INFORMATION FOR BIDDERS

BIDS will be received by <u>Moore Public Works Authority</u> (hereinafter called the "OWNER"), at <u>the office</u> of Purchasing Agent, Purchasing Division, Moore City Hall, 301 N. Broadway, Suite 142, Moore, <u>Oklahoma 73160</u> until <u>1:45 P.M. CST on June 2</u>, 2021, and then at said office publicly opened and read aloud. Each BID must be submitted in sealed envelope, addressed to: Purchasing Agent, Purchasing Division, Moore City Hall, 301 N. Broadway, Suite 142, Moore, Oklahoma 73160 for the supply of:

BID A:

- 1. 15,240 LF of 36-inch OD HDPE 160 psi DR 13.5 IPS Sewer Force Main, three (3) 90-degree 36-inch 160 psi DR 13.5 IPS bends, and Two (2) 45-degree 160 psi DR 13.5 IPS bends complete FOB job site
- 2. 480 LF of 24" HDPE DR 32.5 IPS Gravity Line & two 45-degree 24-inch diameter HDPE DR 32.5 IPS bends.

BID B:

- 1. Three (3) Full-Bore PLUG VALVES, 36-inch HDPE 160 psi DR 13.5 IPS compatible. 36-inch HDPE 160 psi DR 13.5 IPS pipe has a Nominal OD of 36-inches & an Average ID of 30.347 inches.
- 2. Two (2) Full Bore PLUG VALVES, 24-inch HDPE DR 32.5 compatible. 24-inch HDPE IPS gravity line. 24-inch HDPE DR 32.5 IPS Gravity Pipe has a Average OD of 24-inches & Average ID of 22.043.

to transport wastewater from the new Southeast Lift Station located east of Sunny Lane on Indian Hills Road & to connect to Existing Gravity Lines west of Eastern Avenue.

Each sealed envelope containing a BID must be plainly marked on the outside as BID for Sewer Force Main Improvements; OWRB LOAN FAP-19-0003-L and the envelope should bear on the outside the BIDDER'S name, address, and license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at Purchasing Agent, Purchasing Division, Moore City Hall, 301 N. Broadway, Suite 203, Moore, Oklahoma 73160.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one Copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Bids received more than ninety-six (96) hours before time specified and Bids received after the time set for opening Bids will not be considered and will be returned unopened. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information that is pertinent to, and delineates and describes, the land owned, and rights-of-way acquired or to be acquired.

Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the contractor from fulfilling any of the conditions of the contract.

Each bid must be accompanied by a bid bond payable to the OWNER for five percent of the total amount of the bid. A certified check may be used in lieu of the bid bond. No bid security is required if bid is \$7,500.00 or less

The OWNER shall award a contract to the lowest responsive responsible bidder or bidders within thirty (30) calendar days after bid opening. The OWNER may extend the award period not to exceed fifteen (15) calendar days by formal recorded action and for good cause.

The party to whom the contract is awarded will be given a purchase order after contract award by MPWA and concurrence by OWRB.

The OWNER may make such investigations as deemed necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the AGREEMENT and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest, responsive responsible BIDDER, and Tied Bids are non-restrictive. For a Tied Bid proposal to be accepted, it must be lower than the sum of low separate bids.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

The time for completion is 150 calendar days.

Liquidated damages will be \$100.00 per calendar day.

The following items will be submitted with the bid:

Bid proposal, Non-Collusion Affidavit, Business Relationship Affidavit, & Bid bond.

The Consultant is Eagle Consultants, Inc., 2803 South Bryant Avenue, Edmond, OK 73013

The Consultants phone number is: (405) 844-3900 .

The Consultant's contact person is Satish Dasharathy, P.E.

Email Address is satish@eagleconsultants.com

BID PROPOSAL

Proposal of ______ (hereinafter called "BIDDER"), organized and existing under the laws of the State of ______ doing business as ______.* To <u>The Moore Public Works Authority</u> (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of <u>Sewer Force Main Improvements</u>, in strict accordance with The CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER is familiar with and has satisfied itself as to all Federal, State, and local Laws, and Regulations and Permits that may affect cost, progress, and performance of the WORK.

BIDDER hereby agrees to commence WORK under this contract within ten (10) calendar days of the date to be specified in The NOTICE TO PROCEED and to fully complete The PROJECT within 150_consecutive calendar days. BIDDER further agrees to pay as liquidated damages, the sum of <u>\$100.00</u> for each consecutive calendar day thereafter.

No BIDDER may withdraw a BID within 60 days after the actual opening thereof. Each BID must be accompanied by a BID BOND payable to OWNER for 5% of the amount bid.

BIDDER agrees to perform all The Work described in The CONTRACT DOCUMENTS for the unit prices given in The Bid Schedule to deliver as required by the contractor selected by MPWA.

By submitting a bid/proposal under this solicitation, the BIDDER understands that the bid/proposal is subject to the MPWA, City of Moore, OWRB, ODEQ, Oklahoma State requirements.

