

INDIAN RIVER COUNTY UTILITIES HOBART REVERSE OSMOSIS WTP BULK CHEMICAL TANK REPLACEMENT

Prepared For:
Indian River County Utilities

Prepared By:
Kimley-Horn and Associates, Inc.
1920 Wekiva Way, Suite 200
West Palm Beach FL 33411
Ca 00000696

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**INDIAN RIVER COUNTY UTILITIES
HOBART ROWTP BULK CHEMICAL TANK REPLACEMENT**

TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

01010	SUMMARY OF WORK
01030	HURRICANE PREPAREDNESS
01150	MEASUREMENT AND PAYMENT
01300	SUBMITTALS
01410	TESTING AND LABORATORY SERVICES
01700	PROJECT CLOSEOUT
01720	PROJECT RECORD DRAWINGS
01730	OPERATION AND MAINTENANCE MANUALS

DIVISION 2 – SITE WORK

02065	DEMOLITION
02670	FLUSHING, TESTING AND DISINFECTION

DIVISION 9 – FINISHES

09900	PAINTING
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DIVISION 11 – EQUIPMENT

11504	SULFURIC ACID EQUIPMENT
11507	CAUSTIC EQUIPMENT

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY THESE CONTRACT DOCUMENTS

- A. Furnish all labor, equipment and materials necessary to construct all improvement elements at the Hobart Reverse Osmosis Water Treatment Plant described in the plans and these specifications:
1. Furnish all labor and materials necessary to replace the existing 16,000-gallon bulk sulfuric acid tank with a new **12,000-gallon** horizontal steel storage tank. The tank will store 93% - 98% (66 Baume) sulfuric acid and will have a complete coating system, interior and exterior, suitable for storing sulfuric acid in Southeast Florida. This work will include, but is not limited to, removal and demolition of existing storage tank, temporary sulfuric acid storage to provide usable acid throughout construction, installation of a new bulk storage tank, piping, valves, and all miscellaneous support and accessory items to provide a complete operating system as depicted in these documents.
 2. Furnish all labor and materials necessary to replace the existing **5,200-gallon** bulk caustic horizontal steel storage tank with a new **5,200-gallon** horizontal steel storage tank. The tank will store 50% strength sodium hydroxide and will have a complete coating system, interior and exterior, suitable for storing 50% caustic in Southeast Florida. The work will include, but is not limited to, removal and demolition of existing storage tank, temporary caustic storage to provide usable caustic throughout construction, installation of the new bulk storage tank, piping, heat tracing, insulation, jacketing, valves, and all miscellaneous items necessary to provide a complete operating system as depicted in these documents.
 3. Furnish all labor and materials necessary to complete demolition of the existing **1,000-gallon** bulk zinc orthophosphate storage tank. The work is included, but not limited to, removal and demolition of existing storage tank, piping, and appurtenances and restoration of secondary containment structure.
 4. Except as specifically noted, provide and pay for:
 - a. Mobilization and demobilization.
 - b. Labor, materials, and equipment.
 - c. Tools, construction equipment, and fuel.
 - d. Electric, water and utilities required for construction.
 - e. Freight and sales tax.
 - f. Testing and laboratory services.
 - g. Record Information in electronic form (both AutoCAD and PDF) and a hardcopy. Information will be used by the Engineer for Record Drawing development.
 - h. Field engineering and surveying services
 - i. Testing and laboratory services

1.2 CONTRACTS

- A. Construct the Work under a Lump Sum Price contract in accordance with the contract documents and with the Owner.
- B. Subcontractors (when used) shall work directly for the contractor.

1.3 WORK BY OTHERS AND FUTURE WORK

- A. The Owner reserves the right to add to the work in accordance with the Contract Documents.
- B. The Owner reserves the right to direct purchase significant pieces of equipment and/or materials included in this contract by means of a deductive Change Order to this Contract and issuance of a Purchase Order to the supplier or vendor of the equipment or materials for the purpose of the sales tax end use savings.

1.4 SUGGESTED WORK SEQUENCE

- A. Sequence of work will be discussed and decided prior to the start of the project. The contractor shall proceed in a manner that is logical for the progression of work.
- B. Certain areas may be assigned priority to accommodate Owner's needs.
- C. The contractor shall be required to coordinate the work sequence and schedule with the water treatment plant operations.
- D. The Contractor shall follow the suggested and agreed upon sequence of work described herein:
 - 1. All material must be onsite prior to any work commencing or removal of equipment.
 - 2. The Contractor is herein notified that sulfuric acid and caustic feed is critical to WTP operations, and minimal shutdowns will be tolerated as part of this project. It is anticipated that 2-3 WTP shutdowns, no greater than 4 hours in duration per shutdown, will occur as part of this project. These shutdowns will take place to facilitate connections for the temporary feed system and switchover to the proposed permanent sulfuric acid and caustic systems. The Contractor shall utilize existing bulk storage capacity and containment to maintain operations during demolition and construction.
 - a. Contractor is permitted to utilize the existing temporary double-wall vertical polyethylene storage tank on site as a means of bulk storage and supply to the chemical feed pumps during demolition and construction. Use of an off-site storage tank shall be provided at no additional cost to the Owner.
 - b. The Contractor shall begin all preparatory work and commence operations to test the existing temporary sulfuric acid storage tank to confirm acceptable for use.
 - c. The following provides a recommendation for the sequence of work for bulk sulfuric acid tank replacement:
 - 1) Contractor shall empty, purge, and hand swab the existing temporary double wall vertical polyethylene storage tank located adjacent to the sulfuric acid bulk containment structure and permanent bulk storage tank as shown on the construction plans. Contractor shall perform a hydrostatic test of the tank with water for a period no less than twenty-four (24) hours. Contractor shall record level at the beginning of the test and end of the test.
 - 2) If no hydraulic losses observed during test, the Contractor may drain the tank, purge, and swab dry prior to transferring contents of sulfuric acid from the existing bulk storage tank to the temporary storage tank. The temporary tank **must** be dry prior to transferring sulfuric acid.

- a) The Owner will attempt to drain the existing bulk storage tank down as low as possible to minimize the volume of temporary acid storage.
- 3) The Contractor shall configure a temporary spill containment to route any potential spills from the temporary storage tank into the bulk containment area for spill protection.
- 4) With the temporary sulfuric acid storage and feed pump supply online and operational, the Contractor may commence demolition of the existing bulk tank, fill piping, overflow piping, ventilation piping, access ladder and platform, and all other appurtenance as shown on the drawings.
- 5) Contractor is responsible for off-site disposal of unused acid, grit, solids accumulation within the existing bulk storage and temporary tanks.
- 6) Contractor shall set and install new tank, complete, as shown on the construction drawings. Upon successful installation of tank, piping, valves, and appurtenances, the tank may be filled with Owner furnished sulfuric acid and placed into service.
 - a) Prior to placing new tank into service, the Contractor shall coordinate with the Owner to draw the temporary storage tank down as low as possible to minimize the volume of unused chemical to be disposed. Contractor is responsible for disposal of all unused chemical within the temporary storage tank.
- 7) Duration of temporary sulfuric acid storage shall not exceed two (2) weeks.
- 8) The existing sulfuric acid flexible supply piping and containment piping shall remain in place and operational until the proposed piping is pressure tested and put into operation. Demolition of the containment piping and flex tubing may occur once the new supply piping has been successfully installed and tested.
- 9) Any impacts to the containment area coating shall be fully restored prior to project closeout.
- d. The following provides a recommendation for the sequence of work for bulk caustic tank replacement:
 - 1) Prior to commencing demolition of the existing bulk caustic tank, contractor shall demolish and remove the existing zinc orthophosphate tank and piping within the bulk secondary containment area. The existing zinc orthophosphate bulk storage area shall be used for temporary caustic storage and provide spill containment for the temporary tank throughout construction.
 - 2) Furnish and install a temporary storage tank and supply piping to the caustic transfer pump for service throughout duration of caustic tank replacement.
 - 3) After temporary tank and piping has been installed, perform 24-hour hydrostatic test of the tank. Record tank level at beginning and end of 24-hour duration.
 - 4) If no hydraulic losses observed during test, the Contractor may drain the tank, purge, and swab dry prior to transferring contents of caustic from the existing bulk storage tank to the temporary storage tank. The temporary tank **must** be dry prior to transferring caustic.
 - a) The Owner will attempt to drain the existing bulk storage tank down as low as possible to minimize the volume of temporary caustic storage.

- 5) With the temporary caustic storage and feed supply piping online and operational, the Contractor may commence demolition of the bulk caustic storage tank and appurtenances as shown on the drawings.
- 6) Contractor is responsible for off-site disposal of unused caustic within the existing bulk storage and temporary tanks.
- 7) Contractor shall set and install new tank, complete, as shown on the construction drawings. Upon successful installation of tank, piping, valves, heat trace, insulation and appurtenances, the tank may be filled with Owner furnished caustic and placed into service.
 - a) Prior to placing new tank into service, the Contractor shall coordinate with the Owner to draw the temporary storage tank down as low as possible to minimize the volume of unused chemical to be disposed. Contractor is responsible for disposal of all unused chemical within the temporary storage tank.
- 8) Duration of temporary caustic storage shall not exceed two (2) weeks.
- 9) Any impacts to the containment area coating shall be fully restored prior to project closeout.
3. All other proposed work not listed above can be constructed at any time for the duration of the project.
4. Specific sequence of work will be discussed and decided at the pre-construction meeting, whereas certain areas may be assigned priority to accommodate the Owner's needs.
5. Coordinate all equipment and service removal with operations staff. Water treatment plant to remain in service at all times.

1.5 CONTRACTOR-FURNISHED PRODUCTS AND RESPONSIBILITIES

- A. Products furnished to the site and paid for by Contractor: All products necessary to complete the work described herein these contract documents and specifications to provide a complete and functional system.
- B. Contractor's Responsibilities:
 1. Review and incorporate Owner-reviewed shop drawings, product data, and samples into the construction of the project.
 2. Provide any items determined by the Owner to be salvaged to the Owner's on-site staging area.
 3. Legally dispose of construction debris and items not to be salvaged by the Owner off-site.
 4. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 5. Repair or replace items damaged after receipt.
 6. Arrange and pay for product delivery to site.
 7. Handle, store, protect and install all delivered products.
 8. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 9. Arrange for manufacturers' warranties, inspections, and service.
 10. Provide the Owner with a one-year warranty on all equipment and workmanship from the date of substantial completion.
 11. Obtain any permits that may be required to execute the project. No building permit is expected to be required as part of this project.

12. Coordinate sulfuric acid and caustic deliveries during construction with the Owner.
13. Coordinate all chemical transfer and operational changes with the Owner.

1.6 CONTRACTOR'S USE OF THE PREMISES

- A. All work shall be within the limits of the County owned water treatment plant facility.
- B. The Contractor shall coordinate with the County for material lay down and equipment storage areas on site. The contractor shall maintain access to County facilities at all times and not interfere with the operations of other contractors who may also be working within the facility. Any damage caused by the contractor within staging areas shall be completely restored by the contractor to the Owner's satisfaction at no additional cost to the Owner.
- C. The Contractor shall not impede chemical deliveries. The access drive around the process building shall remain clear so operation of the WTP may continue.
- D. All Contractor and subcontractor workers and laborers shall be required to wear clothing that identifies them with their respective contractors. All workers and laborers shall remain in their designated work areas and at no time shall be wandering the site.
- E. Time restrictions for performing work: All work shall be performed during daylight working hours, Monday through Friday, 7:00 AM to 5:00 PM. The Contractor may extend working hours only if approved in writing by the Owner.

