



**CITY OF DELTA, COLORADO
CONTRACT DOCUMENTS**

FOR

***2016 BOOSTER PUMP STATION
PROJECT***

Prepared By:
City of Delta
360 Main Street
Delta, Colorado 81416
(970) 874-7566 ext 216

**CITY OF DELTA PUBLIC WORKS DEPARTMENT
360 MAIN STREET
DELTA, COLORADO 81416**

2016 Booster Pump Station Project

TABLE OF CONTENTS

Advertisement for Bids	AB-1
Instruction to Bidders	IB-1 to IB-5
Proposal	PROP-1 to PROP-4
Bid Forms	BF-1 to BF-3
Project Overview	PO-1 to PO-7
Technical Specifications	TS-1 to TS-22
<i>Butterfly Valves</i>	<i>TS-1 to TS-4</i>
<i>Pump Skid</i>	<i>TS-5 to TS-22</i>
Special Conditions	SC-1 to SC-11
Colorado Department of Transportation Standard Specifications for Road and Bridge Construction.	By Reference Only
City of Delta Standard Specifications For The Design and Construction of Public Improvements	By Reference Only

2016 Booster Pump Station Project

ADVERTISEMENT FOR BIDS

The City of Delta is requesting bids from contractors for the 2016 Booster Station Project located in the utility easement near the northeast corner of F 25 Road and Pioneer Road. The project involves constructing a dual function pump station that includes an emergency booster pump and pressure reducing valve package.

The work will be performed in a workmanlike manner and in compliance with the City of Delta's Standards and Specifications found on the City website under the Public Works Department at <http://cityofdelta.net/publicworks.html>.

Bid packages will be available for pick up from Delta's City Hall building located at 360 Main St., Delta, CO 81416 or online at the City website under the News "RFP" tab at <http://cityofdelta.net/rfp.html>. A mandatory pre bid walk-through is scheduled for the 20th day of May, 2016 at 3:00 pm at the project location. Bids will be due on the 1st day of June, 2016 at 3:00 pm. Project questions must be submitted by the 26th day of May, 2016 at 3:00 pm to ellen@cityofdelta.net or by phone at 970-874-7566 ext 216. Any Addendum will be posted at the above RFP link.

The City Council reserves the right to reject any or all bids, to waive any informalities in bids, and to accept the bid that is in the best interest of the City of Delta, Colorado.

By: City of Delta, Colorado

Published in the Delta County Independent on 11th day of May, 2016

2016 Booster Pump Station Project

INSTRUCTIONS TO BIDDERS

1. TERMINOLOGY

- 1.1 The OWNER is the City of Delta.
- 1.2 The ENGINEER is CITY OF DELTA DEPARTMENT OF PUBLIC WORKS.

2. BID PERIOD AND OPENING DATE

- 2.1 Sealed BIDS will be received by the OWNER at 360 Main Street, Delta, Colorado until the **1st day of June, 2016 at 3:00pm.** A bid opening will not be conducted. See Part 5 of this section for additional information.

3. PROJECT EVALUATION

- 3.1 BIDDERS must satisfy themselves as to the accuracy of the estimated quantities in the BID FORM by examination of the site at the mandatory pre bid walk-through on the **20th day of May, 2016 at 3:00 pm** 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.
- 3.2 The OWNER shall provide to BIDDERS, prior to bidding, all information pertinent to the project.
- 3.3 The CONTRACT DOCUMENTS contain the provisions required for the performance of the Project. 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 him from fulfilling any of the conditions of the CONTRACT.
- 3.4 All applicable laws, ordinances, and rules or regulations of all authorities having jurisdiction over performance of the project shall apply to the WORK described by the CONTRACT DOCUMENTS. The BIDDER shall be responsible for compliance with these statutes.
- 3.5 Each BIDDER is responsible for inspection of the site, and reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of a BIDDER to do any of the foregoing shall in no way relieve a BIDDER of obligations with respect to the BID.

- 3.6 Command type sentences are used in the CONTRACT DOCUMENTS. These refer to and are directed to the CONTRACTOR. Modifications, as stated in the special conditions, shall be given precedence over related language in other parts of the CONTRACT DOCUMENTS.
- 3.7 Questions regarding documents, discrepancies, omissions, or intent of the specifications or drawings shall be communicated to Ellen Michelson, City Engineer for the City of Delta Public Works Department no later than the **26th day of May, 2016 at 3:00 pm** to provide time to issue an Addendum. Questions will not be answered after this date. Addenda will be issued, if in the opinion of the OWNER, it is necessary. Questions can be submitted by email at ellen@cityofdelta.net or by phone at 970-874-7566 ext. 216. The OWNER will not be responsible for oral interpretations of the specifications and drawings.
- 3.8 The BIDDER shall carefully examine the site of the WORK, the drawings, and the specifications. The submission of a BID will be conclusive evidence that the BIDDER has investigated and is satisfied as to the conditions to be encountered, with respect to character, quality, and quantity of WORK to be performed. Submission of a BID will also be seen as evidence of the BIDDERS understanding of the materials required for completion of the WORK, completion time, and the authority that the OWNER and the ENGINEER will exercise over the CONTRACT during its tenure.

4. SUBSTITUTION OR APPROVAL OF ALTERNATE MATERIALS

- 4.1 To obtain approval during the BID period to use unspecified, "or equal", or "as approved" materials, BIDDERS shall submit written requests at least 7 days prior to BID opening. Requests received later than this time will be considered at the discretion of the OWNER. Requests shall clearly describe the product for which approval is asked, including all necessary data to demonstrate its acceptability. The OWNER will make recommendations on acceptability, and an Addendum will be issued if the product is acceptable.

5. BID FORMAT

- 5.1 Each BID must be submitted in a sealed envelope addressed to City of Delta Public Works Department, 360 Main Street, Delta, Colorado, 81416. Each sealed envelope should be marked on the outside with the name of the BIDDER, the BIDDERS address, license number (if applicable), and the name and number of the project for which the BID is submitted. If the BID is mailed, the sealed envelope containing the BID must be enclosed in an envelope addressed to City of Delta Public Works Department, 360 Main Street, Delta, Colorado 81416, Attn: Ellen Michelson, Response to Bids for **2016 Booster Pump Station Project**

- 5.2 All BIDS must be made on the BID FORM included in the BID PACKAGE. All blank space for BID prices must be filled out in ink or typewritten, and the BID form must be completed in its entirety. Only one copy of the BID form is required.
- 5.3 The BIDDER shall supply the names and addresses of major material suppliers and SUBCONTRACTORS on the BID forms where requested.
- 5.4 The full name, business address, zip code and business telephone number with area code of the individual, partnership, joint venture, or corporation submitting the proposal shall be legibly printed on the BID forms. The BIDDER shall sign the form with his usual signature.
- 5.5 A partner shall sign for the partnership. The names of all partners with addresses shall be given.
- 5.6 An officer shall sign for a corporation, the corporate existence shall be attested by the corporate seal, and the names and titles of all officers of the corporation shall be given.
- 5.7 Any signature other than that of a corporate officer, partner, or the BIDDERS legally authorized agent or representative will be accepted only if an authenticated power of attorney is attached to the BID forms. All signatures shall be handwritten with the name printed or typewritten below the signature.
- 5.8 The BIDDER shall state for each item on the BID form the unit price, and item total or lump sum in clearly legible figures. Prices shall be represented on the BID form with numerals in the spaces provided for each.
- 5.9 In case of errors or uncertainty in pricing of any item, or if such pricing is omitted, then either unit prices or total price for the same item may be used, at the OWNERS discretion, to arrive at a total project BID cost. If the OWNER is unable to resolve ambiguities with respect to BID prices, the BID may be disregarded.
- 5.10 The BID shall contain acknowledgment of receipt of all Addenda in the space provided in the BID forms.

6. BONDS

- 6.1 A PERFORMANCE BOND and a PAYMENT AND MAINTENANCE BOND shall be required as outlined in the contract attached herein.

