August 18, 2020

RE: ITB 26-20 South Beach Pumping Station Upgrades
ADDENDUM No. 4

To prospective vendors:

The Utilities Commission is issuing the following addendum. As such it becomes an integral part of the proposal and must be acknowledged by the return of this signed form, with your proposal form, acknowledging receipt of the addendum.

VENDORS ARE ENCOURAGED **NOT TO** ATTEND BID OPENINGS IN PERSON BUT TO ATTEND BY DIALING 1 (646) 570-1040 PIN: 924-5593

THE UTILITIES COMMISSION, CITY OF NEW SMYRNA BEACH TAKES THIS STEP IN AN ABUNDANCE OF CAUTION FOR THE SAFETY AND WELLBEING OF OUR STAFF AND COMMUNITY.

IF YOU ARE DROPPING OFF A BID PLEASE RING THE BELL AND THE SECURITY GUARD WILL TAKE IT FROM YOU.
UTILITIES COMMISSION  
City of New Smyrna Beach, Florida  
200 Canal Street  
P.O. Box 100  
New Smyrna Beach, Fl. 32170-010

Please note, Due to more clarifications required we will be moving this bid opening to Tuesday August 25th at 2:30pm to allow for more time.

1. Question 1: The Interlock part numbers aren’t complete and can’t be used for purchase.

Response: In reference to the attached Kirk Key Interlock Operation Diagram, the part numbers provided are from the Kirk Key website. The “-“ in the part numbers listed represent that the option is not needed.

2. Question 2: Does the panel /disco/MDP/ATS need to be N4X?

Response: The main breaker and generator connection box shall be NEMA-4x. All interior equipment shall be NEMA-1.

3. Question 3: Our supplier is quoting a Contactor Type Transfer switch in lieu of a Breaker Type that uses the Kirk Key Interlock. Does the Automatic Transfer Switch (ATS) need to have the Kirk Key Interlock?

Response: A contactor type ATS is acceptable. The kirk-key system on the ATS is just a transfer block . . . meaning keys are being inserted from the MB and Gen MB in order to release another key.

4. Question 4: Our supplier is quoting a 400Amp ATS but the room layout shows an 800Amp ATS. Does the ATS need to be 400amp or 800amp?

Response: Service size is 400A.

5. Question 5: Does the ATS need to be in a 316SS cabinet or is NEMA1 acceptable?

Response: NEMA-1.

6. Question 6: The existing stucco at the facility is both smooth & parts of the screen wall is cut brick. Will the new screen wall have any cut brick in the stucco and if yes will it be both sides?

Response: Cut brick on the face (public view) and smooth on the interior to the property side.

ITB 26-20 Addendum No 4
7. Specification 11311 – High Service Horizontal Split Case Pumps has been revised and is attached.

Attachments:
- Kirk Key Interlock Operation Diagram
- Specification 11311 – High Service Horizontal Split Case Pumps

A Copy of This Signed Form Must Accompany Your Proposal

Acknowledgment of Receipt of Addenda No. 4

Company_______________________________________
Title___________________________________________
Signature_______________________________________
KIRK KEY INTERLOCK OPERATION DIAGRAM

[LOSS OF NORMAL UTILITY POWER > TRANSFER TO GENERATOR]

3
E3.0

KEYED NOTES
1. KIRK KEY SHALL BE INTERLOCKED WITH SOLENOID THAT HOLDS DOOR LOCKED WHEN THE KEY IS NOT IN THE BARREL.
PART I - GENERAL

1.01 - SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to install three (3) new horizontal split case pumping units complete with drive motors, couplings, bases, variable frequency drives and pressure control system.

B. These Specifications are intended to give a general description of what is required but do not cover all details which will vary in accordance with the requirements of the equipment furnished. They are, however, intended to cover the furnishing, shop testing, delivery and complete installation and field testing of all materials equipment and appurtenances for the complete pumping system herein specified, whether specifically mentioned in the Specifications or not.

