



**CITY OF WINTER GARDEN
WESTERN STORAGE, PUMPING & TRANSMISSION FACILITIES**

Addendum No. 1

April 25, 2018

This Addendum forms a part of the Contract Documents and modifies or supplements the original Bidding Documents dated April 2018. It shall be noted that the responses and revisions set forth herein supersede any previous requirements within the original Drawings and Specifications. Revisions are indicated with bubbles and the addendum number. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

This Addendum consists of 6 pages, plus attachments.

The deadline for bids has been extended. The last day for submitting questions is Thursday 5/10/18 with **Bids due by 2:00 PM on 5/17/18.**

Questions Received at Pre-Bid Meeting

Question 1: Do the VFD's have to be supplied by the pump manufacturer?

Answer 1: No. Specification 11221 – Horizontal Split Case Pumps, Subparagraph 1.02.A.1, has been revised and reissued by this addendum to remove the requirement that VFDs be supplied by the pump manufacturer.

Question 2: What are the liquidated damages?

Answer 2: \$1,000 per day (see Agreement Section 00500).

Question 3: Has a City Building Dept. permit been obtained?

Answer 3: No. Building Dept. Review has not occurred. The contractor will be required to obtain the building permit. Review is done electronically.

Question 4: When does the City expect construction to start?

Answer 4: Mid-June.

Question 5: How is the property accessed?

Answer 5: From the north via Amber Sweet Lane and the City owned roadway parcel.

Question 6: Are there domestic requirements for materials?

Answer 6: No.

Question 7: There are conflicts between Appendix A Approved Materials and the Schedule of Base Bid Manufacturers (Bid Form Section 00300).

Answer 7: Section 00300 – Bid Form has been revised to make the listed manufacturers in the Schedule of Base Bid Manufacturers/Suppliers consistent with the Appendix A - Approved Material List and reissued by this addendum.

Questions Received During Bidding

Question 1: Reference Specification # 16151, 2.01.B.1. Square D by Schneider Electric requests that the ATV 660/960 with 18 pulse phase shifting transformer be added to the approved list of vendors for 18 pulse VFD's. If Square D by Schneider Electric is an approved vendor, reference Specification # 16151, 1.01.F Square D By Schneider Electric requests the ATV 660, enclosed 6 Pulse VFD with Passive Broad Band Technology be added as an approved alternate to the 18 Pulse Phase shifting transformer. This technology meets or exceeds the harmonic mitigation of an 18 pulse design with a smaller footprint and less energy loss as compared to 18 pulse phase shifting transformer drives.

Answer 1: The Schedule of Base Bid Manufacturers/Suppliers (Instruction to Bidders, page 00300-8) has been revised to list the Variable Frequency Drives and the Manufacturer "Yaskawa by Icon Technologies". Bids shall be based on Yaskawa by Icon Technologies.

Question 2: Below are our comments to the specifications associated with the Horizontal Split Case Pumps (11221). Note that it appears that the basis of design 5LR-19A by Flowserve is actually a wastewater pump and not suitable for Potable water applications, as called out in note #4. The good news is that Flowserve does have a similar pump 5LR-15D that is very close to the same curve and hopefully is sufficient. If you would prefer, we made all the associated changes to the specifications in the attached PDF to be used as you see fit.

Answer 2: Our information indicates that the Flowserve model 5LR-19A split case pump it is available configured as NSF 61 certified for potable water. We have reviewed the proposed Flowserve 5LR-15D pump against the operating conditions of the station and found that it would be an acceptable alternative. Section 11221, Table 11221-A - Potable Water High Service Pump Design Requirements has been revised and reissued by this addendum to allow either the 5LR-15D or the 5LR-19A for the large potable water high service pump.

Question 3: Specification section 11221 (Horizontal Split Case Pumps), 2.02.J: There appear to be two "J" sections, one labeled "Performance Requirements" and the other "Pump Construction".

Answer 3: Section 11221 – Horizontal Split Case Pumps has been revised to correct problem with the paragraph lettering and reissued by this addendum.

Question 4: Section 11221, 2.02.J.5: "Pump Construction": Request modification for specific call outs and difference between Reuse Pumps and Potable Water Pumps due to NSF-61 standards

Answer 4: Section 11221 – Horizontal Split Case Pumps has been revised/reissued by this addendum to separately list materials of construction requirements for potable water and reclaimed water pumps.

Question 5: Section 11221, 2.02.J.5: Replace with "Stuffing boxes for potable water pumps shall be provided with NSF-61 ISC2 or approved equal mechanical cartridge shaft seals. Stuffing boxes for reuse pumps shall be provided with T-51 pack or approved equal mechanical

component shaft seals.” The reason for this change is to guarantee NSF-61 compliant seals for potable water pumps and the appropriate cost-effective seal for the reuse pumps.

Answer 5: No revision to the specification is required.

Question 6: Section 11221, 2.03.B.6: Request modification to state, “One year’s supply of all required lubrication grease and oil, provided by Contractor.” This is the common approach and want to avoid confusion on bid day.

Answer: No revision to the specification is required.

Question 7: Table 11221-A “Potable Water High Service Pump Design Requirements”. It appears that the section was pulled directly from Flowserve’s typical specifications for wastewater pumps since this pump arrangements is not available via NSF-61. The pump to meet the flow parameters would need to be 5LR-15D. i. Max. Allowed Pump HP at Design Speed (hp) = 89 (instead of 88), ii. Pump Suction Connection Size (in) = 6 (instead of 8), iii. Secondary Condition Capacity gpm = 1488 (instead of 1,495), iv. Max. TDH at Secondary Capacity (feet) = 145 (instead of 140), v. Pump Model Used for Design = Flowserve 5LR-15D (instead of 5LR-19A, since the 19A utilizes an standard bronze impeller that is not NSF-61 approved).

Answer 7: Our information indicates that the Flowserve model 5LR-19A pump is available as NSF 61 certified for potable water service with 316 SST impeller and trim. We have reviewed the proposed Flowserve 5LR-15D pump against the operating conditions of the station and found it to be an acceptable alternative. Table 11221-A - Potable Water High Service Pump Design Requirements has been revised and reissued by this addendum to allow either the 5LR-15D or the 5LR-19A for the large potable water high service pump. Note that other pump manufacturers have attained NSF 61 certification on pumps with nickel aluminum bronze impellers. We have added 316 stainless steel to the allowable impeller materials since that’s the pump configuration for which Flowserve currently has NSF 61 certification. In Table 11211-A, for the potable water pumps only, the “Maximum Allowed Pump HP at Design Speed (HP)” values have been increased and “Minimum Pump Efficiency at Primary Capacity” values have been decreased to accommodate less efficient stainless steel impellers.

Question 8: Table 11221-A “Reclaimed Water Potable Water High Service Pump Design Requirements”:
a. Please confirm these pumps are being utilized with Reuse Water, and therefore do not required NSF-61 approval. b. Items “Maximum Allowed Pump Horsepower at Design Speed (hp)”, the list 88hp is accurate at the design point but along the curve at the design speed, per the language of the section the accurate hp would be 95hp. 95hp is reached at the end of the curve, since it is a constantly rising power curve. c. If utilized for Reuse water, this table is accurate. Suggest changing title to “Reclaimed Water High Service Pump Design Requirements”

Answer 8 Section 11221– Horizontal Split Case Pumps has been revised and reissued by this addendum. Table 11221-A has been revised to increase maximum allowable horsepower of the large potable water pumps and large reclaimed water pumps to 95 HP and reissued by this addendum.

