INVITATION TO BID
Ordnance Project – Drive
ITB-003 (Phase 1 Drive)

Sealed bids for the purchase of a medium voltage variable frequency drive for the Ordnance Project will be received by the Board of Commissioners of Umatilla County at the Umatilla County Courthouse, Pendleton, Oregon, on December 28, 2022, until 10:00 A.M. Bids will be publicly opened and read in Room 121, Umatilla County Courthouse, Pendleton, Oregon.

The valves types and quantities are listed in the bid sheet form. Delivery will be to the Hermiston, Oregon area.

Dated: November 17, 2022

Package Contents

# INSTRUCTIONS TO BIDDERS

## 1.0 SUBMITTAL OF PROPOSAL

All bids must be presented in a sealed envelope to the Umatilla County Board of Commissioners before 10:00 A.M., December 28, 2022. Bids submitted electronically or by fax will are not acceptable.

1.1 COMPLETE PROPOSAL MUST BE RETURNED. Bidders shall use the attached bid form. Bidder shall complete unit price, extended price and lead time for each component, along with the bid subtotal, freight total and total bid amount, and the amount of days the bid will be valid. The firm name and signature of an authorized person shall be in space provided.

All bids shall be valid for 60 calendar days.

Bids may not be changed or withdrawn after the opening of Bids.

Along with the bid sheet form, please provide manufacturer's cutsheets for all items listed in the bid sheet.

Each Bid shall be identified on the exterior of the sealed envelope as follows:

Bid For: ITB-003 (Phase 1 VFD)

1.2 RIGHT TO REJECT BIDS

The Board of Commissioners reserves the right to reject any or all bids, accept the bid deemed most satisfactory to the County, or terminate this invitation to bid at any time.

1.3 Bids to be submitted by mail shall be addressed to:

Umatilla County
Attn: Board of Commissioners
216 S. E. 4th Street
Pendleton, Oregon 97801

## 2.0 VARIABLE FREQUENCY DRIVE SPECIFICATIONS

The specifications for the variable frequency drive are set out in Attachment 1, attached to this document and incorporated by this reference. An electrical single line diagram for the Ordnance Pump Station is attached as Attachment 2.

## 3.0 CONTRACT AWARD

Award of the contract will be made to one bidder. Notice of Intent to Award by the Board of Commissioners will normally be made within 20 calendar days of opening. If a longer period of time is required, all bidders will be notified. Following the 7 day protest period,

a contract will be provided to the selected bidder. A draft contract is included for information.

## 4.0 DELIVERY

All items listed in the bid sheet need to be delivered by January 31, 2024. If expedited service fees are required to meet this delivery date these fees shall be provided in the bid sheet. Bidders shall set forth the date of delivery in the space provided on the bid sheet. Deliveries should be consolidated as much as possible to minimize the number of deliveries received on site. Delivery date shall be taken into consideration before awarding the contract.

The equipment herein specified shall be delivered to the area of Hermiston, Oregon. A more specific delivery location will be determined at a later date. Any necessary parts for operating the equipment that are not mentioned in the specifications are, by this inference, included and shall not become a cause for extra compensation to the successful bidder.

## 5.0 REQUESTS FOR INFORMATION

All requests for information (RFI) need to be provided in writing to the following email address (ordnanceproject@umatillacounty.gov) within 14 calendar days of the bid opening. Response to RFIs will be completed and published on Umatilla County's website (https://umatillacounty.gov/departments/bcc/notices) 7 calendar days prior to the bid closing date.

## 6.0 CUTSHEETS AND MANUALS

Bidders are to supply manufacturer's standard cutsheets for all items listed in the bid sheet as part of the supplier's proposal package.

Within 4 weeks of award, the successful bidder will need to submit all manufacturer's stand cut sheets, verified VFD and switch gear assembly dimensional drawings and mounting details electronically for technical approval to ordnanceproject@umatillacounty.gov.

Within 8 weeks of award, the successful bidder will need to submit all complete wiring diagrams, operation and maintenance manuals electronically to ordnanceproject@umatillacounty.gov.