7. EVALUATION OF BIDS

- 7.1 The OWNER may waive any informality or minor defects, or reject any and all BIDS. Any BID may be withdrawn prior to the BID opening. Any BID received after the time and date specified for the BID opening shall not be considered. No BIDDER may withdraw a BID within 60 days after the BID opening. Should there be reasons why the CONTRACT cannot be awarded within the specified period, the time within which the BID shall remain valid may be extended by mutual agreement between the OWNER and the BIDDER.
- 7.2 The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the WORK. The BIDDER shall furnish the OWNER with all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if, based on submitted evidence or the OWNERS investigation, said BIDDER fails to satisfy the OWNER that he is properly qualified to carry out the obligations of the CONTRACT and to complete the WORK as presented by the CONTRACT DOCUMENTS.
- 7.3 A Conditional or Qualified BID will not be accepted.

8. NOTICE OF AWARD

- 8.1 The OWNER shall issue a Notice of Award along with the necessary CONTRACT and BOND forms to the lowest acceptable BIDDER that will result in completion of the WORK within the time allotted by the CONTRACT DOCUMENTS.

9. EXECUTION OF CONTRACT

- 9.1 The BIDDER, to whom the CONTRACT is awarded, will be required to execute the CONTRACT and furnish INSURANCE CERTIFICATES within 10 calendar days from the date when the Notice of Award is delivered to the BIDDER. In case of failure of the BIDDER to execute the CONTRACT or provide the required insurance certificates, the OWNER may consider the BIDDER in default.

10. NOTICE TO PROCEED

- 10.1 The OWNER, within 10 calendar days of receipt of acceptable INSURANCE CERTIFICATES and CONTRACT signed by the BIDDER to whom the CONTRACT was awarded, shall sign the Agreement and return to said BIDDER an executed duplicate of the CONTRACT. Should the OWNER not execute the CONTRACT within such period, the BIDDER may, by written notice, withdraw his signed CONTRACT. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

10.2 The Notice to Proceed shall be issued within 10 calendar days of the execution of the Contract by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be changed by mutual agreement between the OWNER and CONTRACTOR. If the Notice to Proceed is not issued within the 10 day period or within the period mutually agreed upon, the CONTRACTOR may terminate the CONTRACT without further liability on the part of either party.

11. LOCATION AND ACCESS

11.1 Encroachment on private property, outside the construction easements or right-of-way, by the CONTRACTOR or the WORK, is prohibited unless special arrangements are made in writing with the property owner, and agreed to by the ENGINEER or the OWNER. Damage to private property, both within and outside the delineated easements, shall be repaired and paid for by the CONTRACTOR at his expense. The location of the project is as shown on the location map.

12. OWNERS RIGHT TO REJECT BIDS

12.1 The OWNER reserves the right to reject any or all proposals and/or to waive technical defects as the interests of the OWNER may require. The OWNER proposes to award a CONTRACT to a single successful BIDDER as soon as possible after BIDS have been opened.

13. PRICES AND PAYMENTS

13.1 The quantities and portions of the WORK are described in the Specifications. Payment for the WORK will be paid on a lump sum basis for the completed WORK, and will cover materials, supplies, labor, tools, equipment and all other expenditures necessary to a satisfactory compliance with the CONTRACT, unless specifically otherwise provided. Monthly progress payments will be made to the contractor.

2016 Booster Pump Station Project

PROPOSAL

THIS BID IS SUBMITTED TO: City of Delta Public Works Department

The undersigned bidder, having examined the plans, specifications, special conditions and other Contract Documents as designated, and any addenda thereto, having investigated the location of, and conditions affecting the proposed work; and being acquainted with and fully understanding the extent and character of the work covered by this Proposal and all factors and conditions affecting the work;

HEREBY PROPOSES, pursuant to the Requirements for Bids as specified in the Bid Package entitled **2016 Booster Pump Station Project**, to furnish all required materials, tools and equipment to perform all necessary labor and superintendence; and to undertake and complete the work required in the City of Delta, Colorado in full accordance with plans, specifications, special conditions and Contract Documents hereto attached or by reference made a part thereof at, and for the lump sum prices depicted in the attached sheets.

The grand total price for the project, based on the attached bid form and parts list:

BOOSTER STATION PROJECT GRAND TOTAL:

(written amount)

(\$ _____)

(number format)

The BIDDER acknowledges receipt of the following ADDENDA:

- 1.
- 2.
- 3.
- 4.
- 5.

The undersigned bidder proposes to sublet the following work:

1. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

2. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

3. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

4. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

5. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

6. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

7. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

8. NAME OF SUBCONTRACTOR: _____

WORK DESCRIPTION: _____

ADDRESS OF SUBCONTRACTOR: _____

The undersigned bidder acknowledges the right of the City to reject any and all bids submitted and to waive informalities therein.

By submission of the BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to his 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.

The BIDDER agrees to commence Work with in 10 calendar days after issuance of a Notice to Proceed, to fully complete said Work on or before 90 calendar days after the notice to proceed has been issued.

The submission of a BID will constitute an incontrovertible representation by the BIDDER that he is familiar with conditions of the site together with the work required.

BIDDER agrees to perform all work described in the Contract Documents for the lump sum as shown on the Bid Form. The BIDDER further agrees that no bid may either be changed or withdrawn, without consent of the City, for a period of sixty (60) days after the scheduled time for opening the bids.

The undersigned BIDDER hereby agrees to be ready and to appear at the office of the City of Delta Clerk to execute the attached Agreement in conformity with this bid, and also to have ready and furnish the required insurance certificates at any time within ten (10) days from the date of a Notice of Award, mailed to the address hereinafter given.

SUBMITTED on _____, 20____.

If BIDDER is:

INDIVIUAL

By (Individual's Name):_____

doing business as_____

Business Address:_____

Phone Number: _____

Email Address:_____

PARTNERSHIP

By (Firm Name): _____

(General Partner) _____

Business Address: _____

Phone Number: _____

Email Address: _____

CORPORATION (CORPORATE SEAL)

By (Corporation Name): _____

By (Name of Person Authorized to Sign): _____

(Title) _____

Attest (Secretary): _____

Business Address: _____

Phone Number: _____

JOINT VENTURE

By (Name): _____

Address: _____

By (Name): _____

Address: _____

Phone Number: _____

Email Address: _____

(Each Joint Venturer must sign. The manner of signing for each individual partnership and corporation that is a party to the Joint Venture should be in the manner indicated above.

2016 Booster Pump Station Project

BID FORM

Contractor will use the plans, and specifications to determine a lump sum price for the building and the pump station. The water line construction will be outlined in the mandatory pre bid walk-through. A parts list including manufacturer, specs, size, and quantity will be required in the bid submittal for the pump station components to verify against plans and specifications.

CATEGORY OF WORK	UNIT	TOTAL (\$)
Booster Pump Station	LS	
Booster Pump Station Building	LS	
New 16" Water Line (3MG Tank): Excavation, Installation and Backfill (Material Provided by City)	LS	
PROJECT GRAND TOTAL	-	

2016 Booster Pump Station Project

PROJECT OVERVIEW

Overview

The City of Delta, will receive sealed bids at Delta City Hall, 360 Main Street, Delta, Colorado for the **2016 Booster Pump Station Project** located in the utility easement located near the northeast corner of F 25 Road and Pioneer Road. There is a mandatory pre bid walk-through scheduled for the **20th day of May, 2016 at 3:00 pm** at the project location. Bids will not be considered if the Contractor does not attend the pre-bid walk-through. Bids will be due on the **1st day of June, 2016 at 3:00 pm** and shall be addressed to the attention of Ellen Michelson, City Engineer.

All work will be managed under the direction of the Public Works Department and in compliance with project plans, technical specifications, special conditions and *City of Delta Standards and Specifications for the Design and Construction of Public Improvements* found on the City website under the Public Works Department at <http://cityofdelta.net/publicworks.html>.

Scope of Work

The project involves constructing a dual function pump station that includes an emergency booster pump and pressure reducing valve package. The project will involve the lump sum bid out of three categories of work: pump station components, pump station building, and construction of a new 16" water line from the 3MG tank (material will be provided by the City). The water line construction will be outlined in the mandatory pre bid walk-through. A parts list including manufacturer, specs, size, and quantity will be required in the bid submittal for the pump station components to verify alongside plan and specifications.

