Council Meeting of April 22, 2015

Agenda Item No. 7K

REQUEST FOR COUNCIL ACTION

SUBJECT: Procurement of a new Motor Control Panel with Variable Frequency Drive for Well No. 6

SUMMARY: Approve a contract with Sturgeon Electric Company, Inc. for the procurement of a motor control panel with variable frequency drive for drinking water Well No. 6 in an amount not to exceed $56,254.00.

FISCAL IMPACT: Funding is available from Drinking Water Capital Funds.

STAFF RECOMMENDATION:

Staff recommends approval of the contract with Sturgeon Electric Company, Inc. for the procurement of a motor control panel with variable frequency drive for Well No.6 in an amount not to exceed $56,254.00.

MOTION RECOMMENDED:

"I move to adopt Resolution No. 15-83 authorizing the Mayor to execute a contract with Sturgeon Electric Company, Inc. for the procurement of a motor control panel with variable frequency drive for drinking water Well No. 6 in an amount not to exceed $56,254.00."

Roll Call vote required

Prepared by:

Tim Heyrend, P.E.
Capital Projects Engineer

Reviewed by:

Roger Payne, P.E.
Engineering Manager for Utilities

Reviewed as to Legal Sufficiency:

Jeffery Robinson
City Attorney

Recommended by:

Wendell Rigby, P.E.
Director of Public Works

Recommended by:

Bryce Haderlie
Interim City Manager

BACKGROUND DISCUSSION:

Well No. 6 is a City-owned drinking water well that supplies water during the summer season to supplement water deliveries from Jordan Valley Water Conservancy District. Well No. 6 was recently rehabilitated including chemical cleaning or the well screens, addition of a new deep well pump and shaft, and rebuilt motor. Now it is determined that additional electrical work is needed to complete the well rehabilitation and make the well operable. The well's electrical motor control panel is very old and is malfunctioning and unreliable, in addition parts to repair the panel are difficult to obtain. This well also requires a new motor control panel with a variable frequency drive controller in order to ramp the pump motor speed up or down. Having the ability to control the motor speed will control the amount of water that is being pumped. Rocky Mountain Power is offering a reimbursement incentive worth $23,700 for switching to the new motor control panel with the variable frequency drive controller because that will improve the power efficiency during well operation.

A bid for a new motor control panel with a variable frequency drive was advertised in Intermountain Contractor and the classified ads of local newspapers two weeks prior to the bid opening on Tuesday, April 14, 2015. Three companies submitted bids. The lowest bid was from Sturgeon Electric Company at the bid amount of $56,254.00, See attached bid results.

Staff recommends accepting the bid of Sturgeon Electric Company for the procurement and installation of the new motor control panel with variable frequency drive at a cost not to exceed $56,254.00. Funding for this item is available in the Drinking Water Capital Projects Fund.

Attachments:

- Bid Results
- Resolution
- Agreement

THE CITY OF WEST JORDAN, UTAH

A Municipal Corporation

RESOLUTION NO. 16-83

A RESOLUTION AUTHORIZING THE MAYOR TO EXECUTE AN AGREEMENT BETWEEN THE CITY AND STURGEON ELECTRIC COMPANY, INC. FOR THE PROCUREMENT OF A MOTOR CONTROL PANEL WTH VARIABLE FREQUENCY DRIVE FOR WELL NO. 6

Whereas, the City Council of the City of West Jordan has received bids for the procurement of a motor control panel with variable frequency drive for Well No. 6, with the low, responsible bid being from Sturgeon Electric Company, Inc. in the amount of $56,254.00; and

Whereas, the City Council desires to award the contract to Sturgeon Electric Company Inc. which award shall not be binding upon the City of West Jordan unless and until the contract is fully executed by the parties; and

Whereas, the proposed contract between the City of West Jordan and Sturgeon Electric Company Inc. (a copy of which is attached as **Exhibit A**) for procurement of a motor control panel with variable frequency drive for Well No. 6 in an amount not-to-exceed $56,254.00 has been reviewed; and

Whereas, the City Council of the City of West Jordan has determined that the attached contract with Sturgeon Electric Company Inc. for an amount not-to-exceed $56,254.00 is acceptable for the procurement of a motor control panel with variable frequency drive for Well No. 6.

NOW, THEREFORE, IT IS RESOLVED BY THE CITY COUNCIL OF WEST JORDAN, UTAH:

Section 1. The contract for the procurement of a motor control panel with variable frequency drive for Well No. 6 is hereby awarded to Sturgeon Electric Company Inc., which award shall not be binding upon the City of West Jordan until the contract is fully executed by the parties.

Section 2. After approval as to legal form by the City Attorney, the Mayor is hereby authorized to execute three original copies of a contract between the City of West Jordan and Sturgeon Electric Company Inc. in an amount not to exceed $56,254.00.

Section 3. This Resolution shall take effect immediately.

Adopted by the City Council of West Jordan, Utah, this 22nd day of April 2015.

