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TRANSMITTAL COVER SHEET

DATE: July 22, 2024
PAGE: 1 of 27(INCLUDING THIS PAGE)
TO: ALL CONTRACTORS
FROM: DENISE KING
PROJECT: NEW LOXLEY WATER TREATMENT PLANT
FOR THE CITY OF LOXLEY
GMC PROJECT NO. CMOB220078(2)
RE: ADDENDUM #2

PLEASE COMPLETE BELOW AND RETURN IMMEDIATELY.

Ashley Morris
Email: Ashley.Morris@gmcnetwork.com

I, the undersigned, hereby acknowledge receipt of this Addendum.

Authorized Representative of Contractor

Date

Company Name

Telephone

Contractor's License Number (if applicable)



ADDENDUM NUMBER 2

NEW LOXLEY WATER TREATMENT PLANT

FOR CITY OF LOXLEY

GMC PROJECT NO. CMOB220078(2)

1. General

- 1.1 The following revisions are hereby added as Addendum No. 2 to the referenced Project Manual and Plans and shall be considered when preparing bids.

2. Revisions to Project Manual

- 2.1 Specification 08 71 00 – Door Hardware has been revised and is included as an attachment to this addendum.
- 2.2 The Bid Form has been revised and is included as an attachment to this addendum.
- 2.3 Specification 43 23 13 – Vertical Turbine Pumps has been revised and is included as an attachment to this addendum.
- Secondary duty point was added

3. Questions

- 3.1 **Question: What is the “Warranty Bond”, section EJCDC C-612? It sounds like a 2-year warranty. But 3 or 4 other places in the specs it is noted that the warranty is to be 1 year. Please clarify.**
Answer: A 2-year warranty bond is not needed. The Contractor shall provide a 1-year warranty as indicated elsewhere in the project manual.
- 3.2 **Question: How do we dispose of excess dirt from the clearwell excavation? I don't think there is enough room to leave it onsite. Does Loxley want it?**
Answer: The Contractor shall dispose of excess dirt offsite. The owner does not want it.
- 3.3 **Question: From what I understand all building permit fees will be waived by the City. Please confirm.**
Answer: That is correct.
- 3.4 **Question: From what I understand existing power is onsite, and we will not have to coordinate with the local power utility. Please confirm.**
Answer: That is correct.
- 3.5 **Question: Will the City allow use of temp power without usage fees?**
Answer: The Contractor will be responsible for paying for temporary power. A meter shall be installed for all temporary power required for construction operations.
- 3.6 **Question: Will the City allow use of temp water without usage fees?**
Answer: The owner will not charge the Contractor for temporary water usage. The Contractor will be responsible for getting water service to the site if needed.