^{*}Insert "a corporation", "a partnership", or "an individual" as applicable

BID SCHEDULE FOR 36-INCH SEWER FORCE MAIN IMPROVEMENTS FAP-19-0003-L

BID A

Purchase of Pipe is Sales Tax Exempt

Item #	Description	Qty	Units	Unit Price	Extension Price
1	36-INCH HDPE DR 13.5 160 PSI IRON PIPE SIZE (IPS) FORCE MAIN PRESSURE PIPE, INCLUDING THREE (3) 90-DEGREE 36- INCH 160 PSI DR 13.5 IPS BENDS, AND TWO (2) 45-DEGREE 160 PSI DR 13.5 IPS BENDS COMPLETE FOB JOB SITE	15,240	LF		
2	24" HDPE DR 32.5 IPS GRAVITY LINE & TWO 45-DEGREE 24-INCH DIAMETER HDPE DR 32.5 IPS BENDS COMPLETE FOB JOB SITE.	480 LF	LF		
TOTAL BASE BID – Includes Bid Items 1,2					

TOTAL BASE BID IN WORDS:______

BID SCHEDULE FOR 36-INCH SEWER FORCE MAIN IMPROVEMENTS FAP-19-0003-L

BID B

Purchase of Valves is Sales Tax Exempt

Item #	Description	Qty	Units	Unit Price	Extension Price
1	THREE (3) FULL-BORE 36-INCH PLUG VALVES FOR 36-INCH HDPE 160 PSI DR 13.5 IPS COMPATIBLE. 36-INCH HDPE 160 PSI DR 13.5 IPS PIPE HAS A NOMINAL OD OF 36-INCHES & AN AVERAGE ID OF 30.347 INCHES COMPLETE FOB JOB SITE.	3	Each		
2	TWO (2) FULL BORE PLUG VALVES, 24- INCH HDPE DR 32.5 COMPATIBLE. 24- INCH HDPE IPS GRAVITY LINE. 24-INCH HDPE DR 32.5 IPS GRAVITY PIPE HAS A AVERAGE OD OF 24-INCHES & AVERAGE ID OF 22.043-INCHES COMPLETE FOB JOB SITE.	2	Each		
TOTAL BASE BID – Includes Bid Items 1,2					

TOTAL BASE BID IN WORDS:______

Respectfully submitted,

Signature	Firm Name
Title	Address
Employer I.D. No.	Email Address of Firm / Contractor
(SEAL) - if BID is by a corporation	Tel/Fax No. of Contractor
ATTEST:	
Secretary/Witness	Date

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, ______as Principal, and ______as Surety, are hereby held firmly bound unto the <u>Moore Public Works Authority</u> as OWNER in the penal sum of ______for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of ______, 2021. The Condition of the above obligation is such that whereas the Principal has submitted to the <u>Moore Public Works Authority</u> a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the <u>Sewer Force Main Improvements</u>.

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (properly completed in accordance with said BOND) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor furnishings materials in connection there with 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 BOND 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 forth above.

(Principal)

ATTEST: (if by Corporation)

(Surety)

(Address of Surety)

(Telephone/Fax Number of Surety)

(Email address of Surety Contact)

By:_____

(Signature)

(Name and Title)

BUSINESS RELATIONSHIPS AFFIDAVIT

STATE OF _____) ss.

COUNTY OF _____)

______, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the nature of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the architect, engineer, or other party to the project is as follows:

Affiant further states that any such business relationship presently in effect or which existed within one (1) year prior to the date of this statement between any officer or director of the bidding company and any officer or director of the architectural or engineering firm or other party to the project is as follows:

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

(If none of the business relationships herein above mentioned exists, affiant should so state.)

Affiant's Signature: Subscribed and sworn to before me this ______ day of ______,201__. Notary Public My Commission Expires: NONCOLLUSION AFFIDAVIT

STATE OF) ss.
COUNTY OF)	

______, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any government official or employee as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussions between bidders and any government official concerning exchange of money or other value for special consideration in the letting of a contract; that the bidder/contractor had not paid, given or donated or agreed to pay, give or donate to any officer or employee of the ______ (or other entity) any money or other thing of value,

either directly or indirectly in the procurement of a contract or pursuant to this bid.

Subscribed and sworn to before me this _____ day of _____,201___.

Notary Public

My Commission Expires:

My Commission Number:

CLAIM OR INVOICE AFFIDAVIT

STATE OF OKLAHOMA)) ss. COUNTY OF_____)

The undersigned (supervisory official), of lawful age, being first duly sworn, on oath says that this (invoice, claim, or contract) is true and correct. Affiant further states that the (work, services or materials) as shown by this invoice or claim have been (completed or supplied) in accordance with the plans, specifications, orders, or requests furnished to the affiant. Affiant further states that (s)he has made no payment, given, or donated or agreed to pay, give, or donate, either directly or indirectly, to any elected official, officer, or employee of the State of Oklahoma, of money or any other thing of value to obtain payment or the award of this contract.

Supervisory Official

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

Notary Public

My Commission Expires:

My Commission Number:

SECTION 02620

HIGH DENSITY POLYETHYLENE (HDPE) PIPE, FITTINGS AND JOINING/FUSION

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This specification covers the material (pipe and fittings), joining methods and general installation practice for high density polyethylene pipe (HDPE) piping systems for water and wastewater utility use as indicated on the Drawings.

1.02 SUBMITTALS

- A. Submit product data to the Engineer for review in accordance with the Section SUBMITTALS for all pipe, fittings, and appurtenances.
- B. Contractor shall also submit the following to the Engineer for approval:
 - 1. Certified dimensional as-built drawings/profile of all installed pipe, specials, and fittings.
 - 2. Details of fittings and specials such as elbows, tees, outlets, connections, test bulkheads, nozzles, or other special items where shown on the Construction Drawings. All connections to jointed gasketed pipe materials, valves or fire hydrants must be restrained and supported independently to withstand the pressure transients, soil settlement, and external loading conditions.
 - 3. The Supplier of the material shall submit, through the Contractor, a Certificate of Compliance that the HDPE pipe and fittings furnished for this project are FM approved materials that meet or exceed the standards set forth in this specification. The Contractor shall submit these certificates to the Engineer prior to installation of the pipe materials.
 - 4. Provide a statement that personnel responsible for fusing the pipe have been trained and qualified.
- C. For items that do not meet all the requirements of this specification, the bid/submittal shall include a written description of the deviations, along with data that show the magnitude and the justification for the deviation from the specification. The decision to accept material deviating from this specification shall be the responsibility of the specifying engineer and must be approved in writing.