_____
Kim V. Rolfe
Mayor

ATTEST:

_____

Melanie Briggs
City Recorder

THE CITY OF WEST JORDAN, UTAH

A Municipal Corporation

RESOLUTION NO. 15-83

A RESOLUTION AUTHORIZING THE MAYOR TO EXECUTE AN AGREEMENT BETWEEN THE CITY AND _____ INC. FOR THE PROCUREMENT OF A MOTOR CONTROL PANEL WITH VARIABLE FREQUENCY DRIVE FOR WELL NO. 6

Voting by the City Council	"AYE"	"NAY"
Jeff Haaga	_____	_____
Judy Hansen	_____	_____
Chris McConnehey	_____	_____
Chad Nichols	_____	_____
Sophie Rice	_____	_____
Ben Southworth	_____	_____
Mayor Kim V. Rolfe	_____	_____

INVITATION FOR BIDS

RETURN BIDS TO:

CITY OF WEST JORDAN
City Recorder's Office
8000 South Redwood Road
West Jordan, Utah 84088

BID NO.:

DUE DATE: **04/14/2015**
2:30 pm sharp

Provide and Install a Variable Frequency Well Control Panel

Please Complete:

Company Name:	Sturgeon Electric Company, Inc.	Contact Person: Casey Willesen	
Phone Number:	303-286-8000	Fax Number: 303-286-1811	
Address (orders):	12150 E. 112th Avenue	City: Henderson State: CO	Zip: 80640
Remit Address:	Same	City: State:	Zip:
Email Address:	degan@myrgroup.com	Fed Tax ID #: 84-0681206	

The City of West Jordan, Utah is seeking bids for the purchase and installation of a Variable Frequency Motor Control panel for a fully enclosed, 500 HP well pump motor located at 5975 West Dannon Way in West Jordan.

A pre-bid Job Site Walk Through may be scheduled by calling Tim Heyrend at 801-569-5086

The variable frequency motor control panel specifications are attached.

The Bidder shall submit with the bid a list of the major equipment and manufacturers that are proposed to meet the Specification.

The installation contractor shall be a Licensed Electrical Contractor in the State of Utah, and have a minimum of 5 years of experience with the installation of variable frequency drive control panels.

Exceptions to the specifications (if any) must be listed on a separate sheet marked "exceptions" and shall explain in writing each exception taken.

A minor exception, if taken and fully explained to the satisfaction of the West Jordan Public Works Department, will not necessarily be cause for rejection of the bid.

Questions regarding the procurement process to: Paul Wellington, Purchasing Agent e-mail: paulwe@wjordan.com.
Questions concerning the specifications may be directed to: John Isbell, Johni@wjordan.com.
only written changes to the specifications in the form of an addendum will be considered in the bid evaluation.

Sealed bids will be received by the City of West Jordan, City Recorder's Office, 8000 South Redwood Road, West Jordan, Utah 84088 until **April 14 at 2:30 P.M.** at which time they shall be publicly opened and read aloud.

Bids, modifications, or corrections received after the closing time on the "Due Date" will be considered late and will not be opened.
Facsimile transmitted bids or emailed bids will not be considered.
Bids will only be considered if they are submitted on the forms provided by the City.

It is the intention of the City to issue a purchase order to the lowest responsive and responsible bidder that meets the bid specifications, with reasonable promptness; however, the City does not guarantee to make any award based upon this IFB.

NOTE:

- A 100% payment and performance bond will be required from the awarded bidder.
- The successful bidder shall at all times maintain a current workers compensation insurance policy in accordance with State of Utah statute.
  $1,000,000 (minimum) per occurrence for bodily injury, personal injury, and property damage.
- The successful bidder shall at all times maintain a general automotive insurance policy in the amount of $1,000,000 (minimum) per occurrence for bodily injury, personal injury, and property damage.
- The successful bidder's insurance shall at all times include the City, its officers, employees, and volunteers as additional insured with respect to liability arising from any contract that results from this bid.

SCOPE OF SERVICES:

1. *Bidders to provide a drawing of the VFD Control Panel to submit to the City's building department to obtain a no fee permit.*
2. Bidders to furnish all equipment, labor, materials, and appurtenances for the project.
3. Provide and Install a Variable Frequency Drive Motor Control Panel at Well 6 (5975 West Dannon Way).
4. See Attached Specifications.
5. Time is of the essence. The installation needs to be COMPLETED by 10 weeks after the contract is initiated.

REFERENCES: **Provide a minimum of three similar jobs recently completed with contact information**

1. Job Name: BELLEVIEW PUMP STATION Contact Name: Debbie Valdez Phone: (303) 628-8564
2. Job Name: CHEESMAN DAM PHASE 2 Contact Name: Mike Gilmor Phone: (303) 628-6649
3. Job Name: Marston Safety Showers Contact Name: David Wilson Phone: (303) 628-6097

All materials submitted become the property of West Jordan, Utah. Materials may be evaluated by anyone designated by West Jordan as part of the proposal evaluation committee. Informative Materials submitted may be returned only at West Jordan's option.

BID PRICING AND DELIVERY DATE:

Total Bid Price: $ 56,254

Time: To assist in the evaluation of the suitability of bids, the bidder sahll specify the time frame required to deliver the VFD equipment after approval of the submittals.

