

ROCKLAND COUNTY SEWER DISTRICT NO. 1

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ADDENDUM NO. 3

**CONTRACT RFP-RC-SWR-CIP 2020-02
MAIN PUMP STATION UPGRADE PROJECT**

**ROCKLAND COUNTY SEWER DISTRICT NO. 1
ROCKLAND COUNTY, NEW YORK**

September 1, 2021

The attention of all proposers is directed to the following changes, additions, and/or substitutions affecting the above-referenced project. This Addendum shall be included in and become part of the RFP for this project. Acknowledge receipt of this addendum in the space provided in this Addendum. This section must be signed and submitted with the bid proposal. Failure to do so, may subject the bidder to disqualification.

Item No. 1 - Questions

Below are the questions that have been submitted with responses from the Owner:

Question 1:

The stair details on drawing A-002 do not provide any member sizes. Without a complete design, the bidders cannot obtain material quotes. Please provide some guidance so that all bidders can price the same design.

Response:

Delete Specification 05510, Article 1.03A and Replace with:

- "A. Fabricate stairs and landings to support a live load of 100 lb/sq.ft. and a concentrated load of 300 lbs, with deflection of stringers or landing framing not to exceed 1/360 of span."

Delete Specification 05510, Article 1.04 and Replace with Attachment 1.

Question 2:

Please confirm what portion of the bypass pumping system is to be removed upon successful testing and acceptance of new pump and pumping systems, is it only the exposed portion above ground, or also the portion underground and supported by the thrust block?

Response:

Thrust block called out on Sheet M-005 is a permanent connection and is to be left in place.

Refer to Specification 01540, Article 1.12A: "The Contractor shall be responsible for the installation, operation, and removal of all flow bypass facilities and surface restoration in accordance with the contract and the approved project schedule."

Question 3:

A representative on behalf of Flowserve has stated that they cannot accommodate the specifications set forth regarding the 6 new pumps. Please advise on whether specifications will be modified or if an alternative will be provided.

Response:

Delete Specification 11306 and Replace with Attachment 2.

Question 4:

Request that Allen Bradley Bulletin 2100 MCC be added to the MCC specification 16486.

Response:

As discussed at the Pre-Bid Meeting, substitutions will not be evaluated during bidding. Refer to GCC 23 - EQUAL, SUBSTITUTION for substitution requirements.

Question 5:

Request that Allen Bradley Variable Frequency Drives model PowerFlex 750TL be added to the VFD specification 16480

Response:

As discussed at the Pre-Bid Meeting, or-equals and substitutions will not be evaluated during bidding. Refer to GCC 23 - EQUAL, SUBSTITUTION for substitution requirements.

Question 6:

Contract drawing E-018 does not show an 18-pulse design. We will like to provide the PF750TL design?

Response:

The drawing referred to is a control drawing shown to pick up all the functions of the VFD. It is not a vendor's single line of the internal makeup of a VFD. Please refer to all Contract Specifications.

Question 7:

General Conditions Article 56 - Hours of Work reads: "The work day for the Engineer and his staff begins at 7:00 A.M. and ends at 5:00 P.M. If the Contractor wishes to prosecute any portion of the work outside of these hours, he shall first obtain permission from the Owner and Engineer, notifying them each time in advance, giving them ample time in which to schedule an Inspector for the work. The Contractor shall reimburse the Owner for the Engineer's overtime costs. These costs shall be deducted from the Contract." Specification 01540 - Temporary Bypass Pumping, section 1.04.A reads: "The system shall not be allowed to be put into operation until all pumps, piping, and valves, MPCP, VFD's, MPDS and MCC's and other electrical components required for the new work and new pump operation are on site and ready for installation." The longest lead time item is expected to be the main sewage pumps with a production time of at least 6 months, and that doesn't include factory testing time. Given these restrictions, it seems reasonable to assume that work outside of normal working hours will be required to complete the project in the allotted 577 consecutive calendar days. Please provide the hourly rates for Inspection Services which the Contractor will need to reimburse the Owner.

Response:

The current maximum straight time hourly rate is \$42.381949. Depending on the amount of overtime, the multiplier will be either 1.5x or 2x. 30% is added to the straight time portion of the overtime for benefits. The rates are subject to adjustment for any future union contract rate increases.

Question 8:

For Valves - Specs call for metal seated double disc and then describe features of resilient wedge. Please clarify which style is required.

Response:

Delete Specification 15100, Article 2.02 and Replace with Attachment 3.

Question 9:

For Valves - specs call for OS&Y and describe features of NRS please clarify which style is required.

Response:

Delete Specification 15100, Article 2.02 and Replace with Attachment 3.

Question 10:

The Screening Building Plan on Page M-007 displays the two screening slide gates that provide discharge to wet wells. Please verify whether both slide gates discharge into Wet Well 1, or if each wet well is tied to a single gate

Response:

Each gate (A7 and A5) discharges to separate wet wells, 1 and 2. Wet wells connected via sluice gate operated on the intermediate level inside wet well. Operational status of gates is unknown.