Question 9: Table 11221-B “Materials of Construction”

- a. Can we utilize two tables, one for NSF-61 / Potable Water and the other for Reuse Pumps, since the materials will need to vary significantly.
- b. **Materials of Construction – Reuse Water Pumps**
 - i. **Casing**
 1. 11221, 2.02, J, 1, a: “Pump Construction”
 - a. The tensile strength of not less than 25,000 pounds per square inch, would require the casing to be a 25A, versus the specified 35A. Note that 35A, aka 35,000 psi, is not available and to meet a 35,000 psi rating the material would need to be adjusted to Ductile Iron
 2. Change Casing material to “Cast Iron ASTM A48 Class 25A”
 - ii. **Impeller**
 1. Reuse pumps do not typically utilize Nickel-Aluminum-Bronze materials due to the associated cost and do not need to meet drinking water standards.
 2. Change Impeller material to Silicon Bronze ASTM B584 C87600
 - iii. The rest of the materials are acceptable for Reuse Pumps
- c. **Materials of Construction – Potable Water Pumps**
 - i. **Casing**
 1. 11221, 2.02, J, 1, a: “Pump Construction”
 - a. The tensile strength of not less than 25,000 pounds per square inch, would require the casing to be a 25A, versus the specified 35A. Note that 35A, aka 35,000 psi, is not available and to meet a 35,000 psi rating the material would need to be adjusted to Ductile Iron
 2. Change Casing material to “Cast Iron ASTM A48 Class 25A”
 - ii. **Impeller**
 1. Flowserve has NSF-61 approval for this series of pump with 316SS CF8M
 2. Change Impeller material to “316SS-CF8M”
 - iii. **Pump Shaft**
 1. Steel ASTM A193 is not an NSF-61 approved material for this pump series
 2. Change Pump Shaft material to “416SS”
 - iv. **Casing Ring**
 1. The Bronze ASTM C93200 material has a high lead content and does not meet NSF-61 materials.
 2. Change Casing Ring material to “316SS-CF8M or 410SS-CA15”
 - v. **Impeller Ring**
 1. The Bronze ASTM C83600 is not a NSF-61 approved material for this pump series
 2. Change Impeller Ring material to “316SS-CF8M or 410SS-CA15”
 - vi. **Shaft Sleeves**
 1. The Bronze ASTM C93200 material has a high lead content and does not meet NSF-61 materials
 2. Change Shaft Sleeves material to “316SS”
 - vii. **Impeller Key**
 1. The Stainless Steel ASTM A276 is not an approved NSF-61 material for this series of pump.
 2. Change Impeller Key material to “Grade 1040 Steel”

Answer 9: Table 11221-B – “Materials of Construction” has been revised and reissued by this addendum. The revised table has separate lists of allowable materials for the potable and reclaimed water pumps. The reclaimed water pumps are to have nickel aluminum bronze impellers as specified.

Question 10: 09900, 2.02, F, 3 (a, b, & c): This section references Tnemec Series 140 Pota-Pox Plus, to meet NSF-61 approval we request this be adjusted to “Tnemec Series-20 Pota-Pox”. The cost of this coating is not much different from non-NSF61 coatings so we recommend it be utilized for the Reuse Pumps as well.

Answer 10: Provide the coating specified.

Question 11: Would like to request that Ruhrpumpen be added as an acceptable pump manufacture for Section 11211, Horizontal Split Case Pumps. Ruhrpumpen meets or exceeds the technical specifications provided and can provide full NSF-61/372 certification on the supplied pumps. There is a large install base of Ruhrpumpen pumps in the state of Florida and has a local factory service facility located in Lakeland, FL.

Answer 11: Bids shall be based on one of the pump manufacturers listed in the Schedule of Base Bid Manufacturers/Suppliers (Instruction to Bidders, page 00300-8). Refer to Section 00300 – Bid Form, and the General and Supplemental Conditions for information on substitutions.

Question 12: Would like to request that OCV Control Valves be added as an acceptable control valve manufacture for Section 15117, Water Regulating Valves. OCV Control Valves meets or exceeds the technical specifications provided. There is a large install base of OCV Control Valves in the state of Florida and has a local factory service facility located in Lakeland, FL.

Answer 12: Bids shall be based on one of the manufacturers listed in the Schedule of Base Bid Manufacturers/Suppliers (Instruction to Bidders, page 00300-8). Refer to Section 00300 – Bid Form, and the General and Supplemental Conditions for information on substitutions.

Question 13: On A-201 and A-501 it calls for an insulated Overhead aluminum door and on A-701 it calls for a coiling Overhead door. The terminology is more so aligned with a rolling steel. Can you please verify you want insulated aluminum sheet doors vs the rolling steel? There is a considerable price difference between the two.

Answer 13: The door is to be insulated steel conforming to Section 08333 – Overhead Coiling Doors.

Question 14: Plans sheets D-304 and D-305 provide top of center of dome elevations for the two tanks. These elevations do not match the required 1/12 rise. The elevation for the top of the 2.0 MG tank dome on sheet D-304 would be 168.83. The elevation for the top of the dome of the 1.0 MG tank would be 166.91. Please confirm these elevations are acceptable.

Answer 14: The top of dome elevations of 168.83' for the 2.0 MG tank and 166.91' for the 1.0 MG tank are acceptable.

Question 15: Can the bidders simply follow the List of Approved Products which is part of Appendix A or will it be necessary to follow the instructions on Page(s) 00300-7/8 regarding choice of a supplier and “or equal” procedures? As mentioned at the pre-bid meeting, within the documents is Appendix A which is the February 2018 list of Approved Products for the city and quite a few of the approved manufacturers are not showing up on pages 00300-7/8.

Answer 15: Section 00300 – Bid Form has been revised to make the listed manufacturers in the Schedule of Base Bid Manufacturers/Suppliers consistent with the Appendix A - Approved Material List and reissued by this addendum.

Changes to Specifications

- A. Section 00300 – Bid Form. DELETE Section 00300 – Bid Form in its entirety and REPLACE with attached Section 00300 – Bid Form.
- B. Section 11221– Horizontal Split Case Pumps. DELETE Section 11221– Horizontal Split Case Pumps in its entirety and REPLACE with attached Section 11221– Horizontal Split Case Pumps.
- C. Section 01410 - Testing and Testing Laboratory Services. The City will be performing all soil compaction and concrete testing. DELETE Section 01410 - Testing and Testing Laboratory Services in its entirety and REPLACE with attached Section 01410 - Testing and Testing Laboratory Services.

Changes to Drawings

- A. Drawing Sheet A-501 – Door Schedule. For Door Number 105A, revise remarks to read as follows: Insulated 12' Wide Steel Coiling Overhead Door.
- B. Drawing Sheet D-304. Revise the top of dome elevation from Elev. 165.67' to Elev. 168.83'.
- C. Drawing Sheet D-305. Revise the top of dome elevation from Elev. 165.42' to Elev. 166.91'.

END OF ADDENDUM NO. 1

SECTION 00300

BID FORM

SUBMITTED: _____
Date

PROJECT IDENTIFICATION: **CITY OF WINTER GARDEN
WESTERN STORAGE, PUMPING, AND
TRANSMISSION FACILITIES**

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

Phone No.: _____ Fax No.: _____

E-Mail Address: _____

CONTRACTOR'S FLORIDA LICENSE NO.: _____

THIS BID IS SUBMITTED TO: City of Winter Garden, Florida (hereinafter called Owner) acting through its City Commission.

