278 AC
RPM : 900	HZ : 60	PHASE : 3	PF : 1.0
EXCITATION: VOLTS : 86.6	AMP : 2.6	KW : 12.6	TYPE: AF1603
INSULATION CLASS : STATOR: F	ROTOR: F	MAX. AMB.: 50 °C	
TEMPERATURE RISE: STATOR: 80 °C	ROTOR: 80 °C		
SERVICE FACTOR : 1.15	OVERLOAD EXCITATION : 2.8	AMPS	
TIME RATING : CONTINUOUS	L.R.KVA/HP CODE: D		
ENCLOSURE : WEATHER PROTECTED TYPE I			
BEFORE INSTALLING OR		DATE OF	
OPERATING READ INST. : PGEI - 217183		MANUFACTURE : 1997	

**+CONTROL DATA
BRUSHLESS SYNCHRONOUS MOTOR**

CUSTOMER: INGERSOLL DRESER PUMP **CUSTOMER ORDER NO.:** PO 09722
MOHAWK WATER PLANT **GE REQUISITION NO.:** 9285-94762-1
MOTOR MODEL NO.: EN217183 **EQUIPMENT NO.:** 9-P-6, 9-P-8, 9-P-10, 9-P-12
MOTOR SERIAL NO.: 217183-1,-2,-3,-4 **DRIVE NO.:** _____

MOTOR RATING **TYPE** TS **POLES** 8 **HP** 2500 **KVA** 1928 **RPM** 900
VOLTS 4000 **PHASE** 3 **HZ** 60 **PF** 1.0 **AMPS** 278

SERVICE FACTOR 1.15 **TIME RATING** CONTINUOUS **DRIVEN LOAD** VERTICAL PUMP
TEMPERATURE RISE 80 °C BY RTD at 1.15 **Service Factor**
(Max. Ambient 50°C) **ROTOR** 80 °C BY RES. at 1.15 **Service Factor**

BRUSHLESS EXCITER FIELD DATA::

Field Resistance : at 25 °C 24.5 ohms at 120°C 33.4 ohms
Field Amps :at rated load 2.6 amps (DC) at S.F. Load 2.8 amps (DC) Minimum 1.4 amps (DC)
Field Voltage at Rated Load and 120°C 86.6 volts (DC) Minimum Field Volts at 25°C 34.3 volts (DC)

PERMISSIBLE STARTING SEQUENCE: The following data is calculated using:

Load Inertia 708 lb-ft² Rotor Inertia 5300 lb-ft² Start Curve 515HA869
Starting torque 40 % Pull-in-torque 100 % Pull-out-torque 150 %

Line Volts	P.U. System Reactance on - MVA BASE	Initial Rotor Bar Temp	Safe Time From Start: in Seconds				Minimum Synchronizing Speed %	Estimated Starting Seconds
			Zero Speed	50% Speed	75% Speed	97% Speed		
0.8 P.U.	infinite bus	25°C	10	11	13	120	96	5

Discharge Resistance: 4 ohms
Induced Field Amps at 100%V, 0 Speed 92 amps 50% Speed 94 amps 95% Speed 103 amps

One start with rotor at ambient temperature. A second start after 0 minutes
Subsequent starts with hot rotor at 30 minutes interval

MOTOR STATOR DATA:

Stator Amps :at Rated Load (1.0 pu) 278 Resistance at 25°C 0.081 ohms
Starting Current : at 80% Voltage * (Zero Speed) 465 % Stator Amps : at Service Factor 320
Maximum Full Voltage Stator Current on first slip cycle at Pull Out with Rated Excitation 260 %
Stator Current: at Pull- In Speed 250 %

SUGGESTED TEMPERATURE SETTINGS FOR PROTECTIVE EQUIPMENT

USING 100 Ohm Platinum Stator RTD's **ALARM** 125 **TRIP** 135 °C
100 Ohm Platinum Bearing RTD's 80 90 °C

OTHER DATA: ** Xd 1.05 X'd .28 X''d .20 Xl .11

Time Constants: T'do = .33, T''do = .025 secs. Insulation System: Class F

Efficiency: 4/4 = .965, 3/4 = .960 2/4 = .949

NOTES: * Motor Starting Current and Induced Field Current are proportional to the voltage at the motor terminals