Question 11:

Based on the elevation of the screening gates shown on Page M-007, it appears that the two screening slide gates is at an elevation lower than both sub-levels of the intermediate level right below the Odor Control room (as shown on Page M-001 View 2). This would mean that aside from the slide gate between the two wet wells, the gates displayed in the Intermediate levels are obsolete, as the two screening gates discharge directly into the Wet Wells. Please verify if this is correct.

Response:

Gates shown on M-003 intermediate level (below the Odor Control Room) are not obsolete. Valving is for manually cleaned bar screen emergency bypass. Operational status of these gates is unknown.

Question 12:

If the assumption stated in **Question 12** is correct, can we partially demolish the Intermediate level platforms underneath the Odor Control room to gain access to the Wet Wells?

Response:

Any demolition of platform will need approval by the Owner.

Question 13:

Was the pre-bid meeting mandatory, meaning only the GC and subs who attended can bid this job or is it open to all?

Response:

Pre-Bid Meeting was not mandatory. Refer to the Contract Documents for bidder requirements.

Question 14:

What is the towns budget for this project?

Response:

The Owner is not a Town.

The Engineer's Opinion of Probable Construction Cost is \$18 million to \$20 million (estimated based on 2020 dollars).

Question 15:

Are there any specs for the manholes shown on site plans.

Response:

The Contract Documents include multiple requirements for manholes.

Question 16:

As the recent Addendum, Addendum #2, has not addressed the pump specification issue brought forth by our Flowserve representative, we would like some time to discuss the matter with the representative so that we can retrieve an accurate quote for the item.

Response:

Please refer to Item No. 3 below. At this time the bid date will not be extended.

Item No. 2

Delete Specification 05510, Article 1.03 A and Replace with:

“A. Fabricate stairs and landings to support a live load of 100 lb/sq.ft. and a concentrated load of 300 lbs, with deflection of stringers or landing framing not to exceed 1/360 of span.”

Delete Specification 05510, Article 1.04 and Replace with Attachment 1.

Item No. 3

Delete Specification 11306 and Replace with Attachment 2.

Item No. 4

Delete Specification 15100, Article 2.02 and Replace with Attachment 3.

Item No. 5

Delete Specification 17095, Article 1.01 C and Replace with:

“C. Main pump control panel (MPCP) specified herein is to be provided by the Contractor.”

Item No. 6

Delete Specification 16480, Article 1.01 A and Replace with:

“A. This Section covers the requirements for variable frequency drives (VFDs) for the pumping system provided by the Contractor. Six (6) VFDs for the 250 HP vertical centrifugal pumps shall be furnished and mounted by the Contractor. The specified motor is 250 HP, 332 FLA, 480V; the VFDs shall be oversized and rated for 300 HP, 398 FLA, 480V as required by this specification. The VFDs shall be provided as a packaged system with the vertical centrifugal pumps.”

Item No. 7

In Bid Proposal paragraph 2 (on P-1), Delete “Five Hundred Seventy Seven (577) calendar days” and Replace with “Seven Hundred Fifty (750) calendar days”.

Item No. 8

Bid Date Extension: Bids will be received on **Thursday, September 16, 2021 until 11:00 a.m.**, Local Time, in the offices of Rockland County Sewer District No. 1, 4 Route 340, Orangeburg, NY, at which time and place they will be publicly opened and read aloud. These bids will be for the furnishing of all tools, equipment, materials and labor for all contracts, all complete, in place, tested and ready for use.

Item No. 9

Extension of Question Period: Final questions will be accepted electronically until **Thursday, September 9, 2021.**

ACKNOWLEDGMENT

Print Name: _____
Name of person responsible for this solicitation

I acknowledge the receipt of _____ addendums.

Signature: _____
Email Address: _____
Direct Phone Number: _____
Fax Number: _____
Date: _____

Martin J. Dolphin, P.E.
Assistance Director

Date: September 1, 2021

ATTACHMENT 1

1.04. SUBMITTALS

- A. Delegated Design - Engage a qualified professional engineer, as defined in Section 01400 "Quality Requirements," to design stairs, railings, and guards, including attachment to building construction.
- B. Shop Drawings - Include complete set of calculations, fabrication details and erection plans, including connections, attachments, reinforcing, anchorage, size and type of fasteners, accessories, and all dimensions. The shop drawing to be stamped and signed by a New York State professional engineer. Photocopies of Contract Drawings, in whole or in part, are not acceptable.
- C. Indicate welded connections using standard AWS welding symbols.
- D. Submit product data for manufactured items, with items of intended use highlighted or otherwise indicated.
- E. Stair treads and landing surfaces shall be submitted under Section 05531, Grating and Floor Plank, and must be approved prior to approval of stair shop drawings.

