

## **Request for Proposals**

### *Equipment Procurement*

***CIP #OW-2404GN: Reservation Road Desalination Plant Renovation Project***

Proposals due

**April 8, 2026**

**2:00 PM**

Questions sent electronically must be directed to:

Jack Gao at [engineering@mcwd.org](mailto:engineering@mcwd.org)

Proposals sent by mail must be directed to:

Marina Coast Water District  
920 2<sup>nd</sup> Ave., Suite A Marina,  
CA 93933

ATTN: Jack Gao

## **I. INTRODUCTION**

The Marina Coast Water District is seeking proposals from qualified vendors for the design, fabrication, and delivery of water treatment equipment. The goal of this RFP is the of a lime dosing system for the Reservation Road Desalination Plant Renovation Project, identified as Capital Improvement Project (CIP) #OW-2404GN.

The specific technical requirements, capacities, and performance standards for the equipment are detailed in Attachment B: Technical Specifications.

## **II. BACKGROUND**

Marina Coast Water District (MCWD, District) is renovating its existing 300-acre feet per year (AFY) desalination treatment plant at 11 Reservation Road in Marina, CA and restoring to active service. The plant operated from 1997 to 2003. Since that time, the treatment equipment and processes have deteriorated beyond functional use. This equipment is part of pre-purchase of long lead items associated with the second phase of the rehabilitation of the Desalination Plant. All construction scoping documents from the previous phase are available on the district's web site:

Bids & Open Projects : Marina Coast Water District

[https://www.mcwd.org/engineering\\_operations\\_administration\\_rfps.php](https://www.mcwd.org/engineering_operations_administration_rfps.php)

## **III. SCOPE OF WORK**

The selected vender will be responsible for providing equipment that meets the attached specifications: Attachment B: Technical Specifications and cost should be included in the BID Schedule **Attachment A: Bid Schedule**

The bid schedule should include a cost for each item listed as "Supply with contract." Zero cost is an acceptable response. For items marked "include with quote", the item should be included in the bid submittal. For items marked "example", such as warranty, the actual item does not need to be included but a representative example should be included.

Partial equipment bids will be accepted and evaluated but selection preference will be given to bids that supply all equipment listed.

For the pump skid configuration and valves, refer to the attached P&ID included with the specifications in Attachment B: Technical Specifications. Alternative configurations will be accepted if accompanied by a P&ID. The pump skid must be shipped with pumps and valves assembled.

## **IV. PROPOSAL SUBMITTAL**

### **A. Proposal Instructions**

#### Proposal Documents

Failure to completely execute and submit the required documents before the bid submittal deadlines will render a proposal non-responsive.

#### Informed Respondent

It will be the proposer's responsibility to be fully informed as to the conditions, requirements, and specifications before submitting qualifications. Failure to do so will be at your firm's own risk and relief cannot be secured on the plea of error.

### **B. Submission Requirements**

No hard copies are required to be submitted. One (1) electronic copy of the proposal shall be submitted in the format contained in the RFP. Electronic copy must be a searchable PDF. The proposal should be one document.

The response shall include the following:

#### COVER LETTER (limit to two pages)

A letter of interest stating the respondent's experience and qualifications in providing the equipment. Provide project histories for three public agencies which the respondent has provided equipment for a similar project within the last five years. Similar experience for California projects is preferred.

#### 1. Budget Proposal

Budget Proposal must include the following elements to be considered by the district:

- a. Itemized equipment with price. Price should also be included for recommended spares and associated consumables. If the vendor recommends commissioning and training that should be included as a separate item.
- b. Instrumentation and Control package. Describer controller and provide list of internal and external I/O.

#### 2: Schedule

- a. Lead time to engineering drawings for district acceptance (if required).
- b. Option to expedite delivery.
- c. Estimated delivery data based on receiving a purchase order on April 22.

## **V. PROPOSAL EVALUATION CRITERIA**

The district will evaluate qualifications based on the scoring criteria outlined in this section.

The district shall be the sole judge of the qualifications and equipment proposed and its decision shall be final. Discussions may be conducted with respondents who submit qualifications determined to be reasonably acceptable of being selected for award.

### **Scoring Criteria**

<b>Evaluation Metric</b>	<b>Description</b>	<b>Weight (%)</b>
Relevant Experience and Past Performance	Demonstrated success on similar desalination or water treatment projects, including references.	10
Proposal Organization	Clarity of proposal and cost breakdown. Details about equipment	5
Performance and Warranty	Duration and extent of warranty.	15
Schedule	Length of lead time is critical. Provide a schedule with delivery by August 17, 2026 or earliest date.	30
Comprehensive Proposal	Ability to provide all equipment as one package.	10
Fee Proposal	Total Cost of project.	30

## **VII. SCHEDULE**

Time is of the essence for responding to this RFP. Proposing firms/Consultants must be able and willing to commit the necessary resources to complete the RFP within the schedule.

<b>Milestone</b>	<b>Date</b>
RFP Release	03/25/2026
Proposal Submission Deadline	4/08/2026 2 PM

Electronic Submittal:

Jack Gao  
JGao@mcwd.org

Physical and U.S. Mail Address:  
Marina Coast Water District  
Attn: Jack Gao  
Reservation Road Desal Project  
920 2<sup>nd</sup> Ave., Suite A  
Marina, CA 93933

Postmark does not constitute receipt. The district reserves the right not to consider late, misdirected or incomplete proposals.

## **IX. GENERAL INFORMATION**

### **A. GENERAL PROVISIONS**

1. Proposers are encouraged to review this RFP carefully in its entirety prior to preparation of its proposal. The District reserves the right to verify all information submitted in a proposal.
2. Waiver of Irregularities. The District reserves the right to waive any informalities or irregularities in this RFP process, or in any proposal.
3. Addenda. The District reserves the right to revise the RFP documents. Any changes to the requirements will be made by written addenda to this RFP. Failure to acknowledge all posted addenda may cause a proposal to be deemed non-responsive to this RFP and be rejected without further evaluation.
4. No Commitment to Award. Issuance of this RFP and receipt of proposals does not commit MCWD to award a contract. The District expressly reserves the right to postpone the RFP process for its own convenience, to accept or reject any or all proposals received in response to this RFP, to award all or a portion of the proposed scope of work, or to cancel all or part of this RFP.
5. Amendments to Proposals. No amendment, addendum or modification will be accepted after the deadline stated herein for receiving proposals. The proposer may modify or amend its proposal only if MCWD receives the amendment prior to the deadline stated herein for receiving proposals.
6. Non-Responsive Proposals. A proposal may be considered non-responsive if conditional, incomplete, or if it contains alterations of form, additions not called for, or other irregularities that may constitute a material change to the proposal.
7. Late Proposals. The District will not be responsible for proposals that are delinquent, lost, or incorrectly submitted.
8. Costs for Preparing. The District will not compensate any proposer for the cost of preparing any proposal, and all materials submitted with a proposal shall become the property of MCWD. The District may retain all proposals submitted and may use any idea in a proposal regardless of whether that proposal is selected.

**9. Public Documents.** All proposals shall be available for public inspection at the conclusion of the selection process.

**10. No Exceptions.** Submission of a proposal constitutes acceptance by proposer of the conditions contained in this RFP.

Referenced Attachments are posted on the District website under one or more Project RFPs at: <https://www.mcwd.org/files/?dl=16b787b3b056f9d1eb5d8b766332f755>

**Attachment A: Bid Schedule**

## MCWD Lime Packakge Bid Schedule

Bid Item	Decription	Specification Section	Include with Quote	Supply with contract	Amount
<b>1.0</b>	<b>Mixer Stand and Access Platform</b>	<b>06 08 03</b>			
1.1	General	1.0			
1.1.1	Shop Drawings	1.2 A		1	
1.1.2	Product Data	1.2 B	1		
1.1.3	Calculations	1.2 C		1	
1.2	Mixing Stand and Access Platform	2.1		1	
1.3	Suplier's Services				
1.3.1	Installation Support	3.1		1	
1.3.2	Testing and Verification	3.2		1	
<b>2.0</b>	<b>Meter Pump Skid</b>	<b>43 23 57</b>			
2.1	General	1.0			
2.1.1	Shop Drawings	1.3 A.1	1		
2.1.2	Product Data	1.3 A.2	1		
2.1.3	Performance Data	1.3 A.3	1		
2.2	P-510 and P-520 pumps	2.2 or 2.3		1	
2.3	spare parts	2.2 J	list	1	
2.4	PIT-505: Discahrge Pressure Indicating Transmitter	2.4		1	
2.5	FIT-504	2.5		1	
2.6	Pump Skid	2.6 and P&ID		1	
2.7	Suppplier Services	3.3		1	
<b>3.0</b>	<b>High Desnity Polythlene Storage Tank</b>	<b>43 41 43</b>			
3.1	General	1.0			
3.1.1	Factory Test	1.2 B		1	
3.1.2	Warranty	1.2 C	example	1	
3.2	Submittals	1.3		1	
3.2.1	Shop Drawings	1.3 A 1		1	
3.2.2	Product Data	1.3 A 2	1		
3.3	Product Delievery, Storage, and Handling	1.4		1	
3.4	Products	2.0			
3.4.1	TNK-500	2.1		1	
3.4.2	LIT-501	2.3.H (a-c, e)		1	
3.4.2.1	LIT-501 data sheet	2.3 H (e)	1		
<b>4.0</b>	<b>Vertical Mixer</b>	<b>44 41 34</b>			
4.1	Quality Assurance		1		
4.1.1	Statement of Equivalency	1.2 B	1		
4.1.2	Performance Test	1.2 C		1	
4.1.3	Warranty	1.2 D	example	1	
4.2	Submittals				
4.2.1	Shop Drawings	1.3 A.1 (a -b)		1	
4.2.2	Anchor System to show interface with stand	1.3 A.1.c	1		
4.2.3	Product Data	1.2	1		
4.2.4	Operation and Maintence Manuals	1.3		1	
4.2.5	Quality Control (deviations and service organization)	1.4 (a and b)	1		
4.2.6	Quality Control (intall and operational assurance)	1.4 (c and d)		1	
4.3	Product Delievery, Storage, and Handling	1.4			
4.4	Spare Parts	1.5		1	
4.5	Product - Vertical Turbine Mixer (MIX-500)	2.0		1	
4.6	Supplier Services				
4.6.1	Installation Confirmation	3.2		1	
4.6.2	Operations Instruction	3.2		1	
<b>TOTAL</b>					

**Attachment B: Technical Specifications**

**SECTION 01 11 03**

**SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.1 LOCATION AND DESCRIPTION OF WORK**

- A. Marina Coast Water District’s (MCWD) owns and operates the Reservation Road Desalination Facility located at 11 Reservation Road, Marina, CA off Highway 1 next to the Marina State Beach parking lot.
- B. This facility is undergoing a rehabilitation project (Project) with an operational completion at the end of 2026. The Project is anticipated to be furnished by the SUPPLIER and installed by the CONTRACTOR. The CONTRACTOR advertisement, selection, and contract execution is forthcoming. To maintain project schedule, MCWD is procuring long-lead equipment directly from SUPPLIER, which will be delivered to the future CONTRACTOR for installation and integration. The CONTRACTOR shall be responsible for the acceptance, shipping, handling, proper storage, installation of the equipment. CONTRACTOR will coordinate with SUPPLIER services for certificates of proper installation, operation, startup, and training.
- C. This solicitation is the first of a series of solicitations for long lead equipment and is focused on the storage, mixing, and dosing of a hydrated lime liquid slurry (aka Milk-of Lime). Forthcoming solicitations will include the RO System, Chlorine System, CO2 System, Anti-scalant system, Flush Tank and Potable water Tank, and Booster Pumps equipped with VFDs.
- D. The hydrated lime liquid slurry feed system, in conjunction with the carbon dioxide solution feed system per the following carbon dioxide solution feed design criteria, shall meet the following conditions to condition the RO permeate flow at 0.3 MGD (208 gpm) for distribution to the MCWD drinking water distribution system:

<b>Final Water Quality Constituent (unit)</b>	<b>Typical Value</b>	<b>Treatment Value Target Range</b>
pH	7.85	7.3 – 8.4
Alkalinity (mg/L as CaCO3)	124.5	68 - 181.7
Total Hardness (mg/L as CaCO3)	163.5	47 - 280
Langelier Saturation Index (LSI)	0.1	≥0.1
Calcium Carbonate Precipitation Potential (CCPP) (mg/L as CaCO3)	0.4	0.4 – 1.11

a. Carbon Dioxide Solution Feed System Design Criteria:

<b>Parameter</b>	<b>Value</b>
Chemical	Liquid Carbon Dioxide
Concentration	100%
Specific Gravity	1.53
Temperature	50°F to 80°F, 60°F average

Liquid Density	10.8 - 11.26 lbs/gal
Carbon Dioxide Solution Dosage Range	67 - 169 mg/L
Carbon Dioxide Solution Dosage	118 mg/L
Carbon Dioxide Solution Feed Rate Range	7 - 18 lbs. CO2/ hour
Carbon Dioxide Solution Feed Rate	12 lbs. CO2/ hour

- E. The procurement of the hydrated lime liquid slurry is NOT the subject of this solicitation, but the equipment specified herein shall be compatible for use with a 45% hydrated lime liquid slurry as specified below:

Parameter	Value
Chemical	Hydrated Lime Liquid Slurry
Percent Solids	45%
Specific Gravity	1.2-1.35
Liquid Density	10.8 - 11.3
pH	12.4
Viscosity	500 cP
Temperature	50 to 80 degrees F, 60 deg average
Operating Pressure	atmospheric
Storage Tank Size	5,400 gallons

- F. Liquid lime will be delivered in bulk and stored in a chemical storage tank where it is mixed intermittently to maintain the suspension and dosed through metering pumps to the pipeline upstream of the Product Water Storage Tank. The Work covers the furnishing, delivery, offloading, inspection of proper installation/operation, and training. Technical specifications for the equipment and all related instrumentation to be supplied under this solicitation as specified in the following sections.
- a. 01 11 03 – Summary of Work (this section)
  - b. 06 80 03 – FRP Mixer Stand and Access Platform
  - c. 46 23 57 – Metering Pump Skid
  - d. 43 41 43 – High Density Polyethylene Storage Tanks
  - e. 46 41 34 – Vertical Mixer
- G. All equipment and instrumentation required for fully automated dosing will be in the subsequent Contract Documents.

