



INVITATION TO BID

ITB #2017-001

"RIO BRAVO WATER TREATMENT PLANT - VALVE & ACTUATOR IMPROVEMENTS"

DUE AUGUST 09, 2017 AT 10 AM OR BEFORE

NOTICE is hereby given that the County of Webb intends to award a contract with a successful bidder for the Rio Bravo Water Treatment Plant Valve & Actuator Improvements in accordance with the Texas Government Code 2269.101; Sub-Chapter C. (Competitive Bids) to install replacement valves and actuators for the Rio Bravo Treatment Plant in order to stay compliant with the Texas Commission on Environmental Quality (TCEQ) requirements.

Project Location: The Rio Bravo Water Treatment Plant located at 513 Martha Drive, Rio Bravo, Texas 78046

The accompanying Invitation to Bid (ITB) with its terms, conditions, attachments and all other forms in this ITB package are due by or before 10 am (Central Time) on Wednesday, August 09, 2017. ITB packages received after the due date and time will not be accepted. All ITB meeting the required deadline will be read publicly at the following location in accordance with Webb County Purchasing Policies and Procedures:

Please Mail or Hand Deliver ITB Packages to:

Webb County Clerk's Office
1110 Victoria Street, 2nd Floor, Suite 201
Laredo, Texas 78040

Copies of the ITB package are available on our website:

<http://www.webbcountytx.gov/PurchasingAgent/PublicNoticeRFP/>

Please submit (1) original RFP package and five (5) copies in a sealed envelope clearly marked on the outer front lower left corner as follows:

ITB 2017-001 "Rio Bravo Water Treatment Plant Valve & Actuator Improvements".

Webb County reserves the right to reject any and all ITB proposals, to waive informalities in the ITB process, or to terminate the ITB process at any time, if deemed in the best interest for Webb County.

THIS FORM MUST BE INCLUDED WITH RFP PACKAGE; PLEASE CHECK OFF EACH ITEM INCLUDED WITH RFP PACKAGE AND SIGN BELOW TO CONFIRM SUBMITTAL OF EACH REQUIRED ITEM.

ITB 2017-001

“Rio Bravo Water Treatment Plant Valve & Actuator Improvements”.

Public Notice

Bid Proposal Sheet

Non Collusive Affidavit Form

Statement of Materials & Other Charges

Information from Bidders Form

Bid Schedule

Bid Bond form

General Terms & Conditions

Conflict of Interest form (Form CIQ)

Certification regarding Debarment (Form H2048)

Certification regarding Federal lobbying (Form 2049)

Proposer Information

Proof of No Delinquent Tax Owed to Webb County

Table of Contents

1. Introduction	Page 4
2. Bid Package Preparation Cost	Page 4
3. Term of Contract	Page 4
4. Instructions to Bidders	Page 4
5. General Conditions	Page 4
6. Questions Concerning this ITB	Page 4
7. Disqualification	Page 4
8. Conflict of Interest	Page 5
9. Texas Ethics Commission Requirement Notification	Page 5
10. ITB Schedule	Page 5
11. Technical Specifications	Page 6

1. Introduction

Webb County intends to award a contract with a successful bidder for the Rio Bravo Water Treatment Plant Valve & Actuator Improvements in accordance with the Texas Government Code 2269.101; Sub-Chapter C. (Competitive Bids) to install replacement valves and actuators for the Rio Bravo Treatment Plant in order to stay compliant with the Texas Commission on Environmental Quality (TCEQ) requirements. Further, Project consists of removal and replacement of valve and actuator sets for the Rio Bravo Water Treatment Plant treatment units consisting of the settling basins and treatment filters. This project will provide for consistent automated operation of these treatment units.

Project Location: The Rio Bravo Water Treatment Plant located at 513 Martha Drive, Rio Bravo, Texas 78046

2. Bid Package Preparation Cost

The County will not reimburse any Bidder for any costs involved in the preparation and submission of bid packages, amendments or other relevant documents associated with the ITB.

3. Term of Agreement

- To be Determined after selection and award of the lowest and responsible bidder.

4. Instructions to Bidders

- a) Bidders are solely responsible to review **ALL** technical specifications and any other requirement listed in the Technical specification document. Bidders must adhere to the schedule listed in the ITB package referencing deadlines for submittal of any questions Bidders may have prior to submittal of Bid.
- b) Bidders must comply with the Bid Security and Contractor minimum qualification requirements listed under Part 6 (6.01 & 6.02). Bid security must be included with sealed ITB package. Bidder must also provide a list of previous projects within the past 5 years in the field of valve and actuator installation.
- c) Any interpretations, corrections or changes to this Request for Bid and specifications will be made by addenda. Sole issuing authority of addenda shall be vested in Webb County through the Purchasing Agent. Addenda will be posted to the Purchasing Agents website <http://www.webbcountytx.gov/PurchasingAgent/PublicNoticeRFP/>

It is the bidder's responsibility to check the website for any addenda.

5. General Conditions

Interested Bidders shall familiarize themselves with conditions relating to the scope, specifications, and restrictions regarding the execution of work to be performed under the contract. It is the Bidder's responsibility to obtain any additional information it deems necessary to submit in its ITB package, as well as in the performance of the contract. Information contained in this document should not be considered all-inclusive.

6. Question concerning this ITB

All questions or clarification regarding this ITB package must be submitted in writing to the Webb County Purchasing Department via email to Mr. Juan Guerrero, Purchasing Contract Administrator at juguerrero@webbcountytx.gov

Each question, along with the County's response will be provided in writing to all prospective Bidders and included as an addendum to ITB document. Any verbal communication regarding this ITB will be considered non-binding on either party.

7. Disqualification

Reasons for disqualification include, but are not limited to:

- Failure to provide any information requested in this document.

8. Conflict of Interest

Webb County requires that its consultants and sub consultants be able to work solely in Webb County's interest, without conflicting financial or personal incentives. Webb County reserves the right to disqualify any prime provider or sub providers, or to place contractual limits on work or on personnel, if there is a conflict of interest that might affect or might be seen to affect the prime provider's or sub providers' duty to act solely in the interest of Webb County.

A conflict of interest may involve conflicting incentives with regard to the firm as a whole, or any employee. The conflict may arise between the provider's work under a contract entered as a result of this solicitation and a relationship involving Webb County, a construction contractor, another engineering firm, a materials testing firm, a third party affected by the project, a sub provider for any other consultant or contractor, or any other entity with an interest in a project on which work is performed under a contract entered as a result of this solicitation.

9. Texas Ethics Commission Requirement Notification:

In 2015, the Texas Legislature adopted [House Bill 1295](#), which added section 2252.908 of the Government Code. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The law applies only to a contract of a governmental entity or state agency that either (1) requires an action or vote by the governing body of the entity or agency before the contract may be signed or (2) has a value of at least \$1 million. The disclosure requirement applies to a contract entered into on or after January 1, 2016.

A signed and notarized Form 1295 shall be tendered to Webb County by providers selected to receive a contract prior to contract execution. Webb County will not evaluate the information provided, or respond to any questions on how to interpret the Texas Ethics Commission's rules.

For additional information, please reference the Texas Ethics Commission webpage at: <https://www.ethics.state.tx.us/tec/1295-Info.htm>

10. ITB SCHEDULE

Activity	Time	Date	Responsible Party
Public Notice/newspaper	n/a	July 19 th , July 23 rd	Webb Co. Purchasing Dept.
Public Notice on website	n/a	Until award is completed	Webb Co. Purchasing Dept.
Questions Due to County	No later than 5pm	July 31 st	Bidder/Contractor
Posting of answers	By 5pm or before	August 1 st	Webb Co. Purchasing Dept.
Sealed ITB packages due	10 am	August 9 th	Bidder/Contractor
Award of Contract	TBD	Aug. 14 th or Aug. 28 th	Governing Body
Finalization of contract doc	TBD	TBD	Webb County/Contractor
Commencement of service	TBD	TBD	Webb County/Contractor

Footnote: County reserves the right to adjust time and dates on above projected schedule if it's in the best interest for Webb County.

TECHNICAL SPECIFICATIONS

FOR

RIO BRAVO WATER TREATMENT PLANT

VALVE & ACTUATOR IMPROVEMENTS

FOR

WEBB COUNTY

**TECHNICAL SPECIFICATIONS
FOR**

**RIO BRAVO WATER TREATMENT PLANT
VALVE AND ACTUATOR IMPROVEMENTS**

FOR

WEBB COUNTY, TEXAS

Honorable Webb County Judge

Tano E. Tijerina

Commissioner Pct. I

Jesse Gonzalez

Commissioner Pct. II

Rosaura "Wawi" Tijerina

Commissioner Pct. III

John Galo

Commissioner Pct. IV

Jaime Canales

May 2017

Prepared by:

LNV

engineers | architects | surveyors

6010 McPherson, Suite 110
Laredo, Texas 78041
(956) 462-5511
TBPE Firm No. F-366



 05/23/2017

Enrique S. Valdez, P.E., No. 111750

**TECHNICAL SPECIFICATIONS
FOR**

**RIO BRAVO WATER TREATMENT PLANT
VALVE AND ACTUATOR IMPROVEMENTS
FOR
WEBB COUNTY, TEXAS**

Honorable Webb County Judge

Tano E. Tijerina

Commissioner Pct. I

Jesse Gonzalez

Commissioner Pct. II

Rosaura "Wawi" Tijerina

Commissioner Pct. III

John Galo

Commissioner Pct. IV

Jaime Canales

May 2017

Prepared by:



engineers | architects | surveyors

6010 McPherson, Suite 110
Laredo, Texas 78041
(956) 462-5511
TBPE Firm No. F-366

**RIO BRAVO WATER TREATMENT PLANT
VALVE AND ACTUATOR IMPROVEMENTS
TABLE OF CONTENTS**

TECHNICAL PROVISIONS

Section 01010	General Scope of Project
Section 01330	Submittal Procedures
Section 01770	Closeout Procedures
Section 09960	High Performance Coatings
Section 13446	Valve and Gate Operators
Section 13446.1	Electric Actuator
Section 15052	Basic Piping Materials and Methods
Section 15061	Pipe Supports
Section 15075	Mechanical Identification
Section 15100	Miscellaneous Valves
Section 15110	Valves
Section 15112.1	Butterfly Valves
Section 15142	Disinfection of Water Lines
Section 15956	Piping System Testing
Section 16015	General Electrical Requirements
Section 116000.1	Stainless Steel Slide Gate & Weir Gate

SECTION 01010

GENERAL SCOPE OF PROJECT

PART 1 SCOPE

1.01 This Part of the TECHNICAL SPECIFICATIONS provides for the following:

- A. Project description and location.
- B. General sequence of work.
- C. General information and items of importance.
- D. CONTRACTOR safety.

PART 2 PROJECT DESCRIPTION

2.01 The project includes improvements of valves and actuators at Rio Bravo Water Treatment plant, including, but not limited to, the removal and replacement of the following:

Valve Tag / Service	Valve Type	Valve Qty.	Size	Actuator Qty.	Actuator Type	Operation	Manual O-ride	Fail Position	Limit Switch	Position Transmitter
Filter Air Scour Valve	BFV	4	4"	4	Electric	O/C	Y	C – Internal Battery Back Up	Y	N
Influent Gate Valve	SG	4	18"	4	Electric	O/C	Y	N	Y	N
Effluent Valve	BFV	4	8"	4	Electric	Modulating	Y	C – Internal Battery Back Up	y	Y – 4-20ma
Backwash Valve	BFV	4	12"	4	Electric	Modulating	Y	C – Internal Battery Back Up	y	Y – 4-20ma
Filter Drain Valve	BFV	4	12"	4	Electric	O/C	Y	N	Y	N
Filter to Waste Valve	BFV	4	8"	4	Electric	Modulating	Y	C – Internal Battery Back Up	Y	Y – 4-20ma
Splitter Box Drain Valve	Centric ball valve	1	4"	1	Electric	O/C	Y	N	Y	N
Acti-Flow Effluent Valve	Industrial Lug Style Valve	2	14"	2	Electric	O/C	Y	C – Internal Battery Back Up	Y	N
High Service Pump Station Valves	No Valves Needed	0	6"	4	Electric	O/C	Y	N	Y	N
Backwash Supply Line Valve	BFV	1	10"	1	Electric	Modulating	Y	N	Y	Y – 4-20

Abbreviations:

1. Valve Type: BFV=butterfly valve, EPV=eccentric plug valve, BV=ball valve, SG=Slide Gate
2. Actuator Type: Electric, Pneumatic, Electro-Hydraulic, Manual
3. Operation: O/C=Open-Close, MOD=Modulating
4. Manual O-ride: Indicates mechanical manual override declutch gearbox, Y=Yes, N=No
5. Fail Position: Based on loss of power or control signal, C=Close, O=Open
6. Limit Switch: Suitable for O/C or MOD actuators, Y=Yes, N=No
7. Position transmitter: 4-20 mA output, used on MOD actuators only, Y=Yes, N=No

- 2.02 It is noted that the site is public owned but not available to unattended public access. Take necessary precautions to protect the public movement surrounding the area and employees that may be present on the site.

PART 3 LOCATION OF WORK

- 3.01 The Rio Bravo Water Treatment Plant is located at 513 Martha Drive, Rio Bravo, Texas, 78046.

PART 4 GENERAL SEQUENCE OF WORK

- 4.01 The following Sequence Of Work shall be followed by the OWNER, the ENGINEER and CONTRACTOR for the entire PROJECT:
- A. The OWNER will issue the Notice to Proceed and conduct the Pre-Construction Meeting.
 - B. Submittal Process: **See Section 01300 – Submittals.**
 - C. CONTRACTOR will complete shop fabrication/purchase of valves and actuators.
 - D. CONTRACTOR will provide electrical materials and complete work for connection of valves and actuators as required.
 - E. CONTRACTOR will mobilize tools, equipment and materials.
 - F. OWNER will provide access to the jobsite upon Notice to Proceed.
 - G. CONTRACTOR will transport all debris for landfill storage and shall be responsible for all City disposal fees.
 - H. OWNER will perform the Final Inspection.
- 4.02 The intent of this required Sequence of Work is to assure that the work progresses in a timely manner.
- 4.03 Because of the items of work that must be performed by the OWNER and ENGINEER at designated points, it is critical that close coordination of the work by the CONTRACTOR, the OWNER and ENGINEER be maintained during the entire course of the PROJECT.

PART 5 PROJECT SUPERINTENDENCE, COORDINATION, RECORD KEEPING, ETC.

- 5.01 During the course of the field work, it will be the CONTRACTOR'S responsibility to:

- A. Maintain at the jobsite a telephone for communications between the CONTRACTOR, OWNER and ENGINEER. Telephone can be either fixed or mobile.
- B. Maintain at the jobsite a full-time, **fully experienced and qualified** field superintendent/foreman. This person must be present **at all times** when work is being performed, including all SUB-CONTRACTOR'S work, and shall be authorized to coordinate and direct all work; to accept all materials/deliveries; and to communicate directly with the OWNER and ENGINEER on scheduling, inspections, status reporting, changes, extra work, etc. This designated superintendent/foreman shall not be removed, substituted or replaced without a minimum of **3 days prior notice** to the ENGINEER. All replacements of superintendence shall be fully versed in the PROJECT status, schedules, scope of work, etc.
- C. Fully coordinate the work between the CONTRACTOR, SUB-CONTRACTORS, OWNER and ENGINEER in such a manner so that the work is executed in a timely manner and in the prescribed general Sequence Of Work (Item NO. 4.1 above).
- D. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations and schedule the Work to accommodate this requirement.
- E. Maintain at the jobsite office copies of the complete Contract Documents, ~~lead test reports,~~ OWNER'S Inspection Report, ~~TCEQ notifications,~~ and addenda, change orders, delivery tickets, testing reports, bar schedule, certification of welders, paint batch numbers, written instructions and/or interpretations from the ENGINEER and any other written data pertaining to the PROJECT. The above items shall be available to the OWNER and ENGINEER upon request at all times.
- F. Follow the general Sequence of Work at all times. If, for whatever reason, it becomes necessary to deviate from the specified sequence, then it is CONTRACTOR'S responsibility to notify the OWNER AND ENGINEER.

PART 6 OTHER GENERAL DATA

The following items, as briefly described below, are important in the preparation of BIDS, the planning and execution of the work and the timely completion of this PROJECT. Each item is outlined or discussed in more detail in other sections of these CONTRACT DOCUMENTS.

6.01 Bid Security

- A. Bid Security for this PROJECT shall be **five percent (5%)** of the greatest amount bid.
- B. A Disclosure of Interests form must also be submitted with the Proposal.

6.02 CONTRACTOR Qualification

- A. The CONTRACTOR **must** be fully experienced and qualified in the field of valve and actuator installation, **at least 5 years** in similar projects.

6.03 Bar Schedule

- A. The CONTRACTOR will prepare a PROJECT Bar Schedule.
- B. This schedule shall include the PROJECT start date, each major item of work (as furnished by the ENGINEER), completion dates for major work items and PROJECT completion date.
- C. The Schedule shall be presented to the OWNER and ENGINEER for review prior to the Pre-Construction Meeting.

- D. A copy of the Schedule shall be maintained at the jobsite and shall be updated (by CONTRACTOR) as required to reflect any significant changes in the Sequence Of Work, completion times and/or extra work.

6.04 Extra and Unit Price Work

- A. It is the intent of these CONTRACT DOCUMENTS that any changes be addressed by all parties in a timely manner and completed quickly so as to not disrupt the PROJECT Sequence Of Work. Compensation for extra and unit price work shall be fair and in the best interest of the OWNER and CONTRACTOR.
- B. The ENGINEER (with approval of the OWNER) shall determine and authorize the scope, the costs, and time extensions (if required) for all unit price and extra work in accordance with the General Conditions. Extra work performed by the CONTRACTOR which is not authorized in writing by the ENGINEER (and approved by the OWNER) shall not be allowed.

6.05 Environmental Protection

- A. CONTRACTOR must be aware that the removal of existing, potentially lead-containing exterior paint system, the collection of blast debris and the possible on-site waste treatment are “environmentally sensitive” operations and subject to strict State and Federal environmental regulations.
- B. All applicable environmental agencies shall be notified in advance of this PROJECT (by OWNER). Notification shall include the name of the CONTRACTOR performing paint removal, location of the PROJECT, required removal and waste handling procedures, monitoring, daily hours of operation and duration of the PROJECT.
- C. The requirements for the installation and maintenance of the environmental protection systems and the handling of debris are **mandatory** and shall be enforced by the CONTRACTOR at all times.
- D. It is the intent of these CONTRACT DOCUMENTS that the OWNER (the generator) be fully protected and in complete compliance with all applicable environmental regulations at all times.

6.06 Work Schedule and Time of Completion

- A. The jobsite shall be made available to the CONTRACTOR for his work seven (7) days a week. The CONTRACTOR shall determine his own work schedule.
- B. The work provided for in these CONTRACT DOCUMENTS shall be completed in the calendar day time stated on the PROPOSAL. A “calendar day” shall consist of 24 hours and measured from midnight to the next midnight.
- C. CONTRACTOR must take into account their expected downtimes due to typical weather conditions at the time the work is performed, equipment breakdowns, labor shortages, scheduling conflicts, material delivery delays, recognized holidays or any other incidents or conditions which can be expected to occur on a project of this size and magnitude. The CONTRACTOR’S failure to properly staff the job, failure to manage the work or failure to allow for usual weather delays shall not entitle the CONTRACTOR to additional time.
- D. No extensions of contract time due to weather delays shall be considered by the OWNER unless the OWNER is satisfied that the weather was significantly severe and unusual for long periods of time in which the work is performed and that the overall PROJECT completion time was, in fact, truly impacted by the severe and unusual weather. The burden to prove “severe” and “unusual” weather is upon the CONTRACTOR.
- E. Time for completing this project is **60** calendar days.

- F. Failure to complete the PROJECT on time shall result in the application of liquidated damages against the CONTRACTOR as defined herein.

The time set forth in the proposal for the completion of the work is an essential element of the Contract. For each calendar day under the conditions described in the preceding Paragraph that any work shall remain uncompleted after the expiration of the calendar days specified in the Contract, together with any additional calendar days allowed, the amount per day given in the following schedule will be deducted from the money due or to become due the Contractor, not as a penalty but as liquidated damages.

FOR AMOUNT OF CONTRACT		
From More Than	To and Including	Amount of Liquidated Damages Per Calendar Days
\$0	\$100,000	\$200
100,000	500,000	400
500,000	1,000,000	550
1,000,000	2,000,000	700
2,000,000	5,000,000	850
5,000,000	10,000,000	1,200
10,000,000	15,000,000	1,500
15,000,000	20,000,000	1,700
20,000,000	Over 20,000,000	2,500

6.07 Occupancy of Site

- A. Occupancy of the jobsite by the CONTRACTOR'S workmen for residential purposes during the PROJECT shall not be allowed.

6.08 Inspection

- A. BIDDER must be aware that the OWNER or the ENGINEER may not provide full-time construction monitoring/inspection services on this PROJECT.
- B. As described in other sections of these TECHNICAL SPECIFICATIONS, monitoring, witnessing and/or inspection of the CONTRACTOR'S quality control by the OWNER is required at designated points in the PROJECT before the work can proceed.
- C. It is the CONTRACTOR'S sole responsibility to ensure that each item of work is completed in accordance with the CONTRACTOR'S Quality Control Program, to notify the OWNER well in advance as to the schedule of required inspections, and to inform the OWNER in advance of any condition which may affect the OWNER'S schedule of inspection (weather, equipment breakdowns, labor/material shortages, etc.).

6.09 Contractor Safety

- A. CONTRACTOR shall be fully responsible for safety on his job site. ~~The CONTRACTOR shall also comply with the City of Laredo risk management program.~~

B. ~~CONTRACTOR shall follow the City of Laredo Confined Space Entry Program. All coordination shall be with the City's Utility Department.~~

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Requirements and procedures for submitting Shop Drawings, Product Data, Samples, other submittals relating to products, and as specified in individual sections.

1.02 DEFINITIONS

- A. Manufacturer's Instructions: Instructions, stipulations, directions, and recommendations issued in printed form by the manufacturer of a product addressing handling, installation, erection, and application of the product; Manufacturers Instructions are not prepared especially for the Work.
- B. Shop Drawings: Drawings, diagrams, schedules, and other data specially prepared for the Work to illustrate some portion of the Work.
- C. Product Data: Illustrations, standard schedules, performance charts, brochures, diagrams and other information to illustrate materials or equipment for some portion of the Work.
- D. Samples: Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
- E. Special Samples: Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged, and will be incorporated in the Work.

1.03 PROCEDURES

- A. Deliver submittals to ENGINEER or OWNER at address given at pre-construction conference, unless another mutually agreeable place is designated.
- B. Submit submittals in ample time for each to serve submittals' intended purpose.
- C. Submit submittals which are specified or reasonably required for construction, operation, and maintenance of the Work.
- D. Deliver Submittals Under Acceptable Transmittal Form Which Identifies:
 - 1. Submittal date.
 - 2. Project and CONTRACTOR.
 - 3. Subcontractor and major supplier, when appropriate.

4. Reference submittal to Contract Documents by Drawing, detail, and/or Specification section numbers, as appropriate.
 5. Variations from Contract Documents when variations are included in submittal.
- E. Submit specified number of copies of submittal.
- F. Provide or furnish products and execute the Work in accordance with accepted submittals, unless in conflict with Contract Documents.
- G. Where Specifications require submittal of a P.E. Certification Form, submit as specified using the form included at the end of this Section.

1.04 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. Submit Shop Drawings, Product Data, Samples, and other pertinent information in sufficient detail to show compliance with specified requirements.
- B. Check, verify, and revise submittals as necessary to bring them into conformance with Contract Documents and actual field conditions:
1. Include with each submittal a copy of the relevant technical specification section with relevant addendum updates. Indicate in the left margin, next to each pertinent paragraph, either compliance or deviation.
 - a. Designate compliance with a check (√) and deviations with consecutive numbers and annotations (1, 2, 3, etc).
 - b. Attach a list of all deviations for the specified requirements, numbered consistently with the marks on the specifications. For each deviation, include a clear explanation of the deviation and the reason for it.
 2. Determine and verify quantities, dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.
 3. Coordinate submittal with other submittals and with the requirements of the Contract Documents.
- C. After completion of checking, verification, and revising; stamp, sign and date submittals indicating review and approval; and submit to ENGINEER:
1. Stamp and signature indicates CONTRACTOR has satisfied shop drawing review responsibilities and constitutes CONTRACTOR's written approval of shop drawing.
 2. Shop drawings without CONTRACTOR's written approval will be returned for resubmission.
- D. Shop Drawings: Submit 3 hard copies and 1 copy in electronic format. Unless otherwise specified, one will be returned with reviewer's comments and stamp.

- E. Product Data and Manufacturer's Instructions: Submit 3 copies, 1 additional copy shall be in electronic format. Excise or cross out non-applicable information and clearly mark applicable information with citations to and terminology consistent with Contract Documents:
 - 1. Unless otherwise specified, one copy will be returned with reviewer's comments and stamp.
- F. Samples: Where Specifications require such, submit 2 samples labeled with reference to applicable Contract Documents. Label will be returned with reviewer's selection when appropriate, comments and stamp. Samples will not be returned unless return is requested in writing and additional sample is submitted.
- G. Special Samples: Submit 1 sample labeled with reference to applicable Contract Documents. Sample and 1 label will be returned for installation in the Work.
- H. Assume risk of expense and delays when proceeding with work related to required submittals without review and acceptance.
- I. Submittals in Electronic Media Format: Include with each submittal electronic copies of all product data, shop drawings and other information as follows:
 - 1. General: Provide all information CDs, PC compatible using Windows 7 operating system.
 - 2. Product Data: Provide text documents and manufacturer's literature using Microsoft Word 2007, or later version.
 - 3. Shop Drawings, Diagrams: Provide all graphic submittals utilizing current version of AutoCAD.
 - 4. Adobe Acrobat: Any information provided as an image file shall be in the latest version of Adobe Acrobat (i.e., PDF extension).

1.05 MANUFACTURER'S INSTRUCTIONS

- A. Submit manufacturer's instructions whenever made available by manufacturers and when installation, erection, or application in accordance with manufacturer's instructions are required by the Specifications.
- B. Submit manufacturer's instructions prior to installation, erection, or application of equipment and other project components. Submit manufacturer's instructions in accordance with requirements for Product Data.

1.06 ENGINEER'S REVIEW

- A. ENGINEER's review of submittals shall not release CONTRACTOR from CONTRACTOR's responsibility for performance of requirements of Contract Documents. Neither shall ENGINEER's review release CONTRACTOR from fulfilling purpose of installation nor from CONTRACTOR's liability to replace defective work.

- B. Do not consider submittals as Contract Documents. Purpose of submittals is to demonstrate how CONTRACTOR intends to conform to the design concepts.
- C. ENGINEER's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents.
 - 1. ENGINEER's Review Does Not Extend to:
 - a. Accuracy of dimensions, quantities, or performance of equipment and systems designed by CONTRACTOR.
 - b. CONTRACTOR's means, methods, techniques, sequences, or procedures except when specified, or required by Contract Documents.
 - c. Safety precautions or programs related to safety which shall remain the sole responsibility of the CONTRACTOR.
- D. Except as may be provided in subsequent specifications, a submittal will be returned within 30 days. When a submittal cannot be returned within that period, ENGINEER will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned.
- E. For submittals returned Resubmittal Not Required - Make Corrections Noted/See all Comments, CONTRACTOR shall incorporate all review comments into the work, but resubmittal of an amended submittal package is not required.
- F. For submittals returned Correct and Resubmit – Make Corrections Noted/See All Comments, CONTRACTOR shall incorporate the review comments into a complete revised package, and resubmit it for review.
- G. For submittals returned Rejected- See All Comments, CONTRACTOR shall develop a new submittal package with materials, equipment, methods, etc. that meet the requirements of the Contract Documents.
- H. For submittals returned Submittal Not Reviewed, Filed for Record, no further action is required by the CONTRACTOR for this submittal.
- I. ENGINEER will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.
- J. Costs incurred by OWNER as a result of additional reviews of a particular submittal after the second time it has been reviewed shall be borne by CONTRACTOR. Reimbursement to OWNER will be made by deducting such costs from CONTRACTOR's subsequent partial payments.