C. For all units there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not. This installation shall incorporate the highest standards for the type of service shown on the drawings including field-testing of the entire installation and instruction of the regular operating personnel in the care, operation and maintenance of all equipment.

D. For units where there are variable speed drive pump systems to be supplied, it is the expressed requirement of these specifications that the Manufacturer or supplier of the pump equipment, shall supply the variable speed drive equipment which is connected to the pump motor supplied for this project as a single source responsibility for the pump systems supplied. There shall be no exceptions to this specification.

E. This project requires the provision and installation of three, 1000 gpm, Horizontal Split Case pumps, drives, and controls in the same location, removing and replacing piping, valves, and motor controls. It is the intent of the project design and coordination that all of the pumps shall be the provision of the same pump equipment supplier/manufacturer for single project responsibility and coordination.

1.02 - DESCRIPTION OF SYSTEMS

A. The pumps shown on the drawings as follows:

1. Three (3) horizontal split case effluent pumping units complete with inverter duty motors as specified, couplings, bases and accessories.

2. Three (3), 75 or 60 HP Yaskawa variable frequency drives.
B. The pumps shall be used to deliver finished, chlorinated, potable water.

1.03 - QUALIFICATIONS

A. The pumps covered by these Specifications are intended to be pumping equipment of proven ability as manufactured by reputable manufacturers having long experience in the production of identical pumps.

The pumps furnished shall be designed, constructed and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed. Pumps shall be manufactured in accordance with the Hydraulic Institute standards.

B. All equipment furnished under these Specifications shall be new and unused and shall be the standard cataloged product of a manufacturer having a successful record of manufacturing and servicing the equipment and systems specified herein. The centrifugal pumps to be furnished under this section shall be the product of Grundfos, Peerless Pump, PACO Pump, Patterson, only. No substitutions for the Base Bid. Provisions for consideration of alternate equipment are outlined in the bid form and any selection of an alternate must be entered on the bid form under alternate equipment manufacturers, with its associated deductive pricing. In any event, the project shall be awarded based on the selection and indication of one of the base bid manufacturers, without regard to alternate manufacturers, and after the award is made, the Owner may, or may not elect to consider the benefit of using alternate manufacturers.

C. To assure unity of responsibility the pumps, motors, variable frequency drives and control system shall be furnished and coordinated by the pump manufacturer. The contractor and pump manufacturer shall assume responsibility for the satisfactory operation of the installed equipment as a system.

D. Balancing: All units shall be statically and dynamically balanced. The vibration allowance in the units shall not exceed the upper limits as established by the Hydraulic Institute Standards.

E. Shop Tests and Test Reports:

1. Each pump shall be fully tested on water at the pump manufacturer's plant before shipment. The motors used in testing shall be the same horsepower, speed, voltage and type as the motors to be provided. Tests shall consist of checking the unit at its rated speed, head, capacity, efficiency and brake horsepower. Tests shall include a Running Test in accordance with AWWA E101, and hydrostatic tests of the bowl and discharge head. Certified copies of test reports shall be submitted. The Standards of the Hydraulic Institute and AWWA shall govern the procedures and calculations for these tests. During these tests the pumps shall be checked for balance.
2. All motors shall be given a standard short commercial test conforming to IEEE, ANSI and NEMA Standard requirements to determine that they are free from electrical or mechanical defects and to provide assurance that design conditions are met. These tests shall include:
   a. Running light current
   b. Locked rotor current
   c. High potential
   d. Winding resistance

F. Equipment manufacturer must have ten (10) years of successful experience with assembly, construction, start-up, and maintenance of water distribution equipment of the type required for this project.

1.04 - SUBMITTALS

A. Nine (9) copies of all materials required to establish compliance with the Specifications shall be submitted in accordance with the provisions of the General Conditions and Section 01340. Submittals shall include at least the following:

1. Certified shop and erection drawings showing all-important details of construction, dimensions and anchor bolt locations.