Weeks to Deliver: 6-8 weeks

Bidder's Authorized Representative

Name: Don Egan Title: Vice President

Signature: Date: 4/2/15

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

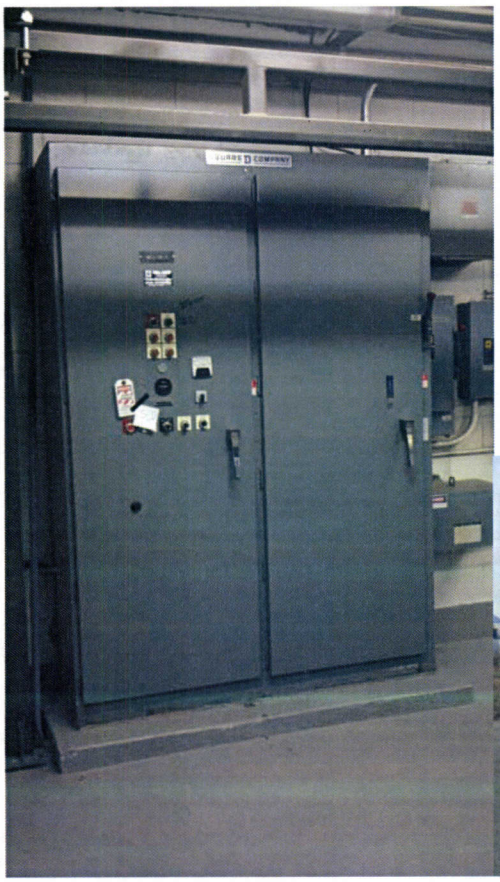
1.1 SCOPE

This specification is for the supply and installation of a complete and fully functional variable frequency drive and motor control panel on Culinary Water Well #6 for the City of West Jordan. The installation contractor shall be a licensed Electrical Contractor in the State of Utah in good standing. Well #6 is a fully enclosed well house building with a vertical turbine pump and 500 HP motor. The input voltage is 480 VAC 3-phase, and conduit and electrical wires are stubbed and pulled to the proposed VFD Panel location inside the Well #6 building. The contractor shall remove and salvage the existing electrical panel to the City. The space for the new motor control panel is restricted to the current panel dimensions of 5' 4" wide x 7' 7" tall x 25" deep.

The VFD needs to be manufactured and installed within 10 weeks from contract initiation. The basic control needs for the VFD are as follows:

1) Backspin start delay,
2) Waste valve timer/over-ride switch to stay in waste,
3) Shaft lube relay for oil dripper,
4) Hand-off-Auto Switch for Manual/Local Start/Stop and Speed Control; or Remote Start/Stop and Speed Control.
5) "In-Auto" contact for input to SCADA.
6) "Run" and "Fault" contacts for input to SCADA.

Additional requirements that must be met are included in the specification sections below.



1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers.

1. IEEE C62.41: Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
2. IEEE 519: Recommended Practices and Requirements for Harmonic Control in Electric Power Systems. 1992. (ANSI)

B. InterNational Electrical Testing Association

1. NETA ATS-1999: Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

C. National Electrical Manufacturers Association

1. NEMA 250-97: Enclosures for Electrical Equipment (1000 Volts Maximum)
2. NEMA AB 1-99: Molded Case Circuit Breakers and Molded Case Switches
3. NEMA ICS 2-93: Industrial Control and Systems: Controllers, Contactors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC
4. NEMA KS 1-96: Enclosures and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
5. NEMA MG 1-98: Motors and Generators (Including Revisions 1 and 2)

D. National Fire Protection Association

1. NFPA 70: National Electrical Code

E. Underwriters Laboratories Inc

1. UL-50 Standards for Enclosures for Electrical Equipment.

1.3 SUMMARY

A. This Section includes solid-state, PWM, VFDs for speed control of three-phase, squirrel-cage induction motors.

1.4 DEFINITIONS

A. IGBT: Insulated gate bipolar transistor.
B. LAN: Local area network.
C. PID: Control action, proportional plus integral plus derivative.
D. PWM: Pulse-width modulated.
E. VFD: Variable frequency drive.

1.5 SUBMITTALS

A. Furnish complete submittals custom prepared by the VFD manufacturer and shall be specific for the equipment furnished.

C. Product Data:

1. Manufacturer of the VFD.
2. Manufacturer of all components of the VFD.
3. Dimensions:
    a. Height.
    b. Width.
    c. Depth
4. Weight.
5. Nameplate Schedule.
6. Bill of material.
7. Ratings:
    a. Voltage.
    b. Phase.
    c. Current.
    d. Interrupting rating.

e. Momentary current rating.
f. Confirmation that the drive is sized for the full motor horsepower at the installed altitude.

8. List of recommended spare parts.

D. Shop Drawings:

1. Complete plan and elevation drawings showing:
   a. All dimensions.
   b. Panel, sub-panel and component layout indexed to the Bill of Material.
   c. Conduit connections.
   d. Required clearance around equipment for working clearances and required area above and around VFDs where pipe and ducts are prohibited.
2. Complete schematic, wiring and interconnection diagrams showing connections to both internal and external devices:
   a. Wiring diagrams shall include terminal number and wire numbers.
3. Complete single-line and three-line diagrams including, but not limited to, circuit breakers, motor circuit protectors, contractors, instrument transformers, meters, relays, timers, control devices, and other equipment comprising the complete system:
   a. Device electrical ratings shall be clearly indicated on the Drawings.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For VFDs, all installed devices, and components to include in emergency, operation, and maintenance manuals. Include the following:

1. Routine maintenance requirements for VFDs and all installed components.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. A qualified manufacturer specializing in manufacturing products specified in this section with minimum five years' experience.
2. Provide information for and location of a service center capable of providing training, parts, and emergency maintenance and repairs.
   a. Type of technical support available (e.g., system engineering and technician).
   b. Location of field service personnel.
   c. Field service daily rates in dollars per hour and dollars per day.
   d. Guaranteed response times to service requests.

B. Source Limitations: Obtain VFDs of a single type through one source from a single manufacturer.

C. All VFD's shall be 100% factory tested to ensure proper performance upon delivery.

D. VFD's installed in panels shall be 100% factory tested as a system by the VFD supplier.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Comply with NFPA 70.

1.7 STANDARDS

A. The VFD shall be UL listed and not require external fuses except where input power is supplied from multiple transformer secondaries.