## 1.2 HYDRATED LIME LIQUID SLURRY COORDINATION

- A. The CONTRACTOR shall be solely responsible for coordination of the Work of this Contract.
- B. The CONTRACTOR shall supervise, direct and cooperate fully with all Subcontractors, manufacturers, fabricators, suppliers, distributors, installers, testing agencies and all others whose services, materials or equipment are required to ensure completion of the Work within the Contract Time.
- C. Work of Others:

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01 11 03-2  
Summary of Work

Reservation Road Desalination Facility Rehabilitation

Marina Coast Water District  
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1. The CONTRACTOR shall cooperate with and coordinate future SUPPLIER's Work with the work of any other contractor, utility service companies, or OWNER's employees performing work at the site.
  2. The CONTRACTOR shall also coordinate their Work with the work of others to assure compliance with schedules.
- D. Responsibility for Damage:
1. The SUPPLIER shall not be responsible for damage done by CONTRACTOR not under their jurisdiction.
  2. The SUPPLIER will not be liable for any such loss or damage, unless it is through the negligence of the CONTRACTOR.

### 1.3 WORK BY OTHERS

- A. OWNER will perform the following work:
1. Operation of all existing system valves and equipment, unless specified otherwise.
  2. Provide storage area for equipment onsite.
- B. Other contracts are as follows:
1. Equipment installation and integration provided by the future CONTRACTOR.

### 1.4 SITE CONDITIONS

- A. Site Investigation and Representation
1. The CONTRACTOR acknowledges that it has satisfied itself as to the nature and location of the work, the general and local conditions, particularly those bearing upon availability of transportation, handling and storage of materials.

### 1.5 SEQUENCE AND PROGRESS OF WORK

- A. The CONTRACTOR shall submit a schedule covering the entire Work, including approval, shipping, and handling.
- B. Limitations on Use of Work Area:
1. It shall be understood that responsibility for protection and safe-keeping of equipment and materials on or near the site will be entirely that of the CONTRACTOR and that no claim shall be made against the OWNER or their authorized representatives by reason of any act.
  2. It shall be further understood that should any occasion arise necessitating access to the sites occupied by these stored materials or equipment, the ENGINEER shall direct the CONTRACTOR owning or responsible for the stored materials and equipment to immediately move the same.
  3. All stored materials shall be labeled according to the manufacturer's recommendations.
  4. Appropriate material safety data sheets (e.g., MSDS) shall be provided.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

++ END OF SECTION ++

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01 11 03-4  
Summary of Work

Reservation Road Desalination Facility Rehabilitation  
Marina Coast Water District  
WWE Project: 25-072

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## SECTION 06 80 03

### FIBERGLASS REINFORCED PLASTIC MIXER STAND AND ACCESS PLATFORM

#### **PART 1 - GENERAL**

##### 1.1 DESCRIPTION

- A. The Marina Coast Water District's Reservation Road Desalination Facility Rehabilitation utilizes commercially supplied hydrated lime liquid slurry to condition RO permeate. Hydrated lime liquid slurry is stored in a chemical storage tank where it is fed to the pipeline contactor upstream of the Product Water Storage Tank via metering pumps. This Section includes Fiberglass Reinforced Plastic (FRP) fabrications for the Mixer Support Stand and Access Platform. The stand shall be designed to provide safe access platform to tank components including but not limited to mixer, instruments, connections, and manway. In addition, system shall be designed to withstand the mixer platform being mounted on the stand. The weight and loads from the mixer shall be coordinated with the mixer design.
- B. Other elements include:
  - A. Handrail and Guardrail
  - B. Access Ladder
  - C. Safety Grating and chain

##### 1.2 SUBMITTALS

- A. Shop Drawings:
  - A. Provide detailed layout and installation drawings.
- B. Product Data:
  - A. Provide complete specifications and data describing the materials to be furnished.
- C. Calculations:
  - A. Provide stamped engineering calculations and load designs for review. FRP system shall be designed by a structural engineer in the State of California and according to the site loading requirements.

##### 1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Per SUPPLIER's standard instructions, specifications and recommendations.

#### **PART 2 - PRODUCTS**

##### 2.1 FRP MIXER STAND AND ACCESS PLATFORM

- A. General:
  - a. Material: FRP with type 316 stainless steel hardware
  - b. Access: Standing platform adjacent to tank

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Fiberglass Reinforced Plastic Fabrications – Mixer Stand and Access Platform

Reservation Road Desalination Facility Rehabilitation

Marina Coast Water District  
WWE Project: 25-072

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- c. Design Requirement: Mixer stand cannot be separated from Tank (per 43 41 43 - High Density Polyethylene Storage Tank) or mixer (per 46 41 34 - Vertical Mixer).
- d. Loads: Coordinate all mixer loads (static, torsional, and overturning moment) in accordance with the manufacturer's requirements.

B. HANDRAIL

A. General:

- a. Provide FRP handrails where indicated on EXHIBIT 1.

B. Manufacturer:

- a. Strongwell Corp, Bristol. VA.
- b. Fibergrate Corporation, Dallas TX, Dynarail.
- c. Or Equal.

C. Materials:

- a. Core: Unidirectionally aligned glass fibers.
- b. Mat: Submit standard corrosion liner.
- c. Veil: Submit standard corrosion liner.

D. Ultraviolet Stabilizer: Added to the exterior surfaces in the type and amount recommended by the resin manufacturer.

E. Resin: Fire retardant premium vinyl ester, antimony trioxide or pentoxide added to meet Class I flame spread rating of ASTM E 84 and self-extinguishing requirements of ASTM D 625, as manufactured by one of the following or equal as recommended by the resin manufacturer for the specific operating environment:

- a. Dow Derakane 530.
- b. Ashland Hetron 992.
- c. Interplastic VE 8400.
- d. Reichhold Dion VER 9300FR.
- e. Or Equal.

F. Color: Safety yellow or as indicated on the Drawings.

G. Design Criteria:

- a. Deflection: No permanent set in any member or connection when tested to design load.
- b. Apply load to produce maximum stress and deflection in each of the respective components.
- c. Load requirements given are a minimum. Comply with all state and federal codes and standards. Where specification conflicts with code or standard, the greater load requirement of the two shall apply.
- d. Load Requirements. Handrail systems shall be capable of withstanding the following loads:
  - 1) Top rail and posts of handrails:
    - a) Concentrated load of 200 pounds applied at any point and in any direction.
    - b) Uniform load on the top rail of 50 pounds per linear foot applied horizontally.
  - 2) In-fill area of railing systems:
    - a) Horizontal concentrated load of 200 pounds applied to 1 square foot at any point in the system, including panels, intermediate rails, balusters or other element composing in-fill area
  - 3) Mid-rails with corner returns:
    - a) Concentrated load of 300 pounds applied at any point and in any direction.

- 4) Connections, mounts, bases, anchoring systems:
  - a) Capable of withstanding all handrail loads applied without permanent set
- H. Thermal Movement:
  - a. Design provisions for thermal movement of handrail system over entire range of ambient temperatures.
- I. Minimum Components:
  - a. Rails: 1-3/4 or 2-inch nominal diameter round or square rails
  - b. Posts: 2-inch nominal diameter round or square posts
    - 1) Unless shown otherwise, provide posts at a maximum spacing of 6'-0" and placed within 1'-0" of both sides of corners.
  - c. Kickplates: Corrugated, 4-inches by 1/2-inch by 0.125-inch thick
  - d. Connectors and splices: continuous without change in handrail diameter. No component shall protrude outside of handrail diameter. Use internal splices with set-screw connections or equal.
  - e. Hardware: Where hardware is required, use type 316 stainless steel.
- C. Structural Members
  - A. General: Provide pultruded structural shapes: angle, channel, square or round tubes, I-sections, W-sections, or channels in fire retardant polyester slate gray.
    - a. All structural shapes shall contain a UV inhibitor.
    - b. Pultruded profiles shall satisfy the visual requirements of ASTM D4385.
  - B. Components shall be sized to handle site specific loads.
  - C. Modulus of elasticity,  $E$ , =  $2.8 \times 10^6$  psi minimum per manufacturer's specifications.
  - D. Manufacturer:
    - a. Strongwell Extren Series 625
    - b. Or equal
  - E. Hardware: Use type 316 stainless steel, unless shown otherwise.
- D. LADDERS
  - A. General:
    - a. Provide FRP access ladder where indicated on EXHIBIT 1.
  - B. Manufacturer:
    - a. Strongwell Corp, Bristol. VA.
    - b. Fibergrate Corporation, Dallas TX, Dynarail.
    - c. Or Equal.
  - C. Design Criteria:
    - a. Deflection: No permanent set in any member or connection when tested to design load.
    - b. Apply load to produce maximum stress and deflection in each of the respective components.
    - c. Load requirements given are a minimum. Comply with all state and federal codes and standards. Where specification conflicts with code or standard, the greater load requirement of the two shall apply.
    - d. Load Requirements.
      - 1) Ladders shall be capable of withstanding a 250 pound concentrated load at midspan of rung with a safety factor of 1.33
      - 2) Cages shall be capable of withstanding a 200-pound load in any direction at any location without permanent distortion.
  - D. Minimum Components:
    - a. Ladders:

- 1) Side rails: 1-3/4 inch square tubes, 0.25-inch thick
- 2) Rungs: minimum 1-inch diameter thermal cure rod with pigmented epoxy non-skid grit surface, or 1-1/4 inch minimum diameter pultruded fluted, non-slip surface of vinyl ester resin.

### **PART 3 - EXECUTION**

#### **3.1 ERECTION AND INSTALLATION, GENERAL**

- A. Installation of the mixer stand and access platform shall be by the CONTRACTOR.
- B. Install products where indicated on EXHIBIT 1 in accordance with SUPPLIER's printed instructions.
- C. Install plumb, level, rigid and neat, as applicable.
- D. Furnish and install all required fasteners and anchors for a complete installation.
- E. All field cuts, drilled edges, holes, and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.

#### **3.2 SUPPLIER'S SERVICES**

- A. A factory-trained representative shall be provided for startup, testing services, and operation and maintenance personnel training services.
- B. The representative shall make a minimum of two visits to the site.
  - A. The first visit shall be for assistance in the installation of the equipment by the CONTRACTOR.
  - B. The second visit shall be for training of the operations and maintenance personnel in accordance with the Project contract documents.
- C. The SUPPLIER's representative shall test operate the system in the presence of the ENGINEER and verify that the mixer stand and access platform conform to all requirements.
- D. The SUPPLIER's representative shall revisit the job site as often as necessary until the installation and operation of the system is entirely satisfactory.