** All Reactances and Time Constants are calculated for unsaturated conditions unless otherwise noted.

*** The Minimum Field Amps is for 90% of No Load Excitation

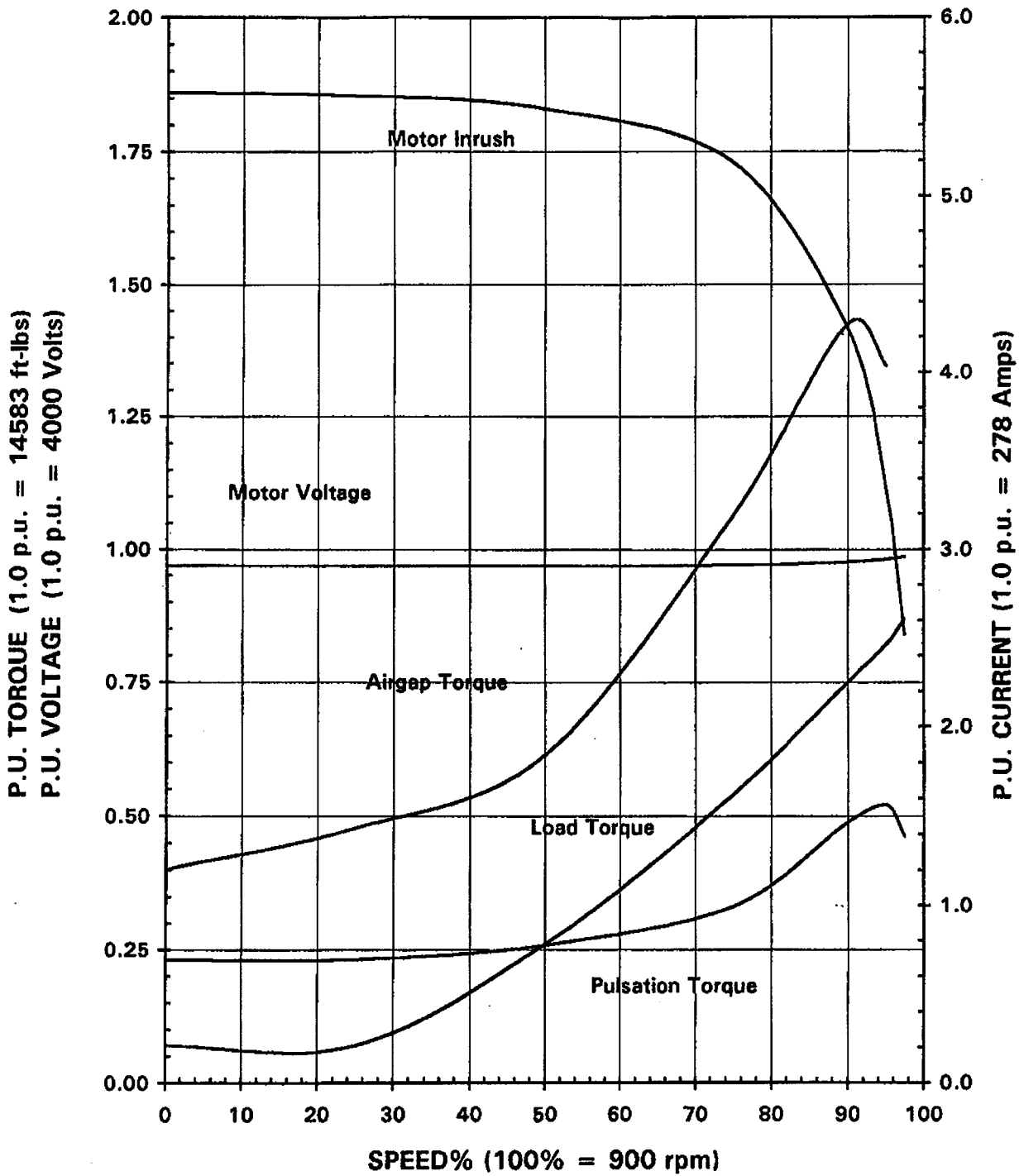
PREPARED BY R.W.Ford