1.07 MINOR OR INCIDENTAL PRODUCTS AND EQUIPMENT SCHEDULES

- A. Shop Drawings of minor or incidental fabricated products will not be required, unless requested.
- B. Submit tabulated lists of minor or incidental products showing the names of the manufacturers and catalog numbers, with Product Data and Samples as required to determine acceptability.

1.08 SUBMITTALS FOR INFORMATION OR RECORD ONLY

- A. See subsequent Specification Sections for submittals designated as “for information or record only.” Such items will be filed for record, and will not be returned.
- B. Mill and Factory Test Reports:
 - 1. Submit 4 certified copies of factory and mill test reports for record only. No copies will be returned.
 - 2. Do not incorporate Products in the Work which have not passed testing and inspection satisfactorily.
 - 3. Pay for mill and factory tests.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

P.E. Certification Form

The undersigned hereby certifies that he/she is a Professional Engineer registered in the State of Texas and that he/she has been employed by:

_____ (Name of Contractor) to design
 _____ (item) in accordance with
 Specification Section _____ for the _____
 _____ (Name of Project).

The undersigned further certifies that he/she has performed the design of the _____
 _____ (item), that said design in conformance with all applicable AWWA,
 TCEQ, ACI, local, state and federal codes, rules, and regulations for consolidated elevated water storage
 tanks and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in,
 and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the
 _____ (Name of Project Owner) or OWNER's representative
 within five working days following written request therefore by the OWNER.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Address	Title
_____	_____
Texas Registration No.	Address

END OF SECTION

SECTION 01770
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Contract closeout requirements including:
 - 1. Final cleaning.
 - 2. Waste disposal.
 - 3. Touch-up and repair.
 - 4. Disinfection of systems.
 - 5. Preparation and submittal of closeout documents.
 - 6. Final completion certification.

1.02 FINAL CLEANING

(Perform as are pertinent to specific elements of the project. Disregard items that are not pertinent to specific elements of the project.)

- A. Perform final cleaning prior to inspections for Final Acceptance.
- B. Employ skilled workers who are experienced in cleaning operations.
- C. Use cleaning materials which are recommended by manufacturers of surfaces to be cleaned.
- D. Prevent scratching, discoloring, and otherwise damaging surfaces being cleaned.
- E. Clean roofs, gutters, downspouts, and drainage systems.
- F. Broom clean exterior paved surfaces and rake clean other surfaces of site work:
 - 1. Police yards and grounds to keep clean.
- G. Remove dust, cobwebs, and traces of insects and dirt.
- H. Clean grease, mastic, adhesives, dust, dirt, stains, fingerprints, paint, blemishes, sealants, plaster, concrete, and other foreign materials from sight-exposed surfaces, and fixtures and equipment.
- I. Remove non-permanent protection and labels.

- J. Polish waxed woodwork and finish hardware.
- K. Wash tile.
- L. Wax and buff hard floors, as applicable.
- M. Wash and polish glass, inside and outside.
- N. Wash and shine mirrors.
- O. Polish glossy surfaces to clear shine.
- P. Vacuum carpeted and soft surfaces.
- Q. Clean permanent filters and replace disposable filters when heating, ventilation, and air conditioning units were operated during construction.
- R. Clean ducts, blowers and coils when units were operated without filters during construction.
- S. Clean light fixtures and replace burned-out or dim lamps.

1.03 WASTE DISPOSAL

- A. Arrange for and dispose of surplus materials, waste products, and debris off-site:
 - 1. Prior to making disposal on private property, obtain written permission from OWNER of such property.
- B. Do not fill ditches, washes, or drainage ways which may create drainage problems.
- C. Do not create unsightly or unsanitary nuisances during disposal operations.
- D. Maintain disposal site in safe condition and good appearance.
- E. Complete leveling and cleanup prior to final acceptance of the Work.

1.04 TOUCH-UP AND REPAIR

- A. Touch-up or repair finished surfaces on structures, equipment, fixtures, and installations that have been damaged prior to inspection for Substantial Completion.
- B. Refinish or replace entire surfaces which cannot be touched-up or repaired satisfactorily.

1.05 FINAL CLEANING AND STERILIZATION [DISINFECTION] OF SYSTEMS OF PLANT FACILITIES

- A. Clean channels, pipe, basins, reservoirs, and tanks before running of 7-day test, or before facility goes on stream when 7-day test is not required.

- B. Wash, wherever practicable, or broom sweep channels, pipe, basins, reservoirs, and tanks.
- C. Disinfect filter basins, reservoirs, clear wells, tanks, channels, and piping intended to carry potable water as follows or in accordance with American Water Works Association Standards.
- D. Provide ample sampling outlets in pipe for testing.
- E. Fill pipe and other plant facilities with chlorine solution of sufficient strength to retain residual of not less than 10 parts per million at end of 24 hours.
- F. When reservoirs and basins are too large to be economically disinfected by filling with chlorine solution, spray reservoirs and basins with solution containing 100 parts per million of chlorine.
- G. After disinfection, rinse entire potable water system with potable water sufficient to reduce chlorine residual to not more than 0.6 parts per million throughout system before system is put into service.

1.06 FINAL CLEANING AND DISINFECTION OF SYSTEMS OF POTABLE WATER MAINS

- A. Clean interior of pipe and fittings.
- B. When pipe contains dirt that cannot be removed by flushing, swab pipe interiors with solution containing not less than 500 parts per million of chlorine until clean.
- C. Flush 12 inch in diameter and smaller pipe as thoroughly as available water sources will permit.
- D. Fill pipe with chlorine solution of sufficient strength to provide 10 parts per million chlorine residual at end of 24 hours.
- E. Flush pipes with potable water until chlorine residual is less than 0.6 parts per million before pipe are put into service.
- F. Assist OWNER with a Bacteriological Test.

1.07 CLOSEOUT DOCUMENTS

- A. Submit following Closeout Submittals upon Substantial Completion and at least 7 days prior to submitting Application for Final Payment:
 1. Evidence of Compliance with Requirements of Governing Authorities.
 2. Project Record Documents.
 3. Operation and Maintenance Manuals.
 4. Warranties and Bonds.

5. Keys and Keying Schedule.
6. Evidence of Payment and Release of Liens or Stop Payment Notices as outlined in Conditions of the Contract.
7. Release of claims as outlined in Conditions of the Contract.
8. Survey Record Documents if required per contract documents.
9. Certificate of Final Completion.
10. Any specific requirements of Sections of the Specifications for Certificates relative to TDLR or Windstorm if required per local or state regulations.

1.08 EVIDENCE OF COMPLIANCE WITH REQUIREMENTS OF GOVERNING AUTHORITIES

A. Submit the Following:

1. Certificate of Occupancy.
2. Certificates of Inspection:
 - a. Elevators.
 - b. Mechanical:
 - 1) Form U-1 "Manufacturer's Data Report for Unfired Pressure Vessels" for each pressure vessel furnished and installed.
 - c. Electrical
 - d. Building

1.09 PROJECT RECORD DOCUMENTS

A. Maintain at Project site, available to OWNER and ENGINEER, 1 copy of the Contract Documents, shop drawings and other submittals, in good order:

1. Mark and record field changes and detailed information contained in submittals and change orders.
2. Record actual depths, horizontal and vertical location of underground pipes, duct banks and other buried utilities. Reference dimensions to permanent surface features.
3. Identify specific details of pipe connections, location of existing buried features located during excavation, and the final locations of piping, equipment, electrical conduits, manholes, and pull boxes.

4. Identify location of spare conduits including beginning, ending and routing through pull boxes, and manholes. Record spare conductors, including number and size, within spare conduits, and filled conduits.
5. Provide schedules, lists, layout drawings, and wiring diagrams.
6. Make annotations with erasable colored pencil conforming to the following color code:

Additions:	Red
Deletions:	Green
Comments	Blue
Dimensions:	Graphite

B. Maintain Documents Separate From Those Used for Construction:

1. Label documents "RECORD DOCUMENTS."

C. Keep Documents Current:

1. Record required information at the time the material and equipment is installed and before permanently concealing.

D. Deliver record documents with transmittal letter containing date, Project title, CONTRACTOR's name and address, list of documents, and signature of CONTRACTOR.

E. During progress meetings, record documents will be reviewed to ascertain that changes have been recorded.

1.10 WARRANTIES AND BONDS

- A. Provide executed Warranty or Guaranty Form if required by Contract Documents.
- B. Provide specified additional warranties, guarantees, and bonds from manufacturers and suppliers.

1.11 CERTIFICATE OF FINAL COMPLETION

- A. When 7-day operational test has been successfully completed, OWNER will certify that new facilities are operationally complete. OWNER may submit a list of known items (punch list) still to be completed or corrected prior to contract completion.
- B. List of items to be completed or corrected will be amended as items are resolved by CONTRACTOR.

- C. When all items have been completed or corrected, submit written certification that the entire work is complete in accordance with the Contract Documents and request final inspection.
- D. Upon completion of final inspection, OWNER will prepare a written acceptance of the entire work or advise CONTRACTOR of work not complete. If necessary, inspection procedures will be repeated.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 09960

HIGH PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Field applied high performance coatings.

1.02 REFERENCES

- A. NSF International (NSF):
 - 1. NSF 61 - Drinking Water System Components - Health Effects.
- B. SSPC – Society for Protective Coatings:
 - 1. SSPC SP1 - Solvent Cleaning.
 - 2. SSPC SP2 - Hand Tool Cleaning.
 - 3. SSPC SP3 - Power Tool Cleaning.
 - 4. SSPC SP5 - White Metal Blast Cleaning.
 - 5. SSPC SP6 - Commercial Blast Cleaning.
 - 6. SSPC SP7 - Brush-Off Blast Cleaning.
 - 7. SSPC SP10 - Near-White Blast Cleaning.
 - 8. SSPC SP 11 - Power Tool Cleaning to Bare Metal.
 - 9. SSPC-SP 12 - High- and Ultrahigh-Pressure Water Jetting.
- C. National Association of Pipe Fabricators
 - 1. NAPF 500-03 Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings.

1.03 DEFINITIONS

- A. Submerged Metal: Steel or iron surfaces below tops of channel or structure walls which will contain water even when above expected water level.
- B. Submerged Concrete and Masonry Surfaces: Surfaces which are or will be:
 - 1. Underwater.

2. In structures which normally contain water.
 3. Below tops of walls of water containing structures.
- C. Dry Film Thickness (DFT): Thickness of fully cured coating, measured in mils.
- D. Volatile Organic Compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon.

1.04 PERFORMANCE REQUIREMENTS

- A. Coating materials for concrete and metal surfaces shall be especially adapted for use in water treatment plants.
- B. Coating materials used in conjunction with potable water supply systems shall be certified to NSF 61 or UL 3P83.

1.05 SUBMITTALS

- A. General: Submit in accordance with Section 01330.
- B. Shop Drawings: Include schedule of where and for what use coating materials are proposed in accordance with requirements for Product Data.
- C. Product Data: Include description of physical properties of coatings including solids content and ingredient analysis, VOC content, temperature resistance, typical exposures and limitations, and manufacturer's standard color chips.
1. Regulatory Requirements: Include requirements concerning the following
 - a. Volatile organic compound limitations.
 - b. Coatings containing lead compounds.
 - c. Abrasives and abrasive blast cleaning techniques, and disposal.
 - d. NSF or UL certification of coatings for use in potable water supply systems.
- D. Samples: Include 8-inch square draw-downs or brush-outs of topcoat finish when requested. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.
- E. Certificates: Submit in accordance with requirements for Product Data.
- F. Manufacturer's Instructions: Include the following
1. Special requirements for transportation and storage.
 2. Mixing instructions.

3. Shelf Life.
 4. Pot life of material.
 5. Precautions for applications free of defects.
 6. Surface preparation.
 7. Method of application.
 8. Recommended number of coats.
 9. Recommended thickness of each coat.
 10. Recommended total thickness.
 11. Drying time of each coat, including prime coat.
 12. Required prime coat.
 13. Compatible and non-compatible prime coats.
 14. Recommended thinners, when recommended.
 15. Limits of ambient conditions during and after application.
 16. Time allowed between coats.
 17. Required protection from sun, wind and other conditions.
 18. Touch-up requirements and limitations.
- G. Manufacturer's Field Reports: Submit for ENGINEER's record only.
- H. Operations and Maintenance Data: Submit as specified in Special Provisions.

1.06 QUALITY ASSURANCE

- A. Qualifications of Applicator:
1. Minimum of 5-year experience applying specified type or types of coatings under conditions similar to those of the Work.
 2. Manufacturer approved applicator when manufacturer has approved applicator program.
 3. Approved and licensed by polymorphic polyester resin manufacturer to apply polymorphic polyester resin coating system.

4. Applicator of off-site application of coal tar epoxy shall have successfully applied coal tar epoxy on similar surfaces in material, size, and complexity as on the Project.
- B. Regulatory Requirements: Comply with governing agencies' regulations by using coatings that do not exceed permissible volatile organic compound limits and do not contain lead.
 1. Do not use coal tar epoxy in contact with drinking water.
- C. Field Samples: Prepare and coat a minimum 100 square foot area between corners or limits such as control or construction joints of each system. Approved field sample may be part of Work.
- D. Pre-installation Conference: Conduct as specified.
- E. Compatibility of Coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise.
- F. Services of Coating Manufacturers Representative: Arrange for coating manufacturer's representative to attend pre-installation conferences and to make periodic visits to the project site to provide consultation and inspection services during surface preparation and application of coatings.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products in accordance with manufacturer's recommendations.
- B. Remove unspecified and unapproved paints from Project Site immediately.
- C. Deliver containers with labels identifying the manufacturer's name, brand name, product type, batch number, date of manufacturer, expiration date or shelf life, color, and mixing and reducing instructions.
- D. Store coatings in well-ventilated facility that provides protection from the sun, weather, and fire hazards. Maintain ambient storage temperature between 45 and 90 degrees Fahrenheit, unless otherwise recommended by the manufacturer.
- E. Take precautions to prevent fire and spontaneous combustion.

1.08 PROJECT CONDITIONS

- A. Surface Moisture Contents: Do not paint surfaces that exceed manufacturer specified moisture contents, or when not specified by the manufacturer, the following moisture contents:
 1. Plaster and Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete and Concrete Block: 12 percent.
 3. Interior Located Wood: 15 percent.

4. Concrete Floors: 7 percent.
- B. Do Not Paint or Coat:
1. Under dusty conditions.
 2. When light on surfaces measures less than 15 foot-candles.
 3. When ambient or surface temperature is less than 45 degrees Fahrenheit.
 4. When relative humidity is higher than 85 percent.
 5. When surface temperature is less than 5 degrees Fahrenheit above dew point.
 6. When surface temperature exceeds the manufacturer's recommendation.
 7. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.
 8. Apply clear finishes at minimum 65 degrees Fahrenheit.
- C. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
- D. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 50 degrees Fahrenheit for 24 hours before, during and 72 hours after application of finishes.

1.09 SEQUENCING AND SCHEDULING

- A. Sequence and Schedule: As directed by the Engineer.

1.10 MAINTENANCE

- A. Extra Materials: Deliver in accordance with the manufacturer's recommendations. Include minimum 1 gallon of each type and color of coating applied.
1. When manufacturer packages material in gallon cans, deliver unopened labeled cans as comes from factory.
 2. When manufacturer does not package material in gallon cans, deliver material in new gallon containers, properly sealed and identified with typed labels indicating brand, type and color.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Special Coatings: One of the following or equal:

1. Tnemec: Tnemec Co., Kansas City, MO.
2. S-W: Sherwin-Williams Co., Cleveland, OH.

2.02 PREPARATION AND PRETREATMENT MATERIALS

- A. Metal Pretreatment: As manufactured by one of the following or equal:
 1. Tnemec: Tneme-Grip 32-1210.
 2. S-W: B71Y1 DTM Wash Primer
- B. Surface Cleaner and Degreaser: As manufactured by one of the following or equal:
 1. Simple Green Heavy Duty Cleaner Degreaser

2.03 COATING MATERIALS

- A. High Build Epoxy: As manufactured by the following or equal:
 1. Tnemec: Series 141 Epoxoline
 2. Sherwin-Williams: Macropoxy 5500 Epoxy (B58-740 Series)
- B. Aliphatic or Aliphatic-acrylic Polyurethane: As manufactured by one of the following or equal:
 1. Tnemec: Series 1075, Semi-Gloss Endura-Shield II.
 2. Sherwin-Williams Hi Solids Polyurethane (B65-300 Series)
- C. Epoxy Primer/Intermediate Coat:
 1. Tnemec: Series 66 Hi-Build Epoxoline
 2. Sherwin-Williams: Macropoxy 5500 Epoxy (B58-740 Series)
- D. Asphalt Varnish:
 1. Tnemec: Series 46-465 H.B. Tnemecol

2.04 MIXES

- A. Mix epoxy parts in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.01 PROTECTION

- A. Protect adjacent surfaces from coatings and damage. Repair damage resulting from inadequate or unsuitable protection.

- B. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being coated and in particular, surfaces within storage and preparation area.
- C. Place cotton waste, cloths and material that may constitute fire hazard in closed metal containers and remove daily from site.
- D. Remove electrical plates, surface hardware, fittings and fastenings, prior to application of coating operations. Carefully store, clean and replace on completion of coating in each area. Do not use solvent or degreasers to clean hardware that may remove permanent lacquer finish.

3.02 GENERAL PREPARATION

- A. Prepare surfaces in accordance with coating manufacturer's instructions, unless more stringent requirements are specified in this Specification.
- B. Protect following surfaces from abrasive blasting by masking, or other means:
 - 1. Threaded portions of valve and gate stems.
 - 2. Machined surfaces for sliding contact.
 - 3. Surfaces to be assembled against gaskets.
 - 4. Surfaces of Shafting on which sprockets are to fit.
 - 5. Surfaces of shafting on which bearings are to fit.
 - 6. Machined surfaces of bronze trim, including those slide gates.
 - 7. Cadmium-plated items except cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment requiring abrasive blasting.
 - 8. Galvanized items, unless scheduled to be coated.
- C. Protect installed equipment, mechanical drives, and adjacent coated equipment from abrasive blasting to prevent damage caused by entering sand or dust.
- D. Concrete: Clean concrete surfaces of dust, mortar, fins, loose concrete particles, form release materials, oil, and grease. Fill voids so that surface is smooth. Etch or brush off-blast clean SSPC SP-7) as recommended by coating manufacturer.
- E. Ferrous Metal Surfaces:
 - 1. Remove grease and oil in accordance with SSPC SP-1.
 - 2. Remove rust, scale, and welding slag and spatter, and prepare surfaces in accordance with SSPC SP-2 through SP-10.
 - 3. Abrasive blast surfaces prior to coating.

4. When abrasive blasted surfaces rust or discolor before coating, abrasive blast surfaces again to remove rust and discoloration.
 5. When metal surfaces are exposed because of coating damage, abrasive blast surfaces before touching-up.
- F. Ferrous Metal Surfaces Not to be Submerged: Abrasive blast in accordance with SSPC SP-6, unless blasting may damage adjacent surfaces, prohibited or specified otherwise. Where not possible to abrasive blast, power tool clean surfaces in accordance with SSPC SP-3.
- G. Ferrous Metal Surfaces to be Submerged: Unless specified otherwise, abrasive blast in accordance with SSPC SP-10 or better to clean and provide roughened surface profile of not less than 2 mils and not more than 4 mils in depth when measured with Elcometer 123, or as recommended by the coating manufacturer.
- H. Ductile Iron Pipe and Fittings to be lined or Coated: Abrasive blast clean in accordance with NAPF-500-03.
- I. Sherardized Aluminum, Copper, and Bronze Surfaces: Prepare in accordance with paint manufacturer's instructions.
- J. Galvanized Surface:
1. Degrease or solvent clean to remove oily residue.
 2. Remove all soluble and insoluble contaminants. Remove any storage stains per Section 6.2 of ASTM d6386. Abrasive blast as per ASTM D 6386 to achieve a 2.0 mil angular anchor profile.
 3. Power tool or hand tool clean or whip abrasive blast.
 4. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded physically, such as bolts, nuts, or preformed channels.
- K. Shop Primed Metal:
1. Remove shop primer from metal to be submerged by abrasive blasting in accordance with SSPC SP-10, unless manufacturer of coating system requires greater degree of surface preparation.
 2. Correct abraded, scratched or otherwise damaged areas of shop prime coat by sanding or abrasive blasting in accordance with SSPC SP-6.
 3. When entire shop priming fails or has weathered excessively, or when recommended by coating manufacturer, abrasive blast shop prime coat to remove entire coat and prepare surface in accordance with SSPC SP-10.
 4. When incorrect prime coat is applied, remove incorrect prime coat by abrasive blasting in accordance with SSPC SP-10.

5. When prime coat not authorized by ENGINEER is applied, remove unauthorized prime coat by abrasive blasting in accordance with SSPC SP-10.
6. Shop Applied Bituminous Paint Asphalt Varnish: Abrasive blast clean shop applied bituminous paint or asphalt varnish from surfaces scheduled to receive non-bituminous coatings.
- L. Abrasive blast cadmium-plated, zinc-plated, or sherardized fasteners in same manner as unprotected metal when used in assembly of equipment designated for abrasive blasting.
- M. Abrasive blast components to be attached to surfaces that cannot be abrasive blasted before components are attached.
- N. Grind sharp edges to approximately 1/8-inch radius.
- O. Remove and grind smooth all excessive weld material and weld spatter before blast cleaning.

3.03 MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Identify equipment, ducting, piping, and conduit in accordance with Section 15075.
- B. Remove grilles, covers and access panels for mechanical and electrical system from location and paint separately.
- C. Finish paint primed equipment with color selected by the OWNER.
- D. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with prefinished coating.
- E. Replace identification markings on mechanical or electrical equipment when painted over or spattered.
- F. Paint interior surfaces of air ducts, convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line.
- G. Paint dampers exposed immediately behind louvers, grilles, convactor and baseboard cabinets to match face panels.
- H. Paint exposed conduit and electrical equipment occurring in finished areas with color and texture to match adjacent surfaces.
- I. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.
- J. Color code equipment, piping, conduit and exposed ductwork and apply color banding and identification, such as flow arrows, naming and numbering, in accordance with DIVISION 15.

3.04 GENERAL PROTECTION

- A. Protect adjacent surfaces not to be coated from spatter and droppings with drop cloths and other coverings.
 - 1. Mask off surfaces of items not to be coated or remove items from area.

3.05 GENERAL APPLICATION REQUIREMENTS

- A. Apply coatings in accordance with manufacturer's instructions.
- B. Coat metal unless specified otherwise.
- C. Verify metal surface preparation immediately before applying coating in accordance with SSPC Pictorial Surface Preparation Standard.
- D. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.
- E. Wash coat and prime sherardized, aluminum, copper, and bronze surfaces, or prime with manufacturers recommended special primer.
- F. Prime shop primed metal surfaces. Spot prime exposed metal of shop primed surfaces before applying primer over entire surface.
- G. Apply minimum number of specified coats.
- H. Apply coats to thicknesses specified, especially at edges and corners.
- I. Apply additional coats when necessary to achieve specified thicknesses.
- J. Coat surfaces without drops, ridges, waves, holidays, laps, or brush marks.
- K. Remove spatter and droppings after completion of coating.
- L. When multiple coats of same material are specified, tint prime coat and intermediate coats with suitable pigment to distinguish each coat.
- M. Dust coatings between coats. Lightly sand and dust surfaces to receive high gloss finishes, unless instructed otherwise by coating manufacturer.
- N. Apply coating by brush, roller, trowel, or spray, unless particular method of application is required by coating manufacturer's instructions or these Specifications.
- O. Spray Application:
 - 1. When using spray application, apply coating to thickness not greater than that suggested in coating manufacturer's instructions for brush coat application.
 - 2. Use airless spray method, unless air spray method is required by coating manufacturer's instruction or these Specifications.

3. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist or spray.

P. Drying and Recoating:

1. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
2. Limit drying time to that required by these Specifications or coating manufacturer's instructions.
3. Do not allow excessive drying time or exposure that may impair bond between coats.
4. Recoat epoxies within time limits recommended by epoxy manufacturer.
5. When time limits are exceeded, abrasive blast coat prior to applying another coat.
6. When limitation on time between abrasive blasting and coating cannot be met before attachment of components to surfaces that cannot be abrasive blasted, coat components before attachment.
7. Ensure primer and intermediate coats of coating are unscarred and completely integral at time of application of each succeeding coat.
8. Touch up suction spots between coats and apply additional coats where required to produce finished surface of solid, even color, free of defects.
9. Leave no holidays.
10. Sand and recoat scratched, contaminated, or otherwise damaged coating surfaces so damages are invisible to naked eye.

3.06 CYCLOALIPHATIC AMINE EPOXY SYSTEM

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements and as follows:
 - a. Abrasive blast ferrous metal surfaces to be submerged at jobsite in accordance with SSPC SP-10 prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-10.
 - b. Abrasive blast non-submerged ferrous metal surfaces at jobsite in accordance with SSPC SP-6, Commercial Blast Cleaning, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.
 - c. Abrasive blast clean ductile iron surfaces in accordance with SSPC SP-7.

B. Application:

1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply minimum 2-coat system with total dry film thickness of 10 mils.
 - b. Recoat or apply succeeding epoxy coats within time limits recommended by manufacturer. Prepare surfaces for recoating in accordance with manufacturer's instructions.
 - c. Coat metal to be submerged before installation when necessary, to obtain acceptable finish and to prevent damage to other surfaces.
 - d. Coat entire surface of support brackets, stem guides, pipe clips, fasteners, and other metal devices bolted to concrete.
 - e. Coat surface of items to be exposed and adjacent 1 inch to be concealed when embedded in concrete or masonry.

3.07 EPOXY AND POLYURETHANE COATING SYSTEM

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements and as follows:
 - a. Touch up shop primed steel and miscellaneous iron.
 - b. Abrasive blast ferrous metal surfaces at jobsite in accordance with SSPC SP-6, Commercial Blast Cleaning, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.
 - c. Degrease or solvent clean, whip abrasive blast, power tool, or hand tool clean galvanized metal surfaces.
 - d. Lightly abrasive blast or sand fiberglass and plastic to be coated to roughen surfaces prior to coating.
 - e. Abrasive blast clean ductile iron surfaces in accordance with SSPC SP-7.

B. Application:

1. Apply coatings in accordance with general application requirements and as follows:
2. Apply 3 coat system consisting of:
 - a. Primer: 4 to 5 mils dry film thickness cycloaliphatic amine or polyamidoamine epoxy primer,

- b. Intermediate Coat: 4 to 5 mils dry film thickness cycloaliphatic amine epoxy or polyamidoamine epoxy intermediate coat, and
 - c. Top Coat: 2.5 to 3.5 mils dry film thickness aliphatic or aliphatic-acrylic polyurethane topcoat.
3. Recoat or apply succeeding epoxy coats within 30 days or within time limits recommended by manufacturer, whichever is shorter. Prepare surfaces for recoating in accordance with manufacturer's instructions.

3.08 ASPHALT VARNISH

A. Preparation:

- 1. Prepare surfaces in accordance with general preparation requirements.

B. Application:

- 1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply minimum 2 coats.

3.09 FIELD QUALITY CONTROL

- A. Each coat will be inspected. Strip and remove defective coats, prepare surfaces and recoat. When approved, apply next coat.
- B. Control and check dry film thicknesses and integrity of coatings.
- C. Measure dry film thickness with calibrated thickness gauge. Dry film thicknesses may be checked with Elcometer or Positector 6000.
- D. Verify coat integrity with low-voltage holiday detector. Allow ENGINEER to use detector for additional checking.
- E. Check wet film thickness before coal tar epoxy coating cures on concrete or non-ferrous metal substrates.

3.10 SCHEDULE OF ITEMS NOT REQUIRING COATING

- A. General: Unless specified otherwise, the following items do not require coating.
 - 1. Items that have received final coat at factory and not listed to receive coating in field.
 - 2. Aluminum, brass, bronze, copper, plastic, rubber, stainless steel, chrome, everdur, or lead.
 - 3. Buried or encased piping or conduit.