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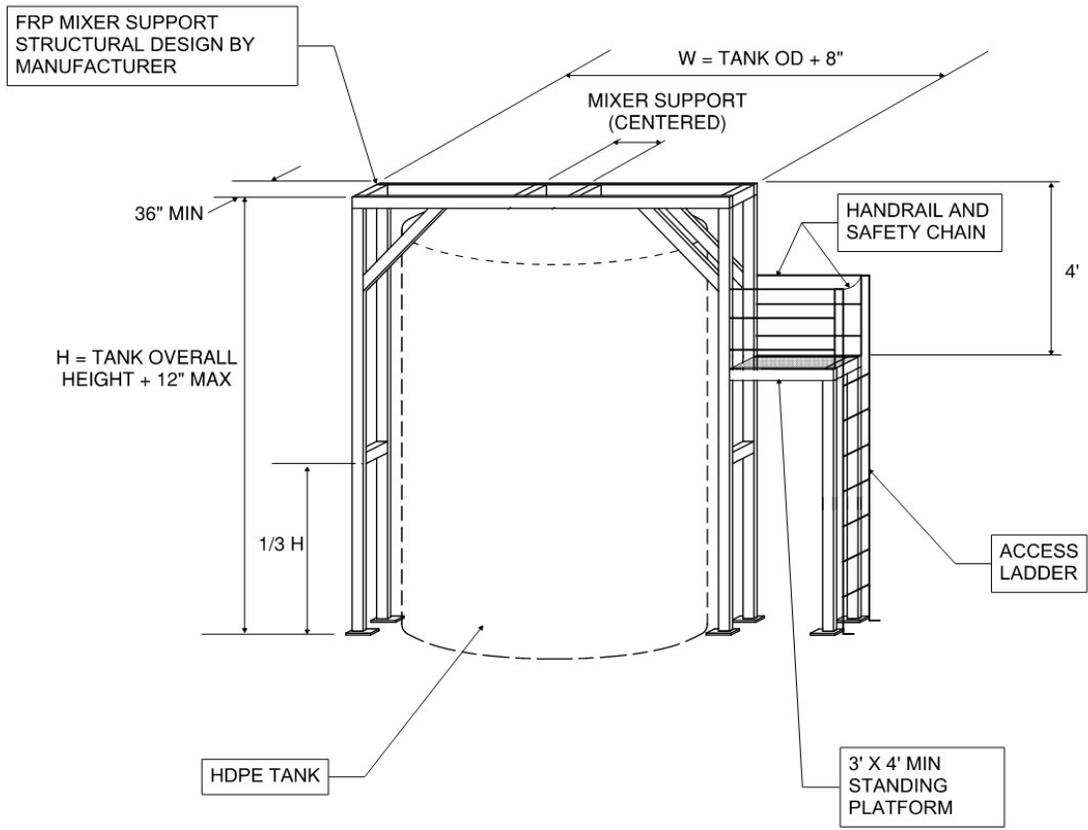
Fiberglass Reinforced Plastic Fabrications – Mixer Stand and Access Platform

Reservation Road Desalination Facility Rehabilitation

Marina Coast Water District  
WWE Project: 25-072

March 2026  
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EXHIBIT 1



++ END OF SECTION ++

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Fiberglass Reinforced Plastic Fabrications – Mixer Stand and Access Platform

Reservation Road Desalination Facility Rehabilitation

Marina Coast Water District

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Fiberglass Reinforced Plastic Fabrications – Mixer Stand and Access Platform

Reservation Road Desalination Facility Rehabilitation

Marina Coast Water District  
WWE Project: 25-072

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## SECTION 43 23 57

### METERING PUMP SKID

#### **PART 1 - GENERAL**

##### **1.1 DESCRIPTION**

- A. The Marina Coast Water District's Reservation Road Desalination Facility Rehabilitation utilizes commercially supplied hydrated lime liquid slurry to condition RO permeate. Hydrated lime liquid slurry is stored in a chemical storage tank where it is fed to the pipeline contactor upstream of the Product Water Storage Tank at a rate of 2.7 - 2.8 gallons per hour (gph) via metering pumps per operating conditions specified in section 3.6. The metering pump skid will be located adjacent to the hydrated lime liquid slurry storage tank to deliver hydrated lime liquid slurry to the pipeline contactor upstream of the Product Water Storage Tank. This Section includes the manufacture, supply, testing, and delivery of the duplex floor mounted metering pump skid, inclusive of all equipment and instrumentation for an automated system for complete operation and stabilization of the RO permeate, including but not limited to the following:
1. 2 x peristaltic or progressive cavity metering pumps (1 duty + 1 standby)
  2. Piping and valves sized to ensure minimum slurry velocity of 0.67 ft/s per SUPPLIER's recommendations
  3. A pressure gauge per pump
  4. A calibration column per pump
  5. A vent line per pump
  6. A pressure relief valve per pump
  7. Integral speed controllers
  8. Discharge header Pressure Indicating Transmitter with annular diaphragm seal
  9. Discharge header Flow Indicating Transmitter
- B. The following Equipment Identification Numbers have been assigned to the equipment that shall be provided under this specification Section:
1. Hydrated lime liquid slurry Pumps No. 1 (PMP-510) and No. 2 (PMP-520)
  2. Discharge header Flow Indicating Transmitter (FIT-504)
  3. Discharge header Pressure Indicating Transmitter (PIT-505) with annular diaphragm seal

##### **1.2 QUALITY ASSURANCE**

- A. Reference Standards: Comply with requirements and recommendations of the following references, except as otherwise specified:
1. Hydraulic Institute (HI)
  2. American Water Works Association (AWWA)
  3. National Electric Code (NEC)
  4. National Electrical Manufacturers Association (NEMA)
  5. Institute of Electrical and Electronic Engineers (IEEE)
  6. American National Standards Institute (ANSI)
  7. ASTM International (ASTM)

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43 23 57-1  
Metering Pump Skid

Reservation Road Desalination Facility Rehabilitation

Marina Coast Water District  
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- B. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.
- C. Unit responsibility:
1. All equipment specified herein shall be furnished by one pump manufacturer (SUPPLIER) to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
  2. SUPPLIER shall review and approve or shall prepare all shop drawings and other submittals for all components.
  3. All components shall be designed for the service specified herein and shall be integrated into the overall equipment design by the SUPPLIER.
- D. Pumps are to be engineered and manufactured under the certification of ISO-9001.
- E. Factory Tests: The selected SUPPLIER shall provide the following factory tests for approval upon acceptance of shop drawings:
1. Provide manufacturer's standard functional test on all equipment.
    - a. At minimum, functional test shall include hydrostatic testing in accordance with Hydraulic Institute Standards.
  2. Performance Test:
    - a. Conduct the test at specified service conditions. Pump test liquid shall be water at 68°F.
      - 1) Vary pump design pressure in five equal decrements to zero psi. Plot pump flow and horsepower versus pressure.
        - a) The curve of flow against pressure shall be smooth descending.
        - b) The curve of horsepower versus pressure shall be straight ascending.
      - 2) Develop pump performance curves, showing capacity versus differential pressure at the design speed.
      - 3) For variable speed pumps, the test shall be run at full load speed. In additions, a family of curves derived from the test data shall be provided for speeds from 40 to 100 percent of full load speed.
    - b. Performance tests shall be run within  $\pm$  five percent of design maximum speed and capacity utilizing the job motor, a calibrated test motor, or dynamometer. No minus tolerances will be allowed with respect to capacity, total head, or the specified efficiency at the design point.
  3. Pump Noise Test: Pumps shall be tested for noise level. A dB(A) level of greater than 85 at five feet from the pump in all directions shall be cause for rejection.
  4. Hydrostatic Test: Each pump casing shall be hydrostatically tested at either twice the total dynamic head or one and a half times the shutoff head, whichever is greater.
  5. Motor Test: Provide short commercial motor test per IEEE 115.
  6. Each test shall be witnessed by a Registered Professional Engineer, who may be an employee of the manufacturer. The Registered Professional Engineer shall sign and seal all copies of curves and shall certify that hydrostatic tests were performed. Tests shall be conducted in conformance with the Standards of the Hydraulics Institute.
  7. Pumps shall not be shipped prior to ENGINEER's approval of test results.

- F. Warranty: Provide a 1-yr warranty on all equipment from date of startup. Warranty shall cover defects in workmanship, design, and materials. If any component should fail during the warranty period, it shall be corrected and the unit restored to service at no expense to the OWNER.

### 1.3 SUBMITTALS

- A. Submit the following items to the ENGINEER for approval:
1. Shop drawings:
    - a. Detailed drawings showing component and assembly dimensions, location of mechanical and electrical connections, weights of all equipment, installation details, and accessory details.
    - b. Power and control wiring diagrams, including terminals and numbers.
    - c. Drawings, templates and directions for installation of anchor bolts.
  2. Product data:
    - a. Descriptive literature, illustrations, specifications, and engineering data.
    - b. Materials of construction for all components and accessories.
    - c. Pump weight, motor weight, and complete assembly weight.
    - d. Complete motor nameplate data, as defined by NEMA.
    - e. Where specified, complete variable frequency drive information.
    - f. Factory finish system description.
    - g. Critical speeds of the pumps supplied.
    - h. Motor data:
      - 1) Test results
      - 2) Motor manufacturer
      - 3) Type
      - 4) Enclosure
      - 5) Service Factor
      - 6) Phase
      - 7) Voltage
      - 8) Rated Horsepower
      - 9) Speed
      - 10) Full load and locked rotor amperage
      - 11) Temperature rating
      - 12) Estimated bearing life under design conditions.
      - 13) Minimum efficiency at  $\frac{1}{4}$ ,  $\frac{3}{4}$ , and full load.
      - 14) Descriptive literature including description of motor insulation.
  3. Performance data:
    - a. Pump rated speed.
    - b. Rated and maximum pump horsepower, and driver horsepower.
    - c. Minimum NPSHr.
    - d. Submit Pump Performance Curves:
      - 1) Provide pump curves showing head, brake horsepower, pump efficiency, and NPSHr and capacity, for the entire operating range of the pump.
      - 2) Correct curves for pump losses and shaft friction horsepower losses. Include pump losses and discharge head losses.
      - 3) Where variable speed drives are specified, curves shall have at least five (5) speeds plotted between maximum and minimum speed.
      - 4) Speed shall be clearly shown on all curves.
  4. Provide details for delivery, storage, and handling, including the following:

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- a. Terms of delivery
  - b. Expected delivery schedule
  - c. Suggested storage
    - 1) Explicitly state all storage conditions which will void any warranties
  - d. Handling recommendations with regard to the following:
    - 1) Preservation of unit functionality
    - 2) Preservation of unit integrity
    - 3) Safety of personnel and bystanders during delivery, unloading, storage, installation
5. Operations and Maintenance Manuals: The selected SUPPLIER shall provide 1 paper and 1 digital copy of operation and maintenance manuals for the equipment provided. The manuals shall contain the following information at minimum:
- a. Equipment description.
  - b. Recommended and limiting operational range.
  - c. Installation instructions including assembly, alignment, and adjustment procedures.
  - d. Operation instructions including startup and shutdown procedures, and troubleshooting guide.
  - e. Lubrication and regular maintenance instructions.
  - f. Shop drawings.
  - g. Parts list with catalog numbers.
  - h. Performance curves.
  - i. Suggested spare parts list to maintain the equipment in service for a period of 2 years. Include any special tools required to maintain or test the equipment.

#### 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All equipment and accessories shall be properly protected during shipment such that no damage or deterioration shall occur between shipment and installation.
  - 1. Finished surfaces shall be protected by wooden blanks.
  - 2. Finished ferrous metal surfaces not painted shall be protected from corrosion.
  - 3. Each box and package shall be clearly marked with the contents and total weight.
- B. SUPPLIER shall provide any special storage and handling instructions.
- C. All equipment and accessories shall be delivered to the site to ensure uninterrupted progress of the Work.
- D. All boxes, crates, and packages shall be inspected by the CONTRACTOR upon delivery to the site. ENGINEER shall be notified of any loss or damage to equipment or components.

## **PART 2 - PRODUCTS**

### 2.1 GENERAL

- A. Positive displacement pumps shall be either progressive cavity type or positive displacement type as specified below.

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## 2.2 PROGRESSING CAVITY PUMP DESIGN

- A. The progressing cavity type pumps shall be heavy duty, positive displacement pumps. Each shall be specifically designed, constructed, and installed for the service intended and shall comply with the service and performance conditions specified herein.
- B. Progressive Cavity Pump Manufacturer and Model:
  - 1. SEEPEX BRAVO Chemical Metering System or equal
    - a. Duplex packaged metering pump skid including but not limited to integral speed controllers, metering pumps, piping, gauges, valves, calibration columns, and instrumentation for complete operation and stabilization of the RO permeate.
  - 2. Dose Control: Speed control through external 4-20 mA analog signal.
- C. Pumps:
  - 1. Provide two (2) frame-mounted progressing cavity pumps complete with driver.
  - 2. The suction and discharge pipes should be at least the diameter of the pumps inlet manifold.
  - 3. Pumping elements shall consist of a helical rotor operating within a helical stator.
  - 4. Vibration at any point of pumps operation shall not exceed the upper limits of the Hydraulic Institute Standards.
  - 5. Pump Components:
    - a. Saddle Pedestals
      - 1) Provide at least two saddle type pedestals that permit the suction port to be rotated a full 360 degrees in 90 degree increments.
      - 2) Saddle pedestals shall be cast iron.
    - b. Suction and Bearing Housings
      - 1) All cast parts shall be free of sand holes, blow holes, and other defects.
      - 2) The bearing and bearing housings of the pump shall be thick-walled cast iron.
      - 3) The suction housing shall incorporate two rectangular inspection ports to permit access to the universal joints within the suction housing.
    - c. Flanges:
      - 1) The suction and discharge connections shall be flat face ANSI 125 lb flanges.
      - 2) Bolt hole dimensions and spacing shall conform to ANSI standards.
    - d. Rotor
      - 1) The rotor shall be a machined and polished single helix.
      - 2) The rotor shall be constructed of alloy steel with a nominal chrome plate thickness of 0.010 inches.
    - e. Stator
      - 1) The stator shall be a one-piece molding of double helix configuration with the molded elastomer chemically bonded to a steel tube.
      - 2) The elastomer shall be Nitrile with a minimum durometer hardness of 70.
      - 3) The stator shall be fastened to the suction housing and discharge flange by removal clamp rings to facilitate stator removal.
      - 4) The stator seals shall be designed to prevent the material being pumped from contacting the stator bonding and steel tube.
    - f. Stuffing Box and Mechanical Seal
      - 1) The stuffing box cover shall be made of close-grained cast iron with integral stuffing box.
      - 2) The stuffing box shall be equipped with a flushless mechanical seal with fittings provided for lubrication.

