ORDER

(Advertise for Bids for Upgrade of MS Avenue Lift Station Pump and Controls)

IT IS ORDERED by the Mayor and City Council of Laurel, Mississippi, that an "Upgrade of MS Avenue Lift Station Pump and Controls" be advertised for bid. The upgrade is necessary for the additional flow due to the construction of Palisades Park Cove Apartment Complex. Funds are budgeted in 386-386-948.9.

(NOTICE TO BIDDERS)

(COPY OF SPECS)

(BID FORM)

SO ORDERED this the __5th___day of __February__, A.D., _2019_.

Motion was made by Councilperson Wheat, and seconded by Councilperson Capers, that the above and foregoing Order be adopted.

Upon roll call vote, the results were as follows:

YEAS: Capers, Wheat, Thaxton, Carmichael, S. Comegys, T. Comegys, Page
NAYS: None
ABSTAINING: None
ABSENT: None

The President thereupon declared the motion carried and the Order adopted, this the 5th day of __February__, A.D., 2019.

_____
PRESIDENT of the COUNCIL

Attested and submitted to the Mayor by the Clerk of the Council on _____.

_____
CLERK of the COUNCIL

APPROVED ( ) DATE _____

VETOED ( ) DATE _____

_____

MAYOR

ATTEST:

_____

CITY CLERK

****

Min. of 02/05/19 Bk. No. 101 Pg. _____; AGENDA ITEM NO. 4A

ADVERTISEMENT
FOR
UPGRADE OF MS AVENUE LIFT STATION PUMP AND CONTROLS

NOTICE TO BIDDERS

Notice is hereby given that bids will be received by the City of Laurel for an "Upgrade of MS Avenue Lift Station Pump and Controls".

Specifications for the "Upgrade of MS Avenue Lift Station Pump and Controls" are on file with the City Clerk and available electronically at www.laurelmsprojects.com. Sealed bids must be submitted to the Office of the City Clerk, Room 201, at Laurel City Hall, 401 North 5th Avenue, Laurel, Mississippi, or electronically at www.laurelmsprojects.com. In the case of sealed bids, the bid envelope must be clearly marked on the outside "Sealed Bid for an Upgrade of MS Avenue Lift Station Pump and Controls" and submitted by 9:55 a.m. on Monday, March 4th, 2019 at which time bids will be publicly opened.

The City of Laurel reserves the right to reject any/or all bids.

This the 5th day of February, 2019, A.D.

_____
Mary Ann Hess, City Clerk

Publish: February 12th and February 19th, 2019

LAUREL, MS – Influent Lift Station
Duplex Control Panel Specifications

Specifications – General

Control panel manufacturer shall be UL 508A listed. Control panels shall be properly labeled and shall contain a data pocket permanently affixed to hold drawings or other City of Laurel operator documentation. All drawings shall be laminated and shall contain all pertinent information about the control panel i.e. wiring diagrams, wiring color keys, etc. etc. The control panel shall house two (2) Variable Frequency Drives (VFDs) to run two motors using 480V 3Phase power. The VFDs will be different sizes to accommodate the HP of the motors in a normal duty cycle. VFDs do not need to be oversized for severe duty cycle.

The pump supplier shall provide an on call seven days a week and twenty four hours a day regardless of holiday service. The preferred pump supplier shall have a fully operated pump repair shop, machine shop, motor rewind shop and UL listed electrical control panel shop under one roof. The pump supplier should be able to test pumps and supply data on performance curves. Any bidder lacking in this type of service may not be considered.

Component Specifications

A. Enclosures
   a. Enclosure

      Enclosure shall be NEMA 4 304 Stainless Steel and shall be preferred Schaefer's Electrical Enclosures or equivalent. Enclosure shall have a Pad lockable 3Point Latching Handle. At a minimum, the enclosure shall be 60"H X 60"W X 16"D and shall be a floor mount double door type.

   b. Deadfront

      Enclosure shall have an aluminum adjustable deadfront mounted on corner brackets to mount all pilot devices on. The deadfront shall have a panel latch. The deadfront shall be mounted a 1" flange on hinge side panel bracket to increase the open width of the deadfront.

B. Surge Protection

   Enclosure shall have a surge protection device. At a minimum it shall be as manufactured by Square D and shall be the SDSA3650 or engineer approval equal.