1.7 OWNER-FURNISHED PRODUCTS AND RESPONSIBILITIES

- A. Products furnished by Owner: None
- B. Owner's responsibility:
 1. On product delivery, inspect products jointly with Contractor

1.8 PERMITS REQUIRED

Not used.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

- END OF SECTION -

SECTION 01030
HURRICANE PREPAREDNESS

PART 1 - GENERAL

1.1 HURRICANE PREPAREDNESS PLAN

- A. The Contractor's attention is drawn to the possibility of hurricane or severe storm conditions occurring at the site of work during the course of Contract Work.
- B. Within fourteen (14) days of the date of the Notice to Proceed, the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan specific to this project. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane or severe weather warning.
- C. In the event of inclement weather, or whenever the Owner shall direct, the Contractor shall, and will, cause Subcontractors to protect carefully the Work and materials against damage or injury. Work and materials damaged due to inclement weather shall be removed and replaced at the expense of the Contractor.
 - 1. Hurricane Watch: Upon designation of a hurricane watch, the Contractor shall be responsible for storing all loose supplies and strapping down or removing large materials and equipment on the job site that may pose a danger. In addition, the Contractor shall remove all bulkheads and plugs in pipelines that would impede drainage in the case of flooding. Structures that may be in danger of floatation shall be flooded. The Contractor shall also cooperate with the Owner in protecting any other structures at the site.
 - 2. Hurricane Warning: No mobile "temporary facility" under the control of or on the property of the Owner shall be staffed during a hurricane warning. Contractor facilities meeting these criteria shall be evacuated. Reasonable steps shall be taken to protect all such facilities and their contents from damage and to avoid the facility causing damage to the surroundings.

PART 2 - PRODUCTS
Not used.

PART 3 - EXECUTION
Not used.

- END OF SECTION -

NO SPECIFICATIONS ON THIS PAGE FOR FORMATTING PURPOSES.

SECTION 01150
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SCOPE OF THIS SECTION

- A. The following explanation of the Measurement and Payment for the Schedule of Payment items is provided; however, the omission or reference to any item shall not alter the intent of the Bid Form or relieve the Contractor of the necessity of constructing a complete project under this Contract.
- B. The quotations prepared by the Contractor for the various items of work are intended to establish a total price for completion of the work in its entirety. Should the Contractor feel that the cost for any particular work item has not been established by the Bid Items or this Section, the Contractor shall notify the Owner prior to submitting a Bid. If no notice is provided by Contractor to the Owner at least three days prior to the date Bids are due, Owner will expect that the submitted Bid includes all costs to complete the Work in its entirety.
- C. The Owner reserves the right to increase or decrease the quantity of any item or portion of the work during the progress of construction in accordance with the terms of the Contract.
- D. Unit prices, if used, are used as a means for computing the bid, for Contract purposes, for periodic payments, for determining value of additions or deletions.
- E. Payment shall be made for the items listed on the Bid Form on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, tools, transportation, delivery, disposal of waste and surplus material, and backfilling as shown in the plans, and all other appurtenances to complete the construction and installation of the work as shown on the drawings and described in the specifications. estimated quantities
- F. Where quantities are shown they are approximate and are given only as a basis of calculation upon which the award of the contract is to be made. The Owner or ENGINEER do not assume any responsibility for the final quantities, nor shall CONTRACTOR claim misunderstanding because of such estimate of quantities. Final payment will be made only for the satisfactorily completed quantity of each item.

1.2 SUBMITTALS

- A. Project Unit Costs and Payment Information:
 - 1. Schedule of Values to provide a breakdown of the work within each unit price item.
 - 2. Application for Payment
 - 3. Final Application for Payment
 - 4. Submittals shall be in accordance with Section 01300.

1.3 SCHEDULE OF VALUES

- A. Contractor shall prepare a detailed schedule of values for Owner's review with the signed Agreement to the Owner. The schedule shall contain sufficient detail quantifying the component parts of Work for the purpose of making monthly progress payments during the

construction period. Monthly progress payments will be based on the percentage of work demolished, procured, prepared, installed, completed, and accepted by the Owner.

- B. The schedule shall contain sufficient detail for proper identification of work accomplished. The sum of all scheduled items shall equal the total value of the contract. The sum of the breakdown of each Bid Item shall equal the total value of the Bid Item.
- C. Unit Price Work: Reflect unit price quantity and price breakdown from the conformed bid form.
- D. Lump Sum Work:
 - 1. Reflect Schedule of Values
 - 2. List Bonds and Insurance, Mobilization, Demobilization, Facility Startup and Contract Closeout separately.
 - 3. Breakdown Divisions 2 through 17 with appropriate subdivision of each Specification.
- E. An unbalanced, front end loaded schedule will not be accepted by Owner.

1.4 APPLICATION FOR PAYMENT

- A. Include accepted schedule of values for each portion of work and the unit price breakdown for the work to be paid on a unit price basis, and a listing of Owner selected equipment, if applicable, and allowances, as appropriate.
- B. Preparation:
 - 1. List each Change Order and Written Amendment executed prior to date of submission as a separate line item.
 - 2. Submit application for payment, a listing of materials on hand as applicable, and such supporting data as may be requested by the Owner/Engineer.
 - 3. Include Owner's Application for Payment Cover Sheet and partial or full releases of liens, as appropriate, for all subcontractors, suppliers, and Contractor.

1.5 COSTS INCLUDED IN PAYMENT ITEMS

- A. No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work.
 - 1. Clearing and grubbing.
 - 2. Trench excavation, including necessary pavement removal, except as otherwise specified.
 - 3. Structural fill, backfill, density testing and grading.
 - 4. Replacement of unpaved roadways, grass and shrubbery plots.
 - 5. Cleanup.
 - 6. Foundation and borrow materials, except as hereinafter specified.
 - 7. Testing and placing existing AND new systems in operation, as described in the contract documents.
 - 8. Any material and equipment required to be installed and utilized for tests.
 - 9. Maintaining the existing quality of service during construction.
 - 10. Maintaining or detouring of the traffic, with all equipment and manpower to comply with Roadway and Traffic Standards, FDOT Indices 600, 601, 602, 603, 605, 607, 611, 612, 613, 616, 617, 618, 619, 625, 628, 630, and 635.
 - 11. Appurtenant work as required for a complete and operable system.
 - 12. Cost for security (if special circumstances apply, approval must be received by the Engineer, in writing).
 - 13. Record drawings.

14. Distribution of door hangers.
15. Material storage areas.
16. Disposal of excess fill and debris.
17. Scheduling and calling for utility locates
- B. Cleanup: Contractor's attention is called to the fact that cleanup is considered a part of the work of construction. No payment will be made until cleanup is essentially complete.
- C. Work Outside Authorized Limits: No payment will be made for work constructed outside the authorized limits of work.

1.6 CHANGE ORDER PROCEDURE

- A. As defined in the General Conditions, a Change Order is a written order to the CONTRACTOR signed by the Owner authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time which is issued after the execution of the Agreement.
- B. The following procedure shall be used in processing Change Orders:
- C. For Additions to the Work:
 1. The Owner shall issue a written order to the CONTRACTOR directing him to accomplish the additional work. The CONTRACTOR shall review the order and if he feels that the additional work entitles him to additional payment or additional time, he may submit a claim as prescribed in the General Conditions of the Contract.
- D. For Deletions from the Work:
 1. The Owner shall issue a written order to the CONTRACTOR directing him to make the change. If the Owner feels that the contract price should be reduced as a result of the change, the Owner shall make a claim for the reduction as provided in the General Conditions of the Contract.
- E. Cost of the changes in the work shall be determined in accordance with the requirements spelled out in the General Conditions of the Contract. Modifications to incorporate the changes in cost will be made as the amount of any change is determined.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 BID ITEMS

- A. Bid item #1 – Mobilization/De-mobilization
 1. The quantity to be paid for under this Section shall be on a lump sum basis. The Contractor's lump sum price shall include full compensation for all work related to mobilization and demobilization, and any other related work, except for any work designated to be paid for separately or to be specifically included in the costs of other work under the Contract.
 2. Basis of Payment: Payment shall be made at the Contract Lump Sum Price and shall include, but not be limited to, the preparatory work and operations in mobilizing for beginning work on the project, including those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site and establishment of temporary

provisions, controls, and utilities. This item shall include those permits that are required to be obtained by the contractor. This item shall also include field surveying/layout and complete record drawings in accordance with the project specifications and the applicable standards.

3. The items specified in this Section consist of the costs of any pre and post construction expenses necessary for the start and completion of the project, excluding the cost of construction materials. The sum of mobilization and demobilization shall not exceed 10% of the contract price. Partial Payments for mobilization shall be as follows:

<u>Construction Percent</u> <u>Complete Lump</u>	<u>Allowable Percent of</u> <u>Sum for Mobilization</u>
5%	25%
10%	50%
25%	75%
100%	100%

B. Bid Item #2 – Bonds and Insurance

1. Method of Measurement: The quantity to be paid for under this Section shall be on a lump sum basis. The work specified in this Section consists of securing the appropriate bonds and insurance policies in the amounts specified by the contract documents.
2. Basis of Payment: Payment shall be made at the Contract Lump Sum Price and shall include all compensation for bonds, insurance and indemnification in accordance with the Contract documents.

C. Bid item #3 – Demolition

1. Method of Measurement: The quantity to be paid for under this Section shall be on a lump sum basis, based on the percentage of the Item completed, and accepted by Owner.
2. Basis of Payment: Payment shall be at the Contract Lump Sum Price and shall include, but not limited to, furnishing all materials, labor, and equipment required to demolish all site, structural, building, mechanical, electrical, and ancillary components as shown on the plans to allow construction of the new improvements. Debris removal, hauling and legal off-site disposal of debris shall also be included in this item. Removal, handling, and delivery of items to be returned to Owner shall also be included in this pay item.

D. Bid Item #4 – Acid Tank Improvements

1. The quantity to be paid for under this Section shall be on a lump sum basis, based on the percentage of the Item completed, and accepted by Owner.
2. Basis of Payment: Payment shall be made at the Contract Lump Sum Price and shall include, but not be limited to, furnishing all materials, labor, and equipment required to install and place into service the temporary sulfuric acid tank storage, supply and spill containment system, demolish the existing sulfuric acid tank and piping, construct the new 12,000 gallon horizontal steel storage tank, piping, valves, fittings, and appurtenances, testing and placing into service existing and new piping, storage tank, analog level measurement, and any other items shown in the contract drawings and required for a complete and fully functional system.

E. Bid Item #5 – Caustic Tank Improvements

1. The quantity to be paid for under this Section shall be on a lump sum basis, based on the percentage of the Item completed, and accepted by Owner.

