



**DALLAS COUNTY
PURCHASING DEPARTMENT**

Founders Square
900 Jackson Street * 6th Floor * Suite 680
Dallas, Texas 75202
DANIEL R. GARZA
Purchasing Director

October 11, 2017

ADDENDUM No. 3

Bid No. 2017-068-6692

CONTRACT FOR MAJOR CAPITAL IMPROVEMENT PROGRAM NO. 31402 Pleasant Run Road Pump Station
Phase 1B From Northeast Corner of Pleasant Run Road and Pinto Road

Whereas, the bid opening date is hereby changed to read as follows: Monday, October 23, 2017 at 2:00 p.m.

Whereas, Page 3B in the bid document is hereby replaced with page 3C

Whereas, Pages 11B, 12B, and 13B in the bid document are hereby replaced with pages 11C, 12C, and 13C.

Whereas, Attachment; Bidders Review Checklist Page 4B is hereby replaced with page 4C.

Whereas, Index of Governing Standard Specifications, pages 225 through 234 are hereby replaced with updated Index of Governing Standard Specifications, pages 225A through 234A.

Whereas, Special Provision to Item 500 Mobilization, page 262 is hereby replaced with updated Special Provision to Item 500 Mobilization, page 262A.

Whereas, Special Provision to Item 502 Barricades, Signs, and Traffic Handling, page 263 is hereby deleted from the bid documents and replaced with blank page 263A

Whereas, Section 09902 Painting and Protective Coatings, Pages 511A through 534A are hereby replaced with updated Section 09902 Painting and Protective Coatings, Pages 511B through 534B.

Whereas, Section 11370 Bridge Crane and Appurtenances, Pages 565A through 572A are hereby replaced with updated Section 11370 Bridge Crane and Appurtenances, Pages 565B through 572B.

Whereas, Section 13211 Composite Elevated Storage Tank, Pages 626A through 656A are hereby replaced with updated Section 13211 Composite Elevated Storage Tank, Pages 626B through 656B.

Whereas, Plan Drawing Page 48A of 69 is hereby replaced with Page 48B of 69.

Except as provided herein / above, all other specification requirements of the original solicitation referenced shall remain unchanged in and full force and effect. This addendum should be signed and returned with your Solicitation package on or before Monday, October 23, 2017 @ 2:00 P.M. (CT).

This addendum is hereby acknowledged, understood and considered in our Solicitation.

Printed Name: _____

Signature of Authorized Representative: _____

Title: _____

Company: _____



PROPOSAL FOR:	Contract for Major Capital Improvement Program No. 31402 Pleasant Run Road Pump Station Phase 1B from Northeast Corner of Pleasant Run Road and Pinto Road	
SOLICITATION NO. 2017-068-6692	DUE DATE: October 23, 2017 @ 2:00p.m.	
FOR FURTHER INFORMATION CALL:	PURCHASING CONTACT: Charles Price, CTPM	AT PHONE AND EMAIL ADDRESS 214.653.6223 and charles.price@dallascounty.org
PRE-BID CONFERENCE:	September 21, 2017 @ 1:00 p.m.	

INSTRUCTIONS TO BIDDERS

PLEASE READ THE ENTIRE PACKAGE CAREFULLY

This page will need to be signed and returned with bid submission.

Bids are solicited for furnishing the merchandise, supplies, services and/or equipment set forth in this Bid Proposal. Completed **SEALED Bid Proposals, ORIGINAL AND TWO (2) COPIES**, must be received in the Purchasing Department, 900 Jackson Street (Founder's Square), Suite 680, Dallas, Texas 75202, **BY 2:00 P.M. ON THE ABOVE "DUE DATE"**. The official time clock will be time clock located in the Purchasing Department. Bids received at 2:01 and thereafter are Late Bids and will not be accepted.

Bids may be withdrawn at any time prior to the official opening. Alterations made before opening time must be initialed by bidder guaranteeing authenticity. After the official opening, bids may not be amended, altered, or withdrawn without the recommendation of the Purchasing Agent and the approval of the Commissioners' Court.

The County is exempt from Federal Excise and State Sales Tax; therefore, tax must not be included in this bid.

The undersigned agrees, if this bid is accepted, to furnish any and all items upon which prices are offered, at the price(s) and upon the terms and conditions contained in the Specifications. The period for acceptance of this Bid Proposal will be 120 calendar days unless a different period is noted by bidder.

The County reserves the right to accept or reject in part or in whole any bids submitted. The Commissioners Court will award the contract to the responsible bidder who submits the lowest and best bid as determined by Commissioners Court. The Commissioners Court reserves the right to determine compliance and to waive technicalities or irregularities and to make award in the best interest of Dallas County.

The undersigned affirms that they are duly authorized to execute this contract, that this company, corporation, firm, partnership or individual has not prepared this bid in collusion with any other Bidder, and that the contents of this bid as to prices, terms or conditions of said bid have not been communicated by the undersigned nor by any employee or agent to any other bidder or to any other person(s) engaged in this type of business prior to the official opening of this bid. And further, that the Manager, Secretary or other agent or officer signing this bid is not and has not been for the past six months directly or indirectly concerned in any pool or agreement or combination to control the price of Supplies, Services or Equipment bid on, or to influence any person to bid or not to bid thereon.

**NAME AND ADDRESS OF COMPANY/BIDDER:		<u>ALL BIDS MUST BE SIGNED PRIOR TO AWARD</u>
Company Name (PRINTED):		Name (PRINTED):
Mailing Address:		Title:
		Signature:
City/ State:	ZIP:	E-Mail Address:
**Texas Secretary of State Filing Number, Jurisdiction and Formation Date:		Telephone and Fax No.:
Federal Taxpayer ID/Certificate Number:		WEB Site:

HELP US KEEP OUR VENDORS' LIST CURRENT

NO BID is submitted for __ this time only; NOT THIS COMMODITY/SERVICE __ ONLY. FAILURE TO RESPOND TO BID SOLICITATIONS FOR TWO (2) BID PERIODS MAY RESULT IN REMOVAL FROM THE VENDORS LIST; however, if removed you will be reinstated upon request. If not submitting a bid, please complete the questionnaire on the next page.

**** Legal Name, Address and Taxpayer ID number:** Bidders are to submit the company's "Legal Name" as identified by their Federal Tax Certification certificate. Bidders are to complete the attached Federal Form "W-9" for verification and filing purposes. Dallas County reserves the right to withhold any invoices and/or payments, without penalties, for documents submitted under a different name/billing address than that identified on the proposal document/award court order or contract. *****Refer to paragraph 38 of the solicitation for a detailed explanation.**

BID NO: 2017-068-6692
PLEASANT RUN ROAD PUMP STATION PHASE 1B – MCIP 31402
Northeast Corner of Pleasant Run Road and Pinto Road
Dallas County, City of Wilmer, Texas

Bidders Review Checklist

Documents to be returned with bid submission

- Copies of Bid Proposal for submission (3 Total) found in Section A: Notice to Contractors, Bid Doc No. 05 (pages 11C-13C)
- “Original” (copy of all documents Pages 1-971) Sealed envelope marked “ORIGINAL Bid No. 2017-068-6692 for Pleasant Run Road Pump Station Phase 1B Project No. 31402”
- “Copy” (Sections A – L, Pages 1 – 114) Sealed envelope marked “COPY Bid No. 2017-068-6692 for Pleasant Run Road Pump Station Phase 1B Project No. 31402”
- “Copy” (Sections A – L, Pages 1 – 114) Sealed envelope marked “COPY Bid No. 2017-068-6692 for Pleasant Run Road Pump Station Phase 1B Project No. 31402”

Documents to be executed in bid submission.

- Instructions to Bidders, Bid Doc No. 00 (Page 3C)
- Section A: Bid Proposal Guaranty (certified check, cashier’s check, or Bidder’s Bond), amount equal to five percent (5%) of total bid amount, made payable to County of Dallas, Texas
- Section B: Proposal to Bid, Bid Doc No. 07 (pages 17-19)
- Section C: Proposal Sheets, Bid Doc No. 09 (pages 23-27)
- Section D: Bid Summary Sheets, Bid Doc No. 11 (pages 31-35)
- Section G: Title VI Assurance / Compliance, Bid Doc No. 18 (pages 63-69)
- Section H: Disclosure of Interest Parties (Form 1295), Bid Doc No. 20 (page 77)
- Section I: Conflict of Interest (Form CIQ), Bid Doc No. 22 (page 81)
- Section J: Insurance Requirement Affidavit, Bid Doc No. 24 (page 87)
- Section K: W-9 Request for Taxpayer Identification Number & Certification (page 91)
- Section L: Minority & Women Business Enterprise Specifications, Bid Doc No. 28 (pages 103-113)

Submission Date: October 23, 2017 by 2:00 p.m.

Purchasing Department, Attn: Charles Price, 900 Jackson Street, Suite 680, Dallas, TX 75202

NOTICE TO CONTRACTORS

FOR

DALLAS COUNTY MAJOR CAPITAL IMPROVEMENT PROGRAM

Sealed original proposals and two copies addressed to Purchasing Agent for construction of the BID No. 2017-068-6692, Pleasant Run Road, Pinto Road Pump Station Phase 1B at the Northeast Corner of Pleasant Run Road and Pinto Road, MCIP Project 31402. The project is located in Road and Bridge District 3 in the City of Wilmer and Dallas County, Texas, will be received at the office of the Dallas County Purchasing Agent, 900 Jackson Street, Suite 680, Dallas, Texas located in the Founder's Square Building, until **Two O'Clock (2:00) P.M (CST), Monday, October 23, 2017**, and then publicly opened and read aloud. Note: The Time-Date Stamp Clock located at the front counter of the Dallas County Purchasing Department will serve as the OFFICIAL CLOCK for the purpose of verifying the date and time of receipt of bids.

Bid Proposals (*one (1) original, clearly marked "ORIGINAL", and two (2) complete copies, clearly marked "COPY"*) shall be submitted in sealed envelopes marked "**Bid No. 2017-068-6692 for Project No. 31402.**" City of Wilmer and County of Dallas, Texas, District No. 3. All bids received will be retained by Dallas County and will not be returned to bidders.

The right is reserved by Dallas County to reject any and all proposals or to waive any irregularities in the bid proposal when in the best interests of the County

DESCRIPTION OF WORK TO BE DONE

The general scope of work is for the construction of a new elevated storage tank, ground storage tank, booster pump/control building, diesel or natural gas, stand by generator, metering station, all associated equipment, piping, civil, and electrical equipment for construction of a new pump station on the Pleasant Run Road, Pinto Road Pump Station Phase 1B, MCIP No. 31402 located on the northeast corner of Pleasant Run Road and Pinto Road was selected in the Major Capital Improvement Program. There are **320 working days allocated for construction of all improvements.**

PRE-BID CONFERENCE

A PRE-BID CONFERENCE will be held on **Thursday, September 21, 2017 at One O'clock (1:00) p.m. (CST)** at the Founder's Square Building, Dallas County Purchasing Department located at 900 Jackson Street, Suite 680, Dallas, Texas 75202.

Attendance at the Pre-Bid Conference is voluntary and highly recommended, but is not mandatory. All bidders are strongly encouraged to attend to discuss the requirements of this bid. It is the responsibility of each bidder to examine the entire bid package, seek clarification in writing, review the plans in detail, visit the project site and review their bid for accuracy before submitting.

All verbal responses to questions at the Conference are non-binding to County, only responses to written questions that are published and/or responded to by the Dallas County Purchasing Department in written communications will be official. Any oral instructions or information concerning the bid given by Dallas County staff or personnel will not bind Dallas County and should not be considered authoritative when assembling responses. The County will not be bound by any information conveyed verbally.

CONTRACT DOCUMENTS AND DRAWINGS

Detailed plans and specifications of the work may be obtained for a \$100 NON-REFUNDABLE FEE at the office of the County Director Public Works at 411 Elm Street, Fourth Floor, Dallas, Texas. Documents may be obtained by mail upon receipt of a separate check in the additional amount of \$10.00, which is for postage or handling charges. If the bidder elects to have a courier service pick up plans and contract documents, the courier MUST provide Dallas County with a contact person, phone number and fax number for the bidder on the bidder's letterhead with the proper mailing address indicated. Plans will not be released without said information. Contractor shall provide one original and one copy of all bid proposal submittals. The Engineer shall issue written orders to the Contractor within One Hundred Twenty (120) days after the Contract is fully executed.

BID PROPOSAL GUARANTY

Each bid proposal submittal shall be accompanied by a certified check, cashier's check, or Bidder's Bond in an amount equal to five percent (5%) of the total bid amount, made payable without recourse to the order of the County of Dallas, Texas.

A Payment Bond is required in the amount of one hundred percent (100%) of the contract amount, if the contract amount exceeds \$25,000. A Performance Bond is required in the amount of one hundred percent (100%) of the contract amount, if the contract amount exceeds \$100,000.

COMMUNICATIONS REGARDING THE BID

All questions and inquiries regarding the bid must be submitted in writing to Charles Price, CTPM, Contract Specialist, by e-mail, fax or via mail. The deadlines for submission of questions relating to this bid are listed below. All questions submitted in writing prior to the deadlines will be compiled and answered in writing. All addendums, questions, responses and answers will be posted and made available exclusively on the Dallas County Purchasing Department's website:

<http://www.dallascounty.org/departments/purchasing/currentbids.php>. (Go to the appropriate Bid #, click on the appropriate hyperlink for viewing and/or downloading.) Bidders are solely responsible for frequently checking this website for updates and changes to this bid.

E-mail Charles.Price@dallascounty.org

Office: 214.653.6223

Fax: 214.653.7449

Mailing Address: 900 Jackson Street, Suite 680, Dallas, Texas 75202

Initial questions regarding this solicitation are to be submitted, in writing, to Charles Price by **10:00 AM (CST), Tuesday, September 19, 2017**. These questions will be addressed during the Pre-Bid Conference.

Contractors will be required to submit, in writing, any **additional questions** presented at the Pre-Bid Conference and/or after the Conference. Any/all additional questions must be received by **10:00-AM (CST), Friday, October 06, 2017**.

All questions submitted in writing prior to the deadline will be complied and answered in writing. Official answers to all written questions will be posted exclusively on the Dallas County Purchasing Department's website:

<http://www.dallascounty.org/departments/purchasing/currentbids.php> as an amendment to this bid.

Dallas County will not be bound by any information conveyed verbally. No oral statements or answers by any person, employee, unit, department, or organization shall be considered binding, cannot modify or otherwise affect the provisions of this bid and / or any contract resulting therefrom.

All modifications, changes, addendums, or amendments will be in writing by Dallas County Purchasing Department and shall be considered official and binding.

Dallas County reserves the right, as its sole discretion, to determine appropriate and adequate responses to the written comments, questions, and requests for clarification.

It is the Bidder's responsibility to review and monitor the Dallas County Purchasing Department's website:

<http://www.dallascounty.org/departments/purchasing/currentbids.php>, on a regular basis during the solicitation process up to the closing due date and time for any updates, amendments, or changes.

Dallas County Purchasing Department's website is our primary communication tool for addenda, changes, and updated information regarding this bid.

Please reference the Bid/Solicitation Number (2017-068-6692), Company Name, Representative Name and email address on all written communication and correspondence to Dallas County.

**DEPARTMENT OF PUBLIC WORKS
DALLAS COUNTY, TEXAS
INDEX OF GOVERNING STANDARD SPECIFICATIONS**

FOR THE CONSTRUCTION OF

**Pleasant Run Road
Pinto Road Pump Station Phase 1B
MCIP PROJECT No. 31402**

Northeast Corner of Pleasant Run Road and Pinto Road

All construction work for this project shall be performed in accordance with the Texas Department of Transportation, 2014 Standard Specifications for Construction And Maintenance of Highways, Streets, and Bridges, TxDOT Standard Details, City of Dallas Construction Details, North Central Texas Council of Governments, 2004 Public Works Construction Standards, County of Dallas Special Provisions to the Standard Specifications; and Special Specifications.

STANDARD SPECIFICATIONS:

1. Texas Department of Transportation 2014 Standard Specifications applicable to this project (base bid and/or alternatives) are identified, but not limited to, the following:

Item 100	Preparing the Right of Way
Item 132	Embankment
Item 164	Seeding for Erosion Control
Item 247	Flexible Base Type D
Item 260	Lime Treatment (Road-Mixed)
Item 260	Lime (Hydrated Lime Slurry)
Item 340	Hot Mix Asphaltic Concrete Pavement
Item 432	Riprap
(Item 462)	Concrete Box Culverts and Storm Drains
Item 464	Reinforced Concrete Pipe
Item 465	Manholes and Inlets
Item 467	Safety End Treatments
Item 500	Mobilization
(Item 502)	Barricades, Signs, and Traffic Handling
Item 504	Field Office
Item 506	Temporary Erosion, Sedimentation and Environmental Control
(Item 512)	Portable Concrete Traffic Barrier
Item 550	Chain Link Fence

2. The following North Central Texas Council of Governments, 2004 Public Works Construction Standards) are identified, but not limited to, the following:

Item (101)	Definitions and Abbreviations
(Item 105)	Control of Work

INDEX OF GOVERNING STANDARD SPECIFICATIONS

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Item 107	Trench Safety System
(Item 109)	Measurement and Payment
(Item 501/506)	Waterline Installation
(Item 502)	Appurtenances
(Item 504)	Open Cut – Backfill

() Not a pay item. Work which would be classifiable under these specifications is subsidiary to other work for which pay items are provided. Whether or not listed, any of the Standard Specifications which are pertinent to work performed on this project are applicable and shall be observed.