4. Exterior Concrete.
5. Galvanized pipe trays and cable trays.
6. Grease fittings.
7. Fiberglass ducting or tanks in concealed locations.
8. Steel to be encased in concrete or masonry.

3.11 SCHEDULE OF SURFACES TO BE COATED IN THE FIELD

- A. In general, apply coatings to steel, iron, and wood surfaces unless specified ~~or otherwise indicated on the Drawings~~. Coat concrete surfaces and anodized aluminum only when specified ~~or indicated on the Drawings~~.
- B. Following schedule is incomplete. Coat unlisted surfaces with same coating system as similar listed surfaces. Verify questionable surfaces.
- C. Metals:
 1. Cycloaliphatic Amine Epoxy and Polyurethane System: exterior and interior non-immersed ferrous metal surfaces including:
 - a. Doors, doorframes, ventilators, louvers, grilles, exposed sheet metal, and flashing.
 - b. Pipe, valves, pipe hangers, supports and saddles, conduit, cable tray hangers, and supports.
 - c. Motors and motor accessory equipment.
 - d. Drive gear, drive housing, coupling housings, and miscellaneous gear drive equipment.
 - e. Valve and gate operators and stands.
 - f. Structural steel including galvanized structural steel.
 - g. Crane and hoist rails.
 - h. Exterior of tanks and other containment vessels.
 - i. Mechanical equipment supports, drive units, and accessories.
 - j. Pumps not submerged.
 - k. Other miscellaneous metals.
 2. Cycloaliphatic Amine Epoxy System:

- a. Field priming of Ferrous metal surfaces with defective shop prime coat where no other prime coat is specified; for non-immersion service.
 - b. Exterior of submerged piping and valves other than stainless steel or PVC piping.
 - c. Submerged pipe supports and hangers.
 - d. Stem guides.
 - e. Other submerged iron and steel metal unless specified otherwise.
 - f. Interior surface of AWWA C504 Butterfly Valves.
 - g. Interior surface of pumps that have interior coating.
 - h. Submerged piping.
 - i. Interior of steel fabricated fittings on discharge piping.
 - j. Submerged pumps.
3. Asphalt Varnish:
- a. Underground valves and valve boxes.
- D. Fiberglass and Plastic Surfaces:
- 1. Epoxy and Polyurethane:
 - a. Plastic piping.
 - b. Plastic exposed to sunlight.

END OF SECTION

SECTION 13446

VALVE AND GATE OPERATORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Valve and Gate Operators.
 - 2. Handwheel Operators.
 - 3. Key Operated Valves.
 - 4. Bench Stands.
 - 5. Floor Stands.
 - 6. Accessory Equipment and Floor Boxes.

1.02 REFERENCES

- A. Aluminum Association (AA):
 - 1. DAF-45 - Designation System for Aluminum Finishes.

1.03 SUBMITTALS

- A. Shop Drawings: Include shop drawings for hydraulic gate lifts with shop drawings for gates as integrated units.

1.04 QUALITY ASSURANCE

- A. Provide valve operators integral with valve or gate, except for valve operators utilizing T-wrenches or keys, and portable operators intended to operate more than 1 valve.
- B. Provide similar operators by one manufacturer.
- C. Provide gates and hand operating lifts by one manufacturer.
- D. Provide hydraulic gate lifts by one manufacturer.
- E. Provide hydraulic valve operators and motorized operators by one manufacturer.

1.05 MAINTENANCE

- A. Extra Materials:

1. Key Operated Valve Keys or Wrenches: Furnish a minimum 4 keys with 4-foot shafts and 3-foot pipe handles or wrenches with 4-foot shafts and 3-foot handles for operating key operated valves.

PART 2 PRODUCTS

2.01 VALVE AND GATE OPERATORS

A. Stem Covers:

1. Aluminum pipe; threaded cap on top; bolted aluminum flange on bottom; 1 by 12 inch slots cut at 18 inches on center in front and back of pipe; capable of covering threaded portion of greased stems that project above operators when gates or valves are opened or closed.

B. Stem Cover Flanges, Pipes and Caps:

1. Etched and anodized to produce chemical finishes in accordance with AA C 22, medium matte finish, and AA A 41 clear anodic coating, or described in AA publication 45, after fabrication.

C. Gate Stem Covers: Concentric with stem.

D. Position Indicators:

1. Tail rods on hydraulic cylinders, or dial indicators with clear full-open and closed position indicators, calibrated in number of turns or percentage of opening.

E. Manual or Power Operator Size:

1. Sized to deliver maximum force required under most severe specified operating condition, including static and dynamic forces, seat and wedge friction, and seating and unseating forces with safety factor of 5, unless otherwise specified.

F. Operator Size: Capable of supporting weight of suspended shafting unless carried by bottom thrust bearings; shaft guides with wall mounting brackets.

G. Provisions for Alternate Operation: Where specified ~~or indicated on Drawings~~, position and equip crank or handwheel operated geared valve operators or lifts for alternate operation with tripod mounted portable gate operators.

H. Operation: Counterclockwise to open with suitable and adequate stops, capable of resisting at least twice normal operating force to prevent overrun of valve or gate in open or closed position.

I. Open Direction Indicator: Cast arrow and legend indicating direction to rotate operator on handwheel, chain wheel rim, crank, or other prominent place.

J. Buried Operator Housing: Oil and watertight, specifically designed for buried service, factory packed with suitable grease, completely enclosed space between operator housing and valve

body so that no moving parts are exposed to soil; provide operators with 2-inch square AWWA operating nut.

- K. Worm Gear Operators: Provide gearing on worm gear operators that is self-locking with gear ratio such that torque in excess of 160 foot-pounds will not need to be applied to operate valve at most adverse conditions for which valve is designed.
- L. Traveling Nut Operators: Capable of requiring maximum 100 foot-pounds of torque when operating valve under most adverse condition; limit stops on input shaft of manual operators for fully open and closed positions; non-moving vertical axis of operating nut when opening or closing valve.

2.02 HANDWHEEL OPERATORS

- A. Manufacturers: One of the following or equal:
 - 1. Rodney Hunt Company.
 - 2. Waterman Industries, Incorporated.
- B. Mounting: Floor stand or bench stand. Unless otherwise indicated ~~on the Drawings~~ position operator 36 inches (nominal) above top of walkway surface.
- C. Bearings above and below Finished Threaded Bronze Operating Nut: Ball or roller.
- D. Wheel Diameter: Minimum 24-inch.
- E. Indicator: Counterclockwise opening with arrow, and word OPEN cast on top of handwheel indicating direction for opening.
- F. Pull to Operate: Maximum 40-pounds pull at most adverse design condition.
- G. Stem Travel Limiting Device: Setscrew locked stop nuts above and below lift nut.
- H. Grease Fittings: Suitable for lubrication of bearings.

2.03 HAND-CRANKED GEARED OPERATORS

- A. Type: Single removable crank; fully enclosed.
- B. Mounting: Floor and Bench Stand. Unless otherwise indicated ~~on the Drawings~~ position operator 36 inches (nominal) above top of walkway surface.
- C. Operating Nut: When scheduled for portable operators.
- D. Geared Lifts: 2-speed with minimum ratio of 4 to 1.
- E. Teeth on Gears, Spur Pinions, Bevel Gears, and Bevel Pinions: Cut.
- F. Lift Nuts: Cast manganese bronze.

- G. Exterior Surfaces on Cast Iron Lift Parts: Smooth.
- H. Bearings above and below Flange on Lift Nuts: Ball or roller; capable of taking thrust developed by opening and closing of gates under maximum operating head; with bronze sleeve bearings and sufficient grease fittings for lubrication of moving parts, including bearings and gears.
- I. Crank Rotation Indicator: Cast arrow with word OPEN in prominent location readily visible indicating correct rotation of crank to open gate.
- J. Hand Cranks: 15-inch radius; requiring maximum 25 pounds pull to operate gate at maximum operating head; with:
 - 1. Revolving brass sleeves.
 - 2. Gears, spur pinions, bevel gears, and bevel pinions with cut teeth.
 - 3. Cast manganese bronze lift nuts.
 - 4. Cast-iron lift parts with smooth exterior surfaces.
- K. Indicator: Dial position type mounted on gear operator; enclosed in cast iron or aluminum housing with clear plastic cover; marked with fully open, 3/4, 1/2, 1/4, and closed positions.

2.04 FLOOR BOXES

- A. Manufacturers: One of the following or equal:
 - 1. Waterman industries, Inc.
 - 2. Rodney Hunt Company.
- B. Floor Boxes: Cast iron; with:
 - 1. Counter type indicator.
 - 2. Hinged, lockable lid with directional arrow.
 - 3. 2-inch square AWWA operating nut.
 - 4. Packing gland providing drip-tight seal around valve shaft.

2.05 FLOOR STAND

- A. Manufacturers: One of the following or equal:
 - 1. Rodney Hunt Company.
 - 2. Waterman industries, Inc.
- B. Floor Stand Assemblies: Heavy-duty cast iron, suitable for mounting specified operator.

2.06 BENCH STANDS

- A. Manufacturers: One of the following or equal:
 - 1. Rodney Hunt Company.
 - 2. Waterman industries, Inc.
- B. Bench Stands: Handwheel operators or hand crank, geared operators conforming to hand-cranked geared operator requirements, except capacity to be mounted on haunch, wall bracket, or self-contained gate yoke.

2.07 ACCESSORY EQUIPMENT

- A. Wall Brackets or Haunches: ~~As indicated on the Drawings.~~
- B. Stems: Stainless steel; sized to match output of operator; minimum gate or valve operating stem diameter; maximum 200 slenderness ratio.
- C. Stem Couplings: Stainless steel; internally threaded to match stem; lockable to stem by set screw.
- D. Stem Guides: Cast iron with silicon bronze bushing; maximum 200 slenderness ratio; capable of being mounted with wall bracket; adjustable in 2 directions.
- E. Wall Brackets: Cast iron, capable of withstanding output of operator, adjustable in 2 directions.
- F. Stem Stuffing Boxes: Cast iron, with adjustable gland and packing.
- G. Fasteners and Anchor Bolts: 316 stainless steel.
- H. Geared Valve Operators: Provided with cut gears, either spur or worm; sized to operate valves at most adverse design condition; with maximum 40 pound pull at handwheel or chain wheel rim.
- I. Geared Valve Traveling Nut Operators: Acceptable only where specified ~~or indicated on the Drawings.~~
- J. Accessory Equipment for Valves and Gates Requiring Remote Operators: Operating stems, stem couplings, stem guides, wall brackets, and stem stuffing boxes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install floor boxes in concrete floor with lid flush with floor.
- B. After installation of gate and stem covers, mark stem covers at point where top of stems are at full-open position and at closed position.

- C. Attach floor stand to structure with stainless steel anchor bolts
- D. Install stem stuffing boxes where operating stems pass through intermediate concrete floor slabs.

3.02 SCHEDULES

- A. Geared Operators: Provide geared operators for following valves:
 - 1. Butterfly valves larger than 6 inches, nominal size, on liquid service.
 - 2. Butterfly valves larger than 10 inches, nominal size, on gas and air service.
 - 3. Plug valves 6 inches, nominal size, and larger.
- B. Handwheel Operators: Provide handwheel operators for valves mounted 6 feet or less above floors.
- C. Chain Wheel Operators: Provide chain wheel operators for valves mounted more than 6 feet to centerline above floors.
- D. Gate Operators: Provide geared operators with floor stand for all gates.

END OF SECTION

SECTION 13446.1

ELECTRIC ACTUATORS

PART 1 GENERAL

1.01 SCOPE

- A. Furnish all labor and materials required and install, test, and make complete ready for operation, valve actuators for valves with accessories as specified in Section 01010 Part 2, and as specified herein.

1.02 REFERENCES

- A. At a minimum the actuators should meet the requirements set out in ANSI/AWWA C542, of latest revision, and the standards listed below.
 - 1. ANSI/IEEE or IEC for electrical wiring diagrams,
 - 2. Safe Drinking Water Act for potable water,
 - 3. EN15714-2,
 - 4. ISA SP96.02.

PART 2 EQUIPMENT

2.01 ACTUATOR SIZING

- A. The actuator shall be sized to guarantee valve closure at the specified differential pressure and temperature. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal. For linear operating valves, the operating speed shall be such as to give valve closing and opening at approximately 10-12 inches per minute unless otherwise stated in the data sheet. For 90° valve types the operating time will be specified.

2.02 ENVIRONMENTAL

- A. Actuators shall be suitable for indoor and outdoor use. Corrosion-resistant metals (aluminum, stainless steel, nickel-copper, alloy, or bronze) must be carefully selected and required to be compatible with the environmental conditions to which they are exposed in a given application. The actuator shall be capable of functioning in an ambient temperature ranging from -33°C (22°F) to 70°C (140°F), up to 100% relative humidity. Actuators for hazardous area applications shall meet the area classification, gas group and surface temperature requirements specified in data sheet.

2.03 ENCLOSURE

- A. At a minimum the remote and motor enclosures shall meet NEMA Type 4, watertight construction, NEMA Type 4X, watertight/corrosion/resistant, NEMA Type 6, submersible; or NEMA Type 7, hazardous requirements, in accordance with the National Electrical Code, Article 500. The motor and all other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site for cabling, the terminal compartment having the same ingress protection rating as the actuator with the terminal cover removed.
- B. Enclosure must allow for temporary site storage without the need for electrical supply connection.
- C. Actuators shall be O-ring sealed, watertight to IP66/IP68 7m for 72hrs, NEMA 4, 6.
- D. All external fasteners shall be plated steel or stainless steel. The use of un-plated stainless steel or steel fasteners is not permitted.
- E. In order to maintain the integrity of the enclosure, setting of the torque levels, position limits and configuration of the indication contacts etc. shall be carried out without the removal of any actuator covers and without mains power over an Infra red or *Bluetooth*® wireless interface. Sufficient commissioning tools shall be provided with the actuators and must meet the enclosure protection and certification levels of the actuators. Commissioning tools shall not form an integral part of the actuator and must be removable for secure storage / authorised release. In addition, provision shall be made for the protection of configured actuator settings by a means independent of access to the commissioning tool. Provision shall be made to disable *Bluetooth*® communications or only allow a *Bluetooth*® connection initiated by an Infra-Red command for maximum security. The actuator should be of the intelligent type with on screen valve diagnostics at the actuator.

2.04 MOTOR

- A. The actuators shall be suitable for use on a nominal 120 volt, single phase, 60 Hz power supply and are to incorporate motor, integral reversing starter, local control facilities and terminals for remote control and indication connections housed within a self-contained, sealed enclosure.
- B. Electric motors shall be specifically designed for valve or slide gate actuator service as specified in Part 23. The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel irrespective of the connection sequence of the power supply.
- C. The motor shall be an integral part of the actuator, designed specifically for valve actuator applications. It shall be a low inertia high torque design, class F, insulated with a class B temperature rise giving a time rating of 15 minutes at 40°C (104°F) at an average load of at least 33% of maximum valve torque.

- D. The motor shall be of a squirrel cage design for 3-phase multi-turn actuators and also allow DC motors for small direct mount part-turn actuators with an output of 3000Nm or less, where applicable.
- E. Temperature shall be limited by 2 thermostats embedded in the motor end windings and integrated into its control.
- F. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gearcase.

2.05 MOTOR PROTECTION

- A. Protection shall be provided for the motor as follows:
 - 1. Stall - the motor shall be de-energized within 8 seconds in the event of a stall when attempting to unseat a jammed valve.
 - 2. Over temperature - thermostat will cause tripping of the motor. Auto-reset on cooling
 - 3. Single phasing - lost phase protection.
 - 4. Direction – phase rotation correction.

2.06 GEARING

- A. The actuator gearing shall be totally enclosed in an oil-filled gearcase suitable for operation at any angle.
- B. Gearing and bearings shall be grease- or oil-lubricated. Seals shall be provided at shaft penetrations of the gear case to prevent the leakage of lubricants regardless of position. Lubricants shall be suitable for year-round service based on prevailing ambient temperature conditions; normal ambient temperature limits are considered to be 0 °F to 150 °F (-17.8 °C to 65.6 °C).
- C. Reduction shall be accomplished by means of spur (steel), helical (steel), bevel (steel), or worm gears. The worm gear teeth shall be made of bronze and the worm shall be hardened steel.
- D. When required by the unseating application a lost-motion device independent of gear backlash shall be supplied as an integral part of the actuator gear train. This device shall allow the motor to attain full speed before the load is engaged. The lost-motion device shall not be incorporated in actuators supplied for modulating service.
- E. All drive gearing and components must incorporate a lost-motion hammer-blow feature. For rising spindle valves the output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator. Gears and shafting shall be supported on antifriction bearings. Where thrust is a consideration, roller or axial-thrust needle bearings (to accept thrust) shall be provided. The design should be such as to permit the opening of the gearcase for inspection or disassembled without releasing the stem thrust or taking the valve out of service. For 90° operating type of valves drive gearing shall be self-locking to prevent the valve back-driving the actuator.

2.07 HAND OPERATION

- A. A handwheel shall be provided for manual and emergency operation, engaged when the motor is declutched by a lever or similar means, the drive being restored to electrical operation automatically by starting the motor. The handwheel or selection lever shall not move on restoration of motor drive. Provision shall be made for the hand/auto selection lever to be locked in both hand and auto positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in hand without damage to the drive train. Operation of the motor shall not cause the handwheel to rotate, and operation of the handwheel shall not cause the motor to rotate. If power is returned to the motor while the handwheel is in use, the design of the actuator shall prevent transmission of the motor torque to the handwheel. Use of the handwheel shall not negate the lost-motion feature (when supplied).
- B. Clockwise operation of the handwheel shall give closing movement of the valve unless otherwise specified. For linear valve types the actuator handwheel drive must be mechanically independent of the motor drive and should be such as to permit valve operation in a reasonable time. The handwheel shall require a maximum input force of 80 lb (356 N) on the rim/spoke for seating or unseating load. When unseated, the handwheel shall require a maximum input force of 60 lb (267 N) on the rim/spoke at any point through the travel for running load

2.08 DRIVE INTERFACE

- A. The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. The drive bush shall be positioned in a detachable base of the actuator. Thrust bearings shall be sealed for life and the base shall be capable of withstanding five times the rated thrust of the actuator.

2.09 LOCAL CONTROLS

- A. The actuator shall incorporate local controls for Open, Close and Stop and a Local/Stop/Remote mode selector switch lockable in any one of the following three positions: local control only, stop (no electrical operation), remote control plus local stop only. It shall be possible to select maintained or non-maintained local control. Local controls have to be non-intrusive to the actuator and must function with the Hall Effect type sensors.
- B. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.
- C. The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

2.10 TORQUE AND LIMITS

- A. Torque and turns limitation to be adjustable as follows:
 - 1. Position setting range – multi-turn: 2.5 to 8,000 turns, with resolution to 7.5 deg. of actuator output.

2. Position setting range – direct drive part turn actuators: $90^{\circ} \pm 10^{\circ}$, with resolution to 0.1 deg. of actuator output.
 3. Torque setting: 40% to 100% rated torque.
- B. Position measurement – Absolute position measurement should be incorporated within the actuator. The technology must be capable of reliably measuring position even in the case of a single fault. The design must be simple with the minimum amount of moving parts (no more than 5).
- C. Measurement of torque shall be from direct measurement of force at the output of the actuator or by deriving from the motor current (small $\frac{1}{4}$ turn actuators only). The use of motor flux to derive torque is not permissible.
- D. A means for automatic “torque switch bypass” to inhibit torque off during valve unseating and “latching” to prevent torque switch hammer under maintained or repeated control signals shall be provided.
- E. The electrical circuit diagram of the actuator should not vary with valve type but remain identical regardless of whether the valve is to open or close on torque or position limit.

2.11 REMOTE VALVE POSITION AND STATUS INDICATION

- A. Four contacts shall be provided which can be selected to indicate any position of the valve; Provision shall be made for the selection of a normally closed or open contact form. Contacts shall maintain and update position indication during handwheel operation when all external power to the actuator is isolated.
- B. The contacts shall be rated for 5mA to 5A, 120V AC, 30V DC.
- C. As an alternative to providing valve position indication any of the four above contacts shall be selectable to signal one of the following:
1. Valve opening, closing or moving
 2. Thermostat tripped, lost phase
 3. Motor tripped on torque in mid travel, motor stalled
 4. Remote selected
 5. Actuator being operated by handwheel
 6. Actuator fault
- D. Provision shall be made in the design for an additional eight contacts having the same functionality.
- E. A configurable monitor relay shall be provided as standard, which can be used to indicate either Availability or Fault. The relay should be a spring return type with a Normally Open / Normally Closed contact pre-wired to the terminal bung.
- F. The Monitor (availability or fault) relay, being energized from the control transformer will de-energise under any one or more the following conditions:

<u>Available Mode</u>	<u>Fault Mode</u>
<ul style="list-style-type: none"> • Loss of main or customer 24V DC power supply • Actuator control selected to local or stop • Motor thermostat tripped • Actuator internal fault 	<ul style="list-style-type: none"> • Loss of main or customer 24V DC power supply • Motor thermostat tripped • Actuator internal fault

- G. Provision shall be made in the design for the addition of a contactless transmitter to give a 4-20mA analogue signal corresponding to valve travel and / or torque for remote indication when required. The transmitter will auto range to the set limits.

2.12 LOCAL POSITION INDICATION

- A. The actuator display shall include a dedicated numeric/symbol digital position indicator displaying valve position from fully open to fully close in 0.1% increments. Valve closed and open positions shall be indicated by symbols showing valve position in relation to the pipework to ensure that valve status is clearly interpreted. With mains power connected, the display shall be backlit to enhance contrast at all ambient light levels and shall be legible from a distance of at least 5m (16ft).
- B. Red, green, and yellow LEDs corresponding to open, closed and intermediate valve positions shall be included on the actuator display when power is switched on. The yellow LED should also be fully programmable for on/off, blinker and fault indication. The digital display shall be maintained and updated during handwheel operation when mains power to the actuator is isolated.
- C. The actuator display shall include a fully configurable dot-matrix display element with a minimum pixel resolution of 168 x 132 to display operational, alarm, configuration and graphical datalogger information. The text display shall be selectable between English and other languages such as: Spanish, German, French, and Italian. Provision shall be made to upload a different language without removal of any covers or using specialized tools not provided as standard with the actuator.
- D. Datalogger graphical displays should as a minimum be able to display log and trend graphs on the local LCD for the following:
1. Torque versus Position
 2. Number of Starts versus Position
 3. Number of starts per hour
 4. Dwell Time
 5. Average Temperature

- E. The main display shall be capable of indicating 4 different home-screens of the following configuration:
 - 1. Position and status
 - 2. Position and torque (analogue)
 - 3. Position and torque (digital)
 - 4. Position and demand (positioning)
- F. Provision shall be made for the addition of an optional environmental cover to protect the display from high levels of UV radiation or abrasive materials.
- G. The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

2.13 INTEGRAL STARTER AND TRANSFORMER

- A. The reversing starter, control transformer and local controls shall be integral with the valve actuator, suitably housed to prevent breathing and condensation. The starter shall be suitable for 60 starts per hour and of rating appropriate to motor size. The controls supply transformer shall be fed from two of the incoming three phases and incorporate overload protection. It shall have the necessary tapping and be adequately rated to provide power for the following functions:
 - 1. Energising of the contractor coils/motor switching devices
 - 2. 24V DC or 110V AC output for remote controls (maximum 5W/VA)
 - 3. Supply for all the internal electrical circuits.

2.14 REMOTE CONTROL FACILITIES

- A. The necessary control, wiring and terminals shall be provided integral to the actuator enclosure. Open and close external interlocks shall be made available to inhibit local and remote valve opening / closing control. It shall be possible to configure the interlocks to be active in remote control only.
- B. Remote control signals fed from an internal 24V DC (or 110VAC) supply and/or from an external supply between 20V and 60 VDC or 40V and 120VAC, to be suitable for any one or more of the following methods of control:
 - 1. Open, Close and Stop control.
 - 2. Open and Close maintained or “push to run” (inching) control.
 - 3. Overriding Emergency Shut-down to close (or open) valve from a normally closed or open contact.
 - 4. Two-wire control, energise to close (or open), de-energise to open (or close).
- C. Additionally provision shall be made for a separate ‘drive enable’ input to prevent any unwanted electrical operation.

- D. It shall be possible to reverse valve travel without the necessity of stopping the actuator. The motor starter shall be protected from excessive current surges during rapid travel reversal. The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 2kV.
- E. Provision shall be made for operation by distributed control system utilising the following network systems:
 - 1. Profibus
 - 2. Modbus
 - 3. Foundation Fieldbus
 - 4. Pakscan (wired and wireless)
 - 5. HART

2.15 MONITORING FACILITIES

- A. Facilities shall be provided for monitoring actuator operation and availability as follows:
- B. Actuator text display indication of the following status/alarms:
 - 1. Closed Limit, open limit, moving open, moving closed, stopped
 - 2. Torque trip closing, torque trip opening, stalled
 - 3. ESD active, interlock active
 - 4. Thermostat trip, phase lost, 24V supply lost, Local control failure
 - 5. Configuration error, Position sensor failure, Torque sensor failure
 - 6. Battery low, power loss inhibit
- C. Integral datalogger to record and store the following operational data:
 - 1. Closing last/average torque against position
 - 2. Opening motor starts against position
 - 3. Closing motor starts against position
 - 4. Total open/closed operations
 - 5. Maximum recorded opening and closing torque values
 - 6. Event recorder logging operational conditions (valve, control and actuator)
- D. The datalogger shall record relevant time and date information for stored data.
- E. Datalogger data shall be accessed via non-intrusive *Bluetooth*® communication and data displayed on the local LCD. Sufficient standard intrinsically safe tools shall be provided for downloading datalogger and actuator configuration files from the actuators and subsequent uploading to a PC. The actuator manufacturer shall supply PC software to enable datalogger files to be viewed and analysed.

2.16 WIRING AND TERMINATION

- A. Internal wiring shall be tropical grade PVC insulated stranded cable of appropriate size for the control and 3-phase power. Each wire shall be clearly identified at each end. The terminals shall be embedded in a terminal block of high tracking resistance compound.

- B. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal and shall be provided with a minimum of 2 threaded cable entries with provision for an additional 5 extra conduit entries.
- C. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable. A durable terminal identification card showing a plan of terminals shall be provided attached to the inside of the terminal box cover indicating:
 - 1. Serial number
 - 2. External voltage values
 - 3. Wiring diagram number
 - 4. Terminal layout
- D. The code card shall be suitable for the contractor to inscribe cable core identification alongside terminal numbers.

2.17 PAINTING AND COATINGS

- A. Each actuator shall be shop coated, and comply with the requirements outlined in AWWA C542 Section 4.5.

2.18 ELECTRICAL FAILURE OR LOSS OF POWER FEEDBACK AND DISPLAY BACK UP

- A. Each actuator should have an internally installed and connected 12v battery backup for use in the event of a Power Failure or loss of supply voltage to the actuator for continuous current valve position display and position feedback to the control room.