1.03 REFERENCE DOCUMENTS AND STANDARDS

The standards and documents listed below may apply to the materials and practices in this specification. In the event of a conflict, the requirements of this specification prevail. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the project bid date.

ANSI/AWWA

- ANSI/AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm) for Water Service
- ANSI/AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission
- ANSI/AWWA C651 Standard for Disinfecting Water Mains
- AWWA M55 Manual of Water Supply Practices, PE Pipe–Design and Installation

Plastics Pipe Institute, PPI

- PPI Handbook of Polyethylene Pipe 2009 (2ndEdition)
- PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe
- PPI Material Handling Guide for HDPE Pipe and Fittings
- PPI TR-33 Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe
- PPI TR-34 Disinfection of Newly Constructed Polyethylene Water Mains
- PPI TR-38 Bolt Torque for Polyethylene Flanged Joints
- PPI TR-41 Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping
- PPI TN-42 Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects
- PPI TR-46 Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High-Density Polyethylene Pipe

- ASTM D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- ASTM D 2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
- ASTM D 2737 Standard Specification for Polyethylene (PE) Plastic Tubing
- ASTM D 2774 Standard Practice for Underground Installation of Thermoplastic Pressure Piping
- ASTM F 2880 Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes 3/4 in. to 65 in.
- ASTM D 3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
- ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
- ASTM D 3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- ASTM F 585 Standard Guide for Insertion of Flexible Polyethylene Pipe into Existing Sewers
- ASTM F 714 Standard Specification for Polyethylene (PÉ) Plastic Pipe (SDR-PR) Based on Outside Diameter
- ASTM F 905 Standard Practice for Qualification of Polyethylene Saddle-Fused Joints
- ASTM F 1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and
- ASTM F 1290 Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings
- ASTM F1417 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
- ASTM F 1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings
- ASTM F 2164 Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems
 Using Hydrostatic Pressure
- ASTM F 2206 Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock
- ASTM F 2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
- ASTM F 3124 Standard Practice for Data Recording the Procedure Used to Produce Heat Butt Fusion Joints
- ASTM F 3183 Standard Practice for Guided Side Bend Evaluation of Polyethylene Pipe Butt Fusion Joint
- ASTM F 3190 Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings

PART 2 – PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE MATERIALS

- A. Resin and Material Requirements
 - 1. All material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D 3350 with a minimum cell classification of 445474C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

B. HDPE Pipe

- 1. Pipe shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacture of the HDPE resin shall certify the cell classification indicated.
- 2. Pipe sizes 3" and large shall have a manufacturing standard of ASTM F 714, while pipe smaller than 3" shall be manufactured to the dimensional requirements listed in ASTM D 3035. Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans.
- 3. Pipe shall meet AWWA C901 (1/2" to 3") or AWWA C906 (4" to 63") and shall be listed as meeting NSF-61.
- 4. Pipe shall be manufactured by an ISO 9001 certified manufacturer. The pipe manufacturer shall have an ongoing Quality Control program for incoming and outgoing materials and shall assure that the pipe will meet the material requirements of this specification. HDPE resins for

manufacturing of pipe shall be checked for density, melt flow rate, and contamination. The facility shall have the necessary testing equipment to verify that pipe meets the AWWA and NSF standards. Pipe shall be checked for outside diameter, wall thickness, length, and surface finish on the inside and outside. The Manufacturer's production facilities shall be open for inspection by the Owner or Engineer.

- 5. All pipes shall be color coded for the intended service. The color coding shall be permanently co-extruded stripes on the pipe outside surface as part of the pipe's manufacturing process. Painting HDPE pipe to accomplish color coding is not permitted. Color coding shall be as follows:
 - a. Sewer green
 - b. Water blue
 - c. Reclaim purple
- C. HDPE Fittings
 - 1. Butt Fusion Fittings- Fittings shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans or accepted by owner/engineer. All fittings shall meet the requirements of AWWA C901 or C906.
 - a. Molded fittings shall comply with the requirements of ASTM D 3261.
 - b. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F 2206, as manufactured by ISCO Industries, Inc or other approved manufacturer holding an ISO 9001 quality system certificate. Each fitting will be marked per ASTM F 2206 section 10 including the nominal size and fitting EDR, which will meet or exceed the pipe DR identified for the project. Fabricated fittings shall be manufactured using a McElroy Datalogger to record fusion pressure and temperature and shall be stamped with unique joint number that corresponds to the joint report. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained for a minimum of 5 years as part of the quality control and will be available upon request of owner. Test results to validate ASTM F 2206 section 7.3 and 9 shall be provided to owner or owner's representative upon request.
 - c. Socket fittings shall meet ASTM D 2683.
 - 2. Electrofusion Fittings Fittings shall be made of HDPE material with a minimum material designation code of PE 4710 and with a minimum Cell Classification as noted in 2.01.A. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans. For potable water systems, all electrofusion fittings shall have AWWA approval
 - 3. Bolted Connections Flanged and Mechanical Joint Adapters can be made to ASTM D 3261 or if machined, must meet the requirements of ASTM F 2206. Flanges and MJ Adapters shall be fused onto the pipe and have a minimum pressure rating equal to or greater than the pipe unless otherwise specified on the plans.
 - a. Flange Adapters shall meet the dimensional and material requirements of ASTM F 2880.
 - b. Metallic back-up rings (Van-Stone style lap joint flanges) shall have a radius on the inside diameter of the bore to be compatible with HDPE Flanges. Back up rings shall have bolt pattern that will mate with AWWA C207 Class D (or B or E), ASME/ANSI B 16.5 Class 150, ASME/ANSI B 16.1 Class 125, or ASME/ANSI B16.47 Series A.
 - c. Flange assemblies shall be assembled and torqued according to PPI TN-38, "Bolt Torque for Polyethylene Flanged Joints."
 - d. Where shown on the drawings, 4" and larger transitions to mechanical joint fittings and valves shall be accomplished using a MJ Adapter with kit. The D.I./HDPE mechanical joint adaptor shall consist of:
 - i. A molded or fabricated HDPE mechanical joint transition fitting.
 - ii. A rubber gasket.
 - iii. A mechanical joint backup drive ring.