2. Basis of Payment: Payment shall be made at the Contract Lump Sum Price and shall include, but not be limited to, furnishing all materials, labor, and equipment required to demolish the existing bulk zinc orthophosphate tank and piping, install and place into service the temporary caustic storage tank and supply system, demolish the existing 5,200 gallon horizontal steel tank, construct the new 5,200 gallon bulk caustic tank, heat trace system, insulation, piping, valves and appurtenances, testing and placing into service existing and new piping, storage tank, and any other items shown in the contract drawings and required for a complete and fully functional system.

3.2 NON-PAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for following:
 1. Loading, hauling, and disposing of rejected material.
 2. Quantities of excavated material wasted or disposed of in manner not called for under Contract Documents.
 3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
 4. Material not unloaded from transporting vehicle.
 5. Defective Work not accepted by Owner.
 6. Material remaining on hand after completion of Work.

3.3 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored for this project.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.
- C. Final Payment will not be made until all Record Drawings are acceptable to Owner/Engineer, Operation and Maintenance Manuals are final and acceptable to Owner/Engineer, final release of liens have been received for Contractor, Sub-contractor, suppliers, and vendors, all spare parts have been received (by Owner), and all punch list items are complete and acceptable to Owner/Engineer.

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contractor shall submit to the Engineer, shop drawings, project data and samples required by specification sections.

1.2 SCHEDULES

- A. Prepare and submit a Construction Schedule.
- B. Prepare and submit a separate schedule listing dates for submission of shop drawings and projected return dates.
- C. Schedules shall be updated and re-submitted on a monthly basis throughout the duration of the project.
- D. Prepare and submit two-week look ahead schedules bi-weekly throughout duration of the project.
- E. Prepare and submit temporary storage and feed plans for caustic and sulfuric acid systems. Suggested sequence of work is provided in Specification 01010 – Summary of Work.
 - 1. Coordinate all work with OWNER operations staff. Construction activities that impact operations require 48 hours advance notice and approval from the OWNER. It is anticipated that 2-4 shutdowns will be required as part of this project. Shutdown duration shall not exceed 4 hours.

PART 2 - PRODUCTS

2.1 SHOP DRAWINGS

- A. Original drawings, prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate portions of the Work; showing fabrication, layout, setting or erection details including, but not limited to the following:
 - 1. Sulfuric acid storage tank, piping and appurtenances
 - 2. Caustic storage tank, piping, insulation, heat trace system and appurtenances
 - 3. Miscellaneous metals
- B. Prepare submittals by a qualified detailer.
- C. Identify details by reference to sheet numbers and detail shown on Contract Drawings.

2.2 PROJECT DATA

- A. Manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information which is not applicable to project.
 - 2. Supplement standard information to provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
 - 1. Clearly mark each copy to identify pertinent materials, products or models.
 - 2. Show dimensions and clearances required.

3. Show performance characteristics and capacities.
4. Show wiring diagrams and controls.

2.3 SAMPLES

- A. Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.
- B. Office samples of sufficient size and quantity to clearly illustrate:
 1. Functional characteristics of product or material, with integrally related parts and attachment devices.
 2. Full range of color samples.

2.4 PAY REQUESTS

- A. Pay Requests shall be made in accordance with the requirements of the Agreement between Owner and Contractor. Payment requests shall include updated schedules as required in required 01300-1.2.

PART 3 - EXECUTION

3.1 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least 14 days before dates reviewed submittals will be needed.
- B. Submit number of copies of Shop Drawings, Project Datum and Samples which Contractor requires for distribution plus 4 copies for the Owner and Engineer.
- C. Accompany submittals with transmittal letter, in duplicate, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Notification of deviations from Contract Documents.
 5. Other pertinent data.
- D. Submittals must include:
 1. Date of submittal and revision dates.
 2. Project title and number.
 3. The names of:
 - a. Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate detailer when pertinent.
 4. Identification of product or material.
 5. Relation to adjacent structure or materials.
 6. Field dimensions, clearly identified as such.
 7. Identification of deviations from Contract Documents.
 8. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.

3.2 RESUBMISSION REQUIREMENTS

- A. Shop Drawings:
 - 1. Revise initial drawings as required and resubmit as specified for initial submittal.
 - 2. Clearly indicate on shop drawings all changes or revisions which have been made other than those requested by Engineer.
 - 3. Re-submittals without all comments from original review addressed will be returned to the contractor.
- B. Project Data and Samples:
 - 1. Submit new datum and samples as required for initial submittal.

3.3 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute copies of Shop Drawings and Project Datum which carry Engineer's stamp, to:
 - 1. Contractor's file.
 - 2. Job site file.
 - 3. Record Documents file.
 - 4. Other prime contractors.
 - 5. Subcontractors.
 - 6. Supplier.
 - 7. Fabricator.
- B. Distribute samples as directed.

- END OF SECTION -

NO SPECIFICATIONS ON THIS PAGE FOR FORMATTING PURPOSES.

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Contractor shall employ and pay for services of an Independent Testing Laboratory to perform specified services.
- B. Inspection, Sampling and Testing is required for:
 - 1. Cast-in-place Concrete (slump and compressive strength)
 - 2. Other operations specified in these specifications or as required by the Engineer.
- C. Contractor's employment of Testing Laboratory shall in no way relieve Contractor of their obligation to perform Work in accordance with Contract.

1.2 QUALIFICATION OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification", latest edition, published by American Council of Independent Laboratories.
- B. Meet basic requirements of ASTM E 329-90 "Standard Practice for Use in the Evaluation of Testing Agencies for Concrete and Steel as Used in Construction".
- C. Certified in the State of Florida in accordance with FDEP requirements.

1.3 LABORATORY DUTIES; LIMITATIONS OF AUTHORITY

- A. Cooperate with Engineer and Contractor; provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specified standards; ASTM, other recognized authorities, and as specified.
 - 2. Ascertain compliance with requirements of Contract Documents.
- C. Promptly notify Engineer, and Contractor, of irregularities or deficiencies of Work which are observed during performance of services.
- D. Promptly submit 2 copies of reports of inspections and tests to Engineer, including:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing Laboratory name and address.
 - 4. Name of Inspector
 - 5. Date of inspection or sampling.
 - 6. Record of temperature and weather.
 - 7. Date of test.
 - 8. Identification of product and specification section.
 - 9. Location in project.
 - 10. Type of inspection or test.
 - 11. Observations regarding compliance with Contract Documents.
- E. Laboratory is not authorized to:
 - 1. Release, revoke, alter, or enlarge on, requirements of Contract Documents.
 - 2. Approve or accept any portion of Work.
 - 3. Perform any duties of the Contractor.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. Select laboratory, and coordinate testing with Lab and Engineer's representative.
- B. Cooperate with Laboratory personnel, provide access to Work.
- C. Provide to Laboratory, preliminary representative samples of materials to be tested, in required quantities.
- D. Furnish copies of mill test reports.
- E. Furnish casual labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To obtain and handle samples at the site.
 - 3. To facilitate inspections and tests.
 - 4. For Laboratory's exclusive use for storage and curing of test samples.
- F. Notify Laboratory sufficiently in advance of operations to allow for his assignment of personnel and scheduling of tests.
- G. Pay for services of the Testing Laboratory to perform additional inspections, sampling and testing required:
 - 1. For Contractor's convenience.
 - 2. When initial tests indicate Work does not comply with Contract Documents.
 - 3. Such payment shall be made directly by the Contractor.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

- END OF SECTION -

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Comply with requirements stated in the Agreement between Owner and Contractor and in Specifications for administrative procedures in closing out the Work.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Section 01720 - Project Record Drawings
- B. Section 01730 – Operating and Maintenance Manuals

1.3 SUBSTANTIAL COMPLETION

- A. Substantial completion shall be defined as beneficial use of all proposed equipment. Beneficial use will not occur until the new caustic and sulfuric acid tanks have been installed, tested, and accepted by the Owner and Engineer of record.
- B. The Contractor shall deliver to the Engineer the Record Drawings and a draft copy of the Operations and Maintenance manuals for review and deliver to the Owner a complete set of all spare parts.
- C. When Contractor considers the Work is substantially complete, Contractor shall submit to Engineer:
 - 1. A written notice that the Work or designated portion thereof, is substantially complete.
- D. Within a reasonable time after receipt of such notice, Engineer will perform a field investigation to determine the status of completion.
- E. Should Engineer determine that the Work is not substantially complete:
 - 1. Engineer will promptly notify the Contractor in writing, giving the reasons therefore.
 - 2. Contractor shall remedy the deficiencies in the Work and send a second written notice of substantial completion to the Engineer.
 - 3. Engineer will reinvestigate the Work.
- F. When the Engineer finds that the Work is substantially complete, he will:
 - 1. Prepare and deliver to Owner a tentative Certificate of Substantial Completion, with a tentative list of items to be completed or corrected before final payment.
 - 2. After consideration of any objections made by the Owner and when Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

1.4 FINAL SITE REVIEWS

- A. When Contractor considers Work is complete, he shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been investigated for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
5. Work is completed and ready for Final Investigation.
- B. Engineer will perform a field investigation to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Engineer consider that the Work is incomplete or defective:
 1. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Engineer that the Work is complete.
 3. Engineer will reinvestigate the Work.
- D. When the Engineer finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.5 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A. Project Record Drawings to the requirements specified.
- B. Operating and Maintenance Manuals to the requirements specified.
- C. Contractor's affidavit of payment of debts and claims.
 1. Contractor's release or waiver of liens.
- D. Separate releases or waivers of liens for subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.

1.6 FINAL ADJUSTMENTS OF ACCOUNTS

- A. Submit a final statement of accounting to Engineer.
- B. Statement shall reflect all adjustments to the Contract Sum:
 1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Allowances.
 - c. Unit Prices.
 - d. Deductions for uncorrected Work.
 - e. Deductions for liquidated damages.
 - f. Deductions for re-inspection payments.
 - g. Other adjustments.
 3. Total Contract Sum, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. Engineer will prepare a final Change Order reflecting approved adjustments to the Contract Sum which was not previously made by Change Orders.

1.7 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Condition of the Contract.

1.8 FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue final certificate in accordance with provisions of the Contract Documents.

1.9 POST-CONSTRUCTION INSPECTION

- A. Prior to expiration of one year from Date of Substantial Completion, Engineer will make visual field investigation of Project in company with Owner and Contractor to determine whether correction of Work is required, in accordance with provisions of the Contract Documents.
- B. For Guarantees beyond one year, Engineer will make field investigations at request of Owner, after notification to Contractor.
- C. Engineer will promptly notify Contractor, in writing, of any observed deficiencies.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

- END OF SECTION -

NO SPECIFICATIONS ON THIS PAGE FOR FORMATTING PURPOSES.

SECTION 01720
PROJECT RECORD DRAWINGS

PART 1 - GENERAL

1.1 PROJECT RECORD DOCUMENTS

- A. Maintain at the site for the Owner one record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Engineer Field Orders or written instructions.
 - 6. Reviewed Shop Drawings.
 - 7. Field test records.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Conditions of the Contracts
- B. Section 01700 – Project Closeout

1.3 MAINTENANCE OF DOCUMENTS

- A. Store documents in approved location apart from documents used for construction.
- B. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- C. Make documents available at all times for inspection by Engineer and Owner. Record drawing information shall be maintained concurrently with Pay Requests and updated project schedules.