Ship three (3) hard copies of complete wiring diagrams, operation and maintenance manuals with the equipment.

## 8.0 PAYMENT

Payment for the equipment herein specified will be made immediately after the 10th day of the month following full and satisfactory delivery.

## 9.0 WARRANTY SPECIFICATIONS

Bidder shall state all items under warranty and for how long in time and/or machine hours the warranty is good.

Bidder shall completely and adequately specify items, terms and conditions of warranty. If certain items are warranted by agencies other than bidder (or principal manufacturer), these items and warranties shall be expressly identified on a separate sheet indicating terms and conditions. If no such listing is included in this bid, it shall be understood that all items are warranted by the bidder (or principal manufacturer) under the warranty to the attached as part of this bid. Failure to include warranty information in the bid documents may result in your bid being considered non responsive.

## GENERAL CONDITIONS

1. Units offered under this bid shall be new, standard production models of the latest design in current production, unless otherwise specified.

2. Materials shall be of good commercial quality for the intended service and shall be produced by use of current manufacturing processes.

3. The bidder shall list on a separate sheet of paper any variations from, or exceptions to, the conditions and specifications of this bid. This sheet shall be labeled "Exception (s) to Bid Conditions and Specifications", and shall be attached to the bid.

# SECTION 26 18 39 VFD – MEDIUM-VOLTAGE VARIABLE FREQUENCY DRIVES

## PART 1 – GENERAL

### 1.1 Scope

A. This specification defines the requirements for the design, manufacture, test, quality control/quality assurance and shipment of high performance, high efficiency Medium Voltage (MV) Variable Frequency Drive (VFD) packages. The Variable Frequency Drives shall be Yaskawa, ABB, Allen Bradley, Eaton, or WEG.
B. VFD units shall be sized per the following:

| | | |
|---|---|---|
| a. | Input Voltage | 4.16 kV, 3ph |
| b. | Output Voltage | 4.16 kV, 3 ph |
| c. | SCCR Rating | 65 kA RMS |
| d. | Motor Rating | 800 HP |
| e. | Motor Poles | 6 |
| f. | Motor RPM | 1200 RPM |

### 1.2 Type and Description

A. This specification defines the performance requirements, power quality control requirements (for both input and output power), functional and protective features of the VFD, as well as Operator interface. The VFD is one component of a larger system. There are other specifications for medium voltage switchgear serving this equipment. This specification is limited to the VFD and its interface with other components of the system.

### 1.3 Submittals

A. The VFD manufacturer shall submit standard submittal drawings and information on the proposed equipment at the time of bid.
B. As-Built Drawings and Instruction Manuals: Three (3) copies of equipment instruction manuals for material purchased under these specifications shall be furnished. Each copy shall thoroughly address equipment installation, operation and maintenance. Each copy shall also include final test reports, equipment drawings, and renewal parts lists for all replaceable parts and assemblies. Manuals shall be bound by a durable means, properly indexed to identify contents and clearly labeled to indicate the project and equipment covered.
C. A material list shall be furnished listing the quantity, rating, type, and manufacturer's catalog number of all equipment on each unit.
D. Installation, operating and maintenance instructions shall cover all the equipment furnished.

## PART 2 – MATERIALS

### 2.1 Codes and Standards

A. The assemblies shall be constructed, wired and tested in accordance with all applicable sections of the latest listed Standards and Codes.
B. American National Standards Institute, Inc. (ANSI)/IEEE C37
C. IEC
D. IEEE 519
E. UL347A
F. National Electrical Manufacturers Association (NEMA)
G. NEC / NFPA
H. It shall be the manufacturer's responsibility to be, or to become, knowledgeable of the requirements of these Standards and Codes.

## 2.2 Power Requirements and Service Conditions

A. The VFD shall operate from a 3 phase, 4160Vac, 60Hz system and control power shall be derived from the main power source internally within the assembly.