ATTACHMENT 2

SECTION 11306

VERTICAL CENTRIFUGAL PUMPS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish and install, six vertical centrifugal non-clog pumps, including shafts and motors, and variable speed drives, complete with all accessories and ready to operate, and provide spare parts, and manufacturer's services in compliance with the specifications and as shown on the Contract Drawings.
- B. Manufacturer shall have sole responsibility for performance of the entire system to include all components listed above, shall be provided as a packaged system.

1.02 RELATED SECTIONS

- A. Section 01640 - EQUIPMENT – GENERAL
- B. Section 09900 – PAINTING
- C. Section 11300 - PUMPING EQUIPMENT – GENERAL
- D. Section 15170 – MOTORS
- E. Section 16480 - VARIABLE FREQUENCY DRIVES
- F. Section 17095 - CUSTOM CONTROL PANELS AND INTEGRATION

All electrical equipment and wiring shall be in compliance with Division 16, Electrical Specifications.

1.03 REFERENCES

- A. Standards of the Hydraulic Institute.
- B. AFBMA Std. 11 – Load and Fatigue Life of Roller Bearings.
- C. ASTM A278 - Gray Iron Castings.
- D. ASTM A743 - Standard Specifications for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application
- E. NEC – National Electric Code.
- F. NEMA – National Electrical Manufacturers Association.
- G. AISI – American Iron and Steel Institute.
- H. ANSI - American National Standards Institute.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. The pumps shall be able to fit through the existing hatch in the pumping station roof and ground floor as shown on the Contract Drawings.
- B. The pump motors shall be guaranteed to run totally or partially for continuous 24-hour/day operation without damage.
- C. Contractor shall provide fittings as necessary to accommodate the suction/discharge connections required to adapt to piping shown on Drawings.
- D. The pumps shall be designed to pump municipal raw sewage containing solids and fibrous materials without clogging and without cavitation or excessive vibration or noise.
- E. Each Pump shall be designed for the conditions of service tabulated as follows:

Item	Service
Number of Units to be Supplied	6
Maximum Full Load Motor Speed (rpm)	506
Minimum Motor Horsepower (Hp)*	250
Minimum Suction Size (inches)	24
Minimum Discharge Size (inches)	24
Minimum Shut-Off Head at Design Speed Feet	52
System Static Head (ft)	30
Primary Design Point (each unit)	11,350 gpm at 41-ft TDH
Minimum Efficiency at Primary Design Point (%)	82%
Maximum NPSHR at Primary Design Point (feet)	15.3
Secondary Design Point (each unit)	13,800 gpm at 38-ft TDH

* A 250 Hp motor shall be provided even if required brake hp is less.

- F. Solids passing capability of the pump shall be a minimum of a 7-inch solid
- G. The pumps shall be provided with motors connected for operation on 480-volt, 3 phase, 60 Hertz power supply.

1.05 SUBMITTALS

- A. Shop Drawings
 - 1. Submit shop drawings for equipment provided under this section. Format and content of the shop drawing submittal shall conform to requirements specified in Section 01640.

2. The shop drawing submittal shall include the following as a minimum:
 - a. Manufacturer's certificates including performance affidavit for all equipment furnished under this section.
 - b. Manufacturer's published pump curves demonstrating compliance with specified performance requirements.
 - c. Manufacturer's catalog information, descriptive literature, specifications, etc. for pumps, motors, and accessories, including pump seal assemblies and pressure gauges.
 - d. Manufacturer's certified installation drawings containing all critical dimensions, piping connection sizes, weights, etc. required for installation of the equipment. Drawings shall include all pumps, interconnected piping, and valves. Coordinate with Contractor as required to produce drawings in REVIT format.
 - e. Shop and field painting information.
 - f. Motor information conforming to the requirements specified in Section 15170.
 - g. Manufacturer's written installation instructions, including any special requirements for shipping, handling, and storage of equipment prior to installation.
 - h. Information regarding minimum and maximum pump and motor speeds.
 - i. Written statement from the motor manufacturer endorsing the use of their product with the variable frequency drives specified for these pumps in Section 16480.
 - j. Name of the independent firm who will provide vibration testing. The firm shall have been in business for at least five years and shall provide at least ten references for similar work performed. Provide proof of experience and references.
- B. Shop Test Results - Submit shop test results, including certified pump curves for each pump provided, in accordance with requirements specified in Sections 01640 and 11300 showing as a minimum hydraulic efficiency, input power kW, wire to water efficiency, brake horsepower, flow versus head (minimum of 8 points) and vibrometer readings.
- C. Operation and Maintenance Manual
 1. Submit manufacturer's written instructions for proper operation and maintenance of pumps, shafts, motors, and accessories provided under this section.
 2. Format and content of the manufacturer's operation and maintenance instructions shall conform to the requirements specified in Section 01640.