1. The undersigned Bidder offers and agrees to enter into an Agreement with Owner in the form included in the Bidding Documents, to complete all work for the Contract Price and within the Contract Time, all in accordance with the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Bidding Documents, including without limitation those dealing with the Owner's time for accepting for Bid and the disposition of Bid Bond.
3. In submitting this Bid, Bidder makes all representations required by the Instructions to Bidders and further warrants and represents that:

(a) Bidder has examined copies of all the Bidding Documents and of the following addenda:

No. _____	Dated _____;	No. _____	Dated _____
No. _____	Dated _____;	No. _____	Dated _____
No. _____	Dated _____;	No. _____	Dated _____
No. _____	Dated _____;	No. _____	Dated _____

(Receipt of all which is hereby acknowledged) and also copies of the Advertisement for Bids and the Instructions to Bidders.

(b) Bidder has examined the site and locality where the Work is to be performed and the legal requirements (Federal, State and local laws, ordinances, rules and regulations) and conditions affecting cost, degree of difficulty, progress or performance of the Work and has made such independent investigations as Bidder deems necessary.

Addendum No. 1

- (c) This Bid is genuine and not made in the interest or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or a corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for himself any advantage over any other Bidder or over Owner.
 - (d) Bidder hereby agrees if this Bid is accepted, to commence work under this contract on or before a date to be specified in the Notice to Proceed and to fully complete all work of the Project within the Contract Time stipulated in the Agreement (Section 00500). Bidder further agrees to pay as liquidated damages the amount stated in the Agreement for each consecutive calendar day completion of the work is delayed.
4. Bidder submits the following unit prices to perform all the Work as required by the Drawings and Specifications for the City of Winter Garden. Bid shall be awarded based on Total Base Bid. Estimated quantities may exceed items listed. Payment based on installed quantities.
 5. All Bid Items shall include all materials, equipment, labor, permit fees, taxes, tests, miscellaneous costs of all types, overhead, and profit for the item to be complete, in place, and ready for operation in the manner contemplated by the Contract Documents.
 6. The following documents are attached to and made a condition of this Bid:
 - (a) **Bid Bond/Bid Security (Section 00410 and surety bond or cashier's check).**
 - (b) **Power of Attorney (for surety bond only).**
 - (c) **Public Entities Crime Form (Section 00470).**
 - (d) **Noncollusion Affidavit (Section 00480).**
 - (e) **Trench Safety Affidavit (Section 00490).**
 - (f) **Corporate authority to execute Bid (for any corporate employee other than president or vice president).**
 - (g) **Questionnaire and Subcontractor Listing (Sections 00301 and 00301-A).**
 - (h) **Evidence of Bidder's Certification and License to perform the work.**
 - (i) **Experience and financial statement demonstrating the Bidder's ability to successfully complete the work.**
 - (j) **References (Section 00302).**
 - (k) **Similar Projects (Section 00303).**
 - (l) **Drug Free Workplace (Section 00310).**
 7. The terms used in this Bid, which are defined in Article 1 of the General Conditions shall have the meanings assigned to them in the General Conditions as amended by the Supplementary Conditions.
 8. **COMPLIANCE WITH FLORIDA TRENCH SAFETY ACT (90-96, LAWS OF FLORIDA)**

Bidder hereby acknowledges that all costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) are included in the various items of the proposal and in the Total Bid Price. For informational purposes only, the Bidder is required to further identify these costs, to be summarized below:

Addendum No. 1

Trench Safety Measure Description	Units of Measure (LF, SY)	Unit (Quantity)	Unit Cost	Extended Cost
A _____	_____	_____	\$ _____	\$ _____
B _____	_____	_____	\$ _____	\$ _____
C _____	_____	_____	\$ _____	\$ _____
D _____	_____	_____	\$ _____	\$ _____
			TOTAL:	\$ _____

THIS IS NOT A PAY ITEM. The purpose of this form is to disclose information on the costs associated with trench safety measures and to insure that the Bidder has considered these costs and included them in the Bid Price. Contractor will not receive additional payment if actual quantities differ from those estimated above or if the Contractor uses a safety measure different than those listed.

Failure to complete the above may result in the Bid being declared non-responsive.

BID SUMMARY

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Price
1	Mobilization/Demobilization	1	LS	\$	\$
2	Insurance Bonds	1	LS	\$	\$
3	Preconstruction Videotape Recordings	1	LS	\$	\$
4	16" DI Potable Water Main & Fittings Off Facility Site	1990	LF	\$	\$
5	16" DI Reclaimed Water Main & Fittings Off Facility Site	570	LF	\$	\$
6	20" DI Reclaimed Water Main & Fittings Off Facility Site	1810	LF	\$	\$
7	4" PVC Sanitary Force Main & Fittings Off Facility Site	1330	LF	\$	\$
8	3" PVC Sanitary Force Main & Fittings Off Facility Site	560	LF	\$	\$
9	16" Gate Valves Off Facility Site	7	EA	\$	\$
10	20" Gate Valves Off Facility Site	2	EA	\$	\$
11	4" Plug Valves Off Facility Site	2	EA	\$	\$
12	Air Release Valves	4	EA	\$	\$
13	Asphalt Pavement Installation Off Facility Site	1	LS	\$	\$
14	Site Work and Stormwater Off Facility Site	1	LS	\$	\$
15	Storage and Pumping Facility	1	LS	\$	\$
16	All other work not included in items 1-15.	1	LS	\$	\$
WESTERN STORAGE, PUMPING, AND TRANSMISSION FACILITIES – TOTAL BID					
(SUM OF NUMBERS 1 THROUGH 16)					\$
TOTAL BID IN WORDS:					
DOLLARS AND					/100 CENTS

Addendum No. 1

NAME OF BIDDER: _____

If Bidder is: (ALL SIGNATORIES MUST HAVE THEIR NAME PRINTED OR TYPED
BELOW THEIR SIGNATURE)

SOLE PROPRIETORSHIP

_____(SEAL)
(Individual's Signature)

_____(SEAL)
(Individual's Name)

Doing Business as: _____

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Florida License No.: _____

A PARTNERSHIP

_____(SEAL)
(Partnership Name)

_____(SEAL)
(General Partner's Signature)

_____(SEAL)
(General Partner's Name)

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Florida License No.: _____

Addendum No. 1

NAME OF BIDDER: _____

A CORPORATION

(Corporation Name)

(State of Incorporation)

By _____
(Name of Person Authorized to Sign)

(Title)

(Authorized Signature)

(Corporate Seal)

Attest _____
(Secretary)

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Corporation President: _____

Florida License No.: _____

Addendum No. 1

NAME OF BIDDER: _____

A JOINT VENTURE

By _____ (SEAL)

(Name)

(Address)

By _____ (SEAL)

(Name)

(Address)

Business Address: _____

Phone No.: _____

Fax No.: _____

E-Mail Address: _____

Florida License No.: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above).

8. List the following in connection with the Surety which is providing the Bid Bond.

Surety's Name: _____

Surety's Address: _____

Name and address of Surety's resident agent for service of process in Florida:

Addendum No. 1

SCHEDULE OF MANUFACTURERS/SUPPLIERS

The Contract Documents are based upon the equipment or products available from the manufacturers/suppliers denoted as "A", "B", etc. However, the Bidder must indicate in his Bid which Base Bid manufacturer/supplier he intends to use for each item of equipment listed by circling one (1) of the listed manufacturers/suppliers. Should the Bidder fail to circle a named supplier, he hereby agrees to provide the item listed as "A". After receipt of bids, the Bidder may not substitute for any manufacturer or supplier circled.