2.19 OPERATION FOR FAIL SAFE CLOSE VALVES WHERE REQUIRED

- A. Every actuator, where required on valves for fail safe close applications must have internally installed and self-maintained battery backup for the actuator to perform its close function in an emergency or loss of power to the actuator – this feature will be different to the requirements in 2.18 as stated above – no external power source (UPS or spring type mechanism may not be used)

2.21 ACCEPTABLE MANUFACTURERS

- 1. Rotork Dallas, 10410 Vista Park Road, Dallas, Texas 75238 Telephone number (214) 343-9980
- 2. Engineer/Owner Pre-Approved equal

2.20 VALVE ACTUATOR SCHEDULE

Valve Tag / Service	Valve Type	Valve Qty.	Size	Actuator Qty.	Actuator Type	Operation	Manual O-ride	Fail Position	Limit Switch	Position Transmitter
Filter Air Scour Valve	BFV	4	4"	4	Electric	O/C	Y	C – Internal Battery Back Up	Y	N
Influent Gate Valve	SG	4	18"	4	Electric	O/C	Y	N	Y	N
Effluent Valve	BFV	4	8"	4	Electric	Modulating	Y	C – Internal Battery Back Up	y	Y – 4-20ma
Backwash Valve	BFV	4	12"	4	Electric	Modulating	Y	C – Internal Battery Back Up	y	Y – 4-20ma
Filter Drain Valve	BFV	4	12"	4	Electric	O/C	Y	N	Y	N
Filter to Waste Valve	BFV	4	8"	4	Electric	Modulating	Y	C – Internal Battery Back Up	Y	Y – 4-20ma
Splitter Box Drain Valve	Centric ball valve	1	4"	1	Electric	O/C	Y	N	Y	N
Acti-Flow Effluent Valve	Industrial Lug Style Valve	2	14"	2	Electric	O/C	Y	C – Internal Battery Back Up	Y	N
High Service Pump Station Valves	No Valves Needed	0	6"	4	Electric	O/C	Y	N	Y	N
Backwash Supply Line Valve	BFV	1	10"	1	Electric	Modulating	Y	N	Y	Y – 4-20

Abbreviations:

1. Valve Type: BFV=butterfly valve, EPV=eccentric plug valve, BV=ball valve
2. Actuator Type: Electric, Pneumatic, Electro-Hydraulic, Manual
3. Operation: O/C=Open-Close, MOD=Modulating
4. Manual O-ride: Indicates mechanical manual override declutch gearbox, Y=Yes, N=No
5. Fail Position: Based on loss of power or control signal, C=Close, O=Open
6. Limit Switch: Suitable for O/C or MOD actuators, Y=Yes, N=No
7. Position transmitter: 4-20 mA output, used on MOD actuators only, Y=Yes, N=No
8. Slide Gate SG

Electric Actuators

PART 3 EXECUTION

3.01 PERFORMANCE AND TEST CERTIFICATE

- A. Individual proof-of-design tests and performance test certification in accordance with AWWA C542 shall be supplied free of charge.
- B. In addition, the test certificate should record details of specification such as gear ratios for both manual and automatic and second stage gearing if provided, drive closing direction, wiring diagram number.

3.02 SUBMITTALS

- A. Before shipping, the Contractor shall submit three (3) hard copies and one (1) copy in electronic format of detailed drawings, detailed specifications, installation instructions and maintenance instructions for the Engineer's review and approval.
- B. The Contractor shall also submit an affidavit of compliance per AWWA C542 from the manufacturer of the actuators.
- C. Drawings: Include certified drawings for review.
 - 1. Include dimensions- principal dimensions, including those necessary for interfacing with the valve or slide gate, general construction, and outline of the actuator mechanism.
 - 2. Wiring diagrams- electrical wiring diagrams with list of symbols in accordance with ANSI/IEEE or IEC.
 - 3. Actuator data sheet- an information data sheet shall be supplied listing the output torque or thrust, voltage, phase, frequency, motor amperage at running torque and locked rotor, nominal motor HP, and output speed or travel time, as required.
 - 4. Actuator options- any actuator options being supplied shall be listed on the data sheet.
 - 5. Recommended storage practice- placed on the outside of actuator or shipping container as delivered to the jobsite or to the purchaser by the supplier.
 - 6. Climatic requirements- temperature, humidity, and condensation storage requirements shall be provided by manufacturer or supplier.
- D. The manufacturer shall furnish to the Engineer three sets of hard copies and one electronic copy of installation, operation and maintenance instructions including
 - 1. A parts list,
 - 2. Spare parts list,
 - 3. Special tools list for installation, maintenance, or adjustment,
 - 4. Lubrication guide with list of recommended lubricants,
 - 5. Certified drawings,
 - 6. Materials- a list of materials used in the actuator.

3.03 INSTALLATION

- A. Installation of the electric actuators shall be done in a workmanlike manner. It shall be the responsibility of the CONTRACTOR to handle, store and install the equipment specified in this Section in strict accordance with the manufacturer's recommendations and with AWWA C542 requirements.

- B. Each actuator shall be supplied with a start-up kit comprising installation instruction manual, electrical wiring diagram and cover seals to make good any site losses during the commissioning period. In addition, sufficient actuator commissioning tools shall be supplied to enable actuator set up and adjustment during valve/actuator testing and site installation commissioning. Set up and commissioning should be done via infra-red and Bluetooth intrinsically safe hand held setting tool.

END OF SECTION

SECTION 15052

BASIC PIPING MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Basic piping materials and methods.

1.02 REFERENCES

- A. American Society of Testing and Materials (ASTM):
 1. A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 2. A 106 - Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
 3. D 2240 - Test Method for Rubber Property Durometer Hardness.

1.03 DEFINITIONS

- A. Aboveground Piping: Piping within buildings, tunnels, or other structures without regard to elevation of piping, or exposed piping outside buildings and structures.
- B. Underground Piping: Piping actually buried in soil or cast in concrete.
- C. Underwater Piping: Piping below tops of walls in basins or concrete tanks containing water.
- D. Wet Wall: Wall with water on at least one side.

1.04 SYSTEM DESCRIPTION

- A. Piping Drawings:
 1. ~~Except in details, piping is indicated diagrammatically. Not every offset and fitting, or structural difficulty that may be encountered has been indicated on the Drawings. Sizes and locations are indicated on the Drawings.~~
 2. Perform minor modifications to piping alignment where necessary to avoid structural, mechanical, or other type of obstructions that cannot be removed or changed.
 - a. Modifications are intended to be of minor scope, not involving a change to the design concept or a change to the Contract Price or Contract Times.
- B. Performance Requirements:
 1. Venting Piping Under Pressure:
 - a. Lay piping under pressure flat or at a continuous slope without air traps, unless otherwise indicated ~~on the Drawings.~~

- b. Install plug valves as air bleeder cocks at high points in piping. Provide one-inch plug valves for waterlines, unless otherwise indicated on the Drawings.
- c. Provide additional pipe taps with plug cocks and riser pipes along piping as required for venting during initial filling, disinfecting, and sampling.
- d. Before piping is placed into service, close plug valves and install plugs. Protect plugs and plug valves from corrosion in accordance with Section 09960.

2. Restraining Piping:

- a. Restrain piping at valves and at fittings where piping changes direction, changes sizes, and at ends.
 - 1) When piping is underground, use concrete thrust block or mechanical restraints.
 - 2) When piping is aboveground or under water, use mechanical or structural restraints.
 - 3) Determine thrust forces by multiplying the nominal cross sectional area of the piping by design test pressure of the piping.
- b. Provide restraints with ample size to withstand thrust forces resulting from test pressures.
 - 1) During testing, provide suitable temporary restraints where piping does not require permanent restraints.
- c. Place concrete thrust blocks against undisturbed soil. Place concrete so piping joints, fittings, and other appurtenances are accessible for assembly and disassembly.
- d. Provide underground mechanical restraints where specified in the Piping Schedule.

3. Connections to Existing Piping:

- a. Expose existing piping to which connections are to be made with sufficient time to permit, where necessary, field adjustments in line, grade, or fittings.
 - 1) Protect domestic water supplies from contamination.
 - a) Make connections between domestic water supply and other water systems in accordance with requirements of public health authorities.
 - b) Provide devices approved by OWNER of domestic water supply system to prevent flow from other sources into the domestic supply system.

- b. Make connections to existing piping and valves after sections of new piping to be connected have been tested and found satisfactory.
 - c. Provide sleeves, flanges, nipples, couplings, adapters, and other fittings needed to install or attach new fittings to existing piping and to make connections to existing piping.
 - 4. Connections to In-service Piping:
 - a. Shutdown in-service piping in accordance with the plans and specifications.
 - 1) Establish procedures and timing in a conference attended by CONTRACTOR, ENGINEER, and OWNER of the in-service piping.
 - b. Where operation and maintenance of existing facilities require that a shutdown be made during hours other than normal working hours, perform the related work in coordination with the hours of actual shutdown.
 - c. Additional provisions regarding shutdown of existing facilities are specified in the plans and specifications.
 - 5. Connections at Dissimilar Metals:
 - a. Connect ferrous and nonferrous metal piping, tubing, and fittings with dielectric couplings especially designed for the prevention of chemical reactions between dissimilar metals.
 - b. Nonferrous metals include aluminum, copper, and copper alloys.
- C. Piping Alternatives:
 - 1. Provide piping in accordance with this Section, unless ~~indicated on the Drawings or~~ specified otherwise.
 - 2. Alternative Pipe Ratings: Piping with greater pressure rating than specified may be substituted in lieu of specified piping without changes to the Contract Price. Piping of different material may not be substituted in lieu of specified piping.
 - 3. Alternative Joint Types: Ductile iron piping with mechanical joints or push-on joints may be substituted in lieu of bell and spigot joints.
 - 4. Valves in Piping Sections: Capable of withstanding specified test pressures for piping sections and fabricated with ends to fit piping.
 - 5. For flanged joints, where one of the joining flanges is raised face type, provide a matching raised face type flange for the other joining flange.

PART 2 PRODUCTS

2.01 ESCUTCHEONS

- A. Manufacturers: One of the following or equal:

1. Dearborn Brass Company, Model Number 5358.
2. Keeney Manufacturing Company, Model Number 102 or Number 105.
3. Beaton and Corbin, Model Number 1 or Number 13.

B. Material: Chrome plated steel plate.

2.02 LINK TYPE SEALS

A. Manufacturers: One of the following or equal:

1. Calpico, Inc.
2. Thunderline Corporation, Link-Seal.

B. Characteristics:

1. Modular mechanical type, consisting of interlocking EPDM or synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.
2. Assemble links solely with stainless steel bolts and nuts to form a continuous rubber belt around the pipe.
3. Provide a stainless steel or glass reinforced nylon pressure plate under each bolt head and nut. Isolate pressure plate from contact with wall sleeve.

2.03 GASKETS

A. Gaskets for Non-steam Cleaned Ductile Iron and Steel Piping:

1. Suitable for pressures equal to and less than 150 pounds per square inch gauge, temperatures equal to and less than 250 degrees Fahrenheit, and raw sewage service.
2. Gasket Material:
 - a. EPDM elastomer with minimum Shore A hardness value of 70.
 - b. Reinforcement: Inserted 13-ounce nylon fabric cloth for pipes 20 inches or larger.
 - c. Thickness: Minimum 3/32-inch thick for less than 10-inch pipe; minimum 1/8-inch thick for 10-inch and larger pipe.
3. Manufacturers: One of the following or equal:
 - a. Pipe 20 inches in Diameter and Larger:
 - 1) Garlock, Style 8798.
 - 2) John Crane, similar product.
 - b. Pipe less than 20 inches in Diameter:
 - 1) Garlock, Style 7797.

2) John Crane, similar product.

B. Gaskets for Steam Cleaned Nonglass-lined Ductile Iron and Steel Piping:

1. Suitable for pressures equal and less than 150 pressure square inch gauge temperatures equal and less than 360 degrees Fahrenheit.
2. Material:
 - a. EPDM elastomer, compressed, non-asbestos fiber reinforcement.
3. Manufacturers: One of the following or equal:
 - a. Garlock, Blue-Gard Style 3300.
 - b. John Crane, similar product.

C. Gaskets for Flanged Joints in Polyvinyl Chloride and Polyethylene Piping:

1. Suitable for pressures equal and less than 150 pounds per square inch gauge, with low flange bolt loadings, temperatures equal and less than 120 degrees Fahrenheit, polymer, chlorine, caustic solutions, and other chemicals, except chemicals which liberate free fluorine including fluorochemicals and gaseous fluorine.
2. Material: Viton Rubber; 0.125-inch thick.
3. Manufacturers: One of the following or equal:
 - a. Garlock.
 - b. John Crane, similar product.

D. Gaskets for Flanged Joints in Ductile Iron, or Steel Water Piping:

1. Suitable for hot or cold water, pressures equal and less than 150 pounds per square inch gauge, and temperatures equal and less than 160 degrees Fahrenheit.
2. Material:
 - a. EPDM elastomer, compressed, non-asbestos fiber reinforcement.
 - b. Teflon ring; or teflon envelope with nonasbestos filler.
3. Manufacturers: One of the following or equal:
 - a. Garlock.
 - b. John Crane, similar product.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Existing Conditions:
1. Locate and expose existing structures, piping, conduits, and other facilities and obstructions which may affect construction of underground piping before starting excavation for new underground piping and appurtenances.
 2. Verify sizes, elevations, locations, and other relevant features of existing facilities and obstructions. Determine conflicts for the construction of the new underground piping and appurtenances.
 3. Make piping location and grade adjustments to resolve conflicts between new piping and existing facilities and obstructions.

3.02 WALL AND SLAB PENETRATIONS

- A. Provide sleeves for piping penetrations through aboveground masonry and concrete walls, floors, ceilings, roofs, pilasters, columns, piers, and beams unless specified ~~or otherwise indicated on the Drawings~~.
- B. For piping 1 inch in nominal diameter and larger, provide sleeves with minimum inside diameters of 1 inch plus outside diameter of piping. For piping smaller than 1 inch in nominal diameter, provide sleeve of minimum twice the outside diameter of piping.
1. Arrange sleeves and adjacent joints so piping can be pulled out of sleeves and replaced without disturbing the structure.
 2. Cut ends of sleeves flush with surfaces of concrete, masonry, or plaster.
 3. Conceal ends of sleeves with escutcheons where piping runs through floors, walls, or ceilings of finished spaces within buildings.
 4. Seal spaces between pipes and sleeves with link-type seals when not otherwise specified ~~or indicated on the Drawings~~.
- C. Cast couplings or wall pieces in walls for penetrations of buried rigid piping including cast iron, ductile iron, reinforced concrete, and vitrified clay through structures.
1. Provide couplings or wall pieces with mechanical push-ons, or similar flexible joints at outside faces of walls.
 2. Provide additional similar joints in piping at transition points between trenches and structure excavations.
- D. Link Seal: Use 2 link seals where seal is used to seal at wet wall sleeves. Mount one seal on the inside face of the wall and the other on the outside face of the wall. Coordinate the inside diameter of the wall sleeve with the size of the seal to provide watertight sealing.

- E. ~~Where not indicated on the Drawings,~~ penetrations for conditions other than those specified under the preceding subparagraphs shall be 1 of the 3 types specified in such subparagraphs found by ENGINEER to be the most suitable for the particular conditions.

3.03 EXPOSED PIPING

- A. Install exposed piping in straight runs parallel to the axes of structures, unless indicated otherwise.
 - 1. Install piping runs plumb and level, unless otherwise indicated ~~on the Drawings.~~ Slope plumbing drain piping with 1/8-inch per foot downward in the direction of flow.
- B. Install exposed piping after installing equipment and after piping and fitting locations have been determined.
- C. Support piping in accordance with Section 15061.
 - 1. Do not transfer pipe loads and strain to equipment.
- D. In addition to the joints ~~indicated on the Drawings,~~ provide unions, flexible couplings, flanged joints, and other types of joints or means which are compatible with and suitable for the piping system, and necessary to allow ready assembly and disassembly of the piping.
- E. Assemble piping without distortion or stresses caused by misalignment.
 - 1. Match and properly orient flanges, unions, flexible couplings, and other connections.
 - 2. Do not subject piping to bending or other undue stresses when fitting piping. Do not correct defective orientation or alignment by distorting flanged joints or subjecting flange bolts to bending or other undue stresses.
 - 3. Flange bolts, union halves, flexible connectors, and other connection elements shall slip freely into place.
 - 4. Alter piping assembly to fit when proper fit is not obtained.
 - 5. Install eccentric reducers or increasers with the top horizontal for pump suction piping.

3.04 BURIED PIPING

- A. Bury piping with minimum 4-foot cover without air traps, unless otherwise indicated ~~on the Drawings.~~
- B. Where two similar services run parallel to each other, piping for such services may be laid in the same trench. Lay piping with sufficient room for assembly and disassembly of joints, for thrust blocks, for other structures, and to meet any separation requirements of public health authorities having jurisdiction.
- C. Laying Piping:
 - 1. Lay piping in finished trenches free from water or debris. Begin at the lowest point with bell ends up slope.

2. Place piping with top or bottom markings with markings in proper position.
3. Lay piping on an unyielding foundation with uniform bearing under the full length of barrels.
4. Where joints require external grouting, banding, or pointing, provide space under and immediately in front of the bell end of each section laid with sufficient shape and size for grouting, banding, or pointing of joints.
5. At the end of each day's construction, plug open ends of piping temporarily to prevent entrance of debris or animals.
6. Utilize metal detection tape

3.05 CLEANING

A. Piping Cleaning:

1. Upon completion of installation, clean piping interior of foreign matter and debris. Perform special cleaning when required by the Contract Documents.

B. Cleaning Potable Water Piping:

1. Flush and disinfect potable water piping in accordance with Section 15142.

3.06 PIPING SCHEDULE

A. Abbreviations:

1. The following abbreviations used in the column of test method refer to the respective methods specified in Section 15956.

AM	Air method
GR	Gravity method
HH	High head method
LH	Low head method
SC	Special case

2. Abbreviations to designate piping include the following:

CCP	Concrete Cylinder Pipe
CI	Cast iron
Cl	Class, followed by the designation
DIP	Ductile iron piping
Ga	Gauge, preceded by the designation
GE	Grooved end joint
NPS	Nominal pipe size, followed by the number in inches pounds per square inch Pounds per square inch, gauge
PEC	Polyurethane and epoxy coating system
PEE	Polyethylene Encasement

PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
Sch.	Schedule, followed by the designation
SS	Stainless steel

(The PIPING SCHEDULE follows in the next page(s).)

PIPING SCHEDULE					
Use	Piping	Joints/Fittings	Test Press	Method	Test
Inlet/Outlet Piping (inside tank pedestal)	Type 304L Stainless Steel, Schedule 10S	AWWA C226, C228 standard flanged w/ ANSI B16.5 Class 150-lb drilling	150	HH	
Overflow and Drain Piping (inside and outside tank pedestal)	Type 304L Stainless Steel, Schedule 10S	AWWA C226, C228 standard flanged w/ ANSI B16.5 Class 150-lb drilling	150	HH	
Inlet/Outlet Piping (above ground outside tank pedestal)	DIP CI.52 cement-mortar or fusion bonded epoxy lined, coated PEC.	AWWA C110, C115 standard flanged w/ANSI B16.1 150-lb drilling.	150	HH	
Inlet/Outlet Piping (Below Ground)	PVC (C-900, DR 18)	Push-on, mechanical joint restrained and flanged adapters if flanged connection is required.	150	HH	

END OF SECTION

SECTION 15061

PIPE SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Supports for pipe, fittings, valves, and appurtenances.

1.02 REFERENCES

- A. American National Standard Institute or Manufacturer's Standardization Society (ANSI/MSS):
 1. SP-58 - Standard for Pipe Hangers and Supports - Materials, Design, and Manufacture.
 2. SP-69 - Standard for Pipe Hangers and Supports - Selection and Application.

1.03 SUBMITTALS

- A. Shop Drawings: Include schedule, indicating where supports will be installed, and drawings of pipe support system components.

PART 2 PRODUCTS

2.01 PIPE SUPPORTS

- A. Concrete Inserts for Pipes under 30 Inch Diameter: ANSI/MSS SP-69 Type 18. Minimum 1,140 pounds capacity with 5/8-inch diameter rod.
 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 282.
 - b. Carpenter and Paterson, Figure CP-109.
- B. Concrete Inserts for Pipe 30 Inch Diameter and Larger: Hot-dip galvanized steel body with 3/4 inch diameter National Coarse zinc plated square nut, anchor insert to steel concrete reinforcement.
 1. Manufacturers: One of the following or equal:
 - a. Connection Specialties, Inc., Model 6MD350.
- ~~C.~~ Hanger Rods: Sized to match suspended pipe hanger, or as indicated ~~on the Drawings.~~
 1. Manufacturers: One of following or equal:
 - a. Grinnell, Figure 140.
 - b. Bergen-Paterson, Part 5000.
 - c. B-Line Systems, Inc., Figure B3205.

- D. Hanger Rods, Continuously Threaded: Sized to match suspended pipe hanger, or as indicated ~~on the Drawings~~.
1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 146.
 - b. Bergen-Paterson, Part BP-5006.
- E. Eye Bolts: Welded and rated equal to full load capacity of rod.
- F. Welded Eyebolt Rod:
1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 278.
 - b. Bergen-Paterson, Part 5004.
 - c. B-Line Systems, Inc., Figure B3210.
- G. Adjustable Ring Hangers: ANSI/MSS SP 69 Type 7.
1. Manufacturers: One of the following or equal:
 - a. Grinnell.
 - b. B-Line Systems, Inc., Figure B3172.
- H. Adjustable Clevis Hangers: ANSI/MSS PS 69, Type 1.
1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 260.
 - b. Bergen-Paterson, Part 6750.
 - c. B-Line systems, Inc., Figure B3100 or B3105.
- I. Brackets: ANSI/MSS SP-69 Type 32 with back plate; rated for 1,500 pounds.
1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 195.
 - b. B-Line Systems, Inc., Figure B3066.
- J. Standard U-bolt: ANSI/MSS SP-69 Type 24.
1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 137.
 - b. Bergen-Paterson, Part 6502.
- K. Riser Clamps: ANSI/MSS SP-69 Type 8.
1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 261.
 - b. Bergen-Paterson, Part 6302.

- c. B-Line Systems, Inc., Figure B3373.
- L. Pipe Clamps: ANSI/MSS SP 69 Type 4.
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 212.
 - b. Bergen-Paterson, Part 6100.
 - c. B-Line Systems, Inc., Figure B3140.
- M. Adjustable Offset Pipe Clamp:
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 100.
 - b. B-Line Systems, Inc., Figure B3149.
- N. Offset Pipe Clamp:
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 103.
 - b. B-Line Systems, Inc., Figure B3148.
- O. Floor Stand or Stanchion Saddles: ANSI/MSS SP-69 Type 37. Provided with U-bolt hold down yokes.
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 259.
 - b. Bergen-Paterson, Part 6652.
 - c. Piping Technology and Products, Figure 48.
- P. Adjustable Pipe Saddle Supports
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 264
 - b. Piping Technology and Products, Figure 46
 - c. Bergen Paterson, Part 6651.
- Q. Spring Supports:
 - 1. Manufacturers: One of the following or equal:
 - a. Bergen-Paterson, Part 3200.
 - b. Grinnell, Figure B-268.
- R. One Hole Pipe Clamps:
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 126.

- b. Carpenter and Paterson, Figure 237.
- S. Welded Beam Attachment:
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 66.
 - b. Bergen-Paterson, Part 1047.
 - c. B-Line Systems, Inc., Figure B3083.
- T. Heavy Pipe Clamp:
 - 1. Manufacturers: One of the following or equal:
 - a. Grinnell, Figure 216.
 - b. Bergen-Paterson, Part 6101.
- U. Anchor Bolts, Flush Shells, Powder Actuated Fasteners, and Concrete Anchors: As per manufacturers recommendations.

2.02 MATERIALS

- A. Pipe Supports:
 - 1. Stainless Steel (type 316): Use in all submerged locations, above water level but below top of wall inside water bearing structures and where specifically indicated ~~on the Drawings~~.
 - 2. Hot-dip Galvanized Steel: Use in areas other than above and where specifically indicated ~~on the Drawings~~. Hot-dip galvanize pipe support after fabrication.
 - 3. Plastic, Aluminum, FRP and Other Miscellaneous Materials: Use where specifically indicated ~~on the Drawings~~.
- B. Fasteners:
 - 1. As shown in corresponding specification or as pre-approved by engineer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Properly support, suspend or anchor exposed pipe, fittings, valves, and appurtenances to prevent sagging, overstressing, or movement of piping; and to prevent thrusts or loads on or against connected pumps, blowers, and other equipment.
- B. Carefully determine locations of inserts. Anchor to formwork prior to placing concrete.
- C. Use flush shells only where indicated ~~on the Drawings~~.
- D. Do not use anchors relying on deformation of lead alloy.
- E. Do not use stud type powder actuated fasteners for securing metallic conduit or steel pipe larger than 1 inch to concrete, masonry, or wood.

- F. Suspend pipe hangers from hanger rods. Secured with double nuts.
- G. Install continuously threaded hanger rods only where indicated ~~on the Drawings~~.
- H. Use adjustable ring hangers; or adjustable clevis hangers, for 6 inch and smaller diameter pipe.
- I. Use adjustable clevis hangers for pipe larger than 6 inches in diameter.
- J. Secure pipes with galvanized double-nutted U-bolts or suspend pipes from hanger rods and hangers.
- K. Support Spacing:
 - 1. Support 2 inch and smaller piping on horizontal and vertical runs at maximum 5 feet on center, unless otherwise specified.
 - 2. Support larger than 2 inch piping on horizontal and vertical runs at maximum 10 feet on center, unless otherwise specified.
 - 3. Support exposed polyvinyl chloride and other plastic pipes at maximum 5 feet on center, regardless of size.
 - 4. Support tubing, copper pipe and tubing, fiber-reinforced plastic pipe or duct, and rubber hose and tubing at intervals close enough to prevent sagging greater than 1/4-inch between supports.
- L. Install Supports At:
 - 1. Horizontal bends.
 - 2. Both sides of flexible pipe connections.
 - 3. Base of risers.
 - 4. Floor penetrations.
 - 5. Connections to pumps, blowers and other equipment.
 - 6. Valves and appurtenances.
- M. Securely anchor plastic pipe, valves, and headers to prevent movement during operation of valves.
- N. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.
- O. Provide ductile iron elbows or tees supported from floors with base fittings where indicated ~~on the Drawings~~.
- P. Support base fittings with metal supports or where indicated ~~on the Drawings~~, concrete piers.
- Q. Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.
- R. Do not use chains, plumbers' straps, wire, or similar devices for permanently suspending, supporting, or restraining pipes.

- S. Support plumbing drainage and vents in accordance with Uniform Plumbing Code.
- T. Supports, Clamps, Brackets, and Portions of Support System Bearing Against Copper Pipe: Copper plated, copper throughout, or isolated with EPDM or polyvinyl chloride tape.
- U. Where pipe is insulated, install over-sized supports and hangers.
- V. Install insulation shield in accordance with ANSI/MSS SP 69, Type 40. Shield shall be galvanized steel unless specified elsewhere.
- W. Install riser clamps at floor penetrations and where indicated ~~on the Drawings~~.
- X. Paint or Coat support system components as specified in Section 09960.

END OF SECTION

SECTION 15075

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Mechanical Identification including the following:
 - 1. Pipe identification by color and legend.
 - 2. Special Items.
 - 3. Identification of equipment and components of systems with paint, brands, tags, and signboards.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. A13.1 - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Submit Following:
 - 1. Product Data.
 - 2. Samples.
 - 3. Manufacturer's Installation Instructions.
 - 4. Submit following as specified in Special Provisions:
 - a. Operation and Maintenance Data.
 - b. Warranty.

1.04 QUALITY ASSURANCE

Not used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. One of the following or equal:
 - 1. Seton, Opti Code Pipe Markers.
 - 2. Lab Safety Supply.

2.02 MATERIALS

A. Pipe Markers: Self-adhesive vinyl, suitable for outdoor application from -40 degrees to 180 degrees Fahrenheit; meet ANSI A13.1 requirements.

1. Lettering:

Nominal Pipe Diameter	Lettering Size
Less than 1.5	1/2 inch
1.5 inches to 2 inches	3/4 inch
2.5 inches to 6 inches	1-1/4 inches
8 inches to 10 inches	2-1/2 inches
Over 10 inches	3-1/2 inches

2. Marker Colors:

Service	Lettering	Background
Flammables, chemicals, toxics	Black	Yellow
Water, nontoxic solutions or low hazard liquids	White	Green
Nonflammable or nontoxic gases	White	Blue
Fire quenching fluids (foam, fire water, CO ₂ Halon)	White	Red

B. Paint: As specified in Section 09960.

C. Pipe Identification Tags: Aluminum or stainless steel with stamped-in 1/4 inch high identifying lettering.

D. Pipe Identification Tag Chains: Aluminum or stainless steel.

E. Snap-On Markers: Markers with 3/4-inch high letters for 3/4 to 4-inch pipe or covering, or 5-inch high letters for 5-inch or larger pipe or cover, as manufactured by one of following:

1. Brady Bradysnap-On B-915.
2. Seton Setmark.

2.03 SPECIAL ITEMS

A. In addition, special painting of following items will be required:

ITEM	COLOR
Valve handwheels and levers	Red
Hoist hooks and blocks	Yellow and black stripes
Steel guard posts	In accordance with standard details.

