

**SOLICITATION ADDENDUM
DORFP NO. 3
WATER PRODUCTION JOC
CITY OF BUCKEYE
CONTRACTING AND PURCHASING**

ADDENDUM #1

NOTE: Attach to Original DORFP. However, if Proposal has already been returned, complete this Addendum and return for attachment to your Proposal no later than **10:00 AM, September 19, 2022 local time.**

City of Buckeye
530 East Monroe Avenue
Buckeye, Arizona 85326
Attn: Debby Fasano
623-349-6174

SOLICITATION: DORFP NO. 3: Broadway Road Reach Line

Bid Due Date and Time: **September 19, 2022 no later than 10:00 AM local time**

Last Day for Questions: **September 9, 2022 by 5:00 PM local time**

NOTICE TO CONTRACTORS:

This Addendum forms a part of the Contract and clarifies, corrects, or modifies the original Delivery Order Request for Proposal documents prepared by the City of Buckeye.

THE FOLLOWING CHANGES AND COMMENTS ARE BEEN MADE:

1. Last day for questions has been extended to September 9, 2022 at 5:00 PM.
2. Bid due date has been extended to September 19, 2022 at 10:00 AM.
3. Traffic control: two lane traffic to be maintained at all times along Broadway Road east of Watson.

THE FOLLOWING QUESTIONS WERE ASKED BY CONTRACTORS:

1. **Q.** Per City of Buckeye Water Trench Detail 31380 Note 6,

6. All backfill (longitudinal and transverse) in unpaved streets shall be ABC in the Pipe Embedment Zone and can be native backfill per MAG Standard Specification 601 from the top of the Pipe Embedment Zone to top of trench. This also includes streets that will be completely reconstructed.

Are the streets under this project considered "streets that will be completely reconstructed"? If so, can native backfill be utilized from the top of the Pipe Embedment Zone to top of trench (unpaved areas) or bottom of subgrade (in paved areas)?

- A.** Roadway improvements along Broadway Road are to be completed at a future date to be determined by the City of Buckeye. For backfill locations in unpaved areas outside of existing pavement native backfill may be used. Native backfill shall be moisture-conditioned from 3% below to 3% above optimum and compacted to a relative compaction of 95% per the geotechnical report. For backfill locations in paved areas native backfill may be used below the first 1' of aggregate base course (the upper zone) per Figure 4A of the geotechnical report. The first 2' of native backfill below the upper zone shall be moisture conditioned from 2% above to 3% above optimum. The remaining native backfill placed above the pipe embedment zone shall be moisture conditioned from 3% below to 3%

above optimum. Native backfill shall be compacted to a relative compaction of 95% per the geotechnical report.

2. **Q.** The construction notes in the civil plans call out both MAG Detail 200-1 T-Top and 200 Type A, which one do you want utilized for this project?
A. All trenching and pavement repair in existing pavement shall be per MAG Standard Detail 200-1 T Top. Trenching and pavement repair outside of existing pavement shall be per MAG Standard Detail 200-1 Type A.
3. **Q.** Bid item 3 (315 LF)- 30" Steel casing we found 337 LF.
A. Bid Item 3 quantity shall be updated from 315 LF to 337 LF, see Attachment A.
4. **Q.** Bid item 4 (4 EA)- 12" Gate Valves we found 6 EA.
A. Please update the Bid Item 4 quantity from 4 EA to 7 EA. An additional 12" gate valve has been added on sheet C-21 west of the proposed 12" X 12" tee, see Attachment A.
5. **Q.** Is any portion of the job in MCDOT right of way?
A. No.
6. **Q.** What is the existing pavement thickness? If unknown what do you want us to assume for bidding purposes?
A. Assume 6"
7. **Q.** Can we get a copy of the pothole data report?
A. Potholing will be the responsibility of the contractor
8. **Q.** Bid item 3 on the bid form calls out 315 LF, I came up with 337 LF. There are 6 locations, I think whoever put this together missed the one at station 88+47, page 25.
A. See question 3 and 4.
9. **Q.** What is the right of way permit and usage permit fees from City of Buckeye?
A. City of Buckeye Permits will be paid for by the City of Buckeye
10. **Q.** Will the Owner's Contingency cover material escalation?
A. No.
11. **Q.** What about the issue of trying to catch the concrete debris from the tank coring?
A. All debris / core must be remove from the reservoir 1 as part of scope.
12. **Q.** Can we get a geo tech since the specs are saying the price for rock encountered is included in the price?
A. Geotech Report can be found in Attachment I Technical Specifications.
13. **Q.** Can Watson be open cut?
A. Jack and Bore required along Watson Road per plan.
14. **Q.** Two different details on plans for trench there is a COB 31380 or Detail 2 Sheet CD 02. Which one to use?
A. According to MAG ductile iron pipe is considered rigid piping and HDPE and PVC are considered flexible piping. Contractor shall note the differences in trench width for rigid and