B. All VFD and VFD systems shall be designed in accordance with applicable portions of NEMA standards, and panel build-ups shall be manufactured to comply with UL 508A or

other nationally recognized independent testing laboratory label.
C. The VFD shall be compatible with the installation requirements of interpretive codes such as National Electric Code (NEC) and Occupational Safety & Health Act (OSHA).
D. The VFD shall be capable of operating in compliance with IEEE 519-1992.
E. The VFD shall meet IEC 61200-2 for vibration levels.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Store VFDs indoors in clean, dry space with uniform temperature to prevent condensation. Protect VFDs from exposure to dirt, fumes, water, corrosive substances, and physical damage.
B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.9 PROJECT CONDITIONS
A. Environmental Limitations: Rate equipment for continuous operation, capable of driving full motor load, under the following conditions, unless otherwise indicated:
1. Ambient Temperature: 0 to 50 deg C.
2. Humidity: Equal to or less than 95 percent (noncondensing).
3. Altitude: The drive shall be capable of operating at 4922 feet above sea level.

B. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of electrical service.
2. Indicate method of providing temporary electrical service, if required by Owner.
3. Do not proceed with interruption of electrical service without Construction Manager's and Owner's written permission.

1.10 WARRANTY
A. All equipment furnished under this section shall be warranted by the contractor and the equipment manufacturers for a period of two (2) years from date of purchase.
B. Without additional charge the Manufacturer shall replace any work or material they have provided which develops defects within two years from date of substantial completion of the project.
C. All materials and equipment shall be warranted against defective materials, design and workmanship.
D. During the warranty period, the Manufacturer or his authorized dealer is required to make the necessary repairs or replacements on site.
E. Warranties which mention that the part must be returned to the factory are not acceptable.
F. During the warranty period, the OWNER will not accept charges for:
1. Travel time.
2. Mileage.
3. On-site repair labor.

G. Warranty shall list any and all items excluded.
H. If necessary, as determined by the OWNER, any repairs must be made on a premium time basis.

1.11 MANUFACTURER SERVICE AND PARTS AVAILABILITY

A. The VFD supplier must stock all replacement parts to repair or replace the VFD. In the event of a break-down, the supplier shall be able to repair the VFD within a 48 hour period from the time of notification.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
2. Danfoss Inc.; Danfoss Electronic Drives Div.
3. Eaton Corporation; Cutler-Hammer Products.
4. Mitsubishi Electric Automation, INC.
5. Rockwell Automation; Allen-Bradley Co.; Industrial Control Group.
6. Toshiba International Corporation.
7. US Drives

2.2 VARIABLE FREQUENCY DRIVES

A. Description: NEMA ICS 2, IGBT, PWM, VFD; listed and labeled as a complete unit and arranged to provide variable speed of an NEMA MG 1, Design B, 3-phase induction motor by adjusting output voltage and frequency.

1. Regulator technology shall be software configurable to either V/Hz (single or multi motor) mode or Sensorless Dynamic Torque Vector mode (single motor). Full, closed loop flux vector control shall be available for heavy duty applications. In V/Hz mode at base speed (60 hertz) and below, the Drive shall operate in constant volts per hertz mode. Above base speed (60 hertz), the Drive may selectively operate in either a constant volt per hertz mode or a constant voltage extended frequency mode.

B. Output Rating: 3-phase; for a variable torque load.

C. Unit Operating Requirements:

1. Input ac voltage tolerance of 480 V, plus or minus 10 percent.
2. Input frequency tolerance of 50/60 Hz, plus or minus 6 percent.
3. Minimum Efficiency: 96 percent at 60 Hz, full load.
4. Minimum Displacement Primary-Side Power Factor: 96 percent.
5. Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds.
6. Starting Torque: 100 percent of rated torque or as indicated.
7. Speed Regulation: Plus or minus 1 percent.

D. Internal Adjustability Capabilities:

1. Minimum Speed: 0 to 100 percent of maximum rpm.
2. Maximum Speed: 0 to 600 Hz.
3. Acceleration: 0.1 to 3276 seconds per 100 Hz.
4. Deceleration: 0.1 to 3276 seconds per 100 Hz.
5. Current Limit: 50 to a minimum of 110 percent of maximum rating.

E. Self-Protection and Reliability Features:

1. Input transient protection by means of surge suppressors.

2. Under- and overvoltage trips; inverter over temperature, overload, and overcurrent trips.
3. The Drive shall have a selectable electronic inverse time thermal overload function as required by NEC and UL Standard 991 for an AC Induction Motor (Refer to applicable codes for specific installation requirements). The overload shall be programmable from 20 - 135% of Drive rated current. Drive overload type shall be software configurable to protect general-purpose ac motors by reducing overload level at reduced motor shaft speeds. External motor overload relays for single motor applications shall not be required. Drive overload software shall be configurable to protect "inverter duty" AC motors without the use of external motor overload relays.
4. Notch filter to prevent operation of the drive-motor-load combination at a natural frequency of the combination.
5. Instantaneous line-to-line and line-to-ground overcurrent trips.
6. Loss-of-phase protection.
7. Reverse-phase protection.
8. Short-circuit protection.
9. Motor overtemperature fault.

F. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
G. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
H. Input Line Conditioning: The VFD shall be capable of operating in compliance with IEEE 519-1992. This compliance shall be at the input terminals of the drive. If a harmonic filter is required then the two devices together shall comply with IEEE 519-1992. The size of filter shall be determined by the drive manufacturer or the manufacturer's representative. If required the harmonic filter(s) shall be provided with the drive(s).

1. The total harmonic current distortion (THID) shall be less than 15%.

2. The harmonic filter shall be provided with a contactor to turn the filter capacitors off when the drive is not running.

I. VFD Output Filtering: It is the responsibility of the Contractor and drive Manufacturer to coordinate the drive with the motor and the installed cable length to ensure that the drive can charge the cable capacitance and that no damage can occur to the motor as a result of standing waves, high carrier frequency, high levels of dv/dt, etc. Any changes that may need to be made in order to protect the equipment shall be made by the Manufacturer at no additional costs to the OWNER.