D. Manufacturer's Certification of Equipment Compliance

1. Submit written certification of proper equipment installation and satisfactory completion of preliminary field testing by authorized field service representative of the equipment manufacturer.
2. Manufacturer's certification and performance affidavit shall conform to requirements specified in Sections 01640 and 11300.

E. Unless the manufacturer is specifically named in these specifications, the following must be provided along with the shop drawings as required in 1.05.A:

1. A reference list showing that the proposed supplier is in compliance with paragraph 1.06.A.
2. The following information for the 10 references given in Article 1.05.E.1 so the Engineer is able to verify 10 of the installations:
 - a. Details of the equipment including pump, motor, and drive characteristics
 - b. Name and address of the client and location of installation, if different.
 - c. Name of person in direct responsible charge.
 - d. Telephone number and other contact information of person in direct responsible charge.
 - e. Installation and start-up dates.
 - f. Full installed pump performance details of specific pump(s).

It is the sole responsibility of the Contractor to provide the information necessary for the Engineer to contact these references.

F. Guarantee/Warranty

1. By supplying a product under the contract, the system supplier and manufacturers jointly agree that all manufacturer's warranties, expressed or implied, pass through the supplier to Owner. This warranty obligation starts on the date the pump(s) are placed into service following final performance testing and acceptance by the Owner and Engineer, and survives any inspection by, delivery to, acceptance by or payment by the Owner or system supplier for the goods furnished by the manufacturer. Further, this warrants that the equipment designed, manufactured and/or used meets all applicable federal, state, and local laws, rules, and regulations, including applicable OSHA standards. This requirement does not change or limit the requirements for performance affidavits.
2. Provide duplicate notarized copies of guarantees/warranties.
3. Submit prior to Final Application for Payment.

1.06 QUALITY ASSURANCE

- A. The manufacturer of the equipment specified herein shall be regularly engaged in the design and manufacture of the type of equipment described herein for at least seven years. The manufacturer's experience will include at least 10 installations of similar design as that specified herein.
- B. The pump manufacturer shall supply and deliver all materials, products, and services, etc. specified in this section for installation by others to the site. The pump manufacturer shall have total responsibility for pump system performance and conformance to assure proper interfacing and reliable operation of all components of the system.

1.07 SPARE PARTS

- A. The manufacturer shall furnish the following spare parts in clearly identified containers. Provide one set of spare parts for each pump.
 - 1. Two Complete set of gland packing
 - 2. Two impellers with wear ring and fastener.
 - 3. Two suction wear rings.
 - 4. Set of line and thrust Bearings
 - 5. Two shaft sleeves with keys, nuts, O-rings.
 - 6. Two sets of gaskets and seals.
 - 7. Two mechanical seal rebuild kits.
 - 8. Two set of lantern rings
 - 9. Two casing wear rings
 - 10. Two mechanical seals

PART 2 PRODUCTS

2.01 GENERAL

- A. Pumps - The pumps provided under this section shall be Flowserve Model 24MNV28A as manufactured by the Flowserve Corporation, or equal.
- B. Dimensions and locations shown on the Contract Drawings are based on the equipment manufacturers and models listed above. Any change in the dimensions or location of equipment, including accessories, required to accommodate alternate manufacturers and models shall be at the Contractor's expense.
- C. The pumps, motors, drives, shafting and supports shall be designed and built for 24-hour continuous service at any and all points within the specified range of operation, without overheating, without damage cavitation, and without excessive vibration or noise.
- D. In the case of equipment submitted for approval as an "or equal" to the manufacturers and models listed above, the Contractor shall demonstrate, in writing, at the time of shop drawing submittal, that the manufacturer has produced the specified type and size of equipment for sanitary wastewater service that has been in successful operation for a minimum period of 10 years prior to the bid date.

- E. Each major piece of equipment shall be furnished with a stainless steel nameplate (with embossed data) securely mounted to the body of the equipment. As a minimum, the nameplate for the pumps shall include the manufacturer's name and model number, serial number, rated flow capacity, head and speed. As a minimum, nameplates for motors shall include the manufacturer's name and model number, serial number, horsepower, speed, input voltage, amps. Number of cycles, power and service factors.

2.02 PUMP DESIGN

A. Casing

1. Pump casing shall be of the one-piece volute-type with an integral discharge nozzle. Twin or double volute casings will not be accepted. No stationary guides will be permitted on either the suction or discharge sides of the casing.
2. Casing shall be made of close-grained cast iron conforming to ASTM A278 Class 30 nominal 0.88-inch thickness minimum, designed to withstand all stresses and strains of service at full operating pressure.
3. The casing shall be designed to permit the removal of the rotating assembly without disturbing the suction or discharge connections and shall be provided with a large handhole to permit inspection and cleaning of the pump interior. The handhole cover shall be bolted and its inner contour shall match the contour of the casing.
4. The casing shall be provided with tapped and plugged (removeable) vent, drain, and gauge connections. Suction and discharge connections shall be 125 lb. ANSI standard flat-face flanges positioned as indicated on the Contract Drawings. Each casing shall be hydrostatically tested to 1.5 times the pump shutoff head or 75 psi, whichever is greater. Hydrostatic test certification shall be provided prior to shipment.
5. Three lifting eyes minimum shall be furnished to facilitate handling.
6. Pump shall be supported by a ribbed base cast integrally with the suction elbow or nozzle, on reinforced concrete pillars. Alternately, larger pumps may be supported by feet cast integrally with the casing rib structure on reinforced concrete pillars. Reinforced concrete pillars and anchor bolts shall be provided by the Contractor.