2. Descriptive literature, bulletins and/or catalogs of the equipment.

3. Data on the characteristics and performance of each pump. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for head, capacity, efficiency, allowable NPSH and horsepower. Curves shall be submitted on 8-1/2 inch by 11 inch sheets at as large a scale as is practical. Curves shall be plotted from no flow at shut-off head to pump capacity to minimum specified total head.

4. The total weight of the equipment including the weight of the single largest item.

5. A complete total bill of materials of all equipment.

6. A list of the manufacturer's recommended spare parts with the manufacturer's current price for each item including gaskets, packing, etc. on the list. List bearings by the bearing manufacturer's numbers only.

B. Upon receipt of approval of submitted material, provide six (6) certified prints and one (1) reproducible tracing of all drawings.
1.05 - OPERATING INSTRUCTIONS

A. Six (6) copies of the Operating and Maintenance manuals shall be furnished. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operating and maintenance personnel unfamiliar with such equipment the number and special requirements shall be as specified.

B. A factory representative who has complete knowledge of proper operation and maintenance shall be provided for one (1) day to instruct representatives of the owner and the Engineer on proper operation and maintenance. This work may be conducted in conjunction with the inspection of the installation and test run as provided under Part III. If there are difficulties in operation of the equipment due to the manufacturer's design of fabrication, additional service shall be provided at no cost to the owner.

1.06 - TOOLS AND SPARE PARTS

A. One (1) set of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.

B. The manufacturer shall furnish a complete list of recommended spare parts necessary for the first five (5) years of operation of the pumping system, which shall include at least the following:

1. Two (2) complete sets of gaskets for each of the pumps supplied.

2. Two (2) complete sets of mechanical seals, shaft sleeves for each set of pumps.

3. One case (10 tubes) of pump bearing grease, same as factory installed.

C. All spare parts shall be properly protected for long periods of storage and packed in containers, which are clearly identified with indelible markings as to the contents.

1.07 - PRODUCT HANDLING

A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the item of shipment until installation is completed and the units and equipment are ready for operation.

B. All equipment and spare parts must be properly protected against any damage during a prolonged period at the site.

C. Factory assembled parts and components shall not be dismantled for shipment unless permission is
received in writing from the Engineer.

D. Finished surfaces of all exposed pump openings shall be protected by wooden planks, strongly built and securely bolted thereto.

E. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

F. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.

G. Each box shall be properly marked to show its net weight in addition to its contents.

1.08 - WARRANTY

A. The equipment manufacturer shall provide a one (1) year warranty. The equipment manufacturer shall guarantee that the equipment furnished is suitable for the purpose intended and free from defects of design, material and workmanship. In the event the equipment fails to perform as specified, the equipment manufacturer shall promptly repair or replace the defective equipment without any cost to the owner (including handling and shipment costs).

PART II - PRODUCTS

2.01 - MATERIALS AND EQUIPMENT

A. General

1. The equipment covered by these Specifications is intended to be standard pumping of proven ability as manufactured by reputable companies having long experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily when installed as shown on the drawings.

2. Equipment shall be designed and built for 24-hour continuous service at any and all points within the specified range of operation without overheating, cavitation, excessive vibration or strain.

3. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be especially adapted for the work to be done. Ample room and facilities shall be provided for inspection, repairs and adjustments.

4. The pump base shall be rigidly and accurately anchored into position, precisely leveled and aligned, so that the completed installation is free from stress or distortion. All necessary foundation bolts, plates, nuts and washers shall be furnished and installed by the contractor
and conform to the recommendations and instructions of the manufacturers. Anchor bolts; nuts and washers installed by the contractor shall be Type 316L stainless steel. Grouting under bases after the equipment is set is included as work under this section.

5. Stainless steel nameplates giving the name of manufacturer, the rated capacity, head, speed and all other pertinent data shall be attached to the pump.

6. Stainless steel nameplates giving the name of the manufacturer, serial number, model number, horsepower, speed, voltage, amperes and all other pertinent data shall be attached to the motor.