J. VFD Mounted Operator Devices Drive Features: The features of the drive shall include the following:

1. The Drive shall have a Hand / Off / Auto selector switch that allows the operator to select where the VFD Start / Stop commands and Speed reference signal come from.

2. The drive shall have a keypad that shall be extendible, by optional cable, to a remote location up to 30 feet from the drive. This keypad shall be capable of mounting on

the enclosure door. The VFD shall include a local Operator Interface. The keypad shall include the following buttons, allowing 3 modes of operation:

Forward/Reverse/Stop/Start keys, Drive reset key, Reference increment/decrement keys. The keypad shall have a back-lit liquid crystal display (LCD) which can be configured to display frequency, current, function code set points, or Drive status and fault codes. It shall display text, providing display of:

a. Programming Mode: Function Code Numbers, Set points, and Status.
b. Diagnostic Mode: Fault Indication in plain English.
c. I/O Check Parameters: Analog and digital input/output signal status. These parameters shall include:
1) Output frequency (Hz).
2) Motor speed (rpm; adjustable for 2 to 8 pole motors).
3) Motor status (running, stop, fault).
4) Motor current (amperes).
5) Motor torque (percent).
6) Motor power consumption (kW).
7) Fault or alarming status (code).
8) PID feedback signal (percent).
9) DC-link voltage (VDC).
10) DC bus current (amperes).
11) Set-point frequency (Hz).
12) Motor output voltage (V).
d. Status Lights: LED indicators on the keypad shall indicate the following conditions:
1) Power on.
2) Run.
3) Stop.
4) Fault.

2. The Drive shall display operating data and fault information in plain English.
3. Upon a fault condition, the LCD shall be capable of displaying the last three (3) faults. These faults will be stored in memory and selectively be displayed on the LCD.
4. Unless the application requires it, the Drive shall operate as an open-loop control system requiring no feedback devices.
5. The Drive shall maintain set frequency regardless of load fluctuations.
6. The Drive will have an adjustable starting torque and Voltage Boost.
7. All Drive Operating Function Codes shall be stored in non-volatile memory (EEPROM). Potentiometer adjustments are not required nor allowed. The Drive will have a default set of Function Code settings.
8. The Drive shall have adjustable switching frequency settings ranging from 1000 to 3000 Hz.
9. The Drive shall be able to operate with its output disconnected for troubleshooting and startup.
10. The Drive shall have a selectable function to prevent reverse operation of the drive
11. The pilot devices shall be 22 mm, NEMA 4.

K. Control Signal Interface:

1. The drive shall accept up to 6 programmable digital inputs (from external dry contacts). The following are some of the required functions:

a. Run/Stop forward command.
b. Run/Stop reverse command.
c. Speed control from external analog input.
d. Speed control from keypad.
e. E-Stop command.
f. Run at fixed frequencies.

2. A minimum of 2 user programmable analog inputs (0 to 10 V or 4-20 mA). It shall be possible to individually scale each input, invert it, offset it, and then direct it to any settable parameter within the drive.

3. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the owners control system:
   a. 0 to 10 V dc.
   b. 0-20 or 4-20 mA.
   c. Potentiometer using up/down digital inputs.
   d. Fixed frequencies using digital inputs.
   e. Keypad display for local hand operation.

4. Output Signal Interface:
   a. A minimum of 2 user programmable analog output signals (0/4-20 mA), which can be programmed to any of the following:
      1) Output frequency (Hz).
      2) Output current (load).
      3) Output voltage.
      4) DC-link voltage (VDC).
      5) Motor torque (percent).
      6) Motor speed (rpm).
      7) Set-point frequency (Hz).
      8) Other programmable functions.

5. Remote Indication Interface: A minimum of 3 dry circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
   a. Motor running.
   b. Set-point speed reached.
   c. Torque Limiting.
   d. Frequency level detection.
   e. Fault indication (over temperature or overcurrent).
   f. Overload early warning.
   g. PID high- or low-speed limits reached.

L. The VFD shall have eight (8) user programmable preset speeds. It must be possible to select the eight different preset speeds using no more than three contact inputs (binary coded inputs).

M. Integral Disconnecting Means: NEMA AB 1, instantaneous-trip circuit breaker] with lockable handle.

2.3 ENCLOSURES

A. NEMA 12.

2.4 ACCESSORIES

A. Devices shall be factory installed in drive enclosure, unless otherwise indicated.

B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

C. Control Relays: Auxiliary and adjustable time-delay relays.

D. Standard Displays:

1. Output frequency (Hz).
2. Set-point frequency (Hz).
3. Motor current (amperes).
4. DC-link voltage (VDC).
5. Motor torque (percent).
6. Motor speed (rpm).
7. Motor output voltage (V).

E. Historical Logging Information and Displays:

1. Real-time clock with current time and date.
2. Running log of total power versus time.
3. Total run time.
4. Fault log, maintaining last four faults with time and date stamp for each.

F. Input Disconnect and Fuses: The VFD shall include a door interlocked input ac line disconnect switch with fuses. The ac line fuses should be of the semiconductor type and have an asymmetrical short circuit interrupting capability of 200,000 amperes.

G. Input Circuit Breaker: The VFD shall include a door interlocked input circuit breaker. The circuit breaker shall have an asymmetrical short circuit interrupting capacity rated for the current amperage.

H. 120 VAC Operator (Digital Input) Interface Card - to accept 120 VAC logic level input signals and convert them to 24 VDC logic level inputs for the VFD.