- 3.7 **Question: Refer to sheet C-901, Detail D. Please verify whether or not the bottom layer of 8” crusher run needs to be covered by another 8” layer of clay gravel. The clay gravel seems unnecessary.**
Answer: The 8” of clay gravel is not necessary over the 8” of crusher run.
- 3.8 **Question: Refer to sheet P-101, note #6. The referenced waste lines to be encased in concrete are within the Clearwell area. Would double-walled pipe within the Clearwell area be a better option?**
Answer: Hanging double wall pipe inside the clearwell will not be allowed. The waste lines shall be encased in the top slab of the clearwell.
- 3.9 **Question: Reference any drawing that shows the concrete clearwell walls under the aerator. All views indicate that the interior walls are solid walls under the aerator. Shouldn't there be an opening in the northeast wall?**
Answer: There is not currently a section that shows this wall. This interior baffle wall in the clearwell just to the east of the aerator stops 2'-0" from the bottom slab. The typical baffle wall thickness and reinforcing (#5 @ 10" o.c. each way) will be acceptable in this wall, with an additional (3) sets of horizontal bars above the bottom of the wall. The horizontal bars would be at 5" spacing for 6 spaces, and then 10" spacing the rest of the way up.
- 3.10 **Question: Referencing sheet C-302 and D-001, piping note #6 on both sheets. Note says "...provide heat tracing, insulation and electrical appurtenances for all exterior above ground piping...". Is the intent to insulate ALL? Or just small diameter PVC water pipe?**
Answer: No heat tracing or insulation is required in this project.
- 3.11 **Question: Referencing sheet C-301 and C-601, something appears to run parallel and follow the existing gravel drive, and is soon in bold which means proposed. Please clarify what this is and is it in this project.**
Answer: That is an existing easement and was inadvertently shown as bold.
- 3.12 **Question: Referencing Sheet S-604, note #14, succeeding structural sheets, and page 7 of the Geotech report, section 6.3. The report recommends providing a drainage system at the base of below grade walls, consisting of a pump and storm drains. If this is required, this will need to be part of GMC's design. Please provide details ASAP.**
Answer: A drainage system at the base of the below grade walls is not required.
- 3.13 **Question: Referencing sheet C-302. There appears to be a section of new chain-link fence running east and west, just north of the proposed clearwell. Please clarify if this is chain-link fence, and if it's the only new fence required. And if is, can you please provide chain-link fence details?**
Answer: That portion of the fence was inadvertently shown as bold. No new chain link fence is required.
- 3.14 **Question: Referencing sheet C-301, the drawings seem to depict a new concrete apron on Revere Dr. Is this required in the project?**
Answer: No this is not required in the project.
- 3.15 **Question: I did not see any plan view drawings that show the depth of the well pump setting so we can price out the column pipe for the pump. Do you happen to have this information you could provide?**
Answer: The production well is currently being drilled, so final construction details will not be available by the time this project bids. Based on the test well, it is anticipated that the pump will require approximately 460 ft. of column pipe. The pump will also need to be able to fit inside the inner casing. The casing and screen details are below:
- Outer casing – 20" diameter
 - Inner casing – 14" diameter



- Screens – 14” diameter

3.16 **Question: Referencing Sheet A-109, the finish schedule only calls for 4” rubber base in the bathroom. However, interior elevation-E on sheet A-103 shows rubber base in the Control Room. Please clarify.**

Answer: The control room shall have a rubber base.

3.17 **Question: The Finish Schedule and Reflected Ceiling Plan differ between Gyp Board ceilings and Plywood ceilings. Please clarify.**

Answer: The only room with gypsum board ceiling is the electrical room. The lime, storage, mechanical, and chlorine rooms shall have plywood ceilings.

3.18 **Question: The Finish Schedule says to paint the interior CMU walls. With the split-faced CMU being pre-finished, wouldn't it be better to just provide the limited amount of smooth-faced interior CMU as prefinished as well? This way all the wall colors would be sure to match.**

Answer: Smooth-faced, pre-finished interior CMU is acceptable.

3.19 **Question: Please provide the fire extinguisher locations, and which locations are to be bracket mounted or cabinet mounted.**

Answer: A fire extinguisher shall be located in the control room and shall be cabinet mounted.

3.20 **Question: Referencing sheet E-003, note #5. We understand this to say that the local gas utility is running the required line, based on the demand, right up to the generator. As we cannot design the required gas line, or even know where it is originating from. It is our thought that the City should handle this themselves, as the new service will have to be in their name. Please confirm.**

Answer: The City will provide the gas line to the new generator.

4. **Acknowledgement of Receipt**

4.1 Receipt of Addendum No. 2 shall be acknowledged in two ways:

4.1.1 Note on (EJCDC C-410) the Bid Form of the Project Manual – Bidder acknowledges receipt of “Addendum No. 2” and date of “July 22, 2024”.

4.1.2 EMAIL GMC immediately at ashley.morris@gmcnetwork.com and confirm that addendum has been received and is legible.

5. **Conclusion**

5.1 This is the end of Addendum Number 2, dated Monday, July 22, 2024.

BASIS OF AWARD

ADDENDUM NO. 2

LUMP SUM BASE BID

The Bidder hereby proposes to accept as full payment for completion of the Project the amounts computed under the provisions of the Contract Documents and based on the following lump sum amount. The Bidder agrees that the lump sum price represents a true measure of the labor and material required to perform the work, including all allowances, overhead and profit for work called for. The Lump Sum (LS), including cash allowances, shall be shown in both figures and words. If a discrepancy exists between the amount stated in words and the amount stated in figures, the amount stated in words shall govern.