SPECIAL PROVISIONS:

The following **Dallas County Special Provisions** shall govern and **take precedence** over the Specifications listed above, whenever in conflict therewith:

- Special Provision - Important Notice to Contractors - Equal Employment Opportunity
- Special Provision - Important Notice to Contractors - Minority/Women Owned Business Involvement Policy
- Special Provision - Important Notice to Contractors - Texas State Sales Tax
- Special Provision - Important Notice to Contractors - Gifts
- Special Provision - Important Notice to Contractors - Employment of Former County Employees
- Special Provision - Important Notice to Contractors - Construction Payments
- Special Provision - Important Notice to Contractors - Mobilization
- Special Provision - Important Notice to Contractors - Uncontrolled Random Cracking
- Special Provision - Important Notice to Contractors - Utility Adjustments
- Special Provision - Important Notice to Contractors - Workers Compensation Regulations
- Special Provision - Important Notice to Contractors - Submitting Bid Proposal by Computer Printout
- Special Provision - Important Notice to Contractors - Substantial Completion
- Special Provision - Item 100 - Preparing the Right of Way
- Special Provision - Item 132 - Embankment
- Special Provision - Item 164 - Seeding for Erosion Control
- Special Provision - Item 247 - Flexible Base Type D
- Special Provision - Item 260 - Lime Treatment (Road-Mixed)
- Special Provision - Item 340 - Hot Mix Asphaltic Concrete Pavement
- Special Provision - Item 462 - Concrete Box Culverts and Storm Drains
- Special Provision - Item 464 - Reinforced Concrete Pipe
- Special Provision - Item 465 - Manholes and Inlets
- Special Provision - Item 500 - Mobilization
- ~~Special Provision - Item 502 - Barricades, Signs, and Traffic Handling (Deleted)~~
- Special Provision - Item 504 - Field Office
- Special Provision - Item 506 - Temporary Erosion, Sedimentation and Environmental Control

INDEX OF GOVERNING STANDARD SPECIFICATIONS

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The following **Special Provisions to the Dallas County General Provisions and Regulations** shall govern and **take precedence** over those provided in these contract documents:

Special Provision -	County General Provisions & Regulations - Article 6.4
Special Provision -	County General Provisions & Regulations - Article 6.6
Special Provision -	County General Provisions & Regulations - Article 7.6.2
Special Provision -	County General Provisions & Regulations - Article 9.6

SPECIAL SPECIFICATIONS:

1. The following **Dallas County Special Specifications** are applicable to this project:

Special Specification Item 599	Partnering Workshop
Special Specification Item 5900	Stormwater Pollution Prevention Plan
Special Specification Item 6340	Project Sign
Special Specification Item 7000	Contractor Performance Evaluations
Special Specification Item 8000	Cement Use on Public Projects Sustainable Air Quality

2. **Texas Department of Transportation Special Specifications** applicable to this project are identified, but not limited to, the following

Special Specification Item 5008	Precast Concrete Wheel Stop
Special Specification Item 5033	Bollards

3. **Technical Special Specifications** applicable to this project are identified, but not limited to, the following:

Special Specification Section 01010	Summary of Work
Special Specification Section 01270	Measurement and Payment
Special Specification Section 01292	Schedule of Values
Special Specification Section 01300	Submittals
Special Specification Section 01325	Construction Schedule
Special Specification Section 01400	Quality Requirements
Special Specification Section 01660	Equipment Testing, Training and Startup
Special Specification Section 01730	Operation and Maintenance Data
Special Specification Section 02210	Site Grading
Special Specification Section 02242	Cement-Stabilized Sand Backfill
Special Specification Section 02244	Lime-Stabilized Subgrade
Special Specification Section 02315	Excavation and Fill
Special Specification Section 02675	Disinfection of Plant Water Piping Systems
Special Specification Section 02686	Hydrostatic Testing of Pressure Lines
Special Specification Section 03100	Concrete Formwork
Special Specification Section 03200	Concrete Reinforcement
Special Specification Section 03251	Concrete Joints
Special Specification Section 03300	Cast-in-Place Concrete
Special Specification Section 03600	Grout

INDEX OF GOVERNING STANDARD SPECIFICATIONS

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Special Specification Section 04200 Unit Masonry and Accessories
 Special Specification Section 05020 Miscellaneous Metals
 Special Specification Section 05051 Anchorages
 Special Specification Section 05400 Cold-Formed Metal Framing
 Special Specification Section 05532 Aluminum Grating and Checker Plate
 Special Specification Section 06100 Rough Carpentry
 Special Specification Section 07920 Architectural Caulking and Sealants
 Special Specification Section 08150 Fiberglass Reinforced Plastic Doors and Frames
 Special Specification Section 08330 Coiling Doors
 Special Specification Section 08710 Door Finish Hardware
 Special Specification Section 08810 Glass and Glazing
 Special Specification Section 09250 Drywall Construction
 Special Specification Section 09902 Painting and Protective Coatings
 Special Specification Section 10200 Louvers and Vents
 Special Specification Section 11214 Pumps, Single Stage, Double Suction, Horizontal, with Split-Case Centrifugal

 Special Specification Section 11260 Chlorination System
 Special Specification Section 11263 Chlorine Gas Leak Detector
 Special Specification Section 11370 Bridge Cranes and Appurtenances
 Special Specification Section 11398 Engine Generators
 Special Specification Section 13120 Metal Building Systems
 Special Specification Section 13206 Prestressed Concrete Tank
 Special Specification Section 13211 Composite Elevated Storage Tank
 Special Specification Section 13318 Supervisory Control and Data Acquisition (SCADA) System
 Special Specification Section 15051 Installation of Underground Plant Piping
 Special Specification Section 15052 Jointing Cast Iron and Ductile Iron Pipe
 Special Specification Section 15053 Installation of Cast Iron and Ductile Iron Piping Aboveground

 Special Specification Section 15054 Steel Piping – Aboveground
 Special Specification Section 15062 Ductile Iron Pipe, Cast Iron and Ductile Iron Fittings
 Special Specification Section 15064 Polyvinyl Chloride Plastic Piping System
 Special Specification Section 15101 Bronze Valves
 Special Specification Section 15105 Combination Flow Control Valve
Special Specification Section 15106 Altitude Valve
 Special Specification Section 15107 Gate Valve; 2-inches and Larger
 Special Specification Section 15109 Butterfly Valves, Rubber Seated, AWWA
 Special Specification Section 15111 Air Release and Vacuum Relief Valves
 Special Specification Section 15116 Check Valve, Twin Disc
 Special Specification Section 15117 Check Valve, Resilient, Flexible Flapper Swing, Spring Return, for Water Service

 Special Specification Section 15130 Pressure Gauge
 Special Specification Section 15140 Pipe Hangers, Supports, & Restraints
 Special Specification Section 15150 Basket Strainer
 Special Specification Section 15157 Electromagnetic Flowmeters
 Special Specification Section 15172 Electric Motor, High Efficiency, Horizontal Induction 300 HP and Smaller
 Special Specification Section 15261 Pipe Insulation – Water and Chemical Service

INDEX OF GOVERNING STANDARD SPECIFICATIONS

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Special Specification Section 15770 Heat Tracing
Special Specification Section 15956 Field Instrument Devices
Special Specification Section 15959 Automatic Control Valve Insulated Enclosure (Hot Box)
Special Specification Section 16051 Electrical Construction
Special Specification Section 16212 Standby Generator Set
Special Specification Section 16415 Automatic Transfer Switches
Special Specification Section 16472 Programmable Logic Controllers (PLC), SCADA Interface
Panels and Panel Mounted Equipment
Special Specification Section 16480 Motor Control Center, 600 Volts and Less
Special Specification Section 16610 Cathodic Protection System for Steel Water Tanks

Besides the above, the following are part of this Contract:

Technical Specifications

Texas Department of Transportation, 2014 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

The General Specifications (Standard Specifications for Public Works Construction - North Central Texas Council of Governments - Fourth Edition - 2004) - A copy of the Standard Specifications for Public Works Construction may be obtained from:
North Central Texas Council of Governments
616 Six Flags Drive, Arlington, Texas,
Telephone (817) 640-3300.

City of Lancaster, Texas General Design Manual and Subdivision Regulations – Second Addition – 1999 – A copy of the Lancaster Design Manual can be obtained at
<http://www.lancaster-tx.com/DocumentCenter/Home/View/596>

City of Lancaster, Texas Standard Construction Details – 1999, Latest Edition – A copy of the Lancaster Standard Constructions Details can be obtained at
<http://www.lancaster-tx.com/DocumentCenter/Home/View/597>

Occupational Safety and Health Standards - Excavations, 29 CFR Part 1926; effective January 2, 1990 (or Latest Edition).

INDEX OF GOVERNING STANDARD SPECIFICATIONS

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**SPECIAL PROVISION
TO
ITEM 500
MOBILIZATION**

For this project, Item 500, "MOBILIZATION", of the Standard Specifications, is hereby amended with respect to the clauses cited below and no other clauses or requirements of this specification are waived or changed hereby.

Article 500.1 DESCRIPTION: This article is voided in its entirety and replaced by the following:

This Item shall consists of the mobilization of personnel, equipment and supplies at the project site in preparation for beginning work on storage tanks, booster pump building, metering station, site work, paving and drainage contract item. Mobilization shall include the movement of equipment, personnel, equipment material supplies, installation of project signs etc., to the project site and the establishment of field office and other facilities necessary to construct pump station, paving and drainage, and water line, items prior to beginning the Work.

Article 500.2 MEASUREMENT: This article is voided in its entirety and replaced by the following: Measurement of the Item, Mobilization, as specified herein will be by the "Lump Sum" as the work on Pump Station, Paving and Drainage items only progress.

Article 500.3 PAYMENT: This article is voided in its entirety and replaced by the following:

Partial payments for mobilization will be made in accordance with the following schedule:

- (1) When 10 percent of the contract amount for construction items is earned, payment for 50 percent of the lump sum for "Mobilization" will be made.
- (2) Upon completion of 25 percent of the contract amount for the construction items is earned, payment for 75 percent of the lump sum bid for "Mobilization" will be made.
- (3) Upon completion of 50 percent of the contract amount for the construction items is earned, payment for the remainder of the lump sum bid for "Mobilization" will be made.

**SPECIAL PROVISION
TO
ITEM 502
BARRICADES, SIGNS, AND TRAFFIC HANDLING**

This Special Provision Item 502 is hereby deleted

SECTION 09902

PAINTING AND PROTECTIVE COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section describes the furnishing and application, as specified herein, of paint and protective coatings to all surfaces, unless specifically excluded by notes shown on the PLANS.
- B. The CONTRACTOR shall furnish all labor, material and equipment of any kind required to perform surface preparation and painting on the project as hereinafter set forth. The CONTRACTOR shall provide materials, testing, and labor to deliver the Work. Painting shall be performed at such times and in such places as the CONTRACTOR and ENGINEER may agree upon in order that dust-free and neat work is obtained. All painting shall be done in strict accordance with the recommendations of the paint manufacturer and shall be performed in a manner satisfactory to the ENGINEER.

1.02 RELATED REQUIREMENTS

- A. Technical Specification Section 01300 – “Submittals”
- B. Other related work as called for on PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATIONS.

1.03 REFERENCES

This specification references the following publications in their current editions. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS

(NACE INTERNATIONAL)

NATIONAL SANITATION FOUNDATION INTERNATIONAL (NSF)

NSF/ANSI 61 Standards for Drinking Water Systems Components

OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION (OSHA)

OSHA 29 CFR 1910.144 Standards for Safety Color Codes for Marking Physical Hazards

SOCIETY FOR PROTECTIVE COATING (SSPC)

SSPC-SP 1 Standards for Surface Preparation Specification No. 1 - Solvent Cleaning

SSPC SP 2 Standards for Surface Preparation Specification No. 2 - Hand Tool Cleaning

SSPC SP 3 Standards for Surface Preparation Specification No. 3 - Power Tool Cleaning

SSPC SP 5/NACE No. 1 Standards for Surface Preparation Specification No. 5 - White Metal Blast Cleaning

SSPC SP 6/NACE No. 3 Standards for Surface Preparation Specification No. 6 - Commercial Blast Cleaning

SSPC SP 7/NACE No. 4	Standards for Surface Preparation Specification No. 7 - Brush-off Blast Cleaning
SSPC SP 10/NACE No. 2	Standards for Surface Preparation Specification No. 10 - Near White Blast Cleaning
SSPC SP 11	Standards for Surface Preparation Specification No. 11 - Power Tool Cleaning to Bare Metal
SSPC SP 13	Standards for Surface Preparation Specification No. 13 - Surface Preparation of Concrete
SSPC Painting Manual	Good Painting Practice - SSPC Painting Manual, Volume 1 and Volume 2
SSPC VIS 1	Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ)

TCEQ - RG-195	30 TAC 290 Subchapter D: Rules and Regulations for Public Water Systems
TCEQ 30 TAC 101.211	30 TAC 101 General Air Quality Rules Subchapter F: Emissions Events and Scheduled Maintenance, Startup, and Shutdown Activities
TCEQ 30 TAC 111.131-139	30TAC 111 Control of Air Pollution From Visible Emissions and Particulate Matter - Subchapter A: Visible Emissions and Particulate Matter Division 3: Abrasive Blasting of Water Storage Tanks Performed by Portable Operations

1.04 - 1.05 (Not Used)

1.06 SUBMITTALS

Submit the following in accordance with Technical Specification Section 01300 – “Submittals.”

- A. Painting Schedule: Submit list indicating all items to be painted, surface preparation, paint manufacturer, product designation, and dry mil thickness. Submit a plan for protecting existing devices and facilities prior to starting Work.
- B. Panels
 - 1. Submit 4-inch x 12-inch (minimum size) panels painted with proposed paints and coatings. Include three displays of each kind and color of paint used. Panel to be representative of material to be coated.
 - 2. Mark panels to indicate respective types of surfaces to which several kinds and colors of paint, stain, and coating are applied.
- C. Samples: If requested by OWNER, submit 1/4 pint of each kind of paint or stain proposed for use. Do not deliver materials to site until representative samples (if requested) have been approved.
- D. For all sealers solvents, and protective coatings, submit copies of Manufacturer’s printed instructions and application sheets.
- E. Submit certification of coating manufacturer that primer, pigments, sealants, and

coatings incorporated into work contain no lead.

- F. Submit letter certifying coatings and caulk to be applied to interiors of piping and equipment, included as work under this Section, are approved by the National Sanitation Foundation (NSF) and are listed in the latest volume of the NSF/ANSI 61.
- G. Submit certification from manufacturer or supplier of abrasive blast media that media contain less than 1 percent free silica.
- H. Submit evidence of notification of the appropriate office of the Texas Commission on Environmental Quality (TCEQ) prior to abrasive blast cleaning. TCEQ notification to be in accordance with requirements of TCEQ 30 TAC 101.211.
- I. Coordinate Scope of Work with Texas Commission on Environmental Quality (TCEQ). Submit a copy of TCEQ Contractor Permit or certificate stating that no TCEQ Permit was required.
- J. Submit results of all soil and paint samples.

1.07 QUALITY ASSURANCE

- A. Workmanship
 - 1. Furnish workers who perform quality work and who are experienced and knowledgeable in the surface preparation and application of high-performance industrial coatings. Submit list of five similar projects which have been prepared and coated by the personnel to be employed for this project.
 - 2. Provide Manufacturer's written instructions on cleaning and coating prior to any surface preparation or coating.
 - 3. Workmanship shall be of first class quality. Finish painting shall show no drips, runs, sags, holidays, or other defects. The finish coat shall be free from noticeable laps or brush marks.
 - 4. Paint during application shall be continuously stirred and no thinner shall be added after the paint has been mixed. Paint shall be thoroughly worked into all joints, corners, and well brushed out over all surfaces.
 - 5. Should any coat or paint be judged unsatisfactory, the Contractor shall remove the coat(s) as necessary and repaint at no additional cost to the Owner.
 - 6. Paint application procedures shall conform to the standards of craftsmanship discussed in the SSPC Painting Manual.
- B. To the maximum extent possible allowed by "Attachment B," all coatings should be from one manufacturer. Unless otherwise specified, coating materials for a specific surface or piece of equipment will be from a single Manufacturer.
- C. All coatings provided for use on this project in the field or from equipment suppliers will be in compliance with local, state, and federal government laws, regulations and ordinances related to items such as lead, chromate, carcinogens and volatile organic compounds. All coatings in potable water service to meet NSF/ANSI 61 standards for potable water service, and must be certified by an organization accredited by ANSI.

- D. Surface preparation and application standards shall comply with the requirements of the SSPC Painting Manual (including Commentary sections and Appendices), NACE International, the printed instructions of the coating manufacturer, and these TECHNICAL SPECIFICATIONS. The OWNER/ENGINEER shall be consulted regarding any situations not covered by these reference standards or this SPECIFICATION. Where the foregoing standards, recommendations, and SPECIFICATIONS are conflicting, said conflicts shall be brought to the attention of the OWNER. Published manufacturer's recommendations shall be adhered to unless changed in writing by the home office of the manufacturer.
- E. Painting and Cleaning
 - 1. Interior field cleaning and painting to be performed in the presence of the OWNER's designated representative.
 - 2. CONTRACTOR responsible for providing OWNER with surface preparation and painting schedule prior to commencing work. Give a minimum of 72-hour notice before beginning said work.
 - 3. Surface preparation, paint application, and paint curing procedures to be in accordance with paint manufacturer's written instructions.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to site in original sealed containers with manufacturer's label attached.
- B. Materials to be stored on site in location approved by OWNER.
- C. Materials to be protected from weather, sunlight, and low temperatures.
- D. All paints shall be properly prepared by the Manufacturer and delivered to the site for field painting in the original unbroken containers with Manufacturer's label plainly printed thereon. Containers, which are broken, opened, water-marked and/or contain caked, lumpy or otherwise damaged materials are unacceptable and shall immediately be removed from the work site.
- E. The CONTRACTOR shall exercise every precaution in the storing of paints, solvents, cleaning fluids, rags, and similar materials, as to eliminate the risk of spontaneous combustion or other hazardous conditions. Portable fire extinguishing equipment shall be provided in a convenient location for emergency access. All painting materials stored on the job site shall be stored in a location outside of the work area. The CONTRACTOR shall take all safety precautions in accordance with NFPA Bulletin No. 101 and all federal, state, and local regulations.
- F. Storage areas to be kept clean and free of fire hazard. At the end of each work day, oil rags, waste paper, abrasive blast cleaning material and other fire hazards to be removed and disposed of by CONTRACTOR in accordance with applicable regulations.

1.09 PROJECT/SITE CONDITIONS

- A. Surfaces receiving paint include:
 - 1. Equipment, machinery, piping, conduit, and metal surfaces
 - 2. Interior surfaces, as noted in room finish schedule
 - 3. Concrete surfaces, including concrete blocks (when noted on PLANS)

4. Threads on galvanized pipe and conduit
 5. All cabinet and woodwork
 6. Interior concrete surfaces of lift station wet wells
- B. Do not paint surfaces of stainless steel, aluminum, bronze, copper, and lead.
- C. Galvanized Steel Surfaces: Paint only when required by Special Provisions to this Section or where included on finish schedule or shown elsewhere on PLANS.
- D. Existing Utilities, Structures and Properties: It shall be the responsibility of the contractor to locate and avoid damage to any and all existing water, gas, sewer, electric telephone, and other utilities, structures, or appurtenances. The Contractor shall repair or pay for all damages caused by his operations or his personnel to existing utilities, structures, appurtenances, or properties, either below ground or above ground and shall settle in full all damage suites which may arise as a result of his operations.

1.10 - 1.11 (Not Used)

PART 2 PRODUCTS

2.01 MANUFACTURER(S)

Manufacturer: All paints, sealers, and coatings to be manufactured by those firms listed in "Attachment B." Products of equal quality by other manufacturers will be considered, subject to review of written submittal to the ENGINEER within 15 days of Contract award that includes product data and a detailed paint and coating schedule. No request for substitution will be considered which decreases the film thickness and/or the number of coats to be applied, or which offers a change from the generic type of coating specified. Request for substitution shall contain the following:

- A. Full name of each product
- B. Descriptive literature
- C. Directions for use
- D. Generic type
- E. Non volatile content by volume

Bidders desiring to use paints other than those specified shall submit their proposal based on the specified materials, together with the information noted above, and indicate the sum which will be added to or deducted from the base bid, should the alternate materials be acceptable.

2.02 MATERIALS AND/OR EQUIPMENT

- A. "Attachments A and B" to this Section include the paint, protective coatings, and sealers for this project. Furnish all such special materials required for the manufacturer's coating systems whether or not included in Tables.
- B. The combination of coating and thinner shall not exceed 3.5 pounds per gallon of volatile organic compound.
- C. All primers, protective coatings, sealants, and pigments used for this project shall contain no lead.
- D. Colors: Colors to be approved by the OWNER. CONTRACTOR shall submit a current chart of the manufacturer's available colors to the ENGINEER and

receive approval prior to the start of coating and painting operations. CONTRACTOR shall submit a list of items to be painted and color charts for each type of surface.

E. Safety Color Codes: Follow OSHA 29 CFR 1910.144 for "Safety Color Codes for Marking Physical Hazards." The following general requirements are set forth as a guide.

1. Red: Fire protection equipment, danger signs, and fire exit signs. Portable containers of flammable material to be red with yellow band or name of contents stenciled in yellow.
2. Orange: Moving or rotating parts of equipment protected by guards, including shafts and couplings, pulleys, and sprockets. (Do not paint wearing surfaces.)
3. Yellow: Caution signs and all physical hazards, including outside levers and weights on check valves, lower pulley blocks and hooks, sprockets and chains on valve operators, inside of openings adjacent to step or ladders, platforms provided for vertical ladders at transition levels, exposed unguarded edges of pits, platforms and walls subject to being struck, and any piping or equipment extending into normal operating areas.
4. Green: To designate "Safety" and location of first-aid equipment such as gas masks, first-aid kits, and safety deluge showers.
5. Black and White: To indicate areas that must remain clear, such as areas around first-aid, fire-fighting, and other emergency equipment.