Bid Package

Each Bid Package includes the following documents

- Advertisement for Bids
- Instruction to Bidders
- Proposal
- Project Overview & Map
- Technical Specifications
- Special Conditions
- Pump Station Design
- Pump Station Building Design
- Construction Contract & Exhibit B
- Addendum – Obtained from RFP web page: <http://cityofdelta.net/rfp.html>

Bid Submittal Format

Each bid shall be submitted on the BID FORM and PROPOSAL documents with a parts list for the pump station components and shall include at a minimum:

1. Name of company or person submitting proposal
2. Address, phone number, and email of submitting entity
3. Cost to accomplish the scope of this project
4. Names of any subcontractors who will be performing work on this project

Additional Information

The City reserves the right to amend this RFP by an addendum at any time prior to the date set for receipt of bids. Addendum will be posted on the City website under the News “RFP” tab at <http://cityofdelta.net/rfp.html>

The City reserves the right to reject any or all proposals without disclosing the reason therefore, to waive any information in the proposals received, and to accept the proposal deemed most advantageous and in the best interest of the City.

No bids may be withdrawn after the opening of bids, without consent of City of Delta, for a period of sixty (60) days after the scheduled time of opening of bids. The successful bidder or bidders will be required to furnish satisfactory performance and payment bonds equal to the full amount of each bid or proposal.

Questions

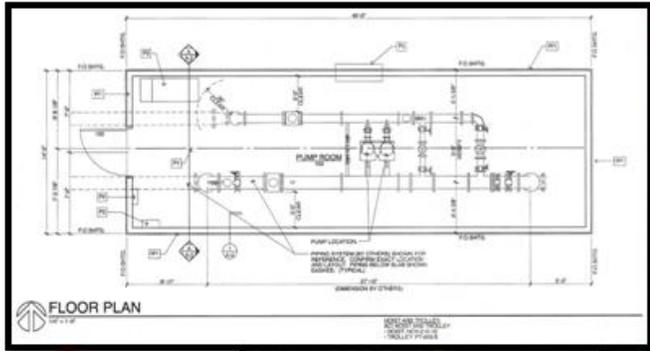
Questions regarding this Request for Bids may be addressed to:

Ellen Michelson: City Engineer
360 Main St., Delta, CO 81416
Email: ellen@cityofdelta.net
Phone # 970.874-7566 x 216

Questions must be submitted by **3:00 p.m. on the 26th day of May, 2016**

Maps

Site Plan: 1250 Pioneer Road, Delta, CO 81416



Booster Station Site Plan



2016 Booster Pump Station Project

TECHNICAL SPECIFICATIONS

**SECTION 1:
BUTTERFLY VALVE SPECIFICATIONS**

PART 2 : GENERAL

2.2 DESCRIPTION

B. This Section covers materials, testing, and installation of butterfly valves for:

1. Entrance/Exit locations on the suction 12” pipe
2. Isolation of 4” PRV
3. Isolation of 6” PRV

2.3 QUALITY ASSURANCE

B. Perform all work in accordance with the latest revisions of the following codes and standards.

1. Federal, state, and local codes, regulations, and ordinances.
2. American National Standard Institute (ANSI)
3. American Water Works Association (AWWA). AWWA C504 – Rubber
4. Seated Butterfly Valves and AWWA C550 – Protective Epoxy Interior
5. Coatings for Valves and Hydrants.
6. American Society for Testing and Materials (ASTM).
7. NSF/ANSI 61.

2.4 RELATED WORK

B. Consult all other Specification sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete operational installation.

2.5 SUBMITTALS

- B.** Submit Shop Drawings and Operation and Maintenance Manuals.
 - 1.** Submit valve manufacturers catalog data, descriptive literature and assembly drawings. Show dimensions, materials of construction by specification reference and grade, linings, and coatings.
 - 2.** Submit manufacturer's affidavit of compliance with referenced standards.
 - 3.** Submit coating application factory test records for measuring coating thickness and holiday detection for the valve interior linings and exterior coatings and repair procedure.
 - 4.** Submit manufacturer proof-of-design per AWWA C504.
 - 5.** Operation and Maintenance Manuals.

2.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- B.** Protect equipment during shipment, handling, and storage.
- C.** Protect equipment from exposure to elements and keep thoroughly dry. Store off of ground in weather tight enclosure.

PART 3 : PRODUCTS

3.2 VALVE DESIGN

- B.** Meet or exceed the requirements of AWWA C504, NSF/ANSI 61, and the requirements of these specifications.
 - 1.** Materials.
 - a.** Body: Ductile Iron ASTM A-536 (65-45-12)
 - b.** Shaft: Stainless Steel.
 - c.** Disc: Ductile Iron with 316 stainless steel edge.
 - d.** Valve Seat: Buna N. Rubber body seats shall be of one piece construction, simultaneously molded and bonded into a recessed cavity in the valve body protecting the leading edge of the seat from shearing force of the line flow. Seats may not be located on the disc or be retained by segments and/or screws

2. Ends: Flanged, ANSI B16.1 Class 125.
3. Valve Class 250B.
4. Butterfly valves, butterfly valve operators and component parts shall be as manufactured by Mueller Co. (Linesal XP11), Henry Pratt Company, or approved equal.

3.3 OPERATORS

- B.** Operators and component parts shall be per AWWA C504, unless otherwise specified.
- C.** Provide flanged valves with counter-clockwise opening handwheel operators.
 1. Compute operation torque of each valve and operator in accordance with Appendix of AWWA Standard C504 for velocity of 16 fps and applicable pressure drop across valve.
 2. Operators: Sized for bi-directional flow and 450 ft-lb input torque.
- D.** Required input torque with maximum handwheel pull of 80 lbs, 300 ft.-lbs. for operating nuts.
- E.** Totally enclosed, permanently lubricated and sealed gear reducers. A vent shall be provided between the valve trunnion and actuator base to prevent infiltration of fluid into the actuator.
 1. Self-locking with open and close stops provided to limit valve disc travel.
 2. Traveling nut type.
 3. Submit calculations for valve torque requirements to Engineer as part of Shop Drawing submittal package. Velocity for dynamic torque must be 16 fps
- F.** Valve operators, as manufactured by Mueller Co., Henry Pratt Company, or approved equal.
- G.** Provide flanged butterfly valves with manual hand wheels and position indicators.
- H.** Provide adequate clearance for handwheel operation. Handwheel orientation will be verified during shop drawing review.

3.4 MARKING AND PAINTING

- B.** Marking: Name of manufacturer and size, cast on body, or on cast plate, or affixed by metal tag.

- C. Painting: All surfaces of the valve interior shall be clean, dry and free from grease before painting. The valve surfaces except for disc edge, rubber seat and finished portions shall be a minimum of 8 mils Ameron 370, NSF approved.

PART 4 : EXECUTION

4.2 INSPECTION

- B. Inspect valve and operator for defects before installation. Operate valve over complete cycle to check seats and closure.

4.3 INSTALLATION

- B. Install using manufacturer's instructions. Place with shaft in vertical position and operator in the most accessible location. Removal and re-bolting of operator may be required.
- C. After placement, check for adequate disc clearance during complete rotation.

END OF SECTION

SECTION 2

PUMP SKID SPECIFICATIONS

PART 1 : GENERAL

1.1 WORK INCLUDED

- A.** Variable Speed Skid Mounted Pumping System
- B.** Flow meters and pressure reducing valves for mounting remote from the skid.

1.2 REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:

- A.** Hydraulic Institute
- B.** ANSI – American National Standards Institute
- C.** ASTM – American Society for Testing and Materials
- D.** D. IEEE – Institute of Electrical and Electronics Engineers
- E.** NEMA – National Electrical Manufacturers Association
- F.** NEC – National Electrical Code
- G.** ISO – International Standards Organization
- H.** UL – Underwriters Laboratories, Inc.

PART 2 : PRODUCTS

2.1 VARIABLE SPEED PACKAGED PUMPING SYSTEM

- A.** Furnish and install a pre-fabricated and tested variable speed packaged pumping system to maintain constant water delivery pressure.
- B.** B. The packaged pump system shall be a standard product assembled by a single manufacturer. The entire pump system including pumps and pump logic controller, shall be designed, built, and tested by the same manufacturer.