The Bidder acknowledges that the **Lump Sum amount includes the amounts for Allowances as listed below.**

The Bidder agrees to perform all the work described in the Base Bid of the Contact Documents for the following lump sum price of

_____ **DOLLARS**
AND _____ **CENTS**
\$ _____

subject to the reductions or additions resulting from price items, all in accordance with the following Schedule of Payment Items.

ALLOWANCES

Allowances (Specification Section 01 21 00) may be used, as authorized and directed by the Engineer, to pay for costs of additional work resulting from the need for allowance items identified below. This work is not shown or specified in the drawings and not covered by another line item in the Bid. This work may be required in the event the Engineer or Owner establish the need for additional work deemed to be necessary for the completion of this contract. This cash allowance amount is to be included in the Lump Sum Base Bid, but is to be paid to the Contractor only if authorized as provided in this paragraph.

	<u>DESCRIPTION</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
1	Construction Staking	LS \$	5,000
2	Materials Testing	LS \$	75,000
3	Engineering Startup	LS \$	25,000
4	Unforeseen Conditions	LS \$	100,000
		\$	205,000

The Bidder understands that the Owner reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

All Owner-Selected Equipment/Supplier items shall be bid according to the following:

The product(s) noted as "A" selection for each item of equipment listed in the following Owner-Selected Equipment/Supplier Schedule has been designated by the Owner for use in the Project. Contractor must bid base bid items. Where more than one product is noted as "A", Bidder must circle the item on which the bid is based. The Bidder may indicate substitute equipment/supplier by writing in a substitute for "B", and writing in the amount of deduction for the substitute equipment supplier.

The prior naming of substitute equipment/suppliers is based on a belief that the substitute should be able to furnish "equal" equipment/service as that specified, although it may not be the supplier's standard. Should the write-in substitute be disallowed by the Owner as "not equal" or "not desired", then the Bidders shall supply the circled "A" item. If no substitute is indicated, the Bidder must supply the circled "A" item. Should Bidder fail to circle one, or circle more than one, the Bid will be deemed by Owner to be based upon the first-listed equipment/supplier, and Bidder, if awarded the Contract, shall provide same.

The Bidder must supply a base bid for the Owner-Selected Equipment/Supplier items. The contract will be awarded based on the base bid. The Bidder may supply a deductive cost from the base bid for one of the products in the schedule below by writing in a substitute. This amount will be deducted from the base bid (after award) if the Owner in its sole discretion determines that the acceptance of the substitute product is in its own best interest. The Owner in its sole discretion may determine any substitute "not desired" and reject said substitute.

For comparable alternate named equipment "B", the furnished items shall fulfill the function and performance of the item specified and shall be of equal quality to base bid equipment "A"; any modifications required by the furnished alternate equipment to the structure, process, associated equipment, electrical or piping shall be include in the Alternate Bid price, and the completed installation of the item by the Contractor shall incur no additional cost to the Owner, including engineering cost to accommodate alternate supplier.

Additional substitutes will not be considered after receipt of the Bidder's Proposal.

Design of this project is based upon the manufacturer's equipment or product noted as "A" item in the schedule. Should a Bidder propose furnishing substitute equipment, the Bidder shall comply with the provisions in Specification Section 01 25 00 – Substitution of Major Equipment Items.

Indicate the Base Bid manufacturer under "Manufacturer" below by circling the manufacturer used for the Lump Sum Base Bid Total.

ADDENDUM NO. 2

Item	Specification Section	Description	Manufacturer/Supplier		Amount of Alternate (\$+/-)
1	33 11 13	Water Supply Wells	A	Goulds	
			A	Peerless	
			A	American Marsh	
			B		\$
2	43 23 13	Vertical Turbine Pumps	A	Goulds	
			A	Peerless	
			A	American Marsh	
			B		\$
3	46 31 11	Gaseous Chlorination System	A	Regal	
			B		\$
4	46 33 44	Peristaltic Metering Pumps	A	Blue-White	
			A	Watson Marlow	
			B		\$
5	46 36 33	Volumetric Feed Equipment	A	Acrison	
			B		\$
6	46 71 00	Aluminum Induced Draft Aerators	A	Tonka	
			A	Deloach	
			B		\$

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.
2. Cylinders for door hardware specified in other Sections.