flexible piping per MAG 601.2.2. Also, note the difference in lift thicknesses for the haunching per MAG 601.4.3.

15. Q. Can we pot hole prior?

A. Potholing and Coordination will be the responsibility of the awarded contractor. A pothole plan will need to be coordinated with the City. Potholing can be completing prior to starting construction.

ATTACHMENTS

A – Revised Bid Form

B – Revised Scope of Work

C – Revised Plans

D – Fusible Polyvinyl Chloride (PVC) Pressure Pipe

E – Flow Control Valve

F – Chlorine Analyzer

G – Futurepath 7-way 18/14 mm

H - Table of Contents Technical Specifications

I – Technical Specifications

The balance of the specifications and instructions remain the same. Bidders must acknowledge receipt and acceptance of this Amendment by returning the attached Solicitation Amendment Acknowledgement Page only with the Bid.

PLEASE ACKNOWLEDGE YOUR FIRM'S RECEIPT OF THIS ADDENDUM BY SIGNING THE ATTACHED SOLICITATION ADDENDUM ACKNOWLEDGEMENT.

SOLICITATION ADDENDUM ACKNOWLEDGEMENT

DORFP #3 – Broadway Road Reach Line
ADDENDUM NUMBER 1
ADDENDUM ISSUE DATE: September 7, 2022

Bidder certifies that Bidder has read, understands, and will fully and faithfully comply with this Invitation to Bid, its attachments and any referenced documents. Bidder also certifies that this offer was independently developed without consultation with any of the other Bidders or potential Bidders.

Name of Company: _____

Authorized Signature: _____

Print Name Title: _____

Date: _____

Address: _____

City, State, Zip Code: _____

Telephone Number: _____

Email Address: _____

**ATTACHMENT A
REVISED BID FORM**

LUMP SUM PROPOSAL:

The undersigned proposes to complete all of the work in accordance with said Construction Documents, plans, specification and all associated addenda for the lump sum of Items No. 1-17.

BASE BID					
Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization, Bonding and Insurance	1	LS		
2	Furnish and Install 12" PC 350 DIP Waterline and Fittings w/Poly Wrap	8061	LF		
3	Furnish and Install 30" Steel Casing 0.375" Thick with 12" PC 350 DIP Waterline (Installed by Bore)	337	LF		
4	Furnish and Install 12" Gate Valve	7	EA		
5	Connect to Existing Water Line	1	EA		
6	Trench Safety	8061	LF		
7	2" Air Release and Vacuum Valve	2	EA		
8	Permanent Asphalt Pavement Repair	2620	SY		
9	Remove and Replace Asphalt Driveway	55	SY		
10	Electrical, Instrumentation, and Controls Improvements	1	LS		
11	Control Valve Assembly	1	LS		
12	Connection to Existing Reservoir	1	LS		
13	Site Restoration	1	LS		
14	Traffic Control	1	LS		
15	ITS Pull Box per COB STD DTL 66124	4	EA		
16	18/14 Millimeter HDPE 7-Way Micro Duct	8233	LF		
17	Owner's Contingency	1	LS	\$480,000.00	\$480,000.00
BASE BID TOTAL Items 1-17					