- C. The complete packaged water booster pump system shall be certified and listed by UL (Category QCZJ – Packaged Pumping Systems) for conformance to U.S. and Canadian Standards.
- D. The complete packaged pumping system shall be NSF61 Annex G listed for drinking water and low lead requirements.

2.2 PUMPS

- A. All pumps shall be ANSI/NSF 61 Annex G listed for drinking water and low lead requirements.
- B. The pumps shall be of the in-line vertical multi-stage design.
- C. The pump station shall be capable of delivering the following capacities and heads when operating at the field-low flow suction pressure condition of 5 psi. TDH is measured from the suction manifold pressure to the discharge manifold pressure, such that minor losses, valve losses and check valve losses on the pump skid are accounted for.
 1. Single Pump Operation: Normal Design Flow Rate 450gpm @ 145 feet TDH (VFD Speed less than 60Hz);
 2. Two Pump Operation: Normal Design Flow Rate 800gpm @ 145 feet TDH (VFD Speed less than 60Hz);
 3. Shut off head shall be no lower than 230 TDH @ 60Hz.
 4. The pump shall be driven by a variable speed motor that is A.C. induction motor, open drip-proof construction, of the vertical shaft, normal thrust type and shall be 3500 rpm nominal and suitable for 3 phase, 60 cycle, 480 volt electrical service.
 5. The pump motor shall be sized so that the nameplate horsepower rating, without consideration of the service factor, shall not be exceeded at any point along the pump performance profile. The pump motor shall be complete with a 1.15 service factor.
 6. Note that the suction pressure varies from a low of approximately 5 psi to a high of approximately 26 psi.
 7. Pumps shall be capable of operating to maintain a discharge pressure of 68 psi across the full range of suction pressures.
 8. For single pump operation, pump shall be capable of operating without cavitation down to 175 gpm, or lower flow, across the full range of suction pressures: for TDH from 96 ft to 145 ft.

- D.** Large In-line Vertical Multi-Stage Pumps (Nominal flows from 130 to 500 gallons per minute) shall have the following features:
1. The pump impellers shall be secured directly to the smooth pump shaft by means of a split cone and nut design.
 2. The suction/discharge base shall have ANSI Class 125 flange connections in a slip ring (rotating flange) design as indicated in the drawings or pump schedule.
 3. Pump Construction.

a. Suction/discharge base, pump head:	Ductile Iron or Cast Iron
b. Shaft couplings, flange rings:	Ductile Iron or Cast Iron
c. Shaft:	Stainless Steel
d. Motor Stool:	Cast Iron
e. Impellers, diffuser chambers, outer sleeve:	Stainless Steel
f. Impeller wear rings:	Stainless Steel
g. Intermediate Bearing Journals:	Tungsten Carbide
h. Intermediate Chamber Bearings:	Leadless Tin Bronze
i. Chamber Bushings:	Graphite Filled PTFE
j. O-rings:	EPDM
 4. The shaft seal shall be a single balanced metal bellows cartridge with the following construction:

a. Bellows:	904L Stainless Steel
b. Shaft Sleeve, Gland Plate, Drive Collar:	316 Stainless Steel
c. Stationary Ring:	Carbon
d. Rotating Ring:	Tungsten Carbide
e. O-rings:	EPDM
 5. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, motor couplings, motor and seal cover. The entire cartridge shaft seal shall be removable as a one piece component. Pumps with motors equal to or larger than 15 hp (fifteen horsepower) shall have adequate space within the motor stool so that shaft seal replacement is possible without motor removal.

- E.** Acceptable Pump Manufacturers:
 - 1. Grundfos, Model CR90-2-1
 - 2. Goulds, Model 92SV
 - 3. Berkeley, Model BVM(I/X) 120-2-1

2.3 VARIABLE FREQUENCY DRIVES (Panel Mount)

- A.** The VFD shall convert incoming fixed frequency single-phase or three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD shall be a six-pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.
- B.** The VFD shall include a full-wave diode bridge rectifier and maintain a displacement power factor of near unity regardless of speed and load.
- C.** The VFD shall produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating.
- D.** The VFD shall utilize an output voltage-vector switching algorithm, or equivalent, in both variable and constant torque modes. VFD's that utilize Sine-Coded PWM or Look-up tables shall not be acceptable.
- E.** VFD shall automatically boost power factor at lower speeds.
- F.** The VFD shall be able to provide its full rated output current continuously at 110% of rated current for 60 seconds.
- G.** An empty pipe fill mode shall be available to fill an empty pipe in a short period of time, and then revert to the PID controller for stable operation.
- H.** Switching of the input power to the VFD shall be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes.
- I.** Switching of power on the output side between the VFD and the motor shall be possible with no limitation or damage to the VFD and shall require no additional interlocks.
- J.** The VFD shall have temperature controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.
- K.** VFD shall provide full torque to the motor given input voltage fluctuations of up to +10% to -15% of the rated input voltage.

- L. The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. VFD's without a DC link reactor shall provide a 5% impedance line side reactor.
- M. VFD to be provided with the following protective features:
 - 1. VFD shall have input surge protection utilizing MOV's, spark gaps, and Zener diodes to withstand surges of 2.3 times line voltage for 1.3 msec.
 - 2. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD.
 - 3. VFD shall include current sensors on all three-output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.
 - 4. VFD shall auto-derate the output voltage and frequency to the motor in the presence of sustained ambient temperatures higher than the normal operating range, so as not to trip on an inverter temperature fault. The use of this feature shall be user-selectable and a warning will be exported during the event. Function shall reduce switching frequency before reducing motor speed.
 - 5. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. Speed can be reduced, but not stopped.
 - 6. The VFD shall have the option of an integral RFI filter. VFD enclosures shall be made of metal to minimize RFI and provide immunity.
- N. VFD to be provided with the following interface features:
 - 1. VFD shall provide an alphanumeric backlit display keypad, which may be remotely mounted using standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
 - 2. VFD shall display all faults in plain text; VFD's, which can display only fault codes, are not acceptable.
 - 3. All VFD's shall be of the same series, and shall utilize a common control card and LCP (keypad/display unit) throughout the rating range. The control cards and keypads shall be interchangeable through the entire range of drives used on the project.
 - 4. VFD keypad shall be capable of storing drive parameter values in non-volatile RAM uploaded to it from the VFD, and shall be capable of downloading stored values to the VFD to facilitate programming of multiple drives in similar applications, or as a means of backing up the programmed parameters.

5. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
6. A start guide menu with factory preset typical parameters shall be provided on the VFD to facilitate commissioning.
7. VFD shall provide full galvanic isolation with suitable potential separation from the power sources (control, signal, and power circuitry within the drive) to ensure compliance with PELV requirements and to protect PLC's and other connected equipment from power surges and spikes.
8. All inputs and outputs shall be optically isolated. Isolation boards between the VFD and external control devices shall not be required.
9. There shall be three programmable digital inputs for interfacing with the systems external control and safety interlock circuitry. An additional digital input is preprogrammed for start/stop.
10. The VFD shall have two analog signal inputs. One dedicated for sensor input and one for external set point input.
11. One programmable analog output shall be provided for indication of a drive status.
12. The VFD shall provide two user programmable relays with selectable functions. Two form 'C' 230VAC/2A rated dry contact relay outputs shall be provided.
13. The VFD shall store in memory the last 5 faults with time stamp and recorded data.
14. The VFD shall be equipped with a standard RS-485 serial communications port for communication to the multi-pump controller. The bus communication protocol for the VFD shall be the same as the controller protocol.

O. VFD service conditions:

1. Ambient temperature operating range, -10 to 45°C (14 to 113°F).
2. 0 to 95% relative humidity, non-condensing.
3. Elevation to 5,100 feet without derating.
4. VFD's shall be rated for line voltage of 380 to 480VAC with +10% to -15% variations. Line frequency variation of $\pm 2\%$ shall be acceptable.
5. No side clearance shall be required for cooling of the units.