B. Related Requirements:

1. Division 8 – Openings

1.2 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation and Keying Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Flow of traffic and degree of security required.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Submittal Sequence: Submit door hardware schedule after or concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - e. Fastenings and other installation information.
 - f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - g. Mounting locations for door hardware.
 - h. List of related door devices specified in other Sections for each door and frame.
- C. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For each type of electrified door hardware.
 1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Field quality-control reports.
- E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
 - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
- a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.
 - c. Concealed Floor Closers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the ABA standards of the Federal agency having jurisdiction.
1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
 5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
1. Door hardware is scheduled in Part 3.

2.4 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. Stanley Commercial Hardware; a division of Stanley Security Solutions.
 - c. Or approved equal.

2.5 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch-thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
- B. Pin-and-Barrel-Type Hinges:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. National Guard Products.
 - b. Select Products Limited.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.
 - d. Or approved equal.

2.6 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 - 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 - 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- E. Locks and Latches: BHMA A156.2, BHMA A156.12, BHMA A156.13, BHMA A156.16.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Best Access Systems; Stanley Security Solutions, Inc.
- b. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
- c. Schlage; Allegion plc.
- d. Or approved equal.

2.7 EXIT LOCKS AND EXIT ALARMS

A. Exit Locks and Alarms: BHMA A156.29, Grade 1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Precision Hardware, Inc.; a Stanley company.
 - b. SARGENT Manufacturing Company; ASSA ABLOY.
 - c. VonDuprin; Allegion plc.
 - d. Or approved equal.

2.8 SURFACE BOLTS

A. Surface Bolts: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Trimco.
 - c. Or approved equal.

2.9 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burns Manufacturing Inc.
 - b. Trimco.
 - c. Or approved equal.

2.10 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

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

- a. Precision Hardware, Inc.; a Stanley company.
- b. SARGENT Manufacturing Company; ASSA ABLOY.
- c. Von Duprin, Allegion plc.
- d. Or approved equal.

2.11 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Best Access Systems; Stanley Security Solutions, Inc.
 - b. Or approved equal.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 2 permanent cores; face finished to match lockset.
 1. Core Type: Best CorMax Patented Interchangeable.
- C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide ten (10) construction master keys.
- D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide ten (10) construction master keys.

2.12 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Supplier is to closely coordinate with owner and architect all keying requirements. All lock cylinders shall be construction master keyed using split key method. Incorporate decisions made in keying conference.
 1. Master Key System: Change keys and a master key operate cylinders.
 - a. Provide three (3) cylinder change keys and five (5) master keys.
 2. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Nickel silver
 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE"

2.13 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. SARGENT Manufacturing Company; ASSA ABLOY.
 - b. Dorma; dormakaba USA
 - c. LCN; Allegion plc.
 - d. Or approved equal.

2.14 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. National Guard Products, Inc.
 - b. Reese Enterprises, Inc.
 - c. Zero International, Inc.
 - d. Or approved equal.
- B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg, as follows:
1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
 2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
 3. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

2.15 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. National Guard Products, Inc.
 - b. Reese Enterprises, Inc.
 - c. Zero International, Inc.
 - d. Or equal

2.16 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 3. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.17 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
 - 2. Furnish permanent cores to Owner for installation.

- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 - Joint Sealants.
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 - 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
 - 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.

- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DOOR HARDWARE SCHEDULE

- A. Nomenclature

1. Manufacturer List

Code	Name
BE	Best Access Systems
DM	Dorma Door Controls
NA	National Guard
PR	Precision
ST	Stanley
TR	Trimco

2. Option List

Code	Name
36"	36" Door Width
3RO	Prefix option for 2000 Apex Series
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
CSK	COUNTER SINKING OF KICK and MOP PLATES
NFHD	Narrow Frame Bracket - Heavy Duty Arms
SNB (2)	SEX BOLTS (2)
VIB	Double Visual Indicator Option

3. Finish List

Code	Name
600	Primed for Painting
603	Zinc Plated
619	Satin Nickel Plated, Clear Coated
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum

B. Hardware Set #1

1. Door #: 103, 104A, 106A, 107
2. Doors: Typical exterior pair of doors

Qty	Unit	Product	Description	Color	Manufacturer
2	ea	Continuous Hinge	HD1100A 83		NA
1	ea	Keyed Removable Mullion	KR822 x LAR	600	PR
1	ea	Mullion Seal	5100N x LAR		NA
1	ea	Exit Device-Exit Only	3RO 2101 36" SNB (2)	630	PR
1	ea	Exit Device-Storeroom	3RO 2103 X 4903D 36" SNB (2)	630	PR
2	ea	Rim Cylinder-Exit	12E-72 PATD	626	BE
2	ea	Trim/Mullion			
2	ea	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	ea	Mullion Seal	5100N-86 86"		NA
1	ea	Perimeter Gasketing	2525 C x LAR		NA
1	ea	Drip Cap	16 A +4" ODW		NA
2	ea	Door Sweep w/ Drip	C627 A x LAR		NA
1	ea	Threshold	896 S x LAR	AL	NA
2	ea	Closer			

C. Hardware Set #2

1. Door #: 101, 105A, 106B
2. Doors: Typical exterior single door

Qty	Unit	Product	Description	Color	Manufacturer
1	ea	Continuous Hinge	HD1100A 83		NA
1	ea	Lockset-Dormitory	45H-7T14H PATD	630	BE
1	ea	Rim Cylinder	12E-72 PATD	626	BE
1	ea	Closer w/ Spring Stop	8916 S-DS	689	DM
1	ea	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	ea	Door Sweep w/ Drip	C627 A x LAR		NA
1	ea	Drip Cap	16 A +4" ODW		NA
1	ea	Perimeter Gasketing	2525 C x LAR		NA
1	ea	Threshold	896 S x LAR	AL	NA

D. Hardware Set #3

1. Door #: 102

Qty	Unit	Product	Description	Color	Manufacturer
3	ea	Hinges	FBB179 4 1/2 X 4 1/2	US32D	ST
1	ea	Privacy Set	45H-0L14H VIB	626	BE
1	ea	Closer w/ Stop	8916 IS	689	DM
1	ea	Kick Plate	K0050 8" x 2" LDW B4E CSK	630	TR
1	ea	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	ea	Coat Hook	3072	630	TR
1	ea	Perimeter Gasketing	2525 C x LAR		NA

END OF SECTION 08 71 00

SECTION 43 23 13 – VERTICAL TURBINE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Vertical turbine pumps for high service pump station.

B. Related Requirements:

1. Section 09 96 00 – High-Performance Coatings: Surface Preparation and coating requirements for pump column and body
2. Section 26 05 93 – Common Motor Requirements for Process Equipment
3. Section 40 70 23 – Process Control Narratives

1.2 REFERENCE STANDARDS

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings.

C. ASTM International:

1. ASTM A29 - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.
3. ASTM A744 - Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service.

D. National Science Foundation:

1. NSF 61 – Drinking Water System Components – Health Effects
2. NSF 372 – Drinking Water System Components – Lead Content

1.3 COORDINATION

A. Section 01 31 00 – Project Management and Coordination: Requirements for coordination.

B. Coordinate installation and startup of Work of this Section with plant operations.

1.4 SCHEDULING

- A. Section 01 31 00 – Project Management and Coordination: Requirements for scheduling.
- B. Schedule Work of this Section to install pumps prior to connecting piping Work.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information for materials of construction and fabrication.
- C. Shop Drawings:
 - 1. Submit detailed dimensions for materials and equipment, including wiring and control diagrams, performance charts and curves, installation and anchoring requirements, fasteners, and other details.
 - 2. Include manufacturer's specified displacement tolerances for vibration at operational speed specified for pumps.
- D. Critical Speed Analysis: Identify speeds at which pumps will be prone to damaging vibrations.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures, anchoring, and layout.
- G. Source Quality-Control Submittals: Indicate results of shop/factory tests and inspections.
- H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- I. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations and final orientation of equipment and accessories.