B. Operating Temperature will not exceed 40$^{o}$C. The VFD equipment will be in a controlled atmosphere building with low relative humidity, non-condensing. Internal space heaters are required for when the unit is not in service. The project is at 500 ft above sea level in a seismic zone 2B.

## 2.3 Performance requirements

A. The VFD shall be able to control an 800 horsepower, 3 phase ac induction motor by using a Pulse Width Modulation (PWM) algorithm to provide adjustable voltage and frequency from a fixed power source. The VFD must be capable of overload protection settings for motors down to 250HP and up to 800 HP.

B. The VFD shall have a minimum efficiency of 97% at rated speed and full load. This efficiency shall include effects of associated transformers, reactors, filters and power factor correction components.

C. The VFD shall have a minimum overload capability of 110% for 1 minute and 120% for 15 seconds, each for 1event every 10 minutes.

D. The VFD shall produce a sinusoidal output waveform with minimal total harmonic distortion without supplemental filtering. The VFD must comply with IEEE 519 as it applies to influence on the power system and output to the motor terminals.

E. The VFD shall have as a minimum the following control features and functions:

1. Acceleration and Deceleration (accel/decel) Control: The VFD shall have four (4) independent sets of accel/decel ramps to optimize process control. Each of the eight (8) ramps shall have a range of adjustment of 0.1 to 6000 seconds. An additional accel/decel set shall be provided for jog mode, and an additional decel ramp shall be provided for Fast Stop.
2. "S curve" Acceleration and Deceleration Control: The VFD shall have an S curve function to soften the start and end of the accel and decel ramps. Four (4) independent S curve functions shall be provided, one each for accel start, accel end, decel start and decel end.
3. Speed Reference: The VFD shall have the capability of setting speed from the built-in digital operator, a remote signal of either 0 to10VDC or –10 to +10VDC, 4-20ma, or serial communication. Analog input resolution shall be 0.03Hz.
4. Preset Speeds: The VFD shall be capable of operating at one of seventeen (17) internally preset speeds, selectable by contact closure or serial communication.
5. Increase or Decrease Speeds by Contact Closure: The VFD shall be capable of accelerating or decelerating for the length of time a contact closure is made (digital M.O.P. function).
6. Upper and Lower Speed Reference Limits: The VFD shall have internally adjustable parameters to limit the upper and lower speeds of the VFD regardless of the speed reference command.
7. Jump Frequencies: The VFD shall have three (3) jump frequency settings to avoid mechanical resonance. The jump frequency bandwidth shall be adjustable.
8. PID Function**:** The VFD shall have an internal Proportional-Integral-Differential (PID) control function (with sleep mode) to minimize external control requirements.

## 2.4 Protective Functions

A. Motor and Load Protection.
   1. Motor Overload Protection: The VFD shall calculate motor overload based on torque requirements and motor parameters. The motor overload detection level shall be adjustable. The motor overload protection time constant shall be adjustable. Actions taken at time of overload shall be selectable from decelerate to stop, coast to stop, Fast Stop at the Fast Stop deceleration time, or continue operation while outputting a motor overload signal.
   2. Torque limit: The VFD shall be provided with an adjustable torque limit function for machine protection.
   3. Overtorque and Undertorque Detection: The VFD shall have independently adjustable overtorque and undertorque detection levels. Action taken at time of detection shall be selectable between stopping the VFD or continuing operation while outputting an overtorque or undertorque detection signal.
   4. Overcurrent Detection: The VFD will detect output overcurrent and react according to selected operation settings.
   5. Stall Prevention: The VFD shall have a stall prevention function during acceleration. The purpose is to prevent the motor from exceeding its breakdown torque level while accelerating a high inertia load, and stalling. Stall prevention shall be selectable between two (2) implementations:
      - Stopping acceleration until the output current reduces below the stall prevention setpoint, **or**
      - Intelligent Acceleration, where the drive continues to accelerate at the stall prevention current level.