2.4 FIXED SPEED MOTORS

- A.** Fixed Speed Motors are to be provided with the following basic features:
- 1.** Designed for continuous duty operation, NEMA design B with a 1.15 service factor.
 - 2.** Totally Enclosed Fan Cooled or Open Drip Proof with Class F insulation.
 - 3.** Nameplate shall have, as a minimum, all information as described in NEMA Standard MG1-20.40.1.
 - 4.** Motors shall have a NEMA C-Flange for vertical mounting.

2.5 PUMP SYSTEM CONTROLLER

- A.** The pump system controller shall be a standard product developed and supported by the pump manufacturer.
- B.** The controller shall be microprocessor based capable of having software changes and updates made by the Owner via personal computer (notebook). The controller user interface shall have a color display with a minimum screen size of 3-1/2" x 4-5/8" for easy viewing of system status parameters and for field programming. The display shall have a back light with contrast adjustment. Password protection of system settings shall be standard.
- C.** The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all fieldbus connections.
- D.** The controller shall have the ability to be connected to a battery to maintain power on controller during periods of loss of supply power.
- E.** The controller shall have built in data logging capability. Logged values shall be graphically displayed on the controller and able to be exported to computer via standard connection. A minimum of 3600 samples per logged value with the following parameters available for logging:
- 1.** Pump Discharge Flow-rate, as measured by the 8" flow meter
 - 2.** Speed of pumps
 - 3.** Inlet pressure
 - 4.** Discharge pressure
 - 5.** Power consumption
 - 6.** Controlling parameter (desired discharge pressure – initial set point 68 psi)

- F.** The controller shall display the following as status readings from a single display on the controller (this display shall be the default):
1. Current value of the control parameter, (typically discharge pressure)
 2. Most recent existing alarm (if any)
 3. System status with current operating mode
 4. Status of each pump with current operating mode and rotational speed as a percentage (%)
 5. Flow-rate
- G.** The controller shall have as a minimum the following hardware inputs and outputs:
1. Three analog inputs (4-20mA or 0-10VDC)
 2. Three digital inputs
 3. Two digital outputs
 4. Ethernet connection
 5. Field Service connection to PC for advanced programming and data logging
- H.** Pump system programming (field adjustable) shall include as a minimum the following:
1. Water shortage protection (analog or digital)
 2. Transducer Settings (Suction and Discharge Analog supply/range)
 3. PI Controller (Proportional gain and Integral time) settings
 4. High system pressure indication and shut-down
 5. Low system pressure indication and shut-down
 6. Low suction pressure shutdown (via digital contact)
 7. Low suction pressure warning (via analog signal)
 8. Low suction pressure shutdown (via analog signal)
 9. Flow meter settings (via analog signal)
- I.** The system controller shall be able to accept up to seven programmable set-points via a digital input, (additional input/output module may be required).

- J.** The controller shall have advanced water shortage protection. When analog pressure sensors are used for water shortage protection, there shall be two indication levels. One level is for warning indication only (indication that the water pressure is getting lower than expected levels) and the other level is for complete system shut-down (water pressure is so low that pump damage can occur). System restart after shut-down shall be manual or automatic (user selectable).
- K.** The system pressure set-point shall be capable of being automatically adjusted by using an external set-point influence. The set-point influence function enables the user to adjust the control parameter (typically pressure) by measuring an additional parameter. (Example: Lower the system pressure set-point based on a flow measurement to compensate for lower friction losses at lower flow rates).
- L.** L. The controller shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote system on/off (digital) signal.
- M.** The controller shall be able to adjust the ramp time of a change in set point on both an increase or decrease change in set point.
- N.** The pump system controller shall store up to 24 warning and alarms in memory. The time, date and duration of each alarm shall be recorded. A potential-free relay shall be provided for alarm notification to the building management system. The controller shall display the following alarm conditions:
 - 1.** High System Pressure
 - 2.** Low system pressure
 - 3.** Low suction pressure (warning and alarm)
 - 4.** Individual pump failure
 - 5.** VFD trip/failure
 - 6.** Loss of sensor signal (4-20 mA)
 - 7.** Loss of remote set-point signal (4-20mA)
 - 8.** System power loss
- O.** The pump system controller shall be mounted in a UL Type 12 rated enclosure. A self-certified NEMA enclosure rating shall not be considered equal. The entire control panel shall be UL 508 listed as an assembly. The control panel shall include a main disconnect, circuit breakers for each pump and the control circuit and control relays for alarm functions.

Control panel options shall include, but not be limited to:

- 1.** Pump Run Lights

2. System Fault Light
3. Audible Alarm (80 db[A])
4. Surge Arrestor
5. Emergency/Normal Operation Switches
6. Service Disconnect Switches
7. Min. Qty (9) Configurable Digital Outputs available for monitoring

- P.** The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor (typically discharge pressure).
- Q.** The controller shall have a pump “Test Run” feature such that pumps are switched on during periods of inactivity (system is switched to the “off” position but with electricity supply still connected). The inoperative pumps shall be switched on for a period of two to three (2-3) seconds every 24 hours, 48 hours or once per week and at specific time of day (user selectable).
- R.** The controller shall be capable of changing the number of pumps available to operate or have the ability to limit the maximum power consumption by activation of a digital input for purposes of limited generator supplied power.
- S.** The controller shall be capable of displaying instantaneous power consumption (Watts or kilowatts) and cumulative energy consumption (kilowatt-hours).
- T.** The controller shall be capable of displaying instantaneous specific energy use (kw/gpm), (optional flow meter must be connected).
- U.** The actual pump performance curves (5th order polynomial) shall be loaded (software) into the pump system controller or be able to input manually into controller based on three points on pump curve of pumps controlled.
- V.** The controller shall be capable of displaying a measured flow-rate on the default status screen.
- W.** The controller shall have the ability to compensate for pipe friction loss by decreasing pressure set-point at lower flow-rates and increasing pressure set-point at higher flow-rates without the requirement of a flow meter.
- X.** The controller shall have the ability to communicate common field-bus protocols, (BACnet, Modbus, Profibus, and LON), via optional communication expansion card installed inside controller.
- Y.** The controller shall have a built in Ethernet connection allowing controller to connected to network and access of controller via web browser and internet anywhere around the world where internet communication is available.

- Z.** The controller shall have a programmable Service Contact Field that can be populated with service contact information including: contact name, address, phone number(s) and website.

2.6 SEQUENCE OF OPERATION

- A.** The system controller shall operate equal capacity variable speed pumps to maintain a constant discharge pressure (system set-point). The system controller shall receive an analog signal [4-20mA] from the factory installed pressure transducer on the discharge manifold, indicating the actual system pressure. As flow demand increases the pump speed shall be increased to maintain the system set-point pressure. When the operating pump(s) reach 96% of full speed (adjustable), an additional pump will be started and will increase speed until the system set-point is achieved. When the system pressure is equal to the system set-point all pumps in operation shall reach equal operating speeds. As flow demand decreases the pump speed shall be reduced while system set-point pressure is maintained. When all pumps in operation are running at low speed the system controller shall switch off pumps when fewer pumps are able to maintain system demand.
- B.** The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors or temperature measuring devices.
- C.** All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous (no flow shut-down does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.
- D.** The system controller shall be able to control a pressure maintenance pump, (jockey pump), in the system. The set point of the pressure maintenance pump shall be able to be any value above or below the pump system's set point. The pressure maintenance pump shall be able to be staged on as back-up pump when capacity of pump system is exceeded. Note: No such jockey pump is presently required by the City, but this provision shall be included in case one is added in the future.

2.7 LOW FLOW FUNCTION

- A.** The system shall be capable of maintaining the desired discharge pressure set point during low flow periods. System controller shall allow for a discharge pressure rise of up to 10 psi above set point during periods of time when system demand as measured by FE/FIT-2 is below the minimum operating capacity of the pump. This will activate the hydraulically controlled 2" PSV, allowing partial recirculation.
- B.** Pumps shall not stop due to low flow conditions.