C. Circuit Breakers
   i. Main Circuit Breaker – Shall be as manufactured by Square D and shall be the H-frame or J-Frames series rated for 600VAC.
   ii. Motor Branch Circuit Breakers – Shall be as manufactured by Square D and shall be the H-frame or J-Frame series dependent on motor HP.
   iii. Control Circuit Breaker – The control panel shall have a control circuit breaker.

iv. Panel shall have a place to wire in a generator and a failsafe to prevent presence of power from both sources simultaneously.

D. Power Distribution

i. The control panel shall be able to distribute power from the main breaker to a power distribution block for distribution to each of the branch circuits. Circuit breaker lugs off of the main shall not be accepted.

E. Motor Starters

i. Motor starters shall be by Square D and be the ATV630 model Variable Frequency Drive.

F. Pilot Devices

Pilot devices shall be mounted on the deadfront and shall be 22mm and as manufactured by Square D. In general, there shall be a pilot device for each of the following:

a. Hand – Off – Auto Selector Switch Per Pump
b. Green: Running Pilot Light Per Pump
c. Yellow: Seal Fail Pilot Light Per Pump
d. Red: Thermal Pilot Light Per Pump
e. Potentiometer for Manual Speed Control

G. Hour Meter

Hour meters per pump shall be installed on the deadfront. Hour meters shall be as manufactured by ENM and shall be the T50A2.

H. Pump Controller

The Controller shall control up to four pumps to perform liquid level control. The Controller shall be capable of controlling a mix of constant speed and variable speed pumps. The Controller shall be capable of alternating the pumps, shall provide lag pump delays and high and low level alarms, and shall perform both pump-down and pump-up operation.

The Controller shall be standard “off the shelf” equipment with published literature and fully tested hardware and operating program. The Controller must be field configurable from the front of the unit, and require no special tools or software to set-up or operate.

The Controller shall be UL listed as Industrial Control Equipment, UL 508.

The Controller shall accept an input signal in the following forms: a 4-20 mA analog signal, inputs from a Conductance Level Probe, or Float Switches.

All connections to the Controller shall be made to removable, “Phoenix” style combination connector/plugs.

The Controller shall be a microcontroller-based device and not require a battery to maintain the operating program. All set-up values shall be stored in non-volatile memory.

A numerical level display shall be provided on the front of the unit. It shall have a 3 digit, 7 segment LED display and show levels in feet and tenths of feet. All setup parameter values shall be viewed or changed from the front of the Controller.

The Controller shall not require an external power supply or any external I/O modules to be a fully functioning unit. An analog input (4-20mA) with zero and span adjustments shall be provided for the scaling of the wet-well level input.

The status of all of the discrete inputs shall also be viewable from the front of the unit.

All electrical connections, for power or I/O, shall be by quick disconnect phoenix style connectors.

The Controller shall have a connector for a conductance level probe of ten sensor points.

Relay outputs shall be provided as standard for high and low level alarms and for the control of up to three pumps.

If not being used, the ten conductance level probe inputs shall be available for use as ten additional discrete SCADA inputs, or for control via float switches.

The Controller shall remember which pump was in the lead position during a power outage.

The Controller shall have 18 discrete inputs. The inputs shall be transient protected and be programmable for the following functions:

- Pump disable with HOA in OFF, or pump fault
- Freeze wet well level during a bubbler tube purge
- External Lead Pump Selector Switch
- Limit number of pump called to run on emergency power
- All Pump Disable – for connection to Phase Monitor
- Sequence Input for Lead Lag Select Switches
- High and Low Level Alarms
- Pump disable upon low level – for connection to low level float switch

- Float switch backup
- Low Level Pump Cutoff
- Start Flush Cycle
- Call Pump Last
- Inputs for user selectable SCADA functions

The Controller shall include a fault indicator on the front of the unit and retrievable fault codes to aid in troubleshooting.

A level simulation feature shall also be available from the front of the unit. The Controller shall automatically return to monitoring wetwell level after sixty seconds, if left in simulation mode.

An RS232 serial port with the Modbus RTU protocol shall be provided for SCADA. Programming shall be in place to collect and transmit the station status, and to allow for the remote control of the pumps.

The Controller shall provide an RS232 Serial Port as a standard feature, and shall have an Ethernet port available as an option.

The Pump On/Off levels, high level alarm, and low level alarm setup values shall be viewable and changeable from a remote location.