- a) The seal shall be cartridge-type with Viton O-rings and tungsten carbide faces. Metal parts shall be Type 316 stainless steel.
- b) The cartridge shall be pre-assembled and pre-tested so that no seal settings or adjustments are required.
- c) Any springs used to push the seal faces together must be shielded from the pumped fluid.
- d) The cartridge shall include a 17-4PH, heat-treated seal sleeve and an ASTM A536 ductile iron seal gland.
- e) The mechanical seal faces shall be lubricated and cooled by a separate oil chamber. The oil chamber shall include a 10 psi pressure relief valve. The area between the seal oil chamber and bearing oil chamber shall be vented and drained to prevent contamination of the bearings.
- g. Bearings
  - 1) The bearings shall be of the grease lubricated, tapered roller type with diverging pressure angles.
  - 2) Bearings are to be designed for a minimum B-10 life of 100,000 hours under maximum operating conditions and will not require periodic lubrication.
  - 3) Bearings shall be protected from contaminants by means of a bearing cover plate bolted to the bearing housing.
- h. The drive housing containing the bearings shall be an extra heavy walled casting.
- i. Drive Shaft
  - 1) The drive shaft shall be alloy steel of one-piece construction through the bearings and shaft seal area. This design shall permit disassembly of the universal joints without affecting the alignment of the shaft sealing area.
  - 2) The quill portion of the shaft shall be hard chrome plated.
- j. Universal Joints
  - 1) The rotor shall be joined to the drive shaft by means of a connecting rod with high strength, shock resistant gear type universal joints.
  - 2) The gear joints shall be of the grease lubricated crowned gear type, totally enclosed and protected by a wire-reinforced elastomeric seal.
  - 3) Mechanical components of the gear joints shall be designed to operate for 10,000 hours at the manufacturer's published maximum speeds and pressures.
- k. Connecting Rod
  - 1) A rigid, splined connecting rod shall connect the gear joints of the drive shaft and the eccentrically moving rotor.
  - 2) The connecting rod shall pass through the shaft seal area inside the hollow drive shaft quill so that no eccentric loads are imparted on the shaft seal area.
  - 3) The connecting rod shall be protected from the accumulation of rags and stringy material by a fiber deflector. The fiber deflector shall be designed to operate similar to an end-face type mechanical seal. The stationary portion of the deflector shall ride against a polished disk rotating with the gear joint shell.

#### D. Motors

- 1. Non-overloading NEMA standard design T-frame suitable for horizontal mounting and coupling connection to the pump.
- 2. Motor manufacturer shall be ISO9000 certified.
  - a. Supply: 110-120V 50/60 Hz and 220-240V 50/60 Hz, 1-Phase field switchable. Supply nine-foot length mains power cord with standard 115V three-prong plug.

- b. Max drive power consumption: 115VA, to be confirmed by manufacturer.
3. Motors shall be solid shaft, squirrel-cage induction motors meeting the requirements of NEMA MG 1.
4. Motors shall be totally enclosed fan cooled (TEFC) with Class H insulation, solid shaft, and ball bearings.
5. Motors shall be constant torque, capable of carrying full load current continuously without injurious temperature rise in an ambient temperature of 40°C.
6. Motor thrust bearings shall be adequate to carry continuous thrust loads under all conditions of pump operation.
7. Locked rotor currents shall be as specified in NEMA standards.
8. Motors shall be adequately sized to prevent overload above nameplate horsepower at maximum pump brake horsepower.
9. Motors shall have the following guaranteed minimum efficiencies at full load as determined by IEEE 112-B.
10. Motors shall have minimum power factor of 87%.
11. Service factor on all motors shall be 1.15.
12. SUPPLIER's recommended bearing lubrication shall be provided.
13. Where specified, motors shall be provided with normally closed thermostat switches.
  - a. Switch shall shutdown the motor upon exceedance of the motor's maximum temperature rating.
14. Where bearing thermostat switches are specified, motor and bearing thermostat contacts shall be wired in series and leads shall be wired to the motor terminal box.
15. Where specified motors shall have a vibration switch with automatic alarm and shutdown limits.
  - a. Provide adjustable time delay to prevent nuisance trips.
16. Provide oversized terminal box with terminal for connection of equipment grounding wire.
17. Provide stainless steel nameplate with the following information, at minimum:
  - a. Manufacturer's name, make, and serial number
  - b. Type
  - c. Voltage
  - d. Frame
  - e. Insulation
  - f. Class
  - g. HP
  - h. Full load amps
  - i. RPM

E. Coupling

1. A flexible, forged steel coupling of an approved type for connecting the pump and motor shall be provided.
2. Coupling shall be of the proper size to transmit the power required to drive the pump under all conditions of operation.
3. Coupling shall be suitably lubricated and designed for long periods of continuous operation.
4. Coupling design shall account for inaccuracies of alignment and permit axial adjustment.
5. Coupling construction shall be such that either shaft of a unit may be removed without disturbing adjustment of the other.
6. Provide and install a steel guard over the coupling.

- F. Base
  - 1. Factory mount pump and motor, coupled together, on a common steel base, properly braced to form a rigid support for the entire unit.
  - 2. The pump and motor shall be factory aligned on the base prior to shipment.
- G. Dry Run Stator Protection
  - 1. The pump shall be provided with a temperature sensor that continuously measures the temperature of the stator near the rotor. If the measured stator temperature rises above an adjustable cutoff setpoint, the stator protection unit signals the pump drive to shutdown and activates an alarm.
- H. Testing
  - a. All major system components shall be factory tested for compliance with the construction and functional requirements specified herein. A copy of the test reports, certified by an officer of the Manufacturer, shall be submitted to the Owner prior to shipment.
  - b. Control Panel shall be tested prior to shipment. This shall include a test of all switches, lights, relays and other components. All local safety devices and remote inputs shall be checked completely for operation, function and control prior to shipment.
  - c. The SUPPLIER shall field test the panel in the presence of the ENGINEER. The ENGINEER will expect to see all functions possible on the day of the test. Functions that are not capable of actual testing, will be required to be simulated.
  - d. Test equipment required to perform testing shall be provided by SUPPLIER.
- I. Coatings:
  - 1. Exteriors of components and appurtenances shall be painted. Prepare surfaces to be painted per coating manufacturer's requirements.
    - a. Primer: 2 coats polyamidolamine epoxy, 4-6 mil thickness
      - 1) Series N69, Hi-Build Epoxoline II
      - 2) Or Equal
    - b. Polyurethane: 1 coat Aliphatic Acrylic Polyurethane designed for exterior weathering, abrasion and corrosion resistance, 2-3 mil thickness
      - 1) Series 73, Endura-Shield
      - 2) Or Equal
- J. Spare Parts:
  - 1. Spare parts shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location until transferred to the OWNER at the conclusion of the Project.
  - 2. Furnish and deliver the following spare parts (per unit supplied) carefully boxed or packaged and plainly marked for reordering:
    - a. Mechanical seal
    - b. Drive coupling
    - c. Complete set of gaskets and O-ring seals
    - d. Complete set of bearings
    - e. Complete set of keys, screws, plugs, etc.
    - f. Any special tools required to dismantle the pump
- K. Equipment Identification Plate: 16-gauge stainless steel with ¼-inch die-stamped equipment tag number securely mounted in an easily visible location.

- L. Lifting Lugs: For all equipment assemblies weighing in excess of 100 pounds.
- M. Anchor Bolts:
  - 1. Type 316 stainless steel
  - 2. Anchor bolts shall be sized by equipment manufacturer.
- N. Factory Finish: Manufacturer's standard enamel finish.

2.3 PERISTALTIC TYPE PUMP

- A. The peristaltic type pumps shall be positive displacement complete with spring loaded pumphead, self-contained variable speed drive, and flexible extruded tube as specified.
- B. Pumps shall be dry self-priming, capable of being run dry without damaging effects to pump or tube, and shall have a maximum suction lift capability of up to 30' vertical water column.
- C. Pumps shall not use check valves or diaphragms and shall not require dynamic seals in contact with pumped fluid. Process fluid shall be contained within pump tubing and shall not directly contact any rotary or metallic components.
- D. Flow shall be in the direction of the rotor rotation, which shall be reversible. Flow shall be proportional to rotor speed.
- E. Peristaltic Pump Manufacturer and Model:
  - 1. Watson-Marlow 520Du/R
    - a. Tubing: Marprene
      - 1) Pressure Rating: 100 psig
  - 2. Or Equal
- F. Pumps must be designed not to exceed the specified P/10 ratio (Theoretical maximum number of occlusions per 10 gallons pumped). Pumps exceeding the specified P/10 ratio, will not be considered suitable for the duty condition.
- G. The following criteria are set to maintain the P/10 of ratio for the tube size specified for this application:
  - 1. Maximum two compressing rollers for two compressions per revolution.
  - 2. Tube wall thickness of 2.4 mm and material specified
  - 3. Large diameter spring-loaded roller set for 2.4mm wall thickness tubing
  - 4. Max base drive speed of 220 RPM for 2.4mm wall thickness tubing.
  - 5. Track geometry of no less than 180 degrees and rotor geometry with roller 180 degrees apart.
  - 6. P/10 ratio shall not exceed the following per tube size:

Tube Size	P/10 ratio
1.6mm x 2.4mm	181,820
3.2mm x 2.4mm	45,460
4.8mm x 2.4mm	20,840
6.4mm x 2.4mm	11,570
8.0mm x 2.4mm	7,170
9.6mm x 2.4mm	4,960

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- H. Drive and pump heads shall be 24 hr continuous duty rated and have a three-year manufacturer's warranty from date of shipment.
- I. Pumps to be manufacturer's standard product.
- J. Manufacturer of tubing pumps must have at least 20 operating installations in domestic water or wastewater treatment plants located in the United States over a period of at least seven years in the same service and size as specified.
- K. Pumps must be manufactured under ISO 9001-2000.
- L. Pumps shall be meet all applicable CE and C ETL US standards per UL610101A
- M. Pump Construction
  - 1. Pumphead:
    - a. Pumphead shall consist of a fixed track, two spring-loaded tube clamp mechanisms, and spring-loaded roller rotor assembly.
    - b. Pump tubing shall be in contact with the inside diameter of the track through an angle of no less than 180 degrees and be held in place on the suction and discharge by a spring loaded self-adjusting clamp mechanism. At all times, one roller shall be fully engaged with the tubing providing complete compression and preventing back flow or siphoning.
    - c. Tube occlusion and spring tension shall be factory set to accommodate 2.4mm wall thickness tubing and shall not require adjustment for accommodating tubing of 0.5mm to 8.0mm ID.
    - d. Pumpheads requiring disassembly or special tools for tube changing are not acceptable.
    - e. Pumphead Assembly:
      - 1) Pump Track Geometry must have a minimum 96.6mm swept diameter through a minimum track angle of 180 degrees
      - 2) Provide high corrosion/impact materials as specified:
        - a) Track Construction: polyphenylene sulfide (PPS)
        - b) Guard Construction: hinged impact-resistant polycarbonate breakaway guard, tool un-lockable for operator safety.
        - c) Rotor Construction: polyphenylene sulfide (PPS)
    - f. Tube Retainer Mechanism: Provide two spring-loaded adjustable tube retainer mechanism to secure the tubing at the entry and exit points of the pumphead
    - g. Rotor Assembly:
      - 1) Provide rotor assembly that ensures gradual tube occlusion and compensates for tube tolerance.
      - 2) Roller assembly shall consist of twin spring-loaded roller arms located 180 degrees apart, each fitted with stainless steel helical springs and compressing roller for occlusion of the tube twice per rotor revolution
        - a) Compressing Rollers: 316SS with low friction stainless steel bearings and PTFE seals, minimum diameter of 18mm.
        - b) Provide non-compressing guide rollers constructed of corrosion resistant Nylatron
        - c) Clutch:

1. Equip rotor with a central handgrip hub and manually activated clutch to disengage the rotor from the drive for manual rotor rotation during tube loading.
  2. Clutch shall automatically re-engage rotor to gearbox upon one complete revolution
  - 3) Mounting: To prevent slip, the rotor assembly shall be axially secured to the dogged output shaft of the gearmotor via a slotted collet and central retaining screw.
2. Tubing
- a. Pump tubing shall be constructed of a thermoplastic elastomer with diameter, durometer, and thickness to maximize tube life pump revolutions and tubing life.
    - 1) If required for chemical compatibility or pressure rating, pump manufacturer shall recommend an alternate tubing material.
  - b. Provide 316 L SST clamps for each tube connection.
  - c. Supply one 15-meter roll of specified tubing size for each different chemical service. For hydraulic stability, tubing with a wall thickness less than 2.4mm is not acceptable.
3. Drive
- a. Rating: Continuous 24 hour operation, 40<sup>o</sup> C ambient.
  - b. Supply: 110-120V 50/60 Hz and 220-240V 50/60 Hz, 1-Phase field switchable, or as recommended by manufacturer. Supply nine-foot length mains power cord with standard 115V three-prong plug.
  - c. Max drive power consumption: 115VA.
  - d. Drive motor- brushless DC motor with integral gearbox and tachometer feedback.
    - 1) Speed Control Range of 3 to 200 rpm in 1.0 rpm increments throughout the range.
    - 2) Closed loop microprocessor controlled drive with pulse width modulation at speeds above 35 rpm and synchronous mode with magnetic field rotation control below 35 rpm
    - 3) Circuitry complete with temperature and load compensation and protection.
  - e. Enclosure: IP 23 or IP 31 Wipedown.
  - f. Housing: Pressure cast aluminum with Alocrom pre-treatment and exterior grade corrosion resistant polyester powder coat. By nature of the environmental conditions, unpainted housings, including 316SS, are not acceptable.
  - g. Mounting: Drive shall be self-supporting and shall not require anchoring.