F. Water Plant Piping Codes:

Color codes used in painting water plant piping to conform to TCEQ - RG-195.

G. Wastewater Treatment Plant Piping Codes

1. Color Codes used in painting wastewater treatment plant piping to be in accordance with the following schedule:

<u>Service</u>	<u>Color</u>
Sludge Line	Brown
Gas Line	Red
Potable Water Line	Blue
Chlorine Line	Yellow
Sewage Line	Grey
Compressed Air Line	Green
Heating Water Lines	Blue with 6" red bands spaced 30" apart
Power Conduit	Orange

2. Non-potable waterlines shall be painted white and marked with black lettering on white background labels "Non-Potable Water."

2.03 - 2.04 (Not Used)

PART 3 EXECUTION

3.01 GENERAL (Not Used)

3.02 PREPARATION

A. Concrete Surfaces

1. Prior to painting, surfaces to be free of all latent matter, burrs, and fins, using one or more of the following methods as per SSPC SP 13.
 - a. Remove oil and grease with detergent and thoroughly rinse with fresh water.
 - b. Abrasive blasting may be used only if machinery or other equipment in vicinity of work is adequately protected either by covering adjacent areas or by the use of self recovering blasting equipment. Also, avoid settling of dust or grit on freshly painted surfaces.
 - c. Wash concrete surfaces with 10 percent solution of muriatic acid, then wash clean and free of scale, mortar, dust, moisture, and other foreign matter.
 - d. Concrete surface shall be allowed to cure 28 days and shall be clean and dry.
2. If curing compound is used, it must be removed prior to coating.

B. Metal Surfaces

1. Clean metal surfaces by abrasive blasting in shop as required by "Attachment A" and leave clean, dry, and ready to receive prime coat. Provide moisture separators to effectively remove all oil and free moisture from air supply. Cleanliness of air shall be tested by impinging an abrasive-free air stream onto a white cloth for 1 minute. If oil or moisture is detected, the source of air shall be shut down and corrected.
2. All dust and abrasives shall be removed from surfaces by brushing or blowing with clean, dry air. All abrasive grit shall be removed from around and between joints of connecting members.
3. Perform field abrasive blasting only if required to correct unsatisfactorily cleaned and shop-primed metal and when approved by ENGINEER.
4. Removal of Oil and Grease: Remove oil and grease with a solvent approved by coating manufacturer, or by steam combined with detergent (in accordance with SSPC-SP 1). Use of gasoline, kerosene, naphtha, or carbon tetrachloride not permitted.
5. Brushing, Scraping, Grinding, and Chipping: In field work, if abrasive blasting is not possible, scrapers, wire brushes, and other suitable grinding or chipping tools may be used (in accordance with SSPC SP-2 or SP-3) for removal of existing paint coatings prior to repainting, or for cleaning, before applying second coats.
7. Surface to be coated on same day as cleaned and before rust bloom occurs. Surfaces which have been cleaned but which have started to show signs of rust or dirt are to be cleaned again prior to coating at no additional expense to OWNER.

8. All surfaces shall be at least 5°F or higher above the dew point and remain this way when blasting, priming, or coating
9. No paint shall be applied when it is expected that the surface temperature will drop below the manufacturer's recommendation within 4 hours after the application of the paint.
10. Dew or moisture condensation should be anticipated, and if such condition are prevalent, painting shall be delayed until it is certain that the surface are dry; further, the days painting shall be completed well in advance of the probable time of day when moisture condensation will occur, in order to permit the film the required drying time prior to the formation of moisture.

C. General

1. Degree of Cleanliness and Surface Profile:
 - a. All surfaces that are abrasive blasted shall be completed to the degree specified for a given area. The profile thus obtained may be verified with replica tape such as Tes-TEX Coarse or Extra Coarse Press-O-Film Tape.
 - b. The standard of cleanliness for the surface preparation shall be evaluated with the use of: SSPC VIS 1; Swedish Pictorial Standards; or Visual Standards in SSPC SP 5/NACE No. 1, SSPC SP 6/NACE No. 3, SSPC SP 7/NACE No. 4 and SSPC SP 10/NACE No. 2.
 - c. All dust and abrasive shall be removed from freshly blasted surfaces by brushing, or blowing with clean dry air, paying special attention to corners and joints of connecting members prior to coating.
2. Abrasive Blast Cleaning:
 - a. Blasting shall progress in such a manner that the area cleaned shall not exceed the area that can be coated in the same day. Blasting shall not be performed if the surface may become wet before coating commences or when the surfaces are less than 5°F above the dew point, determined as outlined elsewhere in these TECHNICAL SPECIFICATIONS.
 - b. Only where abrasive blast cleaning is not possible, and subject to approval of the OWNER, will power scrapers, wire brushes, or other grinding or chipping tools be permitted.
 - c. CONTRACTOR shall be responsible for taking all necessary precautions to protect adjacent plant facilities and all adjacent properties from abrasive blast debris (abrasive and removed paint), as described in Part 3.09 of this Section.
3. Abrasive:
 - a. Abrasive shall be a nonmetallic type containing less than 1 percent free silica by weight before blasting.

- b. The abrasive shall also be of a grit size to produce the profile specified by the paint manufacturer for the coating system being applied.
 - c. Abrasive shall be properly stored and shall be free from contaminants.
 - d. Acceptance of the abrasive used on the interior of the tank shall be based not only on its compliance with the technical application of the coating, but also on its lack of nuisance to surrounding property.
 - e. No abrasives may be recycled for use again on this project because of the possibility of chloride contamination.
 - f. All abrasives must be delivered to the jobsite in moisture-proof bags or airtight bulk containers. Bags and/or containers shall be clearly labeled with the manufacturer's name and address and the content.
- 4. Surfaces which have been cleaned, but which have started to show signs of rust or dirt are to be cleaned again prior to coating at no additional expense to OWNER.
 - 5. If surfaces to be coated cannot be put in proper condition for coating by customary cleaning and abrasive blasting operations, notify the ENGINEER in writing prior to coating application.

3.03 ERECTION/INSTALLATION/APPLICATION AND/OR CONSTRUCTION

A. Application of Paint and Protective Coatings

- 1. General:
 - a. Use one convenient location for storing and mixing of materials, and keep fire extinguisher available in this area as long as location is used for such purpose. Protect floors, and all other areas where work is done, with suitable drop cloths, and remove oily rags and waste from building and legally dispose of in accordance with state and local regulations at close of each day's work.
 - b. Mixing, thinning, and application to be in accordance with manufacturer's printed instructions.
 - c. On completion of operations, remove all spots, oil, and stain from all surfaces and leave entire project in clean condition as far as this work is concerned. Remove from premises all containers and debris resulting from this work and legally dispose of in accordance with state and local regulations.
 - d. Follow Manufacturer's safety precautions.
- 2. Quality of Paint Applications:
 - a. All coatings shall be applied in accordance with manufacturer's recommendations and the specifications as outlined herein, using the best state-of-the-art techniques that will result in a finish containing uniformity and integrity, and a finish that is free of

- runs, sags, curtains, pinholes, orange peel, fish eyes, excessive overspray, or delaminations.
- b. Any defects detrimental to the life or appearance of the coating shall be removed and repaired.
3. Thinners and Solvents: Use only those thinners and solvents specified in paint formulas of paint being used and mix in proportions recommended by paint manufacturer.
 4. Weather:
 - a. No coating work to be done under unfavorable weather conditions unless the work is under cover, well protected, and specific approval from OWNER is obtained.
 - b. No coating or paint to be applied when the surrounding air temperature or the temperature of the surface to be coated is below 50°F or less than 5°F above the dew point.
 - c. No coatings to be applied to wet or damp surfaces or in rain, snow, fog, or mist.
 - d. No coatings to be applied when it is expected that the ambient air temperature will fall below 50°F or less than 5°F above the dew point within 6 hours after application of coatings or paints.
 - e. No coating to be applied when the relative humidity is above 85 percent. Relative humidity and dew point to be measured by use of a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychometric Tables.
 - f. If the above conditions are prevalent, blasting, coating, or painting operations to be delayed until weather conditions are favorable.
 - g. If there is not full-time resident inspection on the project, the CONTRACTOR shall have wet bulb-dry bulb measuring equipment and steel temperature measuring equipment on the job at all times. Readings shall be recorded at the beginning of each painting session and at no less than 4-hour intervals.
 - h. Wind velocities during the exterior painting shall be compatible for the quality application of the exterior coatings.
 - i. No paint shall be applied when it is expected that the surface temperature will drop below the Manufacturer's recommendation within 6 hours after the application of the paint.
 5. Coverage:
 - a. As recommended by paint manufacturer and sufficient to obtain minimum mil thickness specified. Do not exceed maximum thickness specified by manufacturer, if applicable. After final coat is applied, check with non-destructive dry film thickness gauge.
 - b. The thickness of the primer and intermediate coating is essential to the systems integrity. The addition of mils in a succeeding coat to make up for thin preceding coat(s) will not be allowed except where required to hide the underlying color.

- c. Dry mil thickness thicker than the specified allowable will also be considered to be not in compliance with the specifications if it will be detrimental to the appearance, or recoatability of the system, unless required for the uniformity of color.
6. Curing / Drying Time:
- a. Each coat of paint shall be allowed to either dry or cure for the amount of time recommended by the coating manufacturer before successive coats of paint are applied.
 - b. All successive coats of paint shall be applied within the recoat threshold time as recommended by the coating manufacturer.
 - c. Any change in this procedure shall be per the coating manufacturer recommendation and with written approval of the OWNER/ENGINEER.
7. Brush Application
- a. Brushes: Use first-quality hog hair or suitable synthetic bristle brushes. Use of horse hair bristle brushes not permitted. Keep brushes clean and free from accumulation of dried paint or dirt, and when brushes for oil or varnish base paints are not in use, keep them suspended in raw linseed oil bath. Clean brushes with proper solvent before reuse.
 - b. Application: Apply in uniform thickness consistent with specified coverage and with sufficient cross-brushing to ensure filling of surface irregularities. Exercise particular care in painting around bolt heads and nuts and in corners and other restricted spaces.
8. Conventional Spray Application:
- a. Air used for conventional spray guns to be clean and dry. Apply with adjustable air gun equipped with suitable water trap to remove moisture from compressed air, and with paint pot having air driven or mechanical agitator.
 - b. Paint application procedures to conform to the standards of craftsmanship discussed in the SSPC's Painting Manual, Volume 1, Good Painting Practice. These techniques include, but are not limited to, multiple passes of the spray gun with each pass overlapped 50 percent and "Cross Hatching" successive coats of paint.
 - c. Spray with width of spray adequate to coat the applicable surface with suitable pressure for the particular type of paint being used.
 - d. Each coat of paint to be allowed to either dry or cure the amount of time recommended by the coating manufacturer before successive coats of paint are applied. All successive coats of paint to be applied within the recoat threshold time as recommended by the coating manufacturer.
 - e. Make frequent checks to ensure correct spreading rate and coating and apply without sags, runs, or "orange peel" effect. Correct all

such imperfections. Take special care to cover edges, corners, and bolt heads, without bridging over of paint film.

- f. All equipment to be used by the painting CONTRACTOR to be capable of and designed for the purposes for which the equipment is to be used. Safety devices and gauges on the spray equipment to be in proper working order and function equal to new equipment.
 - g. CONTRACTOR responsible for ensuring no overspray from spray application contacts other plant equipment and facilities or adjacent property as described in Part 3.09 of this Section.
9. Airless Spray Application:
- a. Equipment used for airless spray shall be designed for and capable of handling the volume and pressures necessary to ensure smooth and proper application.
 - b. Hoses shall be specifically designed for the viscosity of the material being sprayed and shall be of the nonstatic, self-grounding type.
 - c. Tips shall be properly sized to ensure complete atomization and the spray pattern shall be continuous and free of all fingering effects.
 - d. Spraying techniques that result in a uniform wet pattern shall be used and dry spraying should be avoided. Dry spray shall be removed prior to coating being applied.
 - e. Follow guidelines described in Part 3.03 A.8 of this Section for proper application methods, standards, drying times, reapplication, and checks for correct spreading rates and coatings.
10. Roller Application:
- a. Proper length nap rollers shall be used to ensure a smooth application free of runs, sags, roller marks, or air bubbles.
 - b. Use longer nap for rougher surfaces when specified on PLANS.
 - c. Phenolic core lambs wool type rollers shall be used when polyurethanes, epoxies, or other types of activated coatings are applied by roller.
 - d. Standard type rollers shall be used on water based and enamel coatings.
 - e. Rollers shall be of sufficient quality to leave finished surfaces free of lint, roller nap, runs, sags, and other imperfections.
 - f. Roller core and fiber to be of a material not subject to degradation by the solvents or coating used.
 - g. Roller not to exceed 18 inches in length.
11. Metal Surfaces
- a. Shop-prime metal surfaces, if required, prior to delivery to jobsite.

- b. After delivery and prior to installation, keep all coated metal surfaces clean and free from corrosion. Clean and touch up or repaint damaged areas with additional primer.
 - c. After erection or installation of metal work, clean and touch up all rust spots, all places where primer has been rubbed or scraped off, and all bolts and nuts. After previously applied paint has hardened, and when surfaces to receive succeeding coats of paint have been cleaned and dried, apply finish paint in accordance with Tables 1 and 2. Allow 7 days or more, as recommended by coating manufacturer, for curing of final coat for submerged surfaces.
 - d. Factory-Finished Equipment: After installation of factory-finished machinery and electrical equipment, check base coats carefully and touch up all damaged surface areas. Do not paint nameplates, serial number bases, chrome, or bronze trim. Clean off any excess paint that impairs convenient removal of covers on gauges, instrumentation, or other equipment fitted with doors or covers.
 - e. Factory-Primed Equipment: Delay final field coating to manufacturer's primed equipment until equipment has been installed and is in proper working order in accordance with the applicable Item.
12. Provide necessary equipment to minimize the amount of dust, paint, abrasives, and other matter from settling on or damaging adjoining property. If excessive dust, paint, or abrasives are found which are affecting adjoining property and/or structures, as determined by the OWNER or their representative, the CONTRACTOR shall be required to utilize shrouds, drop tubes, or other means to confine a minimum of 95 percent of the abrasive, paint, and other material to the associated work area.
13. To facilitate adequate observation of all surfaces, provide scaffolding/rigging and adequate illumination required to perform dry film thickness readings and holiday test inspections as required by these specifications and the referenced standards. Provide personnel to move the scaffolding, lighting, or rigging at the instructions of the ENGINEER.
14. Provide proper safety equipment to the ENGINEER for observation.
15. Adequate ventilation for proper curing shall be provided. It is essential that the solvent vapors released during and after application of coating be removed from tanks or enclosed places. During coating application in enclosed areas the capacity of ventilating fans shall be at least 300 cfm per gallon of coating applied per hour. Continuous forced ventilation at a rate of at least one complete air change per 4 hours shall be provided for during all phases of paint application and for at least 7 days after coating application is completed. Air shall be exhausted from the lowest portions of the tank with the top openings kept open and clear.

B. Special Requirements

1. Cast iron or ductile iron piping and valves for interior and exterior installation with a factory-applied bitumastic or asphaltum varnish coating will be cleaned by abrasive blasting so as to provide a NACE #3 finish on interior exposed installations and a NACE #2 finish on exterior exposed surfaces.
2. Inspection: All phases of the work are subject to inspection by the ENGINEER to assure proper performance and compliance with the specifications. The ENGINEER shall be advised of the proper time to inspect surface preparation, prime coat, and each succeeding coat. The Contractor shall apply additional coats only after the previous coat has been approved by the ENGINEER or OWNER's representative.
3. The Contractor shall have on the project site the following testing equipment. Equipment shall be in calibration and proper working order. Equipment shall be used in accordance with the Manufacturers' instructions or as directed by the Engineer.
 - a. One magnetic pull-off type, nondestructive paint film thickness gauge, such as a Mikrotest thickness gauge
 - b. One set of certified coating thickness calibration standards produced by the U.S. Department of Commerce
 - c. One "wet sponge," low-voltage, DC type holiday detector, such as the Tinker-Razor Electrical holiday detector
 - d. Sling Psychrometer: Relative humidity and dew point reading shall be taken at intervals throughout the days work. Readings shall be taken at the start of the mornings work, mid day and afternoon. Should environmental conditions change, additional reading shall be taken to assure that coating are being applied under the conditions as outlined by the coatings Manufacturer.
 - e. Surface Temperature Thermometer: Surface temperature shall be taken in areas where work is being performed. Surface temperature shall be that as specified by the coatings Manufacturer.
 - f. Replica tape & Micrometer: Tesex X-Course Replica Tape shall be employed to determine the surface profile of blasted surfaces. Surface profile shall be 2.0 – 3.0 mils.
4. Tests to be performed by the CONTRACTOR and approved by the OWNER or OWNER's REPRESENTATIVE before equipment is put into operation.
5. All work shall be warranted for a period of two years from date of substantial completion of the project. The OWNER will notify the Contractor at least 30 days prior to the date and shall establish a date for the inspection. Any defects in the coating system shall be repaired by the Contractor at no additional cost to the OWNER. Should a failure occur to

25 percent of the painted surface, either interior or exterior, the entire surface shall be cleaned and painted in accordance with these specifications.

3.04 - 3.06 (Not Used)

3.07 CLEANING

All cloths and waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site and /or destroyed in an approved and legal manner. Paint spots, oil, or stains upon adjacent surfaces and floors shall be completely removed, and the entire job left clean and acceptable to the ENGINEER.

3.08 TESTING AND INSPECTION

- A. Quality control procedures and practices will be utilized to monitor all phases of surface preparation, application, and inspection throughout the project. Each phase of surface preparation and coating application to be inspected and approved in writing by **CONTRACTOR's** certified NACE inspector.
- B. Provide OWNER's inspector or representative with proper safety equipment and necessary scaffolding or rigging and adequate illumination to perform a thorough inspection.
- C. CONTRACTOR to furnish the following equipment for use by the OWNER's inspector or representative.
 - 1. One nondestructive paint film thickness gauge, such as Mikrotest thickness gauge.
 - 2. One set of certified coating thickness calibration standards produced by the U.S. Department of Commerce.
 - 3. One "wet sponge" type holiday detector, such as the Tinker-Razor Model M1 Electrical holiday detector.
 - (1) Tap water to be used as electrolyte for $DFT \leq 10$ mils.
 - (2) Surfactant to be used as electrolyte for $DFT \geq 10$ mils.
 - 4. Replica tape such as "Tes-tex" tape coarse and extra coarse grades. Also provide a dial-type micrometer.
- D. OWNER's inspector or representative to witness measurements and may elect, and shall be permitted, to perform additional measurements deemed necessary.
- E. Dry film thickness tolerance 0.25 mil; measure each 100-square-foot section.
- F. After final coat is applied, check with dry film thickness gauge. Where there are extensive areas or spots with coating thinner than specified, apply additional coats as necessary to provide required dry film thickness and consistent even color.

3.09 PROTECTION

- A. Protection of Adjacent Property
 - 1. Prior to the cleaning and coating of an exterior surface, the CONTRACTOR shall present a written plan to the OWNER describing how paint and/or abrasive damage to automobiles and property will be

handled, including a process for quick removal of the paint, and who will do the work. This approval in no way will relieve the CONTRACTOR from the responsibility of settling claims for damage, but is intended as an avenue to expedite and minimize said claims.

2. Due to the proximity of the site to residences, emissions from abrasive blasting must be controlled using one of the methods given in TCEQ 30 TAC 111.131-139.
3. Shrouds, or other means approved by OWNER, shall be used to protect adjacent property and on site structures from damage associated with paint application.