If the Bidder desires to propose one (1) or more substitution or "or equal" manufacturers/suppliers, he may write in the name of such substitution or "or equal" in the spaces provided on the pages following the lists, but he must, nevertheless, also circle one of the listed manufacturers/suppliers. All substitutions or "or equal" items must be identified at the time of Bid (see Paragraph 6.05 of the General Conditions as amended by the Supplementary Conditions). Substitutions or "or equal" items will **not** be considered when determining the Apparent Low Bidder. Substitutions or "or equal" items will **not** be evaluated or considered until after the "Effective Date" of the Agreement. The Bidder shall base his Bid on providing one of the listed manufacturers and shall assume for bidding purposes that all substitutions or "or equal" items will not be accepted.

If the proposed substitution or "or equal" manufacturer/supplier is determined "not equivalent" by the Engineer, the Bidder must use the circled manufacturer/supplier. If the Bidder fails to indicate which listed manufacturer/supplier he intends to use or if a substitution or "or equal" is rejected, he must use the supplier listed as "A". Also, if the Bidder circles more than one listed manufacturer/supplier, he must use the first manufacturer/supplier circled (unless a substitution or "or equal" is approved).

Each proposed substitution or "or equal" will be evaluated in accordance with Paragraph 6.05 of the General Conditions following the Effective Date of the Agreement.

In addition to the reimbursement required under Paragraph 6.05 of the General Conditions, the Contractor shall also reimburse the Owner for any engineering costs directly attributable to the change in manufacturers/suppliers, caused by the acceptance of proposed substitutions or "or equal" items, such as; additional field trips for the Engineer, additional redesign costs, and additional review costs, etc. Other costs directly attributable to the change in manufacturers/suppliers caused by the acceptance of proposed substitutions or "or equal" items such as increased electrical requirements, larger buildings, modifications to structures, additional pumps, piping or tankage, etc., shall be borne by the Contractor and not by the Owner. Bidder further agrees that the use of substitute equipment offered will not affect the completion date.

The Owner may request, and the Bidder shall supply any additional information on proposed substitutes or "or equal" items prior to Notice of Award.

Addendum No. 1

SCHEDULE OF BASE BID MANUFACTURERS/SUPPLIERS

Item No.	Equipment Item or Material	Specification Section No.	Base Bid Manufacturer/Supplier
1.	Horizontal Split Case Pumps	11221	A. Flowserve B. Aurora C. Goulds-ITT
2.	Prestressed Circular Concrete Water Storage Tanks	13205	A. Crom Corp. B. Precon Corp.
3.	Ductile Iron Pipe and Fittings	15062	A. American B. US Pipe C. Clow D. McWane
4.	Gate Valves	15101	A. Mueller B. American C. Clow/Melt/Kennedy
5.	Butterfly Valves	15103	A. Mueller/Pratt/Milliken B. Kennedy/M&H/Clow
6.	Water Regulating Valves	15117	A. Claval B. Bermad
7.	Variable Frequency Drives	16151	A. Yaskawa by Icon Technologies

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Addendum No. 1

SUBSTITUTIONS AND "OR EQUAL"

The undersigned as Bidder agrees that substitutions, or "or equal" items will not be considered until after the "Effective Date of the Agreement" and will be evaluated in accordance with Paragraph 6.05, of the General Conditions as amended by the Supplementary Conditions. If Bidder intends to propose substitutions or "or equal" items after the "Effective Date of the Agreement", it is agreed that these items will be listed on the Substitution List that must be included with the Bid (form provided herein). Only the proposed substitutions or "or equal" items listed on the Substitution List and submitted at the time of Bid will be evaluated by the Engineer in accordance with the General Conditions.

**SUBSTITUTION LIST OF
MANUFACTURERS/SUPPLIERS**

Bidder proposes the following substitutions and "or equal" items of alternate manufacturers/suppliers for the equipment of material categories so identified:

	<u>Equipment Item Material</u>	<u>Drawing No.</u>	<u>Spec. Section</u>	<u>Substitute/"or equal" Manufacturer/Supplier (List One Only)</u>	<u>Proposed Price Deduct</u>
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____
6.	_____	_____	_____	_____	_____
7.	_____	_____	_____	_____	_____
8.	_____	_____	_____	_____	_____
9.	_____	_____	_____	_____	_____

END OF SECTION

Addendum No. 1

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Contractor will employ and pay for services of an Independent Testing Laboratory to perform testing specifically indicated on the Contract Documents or specified in the Specifications and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.
2. The Contractor shall provide Engineer with all test results herein within five (5) days of receipt.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract.
2. Respective section of the Specifications: Certification of products.
3. Each Specification section listed: Laboratory tests required, and standards for testing.
4. Testing laboratory inspection, sampling and testing is required for, but not limited to the following:
 - a. Cast-in-Place Concrete: Section 03300.

C. The following schedule defines the responsibilities of various tests.

Addendum No. 1

Test	Notes	Paid for By
Soil Compaction	Pipe Work: every 300 ft. at each lift of compaction minimum. Beneath Structures: each 500 SF each lift of compaction minimum.	Contractor Owner
Pressure	As specified in Section 15044.	Contractor
Bacteriological	As required by local and state agencies.	Contractor
Concrete	Slump test each delivery and compression test five cylinders every 50 C.Y. minimum.	Contractor Owner

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- D. Additional Tests: In the event that first test samples do not meet the applicable material specification, the Contractor shall take measures to conform the material and equipment to the Specifications.

1.02 LABORATORY DUTIES: LIMITATIONS OF AUTHORITY

- A. Cooperate with Engineer and Contractor; provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
1. Comply with specific standards; ASTM, other recognized authorities, and as specified.
 2. Determine and report on compliance with requirements of Contract Documents.
- C. Promptly notify the Engineer and Contractor of material or operations which do not meet the specifications.
- D. Promptly submit five (5) copies of reports of inspections and tests to the Engineer including:
1. Date issued.
 2. Project title and Engineer's job number.
 3. Testing Laboratory name and address.

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4. Name and signature of inspector.
 5. Date of inspection or sampling.
 6. Record of temperature and weather.
 7. Date of test.
 8. Identification of product and Specification section.
 9. Location in project.
 10. Type of inspection or test.
 11. Compliance with Contract Documents or not.
- E. Perform additional services as required by Owner.
- F. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Approve or reject any portion of work.
 3. Perform any duties of the Contractor.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel. Provide access to Work and manufacturer's operations.
- B. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
- C. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacturer or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of providing statements and certificates shall be a

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subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

- D. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To facilitate inspections and tests.
- E. Notify laboratory a minimum of three (3) working days in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 11221

HORIZONTAL SPLIT CASE PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. Furnish all labor, materials, equipment and incidentals required and furnish, factory test, install, place in operation, and field test electric motor driven, volute type horizontal axially split case double suction single volute centrifugal pumps as indicated on the Drawings and as specified herein.
2. All appurtenances, bolts, washers, etc., necessary to construct, test and operate the pumping units are intended to be supplied herein whether specifically mentioned or not.

B. Related Work Described Elsewhere

1. Shop Drawings, Working Drawings, and Samples: Section 01340.
2. Start-Up: Section 01650.
3. Concrete: Division 3.
4. Metals: Division 5.
5. Painting: Section 09900.
6. Mechanical: Division 15.
7. Electrical: Division 16.
8. Electric Motors are included in Section 16220
9. VFDs are specified in Section 16151.