B. Impeller

1. The impeller shall be cast in one piece and shall have a minimum of two vanes. Impeller shall be non-clog and capable of passing a 7-inch diameter non-compressible sphere without deformation.
2. The impeller shall be keyed to the shaft and firmly held in place by a streamlined Type 316 stainless steel fastener. The arrangement shall be such that the impeller cannot be loosened by torque from either forward or reverse rotation. The impeller bore shall be concentric to avoid requirement for sleeve nuts which could interfere with mechanical seals.
3. Impeller shall be ASTM A278 class 30 cast iron, machined and polished to remove projections that might encourage cavitation.

4. Each impeller shall be dynamically balanced to Grade 6.3.
5. Impellers shall be secured with a locking assembly and cover, design of which shall prevent the impeller from being loosened by torque from forward or reverse direction.

C. Suction Elbow

1. The suction elbow shall be furnished as part of the pump, of the same material as the casing and designed to provide equal flow distribution to the impeller eye. Standard commercial fittings shall not be substituted.
2. The suction elbow shall be provided with a 125-lb. ANSI flanged connection and a handhole with a removable bolted cover, the interior of which shall be contoured to match the contour of the piece.
3. The suction elbow shall be part of the pump and shall contain the suction wear ring.
4. Standard or fabricated commercial fittings are not an acceptable substitute.

D. Pump Shaft

1. Each pump shall be connected to its driver by means of universal joint intermediate shafting, suitably sized to transmit the required driving torque. Motors must be true vertical, PBase design. Horizontal motors adapted to the vertical position are not acceptable.
2. The pump shaft shall be made from heat treated grade 1045 steel, rigid shaft type, of sufficient size to transmit the full driver horsepower with a liberal safety factor, accurately machined over its entire length and free from any harmful or damaging vibrations. Renewable ASTM A743 hardened 316 stainless steel shaft sleeves extending from the impeller hub through the stuffing box shall be provided.
3. Minimum shaft diameters shall be 4.98 inches between bearings, 4.50 inches under sleeve, 5.00 inches under line bearing, 4.70 inches under thrust bearing, and 4.12 inches at impeller.
4. Shafts shall be protected by a sleeve made of 316 stainless steel. Sleeve shall be keyed to shaft and sealed to prevent leakage between sleeve and shaft. Shrink fit shaft sleeves will not be acceptable. The shaft sleeve O.D. shall be a minimum of 0.375 inches over the shaft diameter.

F. Bearings

1. Each pump shall be provided with bearings both radial and thrust, angular contact roller bearings, of ample size to carry all loads imposed under continuous operation without overheating.
2. All bearings shall be accessible while the pump is in operation. Bearing frame shall be designed so that the complete rotating element can be removed from the casing without disconnecting piping. Bearings shall be designed in accordance with the ABMA standards for a minimum L-10 life of 100,000 hours, without the addition of external cooling.

3. Bearings shall be grease lubricated, and A relief plug shall be provided so that excessive grease pressure will not damage the bearings.
4. Seals shall be provided in the bearing covers to prevent the entrance of contaminants.
5. The bearing frame shall be of one piece ASTM A48 Class 30 cast iron construction, rigidly fixed to the backhead, shoulder fitted and accurately centered. Fabricated bearing housings are not acceptable. The bearing frame shall contain external provisions for the axial adjustment of the rotating element to maintain clearance between the impeller and suction cover wearing rings as the rings wear. A coded shim pack shall be provided to aid in maintaining parallel faces.

G. Stuffing Box

1. The backhead shall be of the same material as the casing, with an integrally cast stuffing box. Its construction shall permit the use of either a mechanical seal or packaging rings without special machining. A large opening shall be provided adjacent to the stuffing box to facilitate packing or mechanical adjustment and replacement.
2. A renewable throat bushing shall be installed in the bottom of the stuffing box to minimize the amount of clean water injected into the box.
3. The Contractor shall provide the seal water piping and accessories as shown on the drawings.
4. Each pump shall be equipped with a PSS 4 split cartridge type mechanical seal, or equal. Seal shall be capable of being replaced without disassembly.
5. Seal faces shall be installed around the shaft, outside of the seal chamber. All metal components shall be either 300 or 420 series stainless steel. Mechanical seals shall be manufactured by pump manufacturer. Provide connection for seal water.
6. Proprietary stuffing box sealing systems are not acceptable.