7. The nameplate ratings of the motor shall not be exceeded, nor shall the design factor be reduced when its pump is operating at any point on its characteristic curve at maximum speed.

2.02 - PUMPS

A. General

1. The pumps shall be of the horizontal centrifugal split case type for inside installation.

2. The pumps shall be of standard dimensions, built to limit gauges or formed to templates, such that parts will be interchangeable between like units.

2. The pumps shall conform to all requirements stipulated in the table at the end of this section.

3. The entire pump unit shall meet and be labeled and listed for NSF-61 compliance, without exception. Pumps without NSF-61 approval and labels shall not meet the requirements of this specification.

B. Certified Factory Tests

1. Each pump shall be given a complete, full scale, non-witnessed performance test, performed on the entire pump / job motor / base assembly, to include head/capacity/HP and efficiency to prove that the pumps supplied conform to the requirements of this Specification. The test data shall be submitted on an 8-1/2 inch by 11-inch sheet at as large a scale as is practical.

2. See Item #2.06 for further requirements.

C. Pump Construction

1. Pump Casings

   a. The pump case shall be of cast iron construction ASTM A48, Class 30, or Ductile Iron construction ASTM 536, having a tensile strength of not less than 30,000 pounds per square inch.
b. Casings shall be free from blowholes, sand pockets or other imperfections. They shall be given a hydrostatic pressure test to at least 1-1/2 times the maximum pump shut-off head.

c. The interior and exterior surfaces of the casings shall be smooth with matching flanges and the internal wetted areas shall be coated with manufacturer’s standard NSF-61 approved epoxy coating, 12 mils DFT minimum on any coated areas. Impellers shall not be coated.

d. The horizontal casing joint shall be a scraped or machined fit, requiring a gasket not more than 0.015 inch thick.

e. Suction and discharge flanges shall be faced and drilled ANSI Class 125 Standard. There shall be 1/4-inch I.P.T. tapped holes in both the suction and discharge flanges of all pumps for test gauge connections.

f. The top half of each case at the topmost part shall have a bossed pipe tap opening for mounting air release valve specified under Division 15. Pipe taps shall be not less than 1/2-inch I.P.T.

g. The casing at both suction inlets to the impeller shall be protected with bronze renewable wearing rings. They shall be of one-piece construction, held rigidly in slots in the case and shall not be held in place by the clamping action of the case alone.

h. Pump casing shall be design for balanced radial thrust.

i. All case fasteners and studs shall be 316 series stainless steel and stud nuts shall be provided with stainless steel washers for the protection of the painted surfaces.

j. All pump casings shall have factory finish coatings applied, including polyurethane, clear coatings, prior to assembly and no fasteners, glands, plugs, shaft, sleeves, couplings, keys, or accessories shall be coated with paint.

k. The pump shall be equipped with 316 series stainless steel fittings and flush lines that are plumbed from the top of the case, through a cross, allowing for air release, and piped to each stuffing box.

l. The cross fitting discussed above, shall be equipped with a stainless steel ball valve for the manual release of air, from the pump bonnet.

2. Impellers

a. The impeller shall be ASTM B-584, C95800, nickel aluminum bronze, only,
enclosed double suction type of one-piece construction. Impeller shall be machined outside and smoothly finished on the internal water passages and shall be balanced.

b. Impellers shall be protected from wear at both suction inlets with renewable bronze wearing rings. These rings shall be fastened to the impeller such that they cannot loosen in service. Impellers without removable wear rings shall not meet this requirement. Impeller wear rings shall be the same alloy as the impeller.

c. Impeller material must be ASTM B-584, C95800, nickel bronze, capable of pumping chlorinated wastewater effluent with a free chlorine residual of a minimum of 5 ppm. Silicon or aluminum brass materials are unacceptable. Impellers shall not be coated.