- iv. Corten mechanical joint tee bolts.
- 4. Mechanical Fittings: The use of mechanical coupling and saddles shall be approved by the owner or engineer prior to installation. Mechanical Fittings shall be designed for use and compatible with HDPE pipe. Mechanical fittings shall have a pressure rating equal to or greater than the pipe.
 - a. Couplings without self-restraining capabilities (integrated serrated teeth or grippers) shall include a plan for external restraint or isolation from pipeline generated forces.
 - b. Mechanical Saddles shall have wide straps for distribution of clamping loads. No Ubolts shall be allowed.
 - c. When required by mechanical coupling manufacturer, pipe stiffeners shall be employed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel, with a wedged style design to fit the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE.
- D. Fusion Unit Requirements
 - 1. All Fusion Equipment, whether new or used, rented or owned, shall comply with the requirements of ISO 12176-1 "Equipment for Fusion Jointing Polyethylene Systems".
 - 2. Butt fusion equipment must be in satisfactory working order and the hydraulic system must be leak free. Heater plates shall be free from scrapes, gouges, and have a consistent clean coated surface. The pressure gage and thermometer should be checked for accuracy. When requested by the owner, records showing a maintenance service/inspection within 3 months prior to use for this project shall be provided.
 - 3. Rental Butt Fusion Equipment must be maintained by a McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff. When requested by owner or his authority, an inspection report detailing the components inspected within 3 months prior to arrival at jobsite will be provided.
 - 4. Electrofusion Processors shall be maintained and calibrated per manufacturer's requirements and recommendations.
- E. Approved Suppliers
 - 1. All Pipe, Fittings, and Fusion Equipment shall be provided by one supplier. Approved suppliers are ISCO Industries, Inc. or equal.

2.02 PIPELINE LOCATING MATERIALS

- A. A. Detectable Marker Tape- Plastic marker tape shall be 5 mil minimum thickness with a solid aluminum core of .35mil minimum thickness and a minimum width of 2". The background of the tape shall be colored based on pipe service with black lettering continuously printed. Marker tape shall have a minimum 35 lbs./inch tensile strength. The installation of the tape shall be at 18 inches below finish grade.
- B. Tracer Wire- All HDPE pipe 4" and greater shall be installed with an extra high-strength, copper clad steel tracer wire including 45 mil HDPE jacket that has a minimum average break load of at least 1150 lbs. The jacket shall be colored based on pipe service, with blue for potable water or green for sewer. Tracer wire gauge shall be 12 AWG, 10 AWG, or 8 AWG depending upon application and installation procedure. This wire shall be continuous and brought up in the valve boxes at the ends of each line segment with splices made only by methods per the equipment manufacturer's recommendation. All miscellaneous splicing components shall be furnished and installed by the Contractor.

PART 3 – EXECUTION

3.01 GENERAL

A. All HDPE pipe and fittings shall be cut, joined, and installed in accordance with the manufacturer's recommendations. Joining, laying, and pulling of polyethylene pipe shall be accomplished by personnel experienced in working with polyethylene pipe systems.

3.02 TRANSPORTATION, UNLOADING, AND STORAGE

- A. The manufacturer shall package product in a manner designed to deliver the pipe and fittings to the project neatly, intact and without physical damage. During transportation, each pipe shall rest on suitable pads, strips skids, or blocks securely wedged or tied in place.
- B. During loading, transportation, and unloading, every precaution should be taken to prevent damage to the pipe. The handling of the pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Cuts or gouges that reduce the wall thickness by more than 10% are not acceptable and must be cut out and discarded.
- C. Handle the pipe in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2. All pipe and accessories shall be loaded and unloaded by lifting with hoists or by skidding to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks, or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are lowered into the trench to be laid.
- D. Materials, if stored, shall be kept safe from damage, and shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Pipe shall not be stored close to heat sources. The contractor shall be responsible for all security, damage, and loss of pipe, excluding Acts of God.
- E. The interior of the pipe as well as all sealing surfaces of mating components (i.e., flange faces) shall be always kept free from dirt or foreign matter. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged to prevent insects, animals, or foreign material from entering the pipe line or pipe section. The practice of stuffing cloth or paper in the open ends of the pipe will not be permitted. Use waterproof nightcaps to prevent the entrance of any type of natural precipitation into the carrier or containment pipe and will be secured to the pipe in such a manner that the wind cannot blow them loose. Where possible, the pipe shall be raised and supported at a suitable distance from the open end such that the open end will be below the level of the pipe at the point of support.

3.03 RECEIPT INSPECTION

A. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are installed or lowered into the trench to be laid. Defective, damaged, or unsound pipe will be rejected. Cuts, punctures, or gouges that penetrate or reduce the wall thickness by 10% or more are not acceptable and must be removed and discarded. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.