Pump elapsed time meters shall be viewable and resettable remotely, and shall be stored in non-volatile memory during a power outage.

The Controller shall be able to perform float back-up using from two to six floats.

The Controller shall be able to supply (as an option) up to four isolated 4-20mA Analog Outputs that shall be used for VFD speed control, or for sending out a copy of the level input signal.

The Controller shall be able to supply (as an option) up to four isolated 4-20mA Auxiliary Analog Inputs to be used to collect analog data for SCADA.

The Controller shall have adjustable lag pump(s) delay.

The Controller shall have a security code that can be set to lock the parameters beyond the on – off setpoints from being changed.

The Controller shall have a setting to select the number of pumps to control.

The Controller shall have a parameter setting to select the number of pumps to run at one time.

The Controller shall have a parameter setting to select the number of pumps allowed to run while on generator power.

Menu selectable alternation modes shall include:

- Standard Alternation
- Jockey pump (Pump 1 stays on when other pumps turn on)
- Jockey Pump (Pump 1 turns off when other pumps turn on)
- Split alternation (Pumps 1&2, Pumps 3&4)
- Fixed sequence (Pump 1 always lead)
- Stepped on/off (Only one pump runs at a time)

Menu selectable First-On/First-Off or First-On/Last-Off alternation sequences shall be available.

The Controller shall contain a parameter setting to allow the disabling of the automatic alternation.

The Controller shall contain a parameter to allow the Controller to be used in either a Pump Up or a Pump Down configuration.

The Controller shall have a straightforward setup for VFD Control. The parameter settings shall include parameters for Minimum Speed, Level at Minimum Speed, Pump Start Boost time.

The Controller shall provide a parameter setting to remotely set the speed of the VFD.

The Controller shall pave parameters for calibrating the zero and span of the level input signal.

The Controller shall contain a parameter for setting the slave address of the Controller when used in a SCADA application.

The Controller shall contain parameter registers for the set up of the RS232 port.

The Controller shall contain a parameter to limit malicious attempts to control the pumps remotely or to change the setup parameters.

The Controller shall be able to force lead pump position by parameter selection.

The Controller shall be able to perform an automatic flush cycle to reduce sludge build up within the wetwell.

The Controller shall have a wetwell flush cycle that is able to be remotely controlled via SCADA.

The Controller shall contain a flow calculator that provides the following:

- Latest Inflow Rate
- Average Daily Flow (Average of the last 7 days)
- Pump Outflow Rate (Latest Rate for each pump)

The Controller shall provide a parameter setting to provide signal conditioning for the analog Level input signal.

The Controller shall provide a parameter setting to allow disabling of the low level alarm.

The Controller shall have a parameter selection to select time for time-based forced alternation.

The Controller shall contain pump disable discrete inputs shall cause the alternation routine to skip over disabled pumps. These pump disable discrete inputs shall be able to be inverted by a parameter setting.

The Controller shall contain registers for quick verification of the firmware revision level.

The Controller shall have a fault code register to aid in troubleshooting.

The Controller shall also have parameters to allow level probe to be a back-up to the analog transducer input.

The Controller shall have parameter based setup for the 18 discrete inputs.

The Controller shall contain a discrete input for connection to an external time clock to force pump alternation.

The Controller shall have a parameter setting to allow the analog input level to be a 4-20mA signal from a transducer, a conductance level probe, or a remote level input signal from SCADA.

The Controller shall have a parameter to select the level probe type by the election of the distance between the electrodes.

The Controller shall have a level offset parameter to enable the transducer or conductance level probe to be placed off the bottom of the wetwell, while maintaining an accurate representation of the wetwell depth.

The Controller shall have a choice of sensitivity settings for use with a conductance probe.

The Controller's unused output relays shall be able to be programmed through SCADA for additional control uses.

The Controller shall contain parameters to view the status of the Level Probe electrodes.

The Controller shall monitor the squarewave signal at the Level Probe inputs, and shall create a fault code if an improper squarewave is detected.