3. Bearings

a. The weight of the pump shaft and impeller assembly shall be carried on bearings at each end of the pump shaft. Bearings shall be grease lubricated, designed for an AFBMA average life of 10 years for any point within the pump operating conditions specified.

b. The outboard bearing of each pump shall be designed to accept any thrust loads and shall function so that the impeller rotor will be centered in the end-play (axial movement) of the wearing ring.

c. Pump Bearings shall be oil lubrication or greaseable bearings only, for long life and owner convenience in maintenance service intervals. Grease shall be synthetic, high temperature, non-petroleum base, only.

4. Shafts

A. Pump shafts shall be of a high-grade hardened stainless steel type 416 or AISI 1141 steel shaft. It shall be protected from wear at the stuffing boxes by renewable 316 series, stainless steel sleeves, on which the pump mechanical seals shall ride. Sleeves shall be fastened to the shaft such as to prevent leakage between the sleeve and the shaft. Bronze shaft sleeves are not acceptable.

5. Stuffing Boxes

a. The pump stuffing boxes shall be mechanical seals. They shall be satisfactory for 20 feet of positive head and 15 feet of negative head.

b. The pumps shall be equipped with single, inside, single spring mechanical seals to maintain pump compliance with NSF61 certification, with carbon and ceramic faces by the manufacturer, if so indicated by these specifications or the project drawings. Metallic faces are not acceptable. Elastomers shall be EPDM. Provide exterior, seal flushing lines from the top of the pump casing to each seal box, fabricated entirely
from 316 series stainless steel.

c. Stuffing box gland shall be Bronze or stainless steel.

d. Drip pockets shall be provided in the bearing brackets under the packing glands to catch all drip from pump stuffing boxes. These drip pockets shall be with tapped drain connections and drip from these pockets shall be piped to waste by the contractor. In no case shall waste from these drip pockets be allowed to drip on bedplate.

6. Base plates

a. Each unit, motor and pump shall be mounted on a continuous fabricated steel or cast iron bedplate. Fabricated steel bedplate shall be of the box type construction with internal web reinforcing for rigidity and with a moisture collecting drip rim. Grouting holes shall be provided. All steel shall be structural “C” type steel welded and fabricated to provide ridged structural support for the pump and motor, on its own merit.

The bedplates shall be constructed of structural C shaped, steel plates and members with lifting eyes, grout areas, and all welded joints ground smooth. Base Plates shall be provided with raised and machined mounting pads for both the pump and motor, and shall have their surfaces milled flat and parallel with all other mounting pads. Mounting pads shall be drilled and tapped for motor and pump mounting fasteners. Motor mounting pads shall have alignment adjustment screws permanently installed for the fine movement of the motor during alignment.

b. The drip rim shall collect condensation moisture from the pump. The drip rim shall extend on both sides of the bedplate from the drive end to the pump end and across the pump end with a slope not less than 1/8-inch per foot. The depth of the drip rim shall be not less than 1-1/4 inches. At the lowest point of the drip rim on the pump end there shall be 3/4-inch pipe tap for drainage piping.

c. Bed-plates shall be of such design and have sufficient grout holes that they can be filled with grout after the units are leveled and aligned.

d. The pump motors shall be factory; precision aligned with lasers and be provided with alignment reports for the engineer’s approval prior to shipping the pump.

f. No motor paint shall be applied to the bottom of the motor feet, nor the top of the machined mounting pads.

f. All fasteners for the pump and motor mounting as well as coupling guards, to the pump bases, shall be 316 series stainless steel with washers to protect factory coated surfaces. No Mounting fasteners shall be coated with paint. All painted equipment shall be coated prior to mounting.
7. Couplings

Couplings shall be Falk T-series, steelflex, type, selected by the manufacturer for the pump unit power rating. Note required coupling spare parts that are required for each pump. Rubber couplings or non spring grid couplings are not acceptable.

8. Coupling Guards

Coupling Guards shall be completely enclosing type, hinged for maintenance, manufactured from Safety Orange, polyurethane plastic, as manufactured by Rexnord.