3.04 FUSION AND JOINING

- A. Fusion Joining Requirements:
 - 1. All HDPE pipes shall be joined to itself by the heat fusion process which produces homogeneous, seal, leak tight joints. Tie-ins between sections of HDPE pipe shall be made by butt fusion whenever possible.
 - 2. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F 2620 or PPI TR-33. All fusion joints shall be made in compliance with the pipe or fitting manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians per PPI TN-42. A record or certificate of training for the fusion operator must be if documents training to the fundamentals of ASTM F 2620. Considerations should be given to and provisions made for adverse weather conditions, such as temperatures below freezing, precipitation, or wind, which is accepted by the owner/engineer.
 - 3. Electrofusion: Electrofusion joining shall be done in accordance with the manufacturers recommended procedure. Other sources of electrofusion joining information are ASTM F 1290, PPI TN 34, and PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe. The process of electrofusion requires an electric source, commonly called an electrofusion processor that has wire leads and a method to

read electronically (by laser) or otherwise input the barcode of the fitting. The electrofusion processor must be capable of reading and storing the input parameters and the fusion results for later download to a record file. Qualification of the fusion technician shall be demonstrated by evidence electrofusion training within the past year on the equipment to be utilized for this project.

- B. Fusion Operators:
 - 1. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion weld made by that individual. The employer is responsible for documenting all training and qualification records for that individual, including compliance to any code requirements for fusion/bonder operators.
 - 2. All HDPE fusion equipment operators shall be qualified to the procedure used to perform pipe joining. Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.
 - 3. For Projects with at least 5,000 feet or with pipe larger than 24 inches, operators or their supervisor must have a current McElroy Fusion Training Certificate for the equipment to be used on the project.
 - 4. When the fusion machine operator is employed by the HDPE pipe and fusion machine supplier, the supplier shall maintain an ISO 9001 Certified Quality Management System.
- C. Butt Fusion Equipment:
 - For 6" and larger pipe sizes, the pipe butt fusion machine shall be a self-contained hydraulic fusion machine capable of butt fusing HDPE pipe. The carriage must be removable from the chassis for in-ditch use. The machine must be compatible with an electronic data recording device. Accessories will include all butt fusion inserts for the specified range of pipe sizes, a pyrometer kit for checking the surface temperature of the heater, extension cord of appropriate gauge (25' minimum), and hydraulic extension hoses (minimum of four). The butt fusion machine will be McElroy, or approved equivalent.
 - 2. In areas where there may be insufficient space to layout the entire length of fused pipe to be pulled-back, the Contractor shall utilize a continuous HDPE pipe fusion equipment such as a PolyHorse by McElroy or other means in order to fuse the length of pipe necessary for the installation. The Contractor shall be responsible for securing and obtaining permission/permits from adjacent property if necessary, for staging and/or fusing of the pipe and HDD equipment at no additional cost to the Owner.
- D. Fusion Data Recording:
 - 1. For 6" and larger pipe sizes, McElroy Datalogger or equivalent fusion data recorder shall be used to record all fusion welds on hydraulically operated fusion machines. The device shall be capable of meeting the requirements of ASTM F 3124, "Standard Practice for Data Recording the Procedure used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings". The device, or combination of devices, shall record the following variables of each fused joint:
 - i. Heater surface temperature- immediately before inserting the heater plate, measure
 - with a pyrometer and manually enter into the weld record.
 - ii. Gauge pressure during the initial heat cycle
 - iii. Gauge pressure and elapsed time during the heat-soak cycle
 - iv. Heater removal (dwell) time
 - v. Gauge pressure and elapsed time during the fusing/cool cycle
 - vi. Drag pressure
 - vii. Pipe diameter and wall thickness
 - viii. Type of HDPE material (Specification and Classification) and manufacturer
 - ix. Fusion Machine Identification
 - 2. The device shall record the operator's name and a unique operator ID number, along with the date and time of each weld.
 - 3. Records showing the device is up to date on all required calibration should be available for presentation when requested.
 - 4. All fusion welds should be traceable to the report (via operator and weld ID) with an indentation weld stamp or by permanent paint marker/pen next to fusion weld.
 - 5. A weld location map may be requested, prior to commencement of work, by the owner or owner's representative.

E. Butt Fusion Examination and Testing:

1. Examinations

- i. Visual: For pipe sections, examine the full exterior circumference for bead uniformity before cutting. After cutting the pipe section, review the interior bead. All beads should have visually acceptable bead formation as shown in Fig 4 and Appendix X2 of ASTM F 2620. In addition, the following characteristics are expected:
 - 1. There shall be no evidence of cracks or incomplete fusing
 - 2. There shall be no evidence of captured objects (e.g., pipe shavings, facer ribbons) between bonded surfaces.
 - 3. Variations in upset bead heights on opposite sides of the cleavage and around the circumference of fused pipe joints are acceptable.
 - 4. The apex of the cleavage between the upset beads of the fused joint shall remain above the base material surface
 - 5. Fused joints shall not display visible angular misalignment, and outside diameter mismatch shall be less than 10% of the nominal wall thickness
 - 6. Fusion data record review that meets criteria of section 3.04.D.1 can be used as additional verification of visual indicators.
- ii. Fusion Data Record Review

The fusion date record for each fused joint shall be compared to the approved fusion procedure. The reviewer shall verify the following:

- 1. That all data required by section 3.04.D.1 was recorded
- 2. Interfacial pressure was within the acceptable range
- 3. Heater surface temperature was within the acceptable range
- 4. Butt fusion pressure applied during the fusing/cool cycle was correctly calculated to include drag pressure, fell within the acceptable range for the applicable size and agrees with the recorded hydraulic fusing pressure.
- 5. Butt fusing pressure was reduced to a value less than or equal to drag pressure at the beginning of the heat soak cycle.
- 6. Fusing machine was opened at the end of the heat soak cycle, the heater was removed, and the end were brought together at the fusion pressure with the acceptable time range
- 7. Cooling time at butt fusing pressure met the minimum time specified
- iii. If the recorded data in section 3.04.D.1 is outside the limits of the acceptable range, the joint is unacceptable, and must be removed and replaced.
- iv. Frequency. Records for test fusion joints should be reviewed immediately after the joint is completed. Fusion joints for jobsite fusions should be reviewed daily or before being covered with backfill.
- 2. Mechanical Tests
 - i. Contractor shall mechanically test the first fusion of each operator and each machine used on the project. Installation shall not continue until a fusion test has passed the test. Additional mechanical test is not required if long as the fusion are reviewed with the frequency specified in section 3.04.E.1. iv. Testing of fusion joints with no fusion data record review shall be at a frequency specified by the Owner or Engineer.
 - ii. The fusion shall be allowed to cool completely, then fusion test straps shall be cut out.
 - iii. All samples shall be labeled with operator information. Testing must be done at 73 degrees F plus or minus 5 degrees. The test temperature and sample size are critical to testing. Testing performed at cold or elevated temperatures may not give similar results to tests performed at ambient temperatures.
 - iv. Each pipe sample weld shall be subjected to testing at two locations 180 degrees apart from each other in the joint weld. All specimens shall be tested by one of the following methods:
 - 1. Reverse Bend Test are allowed for pipe sizes 4" IPS or smaller. The specimens shall be prepared and tested in accordance with ASTM F 2620, Appendix X4.
 - 2. Guided Side Bend Test are allowed for all wall thicknesses of 1" or greater. The specimens shall be removed and tested in accordance with ASTM F 3183.

- 3. Hydrostatic Burst Test is allowed for pipe sizes 2"-24". The specimen length should measure 6 times pipe diameter with the butt fusion joint in the center of the specimen. The specimen should be tested in a tank filled with water, and testing conditions monitored and recorded with computerized equipment. The specimen will be tested at 4 times pipe rated pressure for 5 minutes with no failure of joint allowed.
- v. Results of any mechanical test should be documented. Information on the weld and operator should be transferred from the sample to the testing record.

3.05 INSTALLATION

- A. Direct Burial
 - 1. Buried HDPE pipe and fittings shall be installed per engineering drawings and ASTM D2487, ASTM D2774, ASTM D2321 and AWWA Manual of Water Supply Practices M55 Chapter 8. The Design Window identified in AWWA M55 Chapter 5 (page 65 of 2006 version) shall be considered acceptable design and installation conditions.
 - 2. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be placed to fill any voids created and the backfill shall be re-compacted to provide uniform side support for the pipe.
 - 3. Pipe embedment Embedment material should be Class I, Class II, or Class III materials as defined by ASTM D-2321 Section 6. The use of Class IV or Class V materials is not recommended; however, they may be used only with the evaluation and approval of the engineer at a demonstrated achievable compaction
 - 4. Bedding: Pipe bedding shall be in conformance with ASTM D2321 Section 8. Compaction rates should be as specified in ASTM D2321. Deviations shall be approved by the engineer.
 - 5. Haunching and backfill shall be as specified in ASTM D 2321 Section 9 with Class I, II, or III materials. Compaction shall be more than 85% Proctor, providing a minimum modulus of 1000 psi or greater.
- B. Pull-In Installation
 - 1. Per ASTM F1804 and/or www.HDPEapp.com, the contractor shall determine and document the maximum proposed pull-in length and pull-in force for the pressure class and pipe diameter to be pulled into an open trench. Pull-in lengths will not exceed the maximum lengths for the class and diameter pipe. A commercially available load limiter (weak link) approved by the Engineer shall be used between the puller and the pipe.
 - 2. Prior to pulling the pipeline, contractor shall place rollers or other approved devices beneath the pipe to avoid unnecessary damage and to reduce pipe drag.
 - 3. Trenchless installations:
 - i.For Horizontal Directional Drilling (HDD), refer to ASTM F1962, PPI TR-46, PPI PE Handbook (Chapter 12) and www.PPIBoreAid.com
 - ii.For slip lining, refer to ASTM F585, PPI PE Handbook (Chapter 11) and www.HDPEapp.com
 - iii.For pipe bursting, refer to PPI PE Handbook (Chapter 16)
- C. Appurtenances
 - 1. All appurtenances (tees, elbows, services, valves, air relief valves, fire hydrants, etc.), must be independently supported and shall not rely on the pipeline and its connections for this support. Excessive stresses may be encountered when appurtenances are inadequately supported.
 - 2. Hydrant Assemblies shall be installed, and field tested according to the requirements of AWWA M17.
 - 3. Installation of Tracer Wire. When tracer wire is required, the Contractor shall install along the entire section of pipeline and along all service connections as listed below. The tracer wire shall be installed simultaneously with the polyethylene piping system. Tracer wire shall be installed

by the Contractor once backfill has been placed and compacted to at least 12 inches above the top of the pipe and not more than 18 inches above the top of the pipe. Tracer wire shall be properly spliced at each end connection and each service connection. Care should be taken to adequately wrap and protect wire at all splice locations. No bare tracer wire shall be accepted. Provide Magnesium alloy anode for cathodic protection that conforms to the requirements of ASTM B843. Install tracer wire per local and manufacturer's requirements.