N. FACTORY FINISHING

1. Prepare, prime, and finish coat in accordance with contract documents.
2. Manufacturer's standard baked enamel finish.

2.4 DISCHARGE PRESSURE INDICATING TRANSMITTER (PIT-505)

- A. Inline, absolute pressure indicating transmitter shall be Rosemont or equivalent with an annular diaphragm seal.
  1. Connectivity: 4-20 mA HART or Bluetooth connection
  2. Cable Length: minimum 100 ft
- B. Manufacturer: Rosemont or equal
  1. With annular diaphragm seal

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## 2.5 DISCHARGE HEADER FLOW INDICATING TRANSMITTER (FIT-504)

- A. Flow meter shall be Krohne Enviromag 2000 or equal
  1. Connectivity: 4-20 mA HART®, Modbus, FF, Profibus-PA/DP, PROFINET, or equivalent
  2. Cable Length: minimum 100 ft
  3. Process Pressure: maximum of 580 psig
- B. Manufacturer: Krohne Enviromag 2000 or equal

## 2.6 PUMP SKID COMPONENTS

- A. General: All wetted materials shall be specifically selected for resistance to specified service chemical.
- B. Piping: CPVC conforming to ASTM D2846
  1. Socket welded pipe fittings with solvent weld cement specific for specified service chemical compatibility.
- C. Calibration column:
  1. Provide calibration column on the common suction header for each duplex pump assembly.
  2. Column shall be sized for a minimum 30-second draw down test at operating flow rate.
  3. Scale shall indicate both milliliters and gallons in 0.01-gallon increments printed on the side of the column.
  4. Calibration chamber shall be piped and valved such that each pump may be calibrated without interfering with the operation of other pumps.
  5. Column to be clear PVC or equal translucent material suitable for specified service chemical.
  6. Provide threaded connection at top of column for connection to common vent.
- D. Diaphragm Valves: Provide diaphragm valves for all shut-off, isolation, and flow control applications. Ball valves will not be accepted.
  1. Features:
    - a. PVC body and bonnet
    - b. Flanged or true union as shown on the Drawings
    - c. Diaphragms shall be three-piece:
      - 1) PTFE
      - 2) PVDF gas barrier
      - 3) EPDM backing
    - d. EPDM O-rings
    - e. Bubble-tight sealing
    - f. Travel stop for over-tightening prevention
    - g. Position indication
    - h. 115 psi minimum pressure rating
  2. Manufacturers:
    - a. Asahi/America Inc. Type 14
    - b. Or Equal
- E. Equipment Identification

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1. Provide 16-gauge stainless steel plate with ¼-inch die-stamped equipment identification numbers mounted in a visible location.
- F. Lifting lugs
1. Provide for equipment weighing over 100 pounds.
- G. CONTROLS
1. Pumps must meet the following minimum requirements for operator interface functionality. Pumps not meeting this minimum functionality will not be accepted.
    - a. Operator Controls and Indicators:
      - 1) Backlit graphical LCD to display pump speed in rpm or percent, running status, and flow rate.
      - 2) Sealed keypad for START, STOP, AUTO/MANUAL, speed adjustment, forward/reverse direction, and rapid priming.
      - 3) "Auto Restart" feature to resume pump status in the event of power outage interruption.
    - b. External Interfaces:
      - 1) Analog Input: 4 to 20 mA speed input to control pump speed in AUTO mode, with input signal trimmable and speed scalable over any part of the drive speed range.
      - 2) Discrete Input: Pump RUN in AUTO mode, dry contact.
      - 3) Discrete Outputs: Provide the following dry contact closure outputs, rated 2A at 120 VAC, minimum:
        - a) Pump ON status.
        - b) Pump AUTO mode status.
        - c) Leak detected status
    - c. Power Requirements: 120 volts, 60-Hz, single-phase.
    - d. Termination: Supply screw down terminals suitable for up to 18 AWG field wire and accessible through four glanded cable entry points on the pump.
  2. Provide all cables, connectors, and a terminal junction box for termination of remote signal circuits.
- H. SOURCE QUALITY CONTROL
1. Factory Inspections: Inspect control panels for required construction, electrical connection, and intended function.
  2. Factory Tests and Adjustments: Test all equipment and control panels actually furnished.
  3. Factory Test Report: Include test data sheets.
  4. Functional Test: Perform manufacturer's standard and motor test on equipment

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION BY CONTRACTOR**

- A. Installation of the duplex floor mounted metering pump skid shall be by the CONTRACTOR.
- B. Install in accordance with SUPPLIER's printed instructions. Ensure all products for the metering pump skid package are delivered and included by the SUPPLIER.

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- C. Level base using steel plates and shims with taper no greater than ¼ inch per foot. Adjustment shall be made to prevent changing in level or springing of the baseplate when anchor bolts are tightened.
- D. Adjust pump assemblies such that driving units are properly aligned with shafts and all couplings. The use of flexible couplings for misalignment correction will not be accepted.
- E. Grout the bedplate to floor slab after anchor bolts have been tightened. Grout shall be non-shrinking. Remove wedges after grout is set and grout voids left by wedges.
- F. Connect suction and discharge piping without imposing strain to the pump flanges.
- G. Accurately place anchor bolts using equipment templates.
- H. Neatly placed 1-inch hard CPVC pipe shall be provided on each pump to convey leakage to the nearest approved drain inlet.
- I. Installation shall include furnishing and applying an initial supply of grease and oil, as recommended by the manufacturer.
- J. Upon complete installation, test assemblies for proper alignment, rotation, connection, and quiet operation.

### 3.2 STARTUP AND TESTING

- A. Follow SUPPLIER's instructions for startup of the pump and testing of the pumps. Make necessary adjustments in order to place system in proper operating condition. Field test and calibrate the equipment to assure that the system operates in accordance with these Specifications and to the satisfaction of the ENGINEER.
- B. After completion of installation, the system shall be completely tested to ensure compliance with the operating requirements as specified, indicated on the Drawings, and in accordance with contract documents.

### 3.3 SUPPLIER'S SERVICES

- A. A factory-trained representative shall be provided for startup, testing services, and operation and maintenance personnel training services.
- B. The representative shall make a minimum of two visits to the site.
  - 1. The first visit shall be for checking the completed installation and startup of the system.
  - 2. The second visit shall be for training of the operations and maintenance personnel in accordance with contract documents.
- C. The SUPPLIER's representative shall test operate the system in the presence of the ENGINEER and verify that the pumps conform to all requirements.
- D. The SUPPLIER's representative shall revisit the job site as often as necessary until the installation and operation of the system is entirely satisfactory.

### 3.4 FIELD FINISHING

- A. Finish equipment in accordance with contract documents.

### 3.5 FIELD QUALITY CONTROL

- A. Conduct tests on each pump.
- B. Functional Test:
  - 1. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
- C. Performance Test:
  - 1. Perform under actual or approved simulated operating conditions.
  - 2. Test for a continuous 3-hour period without malfunction.

### 3.6 SUPPLEMENTS

#### A. Pump and Dosing Data Sheet

<b>Section 43 23 57 Metering Pump Dosing Data Sheet</b>	
<b>Project</b>	<b>Reservation Road Desalination Facility Rehabilitation</b>
<b>Equipment Numbers</b>	<b>PMP-510, PMP-520</b>
Equipment Location	East Canopy
Site Elevation	61 ft
Operating Conditions:	
Liquid Pumped	Hydrated Lime Liquid Slurry
Temperature	50 to 80 degrees F, 60 deg average
Specific Gravity	1.2 - 1.35
Liquid Density	10.8 - 11.26 lbs/gal
pH	12.4
Viscosity	500 cP
Percent Solids	45%
Minimum Hydrated Lime Liquid Slurry Dosage	57 mg/L
Operating Hydrated Lime Liquid Slurry Dosage	96 mg/L
Maximum Hydrated Lime Liquid Slurry Dosage	132 mg/L
Max Feed Rate	2.7-2.8 gph
Operating Feed Rate	2.0 gph
Minimum Feed Rate	1.2 gph
Maximum Pressure	100 psig
Operating Pressure	
Minimum Pressure	

++ END OF SECTION ++

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Metering Pump Skid

Reservation Road Desalination Facility Rehabilitation

## SECTION 43 41 43

### HIGH DENSITY POLYETHYLENE STORAGE TANK

#### **PART 1 - GENERAL**

##### **1.1 DESCRIPTION**

- A. The Marina Coast Water District's Reservation Road Desalination Facility Rehabilitation utilizes commercially supplied hydrated lime liquid slurry to condition RO permeate. Hydrated lime liquid slurry is stored in a chemical storage tank where it is fed to the pipeline contactor prior to the Product Water Storage Tank at a rate of 2.8 gallon per hour (gph) via metering pumps. The hydrated lime liquid slurry storage tank shall be equipped with a vertical mixer per Section 46 41 34 - Vertical Mixer and a mixer stand and access platform per Section 06 80 03 - FRP Mixer Stand and Access Platform. This Section includes the design and manufacture of Type I and Type II polyethylene storage tanks complete with appurtenances, including overflow pipe with braces, fittings, ladder, manway, drain, fill, anchorage system, top mounted radar level sensor, and other details as shown on the attached tank data sheet and specified herein. Equipment Identification Numbers: the following equipment identification numbers have been assigned to the equipment that shall be provided under this section:
1. TNK-500: Hydrated Lime Liquid Slurry Storage Tank
- B. Definitions:
1. Type I: Tank molded from cross-linkable polyethylene resin.
  2. Type II: Tank molded from linear polyethylene resin.

##### **1.2 QUALITY ASSURANCE**

- A. Reference Standards: Tanks and appurtenances shall be designed, fabricated and inspected according to the latest edition of the following standards:
1. American Society of Testing Materials (ASTM) D618: Conditioning Plastics and Electrical Insulating Materials for Testing
  2. ASTM D638: Tensile Properties of Plastics
  3. ASTM D790: Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  4. ASTM D883: Standard Definitions of Terms Relating to Plastics
  5. ASTM D1505: Density of Plastics by the Density-Gradient Technique
  6. ASTM D1525: Test Method for Vicat Softening Temperature of Plastics.
  7. ASTM D1693: ESCR Specification Thickness 0.125-inch F50-10% Igepal.
  8. ASTM D1998-04: Standard Specification for Polyethylene Upright Storage Tanks
  9. ASTM D2765: Degree of Crosslinking in Crosslinked Ethylene Plastics as Determined by Solvent Extraction.
  10. ASTM D2837: Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
  11. ASTM D3892: Practice of Packaging/Packing of Plastics.
  12. ASTM F412: Definitions and Terms Relating to Plastic Piping Systems.
  13. Association of Rotational Molders (ARM) Low Temperature Impact Resistance (Falling Dart Test Procedure).

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14. American National Standards Institute (ANSI) B16.5: Pipe Flanges and Flanged Fittings
15. International Building Code (2003)

B. Factory Tests:

1. Dimensions and Tolerances Tests: Measurements shall be taken with the tank in the vertical position with the tank completely empty.
  - a. Tolerances for outside diameter out of roundness shall be per ASTM D1998-04.
  - b. Tolerances for fittings placement will be +/- 0.5 inches in elevation and 2 degrees radial at ambient temperature.
2. Visual inspection: Verification that the tank is free of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, crazing, cracking, and delaminations that will impair the performance of the tank. Fine bubbles may be acceptable with Type II tanks to the degree in which they do not interfere with proper fusion of the resin melt.
3. Low Temperature Impact Test:
  - a. In accordance with ASTM D 1998-04
  - b. Test specimens shall be taken from fittings location or piggy-back test molds.
  - c. Test specimens shall be conditioned at -40 deg F for a minimum of two (2) hours.
  - d. Test specimens > 1/2-inch wall thickness shall be tested at 200 ft-lb. Test specimens < 1/2-inch wall thickness shall be tested at 100 ft-lb.
4. Degree of Crosslinking Test (for Type I tanks only):
  - a. Conduct o-xlene insoluble fraction (gel test) per ASTM D2765 Method C for the determination of the ortho-xlene insoluble fraction (gel) of crosslinked polyethylene.
  - b. The percent gel level for Type I tanks on the inside 1/8 inch of the wall shall be a minimum of 65%.
5. Ultrasonic Tank Thickness Test: All tanks shall meet design wall thickness requirements and tolerances.
  - a. All tanks with capacity greater than 2,000 gallons shall be measured for tank wall thickness at 6 inches, 1 ft, 2 ft, 3 ft and 4 ft on the tank sidewall height at 0 and 180 deg around the tank circumference with 0 deg being the tank manway and in the counter-clockwise direction per ANSI standard drafting specifications.
  - b. All tanks with capacity less than 2,000 gallons shall be measured for tank wall thickness at 6 inches, 1 ft and 2 ft on the tank sidewall height at 0 and 180 deg around the tank circumference with 0 deg being the tank manway and in the counter-clockwise direction per ANSI standard drafting specifications.
6. Hydrostatic test in accordance with ASTM D 1998-04

C. Warranty:

1. Manufacturer shall provide a minimum five (5) year full replacement warranty in the OWNERS name for each tank, by serial number and chemical service.