10. Pump Name plates shall be provided in 316 series stainless steel, which shall provide the following information on each pump:

- Pump model number
- Manufacturer
- Pump size
- Flow and head
- RPM
- Serial number

11. All equipment shall be factory aligned and shimmed, on their job bases with the job motors prior to factory performance testing. Each pump shall be laser aligned with lasers similar to Ludeca Optiline, or equal, that shall document the aligned condition of the pump assembly, and submitted to the engineer.

12. All pump and equipment fasteners shall be properly tightened to proper torque specifications and documented, and each bolt / fastener appropriately marked to show torque specifications were applied in the assembly of the equipment.

2.03 - MOTORS

A. Performance Requirements

1. Motors shall be rated for operation on power supply as shown on the electrical drawings.

2. Each motor shall be TEFC and have a 1.15 service factor when operated on sine wave power.

3. All Motors shall be the manufacturers Premium efficiency, Inverter Duty, rated for the applicable horsepower rating. Motors shall be suitable for 10 to 1 turndown speed on variable torque application.

4. Motors shall be free of objectionable noise and vibration. Units shall operate with a maximum sound level not to exceed 90 dBA as measured 5 feet from any surface.
5. Maximum temperature rise of motor windings shall not exceed 80 degrees Celsius, as measured by resistance, when motor is operated continuously at service factor horsepower, rated voltage and frequency in ambient air temperature of 40 degrees Celsius.

4. Supply motors with:
   1. Grounding lug in the conduit box.
   2. Conduit box, one size larger than NEMA standard for the motor frame size.
   3. Space heaters, 120 VAC.
   5. NEMA 4, Accessory conduit box.
   6. Winding thermostats
   7. Complete motor tests, with heat run, and efficiency tests.

8. Grounded Rotors

9. Electrically isolated bearings

10. 65 Degree C temperature rise above Ambient Temp.

11. High Solids Epoxy Factory coatings with Polyurethane clear coating

12. Special Motor balance, in addition to standard balance.

13. Inverter Duty Labeled


15. Aegis rings

B. Construction

1. Motors shall be suitable for operation in moist air with hydrogen sulfide gas present.

2. Motor frames and end shields shall be of cast iron construction of such design and proportions as to hold all motor components rigidly in proper position and provide adequate protection for the type of enclosure employed.
3. The motors shall be TEFC. Motors shall have Class "H" nonhygroscopic epoxy sealed insulation limited to Class "B" rise by resistance.

4. Windings shall be adequately insulated and securely braced to resist failure due to electrical stresses and vibration.

5. The shaft shall be made of high-grade machine steel or steel forging of size design adequate to withstand the load stresses normally encountered in motors of the particular rating.

6. Stator and rotor cores shall be made of low loss, non-aging electrical sheet steel with insulated laminations. Stator coils shall be random wound and of size, shape, insulation, and number of turns required. Coils shall be epoxy sealed after fabrication.

7. Motors shall be equipped with bearings made of AFBMA Standards and be of ample capacity of the motor rating. Bearings shall be grease lubricated and shall have a minimum B-10 bearing life at 40,000 hours.

8. Nameplates shall be stainless steel. Lifting lugs or "O" type bolts shall be supplied on all motors. Enclosures shall have stainless steel screen and shall be protected from corrosion. Bolts and nuts shall have hex heads. Conduit boxes shall be gasketed. Lead wires between motor frame and conduit box shall be gasketed.

9. All motors shall be supplied with space heaters to prevent accumulation of moisture. Space heaters shall be rated 120-volt single phase. Include all other accessories and features outlined above.

2.04 - VARIABLE FREQUENCY DRIVES

The pump manufacturer / supplier shall provide the variable frequency drives as an integral part of the pump system package for single source responsibility, as described in Section 1.01, D, as manufactured by Yaskawa, No Exceptions.