I. Analog Output Signal Conditioner Card - for 4 to 20 ma output signal.

J. Input / Output Expansion Card – to allow the VFD to accept additional Analog and Digital Input and Output signals.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas, surfaces, and substrates to receive VFDs for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFD installation.

C. Verify that building environment can be maintained within the service conditions required by the manufacturer.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Anchor each VFD assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and grout sills flush with mounting surface.

B. Install VFDs on concrete bases.

C. Install in accordance with NEMA ICS 3.1.

D. Tighten accessible connections and mechanical fasteners after placing controller.

E. Motor Data: Neatly type label inside controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

3.3 IDENTIFICATION

A. Identify VFDs, components, and control wiring.

B. Operating Instructions: Frame printed operating instructions for VFDs, including control

sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFD units.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between VFDs and remote devices according to current electrical code.
B. Bundle, train, and support wiring in enclosures.

3.5 CONNECTIONS

B. Ground equipment according to current electrical code.

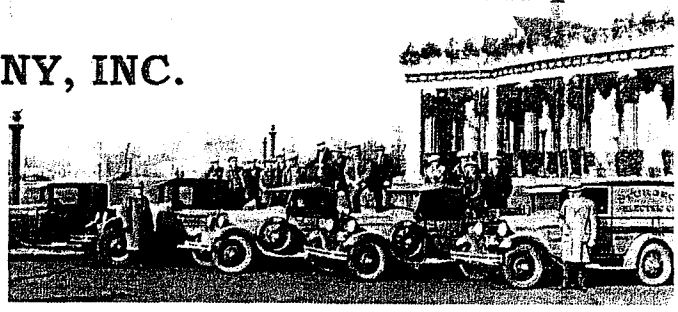
3.6 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:
    1. Test insulation resistance for each enclosed drive element, bus, component, connecting supply, feeder, and control circuit.
    2. Test continuity of each circuit.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:
    1. Inspect drives, wiring, components, connections, and equipment installation.
    2. Assist in field testing of equipment including pre-testing and adjusting of solid-state drives.
    3. Report results in writing.

Your Best Electrical Connection
Since 1912

STURGEON ELECTRIC COMPANY, INC.



Type of Organization: Corporation
Founding Date: 1912
Years in Business: 102 years

Sturgeon Electric Company, Inc. is a wholly owned subsidiary of MYR Group Inc. of Rolling Meadows, Illinois. Our average annual revenue for the last 5 years is $100,000,000.

What We Do: Since 1912, Sturgeon Electric has been providing comprehensive electrical construction solutions to clients throughout the western United States.

- Sturgeon's **Commercial & Industrial (C&I) Division** offers commercial and industrial electrical construction services, telecommunications services, and service and maintenance to clients.
- Our **Transportation Division** provides traffic signalization, highway lighting, interconnects and maintenance services for these systems.
- We also have a **Power Line Construction Division (T & D)** that provides a full range of capabilities related to transmission, distribution and substation construction.
- In addition, we offer preconstruction services in these divisions as well as design-build and other turnkey capabilities.

Who We Are: In 1914, our founder, David Dwight (D.D.) Sturgeon became the first person to light an outdoor Christmas tree with electric bulbs –dipped in red and green paint, Sturgeon colors. Installation Standards for Unit Assemblies developed by his son-in-law, Ralph Edgar Johnson, became the cornerstone of NECA Columns, and Mr. Johnson's *Estimatic Electrical Systems* became the first computerized estimating program for electrical work.

We received another first on August 8, 2008, when OSHA awarded us Star Status in their Voluntary Protection Program (VPP), making the Colorado Commercial and Industrial group the first electrical construction mobile workforce contractor in the United States selected for this elite status. In his presentation, Edwin G. Foulke, Assistant Secretary of Labor stated, "You have joined an elite group of facilities that provide exemplary safety and health protection. Designation as a VPP participant is testament to sustained excellence in all areas of your safety and health management system." In March 2012, we were named one of the Nation's Safest Specialty Contractors for 2011 by the Associated General Contractors of America.

OSHA VPP Star Status

Sturgeon Electric is a leading specialty contractor in Building Information Modeling and Virtual Design Construction using 3-D CAD. We currently use AutoDesk MEP 2012 and Revit MEP 2012 software for 3-D CAD, and NavisWorks for collision detection. We now have several BIM/3D CAD workstations manned and in operation. We are also actively selecting and training Project Engineers, General Foremen and Project Managers in the use of this software.

How We Achieve: We believe in accurately pricing the work and then maintaining the pricing by diligent cost controls throughout the project, so owner's budgets do not receive the negative impacts of unexpected change orders. We task our preconstruction and construction teams to provide a relentlessly positive influence on every project. While most contractors strive to be responsive, our personnel go beyond that; they anticipate owner needs and contribute more than is required. Our methods mandate increased communications, not only throughout all levels of our organization, but with subcontractors, general contractors, vendors and owners, to insure that we are a seamless part of the jobsite team. Sturgeon personnel are expected to diligently identify potential rocks in the road and to voluntarily provide solutions to mitigate potential impacts to the project, to proactively resolve issues, and to provide accurate and timely information to allow for proper scheduling and sequencing of the project to optimize productivity and insure on-time or ahead of time completion of the work.

Our Values
– Safety, Respect, Responsiveness, Creativity, Integrity, Initiative and Teamwork –
have everything to do with our success and longevity.