1.4 MARKING DEVICES

- A. Provide ink marking pens for recording information in a color code.

1.5 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information currently with construction progress.
 - 1. Do not conceal any work until required information is recorded.
- C. Drawings shall be drawn to record actual construction:
 - 1. Field changes of dimension and detail.
 - 2. Changes made by Field Order or by Change Order.
 - 3. Details not on original Contract Drawings.
- D. Specifications and Addenda; Legibly mark each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each item installed.
 - 2. Changes made by Field Order or by Change Order.

1.6 SUBMITTAL

- A. At Contract Close-out, Record Documents shall be submitted to Engineer in the following formats for Owner:

1. One set on 24" x 36".
- B. Accompany submittal with transmittal letter in duplicate, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each record document.
 5. Signature of Contractor or his authorized representative.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

- END OF SECTION -

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 RELATED INFORMATION

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
 - 1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
- B. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.
- C. Related Requirements Specified in Other Sections.
 - 1. Section 01300 - Submittals
 - 2. Section 01720 - Project Record Drawings
 - 3. Section 11504 – Sulfuric Acid Equipment
 - 4. Section 11507 – Caustic Equipment

1.2 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual and electronic format for use by Owner's personnel.
- B. Hard-Copy Format:
 - 1. Size: 8-1/2 in. x 11 in.
 - 2. Text: Manufacturer's printed data, or neatly typewritten.
 - 3. Drawings:
 - a. Provide reinforced punch binder tab, bind in with text.
 - b. Fold larger drawings to the size of the text pages.
 - 4. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.
 - 5. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.
- C. Binders:
 - 1. Commercial quality expandable catalog binders with durable and cleanable plastic covers.
 - 2. When multiple binders are used, correlate the data into related consistent groupings.
- D. Electronic format shall be in .pdf file format. Copies of specific manuals shall either be scanned or converted to .pdf format and submitted on CD disc to Owner. Submit after approval of hard copies from Engineer.

1.3 CONTENT OF MANUAL

- A. Neatly typewritten table of contents for each volume, arranged in a systematic order.
 - 1. Contractor, name of responsible principal, address and telephone number.

2. A list of each product required to be included, indexed to the content of the volume.
 3. List, with each product, the name, address and telephone number of:
 - a. Subcontractor or installer.
 - b. Maintenance contractor, as appropriate.
 - c. Identify the area of responsibility of each.
 - d. Local source of supply for parts and replacement.
 4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- B. Product Data:
1. Include only those sheets which are pertinent to the specific product.
 2. Annotate each sheet to:
 - a. Clearly identify the specific product or part installed.
 - b. Clearly identify the data applicable to the installation.
 - c. Delete references to inapplicable information.
- C. Drawings:
1. Supplement product data with drawings as necessary to clearly illustrate relations of component parts of equipment and systems.
 2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
 3. Do not use Project Record Documents as maintenance drawings.
- D. Written text, as required to supplement product data for the particular installation:
1. Organize in a consistent format under separate headings for different procedures.
 2. Provide a logical sequence of instructions for each procedure.
- E. Copy of each warranty issued.
1. Provide information sheet for Owner's personnel, give:
 - a. Proper procedures in the event of failure.
 - b. Instances which might affect the validity of warranties.

1.4 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit six (6) complete copies of manual in final form and two compact discs (CD) in PDF format. CD shall include bookmarks and chapters to closely duplicate that of the paper copy.
- B. Content, for each unit of equipment and system, as appropriate:
 1. Description of unit and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of all replaceable parts.
 2. Operating procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Alignment, adjusting and checking.
 3. Servicing and lubrication schedule:
 - a. List of lubricants required for each piece of equipment.
 - b. Schedule for manufacturer recommended maintenance.
 4. Manufacturer's printed operating and maintenance instructions.

5. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
6. Other data as required under pertinent sections of specifications.

1.5 SUBMITTAL SCHEDULE

- A. Submit one copy of completed data in final form fifteen days prior to final inspection or acceptance. Electronic submittal for initial review is acceptable.
 1. Copy will be returned after final inspection or acceptance, with comments.
- B. Submit specified number of copies of approved data in final form 10 days after final inspection or acceptance.

1.6 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

- END OF SECTION -

NO SPECIFICATIONS ON THIS PAGE FOR FORMATTING PURPOSES.

SECTION 02065

DEMOLITION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all supervised labor, materials, equipment, and incidentals required for the removal of all items necessary to be removed in order construct the project as indicated on the plans and in accordance with the specifications.
- B. The Contractor is responsible for removal of all debris from the site and proper disposal of debris.

1.2 CONDITION OF STRUCTURES

- A. By submitting a bid, the Contractor affirms that the Contractor has carefully examined the site and all conditions affecting the Work. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable.

1.3 RULES AND REGULATIONS

- A. The Building Code of the State of Florida shall control the demolition, modification or alteration of the existing site.
- B. No blasting shall be done on site.

1.4 SUBMITTALS

- A. Contractor shall follow sequence of demolition and construction of proposed equipment as described herein. Contractor is cautioned that sulfuric acid and caustic feed is essential for WTP operations and a temporary storage, supply, and spill containment system shall be in place for each system throughout duration of construction.
- B. Provide a detailed sequence of demolition and removal work as part of the Contractor's schedule.

1.5 ACCESS

- A. Conduct demolition and modification operations, and the removal of equipment and debris to ensure minimum interference with roads and walks both on-site and off-site and to ensure minimum interference with occupied or used facilities.
- B. Special attention is directed towards maintaining safe and convenient access to the existing facilities by Owner's operations personnel and associated vehicles.
- C. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the Engineer. Provide alternate routes around closed or obstructed traffic in access ways.

1.6 PROTECTION

- A. The Contractor shall conduct construction activities to minimize damage to adjacent buildings, structures, utilities, storm drainage, and other facilities, including persons.

1.7 DAMAGE

- A. The Contractor shall immediately report damage caused to adjacent facilities by demolition operations. The Contractor shall promptly make all required repairs as directed by the Engineer and at no cost to the Owner.

1.8 UTILITIES

- A. It shall be the Contractor's responsibility to maintain existing utilities in service and protect against damage during demolition operations.

1.9 POLLUTION CONTROL

- A. For pollution control, use sprinkling, temporary enclosures, and other suitable methods as necessary to limit the amount of dust and dirt rising and scattering in the air to the lowest level of air pollution practical for the conditions of work. Comply with the governing regulations.
- B. Clean adjacent structures and improvements of all dust, dirt, and debris caused by demolition operations. Return areas to conditions existing prior to the start of work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING EQUIPMENT, PIPING AND APPURTENANCES

- A. Subject to the constraints of maintaining the existing utilities in operation; existing chemical storage and feed equipment, piping, valves, and appurtenances not necessary for the operation of the newly modified facilities shall remain the property of the Owner unless otherwise directed by the Owner. The Contractor shall remove, clean, and prepare for storage all equipment to remain as directed by the Owner. If the Owner elects not to retain ownership of a certain item, the item shall become the property of the Contractor and shall be removed from the site at the Contractor's expense.
- B. All equipment and materials to be stored for reinstallation or salvage shall be properly protected from damage.
- C. Any items of equipment damaged or lost due to the Contractor's carelessness, mishandling, or faulty procedures and/or workmanship shall be repaired or replaced in kind to the satisfaction of the Engineer.

- END OF SECTION -

SECTION 02670

FLUSHING, TESTING AND DISINFECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Flushing and Pressure Testing of systems including, but not limited to, sulfuric acid and caustic system piping as listed herein.
- B. Contractor shall furnish all necessary pumps, hoses, piping, fittings, meters, gauges, chemicals and labor to conduct specified testing.
- C. Testing shall be repeated at the Contractor's expense until satisfactory results are achieved.
- D. Hydrostatic testing of the new bulk storage chemical tanks.
- E. Refer to the specific chemical system specification section for additional flushing and testing procedures.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Section 01300 – Submittals
- B. Section 11504 – Sulfuric Acid Equipment
- C. Section 11507 – Caustic Equipment

1.3 REFERENCES

- A. Not used.

1.4 SUBMITTALS

- A. Test Reports: Indicate results comparative to specified requirements. Submit two (2) copies of test results to Engineer in accordance with Submittal specifications.

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable Florida DEP requirements for performing the work of this Section.
- B. Work shall conform to Indian River County Utility Standards.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that acid and caustic tank(s) and associated piping systems have been cleaned, inspected, and tested.
- B. Coordinate scheduling with start-up, testing, demonstration procedures, including coordination with related systems.

3.2 CHEMICAL LINES – TESTING AND FLUSHING

1. Flush all chemical lines with potable water or use a nitrogen gas blast prior to testing. Purge all chemical lines of water using nitrogen gas to remove standing water and moisture from lines. It is the Contractor's responsibility to purge all water from chemical lines prior to filling lines with chemical to prevent heat damage to piping systems.
2. Pressure test all chemical lines to 150 psi, for a duration of 2 hours. Pressure loss shall not be less than 2% of test pressure. Pump suction lines shall be tested to 25 psi.
3. Ensure lines are thoroughly cleaned of all debris prior to placing into service. Contractor takes responsibility for repairing chemical systems if not thoroughly flushed out.
4. Safety procedures should be employed during pressure testing with nitrogen gas, if used.

3.3 QUALITY CONTROL

1. Not used.

- END OF SECTION -

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, surface preparation and coating material, tools, rigging, lighting, ventilation, and other related items of equipment and materials necessary to clean, prepare, coat, cure and cleanup a complete coating system on all interior and exterior exposed items and surfaces throughout the project, except as otherwise specified or shown on the drawings.
 - 1. Surface preparation, priming, and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the work.
 - 2. The scope of work shall include the coating of existing equipment and surfaces which are modified by this project. Color shall match existing unless otherwise noted and shall not look like patchwork - coating shall be extended to the nearest breakline, corner, etc. as may be necessary.
- B. The work includes field painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron work, tanks, vessels, and primed metal surfaces of equipment installed, except as otherwise indicated.
- C. Paint all newly constructed exposed surfaces normally painted in the execution of a new project. Where items or surfaces are not specifically mentioned, or are not specifically excluded from the painting work, paint these the same as adjacent similar materials or areas.
- D. Clean, prepare, coat, and cure all surfaces in strict accordance with the manufacturer's published recommendations and specifications.
- E. Perform all work by the use of skilled workpersons in a safe and productive manner using equipment and procedures consistent with good coating practices.
- F. Colors are indicated on the Painting Schedule in this section or shown on the drawings. If color or finish is not designated, the Engineer will select these from standard colors available for the materials system specified.

1.2 PAINTING NOT INCLUDED

- A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications.
 - 1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, metal fabrications, hollow metal work, and similar items. Also, for fabricated components such as shop-fabricated or factory-built mechanical and electrical equipment or accessories.
 - 2. Pre-Finished Items: Unless unit is part of an assembly to be painted to match, i.e. - motor, or otherwise shown or specified, do not include painting when factory-finishing or installer finishing is specified.
 - 3. Concealed Surfaces: Unless otherwise shown or specified, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.