C. Description of System

1. Horizontal split-case centrifugal pumps shall be installed to pump potable and reclaimed water from the ground storage tanks into the distribution

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system. The high service pumping system shall consist of eight (8) pumps, three (3) large high service pumps and one (1) jockey high service pump for potable water and three (3) large high service pumps and one (1) jockey high service pump for reclaimed water, all equipped with variable speed frequency drives (VFDs). The pumping units shall be located and arranged as shown on the Drawings.

2. All working parts of the pumps and motors, such as bearings, wearing rings, shaft sleeves, motor windings, etc., shall be of standard dimensions such that parts will be interchangeable between like units, and such that the Owner may at any time in the future obtain replacement and repair parts for those furnished in the original machine. All parts shall be properly stamped for identification and location in the machines as shown on the assembly drawings in the instruction books furnished.

1.02 REFERENCE STANDARDS

A. Design, manufacture and assembly of elements of the equipment herein specified shall be in accordance with, but not limited to, published standards of the following, as applicable (revision in effect at time of bid opening shall apply):

1. American Gear Manufacturers Association (AGMA)
2. American Institute of Steel Construction (AISC)
3. American Iron and Steel Institute (AISI)
4. American Society of Mechanical Engineers (ASME)
5. American National Standards Institute (ANSI)
6. American Society for Testing Materials (ASTM)
7. American Welding Society (AWS)
8. American Bearing Manufacturers Association (ABMA)
9. Hydraulic Institute Standards (current edition)
10. Institute of Electrical and Electronics Engineers (IEEE)
11. National Electric Code (NEC)
12. National Electrical Manufacturers Association (NEMA)
13. Occupational Safety and Health Administration (OSHA)

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14. Steel Structures Painting Council (SSPC)
15. Underwriters Laboratories, Inc. (UL)

1.03 QUALITY ASSURANCE

A. Qualifications

1. To assure unity of responsibility, the ~~variable frequency drives~~, motors, baseplates, and the pumps shall be furnished and coordinated by the pump manufacturer. The Contractor shall be responsible for the satisfactory installation and operation of the entire pumping system including pumps, motors, and controls as specified. 1
2. The pumps covered by these Specifications are intended to be standard pumping equipment of proven ability as manufactured by a reputable manufacturer having long experience in the production of such pumps. The pumps furnished shall be designed, constructed and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed as shown in the Drawings. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards except where otherwise specified herein.
3. All equipment furnished under this Specification shall be new and unused, and shall be the standard product of manufacturers having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of 5 years.
4. The pump manufacturer shall be fully responsible for the design, arrangement and operation of all connected rotating components, of the assembled pumping unit mounted on a fabricated steel baseplate, to ensure that neither harmful nor damaging vibrations occur anywhere within the specified operating range.
5. Pumps shall be as manufactured by Flowserve, Aurora, or Goulds-ITT. The naming of the manufacturer is only an indication that the manufacturer may have the capability of providing the specified equipment and not that the manufacturers standard equipment is acceptable. Pump equipment must meet all of the detailed requirements of the project specifications for materials of construction and performance.
6. All pumps shall be factory tested and certified pump performance curves shall be submitted as described in PART 2 - PRODUCTS.

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1.04 SUBMITTALS

A. Materials and Shop Drawings

1. Copies of all materials required to establish compliance with the Specifications shall be submitted in accordance with the provisions of Section 01340: Shop Drawings, Working Drawings, and Samples. Submittals shall include at least the following:
 - a. Certified shop and erection drawings showing all important details of construction, outline dimensions, space required, clearances, operating features, type of shop and/or finish coat, and anchor bolt locations.
 - b. Descriptive literature, bulletins, and/or catalogs of the equipment, including pump cross section with parts identification and materials of construction.
 - c. 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, NPSHR 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 zero flow at Shut Off Head to a Pump Capacity at minimum specified TDH. Six (6) laminated copies of the final pump performance curves shall be provided with O&M Manuals.
 - d. Manufacturer's drawings of all accessory equipment such as couplings, guards, etc.
 - e. Flexible coupling data including manufacturer, model, type, size, detail drawings, and calculations for coupling sizing.
 - f. The total weight of the equipment including the weight of the single largest item.
 - g. A complete total bill of materials of all equipment.
 - h. A list of the manufacturer's recommended spare parts to be supplied with the manufacturer's current price for each item. Include gaskets, seals, etc., on the list. List bearings by the bearing manufacturer's numbers only.

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- i. Complete motor data. Provide tabulated data for the drive motors including rated HP, full load RPM, power factor and efficiency curves at 1/2, 3/4 and full load, service factor and KW input, including when the pump is at its design point. Submit a certified statement from the motor manufacturer that the motors are capable of continuous operation on the power supply without affecting their design life for bearings or windings.
 - j. Copies of all factory test results, as specified herein.
 - k. A statement that the pump will function properly as installed with respect to the suction piping layout as shown on the Drawings.
 - l. Documentation stating the potable water pumps are NSF/ANSI 61 certified for use with drinking water.
2. In the event that it is impossible to conform with certain details of the Specifications due to different manufacturing techniques, describe completely all nonconforming aspects.
- B. Operation and Maintenance Manuals
1. 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 requirements shall be as specified in the General Conditions.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.
- B. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Owner.
- C. Finished surfaces of all exposed pump openings shall be protected by wooden blanks, strongly built and securely bolted thereto.
- D. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

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- E. 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.
- F. Each box or package shall be properly marked to show its net weight in addition to its contents.
- G. Pumps and drive units shall be delivered with the equipment fully lubricated insofar as possible. If any point cannot be so serviced, it shall be clearly marked to the effect that it is not lubricated and requires servicing prior to operation. An adequate supply of the proper lubricant, with instructions for its application, shall be supplied with the equipment for each point not lubricated prior to shipment.

1.06 WARRANTY

- A. All equipment supplied under this Section shall be warranted for a period of two (2) years by the Contractor and the equipment manufacturers. Warranty period shall commence on date of final completion acceptance by the owner, as outlined in the General Conditions of the Contract.
- B. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and restored to service at no expense to the Owner.
- C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision shall be allowed.

PART 2 - PRODUCTS

2.01 GENERAL

- A. 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 as offered. It is, however, intended to cover the furnishing, the shop testing, the delivery and complete installation and field testing, of all materials, equipment and appurtenances for the complete pumping units as herein specified, whether specifically mentioned in these Specifications or not.
- B. 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, and as required for an installation incorporating the highest standards for the type of service including field testing of the entire installation and instructing the regular operating personnel in the care, operation and maintenance of all equipment.

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2.02 MATERIALS AND EQUIPMENT

- A. The pumping units required under this Section of the Specifications shall be complete including pumps and motors with proper alignment and balancing of the individual units. 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 shall be provided for inspection, repairs, and adjustment.
- B. Each bedplate for pump and drives shall be rigidly and accurately anchored into position. All necessary foundation bolts, plates, nuts, and washers shall be as recommended by the pump manufacturer for installation by the Contractor. All anchor bolts and nuts shall be Type 316 stainless steel.
- C. Stainless steel (316 series) nameplates, 24 U.S. standard gage minimum, giving the name of the manufacturer, model or type, serial number, impeller size or designation, the rated capacity, head, speed, electrical or power characteristics, and all other pertinent data shall be securely attached to each pump and motor.
- D. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum turbine run-away speed of the unit due to back flow through the pump.
- E. The pumps shall be of the horizontal, centrifugal, axially split case double suction type. The flanged suction and discharge connections shall be located in the lower half of the casing allowing removal of the rotating element without disturbing the pipe connections. Pump feet shall be pre-drilled for dowel pin to base plate in field.
- F. All working parts of the pumps, motors and drives, such as bearings, wearing rings, shaft sleeves, motor windings, etc., shall be of standard dimensions built to limit gauges or formed to templates, such that parts will be interchangeable between like units, and such that the Owner may at any time in the future obtain replacement and repair parts for those furnished in the original machine. All parts shall be properly stamped for identification and location in the machine as shown on the assembly drawings in the instruction books furnished.
- G. All pumping units specified herein shall be furnished by a single pump manufacturer. All pumping units shall be the standard cataloged product of the pump manufacturer.