- B. Paint minimum 2-inches high numbers on or adjacent to accessible valves, pumps, flowmeters, and other items of equipment that are identified on Drawings or in Specifications by number.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify satisfactory conditions of substrate for applying identification.
- B. Verify that conditions are satisfactory for installation and application of products.

3.02 PREPARATION

- A. Prepare and paint surfaces as specified in Section 09960.
- B. Prepare surface in accordance with product manufacturer's instructions.

3.03 PIPING IDENTIFICATION

- A. Identify exposed piping, in accessible chases with lettering or tags designating service of each piping system with flow directional arrows and color code. Color coding shall adhere to TCEQ guidelines.
- B. Color Code:
 - 1. Paint piping scheduled to be color coded completely with specified colors.
 - 2. Paint segments of pipe specified to be unpainted with specified coding color long enough to accommodate required lettering and arrows.
- C. Paint piping specified to be painted to match adjacent surfaces, unless otherwise directed.
- D. Lettering and Flow Direction Arrows:
 - 1. Stencil lettering on painted bands or use snap-on markers on pipe to identify pipe. When stenciling, stencil 3/4-inch high letters on 3/4 through 4-inch pipe or coverings, or 5-inch high letters on 5-inch and larger pipe or coverings.
 - 2. Provide lettering and flow direction arrows near equipment served, adjacent to valves, both sides of walls and floors where pipe passes through, at each branch or tee, and at intervals of not more than 50 feet in straight runs of pipe.
- E. Where scheduled, space 6-inch wide bands along stainless steel pipe at 10-foot intervals and other pipe at 5-foot intervals.
- F. Metal Tags:
 - 1. Where outside diameter of pipe or pipe covering is 5/8-inch or smaller, provide metal pipe identification tags instead of lettering.
 - 2. Fasten pipe identification tags to pipe with chain.
 - 3. Where tags are used, color code pipe as scheduled.

3.04 APPLICATION

- A. Identify piping with legend markers, directional arrow markers, and number markers; use self adhesive arrow roll tape to secure ends of piping markers and indicate flow direction.
- B. Provide legend markers, directional arrow markers and number markers where piping passes through walls or floors, at piping intersections and at maximum 5 foot spacing on piping runs.
- C. Provide piping marker letters and colors as scheduled.
- D. Place markers on piping so they are visible from operator's position in walkway or working platform near piping. Locate markers along horizontal centerline of pipe, unless better visibility is achieved elsewhere.

3.05 PIPING COLOR CODE AND MARKER SCHEDULE

- A. As directed by the ENGINEER.

END OF SECTION

SECTION 15100

MISCELLANEOUS VALVES

PART 1 GENERAL

1.01 SCOPE

- A. This specification shall govern for all work necessary to furnish and install the horizontal swing check valves and ball valves as required to complete the project.

1.02 SPECIFICATION TYPE

- A. This specification is a performance specification.

1.03 GENERAL

- A. The check valves shall be the horizontal swing check type, the ball valves shall be regular port, and designed for a minimum of 150 p.s.i. water working pressure service and shall be suitable for domestic water service.

1.04 SUBMITTAL DATA

- A. Before shipping, the Contractor shall submit three (3) hard copies and one (1) copy in electronic format of detailed drawings, detailed specifications, installation instructions and maintenance instructions for the Engineer's review and approval. The Contractor shall also submit an affidavit of compliance per AWWA C504 from the manufacturer of the valves.

- B. Approved Manufacturer/s

The manufacturers listed below are tentatively approved for use on this project provided that equipment meets all requirements of these specifications. If it is found, after bidding (or within one year after installation and acceptance), that equipment to be furnished does not meet these specifications or fails to operate as intended, the Engineer shall have the right to reject the equipment or require the Contractor to modify the equipment to bring it into compliance at no increase in cost to the Contract.

1. Check Valves
 - a. Milwaukee "F-2974"
 - b. Stockham "G-931"
2. Ball Valves
 - a. Conbrace Industries "Apollo 88-209"
 - b. Balon "Series F"
3. or approved equal.

1.05 SUITABILITY CERTIFICATION

- A. As part of the submittal data required above, the Contractor shall submit a certification stating that the manufacturer's authorized representative for the valves furnished under this section has studied the Contract Documents (~~drawings~~ and specifications), questioned the Contractor and/or the Engineer to determine the conditions affecting these valves and hereby certifies that they should be suitable for use on this project and should require no more than normal maintenance if not damaged or abused.

PART 2 PRODUCTS/MATERIALS

2.01 CHECK VALVES

- A. The valve body shall be cast iron with flanged ends conforming to ANSI Standard Specification B16.1 (125 lbs.).
- B. The valve seat ring pins, bushings and other parts subject to wear shall be bronze.

2.02 BALL VALVE

- A. The valve shall be ANSI Class 150 with regular port. The body shall be bolted steel or ductile iron with chrome plated carbon steel ball, Teflon® seats, O-ring or Chevron stem packing and a removable operating lever.

PART 3 CONSTRUCTION METHODS

3.01 INSTALLATION

- A. Check valves and ball valves shall be installed at the required locations with valve stems plumbed as ~~indicated on the drawings~~ directed by the Owner.

3.02 PROTECTIVE COATING

- A. The exterior of metal surfaces (except stainless steel components) shall be shop coated for corrosion protection. The exterior surface of valves to be installed in manholes or valve vaults shall be coated as described in Technical Specification Section 09960 Painting.

3.03 OPERATION AND MAINTENANCE MANUAL

- A. The manufacturer shall furnish to the Engineer 3 hard copies and 1 copy in electronic format of printed instructions, including a parts list, as required to provide proper operation and maintenance of the check valves.

END OF SECTION

SECTION 15110

VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Basic requirements for valves.

1.02 REFERENCES

- A. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ ASME):
 - 1. B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.
 - 2. B16.34 - Valves - Flanged, Threaded, and Welding End.
- B. American Society for Testing and Materials (ASTM):
 - 1. A 126 - Specification for Gray Iron Casting for Valves, Flanges, and Pipe Fittings.
 - 2. A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 3. A 536 - Specification for Ductile Iron Castings.
 - 4. E 527 - Practice for Numbering Metals and Alloys (UNS).
- C. American National Standards Institute/American Water Works Association (ANSI/AWWA):
 - 1. C 111/A21.11 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe Fittings.
- D. American Water Works Association (AWWA):
 - 1. C 504 - Standard for Rubber-Seated Butterfly Valves.
- E. Steel Structures Painting Council (SSPC):
 - 1. SP 2 - Surface Preparation Specification for Hand Tool Cleaning.
 - 2. SP10 - Surface Preparation Specification for Near-White Blast Cleaning.

1.03 DESIGN REQUIREMENTS

- A. Pressure Rating:
 - 1. Suitable for service under minimum working pressures of 150 pounds per square inch gauge.
 - 2. When a piping system is specified in the Piping Schedule to be tested at a pressure greater than 150 pounds per square inch gauge, provide valves for that

piping system with design working pressure which is sufficient to withstand the test pressure.

B. Valve to Piping Connections:

1. Valves 3-Inch Nominal Size and Larger: Flanged ends.
2. Valves less than 3-Inch Nominal Size: Screwed ends.
3. Plastic Valves in Plastic Piping:
 - a. Up to 2.5 inches: Provide solvent or heat welded unions.
 - b. 3 Inches and Above: Provide solvent or heat welded flanges.

1.04 SUBMITTALS

A. Submittals Prior to Installation:

1. Product Data: Submit detailed technical information relating to the valve including description of component parts, materials of construction, performance, dimensions, and weights.

B. Operation and Maintenance Data:

1. Furnish three (3) bound hard copies and one (1) copy in electronic format of installation, operation, and maintenance instructions for each type of valve 4 inch in nominal size and larger. Include information on valve operators in operation and maintenance instruction manual.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Valves: Manufactured by manufacturers whose valves have had successful operational experience in comparable service.

1.06 DELIVERY STORAGE AND HANDLING

- A. Protect valves and protective coatings from damage during handling and installation; repair coating where damaged.

PART 2 PRODUCTS

2.01 MATERIALS

- A. As specified on specifications covering the various types of valves, and as specified herein.
- B. Valve, Gate, and Operator Bolts and Nuts:
1. Fabricated of stainless steel for the following installation conditions:
 - a. Submerged in sewage or water.
 - b. In an enclosed space above sewage or water.

- c. In structures containing sewage or water, below top of walls.
 - d. At openings in concrete or metal decks.
- 2. Where dissimilar metals are being bolted, use stainless steel bolts with isolation bushings and washers.
- 3. Underground Bolts: Low-alloy steel in accordance with AWWA C 111/A21.11.
- C. Bronze and Brass Alloys: Use bronze and brass alloys with not more than 6 percent zinc and not more than 2 percent aluminum in the manufacture of valve parts; UNS Alloy C83600 or C92200 unless specified otherwise.
- D. Valve Bodies: Cast iron in accordance with ASTM A 126 Class 30 minimum or ductile iron in accordance with ASTM A 536 Grade 65-45-12 minimum unless specified otherwise.

2.02 INTERIOR PROTECTIVE COATING

- A. Provide valves with type of protective coating specified in the particular valve specification.
- B. Apply protective coating to interior, non-working surfaces, except stainless steel surfaces.
- C. Coating Types:
 - 1. Powder Epoxies:
 - a. Manufacturers: One of the following or equal:
 - 1) Tnemec Pota-Pox, NSF-61, certified for drinking water use.
 - 2) 3-M Company, ScotchKote 134; certified to NSF 61 for drinking water use.
 - b. Clean surfaces to meet SSPC-SP-10, near-white metal blast cleaning, with grit of size recommended by epoxy manufacturer.
 - c. Apply in accordance with manufacturer's published instructions.
 - d. Coating Thickness: 0.010 to 0.012 inches except that:
 - 1) Coating Thickness in Grooves for Gaskets: 0.005 inches.
 - 2) Do not coat seat grooves in valves with bonded seat.
 - e. Quality Control:
 - 1) Coating Thickness: Measured with a non-destructive magnetic type thickness gauge.
 - 2) Verify coating integrity with a wet sponge testing unit operating at approximately 60 volts.
 - 3) Consider tests successful when coating thickness meets specified requirements and when no pinholes are found.

- 4) Correct defective coating disclosed by unsuccessful tests, and repeat test.
- 5) Repair pinholes with liquid epoxy recommended by manufacturer of the epoxy used for coating.

2. High Solids Cycloaliphatic Amine Epoxy:

- a. Product: As specified in Section 09960.
- b. Quality Control: After coating is cured, check coated surface for porosity with a holiday detector set at 1,800 volts.
 - 1) Repair holidays and other irregularities and retest coating.
 - 2) Repeat procedure until holidays and other irregularities are corrected.

2.03 UNDERGROUND VALVES

- A. Provide underground valves with flanged, mechanical, or other type of joint required for the type of pipe to which the valve is to be connected.
- B. Coating and Wrapping:
 1. Prior to installation, coat buried valves with 2 coats of protective coal tar in accordance with Section 09960.
 2. After installation, wrap valves with polyethylene as specified in the ductile iron piping specification.
 - a. Ascertain that polyethylene wrapping does not affect operation of valve.

2.04 VALVE BOXES

- A. Provide cast-iron valve boxes at each buried valve to access valve and valve operators.
- B. Do not support boxes on valve, valve operator, or pipe.
- C. Boxes:
 1. 2-piece, fabricated of cast-iron; provide cover, with asphalt varnish or enamel protective coating.
 2. Adjustable to grade, install centered around the upper portions of the valve and valve operator.
- D. Manufacturers: One of the following or equal:
 1. Tyler Pipe Industries, Inc.
 2. Neenah Foundry Company.

2.05 VALVE OPERATORS

- A. Valve Operator "Open" Direction: Open counterclockwise.

- B. Provide valves located below operating level or deck with extensions for key operation or floor stands and handwheels.
- C. Provide manually operated valves and gates located not more than 6 feet above the operating level with tee handles, wrenches, or handwheels.
 - 1. Make the valve operator more conveniently accessible by rolling valves, located more than 5 feet but less than 6 feet above the operating level, toward the operating side.
 - 2. Secure tee handles and wrenches to the valve head or stem, except where a handle or wrench so secured constitutes a hazard to personnel; in which case, stow handle or wrench immediately adjacent to the valve on or in a suitable hanger, bracket, or receptacle.
- D. Fit valves located more than 6 feet above operating level with chain operated handles or valve wheels.
 - 1. Chains: Sufficient length to reach approximately 4 feet above the operating level.
 - 2. Where chains constitute a nuisance or hazard to operating personnel, provide hold-backs or other means for keeping the chains out of the way.
- E. Provide an operator shaft extension from valve or valve operator to finish grade or deck level when buried valves, and other valves located below the operating deck or level, are specified ~~or indicated on the Drawings~~ to be key operated; provide 2 inch square AWWA operating nut, and box and cover as specified, or a cover where a box is not required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Preparation: Required Information Prior to Installation:
 - 1. Install valves after the required submittal on installation has been accepted.
 - 2. Determine, after flanged valves and flanged check valves are selected, the face-to-face dimensions of flanged valves and flanged check valves.
- B. Fabricate piping to lengths taking into account the dimensions of flanged valves and flanged check valves.

3.02 INSTALLATION

- A. Provide incidental work and materials necessary for installation of valves including flange gaskets, flange bolts and nuts, valve boxes and covers, concrete bases, blocking, and protective coating.
- B. Where needed, furnish and install additional valves for proper operation and maintenance of equipment and plant facilities under the following circumstances:
 - 1. Where such additional valves are required for operation and maintenance of the particular equipment furnished by CONTRACTOR.

2. Where such additional valves are required as a result of a substitution or change initiated by CONTRACTOR.
- C. Install Valves with their stems in vertical position above the pipe, except as follows:
1. Butterfly valves, gate valves aboveground, globe valves, ball valves, and angle valves may be installed with their stems in the horizontal position.
- D. Install valves so that handles clear obstructions when the valves are operated from fully open to fully closed.
- E. Place top of valve boxes flush with finish grade or as otherwise indicated ~~on the Drawings~~.
- F. Valves with Threaded Connections:
1. Install valves by applying wrench on end of valve nearest the joint to prevent distortion of the valve body.
 2. Apply pipe joint compound and Teflon tape on external (male) threads to prevent forcing compound into valve seat area.
- G. Valves with Flanged Connections:
1. Align flanges and gasket carefully before tightening flange bolts.
 2. When flanges are aligned, install bolts and hand tighten.
 3. Tighten nuts opposite each other with equal tension before moving to next pair of nuts.
- H. Valves with Soldered Connections:
1. Do not overheat connection to prevent damage to resilient seats and metal seat rings.
 2. Position valves in full open position before starting soldering procedure.
 3. Apply heat to piping rather than to valve body.

END OF SECTION

SECTION 15112.1

BUTTERFLY VALVES

PART 1 GENERAL

1.01 SCOPE

- A. The CONTRACTOR shall furnish and install butterfly valves, complete and operable, as shown and specified herein, including epoxy coating, appurtenances, operators, and accessories, in accordance with the requirements of the Technical Specifications.

1.02 SUMMARY

- A. Section Includes: Metal body butterfly valves and manual valve operators.

1.03 REFERENCES

- A. All Work specified herein shall conform to or exceed the applicable requirements of the referenced portions of the following publications to the extent that the provisions thereof are not in conflict with other provisions of these Specifications.
- B. Comply with the applicable editions of the following codes, regulations and standards.
 - 1. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME):
 - 2. ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
 - 3. ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings.
 - 4. American Society for Testing and Materials (ASTM):
 - a. A 126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. D 429 - Test Methods for Rubber Property - Adhesion to Rigid Substrates.
 - 5. American Water Works Association (AWWA):
 - a. C 110 - Standard for Ductile-Iron and Gray-Iron Fittings 3 Inches through 48 Inches for Water and Other Liquids.
 - b. C 504 - Standard for Rubber-Seated Butterfly Valves.
 - 6. NSF/ANSI 61.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. General Purpose Butterfly Valves:

- a. Design Standard: In accordance with AWWA C 504 as modified and complemented herein.
 - b. Class:
 - 1) Valves 3"-20": AWWA Class 150B, when not otherwise specified ~~or indicated on Drawings~~.
 - 2) Valves 24"-72": AWWA Class 75B, when not otherwise specified ~~or indicated on Drawings~~.
2. Design Requirements for General Purpose Butterfly Valves and High Performance Butterfly Valves:
- a. Design valves and actuators for maximum operating torque, in accordance with and using safety factors required in AWWA C 504 and its Appendix A, using the following values:
 - 1) Maximum Water Velocity: 16 feet per second with valve fully open.
 - 2) Maximum pressure differential across the closed valve in accordance with AWWA Class designation, or as indicated on the Butterfly Valve Schedule.
 - 3) System head loss characteristic, exclusive of valve, proportional to the velocity head.
 - 4) Coefficient for seating and unseating torque, dynamic torque, and bearing friction in accordance with valve manufacturer's published recommendations.
 - b. Valve Disc: Seat in an angular position of 90 degrees to the pipe axis and rotate an angle of 90 degrees between fully open and closed positions.
 - 1) Do not supply valves with stops or lugs cast with or mechanically secured to the body of the valve for limiting the disc travel unless specified in Section 01010 Part 2.
 - c. Unacceptable Thrust Bearings: Do not provide valves with thrust bearings exposed to the fluid in the line and consisting of a metal bearing surface in rubbing contact with an opposing metal bearing surface.

B. Performance Requirements:

- 1. Tight shutoff at the AWWA rated class with flow in either direction.
- 2. Suitable for the following service conditions:
 - a. Throttling.
 - b. Frequent operation.
 - c. Operation after long periods of inactivity.
 - d. Installation in any position and flow in either direction.

1.05 SUBMITTALS

- A. Before shipping, the Contractor shall submit three (3) hard copies and one (1) copy in electronic format of detailed drawings, detailed specifications, installation instructions and maintenance instructions for the Engineer's review and approval. The Contractor shall also submit an affidavit of compliance per AWWA C504 from the manufacturer of the valves.
- B. Shop Drawings: Include certified drawings and material specifications in accordance with AWWA C 504, Sections 1.4 and 1.5.
 - 1. Include description of the method of attachment of the edge to the valve disc.
- C. Product Data: Include manufacturer's published recommendations for seating and unseating torque coefficient, dynamic torque, and bearing friction for calculation of maximum operating torque.
- D. Test Reports: Records of tests performed in accordance with AWWA C 504 requirements.
- E. Certificates: Affidavit of compliance specified in AWWA C 504, Section 1.7.
- F. Approved Manufacturer/s

1.06 SUITABILITY CERTIFICATION

- A. As part of the submittal data required above, the Contractor shall submit a certification stating that the manufacturer's authorized representative for the valves furnished under this section has studied the Contract Documents (~~drawings and~~ specifications), questioned the Contractor and/or the Engineer to determine the conditions affecting these valves and hereby certifies that they should be suitable for use on this project and should require no more than normal maintenance if not damaged or abused.

1.07 OPERATION AND MAINTENANCE MANUAL

- A. The manufacturer shall furnish to the Engineer three (3) hard copies and one (1) copy in electronic format of printed instructions, including a parts list, as required to provide proper operation and maintenance of the butterfly valves.

PART 2 PRODUCTS

2.01 GENERAL PURPOSE BUTTERFLY VALVES

- A. Manufacturers: One of the following or approved equal:

The manufacturers listed below are tentatively approved for use on this project provided that equipment meets all requirements of these specifications. If it is found during the construction phase or one year warranty phase that the equipment provided does not meet these specifications, or fails to operate as intended, the contractor shall replace the faulty equipment at no additional cost to the OWNER.

- 1. DeZurik.
- 2. Henry Pratt Company.
- 3. Kennedy Valve.

4. Val-Matic
- B. Valve Body:
1. Material: Cast-iron ASTM A 126, Class B.
 - a. Flanges: 125 pound ANSI/ASME B16.1.
 - b. Mechanical Joint Ends: In accordance with AWWA C 110.
 2. Body Design:
 - a. Provide short body or long body valves at contractor's option, subject to:
 - 1) Location in the piping system so that when the valve is operated, its operation will not interfere with, nor be impaired by, adjacent fittings, valves, equipment or other installations.
 - b. Valves 30 Inches in Nominal Size and Larger: Valve port diameter not reduced more than 1-1/2 inches from the nominal valve diameter.
 3. Valve Ends: Compatible with piping system.
- C. Disc Materials:
1. Stainless steel (SS 316) or nickel-chrome mating edge on a cast-iron or ductile iron disc.
- D. Shaft and Bearings:
1. Shaft: Type 316 stainless steel.
 2. Thrust Bearings: Self-lubricating, sleeve type; Teflon lined with fiberglass backing, or polytetrafluoroethylene (PTFE) with phenolic or stainless steel backing.
 3. Provide valves with polytetrafluoroethylene with phenolic or stainless steel backing.
- E. Disc Pins: Secure valve disc to shaft by means of solid, smooth sided, Type 316 stainless steel or monel, taper or dowel pin.
1. Extend pins through shaft and mechanically secure in place.
- F. Seats:
1. For valves less than 24 inches nominal size, bond or vulcanize seats into the valve body.
 2. For valves 24 inches nominal size and larger, mechanically retain seats in the valve body.
 - a. Achieve retaining effect by an epoxy injection method that expands the seat into the body, or by segmented clamping tee lock ring with adjusting screws.
 - b. Provide means to prevent nuts and screws used to retain rubber seats from loosening due to vibration or cavitation.

- c. Seat Retainers: Type 316 stainless Steel.
- 3. Resilient Seat: Withstand 75 pound pull when tested in accordance with ASTM D 429, Method B.
- 4. Do not provide valve with seats retained by a snap ring.
- 5. Seat Materials:
 - a. EPDM.

G. Valve Packing:

- 1. Valves 4 Inch to 48 Inch in Nominal Size: Self-adjusting V-type packing or chevron type packing.
- 2. Valves 54 Inch in Nominal Size and Larger: Adjustable V-type packing with bronze packing gland or self-adjusting V-type packing.

2.02 BUTTERFLY VALVE OPERATORS

- A. Provide underground valves 6 inches in nominal size and larger with a totally enclosed worm gear operator mounted on the valve.
 - 1. Valve Shaft: Extend from the valve to the operator and be as specified for valve shafts.
 - 2. Operator: Gasketed for watertightness.
 - 3. Provide a 2-inch AWWA operating nut for those valves scheduled for portable operators.
- B. Manual Operators on Aboveground Butterfly Valves Larger than 6 Inches in Nominal Size: Worm geared; valves 10 inches in nominal size and smaller on low pressure air service may be lever operated.

2.03 FABRICATION

- A. Shop coat interior and exterior ferrous metal surfaces of valves and accessories, except as follows:
 - 1. Finished surfaces.
 - 2. Bearing surfaces.
 - 3. Stainless steel components.
- B. Surface Coatings:
 - 1. Unfinished Surfaces:
 - a. Interior Surfaces: High solids cycloaliphatic amine epoxy.
 - b. Exterior Surfaces:
 - 1) Submerged Valves: High solids cycloaliphatic amine epoxy.
 - 2) Buried Valves and Valves in Manholes and Vaults: Coal tar.

- 3) Other Valves: High solids epoxy and polyurethane system.
 2. Polished and Machined Surfaces: Rust-preventive compound.
 3. Actuators and Accessories: Rust-inhibitive primer.
- C. Coating Materials:
1. High Solids Cycloaliphatic Amine Epoxy:
 - a. Application: Shop apply to iron and steel surfaces, except stainless steel.
 - b. Product: As specified in Section 09960.
 - c. Quality Control: After coating is cured, check coated surface for porosity with a holiday detector set at 1,800 volts.
 - 1) Repair holidays and other irregularities and retest coating.
 - 2) Repeat procedure until holidays and other irregularities are corrected.
 - d. Additional field coating, other than touchup coating of damaged surfaces, will not be required.
 - 1) Perform touchup coating within the recoat time recommended by the paint manufacturer.
 - 2) When touchup coating is required after expiration of the recoat time, precede coating by blast cleaning or other surface preparation recommended by the manufacturer of the coating material for satisfactory adhesion between coats.
 2. Rust-inhibitive Primer:
 - a. Rust-inhibitive Primers: Compatible with the piping systems coating specified in Section 09960.
 - b. Surface Preparation: As specified in Section 09960.
 3. Rust-preventive Compound: One of the following or equal:
 - a. Houghton, Rust Veto 344.
 - b. Rust-Oleum, R-9.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install valves with valve shafts horizontal, unless a vertical shaft is required to suit a particular installation, and unless a vertical shaft is indicated ~~on the Drawings~~.
- B. Install pipe spools or valve spacers in locations where butterfly valve disc travel may be impaired by adjacent pipe lining, pipe fittings, valves, or other equipment.

3.02 SCHEDULE

- A. The Butterfly Valve Schedule is not a valve take off list.

1. Only major process control valves are included in the Schedule.
- B. Abbreviations: The following apply to the Butterfly Valve Schedule:
1. Service: See process abbreviations list indicated in the Piping Schedule in Section 15052.
 2. Valve Ends:
 - a. F = Flanged end.
 - b. MJ = Mechanical joint end.
 - c. VIC = Grooved coupling end.
 3. AWWA Class: In accordance with AWWA C 504.
 4. Type of Operator:
 - a. M = Manual operator.
 - b. E = Electric operator.
 - c. P = Portable operator (2-inch square AWWA operating nut).
 5. Disc Orientation:
 - a. V = Vertical
 - b. H = Horizontal
 6. Limit Switches: Provide limit switches on manually operated valves where indicated on the Drawings.
- ~~C. See Drawings for locations of Butterfly Valves.~~

END OF SECTION

SECTION 15142

DISINFECTION OF WATER LINES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Disinfection of water lines, bacteriological testing, and flushing of lines at completion of treatment.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 1. AWWA C 651 - Standard for Disinfecting Water Mains.
- B. APHA/AWWA/WEF - Standard Methods for Examination of Water and Wastewater.

1.03 SUBMITTALS

- A. Submit Disinfection Test Plan Which Details Procedure to be utilized to Disinfect Water Lines Including:
 1. Method and locations of disinfectant application.
 2. Locations of sampling points.
 3. Method of flushing and location of flushing ports.
 4. Method of dechlorination.
 5. Disposal location for dechlorinated water.
- B. Submit Disinfection Reports and Include the Following:
 1. Date issued.
 2. Project name and location.
 3. Treatment subcontractor's name, address, and phone number.
 4. Type and form of disinfectant used.
 5. Time and date of disinfectant injection start.
 6. Time and date of disinfectant injection completion.
 7. Test locations.
 8. Initial and 24 hour disinfectant residuals in parts per million for each outlet tested.
 9. Time and date of flushing start.
 10. Time and date of flushing completion.
 11. Disinfectant residual after flushing in parts per million for each outlet tested.

- C. Submit Bacteriological Reports and Include the Following:
 - 1. Date issued.
 - 2. Project name and location.
 - 3. Laboratory's name, certification number, address, and phone number.
 - 4. Time and date of water sample collection.
 - 5. Name of person collecting samples.
 - 6. Test locations.
 - 7. Time and date of laboratory test start.
 - 8. Coliform bacteria test results for each outlet tested.
 - 9. Certification that water conforms or fails to conform to bacterial standards of Federal Safe Drinking Water Act.
 - 10. Bacteriologist's signature and bacteriological laboratory's evidence of certification.

1.04 QUALITY ASSURANCE

- A. Bacteriological Laboratory: Certified by state in which Project is located.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect against damage and contamination.
- B. Maintain caution labels on hazardous materials.
- C. Maintain storage room dry and with temperatures as uniform as possible between 60 degrees Fahrenheit and 80 degrees Fahrenheit.