Painting of galvanized or stainless steel work that will be concealed in the completed work is not required. Do not paint structural steel to be encased in concrete, nor structural steel specified not to be painted elsewhere. Except for touch-up as specified in Part 3, painting of shop primed structural steel and ferrous metals that will be concealed in the completed work is not required.

4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise specified.
5. Operating Parts and Labels: Moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting unless otherwise specified.
 - a. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
6. Other Surfaces: Do not paint sprinkler heads, fire detection heads, integrally colored stucco, brick masonry, cast stone, stone masonry, or architectural precast concrete, unless otherwise specified.

1.3 RELATED SECTIONS SPECIFIED ELSEWHERE

- A. Section 11504 – Sulfuric Acid Equipment
- B. Section 11507 – Caustic Equipment

1.4 REFERENCES

- A. ANSI/ASTM D16 - Definitions of terms relating to paint, varnish, lacquer, and related products.
- B. ASTM D2016 - Test method for moisture content of wood.
- C. Steel Structures Painting Council (SSPC).

1.5 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this section.

1.6 QUALITY ASSURANCE

- A. Furnish all coating materials by a single manufacturer. Solvent, thinners, and other miscellaneous materials can be supplied by the same manufacturer or by a supplier approved by the manufacturer.
- B. Furnish a statement to the Engineer from the coatings manufacturer that materials to be used by the Contractor comply with the manufacturer's recommendations.
- C. The Engineer reserves the right to require qualification of the product manufacturer and applicator, including satisfactory completion of at least two (2) projects of this nature.
- D. Manufacturer's Inspection Meeting: After set-up for painting but before commencing work, conduct a meeting at the site among representatives of the paint manufacturer, contractor, painting contractor, and Engineer to inspect the facility and review procedures recommended by the manufacturer for the prevailing conditions.

1.7 REGULATORY REQUIREMENTS

- A. Comply with all federal, state, and local health and fire regulations when handling and applying paint and coating products.

1.8 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's technical information including paint label analysis, surface preparation and application instructions for each material proposed for use. Indicate the surfaces to which each material is to be applied.
- B. Samples; Painting: Submit samples for Engineer's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.
- C. Manufacturer's Certificate: Submit a written certification from the paint manufacturer that materials furnished for the work meet or exceed specified requirements.
- D. Prepare a detailed painting schedule. List each Painting System to be used by Painting System Number, define extent and limits of each system and colors (by name and number) where appropriate.

1.9 PRODUCT DELIVERY AND STORAGE

- A. Deliver all materials to the jobsite in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information;
 - 1. Name or title of material.
 - 2. Fed. Spec. number, if applicable.
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Manufacturer's name.
 - 5. Contents by volume, for major pigment and vehicle constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
 - 8. Color name and number.
- B. Store paint materials and painting tools and equipment, including solvents and cleaning material, in a well ventilated, dry area away from high heat. Do not store in buildings or structures in use or being constructed, nor leave overnight therein. Follow manufacturer's recommendations for the safe storage of paints and solvents.
- C. Take precautions to prevent fire hazards and spontaneous combustion.

1.10 SAFETY

- A. Make all necessary provisions regarding materials, equipment, personnel, procedures, and practices, to assure that the work is done safely and that the working area is maintained free of all health and safety hazards.
- B. Observe manufacturer's health and safety precautions when storing, handling, and applying coating materials and cleanup materials containing solvents and/or chemical ingredients.
- C. Direct personnel's attention to all product warnings and information given on the labels of all products.
- D. Ensure that personnel mixing and applying coating materials are equipped with adequate protective clothing and devices (including respirators).
- E. Permit no smoking in the working area.
- F. Permit no item which may produce sparks or open flames in the immediate working area.
- G. Post warning signs outside of the work to apprise personnel of the hazards in the area. Erect barriers where necessary.

- H. Return partially used coating materials that are to be retained to their original containers at the completion of each work day. Tightly reseal containers, wipe material spills, clean and return the containers to the designated storage area.
- I. Remove waste coating materials and contaminated disposable items from the job site and dispose of them at the completion of each work day. Dispose of all items and materials in strict accordance with local, state, and federal regulations.

1.11 JOB CONDITIONS

- A. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F and 90 degrees F unless otherwise permitted by the paint manufacturers printed instructions.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F and 95 degrees F unless otherwise permitted by the paint manufacturers printed instructions.
- C. Do not apply paint in rain, fog or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
- D. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.
- E. Exercise caution when attempting to paint in windy conditions. The Contractor is responsible for all damage caused by wind blown paint.

PART 2 - PRODUCTS

2.1 COLORS AND FINISHES

- A. Paint colors, surface treatments, gloss, and finishes are indicated or specified in the "schedules" of the contract documents. Color and gloss not indicated or specified shall match the Owner's existing color scheme.
- B. Final acceptance of colors will be from samples applied on the job.
- C. Paint Coordination: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Furnish information to manufacturer's, fabricators, suppliers and others where necessary on the characteristics of the finish materials to be used, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required.

2.2 UNDERCOATS AND THINNERS

- A. Undercoats: Provide undercoat paint produced by the same manufacturer as the finish coats.
- B. Thinners: Use only thinners approved by the paint manufacturer, and use only within recommended limits.

2.3 ACCEPTABLE MANUFACTURER'S

- A. All coating references herein are to Tnemec Co., Inc., Ameron, or Sherwin Williams Protective Coatings. All coatings to be in contact with potable water must appear on the current Florida Department of Environmental Protection list of approved paint and protective coatings and be rated NSF approved for potable water.

2.4 PAINTING SYSTEMS

- A. Provide a minimum dry film thickness, noted as D.F.T., for the applications listed in the schedule of finishes.
- B. Touch-up shop-applied and field applied prime coats wherever damaged or bare and keep touched-up as necessary before and after installation or erection of the items, to maintain protection of the metal from rust and corrosion. Clean and touch-up with the same type of primer as initially used.
- C. Note: Color for all surfaces in contact with potable water to be white or ivory to conform to State of Florida, EPA, and FDA Regulations for contact with potable water.

2.5 SCHEDULE OF FINISHES

- A. Steel, galvanized steel and non-ferrous metal
 - 1. Exterior of structural tanks, pipe, equipment and miscellaneous fabrication for outdoor exposure:
 - a. System: Epoxy / Polyurethane
 - b. First Coat: Series 66 Hi-Build Epoxoline
 - c. D.F.T. (Mils): 3.0 - 5.0
 - d. Second Coat: Series 66 Hi-Build Epoxoline
 - e. D.F.T. (Mils): 2.0 – 3.0
 - f. Third Coat: Series 73 Endura-Shield
 - g. D.F.T. (Mils): 2.0 – 3.0
 - h. Min D.F.T. (Mils): 9.0
 - B. Interior of structural tanks. (See Specification Section 11504 and 11507)
 - C. Concrete and Masonry (touch-up, only)
 - 1. Bulk Acid Containment Area
 - a. System: Epoxy Novolak
 - b. First Coat: Series 201 Tnemec – Prime Coat
 - c. D.F.T. (mls) 8.0
 - d. Second Coat: Series 275 Tnemec – Base Coat
 - e. D.F.T. (mls) 35.0
 - f. Final Coat Series 282 Tnemec – Top Coat
 - g. D.F.T. (mls) 15.0
 - h. Total Coats: 3.0
 - i. Total D.F.T. (mls) 58.0
 - 2. Sherwin Williams Cor-Cote Novolac Epoxy can be considered an equivalent coating system.
 - 3. Exterior (Concrete and Stucco)
 - a. System: High Build Acrylic Emulsion
 - b. First Coat: 180 – Color W.B. Tneme-Crete
 - c. D.F.T. (Mils.): 4.0 – 8.0
 - d. Second Coat: 180 – Color W.B. Tneme-Crete
 - e. D.F.T. (Mils.) 4.0 – 8.0
 - f. Min D.F.T. (Mils.): 10.0

2.6 SCHEDULE OF COLORS

- A. These colors are provided for painting of piping, which has modified and furnished and installed. Not all piping listed may require painting.
- B. Liquid Piping:
 - 1. Acid - safety red
 - 2. Caustic - black
- C. Structural Tanks and Buildings
- D. The colors of all structural tanks and containment areas shall match existing where possible.
- E. Owner to pick final colors.
- F. Electrical Conduits—Color to match background

PART 3 - EXECUTION

3.1 FIELD OBSERVATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer. Do not paint over conditions detrimental to the formation of a durable paint bond and film.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application. Do not proceed with the work until unsatisfactory conditions have been corrected.
- C. Provide all necessary equipment, labor, rigging, lighting and other equipment to facilitate inspections
- D. The Engineer may inspect the Work at any time for compliance with the requirements of the specifications.
- E. The Engineer reserves the right to approve each phase of the Work before further work is done, to halt all Work deemed to be improper or not in compliance with the specification, and to require the Contractor to promptly correct all improper practices or deficient Work.
- F. The Contractor is responsible for any expenses incurred in association with corrective measures required as the result of improper practices and/or defective or deficient work.

3.2 GENERAL REQUIREMENTS

- A. Provide adequate explosion - proof lighting sufficient to illuminate clearly the working area without shadows during all surface preparation and coating operations.
- B. Maintain adequate and continuous explosion - proof ventilation in confined areas during all surface preparation and coating operations and during all recoat and curing periods. Provide ventilation of sufficient capacity to maintain a clear atmosphere that is well below explosive and toxic limits. Arrange the ventilation system, including all fans and temporary duct work, so that no still air spaces exist in any area.
- C. Heating devices used to create and/or maintain temperature conditions in compliance with the specification requirements are to be explosion proof and of the type that do not exhaust sooty or oily residues or any other contaminants into the air. Heating devices are not to be used when existing temperature and humidity conditions may create dew point conditions.
- D. Use equipment that is explosion proof and non-sparking. Spray equipment must be recommended by or acceptable to the coatings manufacturer.

- E. Apply caulking material only after the last coat of paint has been applied and has dried hard. Caulking material used must be of a type that is compatible with the specified coating system.

3.3 SURFACE PREPARATION

- A. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate conditions.
- B. Surface preparation shall be conducted to prevent material from contaminating the existing water treatment process.
- C. Fiberglass and PVC materials shall be solvent cleaned according to SSPC-SP1 and scarified by best practical means. Every precaution should be taken to ensure that NO sanding dust is drawn into the degasifiers. Painting contractor to furnish all necessary barrier, drapes, etc. to prevent contamination of the Finish Water.

3.4 MATERIAL PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's direction.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the materials. Remove the film and if necessary, strain the material before using.

3.5 APPLICATION

- A. General
 - 1. Conform to articles "General Requirements" and "Surface Preparation" prior to beginning coating application.
 - 2. Apply paint as specified and in accordance with the manufacturer's printed instructions. Unless otherwise recommended in the manufacturer's printed instructions or specified elsewhere (e.g. Bid Form, Painting System) use brushes for applying first coat on wood and use standard industrial spray equipment, either airless or conventional for applying first coat on metals other than sheetmetal and items fabricated from sheetmetal. For other coats on wood, metal and other substrates, use applicators and techniques best suited for the type of material being applied.
 - 3. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to ensure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces.
 - 5. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
 - 6. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 - 7. Paint the back sides of access panels, and removable or hinged covers to match the exposed surfaces.

8. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated or specified.
 9. Sand lightly between each succeeding enamel or varnish coat.
 10. Omit the field prime coat on shop-primed and touch-up painted metal surfaces which are not to be finish painted and which will not be exposed to view in the completed work. Do not omit primer on metal surfaces specified to be finish coated or on metal surfaces that will be exposed to view in the completed work.
 11. Putty nail holes and joints after prime coat is dry.
 12. Change colors at corner of stop where colors differ between adjoining rooms or spaces and where door frames match wall colors.
 13. Provide a finished coating system free of all runs, sags, cracks, blisters, pinholes, excessive or deficient fill thickness, or any other defects. Correct any such deficiencies by proper removal of the defect and/or recoating.
 14. Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Sandblasted surfaces are not to be left uncoated overnight.
 15. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
 16. Provide minor tinting to each coat of paint in order to differentiate between coats.
- B. Minimum Coating Thickness
1. Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as specified or, if not specified, as recommended by the coating manufacturer.
- C. Painting of Mechanical and Electrical Work
1. Limit painting of mechanical and electrical work to those items exposed in equipment rooms and occupied spaces, and on the exterior of buildings or structures.
 2. Mechanical items to be painted include, but are not limited to, the following:
 - a. Piping, pipe hangers, and supports
 - b. Tanks
 - c. Accessory items
- D. Prime Coats
1. Apply a prime coat of material, which is required to be painted or finished, and which has not been prime coated by others.
 2. Clean and prime unprimed ferrous metals as soon as possible after delivery of the metals to the job site.
 3. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- E. Completed Work
1. Match approved samples for color, texture and coverage.
 2. Remove, refinish or repaint work not in compliance with specified requirements.
- F. Dry Film Gauge

1. Provide "Noroson Magnetic Dry Film Thickness Gauge" as supplied by the coatings manufacturer.

3.6 CLEAN-UP AND PROTECTION

A. Clean-up

1. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
2. Upon completion of painting work, clean window glass and other paint - spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.

B. Protection

1. Protect open water holding tanks and basins of the existing water treatment plant.
2. Protect work of other trades, whether to be painted or not, against damage from painting and finishing work.
3. Protect surfaces that might otherwise be damaged by dripping, splashing, or spraying of paint. Correct any damage by cleaning, repairing or replacing and repainting as acceptable to the Engineer.
4. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after the completion of paint operations.
5. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.
6. Repair of damage caused by overspray is the contractor's responsibility.

3.7 WARRANTY

- A. If within one year after the date of Substantial Completion, any Work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER'S written instructions, either correct such defective Work, or, if it has been rejected by OWNER, remove it from the site and replace it with nondefective Work. If CONTRACTOR does not promptly comply with terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, will be charged to the CONTRACTOR.

- END OF SECTION -

SECTION 11504
SULFURIC ACID EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This section provides for the furnishing, installation and placing into service a bulk acid tank, piping, appurtenances, and valves. The components shall be compatible with 93%-98% concentration, by weight, sulfuric acid.

1.2 RELATED SECTIONS

- A. Section 01010 – Summary of Work
- B. Section 02670 – Flushing, Testing and Disinfection
- C. Section 09900 - Painting

1.3 SUBMITTALS

- A. Submit to the ENGINEER, shop drawings, details of construction and erection for tank, piping, and valves as follows:
 - 1. Dimensions of tank, fittings and attachments, with bolt and gasket material.
 - 2. Wall thickness calculations per ASTM D 1998-97 using 600-psi design hoop stress at 100 degrees F.
 - 3. Statement from the Tank manufacturer that the tank has been fabricated in accordance with ASME Boiler and Pressure vessel Code Section VIII-1-2017
 - a. Include design calculations signed and sealed by an engineer licensed in the State of Florida.
 - 4. Locations of fittings and attachments and size of manway openings.
 - 5. Resin used and a complete manufacturer specification of the resin used.
 - 6. Weight of tanks.
 - 7. Statement from tank manufacturer that fabrication and structural design is in accordance with these Specifications.
 - a. Include structural design calculations signed and sealed by an engineer licensed in the State of Florida.
 - 8. Statement from coating manufacturer that proposed internal tank coating is suitable to be submerged in 93-98% strength sulfuric acid.
 - 9. Certificate of Compliance from the tank manufacturer stating:
 - a. All fittings, heat tracing, insulation, etc. have been installed by the tank manufacturer.
 - b. Hydrostatic tests have been performed by the manufacturer and all fittings were installed prior to the tests.
 - 10. Samples of a representative tank wall.
 - 11. Details on packaging.
 - 12. Instructions for handling, storage and installation of tanks.
 - 13. Statement that materials and resin used is suitable for intended service.
- B. Bill of Materials.
 - 1. Operation and Maintenance data, including test reports, maintenance and schedules.

1.4 QUALITY ASSURANCE & WARRANTY

- A. The tank manufacturer shall be fully responsible for the structural design, integrity, water tightness of the tanks including anchorage and connections. The tank manufacturer shall provide materials and workmanship warranty for a period no less than two (2) years after completion of the project. The warranty shall be submitted with the shop drawings.
- B. The tank manufacturer shall replace defective tanks within the warranty period at no cost to the Owner.

1.5 ACCEPTABLE TANK MANUFACTURERS

- A. The following manufacturers are approved for use:
 - 1. Dixie Southern, Inc.
 - 2. Modern Welding Company of Florida
 - 3. Tampa Tank Incorporated
 - 4. Miami Filter, Inc.

PART 2 - PRODUCTS

2.1 BULK STORAGE TANK

- A. The Sulfuric Acid Bulk Storage Tank shall be a nominal 12,000 gallon horizontal storage tank of nominal dimensions as shown on the drawings, for the storage of 93% - 98% sulfuric acid by weight sized to fit within the bulk containment area. The tank shall be constructed of ¼" minimum ASTM A-285, Grade C Steel, with the following fittings as a minimum:
 - 1. Fill – 3-inch 150# flange (FL) located top of tank
 - 2. Supply to feed pumps – 2-inch 150# FL located at bottom of dished end, flush with bottom of tank
 - 3. Drain – 2-inch 150# FL located on bottom of tank
 - 4. Level Transmitter – 4-inch 150# FL (top of tank)
 - 5. Vent – 3-inch 150# FL
 - 6. Overflow – 6-inch 150# FL located on top of tank
 - 7. Liquid Level Sight Glass – (2) 1-inch 150# FL located on dished end of tank, top and bottom
 - 8. Manway/access - (1) 24-inch opening access
 - 9. Lifting eyes - as required
- B. Tank exterior to be coated in accordance with Section 09900. The interior shall be suitable for immersion in 93%-98% sulfuric acid and have high temperature resistance. Interior coating shall be an oxirane two component thermoset polymer suitable for immersion in 93% sulfuric acid. Surface preparation shall meet SSPC-SP10 near white finish and be in accordance with manufacturers' requirements. Coating shall be a minimum 12 mil DFT, and be ChemLINE 784/32, as manufactured by Advanced Polymer Coatings, Avon, OH, or equal.
- C. Provide fittings for vent, supply/drain, manway, level sensor, overflow, lifting lugs and as indicated on the construction drawings.
- D. Tank shall be sized to provide 12,000 gallons of available volume with adequate freeboard to achieve minimum blanking distance for level transducer. Refer to the construction drawings for clarification.

- E. Liquid level sight gauge shall be borosilicate glass tubing, 1-inch in outer diameter with 1/8-inch wall thickness. Tubular gauge valves shall be shielded, 1-inch flange with auto ball check valves. Body shall be constructed of bronze and packing shall be EPDM with Teflon stem packing.
- F. The proposed tank shall include two (2) Grade A36 carbon steel support saddles complete with base plate, stiffener plates, bands, and webs to sufficiently support the tank with full load of 93-98% strength sulfuric acid. The tank manufacturer shall include support saddle information within the tank shop drawing for approval.
 - 1. Spacing of the support saddles for the proposed tank shall match spacing of the support saddles for the existing sulfuric acid tank. The existing concrete support pedestals shall be reused.

2.2 FILL PIPING

- A. Fill piping connection into the tank shall extend from the flanged connection at the top of the tank to within 12-inches of the bottom of the tank. The pipe shall have a 45-degree mitered end.

2.3 FLANGED NOZZLES

- A. Flanged nozzles shall be designed for a minimum torque of 2,000 ft-pounds and a minimum bending moment of 1,500 pounds.
- B. Nozzles shall be flanged
- C. Flange dimensions shall conform to ANSI B16.5, class 150

2.4 SIGHT INDICATOR

- A. Tank shall be equipped with visual liquid level indicator. Housings and floats shall be constructed of type 316 stainless steel.
- B. Length of level indicators shall be in accordance with the contract documents and shall be coordinated by the tank manufacturer.
- C. Visual liquid level indication shall be mounted such that they are readily visible from outside of the bulk chemical containment area.
- D. Top and bottom connections to tank shall be provided with flanged or fused Halar/PVDF piping and ball valves to allow for isolation of tank from visual sight indicator.
- E. Sight indicator shall be SureSite model by Gems Sensors or approved equivalent.

2.5 SUPPORT SADDLES AND ANCHORAGE

- A. The proposed tank shall include two (2) Grade A36 carbon steel support saddles complete with base plate, stiffener plates, bands, and webs to sufficiently support the tank with full load of 93-98% strength sulfuric acid. The tank manufacturer shall include support saddle information within the tank shop drawing for approval.
 - 1. Spacing of the support saddles for the proposed tank shall match spacing of the support saddles for the existing sulfuric acid tank. The existing concrete support pedestals shall be reused.
- B. Anchor bolts, nuts, washers, etc. shall be type 316 stainless steel.
 - 1. Bolts shall conform to ASTM A 193, Grade B8M
 - 2. Nuts shall conform to ASTM B 194, Grade 8M
 - 3. Provide washer for each nut of same material (316 stainless steel)

2.6 ACID PIPE, DOUBLE CONTAINMENT SYSTEM AND FITTINGS

- A. All piping and pipe fittings that are in continuous contact with sulfuric acid shall be in the appropriate diameters, in accordance with the piping section of this specification and the drawings. Piping includes fill, supply, drain, and liquid level piping, fittings, and valves.
- B. Carrier pipe, fittings, and valves shall be manufactured from E-CTFE (HALAR), OR PVDF (Polyvinylidene fluoride). All fittings material must be compatible with 93% - 98% sulfuric acid. All gaskets associated with the acid system shall be Viton. Containment piping shall be the same or other approved material, such as polypropylene or CPVC.
- C. All piping and pipe fittings associated with the acid system shall be in the appropriate diameters, of similar manufacturer, and in accordance with the piping section of this specification and the drawings.
- D. Double containment piping system shall be Duo-Pro system by Asahi, Inc., Flo-Safe, Inc. or equal. Carrier and containment system shall be 2"x4" systems.
- E. E-CTFE, "HALAR" PIPING
 - 1. All plastic pipe and fittings if used, shall be compatible with 93%-98% sulfuric acid and be made of E-CFTE (Halar) resin.
 - 2. E-CFTE Pipe and Fittings shall be based on a Standard Dimensional Ratio (SDR) of 21, 1" through 4" (20-110mm). Pipe and fittings shall be from the Ultra Proline Piping Systems as supplied by Asahi/America, Inc. or equal. Pressure rating based on water conveyance for pipe and fittings shall be 150 psi (10 bar) for sizes up to 1 1/2" (50mm) and 120 psi (8.3 bar) for sizes 2" (63mm) and above.
 - 3. Pipe Restraint – All pipe restraint in buried systems are accomplished using the Dogbone fitting. All pipe hung aboveground will be restrained using a restraint style Dogbone fitting with locking shoulder in combination with an approved hanger.
 - 4. All Halar (E-CFTE) Systems require all personnel to be trained by factory Field Technicians only, without variation. Any systems or welds conducted by personnel not trained by Asahi/America Factory Field Technicians shall not be accepted.
- F. PVDF (Polyvinylidene Fluoride)
 - 1. Pipe made from PVDF shall be thermoplastic material that is assembled using heat fusion welding, have high impact and abrasion resistance, be UV resistant, and be compatible with 93% sulfuric acid.