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- H. Each horizontal split case pump unit shall be designed for 24-hour per day, 365 days per year continuous service at any and all points within the range of operation without overheating or activating and without excessive vibration or strain.
- I. All potable water pumps shall be NSF/ANSI 61 certified for use with drinking water.
- J. Performance Requirements
 - 1. When operating at the maximum output speed of the motor, the pump shall have a characteristic performance curve, which meets all the conditions listed in Table 11211-A. The pump and drive motor shall be capable of operating satisfactorily under the full range of conditions as defined by Table 11211-A. The Primary Condition capacity, head and efficiency defined in Table 11211-A shall be the "design point."
 - 2. Maximum motor speed shall not exceed that listed in Table 11211-A to satisfy the specified hydraulic duty requirements. The pump "design speed" shall be the maximum output speed of the motor when operating at the pump Primary Condition capacity and head.
 - 3. With the pumping unit operating at full speed, the maximum brake horsepower required by the pump shall not exceed the maximum listed in Table 11211-A at any point on the performance curve.
 - 4. Primary Condition shall be taken as the rated operating condition while operating at maximum speed. Primary Condition has been selected to obtain the rated pumping capacity for the installation. Performance at the rated condition shall be guaranteed. The pumps need not be selected for maximum efficiency at the Primary Condition, but the Primary Condition Capacity shall be in the range of 5% to 15% higher than the flow at the best efficiency point (BEP) at full speed, so that the BEP tracks through the system curve at reduced speeds. Pumps furnished under this section should be selected to achieve Primary Condition performance, but also operate continuously without objectionable vibration or cavitation at the Secondary Condition.
 - 5. Secondary Condition represents operating conditions when the pump is operating at maximum speed against minimum anticipated system head, assuming a hypothetical head-capacity curve. The Secondary Condition Capacity must be shown on the manufacturer's published performance curve data for the specific model proposed for this application and the TDH at the Secondary Condition shall be no higher than the maximum

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TDH listed. Pumps with head-capacity curves steeper than that assumed will produce somewhat less head. Proposed pump selections meeting this discharge head requirement by operating the equipment at less than full speed will be rejected. The pumps shall be capable of operating at the Secondary Condition without vibration, cavitation, or excessive wear, and the NPSHr must no higher than the maximum listed for the Secondary Condition.

K. Pump Construction - Pumps shall be constructed with materials shown in Table 11210-B.

1. Pump Casings

- a. The pump case shall be of cast iron construction, having a tensile strength of not less than 25,000 pounds per square inch (psi).
- b. Casings shall be free from blow holes, sand pockets or other imperfections. They shall be given a hydrostatic pressure test at 150 psi per HI standards and an affidavit that these casings have withstood these pressure tests shall be furnished to the Owner and Engineer before shipment.
- c. The interior and exterior surfaces of the casings shall be smooth with matching flanges.
- d. The horizontal casing joint shall be a scraped or machined fit, requiring a gasket not more than 0.015 inches 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 closed with plugs in both the suction and discharge flanges of all pumps for test gauge connections.
- f. The casing at both suction inlets to the impellers 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.
- g. Provide heavy duty casing feet cast integral with lowercasing half and located immediately adjacent to the suction and discharge flanges.
- h. Provide Threaded (min. 1/2-inch NPT) bossed pipe tap opening vent at top of upper casing for venting air.

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- i. The pump casing shall be piped with stainless steel or brass fittings and stainless steel or copper tube pipe to direct pump pressurized flush water to the stuffing boxes for cooling and lubrication.

2. Impellers

- a. The impeller shall be of nickel aluminum bronze, enclosed double suction type of one-piece construction. Impeller shall be machined outside, smoothly finished on the internal water passages, and shall be statically and hydraulically balanced. The impellers shall be fixed in the axial direction by the shaft sleeves and nuts secured to the shaft through a precision fit and full length key. Stainless steel key shall firmly secure the impeller to the shaft.
- 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.

3. Bearings

- a. The pump shaft and impeller assembly shall be supported on bearings at each end of the pump shaft. Radial bearings shall be single row deep grooved antifriction ball bearings mounted end board side. Thrust bearings shall be two single row angular contact bearings with back to back mounting. Bearings shall be selected in accordance with ANSI B3.15 and B3.16 and shall have a minimum L10 bearing life of 100,000 hours at maximum speed when operating within the manufacturer's allowable operating region. The bearing housings shall be provided with a tapped drain and plug. The bearing housings shall be constructed of cast iron.
- 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. At the inner end of each bearing housing the shaft shall be equipped with a water deflector.
- d. Bearing housing shall be rigid, integrally supported and part of the casing casting. Independent bolted bearing frames and or housing will not be accepted.

4. Shafts: Pump shafts shall be manufactured of steel and ground and polished over the entire length. They shall be protected from wear at the stuffing boxes by renewable bronze sleeves. Sleeves shall be fastened to

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the shaft such as to prevent leakage between the sleeve and the shaft. Sleeves will be locked into position by the impeller key at both sides of the pump. Shafts shall be sized for the largest size impeller for the provided case. Shaft shall be adequately sized and designed to minimize deflection to less than 0.002 inch. The shaft shall have the same nominal diameter through the shaft sleeve.

5. Stuffing Boxes

- a. Stuffing boxes shall be provided with mechanical shaft seals.
- b. Mechanical seals shall be furnished with a carbon seal ring, ceramic mating ring, Viton elastomers, and Type 316 stainless steel metal parts.
- c. Mechanical seals shall be rated for a pressure of 150 psi. The elastomers shall be rated for temperatures ranging from -20 degrees F to 400 degrees F.
- d. Suitably valved connecting lines or passages shall be provided on the upper half casing leading from the discharge volute to the stuffing box for lubricating the stuffing boxes with the liquid being pumped. The seal water shall be discharged through the seal into the pump casing.

L. Motors

1. General

- a. The ODP motors for the pumps shall be of the horizontal solid shaft squirrel cage induction type.
- b. Motors must be designed to accept all thrust loads imposed by pump during starting and running.
- c. All motors shall be built in accordance with latest NEMA, IEEE, ANSI and AFBMA standards where applicable.
- d. Motors shall conform to all requirements stipulated in PART 1 GENERAL of this Section of the Specifications unless modified in this Paragraph.
- e. Motors for use with VFDs shall be premium efficiency and inverter duty nameplated. Motors for use in constant speed applications shall be standard premium efficiency units.

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f. Motors shall be as manufactured by U.S. Motors, General Electric, Marathon or engineer pre-approved equal.