B. Ground Protection

1. Protect the ground from contact with cleaning blast debris. No blast debris from exterior cleaning activities shall be allowed to contact the ground at project location. Ground to include complete plant project site.
2. Material(s) used for ground cover protection to support weight of tank cleaning blast debris, dry and wet, as well as personnel and equipment movement associated with the activities of this project.
3. Prevent storm water, contaminated with blast debris, from leaving area.
4. CONTRACTOR responsible for complete clean up of any areas contaminated by tank cleaning blast debris.

C. Protection of Plant Equipment

The CONTRACTOR shall protect all plant equipment from damage that may result from his activities. The CONTRACTOR shall submit a protection plan to the ENGINEER for review prior to starting work. The protection plan is subject to approval by the ENGINEER and must include detailed descriptions of the CONTRACTOR's proposed plan for protecting sensitive equipment from abrasive blasting, pressure washing, and dust. Special care shall be given to electrical equipment and chlorination facilities.

3.10 SCHEDULES

“Attachment A” to this Section defines System Schedule and “Attachment B” defines Paint, Sealer, and Coating Schedule.

3.11 MEASUREMENT AND PAYMENT

No separate payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part. **Testing of this work shall be performed by the CONTRACTOR and the cost of testing for painting and protective coatings is included in this item.**

**ATTACHMENT A
SYSTEM SCHEDULE**

<u>Type of Surface</u>	<u>Exposure</u>	<u>Cleaning</u>	Attachment B - Material Reference				<u>Minimum Total Mil Thickness</u>
			<u>Primer Coat</u>	<u>Coat</u>	<u>2nd Coat</u>	<u>3rd Coat</u>	
Clay or Brick Masonry	Exterior ⁽¹⁾	Manufacturer's Specification	--	1	--	--	N/A
Concrete Block Buildings	Exterior	Manufacturer's Specification	--	2	4	4	3.0 (Finish Coat)
Concrete Block Walls	Interior ⁽²⁾	Paragraph 3.02 A.	--	3	4	4	3.0 (Finish Coat)
Concrete Walls and Ceilings	Interior	Paragraph 3.02 A.	--	3	4	4	3.0 (Finish Coat)
Wood	Interior and Exterior	Manufacturer's Specification	10	11	11	--	4.5
Metal Doors, Frames and Windows	Interior and Exterior	SSPC SP 7/NACE No. 4 1.0 Mils Surface Profile	18	9	9	--	4.0
Structural and Miscellaneous Steel, Control Panels	Exterior	SSPC SP 10/NACE No. 2 1.0-2.0 Mils Surface Profile	18	17	9	--	7.0
Structural and Miscellaneous Steel, Control Panels	Interior	SSPC SP 6/NACE No. 3 1.0-2.0 Mils Surface Profile	18	17	--	--	5.5

Attachment A - (Cont'd)

<u>Type of Surface</u>	<u>Exposure</u>	<u>Cleaning</u>	Attachment B - Material Reference			<u>Minimum Total Mil Thickness</u>
			<u>1st Coat</u>	<u>2nd Coat</u>	<u>3rd Coat</u>	
Piping and Valves	Interior ⁽²⁾ Exterior ⁽¹⁾	SSPC SP 10/NACE No. 2 SSPC SP 6/NACE No. 3 1.0-2.0 Mils Surface Profile	6 6	17 18	-- 9	4.5 6.0
Valves and Bolting On Cast Iron Pipe	Buried	--	--	14	14	32.0
Factory Finished Machinery, Electrical, and Motors ⁽³⁾	Interior and Exterior	Hand Clean	5 ⁽⁴⁾	8 ⁽⁵⁾	8 ⁽⁵⁾	4.5
Galvanized Steel	Interior	Solvent Cleaning	15	17	--	2.9
Galvanized Steel and Galvanized Pipe Conduit Threads	Exterior	Solvent Cleaning	15	18	9	4.4
Wastewater Treatment Plant Equipment, Piping	Submerged ⁽⁶⁾	SSPC SP 10/NACE No. 2	6	13	13	22.0
Potable Water Treatment Plant Equipment, Piping ⁽⁷⁾	Submerged	SSPC SP 10/NACE No. 2 1.0-2.0 Mils Surface Profile	7	12	--	8.0

Attachment A - (Cont'd)

<u>Type of Surface</u>	<u>Exposure</u>	<u>Cleaning</u>	<u>Attachment B - Material Reference</u>			<u>Minimum Total Mil Thickness</u>
			<u>1st Coat</u>	<u>2nd Coat</u>	<u>3rd Coat</u>	
Water Well, Well Equipment and Piping ⁽⁷⁾	Interior and Exterior	SSPC SP 10/NACE No. 2 1.0-2.0 Mils Surface Profile	7	12	--	8.0
Wastewater Wet-Well ⁽⁸⁾	Interior Surfaces	Paragraph 3.02 A.	6	13	13	22.0
Wallboard (Semi-Gloss)	Interior	Manufacturer's Spec	19	20	20	4.0

(1) Concrete surface or piping above ground exposed to weathering.

(2) Concrete surface or piping above ground sheltered from weathering.

(3) Use coating system per equipment item when specified.

(4) Optional: Use manufacturer's standard primer if compatible with specified finish coats.

(5) Optional: Use manufacturer's standard finish coat.

(6) Piping that is submerged in a fluid.

(7) Coatings used must be in the latest publication of National Sanitation Foundation (NSF) NSF/ANSI 61.

(8) Unless otherwise noted on PLANS.

Note: NACE - Reference to National Association of Corrosion Engineers.

ATTACHMENT B
PAINT, SEALER, AND COATING SCHEDULE

<u>Symbol</u>	<u>Min. Dry Mils Per Coat</u> ⁽¹⁾	<u>Service</u>	<u>Generic Type</u>	<u>Brand and Manufacturer</u>
1.	NA	Primary Sealer	Chemical Penetrant	Aqua-Gard - CreteGard Corp. Loxon 40% Silane Water Repellant – SW Alkali Resistant Primer 4-603 PPG
2.	NA	Weather-proof Primary Sealer	Acrylic Emulsion	16-90 Block Filler - Ameron Carboline Sanitile 120 - Carboline AC 210 Acrylic Primer - Induron Interlac 895 - International Seal Grip Primer 17-21 - PPG Loxon Ext. Masonry Acrylic Primer A24W300 - SW
3.	NA	Primary Sealer	Vinyl-Acrylic Emulsion With Epoxy Esters	16-90 Block Filler - Ameron Carboline Sanitile100 Block Filler - Carboline AC 220 Acrylic Block Filler - Induron Interlac 895-International Heavy Duty Block Filler 16-90 - PPG Heavy Duty Block Filler B42W46 - SW
4.	1.5 Coat	Finish	Acrylic Emulsion	Amercoat 220 - Ameron Carboline 3359 - Carboline Aquanaut II - Induron Intercryl 530- International Pitt-Tech Plus Acrylic 90 Line – PPG DTM Acrylic Coating B66-100 Series - SW

Attachment B - (Cont'd)

Symbol	Min. Dry Mils Per Coat ⁽¹⁾	Service	Generic Type	Brand and Manufacturer
5.1.5	Metal Primer	Alkyd	Amercoat 5105-Ameron	Carboline Carbocoat 115 - Carboline P-30 Universal Primer - Induron Interlac 260 - International Metal Primer 6-208/212 - PPG Kem Kremik Universal Primer B50HZ1 - SW
6.	4.0-8.0	Metal Primer or Concrete Surfaces	Polyamid Cured Epoxy Resin	Amerco 385P - Ameron Carboline Carboguard 61- Carboline PE-70 Epoxy - Induron Interseal 670HS- International Amerlock 2/400 - PPG Dura-Plate 235 - SW
7. (2 & 3)	2.0-4.0	Metal Primer	Polyamide- Cured Epoxy Resin	Amerlock 2 - Ameron Carboline Carboguard 891HS - Carboline PE-70 Epoxy - Induron Interseal 670 HS - International Amerlock 2/400 NSF/61 - PPG Epoxide HS B62W940 - SW
8.	1.5	Finish Coats	Alkyd, Straight Long-oil	Amercoat 5450 Alkyd Gloss - Ameron Carboline Carbocoat 45 - Carboline Armorlux 2500 - Induron Interlac 665- International Industrial Enamel 6-282 series - PPG Industrial enamel HS B542-400 Series - SW

Attachment B - (Cont'd)**Min. Dry**

<u>Symbol</u>	<u>Mils Per Coat</u> ⁽¹⁾	<u>Service</u>	<u>Generic Type</u>	<u>Brand and Manufacturer</u>
9.	2.0-5.0	Finish Coat	Aliphatic Urethane	Amerco 450H - Ameron Carboline 134 HS - Carboline Indurethane 6600 Plus - Induron Interthane 990 HS- International Pitthane Ultra 95-812 series - PPG Acrolon Ultra B65-820 Series - SW
10.	1.5	Wood	Alkyd Primer	Amercoat 5450 - Ameron Carboline Sanitile 120 - Carboline AC 301 Exterior Wood Primer - Induron Interlac 260 - International Speed-Hide Ext Alkyd 6-809 series - PPG Industrial Enamel HS - SW
11.	1.5 Coat	Finish	Alkyd, Straight Long-oil	Amercoat 5450 - Ameron Carboline Carbocoat 45 - Carboline Armorlux 2500 - Induron Interlac 665 - International Amercoat 5450 Alkyd Gloss - PPG Industrial Enamel HS - SW
12. (2 & 3)	4.0-12.0	Submerged Steel, Iron, or Concrete Surface	Polyamide-Cured Epoxy Resin	Amerlock 2 - Ameron Carboline Carboguard 891HS - Carboline PE-70 Epoxy - Induron Interseal 670HS - International Amercoat 240 Amine Cure - PPG Macropoxy 646 PW - SW

Attachment B - (Cont'd)

**Min. Dry
Mils Per**

Generic

<u>Symbol</u>	<u>Coat</u> ⁽¹⁾	<u>Service</u>	<u>Type</u>	<u>Brand and Manufacturer</u>
13.	16	Submerged Steel, Iron or Concrete Surface	Coal-tar Epoxy Two Component	Amercoat 78 HB - Ameron Carboline Bitumastic 300M - Carboline Ruff Stuff 2100 Coal Tar Epoxy - Induron Interzone 954 - International Amercoat 78HB Coat Tar Epoxy - PPG Targuard - SW
14.	16	Buried Steel Or Iron	Tar-base Pitch	Amerlastic 280 - Ameron Carboline Bitumastic 300M - Carboline Ruff Stuff 2100 - Induron Interzone 954 - International Amercoat 78HB Coat Tar Epoxy - PPG
15.	0.4	Galvanized Metal Primer	Vinyl Wash Primer	Galvaprep - Ameron Carboline Galoseal WB - Carboline Vinyl Wash Primer – Induron Galvaprep 5 - International Galvaprep 5 – PPG DTM Wash Primer - SW
16.	2.0-5.0	Steel Above Ground and Above Waterline	High Ratio Silicate Inorganic Zinc	Dimetcote 9 Series - Ameron Carbo Zinc 11 – Carboline Indurazinc MC67 – Induron Interzinc 22 - International Amercoat D-9 Inorganic Zinc - PPG Zinc Clad II - SW

Attachment B - (Cont'd)

<u>Symbol</u>	<u>Coat</u> ⁽¹⁾	<u>Service</u>	<u>Type</u>	<u>Brand and Manufacturer</u>
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Min. Dry

Mils Per

Generic

17.	4.0-8.0	Steel Interior	Polyamide Cured Epoxy Resin	Amercoat 385 Epoxy - Ameron Carboline Carboguard 61 - Carboline Induraguard Epoxy - Induron Interseal 670 HS - International Pitt-Guard All Weather DTR 97-946 - PPG Macropoxy 646 PW - SW
18.	4.0-8.0	Intermediate Finish	Epoxy Primer	Amercoat 385 - Ameron Carboline Carboguard 61 - Carboline Induraguard Epoxy - Induron Interseal 670 HS – International Amercoat 385 - PPG Macropoxy 646 PW - SW
19.	1.2	Sealer	Vinyl-Latex Sealer	Carboline Sanitile 120 – Carboline Seal Grip – 17921 - - PPG
20.	1.4	Finish Coat Semi-Gloss	Synthetic Alkyd Resin	Carboline Sanitile 155 -- Carboline Speedhide – Alkyd Semi-Gloss 6-1510 -- PPG

⁽¹⁾ Or manufacturer’s standard, whichever is greater. Do not exceed manufacturer’s maximum standard, if applicable.

⁽²⁾ For potable water use.

⁽³⁾ As recommended

END OF SECTION

SECTION 11370

BRIDGE CRANES AND APPURTENANCES

PART 1 GENERAL

1.01 DESCRIPTION:

- A. Provide and test bridge cranes, hoists, motors, gear reducers, controls and appurtenances as indicated and specified.
 - 1. Rail and supporting beams included in building structure, refer to structural drawings.
 - 2. Hoist capacities and operating data are indicated in the Bridge Crane Schedule.

1.02 UNIT PRICES

Unless indicated in the Unit Price Schedule as a pay item, no separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items for which this work is a component.

1.03 REFERENCES:

- A. American Bearing Manufacturers Association (ABMA):
 - 1. 9: Load Ratings and Fatigue Life for Ball Bearings.
 - 2. 11: Load Ratings and Fatigue Life for Roller Bearings.
- B. American Society of Mechanical Engineers (ASME):
 - 1. B30.16: Overhead Hoists (Underhung) Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings.
 - 2. B30.17: Overhead and Gantry Cranes (Top Running, Single Grinder, Underhung Hoist).
- C. American Welding Society (AWS):
 - 1. D1.1: Structural Welding Code Aluminum.
- D. National Electric Code (NEC).
- E. National Electrical Manufacturers Association (NEMA):
 - 1. MG1: Motors and Generators.
- F. Occupational Safety and Hazard Association (OSHA):
 - 1. 29 CFR 1910.179: Overhead and Gantry Cranes.
- G. Crane Manufacturers Association of America (CMAA):
 - 1. 74-2004: Specification for Top Running & Under Running single Girder Electric Traveling Cranes Utilizing Under Running trolley Hoist.

1.04 SUBMITTALS:

- A. Comply with the general requirements of Section 01300:
 - 1. Data regarding bridge crane characteristics and performance:
 - 2. Certified setting plans, with tolerances, for anchor bolts.
 - 3. Manufacturer's literature as needed to supplement certified data.

4. Operating and maintenance instructions and parts lists. Comply with the requirements of Section 01730 – Operations and Maintenance Data
5. List of recommended spare parts other than those specified.
6. Shop and field inspection reports.
7. Motor shop test results.
8. Recommendations for short and long-term storage.
9. Shop and field testing procedures, equipment to be used.
10. Special tools.
11. Manufacturer's product data, specifications and color charts for shop painting.
12. Provide scaled drawing height and weight of equipment serviced by the hoisting equipment including hook height and travel dimensions.
13. Material Certification:
 - a. Provide certification from the equipment manufacturer that the materials of construction specified are recommended and designed for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and designed for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.
 - b. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and designed for the service conditions specified and indicated.

1.05 QUALITY ASSURANCE:

- A. Overhead bridge cranes to be in conformance with CMAA Specification No. 74 and as specified and indicated.
- B. Permanently mark the capacity of the hoist and trolley on each hoist and crane, in easy to read letters and in a prominent position.
- C. Provide only safety type hooks.
- D. Provide hoists so that hook can reach the floor at the lowest level of the lift.
- E. Cranes shall be manufacturer's standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.
- F. Welding: In accordance with American Welding Society Code D1.1.
- G. Provide shop tests as specified.
- H. Crane manufacturer shall provide beams, hoists, motors, gear reducers, switches, and controls regardless of manufacturer as a complete integrated package to ensure coordination, compatibility and operation of the systems.

- I. Crane manufacturer shall have a minimum of five (5) operating installations with cranes of the size specified and in the same service as specified operating for not less than five (5) years.

1.06 WARRANTY

Crane manufacturer shall furnish to the OWNER a warranty written expressly from the manufacturer to the OWNER, covering workmanship and material under normal use and service. The warranty shall cover 100 percent of parts and labor for at least **two full years**. The warranty period shall commence on the day **that the project is substantially completed**. Warranty shall be in printed form and previously published as the manufacturer's standard warranty for similar manufactured units.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION:

- A. Bridge Crane Schedule:

Type of Crane	Top running, single girder
Duty Cycle Rating	Class B
Bridge Operating Speed	Single speed, 75 fpm
Span	24'-4"
Runway Length	54'-6"
Hook Height	10'-9" ft (min.)
Overhead Clearance	12 in (min.)
Control System	Pendant control
Type of Hoist	Electric Wire Rope
Hoist capacity	2.0 Tons
Hoist Motor Horsepower	2 hp
Power Source	460V, 3PH, 60 Hz
Trolley Electrification	Festoon
Trolley Motor Horsepower	0.5 hp
Trolley Speed	36 fpm

2.02 CRANE MANUFACTURERS:

- A. Acceptable Manufacturers
1. Konecranes.
 2. Mass Crane & Hoist.
 3. Dearborn Overhead Crane.
 4. Approved Equal
- B. Listing as an approved manufacturer will not relieve the manufacturer from conforming to Contract Specifications.

2.03 BRIDGE:

- A. Top running type crane bridge as indicated in the plans.
 - 1. Provide top running cranes designed to resist all vertical, lateral and torsional forces combined as specified in CMAA-70 and 74.
- B. Provide girders connected with end trucks.
- C. Bridge and truck: Welded steel construction. Provide rigid structure and trucks attached to bridge girders with turned bolts.
- D. Provide bridge with holes drilled and reamed for matched fit before final assembly and welding.
- E. End trucks: minimum wheel base 1/8 of crane span.
 - 1. Provide bridge trucks with ball or roller bearings and medium or high carbon steel or high strength alloy steel fixed or rotating type steel axles.
 - 2. Provide trucks to prevent drop in excess of one inch in the event of wheel or axle failure.
 - 3. Provide entire truck machine as a factory assembled unit to provide perfect alignment.
- F. Truck Wheels: double flanged rolled bridge type forged or cast steel with hardened treads.
 - 1. Wheels to carry maximum wheel load under normal operating conditions. Diameter not less than that shown for maximum load in CMMA-74.
- G. Provide driving mechanism such that travel will be steady and free from vibration or racking in any part of structure while traveling under maximum load at all speeds. Prevent any tendency for crane structure to get out of line while traveling along runway under any operating condition.

2.04 ELECTRIC HOISTS:

- A. Electric Hoists: Spur-gear driven antifriction bearings throughout. Provide a load side holding brake and a separate electrically operated non-load control brake. Design brake with capability of supporting the full load at any point when the motor is stopped. Holding brake shall be externally adjustable, electrically operated friction disk brake that shall apply automatically when the power is off. The brake shall hold 150 percent of the rated load and 125 percent of the rated load at any operating speed. Design shafts of motor, drum, and drum pinion to run in grease-lubricated ball or roller bearings. Design the gear train and bearings to be oil-bath lubricated.
- B. Provide hoist with right angle mounting with H-wheel trolley, motorized as specified and indicated.
- C. Hoist: Standard type.
- D. Design drum with machine-cut grooves and guarded flanges and with capacity to take entire run of cable in one layer with no overlapping.
- E. Provide hoist with an upper and lower geared limit switch with automatic reset control circuit to prevent overtravel. Settings to be field adjustable in accordance with OSHA 29 CFR 1910.179.

- F. Supply sufficient hoisting cable with hoists for two-part single reeving and to accommodate not only the maximum lift but two additional wraps on drum. Make cable flexible high-strength plowsteel cable with a load safety factor of at least 5 to 1.
- G. Make load block of rugged construction containing a ball-bearing sheave and a high-grade forged-steel swivel hook with antifriction bearings.