2.8 PUMP SKID CONSTRUCTION

- A.** Suction and discharge manifold construction shall be in way that ensures minimal pressure drops, minimize potential for corrosion, and prevents bacteria growth at intersection of piping into the manifold. Manifold construction that includes sharp edge transitions or interconnecting piping protruding into manifold is not acceptable. Manifold construction shall be such that water stagnation cannot exist in manifold during operation to prevent bacteria growth inside manifold.
- B.** The suction and discharge manifolds shall be constructed of 316 stainless steel. Manifold connection sizes shall be as follows:
- | | |
|---------------------------|---------------------------------|
| 1. 3 inch and smaller: | Male NPT threaded |
| 2. 4 inch through 8 inch: | ANSI Class 150 rotating flanges |
| 3. 10 inch and larger: | ANSI Class 150 flanges |
- C.** Pump Isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inch and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inch and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
- D.** A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves 1-1/2" and smaller shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats. Check valves 2" and larger shall have a body material of stainless steel or epoxy coated iron (fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.
- E.** For systems that require a diaphragm tank, a connection of no smaller than 3/4" shall be provided on the discharge manifold. Note: No tank is included in the current design, but maintain this connection, plugged, in the event the City elects to add tank in the future.
- F.** PE/PIT-1,2: A pressure transducer shall be factory installed on the discharge manifold (or field installed as specified on plans). Systems with positive inlet gauge pressure shall have a factory installed pressure transducer on the suction manifold for water shortage protection. Pressure indicating transmitter shall be Rosemount Model 2088G, or approved equal, with Local Operator Interface. Pressure range shall be -14.7 to 150 psi, with 4-20mA/Digital HART protocol. Provide with 316 stainless steel process connection and isolation diaphragm with silicone oil fill, 1/2-14NPT female connection, with NSF drinking water certification, LCD display with local operator interface. Install isolation ball valve model T-FP-600A-LF-LL with locking lever by Nibco between tap and pressure transmitter.
- G.** A bourdon tube pressure gauge, Ashcroft 4.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal

parts in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.

- H.** Systems with a flooded suction inlet or suction lift configuration shall have a factory installed water shortage protection device on the suction manifold.
- I.** The base frame shall be constructed of corrosion resistant 304 stainless steel. Rubber vibration dampers shall be fitted between each pumps and baseframe to minimize vibration.
- J.** Depending on the system size and configuration, the control panel shall be mounted on a 304 stainless steel fabricated control cabinet stand attached to the system skid.

2.9 COMPLETE PACKAGED SYSTEM CONSTRUCTION

A. SKID BASE STRUCTURE

1. Materials

- a.** All skids shall be constructed of fabricated carbon steel
- b.** All materials used in the construction of the skid base, equipment mounting provisions, and support materials shall be new.
- c.** All structural steel shapes, bars, plates shall be ASTM A36 grade meeting the requirements of ASTM A6.
- d.** All structural channel, I-beam, and square tubing provided as skid running members (main supports) shall be provided with MTR reports upon request

2. Standards of Design

- a.** Load bearing beams shall be contained within and welded to a steel, I-beam or structural channel exterior.
- b.** Appropriate space and clearance shall be provided for access, operation, and maintenance of supplied equipment.
- c.** Skid exterior running members parallel to shaft lines of rotating equipment shall be sized to accommodate a deflection standard of L/1000.
- d.** The skid shall be designed for grout fill. Provision and installation of a non-shrink grout shall be by others.
- e.** Lifting provisions shall be incorporated into the skid design. The preferred method of lifting provision shall be lifting lugs installed in the exterior running members of the skid structure.

3. Standards of Manufacture

- a. All welded structural members, brackets, pipe supports, equipment supports, and racks will be completely seal welded. Plates may be stitch welded.
- b. All structural welds will be performed by AWS D1.1 certified welders.
- c. All welds shall be of high quality and ground clean. The welds shall be free of slag, pinholes, and undercut.
- d. All major equipment shall be bolted to main skid structural members. Equipment may be installed on stands, risers, etc. No equipment may be attached to floor plate or light weight (less than ¼”) angle brackets.
- e. All skids shall be provided with two drilled and tapped grounding lugs located at opposite corners of the skid and seal welded to the exterior structural member web.
- f. The measurement of the skid diagonal will fall within ¼” of the calculated value using the square root of the sum of the squares of the measured length and the measured width.
- g. The main welded skid joints (4 corners) shall be liquid penetrant tested in accordance with ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process.
- h. The lifting lugs shall be liquid penetrant tested in accordance with ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process.

B. VALVES

- 1. Isolation valves shall be provided for isolation of PRV's and at the entrance and exit of the 12” main line. Reference Section 15103 – Butterfly Valves.
- 2. System shall include air release valves at the high points of the system used to purge air from the system during start-up.
- 3. Pressure Reducing/Sustaining Valves (PRV)
 - a. Valves shall be NSF approved having a ductile iron body meeting ASTM A536 standards, and have stainless steel components for; disc guide, seat and cover bearing, stem, nut, and spring. Disc shall be made of Buna-N Rubber and diaphragm shall be made of Nylon Reinforced Buna-N Rubber.
 - b. PRV – 2: 6” CLA-Val, 393G-02 9854KC15 Electronic Actuated Pressure Reducing and Solenoid Shut Off Valve, ductile iron body; stainless steel

anti-cavitation trim; class 150 flanged ends; globe style body. Pilot system: copper tubing; bronze fittings; bronze pilot valve with stainless steel trim. Includes: pilot system isolation valves; opening & closing speed control; X101 visual valve position indicator; X43 y-strainer; epoxy coating inside and out; with CRD34 (15-75psi) and 120vAC Solenoid (valve will fail closed).

- c. PRV – 1: 4” CLA-Val, 131G-22 576473D Electronic Control Valve. Ductile iron body; stainless steel anti-cavitation trim; class 150 flanged ends; globe style body. Pilot system: copper tubing; bronze fittings. Includes: pilot system isolation valves; opening & closing speed control; X101 visual valve position indicator; X43 y-strainer; epoxy coating inside and out; 120VAC solenoid energize to open main valve.
 - (i) VC-22D Electronic Valve Controller with 120 VAC to 12 VDC Power Converter for the 131 Series Electronic Control Valve.
- d. PSV: 2” CLA-Val 50-01A, ductile iron body, globe style body, standard bronze trim, flanged 150 class ends, hydraulically controlled. Includes: pilot isolation valves; X101 visual valve position indicator; X43 y-strainer; epoxy coating inside and out; CRL-60 pressure relief pilot control.

C. FLOW METERS

1. All flow meters shall have:

- a. NSF 61 certification
- b. Ability to measure flow with 1% accuracy or less between 50 gpm and 3,000 gpm. Provide calibration certificate per ISO 104743.1B/EN10204 3.1
- c. Hardrubber or polyurethane liner
- d. 316 stainless steel grounding rings
- e. Integral mount
- f. 100-230 VAC power supply, 4-20mA/HART + pulse output
- g. Two discrete input/output channels
- h. Local operator interface
- i. Nickel Alloy 276 or Hastelloy C22 electrodes
- j. ASME 150 lb. raised face flanges
- k. Discharge side flow meters must be reversible.

2. Acceptable Manufacturers

- a.** 8" and 12" Krohne ENVIROMAG 2000 Electromagnetic Flowmeter
- b.** 8" and 12" Rosemount 8750WA Magnetic Flowmeter
- c.** 8" and 12" Siemens 5100 Magnetic Flowmeter
- d.** 8" and 12" Endress+Hauser ProMag 50W Flow Meter

D. COATINGS: EQUIPMENT, STRUCTURAL STEEL, AND PIPING

- 1.** All equipment that is provided within the packaged system should be supplied with the respective OEM manufacturer's standard coating, except where higher quality coatings are specified.
- 2.** Structural steel, piping, equipment support brackets and other packaged system items as necessary shall be protectively coated
- 3.** Coatings shall be stored in sections by type and manufacturer
- 4.** Vendor or Vendor's coating Subcontractor shall label each container to indicate the usable shelf life. This shelf life shall be observed (rotate stock)
- 5.** Unless otherwise specified by the manufacturer, temperature shall be maintained between 50° F minimum and 100° F maximum during storage.
- 6.** Manufacturer's data sheets shall be followed for coating application.
 - a.** Surfaces not to be painted shall be protected by masking or grease.
 - b.** All operation mechanisms such as pump shafts, motor shafts, couplings, valve stems, linkages, packing glands, limit/pressure switches, etc. shall be adequately protected prior to painting.
 - c.** All gauges and faces, nameplates, door handles, door gaskets, valve position indicators, etc. shall be adequately masked prior to painting.
 - d.** All masking and other protection used during the painting process shall be removed immediately after painting unless required for shipment.
- 7.** Surfaces to be painted shall be free of grease, oil, dirt, rust, mill, scale, weld spatter, and moisture. Improper surface preparation can cause failure of the paint to adhere to the bare metal or the previously applied paint coat. Paint, crayon, and chalk used for identifying markings shall be cleaned off prior to painting.
- 8.** Prime painting (when applicable) of unprotected metallic surfaces shall be performed immediately following cleaning. Re-cleaning is necessary if surfaces to

be painted become contaminated after initial cleaning or if elapsed time after surface preparation exceeds 8 hours.