B. Power Transient Protection
   1. Automatic Restart After Power Loss: The VFD shall be capable of restarting automatically after a loss of incoming power. The power loss time shall be adjustable to as long as 25.5 seconds, rating dependent. Upon restart, the VFD shall utilize a speed search function to capture the coasting motor and return it to set speed. Note: Requires that control power be maintained (Uninterruptible Power Supply (UPS) optional).
   2. Automatic Restart After a Fault: The VFD shall be capable of restarting automatically after an internal fault trip. The number of restart attempts and the maximum restart time shall be adjustable. Upon restart, the VFD shall utilize a speed search function to capture the coasting motor and return it to set speed.
   3. Input Overvoltage: The VFD shall trip in the event of an input overvoltage greater than 120% of nominal voltage. The overvoltage detection time shall be adjustable to as long as 2 sec.
   4. Input Undervoltage: The undervoltage level (AUV) shall be adjustable to prevent nuisance trips when the application can tolerate brief undervoltage conditions. The undervoltage level shall be adjustable to as low as 65% of nominal voltage.
   5. Momentary Power Loss: The VFD shall provide for momentary power loss recovery protection when a loss of input power occurs for a maximum of up to 2 seconds. When power is restored, the VFD shall execute a speed search function to capture the motor and smoothly accelerate to set speed. Note: Requires that control power be maintained (Uninterruptible Power Supply (UPS) optional).
   6. Kinetic Energy Braking (KEB): The VFD shall be capable of remaining in operation during an input power loss by absorbing stored mechanical energy from the load, decelerating as necessary to maintain operation. Requires uninterruptible Power supply (UPS) for control power (optional, or by others).

C. General Protective Functions
   1. Loss of Frequency (Speed) Reference: If selected by parameter setting, the VFD shall be capable of continuing operation after loss of frequency reference. "Loss of frequency reference" is defined as a drop in frequency reference of over 90% in 400msec.
   2. Output Phase Loss: The VFD shall be capable of detecting the loss of one or two output phases, shut down the VFD and announce the fault.
   3. Output Ground fault: The VFD shall be capable of detecting an output ground fault condition. The output ground fault detection level and time shall be adjustable. Action taken at the time of ground fault detection shall be selectable among no action (detection disabled), coast to rest, or continue operation and provide a "Ground Fault" digital output

D. Motor RTD Functions
   1. Each VFD unit shall monitor six RTD's installed in the motors. Each motor will be provided with (4) Winding RTD's, and (2) Bearing RTD's. The VFD shall shutdown when RTD values are reach trip levels. Tripped levels with be determined based on the motor manufacturers recommendations.
   2. If the manufacturers VFD does not support all six motor RTD's inputs, it is recommended the Schweitzer Engineering 710 Motor Protection relay be included to support these inputs. These relays shall we wired back to the VFD units to activate an external trip when the values reach tripped levels. Tripped levels with be determined based on the motor manufacturers recommendations.

## 2.5 Operator Interface/Communications

A. Digital Operator: The VFD shall be provided with a Digital HMI Operator interface for basic control functions and monitoring.
B. Personal Computer (PC) Interface: The VFD shall be provided with a PC interface to monitor operating status for maintenance and control. Software shall be provided by the VFD manufacturer to expedite setup, store drive data, recover fault history, and provide a 'trace' function to display (selectable) drive operating functions in real time.
C. Communications: The VFD shall be capable of communicating and being controller by a PLC through an ethernet connection using a Ethernet/IP (Allen Bradley) protocol.

## 2.6 Reliability

A. Design Considerations: The VFD shall be designed for high reliability using Insulated Gate Bipolar Transistors (IGBTs) and the high reliability, low power base driver circuitry afforded by an IGBT based design.

## 2.7 Enclosure

A. The VFD enclosure shall be free standing, frame and panel construction. NEMA Type 1 gasketed. All components shall be accessible from the front.
B. The VFD enclosure shall be air cooled with door mounted filters and roof mounted exhaust fans. The filters shall be removable and cleanable. Loss of cooling air flow detection shall be standard.
C. The VFD enclosure shall be painted ANSI 61 gray semi-gloss on both interior and exterior surfaces.