1.06 PROTECTION

- A. Provide necessary signs, barricades, and notices to prevent persons from accidentally consuming water or disturbing system being treated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Disinfectant: Free chlorine in liquid, powder, tablet, or gas form.

PART 3 EXECUTION

3.01 CLEANING WATER LINES

- A. Prior to chlorination, remove by flushing or other means, soil, and debris from the water lines.

3.02 INSPECTION

- A. Verify that water line system is completed and cleaned.

- B. Start disinfection of water lines when conditions are satisfactory.

3.03 SYSTEM TREATMENT

- A. Perform disinfection of water lines in accordance with AWWA C 651 and as specified in this Section.
- B. Starting at outlet closest to water source, bleed water from each outlet until water produces odor of disinfectant. Repeat process at each outlet throughout system.
- C. Test for disinfectant residual at each of following locations and other locations in accordance with submitted disinfection test plan:
 - 1. Ends of piping runs.
 - 2. Remote outlets.
 - 3. Tanks.
 - 4. At least two outlets on each building floor where directed.
- D. Maintain disinfectant in system for 24 hours.
- E. When disinfectant residual is less than 25 parts per million after 24 hours, repeat system treatment.

3.04 FLUSHING

- A. Remove disinfectant from water lines.
- B. Flush water lines with potable water containing no more disinfectant residual than the active distribution system or 1.0 parts per million, whichever is greater.
- C. Continue flushing until water at designated flushing ports contains disinfectant residual equal to concentration specified above.

3.05 DISPOSAL OF CHLORINATED WATER

- A. Dispose of chlorinated water in accordance with the submitted disinfection test plan and applicable requirements of federal, state, county, and city having jurisdiction over disposal of hazardous wastes in location of the Project and disposal site.

3.06 BACTERIOLOGICAL TEST

- A. The bacteriological test shall be performed by the OWNER.
- B. OWNER's inspector will take water samples no sooner than 24 hours after flushing system.
- C. At the end of 24 hours and before the water main or structure is placed in service, collect bacteriological quality samples at each of following locations and other locations in accordance with the submitted disinfection test plan and Standard Methods for the Examination of Water and Wastewater:
 - 1. Where water enters system.
 - 2. Ends of piping runs.

3. Remote outlets.
 4. Tanks.
 5. At least two outlets on each building floor.
- D. Analyze water samples in accordance with Standard Methods for Examination of Water and Wastewater.
- E. When bacteriological test proves water quality to be unacceptable, repeat disinfection treatment.

END OF SECTION

SECTION 15956
PIPING SYSTEMS TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Test requirements for piping systems.

1.02 REFERENCES

- A. Uniform Plumbing Code (UPC).
- B. National Fuel Gas Code: ANSI Z 223.1 or NFPA 54.
- C. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME):
 - 1. B31.8 - Gas Transmission and Distribution Piping Systems.
 - 2. B31.1 - Power Piping.
 - 3. B31.3 - Process Piping.
- D. Uniform Mechanical Code (UMC).

1.03 TESTING REQUIREMENTS

- A. General Requirements:
 - 1. Testing requirements are stipulated in Laws and Regulations; are included in the Piping Schedule in Section 15052; are specified in the specifications covering the various types of piping; and are specified herein.
 - 2. Requirements in Laws and Regulations supersede other requirements of Contract Documents, except where requirements of Contract Documents are more stringent, including higher test pressures, longer test times, and lower leakage allowances.
 - 3. Test plumbing piping in accordance with Laws and Regulations, the Uniform Plumbing Code, and UL requirements.
 - 4. When testing with water, the specified test pressure is considered to be the pressure at the highest point of the piping section under test. Lower test pressure as necessary to prevent testing the lowest point above a safe test pressure.
- B. Furnish necessary personnel, materials, and equipment, including bulkheads, restraints, anchors, temporary connections, pumps, water, pressure gauges, and other means and facilities required to perform tests.
- C. Water for Testing, Cleaning, and Disinfecting:
 - 1. Water for testing, cleaning, and disinfecting will be paid by the CONTRACTOR.

~~2. Water for the EST testing will be provided by the City free of charge one (1) time only. The CONTRACTOR shall pay for any subsequent re-testing of the EST.~~

- D. Pipes to be tested: Test only those portions of pipes that have been installed as part of this Contract. Test new pipe sections prior to making final connections to existing piping. Furnish and install test plugs, bulkheads, and restraints required to isolate new pipe sections. Do not use existing valves as test plug or bulkhead.
- E. Unsuccessful Tests:
 - 1. Where tests are not successful, correct defects or remove defective piping and appurtenances and install piping and appurtenances that comply with the specified requirements.
 - 2. Repeat testing until tests are successful.
- F. Test Completion: Drain and leave piping clean after successful testing.
- G. Test Water Disposal: Dispose of testing water in accordance with requirements of federal, state, county, and city regulations governing disposal of wastes in the location of the Project and disposal site.

1.04 SUBMITTALS

- A. Schedule and Notification of Tests:
 - 1. Submit a list of scheduled piping tests by noon of the working day preceding the date of the scheduled tests.
 - 2. Notification of Readiness to Test: Immediately before testing, notify ENGINEER in writing of readiness, not just intention, to test piping. Have personnel, materials, and equipment specified in place before submitting notification of readiness.

1.05 SEQUENCE

- A. Clean piping before pressure or leak tests.
- B. Test gravity piping underground, including sanitary sewers, for visible leaks before backfilling and compacting.
- C. Underground pressure piping may be tested before or after backfilling when not indicated or specified otherwise.
- D. Backfill and compact trench, or provide blocking that prevents pipe movement before testing underground piping with a maximum leakage allowance.
- E. Test underground piping before encasing piping in concrete or covering piping with slab, structure, or permanent improvement.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 TESTING ALIGNMENT, GRADE, AND DEFLECTION

- A. Alignment and Grade:
 - 1. Visually inspect the interior of gravity piping with artificial light, reflected light, or laser beam.
 - 2. Consider inspection complete when no broken or collapsed piping, no open or poorly made joints, no grade changes that affect the piping capacity, or no other defects are observed.

3.02 AIR TESTING METHOD FOR PRESSURE PIPING

- A. Air test piping, indicated with "AM" in the Piping Schedule, with air or another nonflammable or inert gas.
- B. Test gas, air, liquefied petroleum gas, liquid chlorine, and chlorine gas piping by the air test method.
 - 1. Test chlorine piping with dry air or nitrogen having a dew point of minus 40 degrees Fahrenheit or less. Supply temporary air driers as necessary.
- C. Test at pressure as specified in Piping Schedule in Section 15052.
 - 1. Provide temporary pressure relief valve for piping under test. Set at the lesser of 110 percent of the test pressure or 50 pounds per square inch gauge over the test pressure.
 - 2. Air method test pressures shall not exceed 110 percent of the piping maximum allowable working pressure calculated in accordance with the most stringent of ANSI/ASME B31.1, ANSI/ASME B31.3, ANSI/ASE B31.8, or the pipe manufacturer's stated maximum working pressure.
 - 3. Gradually increase test pressure to an initial test pressure equal to the lesser of one-half the test pressure or 25 pounds per square inch gauge.
 - 4. Perform initial check of joints and fittings for leakage.
 - 5. Gradually increase test pressure in steps no larger than the initial pressure. Check for leakage at each step increase until test pressure reached.
 - 6. At each step in the pressure, examine and test piping being air tested for leaks with soap solution.
 - 7. Consider examination complete when piping section under test holds the test pressure for 15 minutes without losses.

3.03 TESTING GRAVITY FLOW PIPING

- A. Test Gravity Flow Piping Indicated with "GR" in the Piping Schedule, as Follows:
 - 1. Unless Specified Otherwise, Subject Gravity Flow Piping to the Following Tests:
 - a. Alignment and grade.

- b. For plastic piping test for deflection.
 - c. Visible leaks and pressure with maximum leakage allowance, except for storm drains and culverts.
- 2. Inspect piping for visible leaks before backfilling. Provide temporary restraints when needed to prevent movement of piping. Pressure test piping with maximum leakage allowance after backfilling.
- 3. With the lower end plugged, fill piping slowly with water while allowing air to escape from high points. Keep piping full under a slight head for the water at least 24 hours.
 - a. Examine piping for visible leaks. Consider examination complete when no visible leaks are observed.
 - b. Maintain piping with water, or allow a new water absorption period of 24 hours for the performance of the pressure test with maximum leakage allowance.
 - c. After successful completion of the test for visible leaks and after the piping has been restrained and backfilled, subject piping to the test pressure for minimum of four hours while accurately measuring the volume of water added to maintain the test pressure.
 - 1) Consider the test complete when leakage is equal to or less than the following maximum leakage allowances:
 - a) For Concrete Piping with Rubber Gasket Joints: 80 gallons per day per inch of diameter per mile of piping under test.
 - i) Advise manufacturer of concrete piping with rubber gasket joints of more stringent than normal maximum leakage allowance.
 - b) For Vitrified Clay and Other piping: 500 gallons per day per inch of diameter per mile of piping under test.

3.04 TESTING HIGH-HEAD PRESSURE PIPING

- A. Test piping for which the specified test pressure in the Piping Schedule is 20 pounds per square inch gauge or greater, by the high head pressure test method, indicated "HH" in the Piping schedule.
- B. General:
 - 1. Test connections, hydrants, valves, blowoffs, and closure pieces with the piping.
 - 2. Do not use installed valves for shutoff when the specified test pressure exceeds the valve's maximum allowable seat differential pressure. Provide blinds or other means to isolate test sections.
 - 3. Do not include valves, equipment or piping specialties in test sections if test pressure exceeds the valve, equipment or piping specialty safe test pressure allowed by the item's manufacturer.

4. During the performance of the tests, test pressure shall not vary more than plus or minus 5 pounds per square inch gauge with respect to the specified test pressure.
5. Select the limits of testing to sections of piping. Select sections that have the same piping material and test pressure.
6. When Test Results Indicate Failure of Selected Sections, Limit Tests to Piping:
 - a. Between valves.
 - b. Between a valve and the end of the piping.
 - c. Less than 500 feet long.
7. Pressure testing against existing valves is prohibited.
8. Test piping for minimum 2 hours for visible leaks test and minimum 4 hours for the pressure test with maximum leakage allowance.

C. Testing Procedures:

1. Fill piping section under test slowly with water while venting air. Use potable water for all potable waterlines and where noted on the Piping Schedule
2. Before pressurizing for the tests, retain water in piping under slight pressure for a water absorption period of minimum 24 hours.
3. Raise pressure to the specified test pressure and inspect piping visually for leaks. Consider visible leakage testing complete when no visible leaks are observed.

D. Pressure Test with Maximum Leakage Allowance:

1. Leakage allowance is zero for piping systems using flanged, National Pipe Thread threaded and welded joints.
2. Pressure test piping after completion of visible leaks test.
3. For piping systems using joint designs other than flanged threaded or welded joints, accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period.
 - a. Consider the pressure test to be complete when makeup water added is less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - b. Successful completion of the pressure test with maximum leakage allowance shall have been achieved when the observed leakage during the test period is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - c. When leakage is allowed, calculate the allowable leakage by the following formula:

$$L = S \times D \times P^{1/2} \times 133,200^{-1}$$

wherein the terms shall mean:

L = Allowable leakage in gallons per hour.

S = Length of the test section in feet.

D = Nominal diameter of the piping in inches.

P = Average observed test pressure in pounds per square inches, gauge, at the lowest point of the test section, corrected for elevation of the pressure gauge.

x = The multiplication symbol.

3.05 TESTING LOW-HEAD PRESSURE PIPING

- A. Test piping for which the specified test pressure is less than 20 pounds per square inch gauge, by the low head pressure test method, indicated "LH" in the Piping Schedule.
- B. General:
 - 1. Test pressures shall be as scheduled in Section 15052.
 - 2. During the performance of the tests, test pressure shall not vary more than plus or minus 2 pounds per square inch gauge with respect to the specified test pressure.
 - 3. Test connections, blowoffs, vents, closure pieces, and joints into structures, including existing bell rings and other appurtenances, with the piping.
 - 4. Test piping for minimum 2 hours for visible leaks test and minimum 2 hours for the pressure test with maximum leakage allowance.
- C. Visible Leaks Test:
 - 1. Subject piping under test to the specified pressure measured at the lowest end.
 - 2. Fill piping section under test slowly with potable water while venting air.
 - 3. Before pressurizing for the tests, retain water in piping under slight pressure for the water absorption period of minimum 24 hours.
 - 4. Raise pressure to the specified test pressure and inspect piping visually for leaks. Consider testing complete when no visible leaks are observed.
- D. Pressure Test with Maximum Leakage Allowance:
 - 1. Pressure test piping after completion of visible leaks test.
 - 2. Accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period.
 - a. Consider the pressure test to be complete when makeup water added is less than the allowable leakage of 80 gallons per inch of nominal diameter, per mile of piping section under test after 24 hours and no damage to piping and appurtenances has occurred.
 - b. Successful completion of the leakage test shall have been achieved when the observed leakage is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.

E. Optional Joint Test:

1. When Joint Testing Is Allowed by Note in the Piping Schedule, the Procedure Shall Be as Follows:
 - a. Joint testing will be allowed only for low head pressure piping.
2. Joint testing may be performed with water or air.
3. Joint test piping after completion of backfill and compaction to the top of the trench.
4. Joint Testing with Water:
 - a. Measure test pressure at the invert of the pipe. Apply pressure of 4 feet plus the inside diameter of the pipe in water column within 0.20 feet in water column.
 - b. Maintain test pressure for one minute.
 - c. Base the allowable leakage per joint on 80 gallons per inch nominal diameter, per mile of piping, per 24 hours equally distributed to the actual number of joints per mile for the type of piping.
 - d. Consider the pressure test to be complete when makeup water added is less than the allowable leakage.
 - e. Successful completion of the joint test with water shall have been achieved when the observed leakage is equal or less than the allowable leakage.
5. Joint Testing with Air:
 - a. Apply test pressure of 3 pounds per square inch gauge with a maximum variation of plus 0.20 and minus 0.00 pounds per square inch.
 - b. Maintain test pressure for 2 minutes.
 - c. Consider the pressure test to be complete when the test pressure does not drop below 2.7 pounds per square inch for the duration of the test.

END OF SECTION

SECTION 16015

GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL

- A. The General Conditions and Requirements, Special Provisions, are hereby made a part of this section.
- B. The Electrical Drawings and Specifications under this section shall be made a part of the contract documents. The Electrical drawings and specifications ~~of this contract~~, as well as supplements issued thereto, ~~information to bidders~~ and pertinent documents issued by the Owner are a part of these ~~drawings and~~ Technical Specifications and shall be complied with in every respect. All of the above documents will be on file at the office of the Owner and shall be examined by all bidders. Failure to examine all documents shall not relieve the responsibility or be used as a basis for additional compensation due to omission of details of other sections from the electrical documents.
- C. Furnish all work, labor, tools, superintendence, material, equipment, and operations necessary to provide for a complete and workable electrical system as defined by the contract documents.
- D. Be responsible for visiting the site and checking the existing conditions. Ascertain the conditions to be met for installing the work and adjust bid accordingly.
- E. It is the intent of the contract document that upon completion of the electrical work, the entire system shall be in a finished, workable condition.
- F. ~~All work that may be called for in the specifications but not shown on the drawings; or, all work that may be shown on the drawings but not called for in the specifications, shall be performed by the Contractor as if described in both.~~ Should work be required which is not set forth in the specifications, but which work is nevertheless required for fulfilling of the intent thereof; then, the contractor shall perform all work as fully as if it were specifically set forth in the current documents.
- G. The definition of terms used throughout the contract documents shall be as specified by the following agencies:
 - 1. Underwriters Laboratories
 - 2. National Electrical Manufacturers Association
 - 3. American National Standard Institute
 - 4. Insulated Power Cable Engineers Association
 - 5. National Electrical code

6. National Fire Protection Association

1.02 PERMITS, CODES AND UTILITIES

- A. Secure all permits, licenses, and inspections as required by all authorities having jurisdiction. Give all notices and comply with all laws, ordinances, rules, regulations and contract requirements bearing on the work.
- B. The minimum requirements of the electrical system installation shall conform to the latest edition of the National Electrical Code as well as state and local codes.
- C. Codes and ordinances having jurisdiction and specified codes shall serve as minimum requirements; but, if the Contract Documents indicate requirements which are in excess of those minimum requirements then the requirements of the Contract Documents shall be followed. Should there be any conflicts between the Contract Documents and codes, or any ordinances, report these with bid.
- D. Determine the exact requirements for the utility service connections and metering facilities as set forth by the utilities that will serve the project, and pay for and perform all work as required by those utilities.

1.03 STANDARDS

- A. All materials and equipment shall conform to the requirements of the Contract Documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:
 - 1. Underwriters Laboratories, Inc. (UL)
 - 2. National Electrical Manufacturer's Association. (NEMA)
 - 3. American National Standards Association. (ANSI)
 - 4. Insulated Cable Engineers Association. (ICEA)
- B. All material and equipment, of the same class, shall be supplied by the same manufacturer unless specified to the contrary.
- C. All products shall bear UL labels where standards have been set for listing.

1.04 SHOP DRAWINGS AND SUBMITTALS

- A. Shop drawings shall be taken to mean detailed drawings with dimensions, schedules, weights, capacities, installation details and pertinent information that will be needed to describe material or equipment in detail.
- B. Submittals shall be taken to mean catalog cuts, general descriptive information, catalog numbers and manufacturer's name.
- C. Submit for review three (3) hard copies and one (1) electronic copy within fourteen (14) days after notice to proceed, all shop drawings and submittals as called for hereinafter. If

shop drawings and submittals are not received in fourteen (14) days, the Owner reserves the right to go directly to the manufacturer for the information and any expense incurred shall be borne by the contractor.

- D. Review of submittals or shop drawings shall not remove the responsibility for furnishing materials or equipment of proper dimensions, quantity and quality; nor will such review remove the responsibility for error in the shop drawings or submittals.
- E. Failure to process submittals or shop drawings on any item and/or items specified shall make the Contractor responsible for the suitability of the item and/or items, even though the item and/or items installed appear to comply with the Contract Documents.
- F. Assume all costs and liabilities which may result from the ordering of any material or equipment prior to the review of the shop drawings or submittals, and no work shall be done until the shop drawings or submittals have been reviewed. In case of correction or rejection, resubmit until such time as they are accepted by the Engineer and such procedures will not be cause for delay. After final review, supply up to six (6) copies, if requested.
- G. Submittals and shop drawings shall be compiled from the manufacturer's latest product data. Should there be any conflicts between this data and the Contract Documents, report this information for each submittal and/or shop drawing.
- H. Shop drawings and submittals will be returned unchecked if the specific items proposed are not clearly marked, or if the general contractor's approval stamp is omitted.
- I. When requested, furnish samples of materials for acceptance review. If a sample has been reviewed and accepted, then that item of material or equipment installed on the job shall be equal in quality to the sample; if it is found that the installed item is not equal then replace all such items with the accepted sample equivalent.
- J. Materials to be submitted are as follows:
 - 1. Motor Control Centers
 - 2. Wiring Devices
 - 3. Lighting Fixtures
 - 4. Transformers
 - 5. Main Control Panel
 - 6. Instruments
 - 7. Wire and cables
 - 8. Panelboards
 - 9. Safety switches

10. Conduit and fittings
11. Lightning protection system
12. Power and arc flash study

1.05 ACCEPTANCE AND SUBSTITUTIONS

- A. All manufacturers named are a basis as a standard of quality and substitutions of any equal product will be considered for acceptance. The judgement of equality of product substitution shall be made by the Engineer.
- B. Substitutions after award of contract shall be made only within fourteen (14) days after the notice to proceed. Furnish all required supporting data. The submittal of substitutions for review shall not be cause for time extensions.
- C. Where substitutions are offered, the substituted product shall meet the product performance as set forth in the specified manufacturer's current catalog literature, as well as meeting the details of the Contract Documents.
- D. The ~~details on the drawings and the~~ requirements of the specifications are based on the first listed item of material or equipment; if any other than the first listed materials or equipment is furnished, then assume responsibility for the correct function, operation, and accommodation of the substituted item. In the event of misfits or changes in work required, either in this Section or other Sections of the Contract, or in both; bear all costs in connection with all changes arising out of the use of other than the first listed item specified.

1.06 CUTTING AND PATCHING

- A. Cutting and patching required under this section shall be done in a neat workmanlike manner. Cutting lines shall be uniform and smooth.
- B. Use concrete saws for large cuts in concrete and core drills for small round cuts in concrete.
- C. Where openings are cut through masonry walls, provide lintel or other structural supports to protect the remaining masonry. Adequate support shall be provided during the cutting operation to prevent damage to masonry.
- D. Where large openings are cut through metal surfaces, attach metal angles around the opening.
- E. Patch concrete openings that are to be filled with non-shrinking cementing compound. Finish concrete patching shall be troweled smooth and shall be uniform with surrounding surfaces.

1.07 WATERPROOFING

- A. Provide waterproof flashing for each penetration of exterior walls and roofs.

- B. Flashing for conduit penetrations through built-up roofs shall be made with pitch pans filled with pitch. Conduit penetrations through poured concrete roofs shall be made with sleeves and annulus caulked.
- C. Penetrations through walls at below ground elevations shall be waterproofed by conduit sealing fittings or other methods as indicated.
- D. Interiors of raceways that are likely to have water ingress such as runs from hand holes into below-grade installations shall have water stops installed to prevent water from entering into installations.

1.08 EQUIPMENT PROTECTION

- A. Provide suitable protection for all equipment, work and property against damage during construction.
- B. Assume full responsibility for material and equipment stored at the site.
- C. Conduit openings shall be closed with caps or plugs during installation. All outlet boxes and cabinets shall be kept free of concrete, plaster, dirt, and debris.
- D. Equipment shall be tightly sealed against entrance of dust, dirt, and moisture.

1.09 CLEAN-UP

- A. Remove all temporary labels, dirt, paint, grease and stains from all exposed equipment. Upon completion of work, clean equipment and the entire installation so as to present a first class job suitable for occupancy. No loose parts or scraps or equipment shall be left on the premises.
- B. Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer, or with an approved paint.
- C. Clean interiors of each item of electrical equipment. At completion of work all equipment interiors shall be free from dust, dirt, and debris.

1.10 TESTS

- A. All equipment shall be put through a trial run-in test to ascertain the performance complies with the intent of the specifications. All-in tests shall be made in the presence of the Owner. All cables shall have an insulation test performed using 1000 volt megger.
- B. Cables installed with an insulation reading less than 50 megohms shall be removed and new cable installed and retested at no additional cost to the Owner.

1.11 RECORD DRAWINGS

- A. At the start and during the progress of the job, keep one separate set of blue-line prints for making construction notes and mark-ups.
- B. Show conduit routing and wiring runs as constructed and identify each.

- C. Record all deviations from the Contract Documents.
- D. Submit set of marked-up drawings for review.

1.12 OPERATIONS AND MAINTENANCE MANUALS

- A. Three (3) weeks prior to the completion of the project, compile an operations and maintenance manual on each item of equipment. These manuals shall include detailed instructions and maintenance, as well as spare parts lists.
- B. Submit Three (3) hard copies and One (1) electronic copy for review.

PART 2 - PRODUCTS

2.01 RACEWAYS

- A. Above ground conduit shall be schedule 40 galvanized steel and shall comply with Article 346 of NEC and U.L. standard UL-6. ANSI C 80
- B. Below grade conduit shall be non-metallic rigid PVC Schedule 40, rated 90 degrees Celsius and conform to NEMA TC-2 and UL-651 Standards, transitions to above ground to be made with PVC coated hot dipped rigid steel conduit.
- C. Connections to motors shall be made using liquid tight flexible conduit and shall consist of galvanized flexible interlocking steel core with thermoplastic cover.

2.02 CONDUIT FITTINGS

- A. Field applied hubs for sheet metal enclosures shall be galvanized steel ring, nylon throat, threaded NPT insert and shall be MYERS "SRU-TITE", or equal.
- B. Conduit hubs for non-metallic enclosures shall be fiberglass polyester reinforced with galvanized steel core, complete with lockout and grounding bushing and shall be Square D Type NH, or equal.
- C. Rigid metallic conduit chase nipples, slip fittings, unions, reducers shall be hot dipped galvanized steel.
- D. Rigid metallic conduit grounding bushings shall be hot dipped galvanized steel with threaded hub, nylon insulated throat, and ground lug.
- E. Liquid tight flexible conduit fittings shall be hot dipped galvanized steel body with internal locking ring.

2.03 CONDUIT BODIES AND BOXES

- A. Conduit bodies such as "C", "LB", "T" and the like pulling fittings shall be standard finish form 7. Covers shall be gasketed cast metal with stainless steel cover screws and clamp style attachment. Furnish Crouse-Hinds Form 7, or equal.

- B. Conduit bodies such as "GUA", "GUAT", "GUAL", and the like pulling/splicing fittings shall be standard finish form 7 with cast metal covers. All such conduit bodies shall be Crouse-Hinds GU/EA series, Appleton "GR" series, equal.
- C. Cast metal outlet boxes, pullboxes, and junction boxes whose volume is smaller than 100 cubic inches, and cast metal device boxes, shall be ferroalloy iron. All boxes shall have threaded hubs. Furnish Crouse-Hinds "FD" style Condulets, Appleton "FD" style Unilets, or equal.
- D. Covers for cast metal boxes shall be gasketed cast metal covers with stainless steel screws.

2.04 WIRE AND CABLE

- A. Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper.
- B. All conductors shall be stranded, except that lighting and receptacle wiring may be solid.
- C. Except for control, signal and instrumentation circuits, wire smaller than No. 12 AWG shall not be used.
- D. Wire for lighting, receptacles and other circuits not exceeding 150 Volts to ground shall be NEC Type THHN/THWN as manufactured by Okonite Co.; Southwire Co.; Pirelli Corp., or equal.
- E. Wire for circuits over 150 Volts to ground shall be NEC type THHN/THWN for sizes up to No. 6 AWG and Type XHHW for sizes No. 4 AWG and larger as manufactured by Okonite Co.; Southwire Co., or equal.
- F. Wire for control, status and alarm circuits shall be No.14 AWG NEC type THHN/THWN, stranded as manufactured by the Okonite Co.; Carol Cable Co. Inc. West; Pirelli Cable Corp. or equal.
- G. Multi-conductor control and power cables shall have stranded conductors with type THHN/THWN insulated, nylon conductor covering, and an overall PVC jacket covering the individual wires. Cable shall be TC rated meeting UL 1277 and IEEE 383 Standards. Cable shall be flame resistant, nonpropagating and suitable for installation in a Class I, Division II hazardous location and for direct burial in earth. Power and control cables shall be furnished with a green ground conductor. Power cables shall be furnished with a white neutral conductor where required to serve phase to neutral loads. Cable shall be as manufactured by the Okonite Co.; Southwire Co.; General Cable Co., or equal.
- H. Wire for process instrumentation signals (i.e. 1-5 VDC, 4-20 mA), R.T.D., potentiometer and similar signals shall be:
 - 1. Single pair cable:
 - a. Conductors: 2- No.18 stranded and twisted on 2-in lay

- b. Insulation: PVC with 300 Volt, 105 degree C rating
 - c. Shield: 100 percent mylar tape with drain wire
 - d. Jacket: PVC with UL Subject 13, UL 1581, and manufacturers identification
 - e. Max overall diameter: 0.262-in
 - f. Misc: UL listed for underground wet location use
 - g. Manufacturers: Belden No. 1030 or equal
2. Multiple pair cables (where shown on the Drawings):
- a. Conductor: Multiple 2-No. 22 stranded and twisted on a 2-in lay
 - b. Insulation: PVC with 300 Volt, 105 degree C rating
 - c. Shield: Individual pairs shielded with 100 percent mylar tape and drain wire
 - d. Jacket: PVC with UL Subject 13, UL 1581 manufacturers identification
 - e. Misc: UL listed for underground wet location use
 - f. Manufacturers: Belden No. 9330, 9331, 9332, 9333, 9334, 9335, 9336, 9337 or equal
- I. Splices for power wiring shall be compression type connectors insulated with a heat shrink boot or outer covering and epoxy filling. Splice kits shall be as manufactured by Raychem; Ideal Industries; 3M Co. or equal. Splices for power wiring shall not be made without the Engineer's approval.
- J. Motor connections shall be ring type mechanical compression terminations installed on the branch circuit wires and the motor leads and secured with bolt, nut and springwasher. Connections shall be insulated with a Raychem Gep Cap Insulating splice cover for 600v cable or equal.
- K. Termination connectors for control wiring shall be of the locking fork-end (upturned leg ends) type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or equal.
- L. Splices for control wiring shall not be permitted.
- M. Termination connectors for shielded instrumentation wiring shall be of the locking fork-end (upturned leg ends) type as manufactured by Ideal Industries; 3M Co.; Panduit Corp. or equal.