2.05 TROLLEYS:

- A. Provide trolley operating wheels with chain guides, and make chains for each of sufficient length to hang 3 feet above operating floor.
- B. Motor-Driven Trolleys: Four-wheel type consisting of a fully enclosed electric motor equipped with a magnetic brake, a geared transmission completely enclosed in an oiltight housing and suspended on flanged driving wheels with power to two wheels. Use ball or roller bearings throughout.
- C. Make trolleys designed for operation on beam or rail as indicated on drawings. Trolleys to be provided by the hoist manufacturer.

2.06 SAFETY STOPS:

- 1. Provide safety stops on all open ends of track (or where indicated) to prevent trolley from running off ends or damaging building. Provide stops with capability of withstanding impact imposed by motion of fully loaded hoist and trolley.

2.07 TRACK:

- A. Monorail Track: Standard beam of sizes as indicated on drawings.
- B. Shop fabricate all curves for either track or switches to radius indicated.
- C. Erect track level throughout, with section ends machined fitted and spliced with web-type or other designed couplings to provide flush level connections. Maximum gap between adjacent ends not exceeding 1/16-inch.

2.08 CABLE REELS:

- A. Feed cable reel for electric current supply for all electric hoists with trolleys, except as otherwise indicated, through a single flexible, multi-conductor powercable from a self-winding spring-operated reel located near mid-point of trolley travel or where indicated on drawings.
 - 1. The reel shall have a swivel base.
 - 2. The reel shall have a roller outlet.
- B. Furnish junction box to connect cable reel to power supply circuit with hoist.

2.09 ELECTRICAL CONTROLS:

- A. Supply complete integral electrical control system with the electric hoisting equipment (by hoist manufacturer) consisting of starters, circuit breakers, overload relays, limit switches, control transformer for a 120-volt control circuit, control relays, and controlling devices.
- B. Furnish magnetic controls for motors. Design controls to permit "inching" in both forward and reverse directions under full load, automatically regulated acceleration, and rapid brake response.

- C. Provide each hoist with limit switches of automatic-reset control circuit type to prevent overtravel in both raising and lowering directions.
- D. Compliance: Make all electrical equipment including motors, controls, resistors, brakes plus all conduit, wiring, panels, and enclosures with applicable requirements for materials, workmanship, construction, and installation of latest NEMA and National Electrical Code Standards.

2.10 MOTORS:

- A. Provide in accordance with Section 15172 and as specified herein.
- B. Motors for Hoists and Trolley: Totally enclosed, reversible, induction motors especially adapted to hoist service.
 - 1. Enclosure: NEMA 12.
 - 2. Insulation: Minimum Class "F" with Class "B" temperature rise, 40 degrees C ambient unless otherwise indicated or specified.
 - 3. Service Factor: 1.15.
 - 4. Provide capacity to start and operate hoists at maximum speed rated capacity indicated without exceeding nameplate ratings for current and power and without operating in the service factor.
 - 5. Provide ball or roller bearings, in accordance with ABMA Standard 9 and Standard 11; minimum L-10 life of 100,000 hours.
 - 6. Premium efficient motors, nominal and minimum motor efficiencies per NEMA MG1.
 - 7. Rating: 460V, 3 ph, 60 Hertz.

2.11 PUSHBUTTON CONTROL:

- A. Provide pendent pushbutton control station with sufficient pushbuttons to control all operations of hoists and trolley. Clearly mark each pushbutton to indicate its function. Make cable long enough to reach within 4 feet of operating floor or platform level with a supporting chain. If necessary, attach an arm to hoist so that pendent cable and pushbutton controls will hang vertically and be readily accessible from operating positions.

2.12 CONDUCTORS AND COLLECTORS:

- A. Manufacturers:
 - 1. Insul-8-Bar Protected Conductors made by Insul-8-Corp.
 - 2. Safety-T-Bar Conductor Systems made by Howell Corp.
 - 3. Duct-O-Bar Conductor System made by Duct-O-Wire Co.
- B. Use equipment and accessories approved by Underwriter's Laboratories (UL).
- C. For conductor for electric current supply provide safety type in which conductor is shielded by a molded-plastic cover that surrounds conductor except for a slotted opening shaped to contour of collector head. Provide separate conductor for each phase. (Dual conductors in a single insulating shield are not acceptable.) Make conductor of plated steel or copper designed for carrying maximum anticipated current. Make molded-plastic shield of high dielectric strength, rigid yet sufficiently flexible to permit bending to radius of curves or switches, and

resistant to corrosion and deterioration from sunlight or weather. Space insulated supports not over 5 feet on straight track.

- D. Provide collectors of sliding shoe type with an adjustable spring-load arm capable of horizontal or vertical movement to automatically adapt to irregularities of conductor. Set shoe in a molded-plastic head that will prevent external contact with shoe when it is running on conductor. There shall be no exposed bare current-carrying surfaces or wires in collector or arm where shoe is in contact with conductor.

2.13 SHOP PAINTING:

- A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, high solids epoxy in accordance with Section 09902 – Painting and Protective Coatings.
- B. Surface preparation, mixing and application and safety requirements shall be in accordance with the paint manufacturer's printed instructions and as specified.
- C. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.
- D. Provide additional shop paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install items in accordance with manufacturer's printed instructions and as indicated and specified.
- B. Check horizontal and vertical alignment of track and rails.
- C. Erect rack level throughout, with section ends machined fitted and spliced with web-type couplings to provide flush level connections. Maximum gap between adjacent ends not exceeding 1/16-inch.
- D. Do not use cast fittings.

3.02 FIELD TESTING:

- A. Provide as specified herein. Perform all tests with instrumentation controls and motor controls. Perform testing in accordance with OSHA 29 CFR 1910.179 and as specified herein.
- B. After installation of hoist equipment, and after inspection, operation, testing and adjustment have been completed by manufacturer's field service technician, conduct test for each hoist in presence of the Contractor to determine its ability to operate at rated speeds and capacity under conditions specified and indicated. During tests, observe and record, capacity and motor inputs. Promptly correct or replace all equipment not conforming to the requirements of this section revealed by or noted during tests, at no additional cost to the Owner, and repeat tests until specified results are obtained. Contractor to provide all labor, weights and materials for conducting tests.
 - 1. Provide a 60 minute test for each hoist.
 - 2. Running test shall consist of moving hoist and trolley through two complete cycles. The first cycle will be with no load. For the second cycle, the unit will be loaded with 100 percent of the specified load rating.

3. Test and simulate all limit switches, locking and safety devices.
- C. Make all adjustments to place equipment in specified working order at time of above tests.
- D. After three (3) unsuccessful testing attempts, remove and replace equipment at no additional cost to the Owner with equipment that will meet all requirements specified and indicated.

3.03 FIELD TOUCH-UP PAINTING:

- A. After installation and testing, apply touch-up paint to all scratched, abraded and damaged shop painted surfaces. Coating type and color shall match shop painting.

END OF SECTION

SECTION 13211

COMPOSITE ELEVATED STORAGE TANK

PART 1 GENERAL

1.01 SUMMARY

The work to be performed under this Section shall include all labor, materials and equipment necessary for the design, construction, fabrication, erection, and delivery of one composite elevated water storage tank of style, height, and capacity as shown on PLANS and as specified herein.

Cleaning, painting, testing, disinfection, and accessories as shown on PLANS and as specified herein shall be included.

The work shall also include all materials, tools, and labor necessary for the design and construction of the elevated tank foundation including excavation and backfill, site work, and water main. All work shall be performed in accordance with PLANS and as indicated herein.

1.02 RELATED REQUIREMENTS

Related work as called for on PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATIONS.

1.03 MEASUREMENT AND PAYMENT

No separate payment for work performed under this Section, unless noted otherwise below. Include cost of same in Contract price bid for work of which this is a component part. The Bid price is to reflect full payment for design, inspection, supervision, materials, labor, tools, equipment, appurtenances, and other incidentals, including guarantee, as required for full and proper functioning of tank, complete in place.

1.04 REFERENCES

The publications listed below and the references included herein form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The referenced publication refers to the most recent editions or publications.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	Standard Tolerances for Concrete Construction and Materials
ACI 301	Specifications for Structural Concrete Buildings
ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Guide to Formwork for Concrete
ACI 371R	Guide for the Analysis, Design and Construction of Concrete-Pedestal Water Towers

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	Minimum Design Loads for Buildings and Other Structures
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AMERICAN WELDING SOCIETY (AWS)

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA D107 Standard for Composite Elevated Tanks for Water Storage

AWWA D102 Standard for Painting Steel Water Storage Tanks

AWWA C652 Standard for Disinfection of Water Storage Facilities

FEDERAL AVIATION ADMINISTRATION (FAA)

AC 70/7460-1K Obstruction Marking and Lighting

AC 150/5345-43F Specification for Obstruction Lighting Equipment

NATIONAL SAFETY FEDERATION (NSF)

ANSI/NSF 61 Drinking Water System Components

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Occupational Safety and Health Standards

STANDARD SPECIFICATIONS FOR PAINTING CONTRACTORS (SSPC)

SSPC-PAL Paint Application Specification

DEFINITIONS

CFD: Computational Fluid Dynamics

COV: Coefficient of Variation; Ratio of Standard Deviation of Tracer Concentration over Mean Tracer Concentration.

HMS: Method of configuring and operating piping, valves, and related devices to achieve uniform dispersion or dilution of tank influent water and a homogeneous solution.

Mixing Time: Time required for the COV to fall to 0.1 (10%)

Negative buoyancy: condition when incoming water is cooler than the tank contents.

Neutral buoyancy: condition when incoming water as the same temperatures as the tank contents.

Thermal Stratification: Layered variations of density and temperature in the stored water volume.

1.05 SYSTEM DESCRIPTION

- A. The composite elevated tank shall consist of the following: foundation, reinforced concrete support structure, and a welded steel water tank. The support structure shall extend vertically from the foundation as a circular concrete wall. A concrete slab shall be provided as structural support for the steel tank within the perimeter of the wall. A reinforced concrete ring beam shall be provided to connect the steel tank, concrete slab and concrete support wall. The tank manufacturer shall perform the structural design and shall provide plans and specifications sealed by a Professional ENGINEER licensed in the State of Texas.

The elevated tank shall be in accordance with the shape, dimensions and details required by this Specification Section and PLANS.

B. Site information

1. Project Location: Pinto Pump Station, Wilmer, Texas
2. Access to the site: Pinto Road or Pleasant Run Road
3. Electrical service shall be provided on site as shown on PLANS and as indicated in the project specifications. CONTRACTOR is responsible for providing temporary power required for construction.
4. Compressed air is not available at the site. CONTRACTOR is responsible for providing compressed air required for construction.
5. There is an ongoing construction project (by others) to build a waterline down Pleasant Run Road. If available, CONTRACTOR may connect to existing fire hydrant(s) at Pleasant Run Road. Otherwise, CONTRACTOR shall be responsible for supplying own water for construction. Regardless of which method is employed to provide water supply for construction, CONTRACTOR is responsible for complying with all federal, state, and local requirements regarding potable water connections, usage, flow control, and appurtenances.

1.06 SUBMITTALS

In addition to items specified in Section 01300 – Submittals, submit the following.

A. MANUFACTURER INFORMATION:

1. A completed contracts summary demonstrating minimum ten (10) years experience and listing a minimum of ten (10) composite elevated tanks of 500,000 gallon or greater capacity in successful operation for at least five (5) years. These tanks shall be of the same design described in paragraph 1.05. Provide the location, capacity, OWNER contact with phone number and year completed.
2. A Section view drawing of the tank proposed for this project. The drawing shall include sufficient detail to illustrate tank geometry, materials of construction, primary dimensions, support wall thickness and pour height, concrete slab thickness, the elevation of low and high water levels, interior wet, interior dry and exterior paint areas, and other information required to show compliance with the specification.
3. The OWNER and/or ENGINEER shall be the sole and final judge as to the acceptability of a tank manufacturer's qualifications approval or denial.

B. Construction Drawings: After award and prior to construction, the CONTRACTOR shall furnish detailed drawings of the tank, pedestal, and foundation sealed by a Professional ENGINEER licensed in the State of Texas. As a minimum, submittal data to include the following:

1. Sealed tank, pedestal and foundation design calculations including design certificate as required in quality assurance paragraphs.
2. Sealed tank, pedestal and foundation drawings including location and details of accessories, piping appurtenances, materials specifications,

fabrication details, access, details of piping, inlet and outlet ports, valves, and foundation connections, and coating system.

3. Reinforced concrete details shall include construction joints, openings, and inserts. Location, spacing, and splice dimensions shall be shown. Placement and fabrication details shall conform to AC1318.
4. Steel tank details shall include weld joints and a layout showing all primary and secondary shop and field welds.
5. Identify materials by ASTM description.
6. Project expertise to verify conformance with Quality Assurance requirements.
7. Painting data per this Section and Section 09902 – Painting and Protective Coatings.

C. Certificates: As a minimum, provide the following certifications:

1. Letter of certification of compliance with OSHA standards following completion of tank.
2. Certificate of Conformance as required in Quality Assurance paragraph 1.07.
3. Welder qualification certification per AWWA D107 and AWS B30 or latest issue.
4. Provide copy of the NSF61 Certified listing for the valves used in the HMS.

D. Test Reports: As a minimum, provide the following reports:

1. Furnish mill test reports.
2. Submit weld test reports prior to initiation of field painting. Rejected material to be replaced promptly at no cost to OWNER.
3. Written inspection report in accordance with Section 11.2.1 of AWWA D107. Radiographs and inspection records to be retained by tank manufacturer.

4. Deleted

E. Operation and Maintenance

Provide operating instructions and maintenance procedures for the elevated tank and applicable appurtenant equipment, mechanical components, and accessories.

F. Equipment Data

1. Provide a summary of the analysis and design for the proposed hydrodynamic mixing system.
2. Include tank geometry, operational data and CFD model parameters and assumptions.
3. Include calculated jet velocities, head loss for inlet flow, outlet flow, and analysis results.
4. Provide required deliverables for all modeling cases.

5. Provide required minimum drawdown resulting in full mixing during a fill cycle for a range of operational flows.
6. Inlet & Outlet Valves: Provide drawings and technical specifications including size and materials. Provide operational characteristics including head loss, jet velocity and back pressure rating.

1.07 QUALITY ASSURANCE

- A. All work described in this section shall be performed only by and/or under full supervision/responsibility of a tank manufacturer.
- B. Unit Responsibility: The tank manufacturer shall be responsible for the design, fabrication, and erection of the elevated tank defined in paragraph 1.05. Divided responsibilities will not be allowed.
- C. The work described in this Section shall be performed by an elevated tank manufacturer that has a minimum ten (10) years experience in composite tank design and construction. The manufacturer shall have successfully designed, constructed, and commissioned at least ten (10) composite elevated tanks of at least 500,000-gallon capacity in successful operation for at least five (5) years. The OWNER shall be the sole and final judge as to the acceptability of a manufacturer's experience and qualifications.
- D. No exceptions to the requirements of this specification are proposed or requested by the potential alternate tank manufacturer that in the sole opinion of the ENGINEER and OWNER, may adversely impact the quality of the completed tank.
- E. All design calculations and construction drawings to be prepared by or under direct supervision of a Professional ENGINEER registered in the State of Texas. Provide certificate signed and sealed by same ENGINEER stating that the design calculations and drawings are in conformance with applicable design criteria and standards.
- F. Comply with applicable OSHA Rules and Regulations, and with all applicable regional, state, and local regulations.
- G. A qualified supervisor directly employed by the CONTRACTOR shall be on site at all times during construction of the foundation, support structure, and steel tank.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery schedules shall be coordinated with the OWNER.
- B. Storage of the tank and materials shall be in the designated construction staging areas. The tank shall be protected from dust, dirt, and debris. Store in well-drained areas and provide blocking to minimize contact with the ground.
- C. Use care in handling of the tank to avoid scratches to shop coating. Allow painted materials adequate cure time prior to stacking or shipping.
- D. Stainless steel components shall be separated carbon steel components or other materials that could damage the stainless steel finish.
- E. Elastomeric valves shall be protected from excessive UV exposure and remain covered until installed.

- F. Elastomeric valves shall be handled and stored in accordance with the manufacturers recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURER(S)

Landmark, CB & I, Caldwell or Approved Equal

2.02 MATERIALS AND/OR EQUIPMENT

A. Design Criteria

1. Design Loads: The design, materials used, fabrication procedures, construction methods and inspection of the elevated tank shall conform to AWWA D107 and ACI 371R except as modified herein. A design per Section 14 of AWWA D107 shall not be permitted.
 - a. Dead load shall be estimated as the total weight of the permanent construction including piping and accessories and water contained therein. The unit weight of steel shall be assumed to be 490 pounds per cubic foot and the unit weight of concrete shall be considered as 144 pound per cubic foot.
 - b. Live loads shall be the weight of all the water when filled to 6 inches above the overflow. The unit weight of water shall be assumed to be 62.4 pounds per cubic foot.
 - c. Snow load shall be the greater of 15 pounds per square foot of the horizontal projection of the tank for surfaces having a slope of 30 degrees or less with the horizontal, or as determined in accordance with ASCE 7. The specified snow way shall not be less than that required by AWWA D107.
 - d. Wind loads shall be the more conservative of that required by IBC 2000 or AWWA D107. The tank shall be designed for an overturning moment due to the maximum wind loading with and without the weight of water in the tank and shall include the moment due to eccentricity of the gravity loads (tank plus water) caused by deflection of the structure under wind or seismic conditions.
 - e. Seismic design shall be the more conservative of that required by IBC 2000 or that required by AWWA D107 for the zoning indicated by AWWA D107.

B. Design Unit Stresses:

1. The design of the steel tank (cylinders, conical and double curved) shall be in accordance with the latest edition of AWWA D107. A design per Section 14 of AWWA D100 shall not be permitted.
2. No corrosion allowance is required.
3. Unless otherwise noted, at junctions in plates where meridional forces are discontinuous such as cone to cylinder junctions, a tension or compression

ring may be required to resist the radial forces generated. In these regions, the allowable stresses shall not exceed those referred to in AWWA D107.

4. Tension ring stresses shall not exceed the lesser of 15,000 psi or one half of the minimum specified yield of the plate material.
5. Compression ring stresses shall not exceed 15,000 psi.
6. To determine the stresses in the ring due to discontinuity forces, the tank plates immediately adjacent to the discontinuity may be assumed to participate for a distance of $0.78\sqrt{Rt}$.
7. For areas of the elevated tank where the water is supported by a steel cone, the CONTRACTOR shall submit evidence that the design is based on a finite element shell analysis. The analysis shall include the effects of material and geometric non-linearity and residual stresses. The modeled imperfection shall not be less than 125 percent of the tolerance limit to which the steel cone shall be constructed. This limit is the deviation from the theoretical conical surface that shall not exceed $0.032\sqrt{RT}$, when measured in the radial direction over length $4\sqrt{RT}$, where R is the radius normal to the plate surface at the point of consideration, and T is the plate thickness. The design shall have a minimum factor of safety of 2.0 against buckling.

C. Foundation Design:

1. CONTRACTOR to provide tank foundation drawings sealed by a Professional ENGINEER registered in the State of Texas.
2. A geotechnical evaluation will be submitted to the CONTRACTOR upon request. The geotechnical evaluation is not part of this Contract, is made available for information only, and is not warranted to be accurate in any way.
3. Any additional required data is to be obtained by the CONTRACTOR at no additional cost to the OWNER. Modifications to the tank foundation design resulting from new information obtained through the CONTRACTOR's investigations will not result in additional costs to the OWNER.
4. The concrete foundation shall be designed in accordance with ACI 318. Minimum specified compressive strength shall be 4,000 psi at 28 days. The service load reinforcement tension stress shall not exceed 30,000 psi under dead plus water load unless flexural cracking is otherwise controlled in accordance with ACI 318.