### 1.3 SUBMITTALS

A. Submit the following:

1. Shop Drawings:
  - a. Complete drawings and details of the tank and all dimensions, connections, appurtenances, anchorage and restraint system.
  - b. Details of inlet and outlet fittings, manways, flexible connections, and vents.
  - c. Electrical heat tracing details, where specified.

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High Density Polyethylene Storage Tank

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2. Product Data:
  - a. Detailed descriptive literature including tank weight, materials of construction, manufacturing details, resin manufacturer data sheet, and wall thickness.
  - b. Confirmation from resin manufacturer that the proposed resin system is suitable for sodium hypochlorite storage using the fabrication technique proposed.
  - c. Complete design calculations for tank, reinforcement, and anchorage system.
    - 1) Hoop stress shall be calculated using 600 PSI at 100 degrees F as prescribed in ASTM D 1998-04.
    - 2) Tank restraint system calculations for seismic and wind loading criteria specified herein.
  - d. Tank capacity chart indicating storage volume in gallons and height in feet.
  - e. SUPPLIER's recommended unloading, handling, and installation methods for the tank and appurtenances, including recommended bolt torque for all bolted connections.
  - f. Color chart showing available colors.
3. Quality Control Submittals:
  - a. Certificate of Compliance with these specifications and ASTM D 1998-04.
  - b. Copy of the manufacturer's Quality Assurance Program
  - c. Complete Factory Testing Report
  - d. Manufacturer's warranty

#### 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Tank shall not be shipped until ENGINEER has approved Factory Testing Report.
- B. All packing, packaging, and marking provisions of ASTM D3892 shall apply.
- C. Each tank shall be shipped clearly marked with the manufacturer's standard identification system indicating the following, at minimum:
  1. Name of manufacturer.
  2. Date of Manufacture.
  3. Tank Capacity.
  4. Model Number.
  5. Serial Number.
- D. Tank and all components shall be protected from damage during shipment and handling. Details of protection procedures shall be the full responsibility of the manufacturer, with the following minimum measures taken:
  1. Tank shall be supported during shipment to prevent contact with bulkhead or bed of vehicle.
    - a. Tank shipped horizontally shall have padded cradle supports
    - b. Tank shipped vertically shall be placed on a skid.
  2. All fittings shall be installed, removed, and shipped separately.
  3. Prevent damage to flanged connections using wooden blinds bolted to the flange and having a diameter two (2) inches greater than the outside diameter of the flange.
  4. All unflanged components shall be plugged to prevent deflection and protected by adequate exterior wrapping.
  5. All components shipped shall be firmly fastened and padded to prevent shifting or flexing during transport.
  6. No items shall be shipped loose inside the tank.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCT AND MANUFACTURER:**

- A. PolyProcessing
  - 1. Model Number:
    - a. TNK-500: 05400
- B. Assman
- C. Or Equal

### **2.2**

### **2.2 DESIGN CRITERIA**

- A. General:
  - 1. Tanks shall be rotationally-molded Type I or Type II as specified, one-piece seamless construction, cylindrical in cross-section and vertical in axis.
  - 2. Tanks shall fully conform to ASTM D 1998-04.
  - 3. Dimensions shall be as shown in the attached Tank Data sheets.
  - 4. All tank fitting attachments shall be provided with flexible couplings or other provisions to allow for movement without rupture or separation of connections.
    - a. Flexible couplings shall allow minimum 4° deflection in all directions.
  - 5. Tanks shall be clearly marked with manufacturer, date of manufacture, and serial number.
  - 6. All opening cut edges shall be trimmed smooth.
  - 7. Tank size shall accept full 4,200 gallon delivery of hydrated lime liquid slurry chemical.

### B. Design Criteria Table

<b>Tank</b>	<b>TNK-500</b>
Liquid Stored	Hydrated Lime Liquid Slurry
Percent Solids	45%
Specific Gravity	1.2-1.35
pH	12.4
Viscosity	500 cP
Temperature	50 to 80 degrees F, 60 deg average
Operating Pressure	atmospheric
Tank Size	5,400 gallons
Tank Type	Type II
Containment Type	Internal Double Wall Tank
Full Chemical Delivery Volume	4,200 gallons

- C. Design Loads:
  - 1. Resistance of both wind and seismic loads shall be provided for both tank full and tank empty conditions and in accordance with site conditions.
  - 2. No snow load.
  - 3. Uniform man load of 250 lbs/sq ft.
  - 4. Tank Anchorage System:

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High Density Polyethylene Storage Tank

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- a. SUPPLIER shall be fully responsible for design and provision of adequate anchorage system for the service conditions. Anchorage systems requiring tank penetrations are not acceptable.
  - b. All anchorage systems shall be 316 stainless steel unless otherwise specified.
- D. Tank type, style, capacity, dimensions, and fittings orientation shall be as shown in the attached Tank Data Sheets.
- E. Materials:
- 1. General:
    - a. Tanks shall be virgin polyethylene resin as compounded and certified by the manufacturer
    - b. Resin shall contain a minimum of a UV 8 stabilizer as compounded by the resin manufacturer.
    - c. Color shall be natural.
    - d. Pigments, where specified, shall not exceed 0.25% dry blend total weight.
  - 2. Resin:
    - a. Type I Tanks: Crosslinked polyethylene as manufactured by ExxonMobil Chemical, or resin of equal physical and chemical properties.
      - 1) Mechanical Properties:

<b>Property</b>	<b>ASTM</b>	<b>Value</b>
Specific Gravity	D1998	1.9
Hoop Stress	D1998	600 PSI
Density (Resin)	D1505	0.938-0.946 g/cc
Tensile (Yield Stress 2-inch/min)	D638	3000 PSI
Elongation at Break (2-inch/min)	D638	>300%
ESCR (100% Igepal, Condition A, F50)	D1693	>1000 hours
ESCR (100% Igepal, Condition B, F50)	D1693	>1000 hours
Vicat Softening Degrees F	D1525	250
Flexural Modulus	D790	100,000 PSI

- b. Type II Tanks: Linear polyethylene (not cross-linkable resin) as manufactured by ExxonMobil Chemical, or resin of equal physical and chemical properties.
  - 1) Fully compliant with FDA Regulation 177.1520 and NSF/ANSI 61 standards.
  - 2) Mechanical Properties:

<b>Property</b>	<b>ASTM</b>	<b>Value</b>
Density (Resin)	D1505	0.940-0.948 g/cc
Tensile (Yield Stress 2-inch/min)	D638	2950 PSI
Elongation at Break (2-inch/min)	D638	>1000%
ESCR (100% Igepal, Condition A, F50)	D1693	>550 hours
ESCR (100% Igepal, Condition B, F50)	D1693	>48 hours
Vicat Softening Degrees F	D1525	235
Flexural Modulus	D790	129,000 PSI

- 3. Fittings, Gaskets, and Fasteners:

<b>Tank</b>	<b>TNK-500</b>
Liquid Stored	Hydrated lime liquid slurry
Fittings Material	PVC
Gasket Material	Viton
Bolt/Fastener Material	Titanium

- F. Wall Thickness: Minimum required wall thickness for the cylinder must be sufficient to support its own weight in an upright position without any external support, as determined by the following equation, and not less than 0.187 inches:

$$T = 0.433 \times SG \times H \times OD \div (2 \times SD)$$

Where:

- T = wall thickness (inches)  
 SG = specific gravity (g/cm<sup>3</sup>)  
 H = fluid head (feet)  
 SD = hydrostatic design stress (PSI)  
 OD = outside diameter (inches)

- 1) In accordance with the above formula, the tank shall have a stratiform (tapered wall thickness) wall.
- 2) Flat areas shall be provided to allow locating large fittings on the cylinder straight shell.
- 3) Hydrostatic design stress:
  - a) As determined by multiplying the hydrostatic design basis, determined by ASTM D2837 using rotationally molded samples, with a service factor selected for the application.
  - b) The hydrostatic design stress is 600 PSI at 73 deg F for Type I and Type II polyethylene.
  - c) Hydrostatic design stress shall be derated for service above 100 deg F and for mechanical loading of the tank.

G. Top Head:

- a. Integrally molded with cylinder straight shell.
- b. Minimum thickness equal to the top of the cylinder straight shell.
- c. Top head for tanks with capacities in excess of 2000 gallons shall be designed to provide a minimum of 1300 square inches of flat area for fittings locations.

H. Bottom Head:

- a. Integrally molded with cylinder straight shell.
- b. Flat unless specified otherwise.
- c. Knuckle radius shall be 1-1/2 inches minimum.

I. Fittings:

1. Threaded Bulkhead:
  - a. Threaded bulkhead fittings shall not be allowed for connections greater than 2 inches.
  - b. Where used bulkhead fittings shall be constructed of PVC.
  - c. Gaskets shall be a minimum of ¼-inch thickness and constructed of 40-50 durometer EPDM or 60-70 durometer Viton as specified herein and in the Tank Data Sheets.
2. Bolted Double 150 lb. Flange Fittings:

- a. Bolted double flange fitting shall be constructed with two (2) 150 lb. flanges and two (2) 150 lb. flange gaskets, and the correct number and size of all-thread bolts for the flange specified by the flange manufacturer.
- b. Flanges shall be constructed of PVC Type I, Grade I, or other specified material.
- c. Gaskets shall be a minimum of ¼-inch thickness and constructed of 40-50 durometer EPDM or 60-70 durometer Viton as specified herein and in the Tank Data Sheets.
- d. Provide a minimum of four (4) full thread bolts, material as specified in the attached Tank Data Sheets.
  - 1) The bolts may have gasketed flanged metal heads or bolt heads encapsulated in Type II polyethylene material.
    - a) Encapsulated bolts shall be designed to prevent metal exposure to the liquid in the tank and prevent bolt rotation during installation.
    - b) The polyethylene encapsulation shall fully cover the bolt head and a minimum of ¼ inch of the threads closest to the bolt head.
    - c) Polyethylene shall be color coded to distinguish bolt material (white - 316 S.S., yellow - Hastelloy C276, red - Monel, green - Titanium).
    - d) Each encapsulated bolt shall have a gasket to provide a sealing surface against the inner flange.
  - 2) Bolted double flange fittings shall have bolt holes straddling the principal centerline of the tank in accordance with ANSI/ASME B-16.5 unless otherwise specified.
3. Siphon Tube Fittings: Provide where shown on the attached Tank Data Sheets.
4. Flush Bottom Molded Outlets: Provide for all drain connections, as shown on the attached Tank Data Sheets.
  - 1) Shall provide complete drainage of the tank.
  - 2) Manufacturer shall provide all materials and design recommendations necessary to accommodate the outlet and to ensure leak-proof performance.
  - 3) Contractor shall coordinate location of concrete pad blockouts if necessary.
5. Lifting Lugs: Tanks shall have a minimum of three lifting lugs integrally molded in the cylinder straight shell.
  - a. Lifting lugs shall be designed and located to enable erection of an empty tank.
  - b. Lifting lugs shall be Type 316 stainless steel.
6. Tie-downs:
  - a. Provide a minimum of four (4) tie-down lugs integrally molded into the top head.
  - b. Tie-down lugs shall be designed to allow tank retention in wind and seismic loading without damage to the tank.
7. Manway: 18-inch threaded polyethylene, vented and easily accessible.

### 2.3 APPURTENANCES

- A. General:
  1. Uncoated or exposed carbon steel appurtenances, fasteners, or anchorage will not be accepted.
  2. Anchor Bolts: Provide anchor bolts sized by manufacturer and of the type indicated in 2.3.D.3.
- B. Manway:
  1. Manway shall be 24" standard cover, PE or similar material as shown in the attached Tank Data sheets.