H. Wear Rings

1. Removable hardened stainless steel wearing rings shall be provided for both the suction and the impeller, with the wearing surfaces normal to the axis of rotation to accommodate the adjustment feature specified further herein. Radial wear rings are not an acceptable alternate.
2. Rings shall be securely fastened to prevent any relative motions and designed for easy replacement.
3. Both wearing rings shall be hardened 400 series stainless steel, with the impeller wear ring hardened to 300-350 Brinell and the suction head wear ring to 400-450 Brinell, designed to compensate for a minimum of ¼-inch wear.

2.03 INTERMEDIATE SHAFTING

- A. Intermediate shafting of the universal joint type shall be furnished and shall include pump and motor couplings and any required steady bearings. The number of sections shall be as recommended by the shafting manufacturer based on lateral/torsional analysis of data provided by the pump manufacturer.
- B. Shafting shall be selected to have a B10 bearing life of 20,000 hours for the industrial bearings and 50,000 hours for the steady bearings. Shafting shall avoid critical speeds and harmonics as recommended by the shafting manufacturer. Shafting manufacturer shall submit all data and calculations substantiating selection and number of sections.
- C. Contractor shall furnish intermediate bearing supports where multiple shaft sections are required. Intermediate bearing supports shall be designed by a structural Professional Engineer licensed in the State of New York and retained by the Contractor. The structure shall be rigid in all planes. The natural frequency of the bearing support shall be a minimum of four times the running speed forcing frequency. The proposed support and design calculations shall be submitted for approval prior to construction. The existing shaft bearing support steel beams shall be replaced in kind. Manufacturer shall verify shaft and intermediate shaft bearing shall be adequately supported through use of the steel support beams.
- D. Provide galvanized mesh guards enclosing shafting to a height of 7-feet above any floor or standing platform.
- E. Shafting shall be as manufactured by Johnson Power LTD, or equal.

2.04 SURFACE PREPARATION AND SHOP PRIME PAINTING

- A. Each pumping unit, including supports, shall be shop primed with universal rust inhibitive primer, Tnemec 69 or equal. The shop primer shall be compatible with the Contractors finish paint specified in Division 9.
- B. Motors shall have manufacturers standard finish paint for corrosive environments.

2.04 MOTOR

- A. Pump motor shall be 250 HP, 590 rpm vertical inverter duty motor designed to operate on 480-volt, 3 phase, 60 Hertz power. Motors shall be inverter duty rated and have a minimum service factor of 1.15. Motor shall be suitable for use with variable frequency drives as specified in Section 16480. All motors shall comply with Section 15170. The manufacturer shall state in its proposal any limitations on starting methods and steady running conditions. Motors shall be Premium Efficiency.
- B. Provide a cylindrical steel motor support with welded base and end cap. The motor support is not intended to bridge large openings. The support shall be designed to elevate the motor to access the coupling and shall have adequate cut-outs to facilitate inspection.

2.05 CONTROLS

- A. Provide VFD's in accordance with Section 16480 and coordinate with Section 17095.

- B. Pump monitoring – The pump manufacturer shall provide the following instruments with auxiliary contacts to monitor from destinations external to the panel:
1. Vibration – Horizontally and Vertically – Top of pump bearing frame.
 2. Vibration – Horizontally and Vertically – Motor.
 3. Temperature – Motor winding.
 4. Temperature – Pump thrust bearing.
 5. Temperature – Intermediate shaft bearing.

PART 3 EXECUTION

3.01 SHOP TESTING

A. Testing and Reporting Requirements

1. Each pump specified herein shall be factory tested in accordance with the latest edition of the Hydraulic Institute Standards. The tests shall be completed utilizing variable speed drives.
2. Tests shall be run on an open well (not a loop) with the pump pulling a suction lift.
3. Notification of such test and a list of test equipment and procedures shall be furnished to the Engineer at least 10 working days before the schedule test date.
4. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
5. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.
6. Each pump shall be tested, and data recorded at its operating conditions of service as specified in Article 1.04 above, Section 11300, Section 15170, and Section 17095. Sufficient test point readings shall be made to establish complete head flow capacity, efficiency, and brake horsepower curves for each pump.
7. Pump shall be tested at variable speeds and speed curve shall be plotted on the performance curve. Affinity law calculations are not acceptable.
8. A complete test report for each pump, including certified characteristic curves of the pump consisting of at least all information required in Paragraph 1.03 above, except for NPSHR, and certified copies of the hydrostatic test report, shall be submitted to and approved by the Engineer before the pumps are shipped.
9. Factory test shall be performed with job motor and pump combination. Factory test with "shop" motor will not be acceptable.
10. Factor test shall not be used as acceptance testing.