2.7 HALAR/PVDF VALVES

- A. All 1-inch valves shall be flanged true union ball valves, fabricated from PVDF or Halar. Seats shall be Teflon, and seals shall be Viton. Connections shall be flanged. Valves shall be as manufactured by Chemtrol or Asahi America
- B. PVDF True Union Ball Valves: 2" Tru-union ball valves are to be Kynar PVDF Tru-Bloc true union ball valves with Viton seal and seat, and PVDF body stem, and ball. 2" true union ball valves are to be Kynar PVDF Tru-Bloc Model C as manufactured by Chemtrol or Type 21 as manufactured by Asahi America.
- C. PVDF Diaphragm Valves: Valve body shall be PVDF with durable corrosion resistant PPG bonnet, and PVDF diaphragm. Diaphragm valves are to be Kynar True Union Diaphragm PVDF.
- D. Halar Diaphragm Valves: diaphragm valves shall have flanged connections. The valve body shall be fabricated from ECTFE, with a Teflon diaphragm and have stem position indicators. The

diaphragm shall be polytetrafluoroethylene (PTFE) backed EPDM. The valves shall be as manufactured by Asahi, or equal.

- E. Flange insert check valve
 - 1. Flange insert check valve shall be installed on the bulk chemical overflow piping
 - 2. The check valve shall be installed between two mating flanges and be of the same diameter as the overflow piping
 - 3. The valve material shall be Teflon with Teflon o-ring seats, and type 316 stainless steel springs completely encapsulated in Teflon
 - 4. The valve shall have a cracking pressure of 1/2 psi.
 - 5. The flange insert check valve shall be manufactured by Check-All Valve Manufacturing Company or approved equal.

2.8 TANK OVERFLOW

- A. The tank overflow piping shall be equipped with a 2-inch Halar or PVDF drop pipe within the bulk storage tank.
- B. The overflow piping shall be extended and supported to the secondary containment slab. The end of the overflow piping shall have a 316 stainless steel insect screen with openings no larger than 1/4-inch.

2.9 CPVC PIPING AND VALVES

- A. Vent and overflow piping that is not intended for continuous contact with sulfuric acid shall be schedule 80 CPVC.
- B. Schedule 80 CPVC Pipe:
 - 1. Rigid CPVC (chlorinated polyvinyl chloride) compound used in the manufacturer of schedule 80 pipe shall be Type IV, grade 1 as identified in ASTM D1784. The pipe shall be NSF rated for potable water.
 - 2. CPVC schedule 80 shall meet the requirements of ASTM standard D1785 for physical dimensions and tolerances.
 - 3. The marking on CPVC Schedule 80 pipe shall meet the requirements of ASTM D1785 and state the material designation code, nominal pipe size, schedule of pipe, pressure rating in psi for water at 200° F., the ASTM designation number D1785 and the NSF seal for potable water.
 - 4. Fittings used shall be CPVC Schedule 80 and solvent welded in accordance with ASTM D1785.
 - 5. CPVC Flanges shall be schedule 80 Vanstone style. Flanged gaskets shall be manufactured from EPDM. All hardware, bolts, washers, nuts, and etc. shall be Hastelloy. Provide washers for each nut, washer material shall be of same material as the nut.
 - 6. Small Diameter CPVC Pipe: CPVC pipe smaller than 4-inch shall be schedule 80 CPVC plastic pipe with solvent weld fittings in accordance with ASTM F-441.
 - 7. Solvent cement shall be EP42 Gray Industrial Cement.
- C. Ball valves
 - 1. Ball valves shall be Sch. 80 CPVC socket construction with PTFE backed with EPDM seats and EPDM seals. The ball valves shall have a 230psi pressure rating. Ball valves to be manufactured by ASAHI/AMERICA or approved equal.
- D. Ball Check Valves

1. Ball check valve shall be installed on the desiccant air supply piping to the proposed sulfuric acid tank. The ball check valve shall CPVC with viton be Chemtrol BC series, single union
- E. Butterfly Valves
 1. Butterfly valves shall be wafer style for ANSI flanges. Valve body and disc shall be CPVC. Seats and seals shall be EPDM. The disc shaft be stainless steel and have full engagement with the disc so as to be a non-wetted part isolated from the media by double "O" ring seals on top and bottom tru-unions of disc. The valve shall be capable of providing bubble-tight seating. The valve shall have a geared operator capable of providing adequate opening torque at the design 150 psi pressure rating. Valve shall be manufactured by ASAHI/America or approved equal.

2.10 TANK VENT AND DESICCANT BREATHER

- A. One (1) industrial desiccant driers shall be provided and installed for the proposed caustic vent piping, providing the capability of drying air in relatively large quantities on continuous cycles.
- B. The desiccant drier shall be provided with CPVC isolation valve on the supply piping to the drier to allow for isolation during maintenance operations.
- C. The desiccant shall be indicating type, impregnated with cobalt chloride. The desiccant shall be blue when dry and change to pink upon absorption of moisture such that the color change is clearly visible. Desiccant shall be 4-mesh.
- D. Desiccant drier shall be coated per 09900.
- E. Desiccant driers shall be Model 1200 storage tank vent drier with indicating drierite as manufactured by W.A. Hammond Drierite Co., or approved equivalent.

2.11 LEVEL TRANSMITTER

- A. A continuous ultrasonic level transducer/transmitter with non-contacting sensor shall be provided for the day tanks, bulk tanks, clearwell and cleaning tanks as shown on the drawings. The sensor/transmitter shall be installed on the tank fitting.
- B. The sensor shall be manufactured of Tefzel construction, have a 10° beam angle, and be flange mounted in the center of the tank. A pipe extension shall be provided should the sensor dead band require space between high liquid level and sensor face.
- C. The transducer/transmitter shall be mounted so that it will have a clear path perpendicular to the liquid surface. The path should not intersect the fill path, rough walls, seams rungs, etc.
- D. The transducer/transmitter shall have all solid-state circuitry and shall be of the two-wire type. The transmitter shall be suitable for operation in ambient temperatures from -40° to 140° F. The transmitter shall be NEMA 4X rated, have non-volatile EEPROM memory, have a liquid crystal display, have a 4-20 mA dc signal, one normally closed contact relay rated at 5A at 250 VAC non-inductive or 24 V dc, and shall have Hart protocol communication capability. Level transmitter shall be Siemens HydroRanger 200 Controller Model 7ML1034-3AA01, with transducer model # 7ML1106-1BA2C with handheld programmer, or equal.
- E. Twisted shielded pair shall be provided and installed for level indication. Shielded pair shall be 16 gauge twisted pair, 600V, aluminum tape shielded, polyvinyl chloride jacketed, as manufactured by Houston Wire and Cable HW-106 or an approved equal.

2.12 CONDUIT

- A. Liquid tight flexible nonmetallic conduit, couplings and fittings shall be provided as shown on the construction plants.
- B. Conduit shall have PVC core with fused flexible PVC jacket
- C. Conduit shall be UL 1660 listed for:
 - a. Dry conditions: 80 degrees C insulated conductors
 - b. Wet conditions: 60 degrees C insulated conductors
- D. Conduit shall be Carflex or X-flex by Carlon or approved equal.

2.13 TANK SIGNAGE

- A. The bulk storage tank shall be provided with NFPA placard to identify chemical that is being stored.
- B. Tank shall also include a stainless steel nameplate including the following information:
 - 1. Material stored
 - 2. Concentration of material stored
 - 3. Specific gravity
 - 4. Maximum temperature
 - 5. Tank capacity
 - 6. Manufacturer
 - 7. Date manufactured

PART 3 - EXECUTION

3.1 TESTING

- A. Tank shall be thoroughly flushed out of all debris at least twice, or hand swabbed before placing into service in order to insure tank is clean.
- B. All piping, fittings, valves shall be visual leak tested where pressure testing cannot occur. All piping to be completely purged (nitrogen gas purging recommended) from any foreign material prior to filling and testing.
- C. Any defects are to be repaired by the Contractor at no additional cost to the Owner. In the event that field repairs are inadequate, the Contractor shall replace the defective tank/fitting as approved by the Engineer.
- D. Filling of the new system with acid indicates acceptance of system. If leaks develop after filling, contractor is fully responsible for any costs associated with removing spent acid and disposing of properly.
- E. If leaks develop after filling the tanks and piping with sulfuric acid, the Contractor is fully responsible for any costs associated with removing spent acid and disposing of properly. The Contractor will also be responsible for all repairs necessary, as directed by the Owner and/or the Engineer, to restore the system to "new" condition.

3.2 DEMOLITION OF EXISTING TANK

- A. Contractor shall remove existing tank and dispose of properly, including removal of residual chemicals in bottom, hauling and disposal of existing steel storage tank.

3.3 SPARE PARTS

- A. Four (4) 25-pound containers 4-mesh indicating drierite

- END OF SECTION -

SECTION 11507
CAUSTIC EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This section provides for the supply, installation and placing in service 5,200 gallon bulk storage tank and associated piping, valves, fittings, and appurtenances. The components shall be compatible with 50% concentration, by weight, sodium hydroxide.

1.2 RELATED SECTIONS

- A. Section 01000 – Summary of Work
- B. Section 09900 - Painting

1.3 SUBMITTALS

- A. Submit to the ENGINEER, shop drawings, details of construction and erection for tank, piping, and valves as follows:
 - 1. Dimensions of tank, fittings and attachments, with bolt and gasket material.
 - 2. Wall thickness calculations per ASTM D 1998-97 using 600-psi design hoop stress at 100 degrees F.
 - 3. Statement from the Tank manufacturer that the tank has been fabricated in accordance with ASME Boiler and Pressure vessel Code Section VIII-1-2017
 - a. Include design calculations signed and sealed by an engineer licensed in the State of Florida.
 - 4. Locations of fittings and attachments and size of manway openings.
 - 5. Resin used and a complete manufacturer specification of the resin used.
 - 6. Weight of tanks.
 - 7. Statement from tank manufacturer that fabrication and structural design is in accordance with these Specifications.
 - a. Include design calculations for structural design of tank walls, tank support legs, and tank tie-down and anchor system, signed and sealed by an engineer licensed in the State of Florida.
 - 8. Statement from coating manufacturer that proposed internal tank coating is suitable to be submerged in 25-50% strength sodium hydroxide.
 - 9. Certificate of Compliance from the tank manufacturer stating:
 - a. All fittings, heat tracing, insulation, etc. have been installed by the tank manufacturer.
 - b. Hydrostatic tests have been performed by the manufacturer and all fittings were installed prior to the tests.
 - 10. Samples of a representative tank wall.
 - 11. Details on packaging.
 - 12. Instructions for handling, storage and installation of tanks.
 - 13. Statement that materials and resin used is suitable for intended service.
- B. Bill of Materials.
 - 1. Operation and Maintenance data, including test reports, maintenance and schedules.