DATE: December 30, 1996

DRAWING NO. 515HA811 **REV.** 1



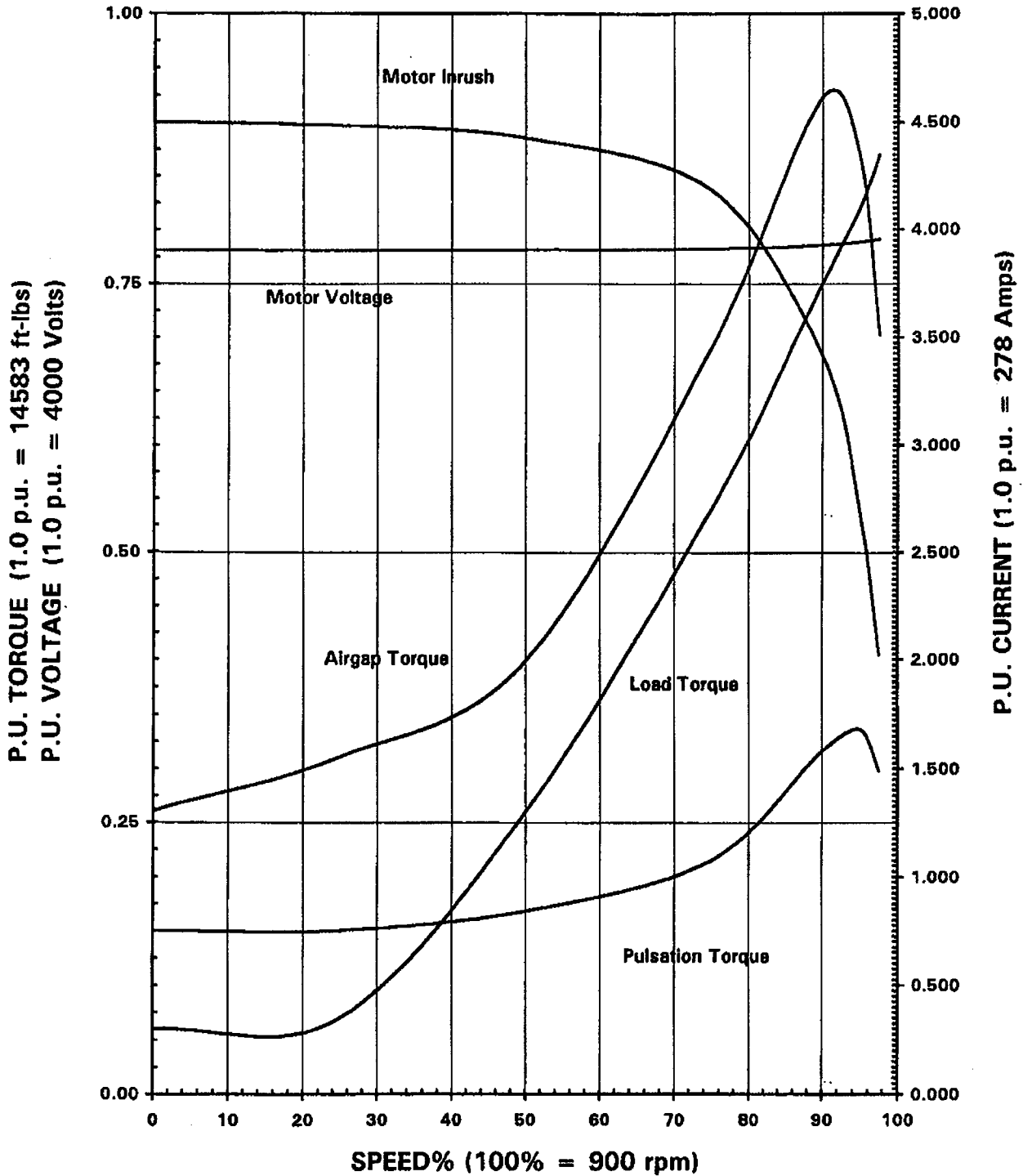
MOTOR MODEL: EN217183
INGERSOLL DRESSER PUMP / MOHAWK WTP.
TS 8P 900RPM 2500HP 1PF 1928KVA 4000V 3PH 60HZ