- C. Sight Gauge:
  - 1. Sight gauge shall be constructed of clear and flexible pipe material that allows for expansion and contraction of the tank.
  - 2. Connections shall be  $\frac{3}{4}$  inch with isolation valves.
- D. Overflow Pipes and Fill Pipes:
  - 1. Overflow pipes and fill pipes shall be PVC or material compatible with chemical stored.
  - 2. Overflow pipes and fill pipes shall be supported at 6-inch intervals.
- E. U-Vent:
  - 1. Each tank must be vented for the material and flow and withdrawal rates expected. U-vents shall be furnished complete and shall be constructed of PVC or material compatible with the chemical stored.
- F. Supports:
  - 1. Provide FRP pipe supports for fill and vent piping.
- G. Insulation
  - 1. Insulate tank where indicated on the Tank Data Sheet.
  - 2. Insulation shall be polyurethane foam with a nominal thickness of 2 inches applied at the factory to all external tank surfaces except the tank bottom head.
  - 3. The insulation shall have a density of 2.0 – 3.0 lb/ft<sup>3</sup>.
  - 4. The insulation shall have a minimum rating of R-12.
  - 5. Upon completion of application and curing of the insulation, two full coverage coats of white latex mastic coating shall be applied at the factory to the surface of the insulation in such manner as to seal the insulation from the outside environment.
  - 6. The installation of the insulation shall be coordinated with the installation of the heat tracing system, where both are required.
- H. Siphon Drain
  - 1. Siphon drains shall extend to 3 inches above tank bottom.
- I. Tank Identification Plate:
  - 1. Each tank shall be provided with a nameplate indicating the equipment number and title as shown on the tank data sheet.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION BY CONTRACTOR**

- A. Installation of the hydrated lime liquid slurry storage tank shall be by the CONTRACTOR.
- B. Install tank in complete conformance with SUPPLIER's written instructions and ENGINEER's approved shop drawings.
- C. Concrete tank pad shall be level and smooth to the tolerances recommended by the tank SUPPLIER.

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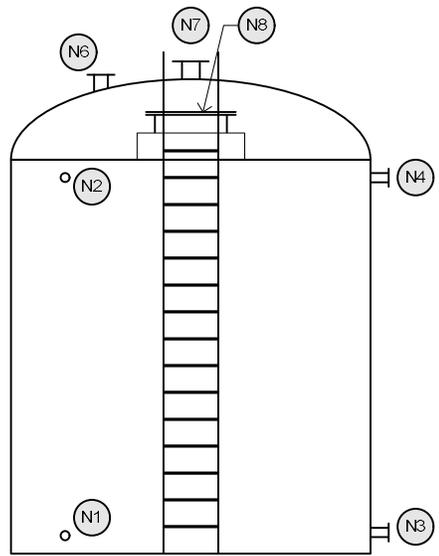
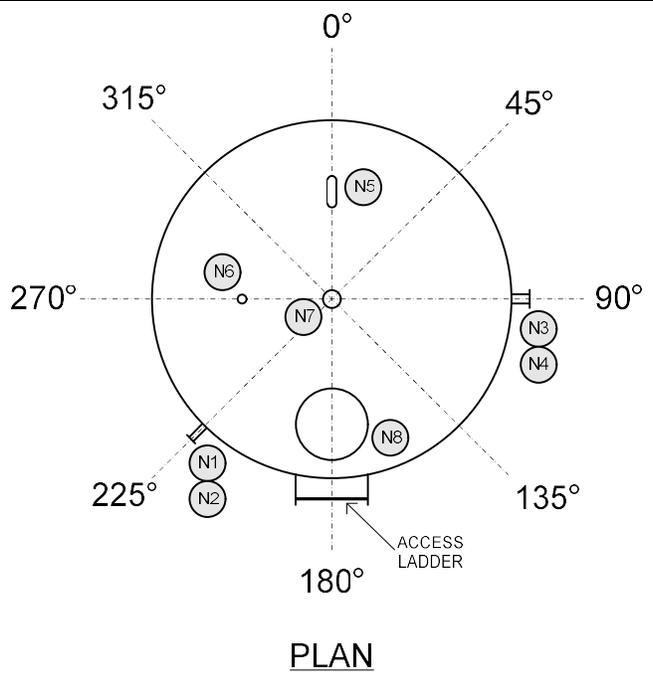
High Density Polyethylene Storage Tank

Reservation Road Desalination Facility Rehabilitation

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**GENERAL**



**General**

<b>Item No.</b>	TNK-500
<b>Name</b>	Hydrated Lime Liquid Slurry Storage Tank
<b>Liquid Stored</b>	45% Hydrated Lime Liquid Slurry
<b>Working Capacity</b>	5,400 gallons
<b>Tank Inside Diameter</b>	11'-0"
<b>Tank Height</b>	7'-9" body, 9'-8" total
<b>Design Code</b>	ASTM D1998-04
<b>Materials:</b>	
<b>Resin</b>	HDLPE
<b>Gaskets</b>	Viton
<b>Bolts</b>	Titanium
<b>Roof</b>	Domed
<b>Shell</b>	Vertical Cylinder
<b>Bottom</b>	Flat

**Nozzle Schedule – ORIENTATION TO BE CONFIRMED DURING SUBMITTAL**

<b>MK</b>	<b>Size/Type</b>	<b>Service</b>
N1	2" FLG	Drain
N2	2" FLG	Overflow
N3	2" FLG	Outlet
N4	2" FLG	Suction Vent
N5	2" FLG	Vent
N6	2" FLG	Fill
N7	6" FLG	Level Element
N8	24" FLG	Access Manway
N9	12" FLG	Mixer Port or as required by mixer design

**Accessories**

<b>Sight Glass</b>		
<b>Level Gage</b>		
<b>Ladder</b>		
<b>Siphon Drain</b>		
<b>Sump</b>		
<b>Mixer</b>	X	N9
<b>Vortex Breaker</b>		
<b>Inlet Baffle</b>		
<b>Lifting Lugs</b>	X	
<b>Thief Hatch</b>		
<b>Access Manway</b>	X	N8
<b>Down-Comer</b>		
<b>Heat Trace</b>		
<b>Insulate</b>		
<b>Handrails on Roof</b>		
<b>Sight Glass</b>		

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High Density Polyethylene Storage Tank

Reservation Road Desalination Facility Rehabilitation

++ END OF SECTION ++

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High Density Polyethylene Storage Tank

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## **SECTION 46 41 34**

### **VERTICAL MIXERS**

#### **PART 1 - GENERAL**

##### **1.1 DESCRIPTION**

- A. Scope The Marina Coast Water District's Reservation Road Desalination Facility Rehabilitation utilizes commercially supplied hydrated lime liquid slurry to condition RO permeate. Hydrated lime liquid slurry is stored in a chemical storage tank where it is fed to the pipeline contactor upstream of the Product Water Storage Tank at a rate of 2.8 gallon per hour (gph) via metering pumps. The hydrated lime liquid slurry must be homogenized before use and should be mixed while in storage and during use. Mixing frequency varies from approximately every four hours to continuously mixed depending on the hydrated lime liquid slurry SUPPLIER. The mixer shall be mounted to the mixer stand and access platform per Section 06 80 03 - FRP Mixer Stand and Access Platform. The mixer shall be compatible with the hydrated lime liquid slurry HDPE storage tank and mounted such that it provides proper agitation based on mounting location. This section includes the manufacture, supply, assembly, installation and testing of completely functional vertical turbine mixers.
- B. Equipment Tag Numbers: The following equipment identification numbers have been assigned to the equipment that shall be provided under this Section:
1. MIX-500 – Hydrated Lime Liquid Slurry Storage Tank Mixer

##### **1.2 QUALITY ASSURANCE**

- A. Reference Standards: Comply with the requirements and recommendations of the following references, except as otherwise specified:
1. National Electric Code (NEC)
  2. National Electrical Manufacturers Association (NEMA)
  3. American National Standards Institute (ANSI)
  4. ASTM International (ASTM)
- B. All equipment furnished under the Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the OWNER that the quality is equal to equipment made by the manufacturer(s) specifically named herein.
- C. Provide a factory operational and performance test on the pre-assembled system and documentation of results prior to shipment.
- D. Warranty: Provide a 1-yr warranty on all equipment from date of start-up. Warranty shall cover defects in workmanship, design, and materials. If any component should fail during the warranty period, it shall be corrected and the unit restored to service at no expense to the OWNER.

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Vertical Mixers

Reservation Road Desalination Facility Rehabilitation

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60% Design

### 1.3 SUBMITTALS

- A. Submit the following items to the ENGINEER for approval:
  - 1. Shop Drawings:
    - a. Detailed drawings showing component and assembly dimensions, location of mechanical and electrical connections, weights of all equipment, installation details, and accessory details.
    - b. Power and control wiring diagrams, including terminals and numbers.
    - c. Drawings, templates, and directions for installation of anchor bolts.
  - 2. Product Data:
    - a. Descriptive literature, specifications, and engineering data.
    - b. Materials of construction for all components and accessories.
    - c. Impeller type, number, and size
    - d. Impeller shaft size, material and number of sections
    - e. Type, specifications, details, input and output speeds, exact gear ratios and service factor of gear reducers
    - f. Ratio of rotative speed to critical speed of shaft
    - g. Detail of supporting base plate and shaft seal
    - h. Mixer weight, motor weight, and complete assembly weight.
    - i. Complete motor nameplate data, as defined by NEMA.
    - j. Where specified, complete variable frequency drive information.
    - k. Maximum forces and loads exerted by the equipment (motor/mixer) onto equipment support.
    - l. Factory finish system.
  - 3. Operations and Maintenance Manuals (Digital Copies)
  - 4. Quality Control Submittals:
    - a. A list of any and all instances where the equipment proposed deviates from these specifications.
    - b. Names and addresses of the factory authorized service organization nearest the project site.
    - c. Upon approval of shop drawings, manufacturer shall provide printed and PDF installation instructions.
    - d. Confirmation that the mixer meets and can be operated as required under the specified design requirements.

### 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All equipment and accessories shall be properly protected during shipment such that no damage or deterioration shall occur between shipment and installation.
  - 1. Finished surfaces shall be protected by wooden blanks.
  - 2. Finished ferrous metal surfaces not painted shall be protected from corrosion.
  - 3. Each box and package shall be clearly marked with the contents and total weight.
- B. Provide details for delivery, storage, and handling, including the following:
  - 1. Terms of delivery
    - a. Expected delivery schedule
    - b. Suggested storage
      - 1) Explicitly state all storage conditions which will void any warranties
    - c. Handling recommendations with regard to the following:
      - 1) Preservation of unit functionality
      - 2) Preservation of unit integrity

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46 41 34-2  
Vertical Mixers

Reservation Road Desalination Facility Rehabilitation

- 3) Safety of personnel and bystanders during delivery, unloading, storage, installation

**1.5 SPARE PARTS**

- A. Furnish and deliver the following spare parts carefully boxed or packaged and plainly marked for re-ordering:
  - 1. One set of special tools required for normal operation and maintenance.
  - 2. One complete spare set of gears, bearings and oil seals for each size gear reducer.
  - 3. One complete set of spare gaskets for sealing the base for each size unit.
  - 4. A complete spare set of all fasteners, bolts, nuts, pins, keys, washers and the like that are not of standard manufacture.

**PART 2 - PRODUCTS**

**2.1 VERTICAL TURBINE MIXERS:**

- A. The vertical mixer assembly shall be mounted from the top of the hydrated lime liquid slurry storage tank on the FRP mixer stand and access platform in accordance with Section 06 80 03 - FRP Mixer Stand and Access Platform. The vertical mixer may be mounted off-center or off-set the center-counted mixer by 10 degrees as long as the mixer achieves complete homogenization of a 5,400 gallon hydrated lime liquid slurry storage tank. The mixer shall consist of a heavy duty speed reducer, in-tank coupling, electric motor connected through a flexible coupling, baseplate, agitator shaft, and mixing impellers. The following mixer design requirements are based on the hydrated lime liquid slurry chemical manufacturer:

Design Requirements:

Mixer ID	MIX-500
No. Required	1
Liquid Mixed	45% (Ca(OH) <sub>2</sub> ) Hydrated lime liquid slurry
Viscosity, cp	500
Mixed Liquid Specific Gravity	1.2 – 1.35
Tank Volume	5,400 gallons
Liquid Temperature Range	50 to 80 degrees F, 60 deg average
Mixing Cycle	Periodic on timer
Maximum Liquid Depth, ft	7 (Coordinate with final tank selection)
Minimum Liquid Depth, ft	2
Motor Requirements	
Drive Type	Variable Speed
Motor Size	1 hp
Motor Frequency	60 Hz
Motor Phase	3
Motor Voltage	230/460

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Mixer Shaft	Manufacturer to size, 2.5" diameter minimum (based on lime liquid slurry manufacturer recommendation)
Mixer Shaft and Impeller Material	Type 316 SS
Gear Reducer	1750 RPM in / 68 RPM out
Impeller Requirements	
Impeller Type	Hydrofoil
No. of Impeller Blades	3
Impeller Diameter	0.4-0.5 ratio of tank diameter
Impeller Shaft Length	35" maximum
Impeller Bore Diameter	3.5" diameter minimum (based on lime liquid slurry manufacturer recommendation)
Impeller Spacing	26" minimum (based on lime liquid slurry manufacturer recommendation)
Bottom Impeller Location	Distance of 0.5 x impeller diameter from bottom of storage tank
Impeller Tip Speed	6.6 ft/s – 13.1 ft/s