## 2.8 Lugs

A. Provide for bottom entry of supply cables. Include 2 hole compression lugs for 1/0 CU wire, 1 per phase. Include one, 2 hole compression lug for #6 AWG CU ground conductor. Lugs shall be rated "Copper Only" and be rated for 12 ton compression tool.

## PART 3 – EXECUTION

### 3.1 Shipping

A. All accessory items shall be shipped with the VFD. Boxes and crates containing accessories will be clearly marked with the contents.

### 3.2 Warranty

A. The manufacturer shall warranty the design, material and workmanship of the VFD for a period of 18 months from time of delivery. This shall not exceed 12 months from the date of commissioning. Warranty shall cover defects of materials, design or manufacture.

### 3.3 Training/Commissioning

A. The supplier shall provide initial startup inspection and commissioning support for each unit.
B. VFD Commissioning shall be performed by Startup Engineers certified and trained by the VFD Manufacturer.
C. Factory Training: The VFD Manufacturer shall offer training on the VFD product at the manufacturer's location. Manuals and training/support documentation shall be provided. Factory training details and fees shall be included during the bid proposal phase.
D. User Site Training: The VFD manufacturer shall also offer training at the end user location. This training shall be tailored to the specific application and shall be quoted separately from the bid proposal.

### 3.4 Factory Test/Witness Test

A. Standard Factory Test: Individual components and subassemblies shall be tested to the VFD manufacturer's standards. System test of the complete VFD shall include a load test driving a motor.
B. Witness Test: The VFD manufacturer shall allow the customer to witness tests during the standard factory testing at no charge. A custom witness test to accommodate customer's schedule shall be available for additional charge.

### 3.5 Service and Maintenance

A. The VFD Manufacturer shall maintain a team of qualified Field Service Engineers to provide field service and maintenance support. That service and support team shall be located within a 200 mile radius of Hermiston, Oregon.
B. Field repair shall be limited to replacement at the subassembly level, i.e. power cell, control board, etc. Subassembly repair and retest shall be provided at the VFD manufacturer's site to ensure Quality Control.