1.7 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. The Manufacturer and Contractor shall furnish a warranty extending twelve (12) months after substantial completion date.

PART 2 - PRODUCTS

2.1 VERTICAL TURBINE PUMPS

A. Manufacturers:

1. The vertical turbine pumps shall be manufactured by:
 - a. Goulds Pumps, Inc.
 - b. Peerless Pump Co.
 - c. American Marsh
 - d. Or Approved Equal.

B. Description: Vertical multi-stage type, consisting of a fabricated steel discharge head, vertical solid shaft motor, discharge column and shafting, and bowl assembly electric motor.

C. Pump Designation:

1. P6210.
2. P6220.

D. Performance and Design Criteria:

1. Primary Design Point Design Flow Rate: 2,000 gpm.
2. Primary Design Flow Total Dynamic Head: 155 feet.
3. Secondary Design Point Flow Rate: 1,000 gpm
4. Secondary Design Flow Total Dynamic Head: 220 feet.
5. Minimum Efficiency at Design Flow Rate: 80%
6. Minimum Column Diameter: 10 inches
7. Pump Discharge Diameter: 10 inches
8. Minimum lineshaft diameter: 1.5 inches

E. Bowl Assembly:

1. Suction Bell: Shall be constructed of cast iron and machined for bolting to the bowls. The suction bell shall be a smooth bell-shaped entrance as a waterway to the impellers, and shall incorporate an integrally cast suction manifold bearing housing. The housing shall have a UNS C93200 tin bronze bearing and a cast iron suction manifold plug. Bowl inlet shall include a 304 stainless steel inlet strainer with $\frac{3}{4}$ inch openings.
2. Pump Bowls: Shall be constructed of ASTM A48 Class 30 close grained cast iron with integrally cast diffusion vanes. The bottom bowl shall be machined to bolt to the suction bell. Each bowl shall be equipped with a UNS C93200 tin bronze bearing. Each bowl interior shall be enameled to provide smooth passage of water and increase efficiency.
3. Impellers: Shall be enclosed type, constructed of ASTM B584000 C87619 silicon bronze or ASTM A744-00 Type 316 stainless steel, dynamically and statically balanced. The impeller vanes shall be machined to match the contours of the suction bell, and also the contour of the series case. Impeller shall be secured by means of ASTM A276-90a Type 316 stainless steel taper lock collet to the bowl shaft. The impeller shaft shall be ASTM A582-88a Type 416 stainless steel, and shall be not less than the minimum diameter

noted above. The total hydraulic down-thrust for pump shall be minimized. Up-thrust developed upon starting shall be acceptable, but pumps that operate in continuous upthrust shall not be acceptable and will not be considered. Verification of thrust values shall be provided and documented with standard manufacturers published information. Failure to verify thrust calculations shall be basis for rejection of equipment.

F. Column Assembly:

1. The Column Assembly: The pump shall be of open lineshaft construction designed for lubrication by the pumped media. Column pipe shall be flanged and shall be fabricated of ASTM A53 Grade B, carbon steel. Column assembly shall have ductile iron bearing retainers that are clamped between registers machined into adjoining column pipe flanges. Each guide shall contain a water lubricated cutless bearing designed for open line shaft, vertical turbine service. Maximum length of one column section shall be 10 feet. Column sections located directly below the discharge head and directly above the pump bowl assembly shall not generally exceed 5'-0" in length. Column sections shall be secured by means of ASTM F593-Gr. CW1 stainless bolts and ASTM F594-Gr. CW1 stainless steel nuts.
2. Line Shafting: Shall be of ASTM A582-88a Type 416 stainless steel, ground and polished. Shafting shall be connected by means of ASTM A582-88a Type 416 stainless steel couplings. All shaft journals shall be provided with ASTM A269 304 S.S. sleeves at the location of each shaft bearing. The use of flame sprayed stainless steel or chrome plating is not considered an acceptable alternate to the specified shaft sleeves. Shafting size shall be determined from the thrust characteristics of the particular pump bowl under consideration, but shall in no case be less than one inch in diameter, and shall be adequate size to transmit the full motor horsepower without failure. Undersized shafting shall be basis for rejection of the pump. Pump supplier shall submit manufacturer's published data to verify shafting selection. Failure to verify shaft sizing shall be basis for rejection of the equipment.
3. A flanged non-spacer coupling shall be furnished to facilitate removal of the motor. The flanged coupling shall be a Type CPAT design with flanged ends and a threaded pump coupling to facilitate field adjustment. The coupling shall be dynamically balanced for smooth operation. Threaded and coupled shafting is not acceptable. The top shaft and the line shaft shall be of ASTM A582-95b Type 416 stainless steel and of adequate size for the HP to be transmitted.