The Controller shall contain the ability to perform the following SCADA features:

Monitor the status of:

Wetwell Level

All Discrete Inputs

- Pump On, Pump Off, High and Low Alarm Levels
- Individual Pump Disable Status
- All Pump Disable Status
- Float Backup Status
- On Generator Status
- Level Probe Backup Status
- Pump Forced On Status
- ETMs
- Relay Remote Control Status
- Forced Alternation Status
- Pump Run Status
- Pump Forced On Status
- Current Lead Pump Status
- Level Probe Electrode Status
- Fault Code Status
- Last Fault Code Status
- Internal 5V Power Supply Status
- Internal 24V Power Supply Status
- Controller Program Revision Number
- Flush Cycle Operation
- Flow Calculator, Latest Inflow Rate
- Flow Calculator, Average Daily Flow
- Flow Calculator, Outflow Rate per Pump
- Flow Calculator, Daily Inflow Total for last 7 days

Control:

Remotely Change Pump On, Pump Off, High and Low Alarm Levels
Remotely Reset ETM's
Remotely Force Pumps On
Remotely Disable Pumps
Remotely Force Alternation
Remotely Select Lead Pump

Remotely Reset Fault Code Register
Remotely Reset Last Fault Code Register
Remotely Control Unused Relays
Remotely Start Wetwell Flush Cycle
Remotely Stop Wetwell Flush Cycle
Remotely Set VFD Speed

Fault Codes:

The following Fault Codes shall be available for Controller Troubleshooting:

Communication Fault
Parameter Setup Faults
Normal Operation Disabled
Pump Operation on Float Backup
Backup Float Out-of-Sequence
All Pump Disable
Level Probe Fault
Level Probe Out-of-Sequence
Pumps called to run by Level Probe Back-Up
Flow Calculator Setup Fault
VFD Speed Reference Setup Fault

The Controller shall offer the following optional features:

4-20mA Analog Level input may be ordered as an isolated input
An optional Ethernet Port that will perform both Modbus TCP and Modbus RTU protocols.

Part Number: SC2000-XX

The first "X" denotes the number of optional analog outputs (0 thru 4).
The second "X" denotes the number of optional auxiliary inputs (0 thru 4).

Part Number Options:

To order with the Analog Level Input isolated, add S to the end of part number.
To order with an Ethernet Port, add E to the end of the part number.

The SC2000-20 Controller shall be manufactured by Motor Protection Electronics of Apopka, Florida, (407) 299-3825.

I. Alarm Light

Alarm light shall be rated NEMA 4X. Alarm light shall be mounted on the top of the enclosure. The alarm light shall be as manufactured by Edwards and shall be the 48FINR-N5-25WH or engineer approved equal.

J. Control Relays

Control Relays shall have 10Amp rated contacts or better. Control relays shall be as manufactured by Square D and shall be the RPM series or engineer approved equal.

K. Moisture & Thermal Module

Moisture & Thermal Modules shall be as recommended by each pump manufacturer. For Sulzer pumps, the module shall be as made by ABS and shall be the CA462.

Field Instrumentation

A. Submersible Level Transducer

i. Transducer – Cable length from the transducer to the pump controller shall be verified by the contractor. Shall be as manufactured by MPE and shall be selected for appropriate range. Transducer shall be of the birdcage style. Typical part number will be the LM-10-40.

B. Float Switches

i. Float switches shall be provided with the appropriate cable length and be as made by Anchor Scientific. Typical part number will be the SM30NO.

Controls

A. Permissives

i. Manual & Automatic Permissive

1. Pump Thermals – Pump thermals will prevent each pump from running in manual & automatic. The thermals will automatically reset and will not require a manual reset.
2. Pump Seals – As per the recommendations of the pump manufacturer.

B. Duplex Operation

i. Primary Control – Transducer

1. The transducer shall send a level signal to the pump controller.
2. The controller shall have an off, lead start, lag start, & high level alarm setpoint.
3. On reaching the lead start setpoint, the controller shall start the first small pump.
4. As it reaches the lag start setpoint, the controller shall start the second small pump.
5. When the level reaches the high level alarm setpoint, it shall activate the external alarm light.
6. Once the off setpoint is reached, the controller will alternate the two small pumps.