D. Tank Pedestal Design:

1. The concrete pedestal shall be designed in accordance with the latest provisions of ACI 318. Horizontal and vertical reinforcing shall be placed as per the CONTRACTOR's specification.
2. The overturning moment used in designing the pedestal and foundation shall include the moment due to eccentricity of the gravity loads caused by deflection of the structure under wind or seismic conditions (i.e. P-Delta effect).

3. The specified compressive strength of concrete shall be as required by design, but not less than 4000 psi at 28 days. The maximum specified compressive strength of concrete for the wall and dome shall be 6,000 and 5,000 psi respectively.
 4. Support wall shall be reinforced concrete with a minimum thickness of 8 inches exclusive of any architectural relief. Wall thickness shall be provided such that the average compressive stress due to the weight of the structure and stored water is limited to 25 percent of specified compressive strength, but not greater than 1,000 psi.
 5. Tank floor shall be a reinforced concrete dome not less than 8 inches thick. The average compressive stress due to the weight of the structure and stored water shall not exceed 13 percent of the specified compressive strength, nor greater than 600 psi.
 6. Openings wider than 3 feet 6 inches shall be subjected to a rigorous analysis taking into account the stress concentrations and diminished lateral support that exist in the vicinity of such openings. Each side of the opening shall be designed as a column in accordance with ACI 318.
 7. The interface region includes those portions of the concrete support structure and steel tank affected by the transfer of forces from the tank cone and the domed concrete tank floor to the concrete ring beam and support wall. The CONTRACTOR shall provide evidence that a thorough review of the interface region has been performed by finite element and finite difference analyses. The geometry of the interface shall provide for positive drainage and not allow either condensate or precipitation to accumulate at the top of the concrete wall or ring beam. The ring beam shall be reinforced concrete with a nominal width and height of at least two times the support wall thickness. Minimum radial and circumferential reinforcement shall be 0.25 percent. For direct tension, reinforcement shall be provided such that the average service load stress in tension reinforcement due to the weight of the structure and stored water does not exceed 12,750 psi.
 8. Tank pedestal shall be designed to carry all loads of elevated steel platform described in paragraph 2.02.U.17.e. of this Section. Pedestal design shall include all proposed and future platform loads as part of the Base Bid.
- E. Tank Capacity: 500,000 gallons from the top of the overflow weir to a minimum of 1 foot above the top of the inlet/outlet pipe. The bottom capacity level shall be a minimum of 1 foot above the elevation of the top of the silt stop.
- F. Tank Type: Concrete Pedestal with Welded Steel Tank
- G. Design Emptying Rate: 4,920 gpm
1. Average Fill Flow Rate during Fill Periods (gpm) – 1,000
 2. Minimum Fill Flow Rate (gpm) – 500
 3. Maximum Fill Flow Rate (gpm) – 4,920
 4. Normal Maximum Outlet Flow Rate (gpm) – 1,200

- 5. Emergency Maximum Outlet Flow Rate (gpm) – 2,400
- H. Maximum Water Surface Elevation: As shown on PLANS
- I. Minimum Water Surface Elevation: As shown on PLANS
- J. Head Range: maximum – As shown on PLANS
- K. Top of Concrete Foundation Elevation: As shown on PLANS

- L. Lightning Protection: Provide lightning protection system as specified in Section 16050 – Electrical Construction.
- M. Cathodic Protection: Provide cathodic protection system as specified in Section 16610 - Cathodic Protection System for Steel Water Tanks.
- N. Shell plates, structural steel, bolts, anchor bolts, rods, and reinforcing shall conform to AWWA D107.
- O. The elevated tank floor shall be concrete and covered with a welded steel liner to provide a watertight boundary. The minimum thickness of the liner plate shall be 1/4 inch. All liner plate welds shall be tested according to AWWA D107.
- P. Liner plates that are not formed to match the shape of the tank floor shall be erected with at least 1 inch of grout space between the liner plates and the tank floor. The space shall be completely filled with a 1:1.5 cement-sand grout, or equivalent, after all welding is completed.
- Q. The roof of the steel tank shall be conical in shape with a slope not less than 0.75 inch per foot, or a dome roof. Roof framing, if required, shall consist of either flat bar, structural angles or flanged structural sections. Roof framing shall be seal welded to the underside of the roof plates for the entire length of the framing. Roof plates shall be fully seal welded on the upper side and the underside of lap joints.
- R. Provide drip rings at the top of the shell and cone to reduce the amount of rainwater and condensation that drain onto the shell and cone.
- S. The supporting structure shall be a cast-in-place concrete pedestal as detailed by the CONTRACTOR.
- T. Tank Piping:
 - 1. Materials
 - a. Materials as shown on PLANS. Galvanic isolation shall be provided for flanges and/or bolts connecting dissimilar materials.
 - b. All inlet/outlet piping above the base elbow(s), and overflow piping shall be flanged, victaulic, or butt welded in accordance with requirements below.

- c. Stainless Steel Requirements – Pipe and fittings shall be Type 304L stainless steel fabricated from material meeting the requirements of ASTM A-240. Fabrication, inspection, testing, marking, and certification of pipe and fittings shall be in accordance with ASTM A-778 and A-774 respectively. All fittings less than 18 inches shall be smooth flow, fittings larger than 18 inches may be of five section miter construction. Backing flanges shall be in accordance with ASTM A285-C drilled to ANSI B16.5 Class 150. Pipe, fittings, and welds shall be cleaned and passivated.

Pipe, fittings, and flange thickness shall be in accordance with the manufacturers certified pressure rating for the applicable service pressures. The design pressure rating shall be a minimum 125 psi for piping located within closed or valve sections.

2. Inlet/Outlet Pipe:

- a. Provide an 20-inch diameter inlet/outlet pipe that extends from the base of the support structure to the tank floor elevation. Provide a minimum 6-inch high removable silt stop where the inlet/outlet pipe enters the tank. The bottom capacity level of the tank's operating range shall be a minimum of 1 foot above the elevation of the top of the silt stop.
- b. Provide all fittings, valves, and appurtenances as shown on PLANS.
- c. The inlet and outlet pipes shall be designed to support all related static and dynamic loads. Suitable galvanized steel brackets, guides, and hangers shall be provided on the support wall and tank floor at intervals not exceeding 20 feet. Galvanic isolation shall be provided to avoid contact between dissimilar materials.
- d. The inlet and outlet pipes, including wall penetrations, foundation penetration, and supports, shall be designed and constructed to accommodate any differential movement caused by settlement and by thermal expansion and contraction over the range of extreme temperature differences expected for the support wall and pipe. The required flexibility shall be provided by an expansion joint located near grade, as shown on the PLANS, in the vertical Section of pipe.

3. Overflow Pipe:

- a. Provide a 16-inch diameter overflow. The top of the overflow shall be located within the tank at the overflow elevation. If the top of the overflow is located above top capacity level, the tank shall be designed for the additional capacity provided by the difference.

- b. The overflow will be equipped with weir box or conical weir and anti-vortex device. The entrance to the overflow pipe shall be designed to discharge the maximum inlet flow rate as specified. The design shall be based on the water level cresting within 6 inches above the overflow elevation.
 - c. The overflow, including wall penetrations, foundation penetration, and supports, shall be designed to support all related static and dynamic loads. Suitable galvanized steel brackets, guides and hangers shall be provided on the support wall and tank floor at intervals not exceeding 20 feet. The overflow pipe and weir Section within the tank shall be carbon steel and supported by the central access tube. Galvanic isolation shall be provided to avoid contact between dissimilar materials.
 - d. The overflow pipe shall be designed and constructed to accommodate any differential movement caused by settlement and by thermal expansion and contraction over the range of extreme temperature differences expected for the support wall and pipe. The required flexibility shall be provided by an expansion joint located near grade, as shown on PLANS, in the vertical section of pipe.
 - e. Top of Weir Elevation: As shown on PLANS.
 - f. Provide all fittings, valves and appurtenances as shown on PLANS.
 - g. Connect Overflow line to Outlet line through 4-inch pipe and 4-inch valve as shown on PLANS.
 - h. Overflows shall be designed in strict accordance with current AWWA standards and shall terminate with a gravity-hinged and weighted cover. The cover shall fit tightly with no gap over 1/16 inch. If the overflow terminates at any point other than the ground level, it shall be located near enough and at a position accessible from a ladder or the balcony for inspection purposes. The overflow(s) shall be sized to handle the maximum possible fill rate without exceeding the capacity of the overflow(s). The discharge opening of the overflow(s) shall be above the surface of the ground and shall not be subject to submergence.
4. Tank Drain – A tank drain shall be provided to completely drain the tank contents if the inlet/outlet pipe does not intersect the low point of the tank. A four inch drain pipe located at the low point of the tank floor shall be fitted with a threaded plug and tee handle. Flexible stainless steel piping shall connect and drain to the overflow pipe.
- U. Accessories as shown on PLANS including the following:
- 1. Access tube located on the vertical centerline of the tank. The access tube shall have a minimum diameter of 48 inches and shall provide access from the top of the pedestal to the tank roof. The access tube shall incorporate a mechanism to collect condensation that may form on the interior surface, and shall drain to the overflow pipe.

2. A four foot wide upper platform with handrails, midrails, and toe plates or an upper shaft platform diameter that spans the entire shaft diameter shall be located at the top of the pedestal to provide access from the pedestal ladder to the roof access ladder located on the interior of the access tube. A four-foot-wide platform shall be provided with handrails, midrails, and toe plates which meet or exceed the requirements of OSHA. All components shall be galvanized steel. Solid steel or grating shall be used for the walking surfaces.
3. One 30-inch diameter or one 24-inch x 36-inch opening (painter's louver) that is accessible from the upper walkway platform giving access to the exterior rigging rail located near the tank/pedestal interface. The access opening shall be provided with a hinged stainless steel cover or a stainless steel or aluminum removable vent with a removable insect screen.

Provide permanently installed rigging rails suitable for rolling trolleys at the interior of the tank at the wall/roof and access tube/roof connections. Provide an exterior rigging rail at the base of the tank adjacent to the support structure.

4. Two 30-inch (minimum) diameter or 30-inch (minimum) square weatherproof hatches shall be provided on the roof of the tank. One hatch shall be located at the top of the access tube complete with chain, hook, stainless steel hardware, hold open arm, locking mechanism and inside handle. The other hatch shall be located in the tank roof above the overflow weir for entry into the tank and shall have a handle and hasp, stainless steel hardware, hold open arm and a locking mechanism. The hatch openings shall have a minimum 4-inch curb and aluminum covers that shall have a downward overlap of two inches.
5. Provide a 30-inch diameter manhole through the tank floor. The manhole shall be operable from a ladder located on the upper platform and shall be designed to withstand the pressure of the tank contents without leakage. The manhole assembly shall include a stainless steel hand wheel operator and threaded components.
6. Vents:
 - a. A tank vent shall be provided, located on the tank roof. Vent shall include a support frame, screened area, and cap, as shown on PLANS.
 - b. The tank vent shall have an intake and relief capacity sized to prevent excessive pressure differential during the maximum flow rate of water, either entering or leaving the tank. The overflow pipe will not be considered as a vent. The tank shall be designed for a maximum fill rate of 4,920 gpm. The maximum flow rate of water exiting the tank shall be calculated assuming a break in the inlet/outlet when the tank is full. The vent shall be provided with an insect screen. Vent capacity shall be determined based on open area provided by the screen.

7. Provide a 42-inch high roof hand rail to enclose all centrally located roof accessories. The roof railing shall be a minimum of 25 feet in diameter. The handrail shall be furnished with a top rail, intermediate rail, and toe board. The handrail shall be constructed to meet all OSHA requirements.
8. Ladders:
 - a. Ladders shall be provided from the slab on grade inside the base of the support wall to the upper walkway platform located below the tank floor. The tank floor manhole shall be provided with ladder access from the upper platform. A ladder shall extend from the upper platform through the access tube interior to the roof. A ladder mounted on the access tube exterior shall be provided for access to the tank interior, extending from the roof manhole to the tank floor.
 - b. Ladders that terminate at platforms or landings shall extend 48 in. above the platform elevations. A removable extension kit (Bilco Ladder-Up Safety Post or equal) shall be added to the fall protection system for all ladders not extending 48 in. above the platform elevations.
 - c. Ladders located in the concrete support structure shall be galvanized steel. Tank interior and access tube ladders shall be coated in accordance with the tank interior coating system.
 - d. Ladder side rails shall be a minimum 3/8 in. by 2 in. with a 16 in. clear spacing. Rungs shall be minimum 3/4 in. diameter, spaced at 12 in. centers and plug welded into holes drilled in the side rails. The surface of the rungs shall be knurled, dimpled, or otherwise treated to minimize slipping.
 - e. Ladders shall be secured to the adjacent structure by brackets located at intervals not exceeding 10 ft. Brackets shall be of sufficient length to provide a minimum distance of 7 in. from the center of the rung to the nearest permanent object behind the ladder. Ladder brackets located on the access tube exterior shall be reinforced at the access tube shell so that potential ice damage is confined to the ladder and bracket; and not the access tube shell.
 - f. Ladders shall be straight-run from top to bottom. Rest platforms shall be provided at maximum 50-foot intervals along the support wall ladder, and at locations shown in the PLANS. Platforms shall be minimum 5 feet x 5 feet, or greater where required for access to valves or I/C field elements, and complete with handrails, midrails and toe plates in accordance with OSHA requirements. Grating shall be used for the walking surface and shall be suitably hinged at the ladder penetration. Platforms shall be arranged for straight run ladder and operable without removing fall prevention equipment. All components shall be galvanized steel.

- g. Provide ladder with safety cage beginning a minimum of 8-feet above the level of the tank bottom and at the location indicated. Ladder and cage shall meet OSHA requirements.
9. Expansion/contraction joints shall be provided in inlet/outlet and overflow piping.
 10. Level indicator as shown on PLANS, reading in feet of water.
 11. Personnel Door: One galvanized steel access door at bottom of tank at least 36 inches wide and 80 inches high with flush threshold, drip cover, and locking mechanism. The door shall be fabricated from steel plate with adequate stiffening and specifically designed for use with the tank. The location of the personnel door shall be as shown on the PLANS.
 12. Overhead Vehicle Door: Provide a manually operated overhead steel and rolling door located in the base of the tower. The door frame shall be fabricated of galvanized steel plate, fastened and reinforced on the interior face of the pedestal tower. The curtain shall be formed of 22-gauge steel interlocking slats designed for a wind load of 20 psf. A 24-gauge steel hood shall be provided with a weather seal to protect the assembly. The curtain, bottom bar, brackets, guides, hood, pipe, and chain shall be galvanized. Provide with locking device. Size and location of the overhead door shall be indicated on the PLANS.
 13. Stainless steel name plate per Section 14 of AWWA D107.
 14. Obstruction lighting: One dual red steady burning L-810 Light System shall be provided at the top of the tank per FAA publication AC 70/7460-1K. Obstruction Lighting System shall be operated by a control device, such as an automatic photoelectric cell type switch per AC 70/7460-K. Lighting Equipment shall conform to FAA publication AC 150/5345-43F, Specification for Obstruction Lighting Equipment. Operation and Maintenance Manual shall be provided in accordance with Section 01730 and AC 70/7460, Chapter 4.
 15. Lightning Protection
 - a. Provide a lightning protection system for the elevated tank structure and any roof mounted equipment that may be damaged by lightning.
 - b. Lightning protection shall be installed in accordance with NFPA 780.
 - c. Lightning protection for obstruction lights shall consist of an air terminal mounted on the support and handrail and formed to fit around the fixture. The 1/2 inch diameter copper air terminal shall extend a minimum of 10 inches above the light fixture and shall connect to a copper conductor that terminates in a bonding plate secured to the tank roof.
 16. Electrical: Electrical work shall be in accordance with Division 16.

17. Cellular Antenna Cable Provisions: Provide all labor, materials, equipment, and installation to make all necessary provisions for future antenna cable routing. CONTRACTOR shall provide drawings of locations of all appurtenances. Drawings shall be signed and sealed by a Professional ENGINEER registered in the State of Texas. This work includes:
- a. A bundle of six 6” Sch 40 PVC conduits complete with long radius (min 24”) 90 degree bend and end caps as shown on the drawings. Size and location of the wall opening shall allow the conduit to terminate as close to the support wall as possible. This grouping of conduits shall serve as the pedestal entry location suitable for a single provider and is typical of four locations.
 - b. Provide an interior rigging rail suitable for rolling trolleys at the top of the support wall accessible from the upper platform.
 - c. Provide industry standard 35” long pre punched “Z” bracket at 5 ft vertical spacing directly above the conduit entry locations at the base of the support wall to a point adjacent to the upper platform. Provide similar brackets in the vertical position along the upper platform handrail to a point adjacent to the access tube at 5 ft centers.
 - d. Provide nine (9) 4” diameter penetrations, with capped couplings, through the tank access tube cover, located adjacent to the access tube roof hatch.
 - e. Provide suitable clips welded to the inside of the access tube to safely secure antenna cable(s).
 - f. For safety considerations during antenna installation, and for maintenance, a 42” high handrail shall be furnished with a top rail, intermediate rail, and toe board. Handrail shall be a minimum 25’ diameter and centered around the tank access tube. The handrail shall also provide an attachment point for the antenna(s). Handrail shall meet all OSHA requirements.

2.03 HYDRODYNAMIC MIXING SYSTEM (HMS)

- A. Analysis and Design
 - 1. General Analytical Requirements
 - a. The following analysis and design specifications are minimum requirements.
 - b. The proposed HMS design shall be based on an analysis that is specific to the tank geometry, operational data, assumptions and cases under consideration. An analysis based on generic conditions will not be accepted.
 - c. The CFD model shall be capable of simulating the physical behavior of water mixing in the tank during operation.

- d. CFD software shall be capable of analyzing both steady state and transient flow of fluid. Acceptable commercial software packages are CFX Ansys, Fluent or equal.
 - e. Analysis shall be performed by a skilled analyst having experience in simulating water flow patterns within tanks.
2. CFD Model Requirements
- a. Geometry of the tank structure and HMS piping used for the model shall be within 10% of actual.
 - b. Mesh definition shall be selected by a skilled analyst. Zones adjacent to inlet and outlet ports and along the inlet jet path shall be modeled with significantly higher concentration of nodes than regions of relatively low velocity.
 - c. The model shall simulate simultaneous filling and drawing of the tank at Normal Operating High Water Elevation as an acceptable approximation of varying water elevation during intermittent fill-draw cycles. Analysis shall be run until COV reaches 5%.
3. CFD Model Assumptions
- a. The primary modeling method to evaluate water mixing and circulation requires a neutrally buoyant tracer. The tracer shall be injected into the inlet water jet at the beginning of the fill cycle. The tracer concentration shall be 1.0 and the tank contents initial concentration shall be 0.0.
 - b. Coefficient of Variation (COV) shall be used to define mixing time. $COV = \text{Ratio of Standard Deviation of Tracer Concentration over Mean Tracer Concentration}$. Mixing Time is the time required for the COV to fall to 0.1 (10%).
 - c. CFD simulation shall utilize steady state model for determination of the steady velocity field.
 - d. CFD simulation shall utilize full transient model for determination of mixing time.
 - e. The k-epsilon turbulence model shall be used unless a more sophisticated approach is required.
4. CFD Modeling Cases
- a. Case 1: Average Fill Flow Rate, Normal Operating High Water Elevation, Neutral buoyancy condition = inlet water same as temperature of tank contents.
 - b. Case 2: Average Fill Flow Rate, Normal Operating High Water Elevation, Negative buoyancy condition = inlet water 10 degrees F less than temperature of tank contents.
 - c. Tank contents shall be at uniform temperature prior to fill cycle.
 - d. Case 2 provides a relative measure of the effectiveness of HMS for lower inlet temperature conditions. Compare with Case 1.