REDUCED VOLTAGE STARTING CHARACTERISTICS
AUTOTRANSFORMER: 7 % REACTANCE 80% TAP

MOTOR MODEL: EN217183
INGERSOLL DRESSER PUMP / MOHAWK WTP.
TS 8P 900RPM 2500HP 1PF 1928KVA 4000V 3PH 60HZ



CUSTOMER - MOHAWK WATER TREATMENT PLANT

RATING

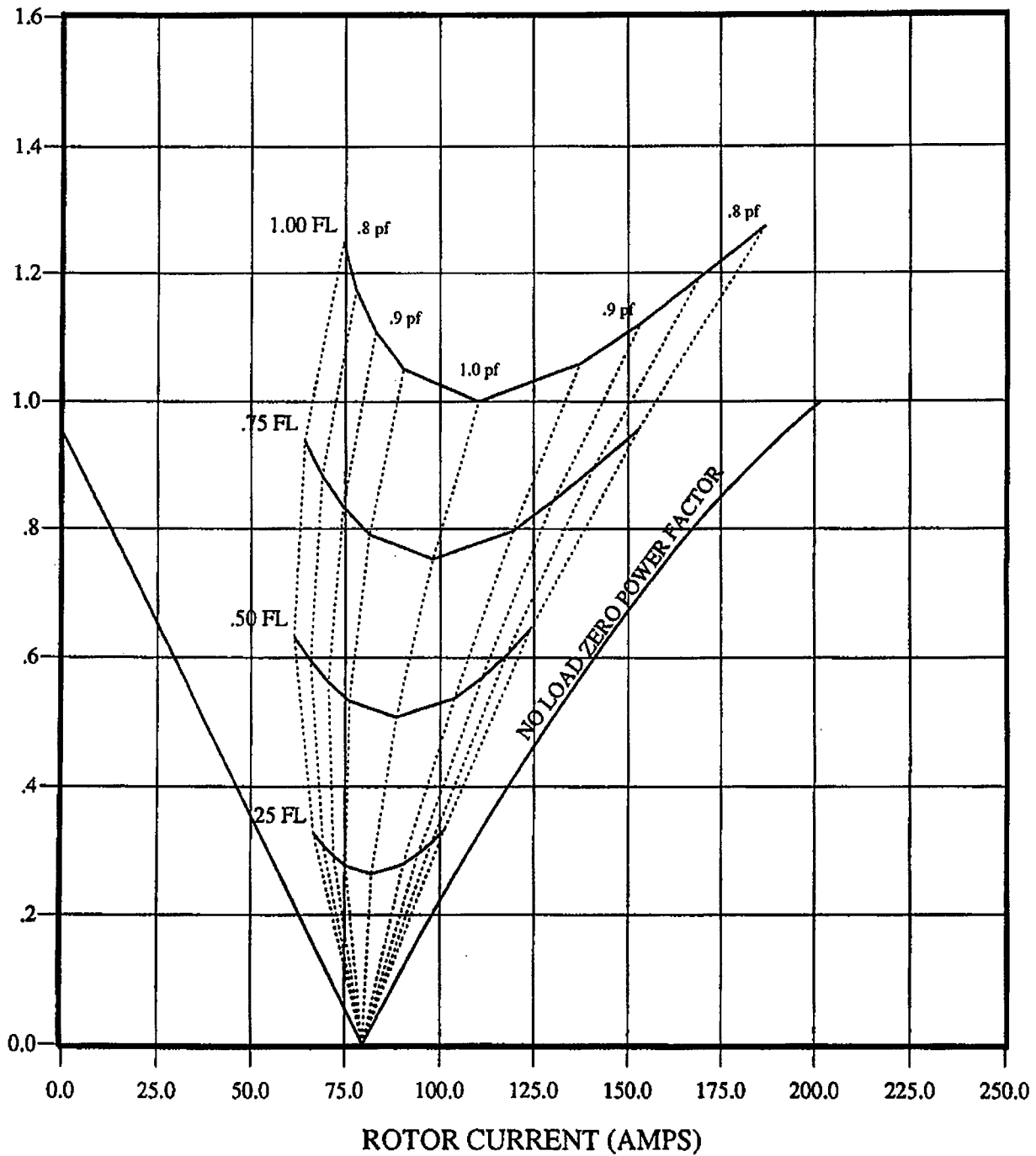
MOTOR MODEL # - EN217183

KVA - 1928.0 PF - 1.00 HP - 2500.0

GE REQUISITION # - 9285-94762-1

VOLTS - 4000.0 CURRENT - 278.0

RATED VOLTAGE V-CURVES



ENGINEER - R.W.Ford
DATE: 22-Jul-96

DWG No.