- B. A detailed signature vibration analysis shall be conducted at the factory prior to delivery on each unit including a bump test and X-Y vibration profiles to prove compliance with the specified vibration limits.
 - 1. A written report will be submitted including a sketch of the unit indicating where and in which direction the vibration readings were taken and recorded showing peak to peak displacement in mils.
 - 2. The manufacturer shall take corrective action to ensure full compliance with the specification and the units shall be retested.
- C. All gauges and other test instruments shall be calibrated within 30 days of the scheduled test and certified calibration data shall be provided. All Venturi flow meters shall be calibrated as required by ANSI/HS standards.

3.02 EQUIPMENT INSTALLATION

- A. Furnish and install the pumping equipment according to manufacturer's instructions, General Contract Provisions and Section 11300.
- B. Furnish all necessary oil and grease for initial operation and for the one-year warranty period.
- C. Contractor shall field verify all dimensions and elevations and shall notify Engineer of any specific differences. There is an existing hatch in the roof and in the upper floor of the Main Pump Station that can be utilized by the Contractor to transfer the pumps into the existing dry pit. Contractor shall be prepared to have to disassemble parts of the pump, if necessary, to fit through the existing hatches as well as to move the pumps within the dry pit.
- D. Shaft Installation - The Contractor shall coordinate with the manufacturer to ensure an approved installation. If after the Contractor has completed the installation of the pumps in accordance with the requirements of the Specifications and as recommended by the Manufacturer, it is found that the installation continues to vibrate beyond allowable limits as established by "Hydraulics Institute Standards" the Contractor, when ordered by the Engineer, shall engage the services of an independent qualified testing firm to perform a vibration analysis of the defective unit to determine, in conjunction with the manufacturer, the source of the problem and what corrective measures should be taken to solve the problem. A detailed report of the findings shall be submitted to the Engineer.
- E. Shaft Guards and Support Beams – It is the intent that the existing shaft guards and steel support beams be reused for this project. If, in the opinion of the manufacturer, the existing shaft guards and support beams cannot be reused, the Contractor is to furnish and install new guards and supports at no additional cost to the Owner. New guard installations must be submitted and approved by the Engineer.

3.03 FIELD TESTING AND INITIAL OPERATION

- A. Tests, trials and initial operation shall be performed in accordance with the General Contract Provisions and Section 11300.

- B. Operating tests in service shall be given to all pumps. The alignment of each pump, shafting and motor unit shall be proven straight and plumb and the satisfactory operation of each pump unit shall be demonstrated before the official test.
- C. Final acceptance of the pumps will be made after each pump has met the stated performance requirements including meeting the hydraulic head and flow capacity as specified in Article 1.04, verification that the motors and drives are not overloaded in normal operating conditions, acceptable vibration testing results, and successful interface with all controls.
- D. Field Testing
 - 1. Furnish the services of pump manufacturer representative who has complete knowledge of the proper operation and maintenance to inspect the final installation and supervise testing of the equipment.
 - 2. Field testing of all equipment shall be conducted after the installation is complete in the presence of the Owner, Engineer and manufacturer's representative, to determine that operation is satisfactory and in compliance with specifications, the equipment has been operated and all necessary adjustments have been made.
 - a. All equipment necessary for preliminary and field testing and the costs involved shall be borne by the Contractor/Manufacturer, including the services of the pump manufacturer's engineer and expenses incidental to retests, if any, occasioned by defects and failure of equipment to meet contract guarantees at the first tests. Water, electric current, water level indicators and recorders, flow meters, observers for taking readings, gauges, and connections for measuring the heads on the pumps shall be provided by the Contractor/Manufacturer.
 - b. All expenses for conducting the field tests shall be part of the cost of the work.
 - c. The pump manufacturer's representative shall be present during both the field pump and vibration testing.
 - d. Each unit will be operated utilizing screened plant influent wastewater for a period during which time all possible loads shall be applied. Data for at least four operating points shall be taken. Additional water needed to perform field test shall be supplied by the Contractor, as needed.
 - e. During the field tests, readings of all essential data shall be recorded at the four operating points. Data taken shall also include discharge pressure, wet well level, total head, flow, and pump speed.
 - 1) Field tests results (head, capacity, efficiency) shall be approximately equal to the results obtained by the shop test.
 - f. Results of the tests shall be submitted to the Engineer for approval.