G. Discharge Head

1. The pump discharge head shall be fabricated steel type. The head shall be suitable for floor mounting and shall be furnished with a steel sole plate to facilitate future removal. Sole plate mounting surface shall be fully machined to provide a perfectly flat base for accurate leveling of the discharge head, and the sole plate shall be accurately leveled to the tolerances specified by the manufacturer prior to installation of the pump. The discharge head base shall be machined to accept the sole plate and shall include a Class 150 integral discharge flange. The head shall have provisions for the mounting and securing of a vertical solid -shaft motor. The motor mounting flange shall be machined for a perfect fit and angular misalignment shall not be allowed.
2. Lifting lugs shall be provided on the discharge head and shall be capable of supporting the entire weight of the pump. A 1-inch NPT drain connection, 1/2-inch NPT pre-lube connection, and a 1/4-inch NPT gauge connection shall be provided. The pump discharge flange shall be provided. The pump discharge flange shall conform to CL 150

ANSI standard drilling for pipe flanges. The pump shall be sealed at the discharge head by means of graphited packing. An ASTM B584-00 C90300 bronze bushing, a ASTM A744-00 Type 316 stainless steel packing washer, and a CL 30 cast iron cadmium plated two-piece packing gland shall secure the packing and allow for adjustment for lubrication. A removable coupling guard fabricated from stainless steel shall be provided to protect operating personnel from accidental contact with the shaft or flanged coupling during operation.

3. Discharge head shall include a tap on the packing gland for connection to external water lubrication source.
4. The pump discharge head shall be provided with shaft critical speed calculations, and a structural natural frequency analysis shall be performed on the discharge head and motor combination to ensure low-vibration operation. The calculations and results shall be provided in the pump submittal data, for review and approval by the engineer.

H. Motor

1. Each turbine pump shall be driven by a 125 HP vertical solid shaft motor suitable for 460 volt, 3 phase, 60 hertz. The motor shall be an integral part of the pumping unit, and shall be suitable for mounting as shown on the plans. All motors shall be sized so that they will not be overloaded at their rated capacity at any point on the pump performance curves. Motors shall be WP-1 with Class F insulation and shall have a minimum service factor of 1.15.
2. Each motor shall have thrust bearing(s) capable of carrying the dead weight of all rotating parts of the pump plus the hydraulic thrust incurred during operation.
3. Motor shall be vertical solid shaft, squirrel cage induction type and shall conform to AIEE standards. Each motor shall be equipped with a non-reverse coupling. A coupling at the top of the motor shall facilitate vertical adjustment of the impellers of the pump. The motor shall also be furnished with a protective cap. All bearings shall be oil or grease lubricated, with proper provisions made to guard against the escape of lubricant.
4. Motors shall be "inverter duty rated" and shall conform to the NEMA "High" standard for premium efficiency. The nameplate on the motor shall also indicate the motor is "inverter duty rated" to the NEMA "High" standard for premium efficiency. A 120v space heater shall be supplied with the motor.
5. Thermostats shall be provided in the windings of each phase to afford protection of the motor against excessive operating temperature. Thermostats shall be normally closed, suitable for operations on 120 VAC, with leads from the same routed to an accessory conduit box for connections separate from the power wiring. One thermostat shall be provided for each phase of the motor windings.
6. Space heaters and thermostat leads shall be directed to a separate junction box, for field wiring by the contractor. These leads shall not be routed through the primary junction box.
7. Pump bowl lateral adjustments shall be made solely by means of the flanged non-spacer coupling that is described in these Specifications. Threaded & coupled pump/motor shaft connections will not be permitted for this project.