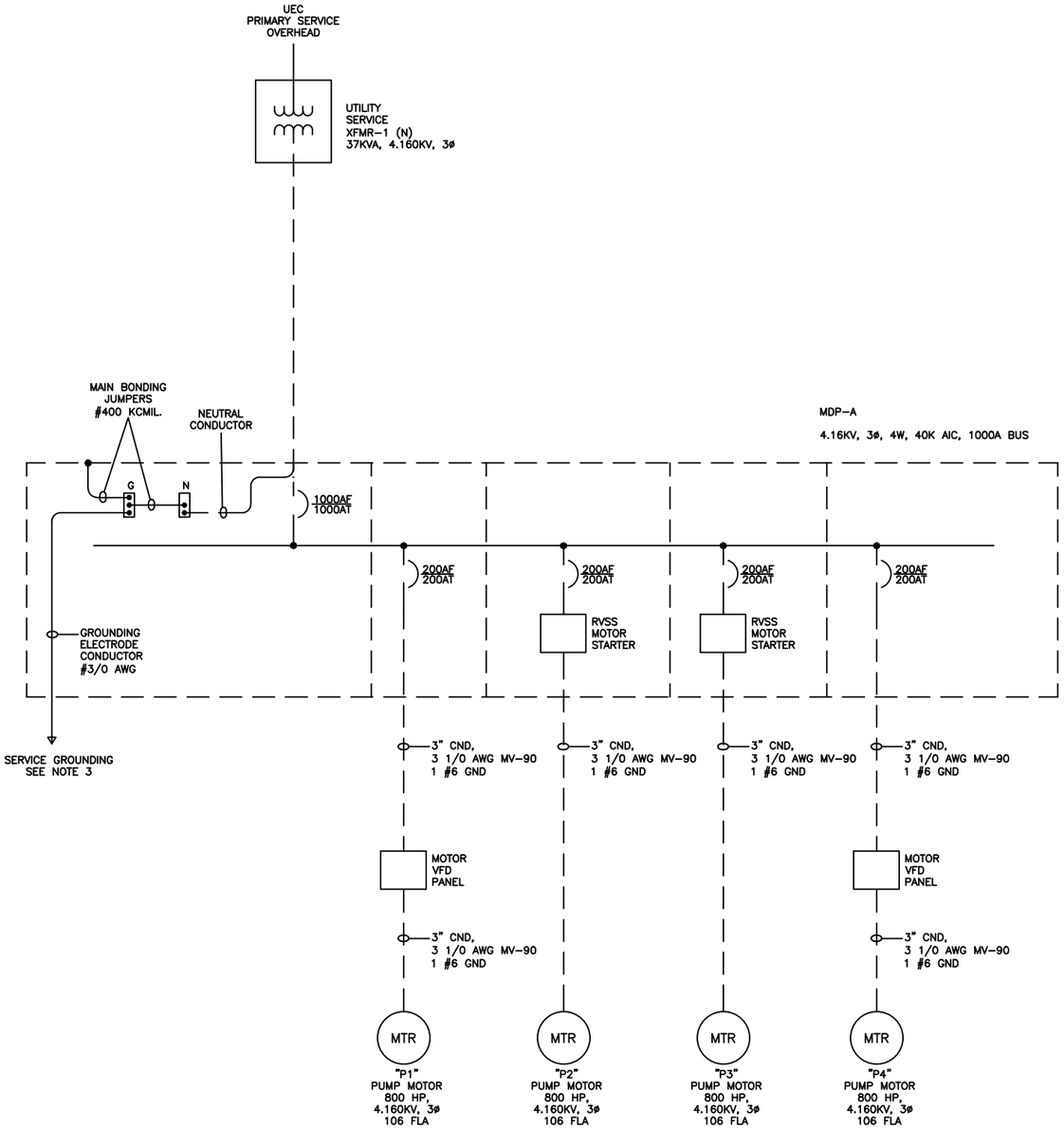
### 3.6 Spare Parts

A. The VFD manufacturer shall supply a list of recommended spare parts with prices as part of the bid.

### 3.7 Deviations to this Specification

A. Any deviations from or exceptions to this specification shall be defined in writing with the bid.

**END OF SECTION**




1 4,160V SINGLE LINE DIAGRAM

Scale: NTS

**NOTES:**

1. INSTALLATION SHALL BE IN ACCORDANCE WITH NEC AND LOCAL CODES.
2. ALL CONDUCTORS SHALL BE COPPER "CU".
3. CONTRACTOR SHALL SIZE CONDUIT PER NEC CODE REQUIREMENTS USING 40% FILL.
4. COORDINATE SERVICE WITH UEC.

| | |
|---|---|
| DRAWN | JACK GOURLEY |
| DESIGNED | JACK GOURLEY |
| APPROVED | JACK GOURLEY |
| DATE | 11/15/2022 |
| SCALE | NTS |
| PROJECT | 220305 |

IRZ ENGINEERING & CONSULTING
IRZ ORDANANCE PUMP STATION

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G6 ENGINEERING LLC
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Revisions

| N0. | Description | Date |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |

0 SCALE CHECK 1"

Stamp:

**DRAWING FOR INFORMATION ONLY, NOT FOR CONSTRUCTION**

Sheet Name and Description:
Issued for Bid
SINGLE LINE DIAGRAM
4,160V

Drawing Number:
E1000

# BID SHEET
## ITB-003 Ordnance Project Phase 1
## Variable Frequency Drive

| Line Item | Description | Quantity | Unit of Measurement | Unit Price (USD) | Extended Price (USD) | Lead Time |
|---|---|---|---|---|---|---|
| **1** | Medium Voltage 800 HP VFD Unit | 2 | EA | | | |
| **2** | Expedited Delivery Fees (When Applicable) | 1 | LS | | | |

| | |
|---|---|
| **Bid Subtotal** | |
| **Freight Total** | |
| **Total Bid Amount** | |

Bidder certifies this bid is valid for _____ calendar days.

Bidder_____

Address_____

By (Print)_____

By (Signed)_____