2.05 - TESTING

A. Pumps

1. Certified Factory Testing

a. Factory testing in accordance with the standards of the Hydraulic Institute shall be required for all pumps. Certified pump performance curves shall be submitted including head, capacity, brake horsepower and pump efficiency for each pump supplied. Prior to conducting a pretest, notification of such test and a list of test equipment and test procedures shall be forwarded to the Engineer at least fifteen (15) working days before the scheduled test date. All electronic transducers, meters, gauges and other test instruments shall be calibrated within thirty (30) days prior to the scheduled test and certified calibration data shall be provided. Differential pressure type flow meters, such as
Venturis are preferred and shall have been calibrated, and its accuracy certified within the past twelve (12) months. Mechanical variation of the meter throat diameter will be accepted as verification of calibration validity. Criteria for acceptance of performance tests shall be equal or better than the best and tightest acceptance levels, to include absolutely, no under-performance with regard to flow, head, efficiency, or power level. No operation in the motor service factor shall be allowed anywhere on or off the performance curve.

b. Each pump shall be tested through the specified range of flow vs. head/capacity/efficiency with curves plotted at pump design speed. During each test, the pump shall be run at each head/capacity condition as specified for sufficient time to accurately determine discharge, head, power input and efficiency. If any pump tested fails to meet any specification requirements, it will be modified until it meets all specification requirements. No Under-Performance will be acceptable.

c. If any pump tested fails to meet the specified efficiency requirements and all reasonable attempts to correct the inefficiency condition are unsuccessful, it will be rejected and the contractor shall be required to provide a pump that meets the specified requirements.

d. Each pump shall be factory tested full scale with each pump’s fully tested Job motor, as previously described earlier in this specification. Pump performance test reports shall be certified, signed, and dated by the manufacturer’s test engineer, and submitted to the engineer for their approval. Pumps shall not be shipped until approved by the engineer.

e. The pump manufacturer shall provide test data sheets and plotted performance curves for the engineer’s approval, prior to shipment of the pumps to the project site.

f. All pumps for this project shall be pre-tested for performance, reports submitted to the engineer for their approval and the scheduling of witnessed testing at the factory.

g. Pumps shall be tested to the standards of the Hydraulic Institute, Tolerance level 1U and shall not overload the provided driver, anywhere on the performance curve.

B. Field Testing

1. After pumps are installed, provide such onsite services by the manufacturer’s service representative that are necessary to demonstrate the complete functionality of the entire pumping system, including the provided control system.

2. Provide the services of an independent balancing and alignment service company or manufacturer’s representative who can perform computerized analysis and provide a certified computerized report of the vibration signature of the rotating mechanical equipment. Each pump must, as a minimum, meet the Hydraulics Institute standard for smooth running pump equipment for acceptance by the engineer.

3. Units failing to meet the referenced standard specified shall be repaired or replaced by the contractor
until the equipment is acceptable by this standard, to the engineer. All vibration testing shall be conducted after all pump equipment is installed and operational, with all pipe and base grouting installed.

4. Field-testing shall be witnessed by the owner and engineer, and shall be performed after providing the engineer a 48-hour notification that the field-testing is scheduled.

2.06 Grouting

All pumps shall be set on the concrete equipment pads by the Contractor as shown on the project drawings and shall be fully aligned and grouted prior to the attachment of any adjacent pipe. Bases shall be completely filled with non-shrink, epoxy grout similar or equal to Sika Dur 42, or Five Star DP Grout.

It is the Contractor’s responsibility to fasten all pumps to their concrete foundations with 316L-series; stainless steel anchor bolts in the sizes shown on the manufacturer’s drawings for the pump bases. Suitable anchor bolts shall be sized in accordance with the recommendations of the pump manufacturer and the structural engineer of record, and provided by the contractor.

2.07 Pump Gauges

1. The contractor shall install pressure gauges for each pump suction and discharge line, in the adjacent pipe, into drilled and tapped holes for their installation. The pump manufacturer / supplier is not responsible for providing these gauges.

2. Each gauge shall be liquid filled with 4” minimum dials, stainless steel internal components, and dual scale faces, calibrated in both psi and feet of head.