- N. Wire markers shall be "Omni-Grip" as manufactured by the W.H. Brady Co.; Thomas & Betts Co.; 3M Co. or equal.
- O. Wire and cables with diameters exceeding the capacity of the "Omni-Grip" shall be marked with pre-printed, self-adhesive vinyl tapes as manufactured by the W.H. Brady Co.; Panduit Corp. or equal.
- P. Direct buried cable warning tape shall be 6-in wide, red polyethylene not less than 0.0035-in thick. Tape shall be W.H. Brady Co., Cat. No. 91296 or equal.

2.05 WIRING DEVICES

- A. Wall switches shall be heavy duty, specification grade, toggle action, flush mounting quiet type. All switches shall conform to the latest revision of Federal Specification WS 896. Wall switches shall be of the following types and manufacturer:
 - 1. Single pole, 20 Amp, 120/277 Volt - Arrow-Hart, Catalog No. 1991, or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
 - 2. Double pole, 20 Amp, 120/277 Volt - Arrow-Hart, Catalog No. 1992, or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
 - 3. Three way, 20 Amp, 120/277 Volt - Arrow-Hart, Catalog No. 1993, or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
 - 4. Explosion-proof single pole factory sealed switches shall be for 20 Amp, 120/277 Volts, mounted in copper free aluminum or malleable iron cast boxes and be similar and equal to Crouse-Hinds EDS Series, or equal by Appleton Electric Co. or Killark.
- B. Receptacles shall be heavy duty, specification grade of the following types and manufacturer or equal. Receptacles shall conform to Federal Specification WC596-F.
 - 1. Duplex, 20 Amp, 125 Volt, 2P, 3W; Arrow-Hart, Catalog No. 5362, or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc.
 - 2. Weatherproof/corrosion resistant single, 20 Amp, 125 Volt, 2P, 3W, with cover; Crouse-Hinds Co., Catalog No. WLRS-5-20, or equal by Appleton Electric.
 - 3. Weatherproof/corrosion resistant duplex, 20 Amp, 125 Volt, 2P, 3W, with cover; Crouse-Hinds Co., Catalog No. WLRD-5-20 or equal by Appleton Electric.
 - 4. Ground fault interrupter, duplex, 20 Amp, 125 Volt, 2P, 3W, GFCI feed thru type with "test" and "reset" buttons. Arrow-Hart, Catalog No. GF5342 or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
 - 5. Single, "power lock," 20 Amp, 125 Volt, 2P, 3W; Arrow-Hart, Catalog No. 23030 and plug Arrow-Hart, Catalog No. 23035N or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.

6. Single, 20 Amp, 250 Volts, 2P, 3W; Arrow-Hart, Catalog No. 5861 or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
7. Single twist-lock, 20 Amp, 250 Volts, 2P, 3W; Arrow-Hart, Catalog No. 6210; plug: Arrow-Hart, Catalog No. 6212 or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
8. Single twist-lock, 30 Amp, 250 Volts, 2P, 3W; Arrow-Hart, Catalog No. 6340; plug: Arrow-Hart, Catalog No. 6342 or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.
9. Explosion-proof single, 20 Amp, 125 Amp, 2P, 3W; Appleton Electric, Catalog No. CPCI-2350 and plug, Appleton Electric, Catalog No. CPP-2033 or equal by Crouse-Hinds; Harvey Hubbell Inc.
10. Explosion-proof duplex, 20 Amp, 125 Volt, 2P, 3W; Appleton Electric, Catalog No. CPC2-2350 and plug, Appleton Electric, Catalog No. CPP-2023 or equal by Crouse-Hinds; Harvey Hubbell, Inc.

C. Device Plates

1. Plates for indoor flush mounted devices shall be of the required number of gangs for the application involved and shall be as follows:
 - a. Administration type buildings: Smooth, high impact nylon of the same manufacturer and color as the device. Final color to be as selected by the Owner.
 - b. Where permitted in other areas of the plant, flush mounted devices in cement block construction shall be Type 302 high nickel (18-8) stainless steel of the same manufacturer as the devices.
2. Plates for indoor surface mounted device boxes shall be cast metal of the same material as the box, Crouse-Hinds, No. DS23G and DS32G, or equal.
3. Oversized plates shall be installed where standard plates do not fully cover the wall opening.
4. Device plates for switches mounted outdoors or indicated as weatherproof shall be gasketed, cast aluminum with provisions for padlocking switches "On" and "Off," Crouse Hinds, No. DS185, or equal.
5. Multiple surface mounted devices shall be ganged in a single, common box and provided with an adapter, if necessary, to allow mounting of single gang device plates on multigang cast boxes.
6. Engraved device plates shall be provided where required.
7. Weatherproof, gasketed cover for GFI receptacle mounted in a FS/FD box shall be Arrow-Hart, Catalog No. 4501-FS or equal by Harvey Hubbell, Inc.; Pass & Seymour, Inc. or equal.

2.06 CONNECTORS

- A. Mechanical connectors shall be copper alloy bolted pressure type with bronze hardware.
- B. Insulated spring-wire connectors, "wire-nuts", for small building wire taps and splices shall be plated spring steel with thermoplastic jacket. Connector shall be rated at 150 degrees Celsius continuous. Furnished 3M "Hyflex", T&B "PT" or equal.
- C. Insulated set-screw connectors shall consist of copper body with flame-retardant plastic insulated shield. Furnished Ideal, T&B, or equal.
- D. Connectors for control conductor connections to screw terminals shall be crimp-type with vinyl insulated barrel and tin-plated copper ring-tongue style connector. Furnish T&B "Sta-kon", 3M "Scotchlok", or equal.

2.07 INSULATING PRODUCTS

- A. Tape products shall be furnished as hereinafter specified and shall be Plymouth, Okonite, F.E., 3M, or equal.
- B. General purpose electrical tape shall be 7 mil thick stretchable vinyl plastic, pressure adhesive type, "slipknot Grey", 3M Scotch 33+, or equal.
- C. Insulating void-filling tape and high voltage bedding tape shall be stretchable ethylene propylene rubber with high-tack and fast fusing surfaces. Tape shall be rated for 90 degrees Celsius continuous, 130 degrees Celsius overload, and shall be moisture-proof void filling tape shall be "plysafe", 3M Scotch 23, or equal.
- D. High temperature protective tape shall be rated 180 degrees Celsius continuous indoor/outdoor, stretchable, self-bonding silicone rubber. High temperature tape shall be "Pylsil #3445", 3M Scotch 70, or equal.
- E. Insulation putty filler-tape shall be Plymouth #2074, 3M, or equal.

2.08 LABELS

- A. Colored banding tape shall be 5 mil stretchable vinyl with permanent solid color. Color shall be as hereinafter specified. Tape shall be Plymouth "Slipknot 45", 3M Scotch #35, or equal.
- B. Numbered marking labels shall be colored vinyl markers, T&B, Brady, or equal.
- C. Cable identification labels shall be water resistant polyester with blank write-on space, T&B, Brady, or equal.
- D. Buried conduit marking tape for marking path of buried conduits shall be a four (4") inch nominal width strip of polyethylene with highly visible, repetitive marking "BURIED CONDUIT", or similar language, along its length.
- E. Nameplates shall be micarta lamicoïd material, 1/6" thick, black background with white engraving. Attachment means shall be self-tapping stainless steel screws.

2.09 GROUND DEVICES

- A. Exothermally welded joints shall be made with Enrico "cadweld", Burndy "Thermweld", or equal kits.
- B. Ground bus connectors shall be Square D type "LU", OZ Type "XLH", or equal.
- C. Conduit grounding bushings shall be as specified under CONDUIT FITTINGS.
- D. Equipment connections to ground mat shall be Burndy Weld Ground Plates or equal.

2.10 SUPPORTING DEVICES

- A. Mounting hardware, nuts, bolts, lock washers, and washers, shall be grade 304 stainless steel.
- B. Unless otherwise indicated, slotted channel framing and supporting devices shall be manufactured of 316 stainless steel. Clamp nuts for use with slotted channels shall be grade 304 stainless steel.
- C. Conduit straps for use with slotted channels shall be aluminum with stainless steel hardware.
- D. After-set concrete inserts shall consist of stainless steel expansion bolts, 1/4" minimum diameter, 500 lbs. minimum pull-out resistance. Furnish Phillips, Wej-it, or equal.
- E. Hanger rod shall be 3/8" minimum diameter galvanized steel all-thread.
- F. Nest-back or clamp-back conduit supports shall be two-piece hot-dip galvanized malleable iron devices. Furnish Crouse-Hinds "MW + CB", Gedney 140 series, or equal.
- G. One-hole conduit clamps shall be hot-dipped galvanized malleable iron type, Crouse-Hinds type "MW", T&B 1270/1280 series, or equal.
- H. Conduit "U" bolts shall be hot-dip galvanized steel with galvanized hex-head bolts.
- I. Plastic saddles for supporting buried conduits shall be interlocking type that provides separation between conduits vertically and laterally and between bottom of conduits and trench floor.

2.11 MISCELLANEOUS MATERIAL

- A. Double bushing for insulating wiring through sheet metal panels shall consist of mating male and female threaded phenolic bushings. Phenolic insulation shall be high-impact "ABB", Gedney type "ABB", or equal.
- B. Cable grips shall be 316 stainless steel grip-type wire mesh with machined metal support. Furnish Kellems, Appleton, or equal products.
- C. Conduit pull-cords for use in empty raceways shall be glass-fiber reinforced tape with foot-marked along its length. Furnish Thomas, Greenlee, or equal products.

- D. Conduit thread coating compound shall be conductive, non-galling, and corrosion-inhibiting. Furnish Crouse-Hinds type "STL", Appleton type "ST", or equal.
- E. Wire pulling compound shall be non-injurious to insulation and to conduit and shall be lubricating, non-crumbling, and non-combustible. Furnish Gedney "Wire-Quick", Ideal "Yellow", or equal.
- F. Plastic compound for field-coating of ferrous material products shall be PVC in liquid form that sets-up semi-hard upon curing. Furnishing Rob Roy "rob Kote", Sedco "Patch Coat", or equal.
- G. Zinc spray for coating electrogalvanized steel products shall be Research Laboratory type "LPS", Mobil "Zinc-spray", or equal.
- H. Splicing kit shall be provided with insulating and sealing compound to provide a moisture-tight splice. Provide Scotchcast Series 82 or equal splicing kit.

2.12 LIGHTING

- A. Fixture and lamps shall be furnished as per the lighting fixture schedule.
- B. Each fixture shall be complete with its appropriate hardware, finish trim, and appurtenances as required for a finished installation.

2.13 PANELBOARDS

- A. Panelboards shall have copper busses and voltage, overcurrent devices and features as indicated.
- B. Breakers shall be plug-on type, trip-free. Multipole breakers shall be provided with a common internal trip which opens all poles simultaneously and with a single operating handle for all poles. Handle ties between breakers are not acceptable.
- C. Breakers for 480V distribution panels shall be rated at least 22000 amps I.C., and breakers for 120/208V panels shall be rated at least 10,000 amps I.C.
- D. Provide ground bus inside each cabinet. Panelboard shall have an internally mounted TVSS surge protective device. Surge protective device shall be SurgeLogic as manufactured by Square D or approved equal.
- E. Enclosures shall be NEMA4 surface mounted cabinet with gasketed, hinged door, inside gutter trim and with door mounted directory pocket. All metal surfaces shall be painted with baked-on acrylic enamel.

2.14 SAFETY SWITCHES

- A. Safety switches shall be fused or non-fused as indicated. Each fused type switch shall be equipped with class R refection clips.
- B. Switch mechanism in each safety switch shall be quick-make, quick-break, heavy-duty type that meets Federal Specification W-S-865C.

- C. Enclosures shall be NEMA types as indicated. NEMA 4X types shall be 316 stainless steel with gasketed door and stainless steel hardware.
- D. Conduit hubs for NEMA 4X enclosed safety switches shall be galvanized steel ring, nylon throat, threaded NPT insert and shall be MYERS "SCRU-TITE".
- E. Each enclosure shall be equipped with ground lug.
- F. Where indicated furnish disconnect mechanism with auxiliary control disconnect contact rated 10 amp make, 6 amp break 120V A. C., 35% p.f.
- G. Where indicated furnish NEMA 4X safety switches with integrally mounted pilot operators.
- H. NEMA 4X safety switches shall be 316 stainless steel furnish Square D or equal.

PART 3 - INSTALLATION

3.01 RACEWAYS

- A. Install the conduit system to provide the facility with the utmost degree of reliability and maintenance free operation. The conduit system shall have the appearance of having been installed by competent workmen. Kinked conduit, conduit inadequately supported or carelessly installed, do not give such reliability and maintenance free operation and will not be accepted.
- B. Raceways shall be installed for all wiring runs except as otherwise indicated.
- C. Conduit sizes, where not indicated, shall be N.E.C. code-sized to accommodate the number and diameter of wires to be pulled into the conduit. Unless otherwise indicated, 3/4" trade-size shall be minimum size conduit.
- D. Unless otherwise noted, conduit runs shall be installed exposed. Such runs shall be made parallel to the lines of the structure.
- E. Rigid metallic conduit runs shall have their couplings and connections made with screwed fittings and shall be made up wrench-tight. Check all threaded conduit joints prior to wire pull.
- F. All conduit runs shall be watertight over their lengths of run except where drain fittings are indicated. In which cases, install specified breather-drain fittings.
- G. Plastic jacketed flexible steel conduit shall be used to connect wiring to motors, limit switches, bearing thermostats, and other devices that may have to be removed for servicing. Unless otherwise indicated, maximum lengths of flex shall be six (6) feet.
- H. Each flex connector shall be made-up tightly so that the minimum pull-out resistance is at least 150 lbs.

- I. Empty conduits shall have pull-tape installed. Identify each terminus as to location of other end. Use blank plastic waterproof write-on label and write information on each label with waterproof ink. Cap exposed ends of empty conduit with plastic caps.
- J. Conduit runs into boxes, cabinets, and enclosures shall be set in a neat manner. Vertical runs shall be set plumb. Conduits set cocked or out of plumb will not be acceptable.
- K. Conduit entrances into equipment shall be carefully planned. Cutting away of enclosure structure, torching out sill or braces, and removal of enclosure structural members, will not be acceptable.
- L. Use approved hole cutting tools for entrances into sheet metal enclosure. Use of cutting torch or incorrect tools will not be acceptable. Holes shall be cleanly cut and they shall be free from burrs, fagged edges, and torn metal.
- M. All raceways shall be swabbed clean after installation. There shall be no debris left inside. All interior surfaces shall be smooth and free from burrs and defects that would injure wire insulation. All conduits shall be sealed after cable installation with electrical insulation putty.

3.02 CONDUIT BODIES AND BOXES

- A. Conduit bodies such as “LB”, “T”, etc., shall be installed in exposed runs of conduit wherever indicated and where required to overcome obstructions and to provide pulling access to wiring. Covers for such fittings shall be accessible and unobstructed by the adjacent construction.
- B. Covers for conduit bodies installed shall be gasketed cast metal type.
- C. All conduit boxes installed shall be cast metal type. Covers for all such boxes shall be gasketed cast metal type.

3.03 RACEWAY SUPPORT

- A. All raceway systems shall be adequately and safely supported. Loose, sloppy and inadequately supported raceways will not be acceptable. Supports shall be installed at intervals not greater than those set forth under Article 300 of N.E.C., unless shorter intervals are otherwise indicated, or unless conditions require shorter intervals of supports.
- B. Surface mounted runs of conduit on concrete or masonry surfaces shall be supported off the surface by means of 316 stainless steel slotted channels and conduit clamps. Attach each slotted channel support to concrete surface by means of two (2) 1/4" diameter stainless steel bolts into drilled expansion shields.
- C. Conduit runs that are installed along metallic structures shall be supported by means of beam clamps or other methods as may be indicated. Coat each beam clamp with PVC prior to installation.
- D. Below-grade conduits shall be supported with plastic saddles.

3.04 WIRING

- A. All control wiring, 120/208V wiring and insulated equipment grounding conductors shall be type THWN insulated stranded copper conductors.
- B. All 480V wiring in sizes #4/0 and larger shall be made with type THWN wire with stranded copper conductors.
- C. All 480V wiring in sizes smaller than #4/0 shall be installed with type THWN insulated stranded copper conductors.
- D. Branch circuits may be spliced for receptacle, lighting and small appliances load inside appropriate junction boxes. All control and power cables shall be run continuous without splices except where approved by the Engineer.
- E. Except as otherwise specified, taps and splices with #10 AWG and smaller shall be made with insulated spring wire connectors. Such connectors in damp or wet locations shall be further insulated with an envelope of stretched piece of EPR tape around each wire to fill the interstices between the wires. Then, apply one-half lapped layer of electrical tape over all.
- F. Motor connections made with #10 AWG and smaller wire shall be made up with set-screwed copper lugs with threaded-on insulating jacket. After make-up of each connector, install two (2) layers half-lapped, high temperature tape over connector barrel and down over wires into connector on (1") inch.
- G. Motor connections made with #8 AWG and larger wire shall be made up with cast copper alloy splice connector. Apply over each connector and down 1.5 inches over each wire entry, wrapping in high temperature tape. Apply at least three (3) layers, half-lapper each layer of such tape with maximum built-up over the connector. Then apply final wrapping of at least three (3) layers, half-lapped each layer of electrical tape.
- H. Taps, splices, and connection in #8 AWG and larger wires shall be made with copper alloy bolted pressure connectors. Each such connector shall be insulated by means of applying insulation putty over sharp edges so as to present a smooth bonding surface. Next, apply at least four (4) layers, half-lapped each layer of EPR tape. Then, make final wrapping of at least three (3) layers, half-lapped each layer of electrical tape.
- I. Control wiring connections to stud type and screw type terminals shall be made with ring-tongue type crimp connectors. Label each terminal jacket with wire marking label at each connection.
- J. Each wire connection shall be made up tightly so that resistance of connection is as low as equivalent length of associated conductor resistance.
- K. Phase label black pigmented power wires with color banding tape. Color of tape applies shall be that specified on the next page.

CONDUCTOR	120/208V SYSTEMS	480V SYSTEMS
Phase A	Black	Purple
Phase B	Red	Brown
Phase C	Blue	Yellow
Neutral	White	Gray
Equipment Ground	Green	Green

- L. Numbered labels shall be installed to identify circuit numbers from panel boards. Install labels on each wire in each panelboard, junction, pullbox and device connection.
- M. Label each wiring run with write-on waterproof labels inside each motor control center and in service switchboard. Install write-on label ties around wire group at conduit entrance and write-on label the wire size, and service.
- N. Install numbered marking on each control wiring termination at each terminal strip and at each device. Do this in motor control center, terminal cabinets, safety switches, remote controllers, pilot operators, and instrumentation equipment. Number selected shall correspond to number on terminal strip.
- O. All wiring inside enclosures will be neatly trained and laced with nylon tie-wraps.
- P. All wiring shall be installed in raceways unless otherwise noted; however, no wire shall be drawn into a conduit until all work of a nature which may cause injury is completed. Do not exceed wire and cable manufacturer's recommended pulling tensions. A cable pulling compound shall be used as a lubricant and its composition shall not affect the conductor or its insulation.

3.05 WIRING DEVICES

- A. Install wiring devices where indicated. Wiring devices shall be type indicated.
- B. Each wiring device shall be set with axis plumb and installed with yoke screw so as to adequately support device yokes to the box.
- C. Device boxes shall be cast metal Condulets or equal.
- D. Use ganged boxes for ganged devices.
- E. Each device box shall be equipped with specified cast metal cover.

3.06 GROUNDING

- A. Each item of equipment shall be adequately and thoroughly grounded. Comply with Article 250 of N.E.C., except where higher standards of grounding have been specified.
- B. Equipment grounding conductors (EGC) shall be installed where indicated. These wires shall be green colored in sizes #6 AWG and smaller and green banded in larger sizes.
- C. EGC runs into equipment and shall be grounded to equipment bus where available, or to equipment ground lugs.

- D. Where grounding type bushings are installed, bond EGC thereto and furthermore ground each bushing lug to equipment ground bus or ground lug, or ground rod.
- E. In each motor terminal box, install equipment ground lug and connect EGC thereto.
- F. In each floodlight pole, install ground connector to pole and bond to conduit bushing and to EGC in branch circuit.

3.07 LABELING

- A. In addition to requirements for labeling as specified throughout this section, install as follows:
 - 1. Phase bank each power wire and cable with colored banding tape. Do this at each termination.
 - 2. Apply numbered wire marking labels to control wires; power wiring in panelboards, pull and junction boxes, and at outlets to identify circuit numbers. Each control wire shall be labeled at each connection.
 - 3. Apply write-on identification labels to wiring sets in each hand-hole to identify function. Use waterproof labels.
 - 4. Apply write-on identification labels to empty conduits to identify each with information as to terminus of other end and also trade size of conduit.
 - 5. Install micarta nameplates with engraving to identify function and/or load served for the following:
 - a. Starters and switchboard
 - b. Overcurrent Devices
 - c. Safety Switches
 - d. Instruments
 - e. Flowmeters
 - f. Vendor panels
 - g. Control panels
 - h. Motor Control Centers
- B. Micarta nameplates shall be attached with stainless steel screws, use two (2) per each nameplate.
- C. Submit for review a schedule for engraving along with size for each proposed micarta nameplate. Do not fabricate nameplate until review has been completed.

D. Type circuit directory information on circuit directory cards on all panelboards.

END OF SECTION

SECTION 116000.1

STAINLESS STEEL SLIDE & WEIR GATES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to install, ready for operation and field test stainless steel gates and appurtenances ~~as shown on the Contract Drawings and~~ as specified herein.
- B. The gates and appurtenances shall be supplied in accordance with the latest edition of AWWA C561 Standard for Fabricated Stainless Steel Slide Gates as modified herein. The allowable leakage rate for the stainless steel gates in this specification shall be 1/2 the allowable leakage listed in the latest revision of AWWA C561.

1.02 SUBMITTALS

- A. Provide the following information to confirm compliance with the specification in addition to the submittal requirements specified in Section 01330.
 - 1. Complete description of all materials including the material thickness of all structural components of the frame and slide.
 - 2. Installation drawings showing all details of construction, details required for installation, dimensions and anchor bolt locations.
 - 3. Maximum bending stress and deflection of the slide under the maximum design head.
 - 4. The location of the company headquarters and the location of the principle manufacturing facility. Provide the name of the company that manufactures the equipment if the supplier utilizes an outside source.

1.03 QUALITY ASSURANCE

- A. Qualifications
 - 1. All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20 years of experience designing and manufacturing water control gates. The manufacturer shall have manufactured water control gates for a minimum of 50 projects and at least 5 projects of similar design within the last 5 years.
 - 2. The specification is based on the FC-SS Series Stainless Steel Gate as manufactured by Mechanical Associates of Fresno, CA.

PART 2 EQUIPMENT

2.01 GENERAL

- A. Gates shall be as specified herein and have the characteristics and dimensions shown in Section 01010 Part 2.
- B. Leakage shall not exceed 0.05 gpm/ft of wetted seal perimeter in seating head and unseating head conditions.
- C. The gate shall utilize self-adjusting seals. Due to the difficulty of accessing gates when they are in service, gates that utilize adjustable wedges, wedging devices or pressure pads are not acceptable.
- D. All structural components of the frame and slide shall be fabricated of stainless steel having a minimum thickness of 1/4-inch and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
- E. All welds shall be performed by welders with AWS certification and when required, weld burn and welds shall be passivated.
- F. Finish: Mill finish on stainless steel. All iron and steel components shall be properly prepared and shop coated with a primer.
- G. Materials:

<u>Components</u>	<u>Materials</u>
Frame Assembly, Yoke, & Retainers	Stainless Steel, Type 304L or 316L, ASTM A240
Slide and Stiffeners	Stainless Steel, Type 304L or 316L, ASTM A240
Stem	Stainless Steel, Type 304 or 316L, ASTM A276
Fasteners, Nuts and Bolts	Stainless Steel, Type 304 or 316L, ASTM A276
Flush Bottom	Neoprene ASTM D-2000 or EPDM
Seat/Seals and Facing	Ultra-High Molecular Weight Polyethylene ASTM D4020
Lift Nuts	Bronze ASTM B584
Pedestals and Wall Brackets	Stainless Steel, Type 304L or 316L, ASTM A276
Operator Housing	Cast aluminum or ductile iron

2.02 FRAME

- A. The frame assembly, including the guide members, invert member and yoke members, shall be constructed of a one piece formed stainless steel plate with a minimum thickness of 1/4-inch.
 - 1. Frame design shall allow for embedded mounting, mounting directly to a wall with stainless steel anchor bolts and grout or mounting to a wall thimble with stainless steel mounting studs and a mastic gasket material. ~~Mounting style shall be as shown on the Contract Drawings.~~

2. All wall mounted or wall thimble mounted gates shall have a flange frame. Flat frame gates are not acceptable.
3. The structural portion of the frame that incorporates the seat/seals shall be formed into a one-piece c-channel shape for rigidity.
4. Gussets shall be provided as necessary to support the guide members in an unseating head condition. The gussets shall extend to support the outer portion of the guide assembly and shall be positioned to ensure that the load is transferred to the anchor bolts or the wall thimble studs.
5. The frame shall extend to accommodate two thirds the height of the slide when the slide is in the fully opened position on upward opening gates or downward opening weir gates.
6. On self-contained gates, a yoke shall be provided across the top of the frame. The yoke shall be formed by a single formed structural member or two structural members affixed to the top of the side frame members to provide a one-piece rigid assembly. The yoke shall be designed to allow removal of the slide.
7. A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flush bottom type on upward opening gates.
8. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.
9. A rigid stainless steel member shall be provided across the invert of the opening on downward opening weir gates.

2.03 SLIDE

- A. The slide and reinforcing stiffeners shall be constructed of stainless steel plate. All structural components shall have a minimum thickness of 1/4-inch.
 1. The slide shall not deflect more than $1/720$ of the span or $1/16$ inch, whichever is smaller, under the maximum design head.
 2. Stiffeners shall be welded on the outside of the horizontal stiffeners for additional reinforcement.
 3. The stem connector shall be constructed of two angles or formed plates. The stem connector shall be welded to the slide. A minimum of two bolts shall connect the stem to the stem connector.

2.04 SEALS

- A. All gates shall be provided with a self-adjusting UHMW polyethylene seal system to restrict leakage in accordance with the requirements listed in this specification.

1. All gates shall be equipped with UHMW polyethylene seat/seals to restrict leakage and to prevent metal to metal contact between the frame and slide.
2. The seat/seals shall extend to accommodate 2/3 of the slide when gate is fully opened.
3. All upward opening gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member or the bottom of the slide.
4. All downward opening weir gates shall be provided with UHMW polyethylene seat/seals across the invert member.
5. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.
6. All side seals must be bolted or otherwise mechanically fastened to the frame or slide.
7. The seals shall be mounted so as not to obstruct the water way opening.
8. Gates that utilize rubber “J” seals or “P” seals are not acceptable.
9. The seal system shall have been factory tested to confirm negligible wear (less than 0.01”) and proper sealing. The factory testing shall consist of an accelerated wear test comprised of a minimum of 30,000 open-close cycles using a well-agitated sand/water mixture to simulate fluidized grit.