3.06 PIGGING, FLUSHING, CLEANING, AND DISINFECTING

- A. All mains shall be pigged, cleaned, and flushed to remove all dirt, sand, debris and other foreign matter. The Contractor shall be responsible for developing a pigging and flushing plan to be submitted to the Engineer for approval prior to pigging and flushing.
- B. Disinfection:
 - 1. Cleaning and disinfecting of potable water systems shall be in accordance with AWWA C651 and AWWA M55 Chapter 10, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition).
 - 2. The liquid disinfection chemical solution should be limited to less than 12% active chlorine. The time-duration of the disinfection should not exceed 24 hours. Chlorine tablets or powders are not permitted.
 - 3. Upon completion, the system should be thoroughly flushed with fresh water, and retested to verify the disinfectant chlorine level has been reduced to potable drinking water concentrations in all service water tubing and branch lateral pipes

3.07 TESTING AND LEAKAGE

- A. The contractor shall insure testing can be accomplished in a safe manner, including protection of personnel, equipment, and public in the event of a failure during testing. The contractor shall restrain pipe, components, and test equipment as required. All pumps, valves, temporary connections, meters, gauges, and other measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Owner's Engineer.
- B. The pressure gauges or data recorders should be calibrated and sufficiently sized to provide mid-range data (pressure tested will not be below 10% or greater than 90% of gauge capacity) that result in easy reading, interpretation. Gauges shall be accurate to within 2% of full scale with increments no greater than X psi.
- C. The test pressure may be up to 1.5 times the FM pressure class, based on the lowest point in elevation in the test section.
- D. Test pressures require consideration of thermal conditions. Polyethylene piping materials are typically pressure rated at 73°F (23°C) and PE piping at temperatures greater than 80°F (26°C) require reduced test pressures. (Note that higher pipe temperatures should consider both ambient temperatures and radiant solar heating of exposed black HDPE pipe) Guidance for elevated temperatures can be found in the appendix of Chapter 3 (Material Properties) of the PPI Handbook of PE Pipe.
- E. Gravity Pipelines-The Contractor shall perform a low-pressure air test for gravity flow pipelines to the requirements and specifications of ASTM F 1473. Warning: All pneumatic test, regardless of pressure, can be dangerous and safety procedures shall be identified, documented, approved by the owner and engineer, and followed.
- F. Pressure Pipelines-Pressure testing shall be conducted in accordance with requirements and recommendations of ASTM F 2164 (Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure), AWWA M55 Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition). Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.
 - 1. The section of pipe to be tested shall be filled with potable or generally clean water (uncontaminated river/lake water) approved by the Owner/Engineer. While the system is being filled with water, air shall be carefully and completely exhausted.
 - 2. If the Contractor elects to perform hydrostatic testing against valves in an existing system, it does so at his own risk and will bear the cost of any damages to the existing valve, piping system, private or public property, or the new pipeline under test.

- 3. The test procedure for HDPE pipe consists of two steps: 1) the initial phase or expansion phase and 2) the test phase. During the initial/expansion phase, sufficient make-up water shall be added hourly for 3 hours to return to the test pressure. During the test phase, the expansion phase pressure is reduced by 10 psi to test phase pressure and monitored for at least one hour (3 hours maximum).
- 4. Under no circumstances shall the total time under test exceed eight (8) hours. If the test is not completed due to leakage, equipment failure or any other reason, depressurize the test section and permit the system to "relax" for eight (8) hours prior to the next testing sequence.
- 5. In accordance with section 9.8 of ASTM F 2164, the pipe shall pass if the final pressure is within 5% of the test phase pressure for the testing period (3 hours maximum). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.
- G. All pressure and leakage testing shall be done in the presence of a representative of the Owner and Engineer.

END OF SECTION

SECTION 15000 FULL-PORT PLUG VALVES

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. This specification covers the work necessary to furnish and install the various full-port plug valves as specified herein and as shown on the plans.
- B. To obtain standardization of performance, operation, spare parts, maintenance, and Manufacturer's service, it is the intent of these specifications that all valves of like type be furnished by a single Manufacturer.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Individual equipment components shall be crated in structurally adequate packing containers to prevent damage during shipping, facilitate ease of handling and to provide suitable protection from weather for extended at the jobsite prior to installation. Packing containers shall be permanently labeled with appropriate equipment identification, shipping address and return address. Packing list shall be provided with equipment at time of delivery.
- B. Electrical equipment shall be always kept thoroughly dry and stored indoors. Equipment storage shall be protected and maintained in accordance with the Manufacturer's recommendations. Equipment shall not be stored directly on the ground.
- C. Contractor shall utilize equipment and tools of adequate size suitable for unloading, transporting, storing, and supporting the equipment during installation. Caution shall be employed to prevent equipment damage resulting from abrupt contact with other materials or equipment.

1.03 QUALITY ASSURANCE

- A. The valves furnished under this contract shall be as manufactured by DeZurik or equal.
- B. Manufacturers regularly engaged in the manufacture of the type of equipment specified and can demonstrate equipment of their manufacture in actual service for a period of not less than 10 years will be considered as acceptable Manufacturer if able to comply with the specifications.
- C. The valve Manufacturer shall submit to the Contractor certified copies of factory test results for each system valve size. Test results shall be submitted prior to shipment upon Engineer's request and shall show compliance with specified performance requirements.

1.04 WARRANTY

- A. The Manufacturer shall warrant the equipment to be of quality construction, free from defects in materials and workmanship. The warranty shall become effective upon FINAL acceptance by the Owner's authorized agent of the South East Lift Station Force Main project.
- B. The equipment, apparatus, and parts furnished shall be warranted for a period of one (1) year, expecting only those items that are normally consumed in service such as packing, grease, gaskets, O-rings, etc. The Manufacturer shall be solely responsible for the warranty of the equipment and all non-consumable components.
- C. Components failing to perform as specified by the Engineer, or as represented by the Manufacturer, or proven to be defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the Manufacturer without cost of parts or labor to the Owner.