- g. Vibration Analysis- A detailed signature vibration analysis shall be conducted on each pumping unit and shaft, including a bump test and X-Y vibration profiles to prove compliance with the specified vibration limits and to prove there are no field resonant conditions caused by misalignment, the foundation, the mounting or connecting piping and its supports, when operating over the range of design.
 - 1) The Contractor shall utilize the services of an independent qualified firm specializing in vibration analysis.
 - 2) A written report will be submitted including a sketch of the unit indicating where and in which direction the vibration readings were taken and recorded showing peak to peak displacement in mils.
 - 3) Vibration levels shall be within the acceptable limits for the type of pump and pump speed as given in the Hydraulic Institute Standards, most current Edition.
 - 4) The Contractor shall take corrective action to ensure full compliance with the specification and the units shall be retested.
 - 5) All defects or failures noted during the tests shall be corrected as approved by the Engineer. All costs associated with the required corrective action shall be borne by the Contractor.
- C. Each pump shall be tested individually through the new discharge header and existing discharge pipeline to the aerated grit building utilizing screened plant influent. Flows shall be monitored and recorded by Contractor utilizing a flow measurement device provided by the Contractor throughout the testing period. Performance and efficiency tests of the pumps shall include tests to prove the capacity and efficiency of each pump at rated conditions.
 - a. Capacity and overall efficiency - The work done by the unit shall be determined by multiplying the total weight of water pumped figured at 62.4 lbs. per cu. ft. by the average total head. The overall efficiency shall be the ratio of the total work done to the power input to the motor, both expressed in like units. The quantity of water pumped will be measured by flow meters installed downstream of the pumping units (by Contractor).
 - b. Power input - Reading simultaneous with the capacity readings and total head readings shall be taken of the power input to the motor as determined by calibrated polyphase watt-hour meters or wattmeters to be located on the switchgear.
 - c. Accuracy of efficiency - The field test efficiency shall be within 2 points of the guaranteed efficiency at rated capacity and head. The 2 points allowable differential is to cover estimated deficiencies on flow, pressure, and power measurements for testing.
 - d. Submit copies of certified field test reports to the Engineer for review.
- D. Following successful completion of testing of individual pumps, multiple pumps shall be tested together, up to a maximum of 5 pumps, through the new discharge header and existing discharge pipeline to the aerated grit building utilizing screened plant influent. Flows shall be monitored and recorded by Contractor utilizing a flow measurement device provided by the Contractor throughout the testing period.. Number of pumps that can be operated together may be dependent on incoming plant flows, Contractor shall be responsible for any additional water needed to preform field test.

- E. Upon successful completion of initial pump testing as described above, entire facility shall be operated for a two-week period under normal operating conditions as a condition of receiving final acceptance. Flows shall be monitored and recorded by Contractor utilizing the Owner's Parshall flume equipment in the aerated grit channel throughout the testing period. Owner will operate equipment under supervision of Contractor who shall still be responsible for system adjustments or repairs. If system or equipment repairs are needed, the test period shall restart.

3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide manufacturer's (or supplier's) services according to the General Contract Conditions and Section 01640.

END OF SECTION

ATTACHMENT 3

2.02. RESILIENT SEATED GATE VALVES

- A. Gate valves 2 inches and smaller shall be bronze gate valves with rising stem, double wedge disc, screwed bonnet, screwed ends, 125-lb. rating and shall be repackable under pressure in full open position.
- B. All gate valves 2 inches and smaller shall be Stockham Figure 107; Lunkenheimer Figure 2127; or equal.
- C. All other gate valves shall conform to the latest AWWA Standard and shall be suitable for wastewater applications. Except where otherwise indicated on the Contract Drawings.
- D. The valves shall have a cast iron body, bonnet and wedge. The wedge shall be totally encapsulated with rubber
- E. The sealing rubber shall be permanently bonded to the wedge to meet ASTM tests for rubber metal bond ATSM D249.
- F. Valves shall be supplied with O-Ring seals at all joints.
- G. The valves shall be non-rising (NRS), unless otherwise noted in the Contract Drawings.
- H. Stems for NRS assemblies shall be cast bronze with integral collars in full compliance with AWWA. OS&Y (rising stems) shall be of bronze. All stems shall operate with bronze stem nuts, independent of stem (in NRS valves). NRS stems shall have 2 O-Rings located above thrust collar and O-Ring below. All stem O-Rings shall be replaceable with valve fully opened and subjected to full pressure. The NRS stems shall also have 2 low torque thrust bearings located above and below stem collar to reduce friction during operation.
- I. Waterway shall be smooth, unobstructed and free of all pockets, cavities and depressions in the seat area. Valves shall accept a full size tapping cutter.
- J. The body, bonnet and stuffing plate shall be coated with fusion bonded epoxy, both interior and exterior on body and bonnet. Epoxy shall be applied in accordance with AWWA C550.
- K. Each valve shall have a maker's name, pressure rating, and year in which it was manufactured cast in the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to requirements of AWWA.
- L. All interior gate valves shall be equipped with handwheel or chain and wheel operators unless otherwise specified.
 - 1. Handwheel or chain and wheel operators shall be replaceable with 2-inch operating nuts without replacing the valve stem or removing the bevel gears.
- M. Gate valves shall be designed to be leak-tight with full pressure on either face with no pressure on the opposite face.
- N. All internal parts shall be accessible without removing the body from the line.
- O. Valves shall have all brass components cast and assembled in the USA and shall be manufactured by Kennedy Valve Company or equal.