2.05 STEM

- A. A threaded operating stem shall be utilized to connect the operating mechanism to the slide. On rising stem gates, the threaded portion shall engage the operating nut in the manual operator or motor actuator. On non-rising stem gates, the threaded portion shall engage the nut on the slide.
1. The threaded portion of the stem shall have a minimum outside diameter of 1-1/2 inches.
 2. The stem shall be constructed having a tensile strength of not less than 90,000 psi for stems that are 3 inches or less in diameter. Stems that are in excess of 3 inches in diameter shall have a tensile strength of 85,000 psi.
 3. The stem shall be threaded to allow full travel of the slide unless the travel distance is otherwise indicated ~~shown on the Contract Drawings~~.
 4. Maximum L/R ratio for the unsupported part of the stem shall not exceed 200.
 5. In compression, the stem shall be designed for a critical buckling load caused by a 40 lb effort on the crank or handwheel with a safety factor of 2, using the Euler column formula.

6. The stem shall be designed to withstand the tension load caused by the application of a 40 lb effort on the crank or handwheel without exceeding 1/5 of the ultimate tensile strength of the stem material.
7. The threaded portion of the stem shall have machine rolled threads of the Acme type with a 16 micro inch finish or better.
8. Stems of more than one section shall be joined by stainless steel or bronze couplings. The coupling shall be bolted to the stems.
9. Stems, on manually operated gates, shall be provided with adjustable stop collars or slide stops to prevent over closing of the slide.

2.06 STEM GUIDES

- A. Stem guide shall be provided when necessary to ensure that the maximum L/R ratio for the unsupported part of the stem is 200 or less.
 1. Stem guide brackets shall be fabricated of stainless steel and shall be outfitted with UHMW or bronze bushings.
 2. Adjustable in two directions.

2.07 WALL THIMBLES

- A. Wall thimbles shall be provided when indicated ~~shown on the Contract Drawings~~.
 1. The wall thimble depth shall be equal to the thickness of the concrete wall in which the thimble is to be mounted.
 2. Wall thimbles shall be fabricated stainless steel construction of adequate section to withstand all operational and reasonable installation stresses.
 3. Wall thimbles shall be constructed of 1/4-inch minimum thickness stainless steel and the front face shall have a minimum thickness of 1/4-inch.
 4. The fabrication process shall ensure that the wall thimble is square and plumb and the front face is sufficiently flat to provide a proper mounting surface for the gate frame.
 5. A water stop shall be welded around the periphery of the thimble. Wall thimbles shall be designed to allow thorough and uniform concrete placement during installation.
 6. Studs and nuts shall be stainless steel. Water stop must be continuous welded.
 7. A suitable gasket or mastic shall be provided by contractor to seal between the gate frame and the wall thimble.

2.08 MANUAL OPERATORS

- A. Unless otherwise indicated ~~shown on the Drawings~~, gates shall be operated by a manual handwheel or a manual crank-operated gearbox. The operator shall be mounted on the yoke of self contained gates or on the pedestal of non-self contained gates.
1. The gate manufacturer shall select the proper gear ratio to ensure that the gate can be operated with no more than a 40 lb effort when the gate is in the closed position and experiencing the maximum operating head.
 2. An arrow with the word "OPEN" shall be permanently attached or cast onto the operator to indicate the direction or rotation to open the gate.
 3. Handwheel operators shall be fully enclosed and shall have a cast ductile iron housing.
 - a. Handwheel operators shall be provided with a threaded cast bronze lift nut to engage the operating stem with UHMW PE bearings for standard lifts.
 - b. Handwheel operators may be equipped with roller bearings above and below the operating nut when required.
 - c. Positive mechanical seals can be provided above and below the operating nut to exclude moisture and dirt and prevent leakage of lubricant out of the hoist when required.
 - d. The handwheel shall be removable and shall have a minimum diameter of 14 inches.
 4. Crank-operated gearboxes shall be fully enclosed and shall have a cast aluminum or ductile iron housing.
 - a. Gearboxes shall have either single or double gear reduction depending upon the lifting capacity required.
 - b. Gearboxes shall be provided with a threaded cast bronze lift nut to engage the operating stem.
 - c. Bearings shall be provided above and below the flange on the operating nut to support both opening and closing thrusts.
 - d. Gears shall be steel with machined cut teeth designed for smooth operation.
 - e. The pinion shaft shall be supported on ball or tapered roller bearings.
 - f. Positive mechanical seals shall be provided on the operating nut and the pinion shafts to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.
 - g. The crank shall be aluminum or stainless steel with a revolving grip.
 - h. The crank shall be removable.
 5. All gates having widths greater than twice their height shall be provided with two gearboxes connected by an interconnecting shaft for simultaneous operation.
 - a. Interconnecting shafting shall be constructed of aluminum or stainless steel.
 - b. Universal style couplings shall be provided at each end of the interconnecting shaft.
 - c. One crank shall be provided to mount on the pinion shaft of one of the gearboxes.
 6. An extended operator system utilizing chain and sprockets shall be furnished by the manufacturer when the centerline of the crank or handwheel, on a non-gear operator, is located over 48-in above the operating floor. Chain wheels are not acceptable.

- a. A removable stainless steel or aluminum cover shall be provided to enclose chain and sprockets.
 - b. The extended operator system shall lower the centerline of the pinion shaft to 36-in above the operating floor.
 - c. A handwheel may be utilized in conjunction with a gearbox in lieu of the extended operator system if the centerline of the pinion shaft is 60-in or less above the operating floor.
7. Pedestals shall be constructed of stainless steel. Aluminum pedestals are not acceptable.
- a. The pedestal height shall be such that the handwheel or pinion shaft on the crank-operated gearbox is located approximately 36-in above the operating floor.
 - b. Wall brackets shall be used to support floor stands where indicated ~~shown on the Drawings~~ and shall be constructed of stainless steel.
 - c. Wall brackets shall be reinforced to withstand in compression at least two times the rated output of the operator with a 40 lb effort on the crank or handwheel.
 - d. The design and detail of the brackets and anchor bolts shall be provided by the gate manufacturer and shall be approved by the ENGINEER. The gate manufacturer shall supply the bracket, anchor bolts and accessories as part of the gate assembly.
8. Operators shall be equipped with fracture-resistant clear butyrate plastic stem covers.
- a. The top of the stem cover shall be closed.
 - b. The bottom end of the stem cover shall be mounted in a housing or adapter for easy field mounting.
 - c. Stem covers shall be complete with indicator markings to indicate gate position.
9. When indicated ~~shown on the Contract Drawings~~, provide 2 inch square nut, mounted in a floor box, with a non-rising stem.
- a. The square nut shall be constructed of stainless steel.
 - b. The floor box shall be constructed of stainless steel and shall be set in the concrete floor above the gate as shown.
 - c. Provide one aluminum or stainless steel T-handle wrench for operation.

2.09 ELECTRIC MOTOR ACTUATORS

A. See Section 13446.1.

2.10 ANCHOR BOLTS

- A. Anchor bolts shall be provided by the gate manufacturer for mounting the gates and appurtenances.
- 1. Quantity and location shall be determined by the gate manufacturer.
 - 2. If epoxy type anchor bolts are provided, the gate manufacturer shall provide the studs and nuts.

3. Anchor bolts shall have a minimum diameter of 1/2-inch.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation of the gates and appurtenances shall be done in a workmanlike manner. It shall be the responsibility of the CONTRACTOR to handle, store and install the equipment specified in this Section in strict accordance with the manufacturer's recommendations.
- B. The CONTRACTOR shall review the installation drawings and installation instruction prior to installing the gates.
- C. The gate assemblies shall be installed in a true vertical plane, square and plumb.
- D. The CONTRACTOR shall fill the void in between the gate frame and the wall with non-shrink epoxy grout as shown on the installation drawing and in accordance with the manufacturer's recommendations.
- E. The CONTRACTOR shall add a mastic or neoprene gasket between the gate frame and wall thimble (when applicable) in accordance with the manufacturer's recommendations.

3.02 FIELD TESTING

- A. After installation, all gates shall be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section. Each gate shall be cycled to confirm that they operate without binding, scraping, or distorting. The effort to open and close manual operators shall be measured, and shall not exceed the maximum operating effort specified above. Electric motor actuators shall function smoothly and without interruption. Each gate shall be water tested by the CONTRACTOR, at the discretion of the OWNER, to confirm that leakage does not exceed the specified allowable leakage.

END OF SECTION

BID PROPOSAL

To: The County of Webb, Laredo, Texas
Honorable Judge Tano Tijerina

From: _____
Contractor

Address: _____

Phone: _____

Fax: _____

Project:

Pursuant to Notice to Bidders, the undersigned bidder hereby proposes to furnish the labor, materials, and equipment in accordance with the plans and specifications, general conditions of the agreement, special provisions of the Agreement, and Addenda, if any. The bidder binds himself upon acceptance of his proposal to execute a contract and bonds accompanying form of performing and completing the said work within the time stated as required by the detailed specifications at the following unit prices. The quantities shown below are based on the Engineer's estimate of quantities and it is agreed that the quantities may be increased or diminished, and may be considered necessary in the opinion of Webb County, Texas to complete the work fully as planned and contemplated, and that all quantities of work, either increased or decreased, are to be performed at the unit prices set forth below (except as provided in the General Conditions of the Agreement or the specifications, the contract documents).

Acknowledgment of Addenda: (Please initial and date):

Addendum No. 1: _____

Addendum No. 2: _____

Addendum No. 3: _____

Addendum No. 4: _____

Addendum No. 5: _____

Acknowledgment of other documents: (Please initial and date):

Wage Determination: _____

Labor Provisions: _____

Affirmative Action Program: _____

Project: Rio Bravo Water Treatment Plant Valve and Actuator Improvements

Form of Non-Collusive Affidavit

A F F I D A V I T

STATE OF TEXAS {}
COUNTY OF WEBB {}

_____ being first duly sworn, deposes and says

That he is _____
(a Partner or Officer of the firm of, etc.)

the party making the foregoing proposal or bid, that such proposal or bid is genuine and not collusive or sham; that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any Bidder or Person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the bid price or affiant or of any other Bidder or to fix any overhead, profit or cost element of said bid price, or of that of any other Bidder, or to secure any advantage against the County of Webb, Texas or any person interested in the proposed Contract; and that all statements in said proposal or bid are true.

Signature of

Bidder, if the Bidder is an individual
Partner, if the Bidder is a Partnership
Officer, if the Bidder is a Corporation

Subscribed and sworn before me this _____ day of _____, 20__.

Notary Public

My Commission expires

STATEMENT OF MATERIALS AND OTHER CHARGES

PROJECT: Rio Bravo Water Treatment Plant Valve and Actuator Improvements

MATERIALS INCORPORATED INTO THE PROJECT: \$ _____

ALL OTHER CHARGES: \$ _____

*TOTAL: \$ _____

*This total must agree with the total figure shown in the Item and Quantity Sheets in the bound contract.

For purposes of complying with the Texas Tax Code, the Contractor agrees that the charges for any material incorporated into the project in excess of the estimated quantity provided for herein will be no less than the invoice price for such material to the Contractor.

NOTE: ONLY THE COPY OF THIS FORM IN THE BOUND CONTRACTS IS TO BE FILLED OUT.

**INFORMATION FROM BIDDERS
MUST BE COMPLETED AND SUBMITTED WITH BID PROPOSAL**

Project: Rio Bravo Water Treatment Plant Valve and Actuator Improvements

Statement of Qualifications: (Similar Projects Completed by Bidder)

1. Name of Project: _____
Value of Contract: _____
Date Completed: _____
2. Name of Project: _____
Value of Contract: _____
Date Completed: _____
3. Name of Project: _____
Value of Contract: _____
Date Completed: _____

Experience Data: (Include name and experience record of the Superintendent)

Financial Status: A confidential financial statement will be submitted by the apparent successful low Bidder only if the Owner deems it necessary.

NOTE: TO BE SUBMITTED UPON REQUEST

IS NOT AN ACCEPTABLE ANSWER.

Project: Rio Bravo Water Treatment Plant Valve and Actuator Improvements

Proposed Progress Schedules:

Data on Equipment to be used on the Work: (Include the number of machines, the type, capacity, age and conditions and location)

Subcontractors: (Submit a list of proposed Subcontractors. List sources, types and manufacturers of proposed materials)

**NOTE: TO BE SUBMITTED UPON REQUEST
IS NOT AN ACCEPTABLE ANSWER.**

**WEBB COUNTY
RIO BRAVO WATER TREATMENT PLANT
BID SCHEDULE**

**PROJECT: Rio Bravo Water Treatment Plant Valve and Actuator Improvements
BASE BID**

Description of item with Unit Price Written in Words	Unit	Estimated Qty.	Unit Bid Price	Amount
Installation of new valves, actuators, and electrical materials as required, including mobilization of equipment and disposal of debris; all work complete, in place, ready to use for the lump sum of: _____dollars and _____cents.	LS	1 ea	\$	\$

TOTAL BID AMOUNT _____

TOTAL BID WRITTEN IN WORDS:

Note 1: Any work required to complete the project per plans, specifications, and contract documents and not specifically shown in the "Bid Proposal" must be performed and costs shall be considered subsidiary to other items in the "Bid Proposal."

Note 2: For any conflict for measurement and payment items shown in the plans, standard or technical specifications, or drawings of this project the items shown in the "Bid Proposal" and "Bid Schedule" will prevail and be the only items to be used for project payment; complete, in place and ready to use.

Contractor

Signature Title

Address City/State Zip Code

Telephone Number:() _____

Fax Number:() _____

Date: _____

NOTE: FINAL PAYMENT FOR BID ITEMS SHOWN IN BID PROPOSAL AND SCHEDULED WILL BE PAID FOR WHEN COMPLETE IN PLACE, TESTED, AND ACCEPTED BY THE OWNER.

BID BOND

Project:

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned

as Principal, and _____ as

Surety, are hereby held and firmly bound unto

_____ as Owner in the penal sum of 5% of greatest amount bid for payment of which, well and truly to be made, we hereby jointly and severally bid ourselves, our heirs, executors, administrations, successors and assigns.

Signed, this _____ day of _____, 20____.

The condition of the above obligation is such that whereas the Principal has submitted to

_____ a certain Bid, attached hereto and hereby made a part hereof to enter into a Contract in writing for the

NOW, THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate,
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the Agreement created by the acceptance of said Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety, and its bonds shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set fourth herein.

Principal (L.S.)

Surety

By: _____

COUNTY OF WEBB

General Terms and Conditions for Request for Proposals/bids

1. GENERAL CONDITIONS:

Proposers/Bidders are required to submit their proposals upon the following expressed conditions:

- (A) Proposers/bidders shall thoroughly examine the scope of work and layouts, instructions and all other contract documents.
- (B) Proposers/bidders shall make all investigations necessary to thoroughly inform themselves regarding plant and facilities for delivery of materials and equipment as required by the bid conditions. No plea of ignorance by the bidder of conditions that exist or that may hereafter exist as a result of failure to fulfill in every detail the requirements of the contract documents of the County or the compensation of the vendor.
- (C) Proposers/bidders are advised that all County contracts are subject to all legal requirements provided by Local, State, and Federal statutes & regulations.

2. PREPARATION OF BIDS/PROPOSALS:

Proposals/bids will be prepared in accordance with the following:

- (A) Unit prices shall be shown and where there is an error in extension of prices, the unit price shall govern. If applicable.
- (B) Alternate bids/proposals will not be considered unless specifically requested within the proposal package.
- (C) Proposed Period of Performance (POP) must be shown and shall include Sundays and holidays or as specified in RFQ document.
- (D) Bidders/Proposers will not include Federal taxes or State of Texas limited sales excise and use taxes in bid/proposal prices since the County of Webb is exempt from payment of such taxes. An exemption certificate will be signed where applicable upon request.

3. DESCRIPTION OF SUPPLIES:

Any catalog or manufacturer's reference used in describing an item is merely descriptive, and not restrictive, unless otherwise noted, and is used only to indicate type and quality of material. Bidders are required to state exactly what they intend to furnish otherwise they shall be required to furnish the items as specified.

4. SUBMISSION OF BIDS/PROPOSALS:

- (A) Bids/Proposals and changes thereto shall be enclosed in sealed envelopes addressed to the Webb County Clerk. The name and address of the Proposer/bidder, the date of the proposal opening and the material or service bid shall be placed on the outside of the sealed envelope.
- (B) Bids/Proposals must be submitted in the forms furnished. Electronic bids/proposals will not be considered. Bids/Proposals, however, may be modified by written notice provided such notice is received at the County Clerk's Office before the time and date set for the proposal opening.
- (C) Samples, when required, must be submitted within the time specified, at no expense to the County of Webb. If not destroyed or used up during testing, samples will be returned upon request at the proposer expense. If applicable.

5. REJECTION OF BIDS/PROPOSALS:

- (A) The Purchasing Agent may reject a bid/proposal if it is deemed to be non responsive and/or provided by not responsible bidder/proposer.
- (B) No bid/ proposal submitted herein shall be considered if the proposer owes any delinquent taxes to the County of Webb at the time proposals are opened. In the event that the successful proposer herein subsequently becomes delinquent in the payment of his or its County taxes, such fact shall constitute grounds for cancellation of the contract.
- (C) No bid/proposal submitted herein shall be considered unless the bidder/proposer warrants that upon execution of a contract with the County of Webb, the bidder/ proposer will not engage in employment practices which have the effect of discriminating against employees or prospective employees because of race, color, sex, creed, disability, or national origin and will submit such report as the County may thereafter require to assure compliance.
- (D) The County may, however, reject all proposals/bids whenever it is deemed in the best interest of the County to do so, and may reject any part of a proposal or bid. County may also waive any minor informalities or irregularities in any proposal or bid.

6. WITHDRAWAL OF BIDS/PROPOSALS:

Bids/Proposals may not be withdrawn after the closing time and date.

7. LATE BIDS/PROPOSALS OR MODIFICATIONS:

Bids/Proposals and modifications received after the time set for the proposal submission will not be considered.

8. CLARIFICATION OR OBJECTION TO PROPOSAL SPECIFICATIONS:

If any person contemplating submitting a proposal for this contract is in doubt as to the true meaning of the specifications, or other bid/proposal documents or any part thereof, the bidder/proposer may submit to the Purchasing Agent on or before five days prior to scheduled opening a request for clarification. All such requests for information shall be made in writing and the person submitting the request will be responsible for its prompt delivery. Any interpretation of Webb County proposal package specification instructions, if made, will be made only by Addendum duly issued. A copy of such Addendum will be posted on the web-site and email to the vendors list that have received email copy of package. The County will not be responsible for any other explanation or interpretation made or given prior to the award of the contract. Any objections to the specifications and requirements as set forth in this proposal must be filed in writing with the Purchasing Agent on or before five days prior to the scheduled opening.

Where there is a question that will not lead to an addendum, the questions will be made in writing to the Purchasing Department. The answer will be in writing posted on the website for everyone to receive the same response.

9. DELINQUENT TAXES:

All vendors seeking to do business with Webb County must owe no delinquent taxes to the County. Attestation of owing no delinquent taxes will be required. If a vendor owes taxes to Webb County, those taxes should be paid before submitting a proposal.

10. AWARD OF CONTRACT:

(A) The contract will be awarded to the best qualified according to the bid/proposal criteria and a written award letter will be issue.

(1) Award of a bid/proposal requires formal approval by the Commissioners Court.

(2) Bid/Proposal contract must also be approved by the Commissioners Court.

(3) The written notice to proceed will be for construction contracts provided after all contract documents are signed.

(B) Prices must be quoted F.O.B. Webb County with all transportation charges prepaid, unless otherwise specified in the Invitation for Bids/Proposals.

(B) Period of Performance will commence with written Notice to Proceed.

11. BID BOND

A bid bond in the amount of 5% of the Bid/Proposal issued by an acceptable surety company shall be submitted with each bid. A certified check or Bank Draft payable to the Webb County may be submitted in lieu of the Bid Bond. All such bonds, cashier checks shall be drawn payable to Webb County, if required by RFQ/Bid document.

12. PERFORMANCE AND PAYMENT BOND

A Performance Bond is require for construction work if the contract is in excess of \$100,000; and a Payment Bond is require if the construction contract is in excess of \$25,000. The requirement is for all prime contractors which enter into a formal contract with the State, any department, board, agency, municipality, county, school district or any division or subdivision. The failure of the successful bidder/proposer to execute the agreement and supply the required bonds within ten (10) days after the award or within such extended period as Webb County may grant, shall constitute a default and Webb County may, at its option either award the contract to next lowest responsible bidder, or re-advertise for bids/proposals. ~~In either case, Webb County may charge against the bidder the difference between the amount of the bid, and the amount for which a contract is subsequently executed irrespective of whether this difference exceeds the amount of the bid bond.~~ If a more favorable bid is received through re-advertisement, the defaulting bidder shall have no claim against Webb County for a refund. If applicable.

13. WORKERS' COMPENSATION INSURANCE COVERAGE:

The Workers' Compensation Commission has adopted Rule 110.110 effective with all bids advertised after September 1, 1994. The TWCC has stated that it is aware that a statutory requirement for workers' compensation insurance coverage is not being met. Therefore, Rule 110.110 requires that all bidders be covered under workers' compensation insurance to achieve compliance from both contractor(s) and governmental entities. Attachment A is provided in accordance with the requirements on governmental entities. Please read carefully and prepare your bid in full compliance to TWCC Rule 110.110. Failure to provide the required certificates upon submission of a bid could result in your bid being declared non-responsive. If applicable and unless stated differently under RFQ package.

14. REFERENCES:

Webb County requires proposer to supply with this proposal, a list of at least five (5) references where like services have been supplied by their firm. Include name of firm, address, telephone number and name of representative.

15. STATEMENTS:

No oral statement of any person shall modify or otherwise change, or affect the terms conditions, plans and/or specifications stated in the bid/proposal packages.

16. ETHICS:

The proposer shall not accept or offer gifts or anything of value nor enter into any business arrangement with any employee, of the Webb County Purchasing Department.

17. PROPRIETARY INFORMATION:

All materials submitted to the County become public property and are subject to the Texas Open Records Act upon receipt. If a proposer does not desire proprietary information in the proposal to be disclosed, each page must be identified and marked proprietary a time of submittal. The County will, to the extent allowed by law, endeavor to protect such information from disclosure. The final decision as to what information must be disclosed, however, lies with the Texas Attorney General. Failure to identify proprietary information will result in all unmarked sections being deemed non-proprietary and available upon public request.

Webb County

Conflict of Interest Disclosure

Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that any vendor or person considering doing business with a local government entity disclose in the Questionnaire Form CIQ, the vendor or person's affiliation or business relationship that might cause a conflict of interest with a local government entity. By law, this questionnaire must be filled with the records administrator of Webb County no later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code. A person commits an offense if the person violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor. The questionnaire may be viewed and printed by following the link before:

By submitting a response to this request, the vendor represents that it is in compliance with the requirements of Chapter 176 of the Texas Local Government Code.

The Webb County Officials who come within Chapter 176 of the Local Government Code relating to filing of Conflict of Interest Questionnaire (Form CIQ) include:

1. Webb County Judge Tano Tijerina
2. Commissioner Jesse Gonzalez
3. Commissioner Rosaura "Wawi" Tijerina
4. Commissioner John Galo
5. Commissioner Jaime Canales
6. Judge Joe Lopez, 49th Judicial District Court
7. Judge Becky Palomo, 341st Judicial District Court
8. Judge Oscar Hale 406th Judicial District Court

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of vendor who has a business relationship with local governmental entity.

2 Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 Name of local government officer about whom the information is being disclosed.

Name of Officer

4 Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

Yes No

5 Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

6 Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed;
or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

CERTIFICATION
REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY
EXCLUSION FOR COVERED CONTRACTS

PART A.

Federal Executive Orders 12549 and 12689 require the Texas Department of Agriculture (TDA) to screen each covered potential contractor to determine whether each has a right to obtain a contract in accordance with federal regulations on debarment, suspension, ineligibility, and voluntary exclusion. Each covered contractor must also screen each of its covered subcontractors.

In this certification "contractor" refers to both contractor and subcontractor; "contract" refers to both contract and subcontract.

By signing and submitting this certification the potential contractor accepts the following terms:

1. The certification herein below is a material representation of fact upon which reliance was placed when this contract was entered into. If it is later determined that the potential contractor knowingly rendered an erroneous certification, in addition to other remedies available to the federal government, the Department of Health and Human Services, United States Department of Agriculture or other federal department or agency, or the TDA may pursue available remedies, including suspension and/or debarment.
2. The potential contractor will provide immediate written notice to the person to whom this certification is submitted if at any time the potential contractor learns that the certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
3. The words "covered contract", "debarred", "suspended", "ineligible", "participant", "person", "principal", "proposal", and "voluntarily excluded", as used in this certification have meanings based upon materials in the Definitions and Coverage sections of federal rules implementing Executive Order 12549. Usage is as defined in the attachment.
4. The potential contractor agrees by submitting this certification that, should the proposed covered contract be entered into, it will not knowingly enter into any subcontract with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the Department of Health and Human Services, United States Department of Agriculture or other federal department or agency, and/or the TDA, as applicable.

Do you have or do you anticipate having subcontractors under this proposed contract?

Yes

No

5. The potential contractor further agrees by submitting this certification that it will include this certification titled "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion for Covered Contracts" without modification, in all covered subcontracts and in solicitations for all covered subcontracts.
6. A contractor may rely upon a certification of a potential subcontractor that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered contract, unless it knows that the certification is erroneous. A contractor must, at a minimum, obtain certifications from its covered subcontractors upon each subcontract's initiation and upon each renewal.
7. Nothing contained in all the foregoing will be construed to require establishment of a system of records in order to render in good faith the certification required by this certification document. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
8. Except for contracts authorized under paragraph 4 of these terms, if a contractor in a covered contract knowingly enters into a covered subcontract with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the federal government, Department of Health and Human Services, United States Department of Agriculture, or other federal department or agency, as applicable, and/or the TDA may pursue available remedies, including suspension and/or debarment.

**PART B. CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
INELIGIBILITY AND VOLUNTARY EXCLUSION FOR COVERED CONTRACTS**

Indicate in the appropriate box which statement applies to the covered potential contractor:

- The potential contractor certifies, by submission of this certification, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this contract by any federal department or agency or by the State of Texas.
- The potential contractor is unable to certify to one or more of the terms in this certification. In this instance, the potential contractor must attach an explanation for each of the above terms to which he is unable to make certification. Attach the explanation(s) to this certification.

Name of Contractor	Vendor ID No. or Social Security No.	Program No.
--------------------	--------------------------------------	-------------

Signature of Authorized Representative

Date

Printed/Typed Name and Title of
Authorized Representative

CERTIFICATION REGARDING FEDERAL LOBBYING
(Certification for Contracts, Grants, Loans, and Cooperative Agreements)

PART A. PREAMBLE

Federal legislation, Section 319 of Public Law 101-121 generally prohibits entities from using federally appropriated funds to lobby the executive or legislative branches of the federal government. Section 319 specifically requires disclosure of certain lobbying activities. A federal government-wide rule, "New Restrictions on Lobbying", published in the Federal Register, February 26, 1990, requires certification and disclosure in specific instances.

PART B. CERTIFICATION

This certification applies only to the instant federal action for which the certification is being obtained and is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$100,000 for each such failure.

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, or the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
2. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with these federally funded contract, subcontract, subgrant, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions. (If needed, contact the Texas Department of Agriculture to obtain a copy of Standard Form-LLL.)

3. The undersigned shall require that the language of this certification be included in the award documents for all covered subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all covered subrecipients will certify and disclose accordingly.

Do you have or do you anticipate having covered subawards under this transaction?

- Yes
 No

Name of Contractor/Potential Contractor	Vendor ID No. or Social Security No.	Program No.
---	--------------------------------------	-------------

Name of Authorized Representative	Title
-----------------------------------	-------

Signature – Authorized Representative

Date



Proposer Information

Name of Company: _____

Address: _____

City and State _____

Phone: _____

Email Address: _____

Signature of Person Authorized to Sign:

Signature

Print Name

Title

Indicate status as to "Partnership", "Corporation", "Land Owner", etc.

(Date)

Note:

All submissions relative to this ITB shall become the property of Webb County and are nonreturnable.

If any further information is required please call the Webb County Assistant Purchasing Agent, Mr. Cesar Guerra, Jr. at (956) 523-4133 or email at ceguerra@webbcountytx.gov