1.05 FACTORY PAINTING

A. Unless otherwise specified, exterior and interior metallic surfaces of each valve shall be shop painted per the latest revision of industry standard AWWA C504.

PART 2: PRODUCTS

2.01 100% PORT PLUG VALVES

- A. Plugs shall be solid one piece, cast iron ASTM A126 Class B or ductile iron ASTM A536 Grade 65-45-12. The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft. Plug shall not contact the seat until at least 90% closed. Resilient plug facing shall be chloroprene. Spherical shaped plugs are not acceptable.
- B. Bodies and covers shall be cast iron ASTM A126 Class B or ASTM A536 Grade 65-45-12. Ports shall be rectangular and shall be 100% full port. The valve port area shall meet or exceed standard pipe area per ASME/ANSI B36.10M. Round ports are not acceptable. Bearings shall be sleeve

type and made of sintered, oil impregnated permanently lubricated type 316SS for sizes 4"-18", and ASTM Grade CF8M for sizes 20"-36". In valves larger than 36", the upper and lower plug journals shall be fitted with ASTM A240 type 316SS sleeves with body bearings of ASTM B30, Alloy C95400 aluminum bronze.

- C. Seats shall be 1/8" thick welded overlay of not less than 95% pure nickel. Seat shall be at least ½" wide, 1/8" thick through entire width and raised. The raised surface shall be completely covered with nickel to ensure that the resilient plug face contacts only the nickel seat.
- D. Adjustable packing shall be NBR multiple v-ring type, with a packing gland follower. Packing gland shall permit inspection, adjustment, or complete replacement of packing without disturbing any part of the valve or actuator assembly, except the gland follower. Non-adjustable packing or packing requiring actuator removal to replace the packing is not acceptable.
- E. Pressure ratings shall be 175 PSI on valve sizes through 12", and 150 PSI for valves sizes 14" and larger. Every valve shall be given a certified hydrostatic shell test and seat test, with test reports being available upon request.
- F. Buried actuators shall be 90% grease filled. Input shaft and fasteners shall be stainless steel. Actuator mounting brackets shall be totally enclosed. Other actuators to be installed according to drawings or customer specifications.
- G. End connections shall meet or exceed the latest revisions of AWWA C517 and other applicable standards. End connections shall be flanged drilled per ASME B16.1, or mechanical joint per AWWA C111.
- H. When specified, valves shall be NSF/ANSI 372 certified lead-free and NSF/ANSI 61 certified for drinking water.
- I. Manual vales shall have lever or worm gear actuators with handwheels, chainwheels, tee wrenches, extension stems, floor stands, etc., as shown on the plans or as called for in the valve schedule. Worm gear actuators shall be furnished for all valves 4" or larger where the maximum reverse shutoff pressure is greater than 25 psi as indicated on the plans or in a valve schedule. Worm gear actuators shall be sized for pressure as indicated on the plans. All gearings shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. This adjustable stop shall be the only adjustment necessary to set the clearance between the valve plug and the seat while the valve is in line and under pressure. Handwheel and chainwheel sizes for worm gear actuators shall be no smaller than 6" in diameter and no larger than twice the diameter of the actuator's gear sector. All exposed nuts, bolts, and washers shall be zinc plated.
- J. Valves and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts, springs, and washers shall be stainless steel. Furnish adjustable valve boxes, and extension stems to within 12 inches of ground surface.

PART 3: EXECUTION

3.01 INSTALLATION

- A. The Contractor shall assume full responsibility for coordination of the entire project, including verification that all structures, piping, coating systems and equipment components are compatible. The Contractor shall initially operate each equipment system and shall make all necessary adjustments so that each system is placed in proper operating condition.
- B. Equipment and materials utilized for this project must be approved by the Engineer prior to installation. Approval for installation or incorporation in this project will be made only after submittal of Manufacturer's shop and installation drawings, test result certificates or other data as required and specified herein.
- C. Installation of equipment shall be in full conformance with the Manufacturer's shop drawings and requirements as approved by the Engineer. Wherever a conflict arises between Manufacturer's instruction and the contract documents, the Contractor shall follow the Engineer's decision at no additional cost to the Owner.

3.02 WORKMANSHIP

- A. The Contractor shall install equipment and materials in a workmanlike manner utilizing craftsmen skilled in the particular trade. The finished installation shall portrait a neat and plumb appearance.
- B. Before installation, carefully clean valves of all foreign material, adjust stuffing boxes, and inspect valves in the OPEN and CLOSED positions. Install valves in accordance with the applicable portions of the Specifications. Unless otherwise indicated, install valves with the shaft vertical. Valves provided with chainwheel manual operators are to be installed with the shaft vertical, and the manual operator located below the piping. This should provide the operator with a clear view of the visual position indicator. Mount horizontal valves in such a manner that adequate clearance is provided for operation. Installation practices shall conform to Manufacturer's recommendations.
- C. Prior to installing valves, the mating flange faces shall be thoroughly cleaned. After cleaning, insert the flange seals and valves and tighten the flange bolting progressively and in a uniform manner. Flanges should be pulled down tight against the valve / flange seals evenly. If flanges leak under pressure, loosen the bolting, reseat, or replace the flange seals, re-tighten the bolting, and retest the connection. Flanged joints must be watertight at test pressures before acceptance.

3.03 MANUFACTURER'S SERVICES

A. Provide the services of a Representative of the Manufacturer of the valves to assist in adjusting and testing the equipment, to supervise initial operation, and to assist in making final adjustments and the tests specified, or which may be necessary to assure the Engineer the equipment is in satisfactory operating condition.

END OF SECTION