515HA813

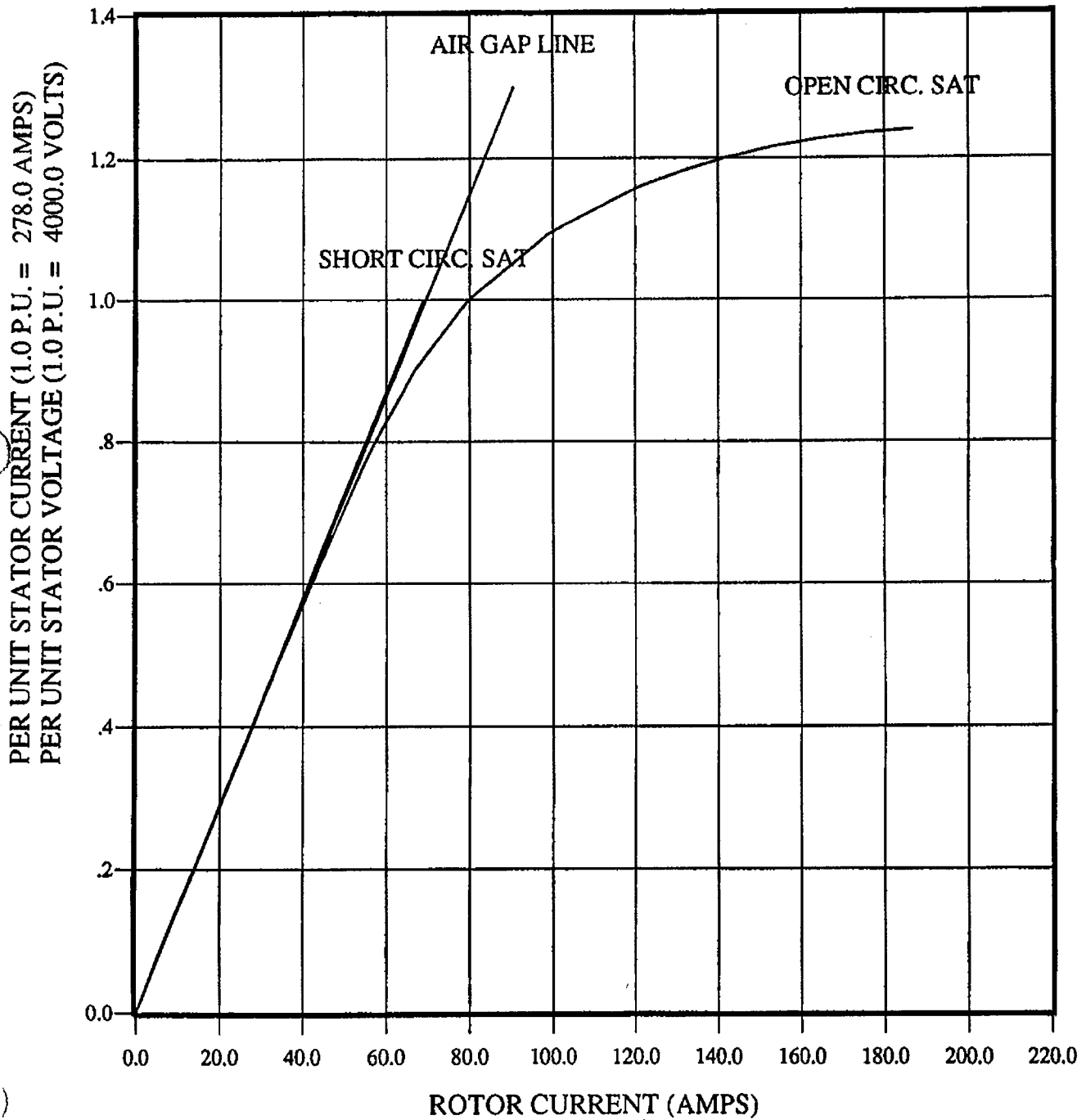
CUSTOMER - MOHAWK WATER TREATMENT PLANT

RATING

KVA - 1928.0 PF - 1.00 HP - 2500.0
VOLTS - 4000.0 CURRENT - 278.0

MOTOR MODEL # - EN217183
GE REQUISITION # - 9285-94762-1