9. Surfaces that require painting, but are inaccessible after assembly shall be prepped and prime coated prior to the assembly operation.
10. Additional items that may not be coated are control panels, junction boxes, power/circuit breaker panels, transformers, machined surfaces, stainless steel, copper, brass, bronze, aluminum, and galvanized material, unless otherwise specified.

11. System 2 Coating Description (Minimum standard for indoor applications)

- a. Surface preparation
- b. The requirements of the Steel Structures Painting Council.
- c. Coating of pre-painted major equipment items such as control panels, motors, pumps, etc. is not required.
- d. Finish Coat
- e. Top Coat – Aliphatic Acrylic Polyurethane shall be applied to all primed and/or prepped surfaces.
- f. Coating shall be applied in accordance with the manufacturer’s instructions
- g. Coating shall be applied to an overall average thickness of 3 mils (DFT) or as required by the coating manufacturer

12. Acceptable Coating Manufacturers

- a. Ameron - Amercoat 450HS (2-3 mils DFT) or equal
- b. Carboline - Carbothane 134HG (2-2-1/2 mils DFT) or equal
- c. International – Interthane 990 (2-3 mils) or equal

2.10 TESTING

- A. The entire pump station shall be factory tested for functionality, including use of FE/FIT-2 and the PSV for low flows. Functionality testing shall include the following parameters: Dry Run Protection, Minimum Pressure and Maximum Pressure alarms (where applicable), Setpoint Operation, Motor Rotation, low flow operation when demands fall to as low as 50 gpm.

1. City shall be provided with a minimum of 14 days advance notice so that they have the option of witnessing the factory testing at City expense.
- B. The system shall undergo a factory hydrostatic test at the end of the production cycle. The system shall be filled with water and pressurized to 1.5 times the nameplate maximum pressure. Systems with 150# flange connections shall be tested at 350 psig, and systems with 300# flange connections shall be tested at 450 psig. The pressure shall be maintained for a minimum of 15 minutes with no leakage (slight leakage around pump(s) mechanical seal is acceptable) prior to shipment.

2.11 START-UP SERVICE

The manufacturer shall provide a factory trained representative to be made available on the job-site for start-up and instructing operating personal for one (1) working day.

2.12 WARRANTY

The manufacturer shall warrant the water pumping system to be free of defects in material and workmanship for two years (24 months) from date of authorized start-up, not to exceed thirty (30) months from date of manufacturer's invoice. Complete terms and conditions shall be provided upon request.

END OF SECTION

2016 Booster Pump Station Project

SPECIAL CONDITIONS

1. GENERAL

Work performed under this Agreement consists of furnishing all labor, materials, equipment and accessories and performing all operations necessary to complete the work in accordance with the plans and technical specifications.

The following "Special Conditions" shall govern in case of any discrepancies in any or all of the above plans, technical specifications, and the intent, either expressed or implied in these "Special Conditions", shall govern in the interpretation of the plans and specifications.

The tasks to be performed under this project include:

Constructing a new emergency Booster Pump Station in the utility easement located near the northeast corner of F 25 Road and Pioneer Road. The project involves constructing a dual function pump station that includes an emergency booster pump and pressure reducing valve package. The project will involve the lump sum bid out of three categories of work: pump station components, pump station building, and construction of a new 16' water line from the 3MG tank (material will be provided by the City). The water line construction will be outlined in the mandatory pre bid walk-through. A parts list including manufacturer, specs, size, and quantity will be required in the bid submittal for the pump station components to verify alongside plans and specifications.

2. INSURANCE

The Contractor shall provide insurance for this project in accordance with the requirements of Article 18 of the Construction Contract Agreement. In the event a claim arises by cause of the Contractor's activities within the boundaries of the project, the Contractor shall conform to the following procedure:

The Contractor's Representative shall be contacted as soon as possible by the Contractor's work crew. The Contractor's Representative shall immediately contact the City of Delta's Representative.

The Contractor's Representative shall recommend resolution of the matter in writing to the claimant with a copy to the City of Delta no more than 48 hours following the occurrence.

The Contractor shall purchase insurance as described Article 18 of the Construction Contract Agreement with the understanding minor claims are to be considered as well as major claims.

3. LIQUIDATED DAMAGES

If the Contractor does not achieve Final Completion by the required date, whether by neglect, refusal, or any other reason, the date for Final Completion may be extended in writing by the Owner. As provided elsewhere, this provision does not apply for delays caused by the City. The parties agree and stipulate that the Contractor shall pay liquidated damages to the City for each day that Final Completion is late in the amount detailed in Table 15.1 of Article 15 of the Construction Contract Agreement.

4. EXEMPTION FROM SALES TAX

The City of Delta is exempt from State and local sales and use taxes. The Contractor shall take steps to obtain such exemption from the Colorado Department of Revenue pursuant to C. R. S. 39-25-114(1) (a) XIX and 114 (d).

5. CONTRACT TIME

The scheduled time of completion for the project is approximately 180 calendar days (one hundred and eighty days) from the start date indicated in the Notice to Proceed. Must be completed by December 31st, 2016

Completion is achieved when the site clean-up and all punch list items from the final inspection have been complete. Completion shall have the meaning set forth in the Contract Agreement.

The anticipated schedule for the Project is as follows:

Bid Packages Available	May 11, 2016
Pre-Bid Meeting	May 20, 2016
Last Day for Questions	May 26, 2016
Bids Deadline	Jun. 1, 2016
Notice of Intent to Award	Jun. 8, 2016
Notice To Proceed	Jul. 6, 2016
Final Completion	Dec. 31, 2016

A mandatory pre-bid meeting is required for all prime contractors wanting to submit a bid for the project. The pre-bid meeting will be held on May 20, 2016 at 3:00 PM at the project location in the utility easement along the southern property boundary of Delta First Baptist Church, 1250 Pioneer Rd, Delta, CO 81416.

6. PROJECT SCHEDULE AND PROGRESS MEETINGS

6.1. Schedule

The Contractor shall plan, schedule, and report the progress of the work to ensure timely completion of the work as called for in the Contract. The Contractor shall prepare a Project

Schedule that shall be used for coordination, for evaluation of progress, and for the evaluation of changes to the Contract. The Schedule shall show the logical progression of all activities required to complete the Contract work, including those of subcontractors, Contractor's engineers and surveyors, and suppliers. Seasonal and weather constraints, utility coordination, railroad restrictions, right of way restrictions, traffic constraints, environmental constraints, other project interfaces, expected job learning curves, and other constraints shall be considered when preparing the Project Schedule. Days scheduled as no work days shall be indicated. The Schedule shall show all work completed within the contract time.

The Contractor shall present the schedule in a bar chart format and shall submit two copies of all required schedule information. All schedules, diagrams, and reports shall include a title, project number, date of preparation, and the name of the Contractor.

6.2. Progress Meetings

The Contractor shall conduct weekly construction meetings with the OWNER at a location agreeable to all parties. The Contractor will be responsible for taking meeting minutes at these meetings, assigning action items, reviewing project schedules and deliverables, and any other coordination support necessary for the project.

7. SPECIFICATIONS

All construction shall be in conformance with the Plans, Technical Specifications, Special Conditions, the *City of Delta Standards and Specifications for the Design and Construction of Public Improvements*, and the *Colorado Department of Transportation Standard Specifications for Road and Bridge Construction*.