ALTERNATE 1

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
A1-2	Furnish and Install 16" DR-11 HDE Waterline	8061	LF		
A1-3	0.375" Thick with 16: DR-11 HDPE Waterline (Installed by Bore)	337	LF		
A1-18	Fusion Machine and Inserts	1	EA		

ALTERNATE 2

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
A2-2	Furnish and Install 2" DR-14 C900 Fusible PVC Waterline	8061	LF		
A2-3	30" Steel Casing 0.375" Thick with 12" DR-14 C900 Fusible PVC Waterline (Installed by Bore)	337	LF		
A2-18	Fusion Machine and Inserts	1	EA		

Submitted by: _____

SIGNATURE: _____

NAME: _____

TITLE: _____

Principal Office: _____

Address: _____

Telephone: _____

Facsimile: _____

I, _____ being duly sworn deposes and says that he/she is the
_____ of _____ Contractor(s), and that answers to the foregoing
questions and all statements therein contained are true and correct.

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

Notary Public: _____

My Commission Expires: ____ day of _____, 20__

SIGNATURE: _____

**ATTACHMENT B
REVISED SCOPE OF WORK**

DESCRIPTION OF PAY ITEMS

BASE BID

BID ITEM NO. 1: Mobilization, Bonding, and Insurance

The work under this item shall include the establishment of offices and other facilities on the project site and the movement of personnel, construction equipment and supplies to the project site or to the vicinity of the project site in order to enable the Contractor to begin work on the contract. The cost of all bonds and insurance for the project will also be considered part of this specification.

Mobilization will be measured as a lump sum item as the work progresses. Partial payments for mobilization shall be paid for at the Total Unit Price as shown in the bid proposal with the regular monthly estimates as follows: The adjusted contract amount for construction items as used below is defined as the total contract amount less the lump sum bid for Mobilization.

- a. When 1% and less than 5% of the adjusted contract amount for construction items is completed, 50% of the mobilization lump sum bid will be paid.
- b. When 5% and less than 10% of the adjusted contract amount for construction items is completed, 75% of the mobilization lump sum bid will be paid. Previous payments under this section will be deducted from this amount.
- c. When 10% or more of the adjusted contract amount for construction items is completed, 95% of the mobilization lump sum bid will be paid. Previous payments under this section will be deducted from this amount.
- d. Payment for the remainder of the bid for "Mobilization" will be made on the final estimate.

BID ITEM NO. 2: 12" PC 350 DIP Waterline and Fittings with Poly Wrap

This item consists of installing water pipe at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Pipe shall meet the requirements of MAG Item 750.2 "Ductile Iron Water Pipe". Pipe shall be installed and tested in accordance with MAG Item 610, the City of Buckeye Engineering Design Standards, and the details in the construction plans.

Measurement and payment shall be per linear foot of Water Pipe installed and MAG Item 610.16 and shall include all costs, material and labor required for placement of the specified backfill material. The bid price shall also include all costs associated with the excavation of any rock encountered during the water line installation, tracer wires, water markers, and testing the lines.

BID ITEM NO. 3: 30" Steel Casing 0.375" Thick with 12" PC 350 DIP Waterline (Installed by Bore)

This item consists of installing water pipe inside of steel casing installed by bore at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Pipe shall meet the requirements of MAG Item 750.2 "Ductile Iron Water Pipe". Pipe shall be installed in accordance with MAG Item 602 "Trenchless or Open Cut Installation of Steel Casing" and the details in the construction plans.

Measurement and payment shall be per linear foot of Water Pipe installed inside of steel casing and per MAG 602 and shall include all costs, material and labor required for placement of the specified backfill material. The bid price shall also include all costs associated with the excavation of any rock encountered during the water line installation, tracer wires, water markers, and testing the lines.

△ SECTION 33 14 12
FUSIBLE POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible Polyvinyl Chloride (PVC) Pressure Pipe 6-inch through 16-inch for potable water and reuse applications, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe by direct bury.

B. Deviations from this City of Buckeye Standard Specification:

1. None.

C. Related Specification Sections include but are not limited to:

1. City of Buckeye Water Engineering Design Standards.
2. MAG Uniform Standard Specifications and Details for Public Works Construction.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment

1. Measurement

- a. Measured horizontally along the ground surface from center line to center line of fitting, manhole, or appurtenance of Fusible PVC Water Line installed.