Pump and Pump Components Specifications

Scope

Furnish ____2_ ABS Model XFP155J CB2 PE350/6 submersible non-clog wastewater pump(s). The pump(s) shall be supplied with a mating cast iron six inch discharge connection and be capable of delivering _1800 U.S. GPM at a total dynamic head of __70___ feet. An additional point on the same curve shall be _1300__ U.S. GPM at a total dynamic head of _86___ feet. Shut off head shall be _109__ feet (minimum). The Premium Efficiency motor shall be an integral part of the pump unit. The motor shall be __47__ HP connected for operation on a _460___ volt, 3 phase, 60 hertz electrical supply service. Pumps intended for wet pit installation shall be supplied with a cast iron guide rail system with an integrated six inch discharge elbow. Pumps intended for dry pit installation shall be supplied with a steel mounting frame. Each pump unit shall be fitted with a SS chain assembly, ___20___ feet long for lifting the pump. The working load rating of the lifting system shall be a minimum of 50% greater than the pump weight. Each pump motor shall be equipped with __49_____ feet of power and control cable sized in accordance with NEC and CSA standards.

PUMP DESIGN

The heavy duty submersible wastewater pump(s) shall be capable of handling raw unscreened sewage, storm water, and other similar solids-laden fluids without clogging. The pump shall be driven by a Premium Efficiency motor, providing the highest levels of operational reliability and energy efficiency.

GUIDE RAIL BASE ASSEMBLY (wet pit installation)

There shall be no need for personnel to enter the wet well to remove or reinstall the pump(s). In a wet pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide rail base automatically and firmly, guided by one 2 inch guide pipe (two 2 inch pipes optional) extending from the base elbow to the top of the station. Systems using guide cable in lieu of rigid guide bars or pipes shall not be considered acceptable. The sliding guide bracket shall be a separate part of the pumping unit, capable of being attached to standard 6 inch ANSI class 125 or metric DN150 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non standard flange dimensions shall not be considered acceptable.

A field replaceable Nitrile (Buna-N) rubber profile gasket or o-ring shall accomplish positive sealing of the pump flange/guide rail bracket to the discharge elbow. Base assemblies which rely solely on metal to metal contact between the pump flange and discharge base elbow as a means of sealing are inherently leak prone, and shall not be considered equal. No portion of the pump shall bear directly on the floor of the sump. The guide rail system shall be available in an optional non-sparking version, approved by Factory Mutual for use in NEC Class 1, Division 1, Group C&D hazardous locations.

PUMP CONSTRUCTION

Major pump components shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be stainless steel 1.4401 (AISI type 316) construction. All metal surfaces coming into contact with

the pumped media (other than the stainless steel components) shall be protected by a factory applied spray coating of high solids two part epoxy paint finish on the exterior of the pump. The pump shall be equipped with an open lifting hoop suitable for attachment of standard chain fittings, or for hooking from the wet well surface. The hoop shall ductile cast iron EN-GJS-400-18 (ASTM A536; 60-40-18) with an option of stainless steel 1.4462, and shall be rated to lift a minimum of four times the pump weight.

Sealing design for the pump/motor assembly shall incorporate machined surfaces fitted with Nitrile (Buna-N) rubber O-rings. Sealing will be the result of controlled compression of rubber O-rings in two planes of the sealing interface. Housing interfaces shall meet with metal to metal contact between machined surfaces, and sealing shall be accomplished without requiring a specific torque on the securing fasteners. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered equal. No secondary sealing compounds shall be required or used.

Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, two vane design, meeting the Ten State Standards requirement for minimum solids passage size of 3 inches. The impeller shall be capable of passing a minimum of 3x4 inch spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt shall be effectively recessed within the impeller bore or supporting washer to prevent disruption of the flow stream and loss of hydraulic efficiency. The impeller shall be dynamically balanced to the ISO 10816 standard to provide smooth vibration free operation. Impeller designs which do not meet the Ten State Standards requirement for 3 inch solids passage size, those that rely on retractable impeller designs to pass 3 inch solids, or those that rely on fins or pins protruding into the suction path to assist in the handling of fibrous material shall not be considered equal.

Self Cleaning Wear Plate: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with a surface incorporating strategically placed cutting grooves on the side facing the impeller, to shred and force any stringy solids which attempt to become lodged between the impeller and wear plate outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with four stainless steel securing screws and four stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. Adjustment to allow for wear and restore peak pumping performance shall be easily accomplished using standard tools, and without requiring disassembly of the pump. The use of fixed or non-adjustable wear plates or rings, or systems that require disassembly of the pump or shimming of the impeller to facilitate adjustment shall not be considered equal or acceptable. The suction flange shall be integrated into the wear plate and its bolt holes shall be drilled and threaded to accept standard 8 inch ANSI class 125 flanged fittings.