In the event that there is conflict between the various reference specifications, they shall in general govern in the following order:

- 1) Plans
- 2) Technical Specifications
- 3) Special Conditions
- 4) City of Delta Standards and Specifications For the Design and Construction of Public Improvements
- 5) Colorado Department of Transportation Standard Specifications for Road and Bridge Construction.

The Contractor shall obtain, at his expense, copies of the *Colorado Department of Transportation Standard Specifications for Road and Bridge Construction* and the M- and S- Standards as may be necessary to prepare his proposal or to complete the work. He shall also obtain, at his expense, copies of the *City of Delta Standards and Specifications for the Design and Construction of Public Improvements*.

8. PROPERTY OWNER NOTIFICATION

The Contractor shall be responsible for coordinating with property owners whose primary access falls within the construction activities. This shall include a minimum of 24-hour notification and coordinating private driveway and/or other site improvements with the homeowner or business. The construction area is located in area zoned for business and will involve the coordination with the local businesses for scheduling truck deliveries

The Contractor will be required to provide safe pedestrian access, business access and access for the US Postal Service, through the project during construction. All pedestrian accommodations shall conform to the most recent version of the ADA requirements.

9. PROTECTION OF ADJOINING PROPERTIES

The Contractor shall at all times take such actions as necessary to protect all adjoining property and improvements from damage due to the conduct of his operations. Construction of improvements requiring excavation adjacent to trees or shrubs not specified for removal shall be performed by manual methods so as to minimize the impact on existing root systems.

10. DAYS AND HOURS WORKED

The Contractor's work shall take place between the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday of each week that work to be performed.

The Contractor shall not carry on construction operations on Saturdays, Sundays or holidays unless previously arranged and approved. The Contractor shall not perform work on any day of a three or four day holiday weekend when the holiday is New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, or Christmas Day. The Contractor shall only make emergency repairs, and provide proper protection of the work and traveling public on these days.

11. PERMITS

The Contractor is responsible for obtaining all permits needed to complete the project, including any permits from CDOT. A CDPHE construction stormwater discharge permit is not anticipated for the project. The Contractor though shall be responsible to implement best management practices for the projects in accordance with CDPHE requirements.

12. TRAFFIC CONTROL – LOCAL

If work is required to take place in the roadways, a Traffic Control Plan in accordance with Section 630 of the *Colorado Department of Transportation, Standard Specifications for Road and Bridge Construction* will be required to be submitted to the Owner.

It shall be the Contractor's responsibility to notify all emergency response agencies and the school district and familiarize them with his intent and operations during construction of this project.

It shall be the Contractor's responsibility to keep the pavement of all affected roadways free of mud, rocks, gravel and other construction debris. The Contractor shall sweep or otherwise clean all affected roadway within 100 feet of the project limits at the direction of the Engineer. Such work shall be incidental to construction and at no additional cost to the City of Delta.

13. URANIUM MILL TAILINGS

No uranium mill tailings are expected with this project.

14. FUGITIVE PETROLEUM OR OTHER CONTAMINATION

No fugitive petroleum or other contamination areas are expected with this project.

15. STOCKPILING MATERIALS AND EQUIPMENT

The Contractor shall be responsible for the removal of asphalt. The City has a disposal location at the City of Delta Public Work's yard located approximately five blocks west of the intersection of 4th and Main Street.

16. EXISTING UTILITIES AND STRUCTURES

It is the responsibility of the Contractor to pothole/locate and protect all structures and utilities in accordance with General Contract Conditions Section 3.7.

Contractor shall comply with Article 1.5 of Title 9, Colorado Revised Statutes, 1986 Repl. Vol., as amended by Senate Bill 93-155 (Excavation Requirements) when excavation or grading is planned in the area of underground utility facilities. The Contractor shall notify all affected utilities at least two (2) business day, (NOT INCLUDING THE DAY OF NOTICE OR THE DAY OF EXCAVATION), prior to commencing such operations. Contact the Utility Notification Center of Colorado (UNCC 1-800-922-1987) to have locations of UNCC registered lines marked by member companies.

17. CONCURRENT OPERATIONS

There are no known operations that will occur concurrently with this project.

18. MATERIALS SUBMITTALS

Submitted to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

Submit in form of electronic files by email or hard copy (paper). If in hard copy, submit number of copies which Contractor requires, plus three copies which be retained by the Engineer.

Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this project.

Submit the following:

- a) Soil test data for all imported backfill, onsite subgrade soils and Class VI base course materials.
- b) Quality Control testing schedule for compaction. Quality control shall be in conformance to Section 106 of the *Colorado Department of Transportation, Standard Specifications for Road and Bridge Construction*.
- c) Traffic Control Plan
- d) Construction Schedule

19. RESTORATION

Contractor shall be required to restore the surfaces of the areas within the right of way, temporary construction easements, other easements and all areas adjoining or disturbed by construction activities to its original condition, or as shown on the plans or directed by the Engineer. The Contractor shall also restore any disturbed structures; utility appurtenances or fencing not designated for removal within the project limits, to its original condition. Restoration shall be considered incidental to the work and no separate payment shall be made for this work.

20. INCIDENTAL ITEMS

Any item of work not specifically identified or paid for directly, but is necessary for the satisfactory completion of any paid items of work, will be considered as incidental to those items and shall be included in the cost of those items.

21. RETAINAGE

The amount to be retained from partial payments shall be five (5%) percent of the total value of the work completed as determined from the cumulative request for payment for the entire project.

22. COMPACTION AND MATERIALS TESTING

The Contractor shall provide all quality control and quality assurance testing required for completion of the project. Aggregates shall meet the requirements of section 304 and subsection 703.03 of the *Colorado Department of Transportation, Standard Specifications for Road and Bridge Construction*. For acceptance of aggregate, testing shall have occurred within 6 months of placement.

Contractor will be required to insure that all tests and frequencies as specified from the following exert from section 9.15 of the *City of Delta Standards and Specifications for the Design and Construction of Public Improvements* are met if any additional base course is required to be added to the existing soil. All failing tests shall be reworked and retested to provide a passing result.

9.15.00 FIELD QUALITY CONTROL

(A) Field Compaction Control:

1. Field tests will be conducted to determine compliance of compaction methods with specified density in accordance with ASTM D 2922 (Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods).
2. Compaction tests shall be performed at a depth of one-and-one-half feet (1-1/2') above the top of the pipe and in one-foot (1') vertical increments up to the finish grade.
3. Compaction tests shall be performed at least once every one hundred (100) linear feet as measured along the length of the pipe.
4. If the City Representative determines that reliable and uniform results are produced by the Responsible Party's construction techniques, the frequency of testing may be changed subject to the City Representatives discretion, but no more than three hundred (300) linear feet.

23. CONSTRUCTION SURVEYING AND AS-BUILTS

The Contractor shall provide all survey staking required for the project. Construction staking shall be provided to allow the Owners inspector the ability to check on the work at logical intervals and conditions. Construction surveying work shall be completed by a Professional Land Surveyor licensed in the State of Colorado.

Maintain on site one set of Contract Documents to be utilized for record documents.

Provide electronic as-built drawing and survey files prepared and sealed by Colorado licensed Land Survey that reflect the as-constructed improvements. These as-built drawings shall be submitted for approval to the Engineer prior to approval of final Application of Payment

24. COORDINATING WITH UTILITY COMPANIES AND OTHER CONTRACTORS

Other utility providers, including City of Delta Electrical Power, Delta-Montrose Electric Association, Tri County Water, Black Hills Energy, Century Link and Charter may need to coordinate their work and support with this project. The Contractor shall be responsible for coordinating this work effort with the various utility companies. All costs incurred coordinating with various utility companies will not be paid for separately but included in the work.

25. SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements of the State, County and other local Boards of Health, having jurisdiction.

26. CONSTRUCTION FIELD CHANGES

ALL changes to the contract drawings which result in increased cost to the contract MUST be approved in writing PRIOR to the work being performed. Any change, or increases in quantities, made without written prior approval may result in no additional compensation to the contractor.