2. Performance Requirements

a. Motors shall be rated 480 volts, 3 phase, 60 Hertz.

b. Each motor shall have a 1.15 service factor.

c. Motors shall have horsepower and full load output speed ratings as listed in Table 11221-A.

d. Motors shall be free of objectionable noise and vibration. Vibration level measured on the bearing housing shall be in accordance with values shown in NEMA and Hydraulic Institute Standards.

e. Maximum temperature rise of the motor windings shall not exceed 80°C as measured by resistance, when motor is operated continuously at rated horsepower, rated voltage and frequency in ambient air temperature of 40°C.

f. Tests

i. All motors shall be completely assembled at the factory and shall be given routine tests conducted in accordance with NEMA Standards MG1-20.46 and MG1-20.47 which includes the following non-witnessed tests:

- 1) No load current.
- 2) Winding resistance.
- 3) High potential dielectric tests.
- 4) Bearing inspection.
- 5) Locked rotor current.

ii. Copies of the test results for each motor shall be certified by a responsible test engineer. The test results shall be furnished to the Engineer for review before shipment of the motors as required by Paragraph 1.03.

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3. Construction

- a. Motor frames and end shields shall be heavy fabricated steel or cast iron 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. Openings for ventilation shall be uniformly spaced around the motor frame.
- b. Space heaters shall be provided to operate on 120 volt, single phase power. Leads shall be brought out to a terminal block enclosed in a NEMA 12 accessory box. Motors shall be provided with a metallic foil or plastic warning label with red background and white letters which has the following legend: "WARNING - ELECTRICAL SHOCK HAZARD, Motor Equipped with Strip Heaters. Strip Heater Circuit remains Energized when Main Disconnect for Pump is OFF".
- c. Each motor shall be furnished with a "Klixon" thermal protection device or an approved equal.
- d. The shaft shall be made of high-grade machine steel or steel forging of size and design adequate to withstand the load stresses normally encountered in motors of the particular rating.
- e. Stator cores shall be made of low loss, non-aging electrical sheet steel with insulated laminations.
- f. Stators shall be random wound and insulated with glass and mica applied directly to the coils. Motors shall have a Class F rise non-hygroscopic epoxy sealed or encapsulated insulation system limited to the temperature rise specified in 2.02I2. All connections shall be silver soldered with no crimp connections used except for terminals. A coil bracing system for stator end turns shall be utilized to minimize coil movement during starting and running conditions.
- g. Rotors shall be made from high grade steel laminations adequately fastened together, and to the shaft. Rotor squirrel cage may be of cast-aluminum or copper alloy bar-type construction with brazed end rings.
- h. Bearings shall be grease lubricated antifriction type with an AFBMA average bearing life of 20 years. Bearing design shall include over-grease protection.

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- i. The motor bearings shall have ample capacity to carry the weight of all the rotating parts plus the hydraulic thrust of the pump impellers, and have an ample safety factor. This factor shall be based on an average life expectancy of five (5) years operation at 24 hours per day.
- j. All motors shall have an interior coating of corrosion resistant and fungus protective coating on all interior surfaces. Exterior prime coating shall be compatible with the field applied finish coating.
- k. Nameplates shall be stainless steel. Lifting lugs or "O" type bolts shall be supplied on all motors capable of supporting the weight of the motor. Enclosures shall have stainless steel insect screens.
- l. All fittings, bolts, nuts and screws shall be plated to resist corrosion. Bolts and nuts shall have hex heads.
- m. The main terminal box shall be NEMA 12 and provide ample room for connections.

M. Shaft Couplings

- 1. Based on lateral critical, torsional critical and/or other computations, the pump manufacturer shall select and supply suitable coupling size, intermediate bearing(s) and location, if required, so that operating speed is a minimum of 10% below one-half critical speed or critical speed which could cause damage to the drive shafting.
- 2. The pump manufacturer shall provide adequate protective removable sheet metal coupling guard, not less than 18 gauge, around the rotating shaft and couplings to meet OSHA and Florida Industrial Safety Laws.
- 3. The couplings connecting the pump with the motor shall be sized and arranged to transmit all expected torque and loads.

N. Bedplates

- 1. Each unit, motor and pump shall be mounted on a continuous fabricated steel bedplate. Bedplates shall be designed so as not to exceed the dimensions shown on the Drawings. The pump bedplate shall be designed and manufactured by the pump manufacturer. Bedplates manufactured by the pump supplier, contractor, or other source are not acceptable. Pumps and motors shall be mounted and pre-aligned at the manufacturer's facility prior to shipment. Documentation of this factory alignment by the pump manufacturer shall be provided to the engineer prior to shipment.

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2. Bedplates shall be of such design and have sufficient grout holes that they can be filled with grout after the units are leveled and aligned.
3. All items of equipment shall be mounted on heavy mounting pads, and all mounting pads shall have machined surfaces. All square edges and corner of these mounting pads shall have the sharp edges "knocked off" by grinding. All parts of the bedplates which are flame cut and exposed to view shall be ground relatively smooth to remove at least 90 percent (90%) of the flame cutting marks.
4. The equipment shall be held to the mounting pads with cap screws; through bolts will not be considered. If shims are required under the mounting feet of equipment for alignment and leveling purposes, they shall be full faced cut to the contour of the equipment feet.
5. Each bedplate shall be supplied with sufficient anchor bolts for holding the bedplates in position while installing, leveling, aligning and grouting the units. Anchor bolts shall be sufficiently strong for all stresses which will be imposed on them during the operation of the units. Anchor bolts shall be provided with steel pipe sleeves and heavy semi-finished hex nuts and shall be as recommended by the supplier of the equipment specified in this Paragraph.

2.03 SPECIAL TOOLS AND SPARE PARTS

- A. One (1) set of all special tools required for normal adjustment, 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 operation of the pumping system, which shall include at least the following:
 1. One (1) set of mechanical seals for each pump supplied.
 2. One (1) complete set of all gaskets required for the assembly of the pump for each pump supplied.
 3. One (1) set of bearings for each pump supplied.
 4. 1 complete set of shaft sleeves, keys and accessories for each pump.
 5. 1 spare set of coupling rubber bushings per pump.

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6. One year's supply of all required lubrication grease and oil.
- C. Spare parts shall be properly bound and labeled for easy identification without opening the packaging and suitably protected for long term storage.

2.04 ACCESSORIES

- A. Pressure Gauges
 1. Supply suction and discharge gauges for each pump, including isolation valves.
 2. Gauges shall be in accordance with Section 15130 except:
 - a. Size of face shall be 4½-inches.
 - b. Connection 3/8-inch minimum NPT, installed with brass pipe nipples, brass lever handle gauge cock, and brass union.
 - c. Pressure ranges: High Service Pumps - (Discharge): 0 to 150 psi, (Suction): 0 to 30 psi.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the Drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Anchor bolts shall be set in accordance with the manufacturer's recommendations.
- B. The Contractor shall dial gauge align the pump and motor in the field in accordance with the manufacturer's instructions and in the presence of the Owner's representative. The alignment shall be rechecked after the piping has been connected to the pumps and piping shall be adjusted as required, if alignment has changed. Final alignment shall be completed by the pump supplier prior to startup using a laser-type alignment device.
- C. Bedplates shall be fully grouted in accordance with Appendix G, Precision Cementitious Grouting of API Standard 610.
- D. The Contractor shall submit a certificate from the equipment manufacturer stating that the installation of equipment is satisfactory, that the equipment is ready for

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permanent operation, that nothing in the installation will render the manufacturer's warranty null and void, and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

- E. After being connected to the existing reclaimed water system, pumps shall not be started until permission is given from the Owner.

3.02 SHOP PAINTING

- A. Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all millscale, rust, grease, dirt and other foreign matter.
- B. All pumps and baseplates shall be shop primed by the manufacturer prior to shipment, with primer compatible with field painting as specified in Section 09900: Painting.
- C. All nameplates shall be properly protected during painting.

3.03 FIELD PAINTING

- A. Field painting is specified under Section 09900. Finish colors shall be selected by Owner.
- B. All nameplates shall be properly protected during painting.