5. CFD Modeling Output (Governing Case)
 - a. Mixing Time.
 - b. Graphic diagrams: Tracer distribution, streamlines, and diagrams showing change of tracer concentration with time.
6. Inlet Design
 - a. Based on CFD analysis results calculate velocities and head loss at the inlet valves for Minimum, Average, and Maximum Fill Flow Rate.
 - b. Consider HMS components and piping within tank only in head loss calculations.
 - c. Unless otherwise specified, minimum HMS manifold diameter shall be the same as the tank inlet pipe.
 - d. Provide vent hole at the top of the inlet manifold.
 - e. Maximum 2.0 feet head loss during Average Fill Flow Rate, unless otherwise specified.
 - f. Maximum 4.0 feet head loss during Maximum Fill Flow Rate, unless otherwise specified.
7. Outlet Design
 - a. Maximum 2.0 feet head loss during Normal Maximum Outlet Flow Rate, unless otherwise specified.
 - b. Maximum 4.0 feet head loss during Emergency Maximum Outlet Flow Rate, unless otherwise specified.
 - c. Provide a minimum of two outlet check valves for redundant operation.
8. Structural Design
 - a. Tank engineer of record shall review and approve attachment and support points between the HMS and the tank components.
 - b. Pipe supports and ancillary items shall comply with AISC. Structural analysis shall consider the effects under maximum flow conditions.
 - c. Tank modifications required to accommodate the HMS shall be fully analyzed and designed in accordance with the applicable structural design codes and standards.

B. Configuration

1. HMS shall be comprised of a single manifold pipe, fittings, supports and four (4) tank inlet ports consisting of nozzles with variable orifice elastomeric check valves.
2. Tank outlet ports with check valves shall be separated a sufficient distance from tank inlet nozzles in order to mitigate short circuiting.
3. The system is defined as all components within the tank beyond the inlet/outlet pipe penetration.

4. HMS shall function automatically, utilizing the water distribution system pressure and normal tank operation filling and drawdown cycles above. No mechanical pumps, blowers or similar equipment shall be used.
- C. Performance Requirements
1. Select HMS for the actual tank geometry and specified operating data that results in full mixing of the tank contents.
 2. Optimize the mixing characteristics (nozzle size, elevations, orientation, style and number) based on the operating data and the CFD Model Assumptions, Requirements and Cases.
 3. Distribute influent during fill cycles via turbulent jets and circulation patterns that will maximize sizing efficiency while minimizing system head loss.
 4. Minimize stratification and eliminate short circuiting in all seasonal conditions.
- D. Pipe and Fittings – Stainless Steel
1. Stainless steel pipe shall be Type 304L fabricated from ASTM A-240 materials.
 2. Fabrication, inspection, testing, marking and certification of pipe and fittings shall be in accordance with ASTM A-778 and ASTM A-774.
 3. Flanges shall be Type 304L stainless steel. Flange design by Manufacturer with bolt pattern per ANSI B16.5.
- E. Pipe and Fittings – Carbon Steel
1. Carbon steel pipe and fittings shall be in accordance with ANSI/AWWA C200, C207, and C208.
 2. Provide schedule 40 wall thickness in accordance with ANSI/ASME B36.10.
 3. Flanges shall be in accordance with AWWA C207 Class D with flange drilling pattern in accordance with ANSI/ASME B16.5.
- F. Flange Gaskets
1. Gaskets shall be 1/8" full-faced, in accordance with ASTM D1330.
 2. Gasket material shall be EPDM.
- G. Fasteners
1. Hex head bolts and nuts shall conform to ANSI/ASME B18.2.1 and B18.2.2.
 2. Provide Type 316L stainless steel.
 3. Provide isolation sleeves and washers for connections with dissimilar metals.
- H. Brackets, Clips & Supports
1. ASTM A36 steel or equal.
 2. Fabricate using flat bar or sealed tubular sections. Details that are difficult to maintain or paint in the field will not be accepted.

3. Bracket or support material directly in contact with stainless steel pipe shall be Type 304L stainless steel.

I. Tank Inlet Valves

1. Provide variable orifice elastomeric check valve that allows water to enter the tank during fill cycles while preventing reverse flow (into the outlet pipe) during draw periods.
2. Valve manufacturer shall have minimum ten years' experience in the manufacturing of variable orifice elastomeric valves.
3. Valve manufacturer shall have conducted hydraulic testing to determine head loss, jet velocity and back pressure characteristics.
4. Elastomer shall be one-piece internally reinforced EPDM or approved equal.
5. Flange backing ring components shall be Type 304 stainless steel.
6. Valves shall be NSF Standard 61 certified.
7. The elastomer used in construction of valves shall be tested in accordance with ASTM D6284 to confirm there is no degradation in the elastomer when exposed to chlorine and chloramine.
8. Manufacturer shall be Onyx Duckbill Check Valve, Tideflex, or approved equal.

J. Tank Outlet Valves (Single Inlet / Outlet Pipe Configuration)

1. Wafer style type elastomeric membrane that allows water to enter the outlet pipe during draw cycles while preventing reverse flow (into the tank) during fill periods.
2. Valve manufacturer shall have minimum ten years' experience in the manufacturing of wafer style elastomeric valves.
3. Valve manufacturer shall have conducted hydraulic testing to determine head loss characteristics.
4. Elastomer shall be one-piece internally reinforced EPDM or approved equal.
5. Flange disc plate and other metal components shall be Type 304 stainless steel.
6. Valves shall be NSF Standard 61 certified.
7. The elastomer used in construction of valves shall be tested in accordance with ASTM D6284 to confirm there is no degradation in the elastomer when exposed to chlorine and chloramine.
8. Manufacturer shall be Onyx Wafer Check Valve, Tideflex, or approved equal.

2.04 FABRICATION

The tank shall be fabricated to conform with Section 9 of AWWA D107.

- A. Tank Shell: Welded joints per ANSI/AWS A3.0 and as required to conform with all requirements of AWWA D107. All welders must be certified.
- B. Tank Shape: Composite, concrete pedestal and steel tank.
- C. Tank Support Structure: Fabrication, placement, development, and splicing of reinforcement shall be in accordance with ACI 318 and ACI 317.

2.05 SOURCE QUALITY CONTROL (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. All welders shall be qualified by ASME Section IX for the processes and positions utilized.
- B. CONTRACTOR shall employ the service of a welding supervisor independent of the tank erection foreman's jurisdiction.

3.02 PREPARATION (NOT USED)

3.03 ERECTION/INSTALLATION/APPLICATION AND/OR CONSTRUCTION

- A. In accordance with Section 5.4 of AWWA D107.
- B. Field erection equipment to comply with applicable Federal Aviation Administration (FAA) regulations and rules regarding obstruction marking and lighting. Tank supplier shall be responsible for obtaining any FAA construction permit. The OWNER has obtained a "Determination of No Hazard to Air Navigation" from the FAA, which is included in *Attachment A* to this Section. CONTRACTOR shall notify the FAA within 5 days after the construction has reached its maximum height by submitting FAA Form 7460-2, Part II.
- C. Welding:
 - 1. Welding shall be inspected and tested by radiographic testing consistent with the requirements of AWWA D107.
 - 2. Welding procedures and details specifically designed to minimize cracking and spalling of the concrete shall be used when it is necessary to weld on steel members embedded in concrete.
 - 3. The welding edges of the plates may be prepared by shearing, machining, gas-cutting, or chipping. Welded members and their component parts shall be straight and free from excessive buckles or warping. Misalignment of the adjoining plates for butt joints shall not exceed those in AWWA D107. The separation in lap joints shall not exceed 1/16 inch.
 - 4. Welding procedures and welding operators shall be qualified in accordance with the American Welding Society's "Standard Qualification

Procedure.” All field welding shall be done by the shielded metal arc welding process, the gas metal arc welding process or the flux core arc welding process. Shop welding may be done either by the shielded metal arc or submerged metal arc welding process.

5. Plates and component members of the tank shall be assembled and welded following a procedure which will result in a minimum of distortion from weld shrinkage. The weld metal shall be sound throughout and be free from an excessive amount of oxides, non-metallic inclusions, and gas pockets. Surfaces to be welded shall be free from loose scale, slag, heavy rust, grease, paint and other foreign material.
6. Grinding of weld contour shall approximate Condition “D” of NACE Standard RP0178.

D. Architectural Concrete Support Pedestal:

1. The exposed exterior surface of the concrete support wall is designated architectural concrete. The concrete and formwork requirements of this Section shall be strictly enforced to ensure concrete of the highest practicable structural and architectural standard. Formwork design, installation and removal shall comply with the minimum requirements of ACI 318, ACI 117 and the applicable requirements of ACI 347, except as modified herein.
2. Attention shall be given to ensure the same concrete design mix is used throughout the support wall. The proportion, type and source of cement and aggregates shall not be changed. Uniform moisture content and placing consistency shall be maintained.
3. Drop chutes shall be used in all wall concreting operations. Concrete shall be placed directly between reinforcement layers to prevent aggregate segregation and form splatter with the resulting surface finish variations.
4. The forming system for the pedestal wall shall be fully engineered and detailed with procedures to meet the increased demands of architectural concrete. The support wall shall be constructed with a jump form process using form segments prefabricated to match the wall curvature. Concrete pour height shall be a minimum of 4 feet and a maximum of 10 feet. Form panels shall extend the full height of the concrete pour using only vertical panel joints. Form system shall be designed to lap and be secured to the previous wall pour. The space between the form and the previous pour shall be sealed to prevent grout leakage. Wall forms shall incorporate a positive means of adjustment to maintain dimensional tolerances specified. Wall forms shall be adjusted for vertical plumb and circularity and locked into position with through wall form ties prior to concrete placement. Panels shall be designed for lateral pressures associated with full height plastic concrete head, and support and bracing shall be provided for construction related impact loads and wind loads. Working platforms that allow safe access for inspection and concrete placement shall be provided. Form surfaces shall be steel, or plywood faced with plastic or fiberglass.

5. Forming systems shall be designed with the provision of ties and bracing such that concrete components conform to the correct dimensions, shape, alignment and elevation without leakage of mortar. Embedded items shall be properly positioned and secured. Form surfaces shall be cleaned of foreign materials and coated with a release agent prior to placing reinforcement. Do not allow excessive release agent to accumulate on the form. Steel forms shall be coated with a non-staining, rust preventative form oil or otherwise protected. Rust stained steel formwork shall not be used.
6. The form system shall incorporate a uniform pattern of vertical and horizontal rustications to provide architectural relief to the exterior wall surface. Rustication strips shall be sealed to the form face to eliminate the grout leakage that results in broken corners, color variations and rock pockets. Broken edges and chamfers will not be accepted. All construction joints and panel joints shall be located in rustications. Vertical panel joints shall be sealed using closures which combine with the form pattern to eliminate grout leakage and panel joint lines. All joints shall be grout tight. The vertical and horizontal rustications shall be proportioned and combined to impart a symmetrical architectural pattern to the completed structure. Form ties shall be located in a uniform pattern. No architectural form treatment is required on the interior surface.
7. Support wall concreting shall incorporate segmented placement procedures. Temporary vertical bulkheads shall divide the wall pour into segments corresponding to a single batch (truckload) of concrete. The bulkheads shall be located at rustications, braced rigid and tight to maintain vertical alignment under concrete load without grout leakage. Wall segment concrete shall be placed continuously to full form height from a single load. Placement from multiple batches is not permitted. Temporary bulkheads shall not be removed until adjacent concrete is placed.
8. Wall forms shall not be disturbed or removed until the concrete has attained sufficient strength to prevent forming operations or environmental loads from causing surface damage or excessive stress. Form removal shall be based on early age concrete strength testing. The minimum concrete strength shall be established by the CONTRACTOR, based on an analysis of stress at critical stages throughout the forming and concrete operations. Early age concrete testing shall be in accordance with ACI 228.1R-89. Pull Out testing in accordance with ASTM C 900-99, Maturity Method testing in accordance with ASTM C 1074-93, or field cured cylinders compressive strength tested in accordance with ASTM C 172 are the acceptable methods to determine early concrete strength.
9. All exterior exposed surfaces shall receive a smooth as-cast form finish. These surfaces shall also be finished with a light brush blast to help provide a more uniform appearance. All exposed surfaces shall be cleaned to remove surface contamination.
10. All interior exposed surfaces shall receive a rough as-cast form finish. No additional finishing of the interior exposed surfaces is required

11. The top of the domed concrete tank floor shall receive a float finish.
12. Tie holes in the support wall shall be plugged using grout on the interior and manufactured plugs on the exterior which match the color of the cured concrete as closely as possible.

13. Dimensional Tolerances:

Support structure concrete construction shall conform to the following:

Variation in thickness:

wall.....	-3.0% to +5.0%
dome.....	-6.0% to +10%
slab floor	-3.0% to +5.0%

Support wall variation from plumb:

in any 10 feet of height	1 inch
in any 50 feet of height	2 inches
maximum in total height	3 inches

Support wall diameter variation..... 0.4%

not to exceed 3 inches

Dome floor radius variation 1.0%

Level alignment variation:

from specified elevation.....	1 inch
from horizontal plane.....	1/2 inch

Offset between adjacent pieces of formwork:

exterior exposed surfaces.....	1/8 inch
interior exposed surfaces.....	1/4 inch

14. Completed concrete pedestal shall be water-tight. Moisture within tank pedestal following rain events shall be considered an issue covered by warranty.

15. Mock Up Panel

- a. A mock up panel shall be constructed using the proposed form work, concrete and placement methods. Minimum size will be 4 ft wide by 6 ft high. This panel shall be agreed upon by the CONTRACTOR and ENGINEER as the reference standard with which to judge surface quality, appearance and uniformity of texture and color. Succeeding pours shall not be placed until the most recent wall pour has been stripped and the form surface approved.

- b. Review and acceptance of formed concrete surface must be made within 48 hours of form removal. The CONTRACTOR shall be responsible to inform the ENGINEER 48 hours prior to the pour.
- c. Concrete with surface defects exceeding limitations specified herein or not meeting the standard represented by the mock-up panel shall be repaired to meet that standard, or removed, as determined by the ENGINEER.

E. Concrete Foundation:

- 1. The concrete foundation shall be designed by the CONTRACTOR for the specific site conditions.
- 2. Inlet/outlet pipe from the riser pipe base bend extending 15 feet outside the foundation wall shall be included as part of the foundation drain line. Concrete work shall conform to the requirements of ACI 301 "Specifications for Structural Concrete for Buildings." CONTRACTOR is responsible for all proposed piping shown on PLANS.
- 3. The sides of foundations shall be formed using any suitable system conforming to ACI 318. Earth cuts shall not be used as forms for vertical surfaces. Forms shall be provided on top sloping surfaces steeper than 2.5 horizontal to 1 vertical. Straight form panels may be used to form circular foundation shapes. The minimum design radius shall be maintained at all sections.
- 4. The foundation bearing surface and excavation shall be inspected by a representative of the Geotechnical ENGINEER prior to foundation construction. Verification of the applicable design and construction recommendations is required. The Geotechnical ENGINEER shall be retained by the CONTRACTOR. After verification of the foundation bearing surface, provide a 2 in. thick concrete working slab within the lower excavation limits. Grade the site to prevent runoff from entering the excavation.
- 5. The concrete foundation shall be designed by the tank CONTRACTOR based upon the recommendations in the Geotechnical Report. A copy of the Geotechnical Report shall be provided for the CONTRACTOR's information prior to the Bid of this Contract. The Geotechnical Report was prepared exclusively for the design of this project and does not intend to indicate to the Bidder 100 percent of the subsurface conditions that may exist in the project area. Bidder is solely responsible for verifying the subsurface conditions of the project prior to the submission of the Bid.
- 6. Except as otherwise required by this specification, the requirements for cement and aggregate, and the mixing of the aggregate shall be in

accordance with the latest revision of ACI Standard 318 as published by the American Concrete Institute. The concrete shall develop a minimum compressive strength of 4,000 psi at 28 days. Reinforcement shall comply with the latest revision of ASTM A615 Grade 60 billet steel bars for concrete reinforcement.

F. Painting:

1. All tank painting shall be per Specification Section 09902 and in accordance with AWWA D102, the Steel Structures Painting Council Specification SSPC-PA1, approved paint manufacturer specifications and as specified herein.
2. Pre-construction primers may be utilized in the fabrication process to preserve the blast profile and cleanliness. In the field, weld seams and abraded areas shall be cleaned on a spot basis. The remaining sound primer shall be cleaned to remove dirt and other contaminants. After cleaning the specified coating will be applied in its entirety in the field at the specified film thickness.
3. Each paint system shall be from a single manufacturer. Equal products manufactured by manufacturers listed in Section 09902 – Painting and Protective Coatings may be substituted if approved by ENGINEER.
4. No paint shall be applied when the temperature of the surface to be painted is below the minimum temperature specified by the paint manufacturer, or less than 5 degrees above the dew point temperature. Paint shall not be applied to wet or damp surfaces or when the relative humidity exceeds 85 percent. Follow paint manufacturer's recommendations for the specific paint system used.
5. All areas blasted in the field shall be coated the same day before any rusting occurs.
6. After erection and before painting, remove slag, weld metal splatter and sharp edges by chipping or grinding. All surfaces that have been welded, abraded or otherwise damaged shall be cleaned and primed in the field in accordance with the paint system requirements.
7. Shop Surface Preparation and Coating:
 - a. Spot clean as required to remove all oil and grease from the surface prior to blast cleaning. All surfaces shall be abrasive blast cleaned to a near-white finish in accordance with the recommended methods outlined in the Steel Structures Painting Council Specification (SSPC) SP-10.
 - b. Preparation and coating shall be per Specification Section 09902 – Painting and Protective Coatings.
8. Protect adjacent property or properties from wind blown abrasive blasting material, paint, or debris.
9. Exterior Coating System:
 - a. The exterior paint system shall conform to Specification Section 09902 – Painting and Protective Coatings.

- b. Field Surface Preparation: After erection and prior to field touch-up priming, all surfaces shall be cleaned to remove all surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld spatter and other sharp or rough projections shall be removed. All rusted, abraded, and unpainted areas shall be blast cleaned to a near-white finish in accordance with SSPC SP-10.
- 10. Tank Logo and Lettering
 - a. Contractor shall design and submit up to 3 substantially different computer-aided renderings for Owner approval. Owner's preferences shall dictate the final Tank Logo and Lettering design. Renderings shall be shown to scale on a rendering of the actual tank to be constructed and shall be representative of the actual paint colors, logos, reflectivity, and location of each logo. Locations of logos and lettering shall be dimensioned on the rendering or other scaled drawing as necessary to convey the view of the tank from all 360 degrees. Design shall also include the following criteria:
 - (1) Bowl Color: owner preference.
 - (2) Lettering: owner preference.
 - (3) Logos: owner preference.
 - b. Tank Logo and lettering shall be applied prior to the exterior clear coat of the same type of finish paint used on the tank. Thickness of the logo paint shall be 2 - 3 mils.
- 11. Interior Coating System – Wetted Surfaces:
 - a. Interior tank surfaces (including the roof) shall be coated per Specification Section 09902 – Painting and Protective Coatings
 - b. Field Surface Preparation: After erection and prior to field touch-up priming, all surfaces shall be spot cleaned as required to remove all surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld spatter and other sharp or rough projections shall be removed. All rusted, abraded and unpainted areas shall be blast cleaned to a NEAR-WHITE finish in accordance with SSPC SP-10.
- 12. Seal bottom course of concrete work (to minimum 8' height) with clear, penetrating concrete sealer to assist in removal in the event of graffiti or defacement.
- 13. Galvanized ladders and landings only, are exempt from required painting.