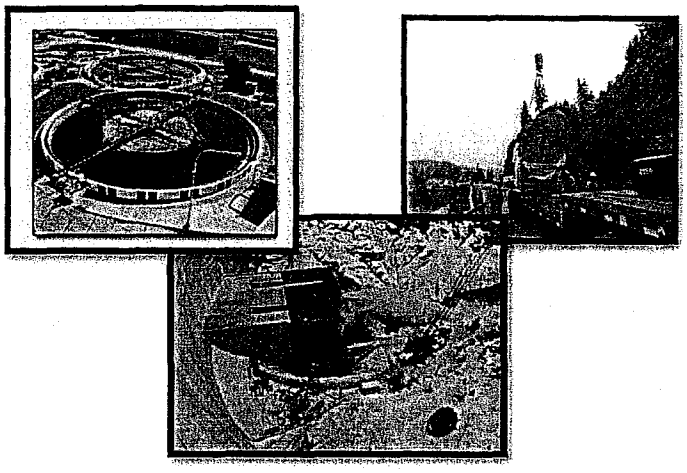
12150 East 112th Avenue, Henderson, Colorado 80640 *303-286-8000*

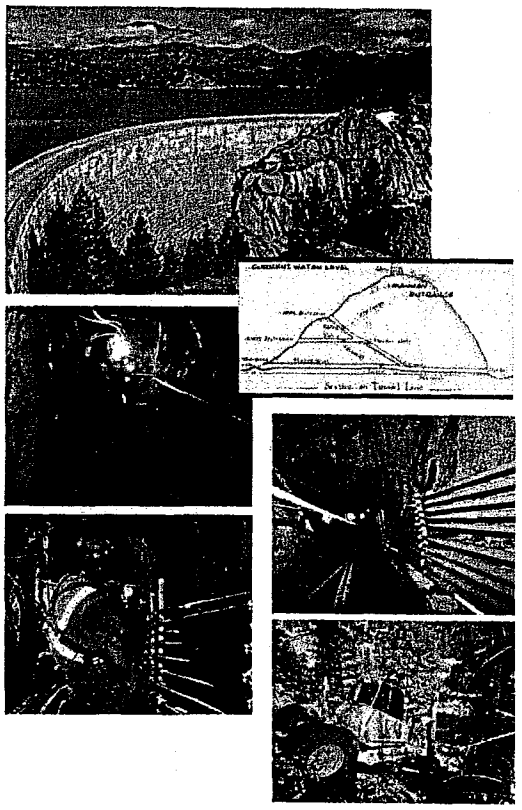
What We've Done: Over the decades, Sturgeon has helped construct thousands of projects. A small sampling of recently completed projects include:

- St. Anthony's West Hospital
- Research Complex 2 - UCHSC
- Adams County Government Center
- Lone Tree- Highlands Pump Stations
- TREX
- Comanche Power Plant
- Coors 15kV Switchgear Replacement
- Department of State Data Center
- Eisenhower Tunnel MCC Replacement
- COSMIX in Colorado Springs
- PrimeStar Solar Manufacturing Facility
- Cheesman Reservoir
- Ft. Carson Brigade & Battalion HQ
- SOCS Facility at Martin Marietta
- Denver Union Station Signalization

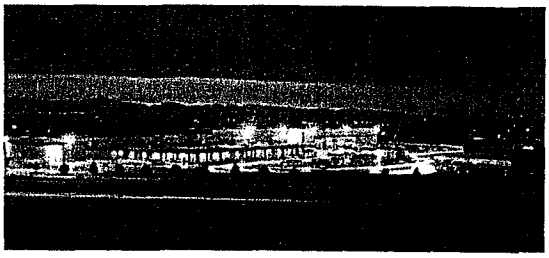
Water, Wastewater and similar projects In Progress or Completed: Over the past dozen or so years, we have performed on multiple projects similar to the Broomfield BNR Enhancement project. Additional information about these projects is attached.

- Clifton Water Treatment Plant - $561,000
- Metro Wastewater - $7,500,000
- Cheesman Dam Upgrade - $2,170,785
- Palisades Water Treatment Plant – $345,000
- Summitville Water Treatment - $1,557,900
- Ute Water Treatment Plant - $620,000
- Farmers Korner - $3,472,800
- Williams Fork Reservoir - $6,725,500
- Lone Tree and Highlands Pump Stations -$5,945,200





Our Facilities: Sturgeon Electric is headquartered in Henderson, Colorado, 20 minutes from Downtown Denver, Colorado. This facility houses central operations management, accounting, estimating, purchasing, marketing, tools, and equipment. Currently, we have approximately 100 personnel within the office and 500 electricians in the field.



The headquarters site covers 10 acres and 75,000 square feet of building. This includes offices, warehouse for tools and materials and garage for equipment maintenance and repairs. It also includes a shop area for dielectric testing of rubber goods, aerial buckets, and insulated booms.

Our Mission Statement
– To be the preferred provider of construction services to our clients –
has everything to do with our client's satisfaction.

Sturgeon Electric Contact: Bruce Byers, bbyers@myrgroup.com, 303-286-8000 x 3017.