3.04 INSPECTION AND TESTING

- A. General
 - 1. The Engineer shall have the right to inspect, test or witness tests of all materials or equipment to be furnished under these Specifications, prior to their shipment from the point of manufacture.
 - 2. The Engineer shall be notified in writing prior to initial shipment, in ample time so that arrangement can be made for inspection by the Owner.
 - 3. The Owner or his representative shall be furnished all facilities, including labor, and shall be allowed proper time for inspection and testing of material and equipment.
 - 4. Materials and equipment shall be tested or inspected as required by the Engineer, and the cost of such work shall be included in the cost of the equipment. The Contractor shall anticipate that delays may be caused

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because of the necessity of inspection, testing and accepting materials and equipment before their use is approved.

5. Furnish the services of a factory representative for at least one (1) day who has complete knowledge of proper operation and maintenance to inspect the final installation and supervise a test run of the equipment. The manufacturer's representative shall inspect the completed installation for soundness (no damaged or cracked components), completeness, correctness of setting and alignment, that the pumps are free from stresses imposed by the attached piping, and for the adequacy and correctness of packing, lubrication, and sealing. The representative shall submit to the Engineer a signed report detailing the results of his inspection. The Contractor's responsibility for startup services shall be fulfilled when startup is complete, the equipment is functioning properly and when it has been accepted by the Owner.
 6. Field tests shall not be conducted until such time that the entire installation is complete and ready for testing.
- B. Certified Factory Tests: Factory testing in accordance with the standards of the Hydraulic Institute shall be required for each and every pump. Six copies of the certified pump performance curves for each pump, 8-1/2 inch x 11 inch, laminated in plastic shall be submitted, including head, capacity, brake horsepower, NPSHR and pump efficiency for each pump supplied. The curves shall indicate the pump number, manufacturer, model number, and serial number. The results of the factory performance tests shall be submitted to the Engineer for review and approval prior to shipment. Factory pump tests shall be conducted to meet the requirements of this specification. Each and every pump that is furnished shall undergo factory testing. Factory tests shall include:
1. Performance curve data over entire manufacturer's published performance curve including shutoff and runout (rightmost point on the curve).
 2. Vibration testing over entire operating range.
 3. Noise level testing over entire operating range.
 4. Electrical data (current load, horsepower) over entire operating range.
 5. The tested pumps shall meet Hydraulic Institute acceptance level 1U (0% negative deviation) to be approved for shipment.
- C. Pumps: After all pumps have been completely installed, and working under the direction of the manufacturer, conduct in the presence of the Owner or his representative, such tests as necessary to indicate that pump discharge conforms to the

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Specifications. Field tests shall include all pumps included under this Section. Supply all labor, equipment and incidentals required to complete the field tests.

D. Motors

1. The Contractor shall megger each motor winding before energizing the motor, and, if insulation resistance is found to be low, shall notify the Engineer and shall not energize the motor.
2. The Contractor shall check all motors for correct clearances and alignment and for correct lubrication in accordance with manufacturer's instructions. The Contractor shall check direction of rotation of all motors and reverse connections if necessary.

3.04 TRAINING

- A. A factory representative of all major component manufacturers, who has complete knowledge of proper operation and maintenance shall be provided for at least one (1) day to instruct representatives of the Owner and the Engineer on proper operation and maintenance. With the Owner's permission, this work may be conducted in conjunction with the inspection of the installation and test run as provided under PART 3, herein. If there are difficulties in operation of the equipment due to the manufacturer's design, fabrication, or installation by Contractor, additional service shall be provided at no cost to the Owner.

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TABLE 11211-A
POTABLE WATER HIGH SERVICE PUMP DESIGN REQUIREMENTS

Criteria	Potable Water Jockey HSP	Potable Large HSP No. 1 - 3
Number of Pumps	1	3
Max. Motor Full Load Speed (rpm)	3,600	1,800
Max. Motor Power (hp)	50	100
Speed Control	VFD	VFD
Pump Design Speed (rpm)	motor full load speed	motor full load speed
Maximum Allowed Pump Horsepower at Design Speed (hp)	44	95
Rated Pumping Temperature	80 deg F	80 deg F
Pumping Medium	potable water	potable water
Pump Suction Connection Size (in)	4	6 - 8
Pump Discharge Connection Size (in)	3	5
Min. Shut-Off Head (ft) at Design Speed	228	244
Primary Condition Capacity (gpm)	625	1,250
Min. TDH at Primary Capacity (feet)	184	184
Min. Pump Efficiency at Primary Capacity (%)	74	69
Secondary Condition Capacity, gpm	775	1,485
Max. TDH at Secondary Capacity (feet)	142	147
Max. NPSHr at Secondary Capacity (feet)	27	24
Pump Model Used for Design	Flowserve 3LR-9A	Flowserve 5LR-19A or 5LR-15D

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TABLE 11211-A (CONTINUED)

RECLAIMED WATER POTABLE WATER HIGH SERVICE PUMP DESIGN REQUIREMENTS	1
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Criteria	Reuse Water Jockey HSP	Reuse Large HSP No. 1 - 3
Number of Pumps	1	3
Max. Motor Full Load Speed (rpm)	3,600	1,800
Max. Motor Power (hp)	50	100
Speed Control	VFD	VFD
Pump Design Speed (rpm)	motor full load speed	motor full load speed
Maximum Allowed Pump Horsepower at Design Speed (hp)	44	95
Rated Pumping Temperature	80 deg F	80 deg F
Pumping Medium	reclaimed water	reclaimed water
Pump Suction Connection Size (in)	4	8
Pump Discharge Connection Size (in)	3	5
Min. Shut-Off Head (ft) at Design Speed	240	286
Primary Condition Capacity (gpm)	650	1,300
Min. TDH at Primary Capacity (feet)	191	191
Min. Pump Efficiency at Primary Capacity (%)	75	71
Secondary Condition Capacity, gpm	792	1,500
Max. TDH at Secondary Capacity (feet)	151	158
Max. NPSHr at Secondary Capacity (feet)	28	22
Pump Model Used for Design	Flowserve 3LR-9A	Flowserve 5LR-19A

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TABLE 11210-B
MATERIALS OF CONSTRUCTION

POTABLE WATER PUMPS

<u>Component</u>	<u>Material</u>
Casing	Cast Iron ASTM A48 Class 25A or Class 35
Impeller	ASTM A351 CF8M or NAB
Pump Shaft	316 or 416 SST
Casing Rings	316 or 400 Series SST, Bronze UNS C89835, or Nitronic 60
Impeller Rings	316 SST, NAB, or Bronze UNS C89835
Shaft Sleeves	316 or 304 SST, or NAB
Impeller Key	AISI 1040 Steel or 303 SST

SST = Stainless Steel (ASTM A276); NAB = Nickel Aluminum Bronze (ASTM B148 C95800)

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RECLAIMED WATER PUMPS

<u>Component</u>	<u>Material</u>
Casing	Cast Iron ASTM A48 Class 25A or Class 35
Impeller	NAB
Pump Shaft	Steel ASTM A193 Grade B7 or AISI 1040, or 316 SST
Casing Rings	Bronze ASTM B584 C93800 or Nitronic 60
Impeller Rings	Bronze ASTM B584 C93800 or NAB
Shaft Sleeves	Bronze ASTM B584 C93200 or NAB
Impeller Key	303 SST

SST = Stainless Steel (ASTM A276); NAB = Nickel Aluminum Bronze (ASTM B148 C95800)

END OF SECTION

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