Pump Volute: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be drilled to accept both 6 inch

ANSI class 125 and metric DN150 (PN 10) metric flanged fittings. Proprietary or non standard flange dimensions shall not be considered acceptable. The maximum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

PREMIUM EFFICIENCY MOTOR

The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 and NEMA Premium*. Motor rating tests shall be conducted in accordance with IEC 60034-2-1 requirements and shall be certified accurate and correct by a third party certifying agency. A certificate shall be available upon request.

* IE3 and NEMA Premium efficiency levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

The Premium Efficiency motor shall be housed in a water tight gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) enclosure capable of continuous submerged operation underwater to a depth of 20 meters (65 feet), and shall have an IP68 protection rating. The motor shall be of the squirrel-cage induction design, NEMA type B, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation material, rated for 180oC (356oF). The stator shall be press fitted into the stator housing. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is unacceptable. The rotor bars and short circuit rings shall be made of cast aluminum.

The motor shall be designed for continuous duty. The maximum continuous temperature of the pumped liquid shall be 40oC (104oF), and intermittently up to 50oC (122oF). The motor shall be capable of handling up to 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be 1.3. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall have a NEMA Class A temperature rise, providing cool operation under all operating conditions. The Premium Efficiency Motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C. The motor shall meet the requirements of NEMA MG1 Part 30 and 31 for operation on PWM type Variable Frequency Drives.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self-cooling via the process fluid surrounding the motor.

Optional Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by an axial flow circulating impeller attached to the main motor shaft. The coolant shall be pumped through an integrated heat exchanger in the base of the motor whenever the motor is running, allowing excess heat to be transferred to the process liquid. Cooling systems that circulate the pumped medium through the cooling jacket, or those that use a toxic cooling liquid shall not be acceptable. The use of external heat exchangers, fans, or the supply of supplemental cooling liquid shall not be required.

Thermal Protection: Each phase of the motor shall contain a normally closed bi-metallic temperature monitor switch imbedded in the motor windings. These thermal switches shall be connected in series and set to open at 140oC +/- 5oC (284oF). They shall be connected to the control panel to provide a high stator temperature shutdown signal, and are used in conjunction with external motor overload protection. As an option, bi-metallic temperature switches shall be available for the upper and lower bearings to provide high bearing temperature warning signals. As an alternate option, RTD (PT100) type temperature measuring devices shall be available for the motor winding and bearings to provide actual temperature measurement at these locations. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. The bi-metallic system must be connected to the control to provide positive shutdown of the motor in the event of an overheat condition. This is required in order to conform to FM and CSA rules for explosion proof equipment.

Mechanical Seals: Each pump shall be equipped with a triple seal system consisting of tandem mechanical shaft seals, plus a radial lip seal; providing three complete levels of sealing between the pump wet end and the motor. The mechanical seal system shall consist of two totally independent seal assemblies operating in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non proprietary design, and shall be manufactured by a major independent manufacturer specializing in the design and manufacture of mechanical seals. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty solid silicon-carbide seal ring and one rotating industrial duty solid silicon-carbide seal ring. The stationary ring of the primary seal shall be installed in a seal holding plate of gray cast iron EN-GJL-250 (ASTM A-48, Class 35B). The seal holding plate shall be equipped with swirl disruption ribs to prevent abrasive material from prematurely wearing the seal plate. The upper, secondary seal unit, located between the lubricant chamber and the sensing chamber, shall contain one stationary industrial duty solid silicon-carbide seal ring, and one rotating one rotating industrial duty solid silicon-carbide seal ring. Each seal interface shall be held in contact by its own spring system. A radial lip seal shall be positioned above the sensing chamber, preventing any liquid which accumulates in the sensing chamber from entering the lower bearing and motor. The seals shall not require routine maintenance, or adjustment, and shall not be dependent on the direction of rotation for proper sealing. Each pump shall be provided with a lubricant chamber for the shaft sealing system which shall provide superior heat transfer and maximum seal cooling. The lubricant chamber shall be designed to prevent overfilling, and to provide lubricant expansion capacity. The drain and inspection plug shall have a positive anti-leak seal, and shall be easily accessible from the outside of the pump. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. Lubricant in the chamber shall be environmentally safe non-toxic material.

The following seal types shall not be considered equal: Seal systems with less than three complete levels of sealing between the pump wet end and the motor. Seals of proprietary design, or seals manufactured by other than major independent seal manufacturing companies. Seals requiring set screws, pins, or other mechanical locking devices to hold the seal in place, conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces, any system requiring a pressure differential to seat the seal and ensure sealing.