CALCULATED OPEN AND SHORT CIRCUIT SATURATION CURVES

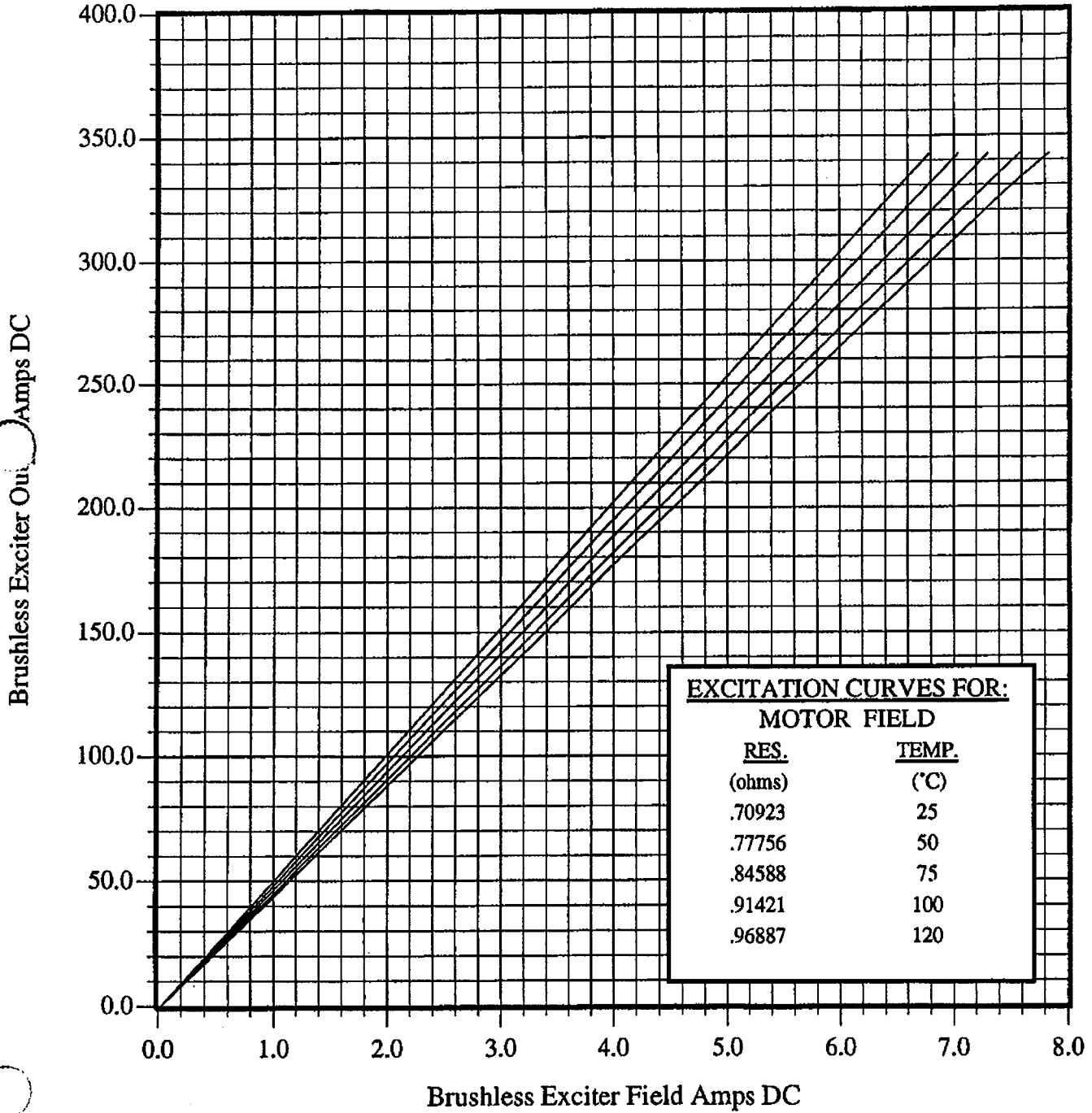


ENGINEER - R.W.Ford
DATE: 22-Jul-96

DWG No.

515HA812

Calculated Input-Output For Brushless Exciter



Model No.

EN217183

DWG No. 515HA814.