Project History - Denver Water Projects

Project Title	Project Location	Value	Date Start	Date Complete	Owner Name	Owner Contact	Owner Phone	Description
1arston Safety Showers	Denver, CO	$61,700.00	02-Feb-12	31-May-12	Denver Water	David Wilson	(303) 628-6097	Install flow switches on new safety showers and eye wash stations. Connect to existing control panels. Install power to water circulation pumps.
HEESMAN DAM PHASE 2	Sedalia, CO	$345,900.00	01-May-11	01-May-12	Denver Water	Mike Gilmor	(303) 628-6649	Provide new power, lighting and communications for upgrades at Chessman Dam.
ELLEVIEW PUMP STATION	LITTLETON, CO	$1,397,900.00	02-Jun-11	16-Feb-12	Denver Water	Debbie Valdez		Other Building Renovations
OOTHILLS WATER TREATMENT	Littleton, CO	$51,800.00	07-Mar-11	31-Dec-11	Denver Water		(303) 628-6000	Foothills treatment plant sodium hydroxide system improvements.
ROOMFIELD PUMP STATION PH2	Thornton, CO	$275,600.00	10-Feb-11	31-Dec-11	Denver Water	Greg Hempleman	(303) 628-6650	Install nw 13.2kV metal clad switchgear,primary metered service, two 13-2kV to 4160V transformers, wire new power, controls and instrumentation to 3 new 450hp 4160 volt pumps at existing Denver Water Broomfield Pump Station.
ENVER WATER	Denver, CO	$25,000.00	17-Sep-08	17-Sep-11	Denver Water	Debbie Valdez		Miscellaneous estimating services for Denver Water Board.
ON WOMEN CONSTRUCTORS	Denver, CO	$25,000.00	20-Jun-11	01-Sep-11	Denver Water			Furnish and install conduit and wire for water meter vault.
ONE TREE AND HIGHLANDS PS	Lone Tree, CO	$5,945,200.00	04-Aug-10	30-May-11	Denver Water	Brett Bailey	303-628-6692	2 generators, 4160v switchgear, 750kW padmount transformers, 480v MCC, 2 PLC panels, 150HP motors and VFDs,modify 4160 volt breakers, generator pads and retaining walls.
ENVER WATER RECYCLING STORAGE UILDING	Commerce City, CO	$77,600.00	28-Sep-10	26-Jan-11	Denver Water			New steel storage building includes new power, lighting, Gai Tronics, handhole and ductbank
ENVER WATER CHEESEMAN DAM ESERVOIR	Sedalia, CO	$2,170,800.00	16-Nov-09	10-Oct-10	Denver Water	Mike Gilmor	303-628-6649	Electrical Construction/New Construction, Sedalia Colorado Chessman Dam, Upgrade complete electrical, communications and security systems at dam including backup generator, fiber optics and new electrical service entrance equipment.

IARSTON FILTER PLANT #2	Denver, CO	$2,729,300.00	22-Jun-09	01-Jul-10	Denver Water	Brett Balley	303-628-6692	At Marston Filter Plant #2; rework existing filter plant including new controls, instrumentation, PLC's, fiber, lighting, new 13.3kV distribution including a new PMH-12 cabinet, 750kva transformer, 15kV feeders, 600 kw diesel generator.
APITOL HILL RECYCLED WATER STREET	Denver, CO	$21,700.00	09-Oct-09	31-Dec-09	Denver Water	Debbie Valdez		Water Treatment New Service, Extend the ground grid for the lighting protection system near the Botanic Gardens lease area at the Capitol Hill recycled water storage tank.
ROOMFIELD PUMP STATION	Thornton, CO	$538,100.00	13-Aug-08	15-Apr-09	Denver Water	Jeff Slankard		Electrical installation at pump station. Furnish and install medium voltage switchgear, conductors, conduit and controls for existing pumps at the existing Broomfield Pump Station.
ENDRICK PUMP STATION	Lakewood, CO	$919,000.00	13-Aug-08	15-Apr-09	Denver Water	Mark Keilwitz	303-628-6615	Electrical installation at the new pump station. Furnish and install 15kV metal enclosed switchgear, 2500 KVA transformer, 480 V MCC, and 5 variable frequency drives, including power and controls at the existing Kendrick Pump Station.
ENVER WATER - JONES PASS	Empire, CO	$36,000.00	22-Sep-08	31-Dec-08	Denver Water	Debbie Valdez		Electrical work at Jones Pass for the Denver Water Board.
WB HIGHLANDS PUMP STN	Centennial, CO	$1,602,600.00	18-Feb-08	01-Sep-08	Denver Water		(303) 628-6000	DWB Highlands; provide complete electrical, communications, security and fire alarm systems for pump station and data center and relocation / conversion of 15kV overhead distribution line to underground.
IARSTON RESERV	Denver, CO	$405,600.00	04-Feb-08	15-May-08	Denver Water	Sarah Dominick	(303) 628-6446	Construction at Marston Reservoir; wire new oxygenation system including duct bank, conduit, wire, controls, instrumentation, new control panels, submersible cable installed in the reservoir to a new pump on a "Speece Cone".
ENVER WATER HV MAINT	Various, CO	$100,000.00	01-Apr-07	31-Mar-08	Denver Water	Mark Keilwitz	(303) 628-6618	Maintenance contract - High voltage maintenance at various locations in Denver Water area.
IONTCLAIR RE-USE PUMP STATION	Denver, CO	$2,461,700.00	20-Oct-06	13-Sep-07	Denver Water	Mark Keilwitz	303-628-6615	Wiring new recycled Denver Water pump station to include medium voltage distribution, 40 V VFDs, MCCs, instrumentation, fire alarm, security and lightning protection.
OBERTS TUNNEL	Grant, CO	$307,900.00	23-Apr-07	01-Sep-07	Denver Water	Debbie Valdez	(303) 628-8564	Maintenance contract - Renovations and maintenance as needed.
APITOL HILL STORAGE TANK	Denver, CO	$805,100.00	20-Oct-06	13-Feb-07	Denver Water		(303) 628-6000	Install power and instrumentation for new recycle water storage tank.

BID / QUOTE TABULATION FORM:

Bid Name Variable frequency Well Control Panel

Project #

Bid/Quote Date: 4/14/2015 2:30 PM

Requesting Department: Eng. Tim Heyrand

CONTRACTOR NAME:		Total Bid Price
1 John Deere		$69,734
2 S&S Electric		$65,600
3 Sturgeon Electric Co.		$56,254
4		
5		
6		
7		
8		
9		
10		