I. Miscellaneous

1. Data Plates: Each pump shall be equipped with a data plate securely fastened to the pump that contains the manufacturer's name, pump size and type, serial number, pump speed, impeller data, capacity and head rating, and any other pertinent information.

2. A fabricated steel sole plate shall be provided with each pump to facilitate installation and future removal. The plate shall be a minimum of 30" square and 1¼" thick, and shall be provided with 1" diameter holes for anchor bolts and tapped holes corresponding to drilling of the pump discharge head base bolting. A suitably-sized hole shall be accurately cut in the center of the plate to allow passage of the pump, and the top surface shall be accurately machined to provide a perfectly flat surface for mounting the discharge head. Raw or mill finished steel plate is not considered acceptable. The base plate shall be grouted in place by the Contractor, in the position as indicated on the Plans. Anchor bolts shall be provided by the Contractor, and shall be fabricated of 304 stainless steel.
3. Testing: The pump shall be performance tested prior to shipment to confirm pump performance. Test shall comply with ANSI/HI 14.6 Grade 1U requirements, and shall include, but not be limited to, checking the unit at its rated speed, capacity, head, efficiency, and brake horsepower at such conditions of head and capacity so as to properly establish the actual performance curve. Certified copies of the test reports shall be submitted for review prior to shipment. The Standards of the Hydraulic Institute shall govern the procedures and calculations for the prescribed testing.
4. Painting: All equipment comprising each pumping unit shall be painted with a potable epoxy finish by the pump manufacturer prior to shipment. Epoxy shall be Tnemec 21 or equivalent NSF coating, and shall be applied to the discharge head ID/OD, column pipe ID/OD, and bowl OD. All finish coating shall be provided as specified in Section 09 96 00.
5. All pumps shall be completely assembled, less motors, at the manufacturer's facility prior to shipment, and shall be shipped in one (1) piece. Onsite assembly of pumps will not be permitted.

J. Operation:

1. Electrical Characteristics: As specified in Division 26 – Electrical and the following:
 - a. Voltage: 460/480V, three phase, 60 Hz.
2. Control Panel: VFD/SCADA panel.
3. Disconnect Switch: Factory mounted on equipment.
4. Operation Sequences:
 - a. The purpose of the vertical turbine pumps is to pump finished water from wetwell to the distribution system. The pumps are vertical turbine type, and both are on variable speed drives (VFDs). The pumps are controlled by the SCADA system based on an operator defined setpoint for flow rate.
 - b. The pumps are designed with one (1) duty and one (1) standby. The pumps shall be set to alternate operation when the pumps are shut off such that the run times of the pumps are equalized throughout its lifecycle.

K. Fabrication:

1. Connect pump shaft to drive motor with universal flexible coupling to compensate for minor misalignment and to permit removal of pump-rotating assembly and motor without removing piping.
2. Shaft Guard: Enclose shaft and universal joint with enclosed-type metal shaft guard complying with OSHA standards. Also, install a reverse ratchet to prevent the impeller from loosening if the motor turns in reverse.

3. Pump and Drive Mating Surfaces: Machine finished.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pumps where indicated on Drawings and according to manufacturer instructions.
- B. Provide and connect piping, power and control conduit, and wiring to make system operational and ready for startup.
- C. Flush piping with clean water.

3.2 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- C. Preoperational Check: Before operating system or components, perform following:
 1. Check pump and motor alignment.
 2. Check for proper motor rotation.
 3. Check pump and drive units for proper lubrication.
- D. Startup and Performance Testing:
 1. Operate pump on clear water at design point for continuous period of two (2) hours, under supervision of manufacturer's representative and in presence of Architect/Engineer.
- E. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than two (2) eight-hour days on Site for installation, inspection, startup, field testing, and instructing Owner's personnel in maintenance of equipment.
- F. Verify pump performance by performing time-fill test.
- G. Check pump and motor for excessive vibration according to manufacturer instructions. Check for motor overload by taking ampere readings.
- H. Equipment Acceptance:
 1. Adjust, repair, modify, or replace system components that fail to perform as specified and rerun tests.
 2. Make final adjustments to equipment under direction of manufacturer's representative.

END OF SECTION 43 23 13