Mechanical Seal Protection System:

The primary mechanical seal shall be protected from interference by particles in the waste water, including fibrous materials, by an active Seal Protection System integrated into the impeller. The back side of the impeller shall be equipped with a sinusoidal cutting ring, forming a close clearance cutting system with the lower submersible motor housing or seal plate. This sinusoidal cutting ring shall spin with the pump impeller providing a minimum of 75 shearing actions per pump revolution. Large particles or fibrous material which attempt to lodge behind the impeller or wrap around the mechanical seal, shall be effectively sheared by the active cutting system into particles small enough the prevent interference with the mechanical seal. The Seal Protection System shall operate whenever the pump operates, and shall not require adjustment or maintenance in order to function. Submersible pump designs which do not incorporate an active cutting system to protect the primary mechanical seal shall not be considered acceptable for wastewater service.

Seal Failure Early Warning System: The integrity of the mechanical seal system shall be continuously monitored during pump operation and standby time. An electrical probe shall be provided in a sensing chamber positioned above the mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be air filled, and shall have a drain / inspection plug with a positive anti-leak seal which is easily accessible from the outside of the pump. A solid-state relay mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe, continuously monitoring the conductivity of the liquid in the sensing chamber. If sufficient water enters the sensing chamber through the mechanical seal system, the probe shall sense the increase in conductivity and signal the solid state relay in the control panel. The relay shall then energize a warning light on the control panel, or optionally, cause the pump shut down. This system shall provide an early warning of mechanical seal leakage, thereby preventing damage to the submersible pump, and allowing scheduled rather than emergency maintenance. Systems utilizing float switches or any other monitoring devices located in the stator housing rather than in a sensing chamber between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.

As an option, two additional moisture sensing probes, one in the electrical connection chamber, and one in the motor chamber shall be available. These optional probes shall send separate signals to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the respective sensing chambers.

Shaft: The pump shaft and motor shaft shall be an integral, one piece unit adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system. The shaft shall have a full shutoff head design safety factor of 1.7, and the maximum shaft deflection shall not exceed .05 mm (.002 inch) at the lower seal during normal pump operation. Each shaft shall be stainless steel 1.4021 (AISI 420) material, and shall have a polished finish with accurately machined shoulders to accommodate bearings, seals and impeller. As an option, the shaft shall be available in stainless steel 1.4462 (UNS S31803). Carbon steel, chrome plated, or multi piece welded shafts shall not be considered adequate or equal.

Bearings: Each pump shaft shall rotate on high quality permanently lubricated, greased bearings. The upper bearing shall be a cylindrical roller bearing and the lower bearings shall be a matched set of at least three heavy duty bearings, two angular contact ball bearings and one cylindrical roller bearing. All three lower bearings shall have identical outer race diameters to provide maximum bearing load capacity. Designs which utilize a roller bearing with a smaller outer diameter than the other bearings in the assembly do not provide maximum load capacity and shall not be considered equal. Bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. L-10 bearing life shall be a minimum of 100,000 hours at flows ranging from ½ of BEP flow to 1½ times BEP flow (BEP is best efficiency point). The bearings shall be manufactured by a major internationally known manufacturer of high quality bearings, and shall be stamped with the manufacturer's name and size designation on the race. Generic or unbranded bearings from other than major bearing manufacturers shall not be considered acceptable.

Power Cable: The power cables shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil, water, and UV resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

Cable Entry/Junction Chamber: The cable entry design shall not require a specific torque to insure a watertight seal. The cable entry shall consist of cylindrical elastomer grommets, flanked by stainless steel washers. A cable cap incorporating a strain relief and bend radius limiter shall mount to the cable entry boss, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry. The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

City of Laurel, Mississippi

Bid Form

Bid Date: Monday, March 4th, 2019 at 10:00 A.M.

To: City Of Laurel, Mississippi
Office of City Clerk
Post Office Box 647
Laurel, MS 39441

I/We the undersigned submit the following bid for an "Upgrade to MS Avenue Lift Station Pump and Controls".

Brand _____

Description _____

Bid Price_____

_____

_____
Bid Purchase Price in Words

Delivery Date_____

Signed_____

Company_____

Name/Title_____

Address_____

_____

Telephone _____Fax_____