B. Product and Manufacturers:

1. Cleaveland
  - a. Model: XTRA-FLO LITE XTLGE-1 or equal
  - b. Material: 316 SS
2. Or Equal.

C. Mechanical details of each component shall be as follows:

1. Gear Drive:
  - a. The mixer gear drive must be built and rated in accordance with the current AGMA Standard 6010-E88.
  - b. The AGMA calculated drive HP rating shall be stamped on drive nameplate.
  - c. Drive housings shall be of high quality close-grained cast iron, or fabricated steel, stress relieved and reinforced, and shall be provided with lifting lugs or holes.
  - d. Each unit shall be provided with an integral or separate baseplate and shall have a minimum 12-inch pedestal base for ease of assembly of the agitator shaft and to facilitate draining of the oil from the gear drive. The base shall be mounted to the storage tank according to the tank and mixer manufacturer recommendations.
  - e. All gear reducers shall be all-helical to ensure highest efficiency coupled with convenience of mounting, maintenance and installation.
  - f. It shall not be necessary to remove the motor to perform routine maintenance on the speed reducer.
  - g. Worm gears are not acceptable.
  - h. Gearing shall be of AGMA Quality No. 10 (ten) or better, per AGMA standard 390.03a and ASI-AGMA 2000-A88.
  - i. The full load operating noise levels of the mixer drives shall meet current OSHA Occupational noise levels, and/or AGMA standard 299.1, and shall not exceed 85 dBA at 3 feet from any part of the drive.
  - j. Service Factor:

- 1) The drive's minimum AGMA service factor shall be 2.5 and based upon motor nameplate horsepower.
  - 2) The service factor shall be based on AGMA Standard 6010-F97 for 24-hour per day moderate shock application.
  - 3) Service factors based on uniform load and motor bhp will not be accepted.
  - k. Mixer SUPPLIER shall submit gear rating calculations upon request with approval drawings.
2. Output Shaft:
    - a. The mixer gear drive shall be designed with an output shaft system suitable for the loadings imposed by the application.
    - b. The output shaft diameter shall be equal to or greater than the agitator shaft diameter.
    - c. The output shaft shall be supported by two adapter-type anti-friction bearings.
  3. Gear Drive Manufacture:
    - a. All components of each gear drive shall be designed, manufactured and assembled in full compliance with all applicable AGMA requirements.
    - b. Only mixer gear drives designed and manufactured by the mixer SUPPLIER shall be acceptable.
    - c. Gear drives designed and manufactured by a company other than the mixer manufacturer are not acceptable.
  4. Drive Bearings:
    - a. All drive bearings shall be of antifriction type, ball or roller bearings.
    - b. All bearings within the drive, including the output shaft bearings, shall have minimum AFBMA B-10 lives of 100,000 hours when operating at full motor nameplate horsepower at design speed.
    - c. Mixer SUPPLIER shall submit bearing life calculations upon request, with approval drawings.
  5. Lubrication:
    - a. Lubrication of each speed reducer shall be accomplished by all bearings and gears being immersed in oil.
    - b. The drive shall be provided with a dipstick and/or a sight glass to observe oil level.
    - c. Each drive must have an effective drywell feature to eliminate oil leakage down the output shaft.
    - d. Grease lubricated bearings are acceptable on the output shaft, provided adequate sealing is provided to separate them from the oil bath. Sealed-for-life bearings are not acceptable.
    - e. All oil fill and drain lines shall be located so as to be easily accessible.
    - f. A 1/2-inch NPT drain connection with a ball valve suitable for oil service shall be provided.
    - g. All gearing must be contained within a single housing and lubricated by a common oil bath.
    - h. Gear-motor attachments to reduce speed will not be allowed.
  6. Thermal rating of the gear reducer must exceed design mechanical rating. No external cooling devices are allowed.
  7. Shaft Coupling:
    - a. The lower mixer shaft shall be connected to the upper, or drive output shaft, by means of a rigid flanged coupling of either the welded or interference-fit hub type.

- b. Coupling face shall have a rabbeted male and female piloted connection for accurate concentricity and shall not require match marks for alignment.
  - c. If located above tank top surface, the rigid coupling may be of carbon steel construction; if located below the level of the tank top, its material of construction must match that of the agitator shaft.
  - d. Alternately, the mixer shaft can be attached to the mixer drive by means of a split hub attachment located above the drive's hollow-quill output shaft.
8. Shaft:
- a. The agitator shaft shall be of the material specified in the Design Requirements paragraph.
  - b. The shaft shall be designed such that the maximum stress shall not exceed 9,000 psi under maximum operating loads.
  - c. It shall be of overhung design – the use of underwater bearings is not permitted.
  - d. Lower shaft straightness, rigid coupling squareness, and output shaft accuracy must be such that the maximum total indicated runout at the lower end of the shaft does not exceed 1/8 inch for every 10 foot of overhand, as measured when turning over by hand.
  - e. The shaft assembly shall be designed to handle the loads created by off-center tank mounting
  - f. Keyways:
  - g. Extended keyways shall be provided to allow for vertical adjustment of the impeller in 3" increments.
  - h. Keyways shall allow the impeller to be placed 0.5 D off the tank bottom (where D is the impeller diameter).
9. Impellers:
- a. Provide a single impeller sized as required to mix entire operating depth range including the minimum liquid depth. The number impellers required shall be determined.
  - b. Location of the impeller along the shaft shall be determined by mixer SUPPLIER.
  - c. The impeller shall be constructed of the material specified in the Design Requirements paragraph.
  - d. Impeller shall be of bolted construction, and shall be connected to the agitator shaft with a hook key for maximum security.
  - e. The maximum stress in any impeller component shall not exceed 11,000 psi under maximum operating loads.
  - f. The shaft-impeller system design shall be such that its operating speed shall not exceed 75% of its first lateral critical speed. The use of stabilizing rings or fins will not influence this limitation.
  - g. The shaft shall be safe for operation when the liquid level passes through the lower impeller while the mixer is running.
  - h. Calculations supporting all shaft and impeller design criteria (stresses and critical speed) shall, upon request, be supplied with approval drawings.
  - i. Impellers shall be able to fit through the tank manway access for installation.
10. Motor:
- a. Motors shall comply with requirements in accordance with the manufacturer's recommendations.

- b. The electric motor driver shall be commercially available standard NEMA C-Face, rated for continuous duty in a humid corrosive environment with full mill and chemical duty features.
  - c. Insulation shall be Class H, limited to Class B temperature rise at 50°C ambient at 1.15 service factor.
  - d. Motors shall meet the NEMA MG 1 Premium Efficiency.
  - e. Motors shall be squirrel cage induction motors for operation on 3PH, 60 Hz, 460/230 V current.
  - f. Synchronous speed shall be 1800 rpm maximum.
11. Variable Frequency Drives
- a. All mixers shall be provided with Toshiba AS3 Variable Frequency Drives or equal.
  - b. Variable Frequency Drives shall meet the requirements in accordance with the manufacturer's recommendations.
12. Mixer drives shall be painted with the manufacturer's recommended finish for the intended service.

## 2.2 CONTROLS

- A. Provide control for each mixer.
- B. Mixer must meet the following minimum requirements for operator interface functionality. Mixer not meeting this minimum functionality will not be accepted.
  - 1. Operator Controls and Indicators:
    - a. Backlit graphical LCD to display mixer speed in rpm or percent and running status.
    - b. Sealed keypad for START, STOP, AUTO/MANUAL, speed adjustment.
    - c. "Auto Restart" feature to resume mixer status in the event of power outage interruption.
  - 2. External Interfaces:
    - a. Analog Input: 4 to 20 mA speed input to control pump speed in AUTO mode, with input signal trimmable and speed scalable over any part of the drive speed range.
  - 3. Power Requirements:
  - 4. Termination: Supply screw down terminals suitable for up to 14AWG field wire and accessible through four glanded cable entry points on the mixer.
  - 5. Provide all cables, connectors, and a terminal junction box for termination of remote signal circuits.

## **PART 3 - EXECUTION**

### 3.1 INSTALLATION BY CONTRACTOR

- A. Installation of the vertical top-mounted tank mixer shall be by the CONTRACTOR.
- B. Install in accordance with SUPPLIER's written instructions.
- C. Check and align motor, vessel, and piping, etc. after mixer is installed to ensure alignment and assembly has been unchanged from factory assembly conditions. Make adjustments required to place system in proper operating condition.

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- D. Installation shall include furnishing and applying an initial supply of grease and oil, recommended by manufacturer.
- E. Unit as furnished and installed shall not vibrate or produce noise in excess of mixer SUPPLIER's recommendations.
- F. Motor vibration shall not exceed limits as required by latest revision of NEMA MG 1 standards.

### 3.2 SUPPLIER'S FIELD SERVICES

- A. A factory trained representative shall be provided for installation supervision, start-up and test services, and operation and maintenance personnel training services. The serviceman shall make one (1) visit (1 day onsite) to the site to inspect the CONTRACTOR's installation, assist with startup, and one (1) visit (1 day onsite) instruct operations and maintenance personnel.

++ END OF SECTION ++

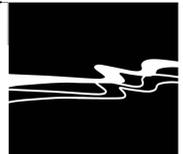
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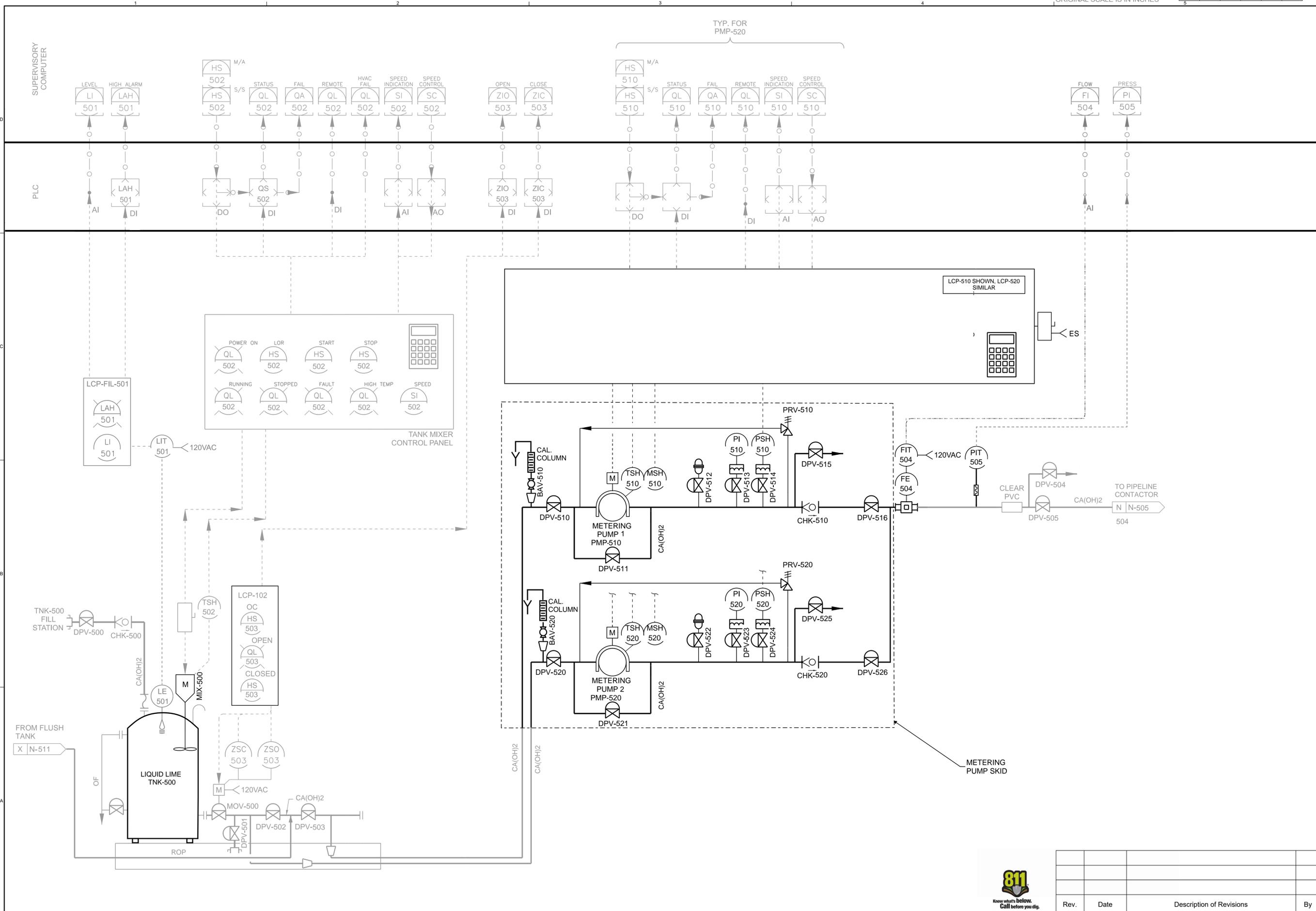
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MARINA COAST WATER DISTRICT  
RESERVATION ROAD DESAL PLANT RENOVATION  
HYDRATED LIQUID LIME SLURRY DOSING SYSTEM  
P&ID

JOB #: 25-072  
DESIGNERS: TA  
DRAWN BY: NCR  
DATE: MARCH 2026  
DRAWING NO. XXX  
X OF X SHEETS

Rev.	Date	Description of Revisions	By