3. Pump suction gauges shall be provided as compound, positive and negative scale gauges. Each gauge shall be isolated from the pumped liquid by means of an all stainless steel diaphragm seal attached to the stem of each gauge. Gauge internals shall be NSF-61 certified, glycerin filled above the diaphragm seals.

4. Each gauge shall be calibrated at 1/2% accuracy. Gauges shall be installed with all stainless steel nipples and quarter-turn ball valves. Gauges shall be selected such that the operating specified pressure shall be directly in the middle of each gauge scale and range.

2.08 Final Vibration Testing and Reports

A. After the completion of the pump installation and Start-Up, the manufacture’s service representative or a third-party vibration testing company shall test each pump for operation and provide their computer generated vibration spectrum analysis report.

B. Pumps and motors shall have vibration readings recorded at all bearing locations on the motors and pumps, as well as a natural frequency, “Bump Test”
C. The vibration reports shall be incorporated by the contractor, into the final O&M manuals.

2.09 Start-Up Services Required

A. Provide factory trained and certified pump technicians to provide final Laser Alignment at the site prior to pump commissioning. Laser alignment must be performed with a precision Laser alignment tool that generates a printable results form. Service day required shall be one dedicated day for alignment.

B. Provide factory trained and certified pump technicians to check the pump’s base for level, prior to the contractor grouting the bases. Level and Grout shall be complete before pipe is connected. Service day required shall be one dedicated day for level and grouting.

C. Provide factory trained and certified pump technicians to assist the contractor and Utilities Commission with the commissioning of the installed pumps. (Start-Up) Service day required shall be one dedicated day for Start-Up.

D. Provide factory trained and certified pump technicians for one follow up service visit to review pump operation, pump lubrication, vibrations, bearing heat, pump noise, at a date determined by the Utilities Commission at the 6 month anniversary of the Start-Up Date, scheduled in advance at the convenience of the Utilities Commission.
**TABLE "A"**

**PUMPING UNIT DESIGN REQUIREMENTS**

<table>
<thead>
<tr>
<th>ITEM/DESIGN CONDITIONS</th>
<th>CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM</td>
<td>High Service Pumps</td>
</tr>
<tr>
<td>Maximum Motor Full Load Speed (RPM)</td>
<td>1760</td>
</tr>
<tr>
<td>Motor to be Supplied (HP) Max</td>
<td>75</td>
</tr>
<tr>
<td>Pump Design Speed (RPM)</td>
<td>MOTOR FULL LOAD SPEED</td>
</tr>
<tr>
<td>Suction Size, Minimum (Inches)</td>
<td>6&quot; or 8&quot;</td>
</tr>
<tr>
<td>Discharge Size, Minimum (Inches)</td>
<td>5&quot; or 6&quot;</td>
</tr>
<tr>
<td>Minimum Pump Shut-off Head (Feet)</td>
<td>193'</td>
</tr>
<tr>
<td><strong>Capacity (GPM) intermediate</strong></td>
<td>600</td>
</tr>
<tr>
<td><strong>TDH at intermediate Capacity (Feet)</strong></td>
<td>184'</td>
</tr>
<tr>
<td>Minimum Efficiency at Design Capacity</td>
<td>78%</td>
</tr>
<tr>
<td><strong>Design Capacity (GPM) (Design)</strong></td>
<td>1000</td>
</tr>
<tr>
<td><strong>TDH and Design Capacity (Feet) (Design)</strong></td>
<td>162'</td>
</tr>
<tr>
<td>Minimum Intermediate Nominal Efficiency</td>
<td>70%</td>
</tr>
<tr>
<td><strong>Secondary Capacity (GPM) (run-out)</strong></td>
<td>1300</td>
</tr>
<tr>
<td><strong>Secondary Minimum TDH (Feet)</strong></td>
<td>125'</td>
</tr>
<tr>
<td>Minimum Pump Efficiency at Secondary TDH</td>
<td>70%</td>
</tr>
<tr>
<td>Maximum NPSHR at Design Point (Feet) (Design)</td>
<td>11’</td>
</tr>
</tbody>
</table>

END OF SECTION 11311