1.4 QUALITY ASSURANCE & WARRANTY

- A. The tank manufacturer shall be fully responsible for the structural design, integrity, water tightness of the tanks including anchorage and connections. The tank manufacturer shall provide materials and workmanship warranty for a period no less than two (2) years after completion of the project. The warranty shall be submitted with the shop drawings.
- B. The tank manufacturer shall replace defective tanks within the warranty period at no cost to the Owner.

1.5 ACCEPTABLE TANK MANUFACTURERS

- A. The following manufacturers are approved for use:
 - 1. Dixie Southern, Inc.
 - 2. Modern Welding Company of Florida
 - 3. Tampa Tank Incorporated
 - 4. Miami Filter, Inc.

PART 2 - PRODUCTS

2.1 BULK STORAGE TANK

- A. The bulk caustic storage tank shall be a nominal 5,200 gallon horizontal storage tank of nominal dimensions as shown on the drawings, for the storage of 25-50% sodium hydroxide by weight sized to fit within the bulk containment area. The tank shall be constructed of ¼" minimum ASTM A-285, Grade C Steel, with the following fittings as a minimum:
 - 1. Fill – 3-inch 150# flange (FL) located top of tank w/ drop pipe
 - 2. Supply to feed pumps – 2-inch 150# FL located at bottom of dished end, flush with bottom of tank
 - 3. Day tank overflow – 2-inch 150# FL located on top of dished end, flush with top of tank
 - 4. Drain – 2-inch 150# FL located at bottom of tank
 - 5. Level Transmitter – 4-inch 150# FL (top of tank) for future installation. Install 4" blind flange
 - 6. Vent – 2-inch 150# FL
 - 7. Overflow – 3-inch 150# FL located on top of tank
 - 8. Liquid Level Sight Glass – (2) 1-inch 150# FL located on dished end of tank, top and bottom
 - 9. Manhole/access - (1) 24-inch opening access
 - 10. Lifting eyes - as required
- B. Tank exterior to be coated in accordance with Section 09900, green urethane on exposed carbon steel.
- C. The tank interior shall be coated to be suitable for immersion in 25-50% sodium hydroxide and have high temperature resistance. Surface preparation shall meet SSPC-SP10 near white finish and be in accordance with manufacturers' requirements. Coating shall be a minimum 12 mil DFT, and be ChemLINE High Solids, as manufactured by Advanced Polymer Coatings, Avon, OH, or equal.
- D. Provide fittings for vent, supply/drain, manway, level sensor, overflow, day tank overflow, lifting lugs and as indicated on the construction drawings.

- E. Tank shall be sized to provide 5,200 gallons of available volume with adequate freeboard to achieve minimum blanking distance for future level transducer. Refer to the construction drawings for clarification.

2.2 HEAT TRACING AND INSULATION

- A. The proposed bulk storage tank shall be heat traced and insulated.
 - 1. Bulk storage tank shall have polyurethane spray foam insulation.
 - 2. The existing heater cables and thermostat cables may be re-used. Replace all conduit as described on the drawings
- B. Supply piping from the bulk storage tank to the transfer pump located outside (within bulk containment) shall be heat traced and insulated.
 - 1. Pipe insulation and jacketing shall be molded type pipe covering made of fibrous glass. Joints between sections of insulation shall be covered with woven glass fiber type. Insulation shall be covered with smooth PVC jacketing. Piping insulation and PVC jacket shall be as manufactured by Johns Manville, or approved equivalent.
 - 2. Valves and flanges shall not be insulated.
- C. Conduit and temperature switch shall be replaced as described on the construction plans.
 - 1. Temperature switch shall be Type 55A by United Electric of approved equal.
 - 2. Rigid conduit shall be schedule 80 PVC
 - 3. Non-rigid, nonmetallic, flexible conduit shall have a PVC core with fused flexible PVC jacket. Conduit shall be UL 1660 listed for:
 - a. Dry conditions: 80 degrees C insulated conductors
 - b. West conditions: 60 degrees C insulated conductors
 - c. Conduit shall be Carflex or X-flex by Carlon or approved equal.

2.3 FILL PIPING

- A. Fill piping connection into the tank shall extend from the flanged connection at the top of the tank to within 12-inches of the bottom of the tank. The pipe shall have a 45-degree mitered end.

2.4 FLANGED NOZZLES

- A. Flanged nozzles shall be designed for a minimum torque of 2,000 ft-pounds and a minimum bending moment of 1,500 pounds.
- B. Nozzles shall be flanged
- C. Flange dimensions shall conform to ANSI B16.5, class 150

2.5 SIGHT INDICATOR

- A. Tank shall be equipped with visual liquid level indicator. Housings and floats shall be constructed of type 316 stainless steel.
- B. Length of level indicators shall be in accordance with the contract documents and shall be coordinated by the tank manufacturer.
- C. Visual liquid level indication shall be mounted such that they are readily visible from outside of the bulk chemical containment area.
- D. Top and bottom connections to tank shall be provided with flanged or solvent welded CPVC ball valves to allow for isolation of tank from visual sight indicator.

- E. Sight indicator shall be SureSite model by Gems Sensors or approved equivalent.

2.6 SUPPORT SADDLES AND ANCHORAGE

- A. The proposed tank shall include two (2) Grade A36 carbon steel support saddles complete with base plate, stiffener plates, bands, and webs to sufficiently support the tank with full load of 25-50% strength sodium hydroxide. The tank manufacturer shall include support saddle information within the tank shop drawing for approval.
 - 1. Spacing of the support saddles for the proposed tank shall match spacing of the support saddles for the existing sulfuric bulk storage tank. The existing concrete support pedestals shall be reused.
- B. Anchor bolts, nuts, washers, etc. shall be type 316 stainless steel.
 - 1. Bolts shall conform to ASTM A 193, Grade B8M
 - 2. Nuts shall conform to ASTM B 194, Grade 8M
 - 3. Provide washer for each nut of same material (316 stainless steel)

2.7 CPVC PIPING AND VALVES

- A. Piping and valves for caustic system shall be schedule 80 CPVC.
- B. Schedule 80 CPVC Pipe:
 - 1. Rigid CPVC (chlorinated polyvinyl chloride) compound used in the manufacturer of schedule 80 pipe shall be Type IV, grade 1 as identified in ASTM D1784. The pipe shall be NSF rated for potable water.
 - 2. CPVC schedule 80 shall meet the requirements of ASTM standard D1785 for physical dimensions and tolerances.
 - 3. The marking on CPVC Schedule 80 pipe shall meet the requirements of ASTM D1785 and state the material designation code, nominal pipe size, schedule of pipe, pressure rating in psi for water at 200-degrees F., the ASTM designation number D1785 and the NSF seal for potable water.
 - 4. Fittings used shall be CPVC Schedule 80 and solvent welded in accordance with ASTM D1785.
 - 5. CPVC Flanges shall be schedule 80 Vanstone style. Flanged gaskets shall be manufactured from EPDM. All hardware, bolts, washers, nuts, and etc. shall be Hastelloy. Provide washers for each nut, washer material shall be of same material as the nut.
 - 6. Small Diameter CPVC Pipe: CPVC pipe smaller than 4-inch shall be schedule 80 CPVC plastic pipe with solvent weld fittings in accordance with ASTM F-441.
 - 7. Solvent cement shall be EP42 Gray Industrial Cement.
 - 8. Threaded fittings are not permitted for the caustic system.
- C. Ball valves
 - 1. Ball valves shall be Sch. 80 CPVC socket construction with PTFE backed with EPDM seats and EPDM seals. The ball valves shall have a 230psi pressure rating. Ball valves to be manufactured by ASahi/AMERICA or approved equal.
- D. Ball Check Valves
 - 1. Ball check valve shall be installed on the desiccant air supply piping to the proposed caustic tank. The ball check valve shall CPVC and be Chemtrol BC series, single union
- E. Flange insert check valve
 - 1. Flange insert check valve shall be installed on the bulk chemical overflow piping

2. The check valve shall be installed between two mating flanges and be of the same diameter as the overflow piping
3. The valve material shall be Teflon with Teflon o-ring seats, and type 316 stainless steel springs completely encapsulated in Teflon
4. The valve shall have a cracking pressure of 1/2 psi.
5. The flange insert check valve shall be manufactured by Check-All Valve Manufacturing Company or approved equal.

2.8 DESICCANT DRIER

- A. One (1) industrial desiccant driers shall be provided and installed for the proposed caustic vent piping, providing the capability of drying air in relatively large quantities on continuous cycles.
- B. The desiccant drier shall be provided with CPVC isolation valve on the supply piping to the drier to allow for isolation during maintenance operations.
- C. The desiccant shall be indicating type, impregnated with cobalt chloride. The desiccant shall be blue when dry and change to pink upon absorption of moisture such that the color change is clearly visible. Desiccant shall be 4-mesh.
- D. Desiccant drier shall be coated per 09900.
- E. Desiccant drier shall be Model 1100 storage tank vent drier with indicating drierite as manufactured by W.A. Hammond Drierite Co., or approved equivalent.

2.9 TANK SIGNAGE

- A. The bulk storage tank shall be provided with NFPA placard to identify chemical that is being stored.

2.10 ACCESS LADDER

- A. The bulk caustic tank shall be equipped with 316 stainless steel access ladder on side of tank to provide access to the connections and manway located on the top of the tank.
- B. The ladder design shall meet all applicable regulatory requirements

PART 3 - EXECUTION

3.1 TESTING

- A. Tank shall be thoroughly flushed out of all debris at least twice, or hand swabbed before placing into service in order to insure tank is clean.
- B. All piping, fittings, valves shall be visual leak tested where pressure testing cannot occur. All piping to be completely purged (nitrogen gas purging recommended) from any foreign material prior to filling and testing.
- C. Pressure testing of new piping shall be at 150 psig for 1-hour without any drop in pressure (less than 2%). Any leaks (visual or testing failure) shall be corrected at not cost to Owner.
- D. Filling of the new system with caustic indicates acceptance of system. If leaks develop after filling, contractor is fully responsible for any costs associated with removing spent caustic and disposing of properly.

3.2 DEMOLITION OF EXISTING TANK

- A. Contractor shall remove existing tank and dispose of properly, including removal of residual chemicals in bottom, hauling and disposal of existing steel storage tank.

3.3 SPARE PARTS

- A. Four (4) 25-pound containers 4-mesh indicating drierite

- END OF SECTION -