3.04 REPAIR/RESTORATION (Not Used)

3.05 FIELD QUALITY CONTROL

- A. Inspection:

1. The OWNER reserves the right to make mill, shop and field inspections per the procedures set forth in Section 9, "Inspection and Testing" according to AWWA D107.
2. CONTRACTOR to provide inspection of welded joints.
 - a. The OWNER does not plan to provide an independent welding inspection agency.
 - b. Welding shall be inspected and tested by CONTRACTOR by radiographic testing consistent with the requirements of AWWA D107.
 - c. CONTRACTOR to provide radiographer with qualifications per AWWA D107 Section 9.
 - d. Provide a written report per AWWA D107, Section 9.
3. Mill or shop inspection reports shall be supplied in accordance with Section 5.4 of AWWA D107 if so specified.
4. Inspection for the tank painting and coating shall be conducted by Contractor per Section 09902.

B. Site tests and Disinfection:

1. Sufficient cure, per the manufacturer's recommendations, of the final coat on the interior wet surface shall be allowed before the elevated tank is disinfected and filled with water.
2. After interior painting, fill tank to maximum water level, with potable water furnished by OWNER at line pressure of 40 psi, at grade. CONTRACTOR to handle and convey water and furnish booster pump and piping to supply additional pressure for filling tank, if required.
3. Welding shall be inspected and tested by CONTRACTOR by radiographic testing consistent with the requirements of AWWA D107.
4. Repair leaks by gas-gouging defective welds and rewelding. No repair work shall be done on any joint unless the water in the tank is at least 2 feet below the joint being repaired. Any paint damaged by repairs shall be properly restored.
5. The tank shall be disinfected per the requirements of AWWA C652-Chlorination Method No. 1 or 2. Disinfection process to meet Texas Commission on Environmental Quality (TCEQ) regulatory requirements.
6. Prior to testing for leakage, thoroughly clean and flush tank interior. Remove all foreign matter from tank.
7. Comply with the requirements of AWWA C652, Chlorination Method 1 or Method 2 for the disposal of disinfection water (paragraphs 4.1.5 and 4.1.5.1).
8. Coordinate with OWNER collection of water sample for bacteriological analysis. OWNER, when notified by CONTRACTOR, will collect water samples. Three consecutive, satisfactory water samples required. A

satisfactory water sample is a sample analyzed and determined to meet State Department of Health criteria for bacterial analysis.

9. Repeat disinfection and water sampling procedures, if necessary, until three consecutive water samples meet State Department of Health criteria for bacterial analysis.
10. Water samples to meet State Department of Health criteria for bacterial analysis before tank will be accepted.

C. Guarantee:

1. The CONTRACTOR shall guarantee its work for a period of one year from the completion date defined in the contract documents to the extent that it will repair any defects caused by faulty design, workmanship or material furnished under the specifications. If CONTRACTOR is not advised of any defects within 30 days of end of guarantee period, guarantee shall be considered fulfilled and complete. Defects caused by damaging service conditions such as electrolytic, chemical, abrasive or other damaging service conditions are not covered by this guarantee.
2. All guarantees obtained by the CONTRACTOR from the manufacturer or installer of paint, equipment or accessories not manufactured by tank CONTRACTOR shall be obtained for the benefit of the OWNER.

END OF SECTION

ATTACHMENT 1

ALTERNATE LOGO 1:

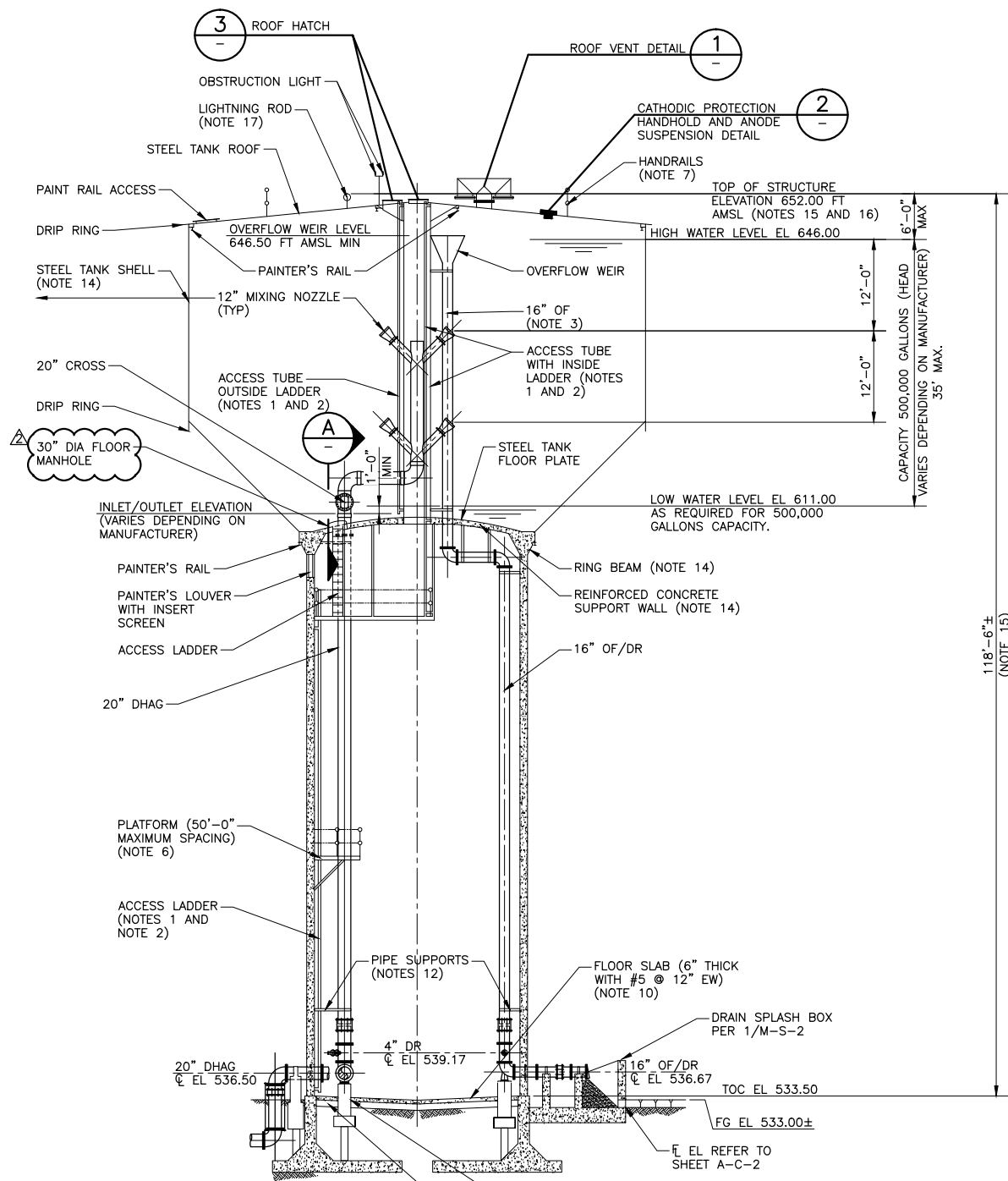


ALTERNATE LOGO 2:

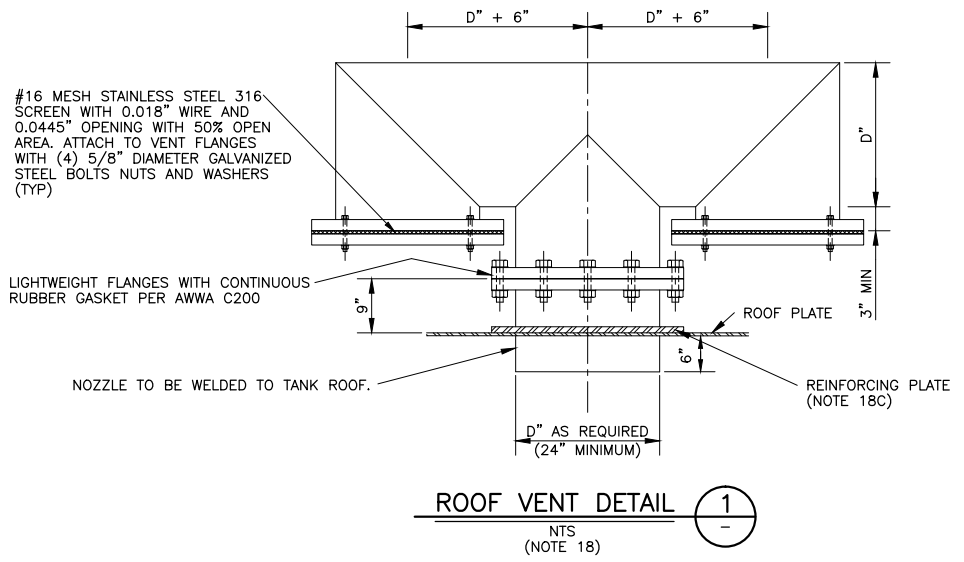
WILMER

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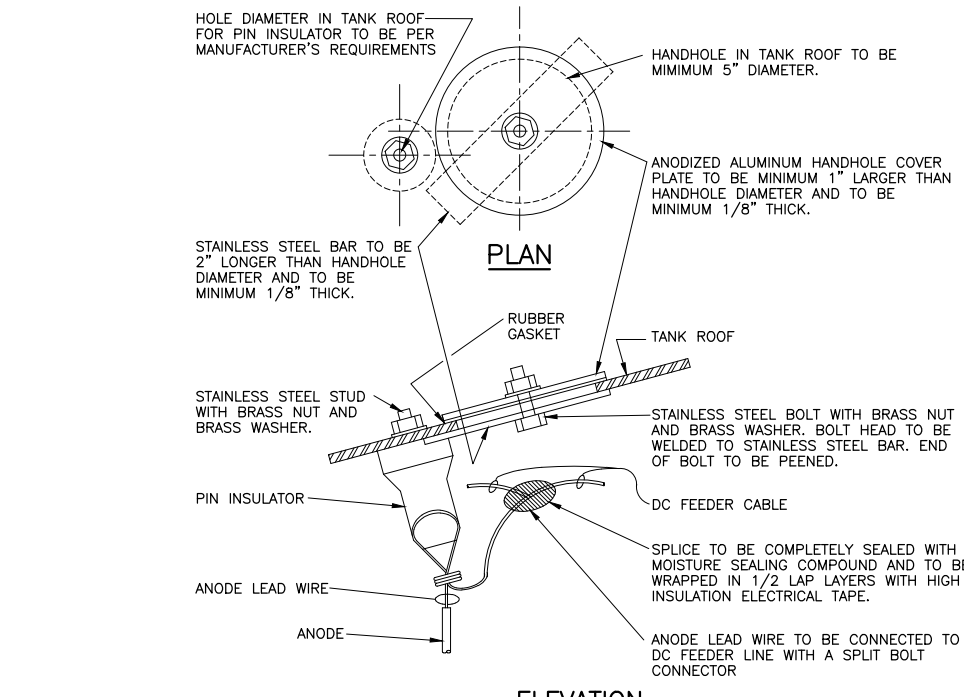
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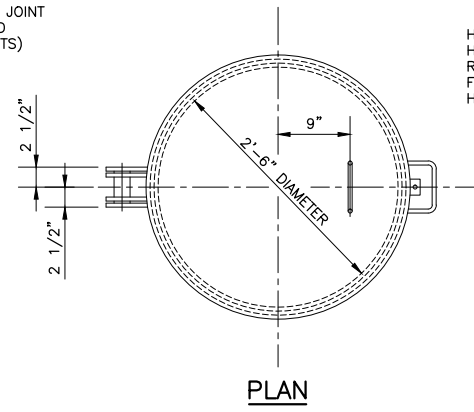
TANK SECTIONAL ELEVATION
NTS



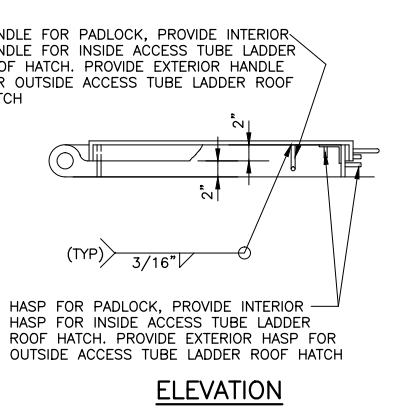
ROOF VENT DETAIL (1)
NTS (NOTE 18)



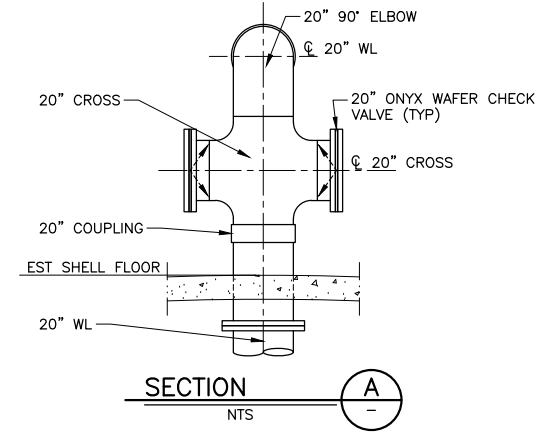
CATHODIC PROTECTION HANDHOLD AND ANODE SUSPENSION (2)
NTS (NOTE 19)



ROOF HATCH (3)
NTS (NOTE 20)



ELEVATION



SECTION A

NOTES:

1. ALL LADDERS AND SAFETY DEVICES TO BE OSHA APPROVED. ALL LADDERS TO HAVE CAGES AND SAFETY DEVICES, UNLESS OTHERWISE NOTED. ALL LADDERS SHALL BE GALVANIZED.
2. PROVIDE 5 BELT ASSEMBLIES COMPLETE WITH ALL ACCESSORIES BY SAF-T-CLIMB OR EQUAL. CONTRACTOR TO PROVIDE A WALL MOUNTED STEEL CABINET FOR STORAGE OF SAF-T-CLIMB BELTS. CABINET TO HAVE HINGED FRONT DOOR WITH HASP FOR LOCKING.
3. COAT EXTERIOR OF OVERFLOW PIPE, OUTSIDE TUBE, AND ACCESS LADDER INSIDE OF TANK SAME AS TANK INTERIOR.
4. RECEPTACLE TO BE CONNECTED TO CIRCUITRY SO THAT IT IS NOT CONTROLLED BY TRANSFER RELAY AND PHOTOCCELL. OBSTRUCTION LIGHTS TO BE CONTROLLED BY TRANSFER RELAY AND PHOTOCCELL.
5. PROVIDE INTERIOR HASP FOR INSIDE ACCESS TUBE LADDER ROOF HATCH. PROVIDE EXTERIOR HASP FOR OUTSIDE ACCESS TUBE LADDER ROOF HATCH.
6. PROVIDE REST PLATFORM, EQUIPPED WITH HANDRAILS, ON ACCESS LADDER AT A MAXIMUM SPACING OF 50 FEET. SWING-OUT SEATS NOT ACCEPTABLE.
7. ROOF HANDRAIL TO FULLY ENCLOSE THE HATCHES, VENT, OBSTRUCTION LIGHTS, AND CATHODIC PROTECTION HAND-HOLES.
8. PROVIDE VERTICAL NON-METALLIC GRIPS AT 50 FOOT INTERVALS IN JUNCTION BOXES TO RELIEVE CABLE WEIGHT.
9. SEE DWG G-M-1 FOR FITTINGS AND ACCESSORIES SCHEDULE.
10. FLOOR SLAB TO SLOPE UNIFORMLY FROM OUTSIDE TO CENTER. CENTER TO BE 4\"/>
- 11. ACCESS HATCH TO PROVIDE ACCESS TO RIGGING RAIL (NOT SHOWN).
- 12. CONTRACTOR IS RESPONSIBLE FOR DESIGNING, FURNISHING AND INSTALLING HANGERS AND SUPPORTS FOR ALL PIPING AND VALVES TO PREVENT SAGGING AND LATERAL MOVEMENT, AND TRANSFERRING STRESS TO EQUIPMENT OR COUPLINGS.
- 13. AT A MINIMUM, SUPPORT PIPES AT EACH CHANGE OF DIRECTION, AT EACH VALVE, AT IN-LINE EQUIPMENT, AT LEAST ONE FOR EACH LENGTH OF PIPE. SEE SPECIFICATION 13211 - "COMPOSITE ELEVATED STORAGE TANK" FOR MAXIMUM SPACING OF PIPE SUPPORTS. SPECIFIED MAXIMUM SPACING REQUIREMENTS SUPERSEDE SPACING SHOWN ON PLANS.
- 14. FOUNDATION, REINFORCED CONCRETE SUPPORT STRUCTURE, AND WELDED STEEL WATER TANK AND ALL APPURTENANCES SHALL BE DESIGNED BY APPROVED MANUFACTURER (CB&I, CALDWELL, LANDMARK, OR APPROVED EQUAL). APPROVED MANUFACTURER SHALL PROVIDE STRUCTURAL DESIGN, PLANS AND SPECIFICATIONS SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS.
- 15. TOP OF STRUCTURE ELEVATION INCLUDES ALL ITEMS LOCATED ON THE TANK INCLUDING, BUT NOT LIMITED TO, ROOF HATCHES, ROOF VENT, HANDRAILS AND ELECTRICAL EQUIPMENT. TOP OF STRUCTURE ELEVATION SHALL NOT EXCEED ELEVATION SHOWN.
- 16. AMSL = ABOVE MEAN SEA LEVEL.
- 17. PROVIDE LIGHTNING ROD 2' HIGHER THAN THE HIGHEST POINT OF TANK.
- 18. ROOF VENT
 - A. ROOF VENT SHALL BE SIZED FOR EMPTYING TANK AT A MAXIMUM FLOW RATE OF WATER EXITING THE TANK WHEN EST IS FULL AND INLET/OUTLET PIPE BREAKS. ROOF VENT SHALL BE SIZED TO FILL AT A RATE OF 4,920 GPM.
 - B. VENT SHALL BE FABRICATED FROM FIBERGLASS REINFORCED PLASTIC.
 - C. INSTALL 3/8\"/>
 - D. LOCATE BETWEEN ROOF RAFTERS.
 - E. INSTALL ROOF VENT AS CLOSE TO TOP OF TANK AS POSSIBLE.
- 19. FOR CATHODIC PROTECTION ANODES, REFER TO DETAIL "2" ON THIS SHEET. LOCATION, SIZE, AND NUMBER AS DETERMINED BY CATHODIC PROTECTION SYSTEM SUPPLIER.
- 20. REFER TO TECHNICAL SPECIFICATION SECTION 13211 - "COMPOSITE ELEVATED STORAGE TANK" FOR ADDITIONAL ROOF HATCH INFORMATION.
- 21. DESIGN, FABRICATE, INSTALL, AND TEST THE COMPLETE HYDRODYNAMIC PASSIVE MIXING SYSTEM PER TECHNICAL SPECIFICATION SECTION 13211 - "COMPOSITE ELEVATED STORAGE TANK."



AECOM			
AECOM TECHNICAL SERVICES INC. 16000 DALLAS PARKWAY, SUITE 350 DALLAS, TEXAS 75248 WWW.AECOM.COM TBPE REG. NO. 3580 972.735.3000			
ADDENDUM NO. 3	KAO	10/10/2017	
ADDENDUM NO. 2	KAO	10/03/2017	
NO.	REVISION	BY	DATE
COUNTY OF DALLAS, TEXAS			
DEPARTMENT OF PUBLIC WORKS			
PLEASANT RUN ROAD			
PINTO ROAD PUMP STATION			
MCIP 31402			
ELEVATED STORAGE TANK - SECTIONAL ELEVATION			
DESIGNED-AECOM	DRAWN-AECOM	DATE- 01/28/2016	FILE-
APPROVED-AECOM	CHECKED-AECOM	SCALE- AS SHOWN	SHEET- G-M-2 48 OF 69

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