2. Payment

- a. The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid per linear foot for "Fusible PVC Water Line" installed for:
 - 1) Various sizes.
 - 2) Various types of backfill.

3. The price bid shall include:

- a. Furnishing and installing Fusible PVC Water Line as specified by the Drawings
- b. Furnishing and installing Ductile Iron Fittings in accordance with MAG Specifications.
- c. Pavement removal
- d. Pavement repair
- e. Fence removal, repair, and replacement
- f. Relocation of mailbox, sign, dumpster
- g. Excavation
- h. Hauling
- i. Disposal of excess material
- j. Furnishing, placement and compaction of embedment
- k. Furnishing, placement and compaction of backfill
- l. Thrust restraint
- m. Cut and plug of existing water line
- n. Cut and pressure plug of existing water line
- o. Connection to existing water line

- p. Gaskets
- q. Clean-up
- r. Disinfection
- s. Testing

1.3 REFERENCES

A. Abbreviations and Acronyms

- 1. PVC – Polyvinyl Chloride

B. Reference Standards

- 1. Reference standards cited in this Section refer to the current reference standard published at the time of the latest revision date logged at the end of this Section unless a date is specifically cited.
- 2. American Association of State Highway and Transportation Officials (AASHTO).
- 3. ASTM International (ASTM):
 - a. D1784, Standard Specification for Rigid Poly(Vinyl-Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - b. D3139, Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - c. F477, Standard for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- 4. American Water Works Association (AWWA):
 - a. M23, PVC Pipe – Design and Installation.
- 5. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C600, Installation of Ductile-Iron Water Mains and their Appurtenances.
 - b. C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipes and Fittings for Water.
 - c. C900, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 IN through 60 IN, for Water Transmission and Distribution.
- 6. NSF International (NSF):
 - a. 14, Plastics Piping System Components and Related Materials
 - b. 61, Drinking Water System Components – Health Effects.
 - c. 372, Drinking Water System Components – Lead Content.
- 7. Underwriters Laboratories, Inc. (UL).
 - a. 1285, Standard for Pipe and Couplings, Polyvinyl Chloride (PVC), and Oriented Polyvinyl Chloride (PVCO) for Underground Fire Service

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with the City of Buckeye Water Engineering Design Standards.
- B. All submittals shall be approved by the City prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

A. Product Data

- 1. For PVC Pressure Pipe that is used for water distribution or wastewater gravity mains, including:

- a. PVC Pressure Pipe
 - b. Manufacturer
 - c. Dimension Ratio
 - d. Joint Types
2. Restraint
 - a. Retainer glands
 - b. Thrust harnesses
 - c. Any other means of restraint
 - d. Recommended Minimum Bending Radius
 - e. Recommended Maximum Safe Pull Force
 3. Gaskets
 4. Other
 - a. Fusion technician qualification indicating conformance with this specification

B. Certificates

1. Furnish an affidavit certifying the PVC Pressure Pipe meets the provisions of this Section, all inspections have been made, and all tests have been performed in accordance with AWWA C900.

1.7 CLOSEOUT SUBMITTALS

- A. The following as-recorded data is required from the contractor and/or fusion provider to the owner at the completion of the project.
 1. Approved datalogger device reports
 2. Fusion joint documentation containing the following information:
 - a. Pipe size and thickness
 - b. Machine size
 - c. Fusion technician identification
 - d. Job identification
 - e. Fusion joint number
 - f. Fusion, heating, and drag pressure settings
 - g. Heat plate temperature
 - h. Time stamp
 - i. Heating and cool down time of fusion
 - j. Ambient temperature

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

A. Qualifications

1. Manufacturers
 - a. All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.
 - b. Finished pipe shall be the product of 1 manufacturer for each size, unless otherwise approved by the City.
 - 1) Change orders, specials, and field changes may be provided by a different manufacturer upon City approval.
 - c. Pipe manufacturing operations shall be performed under the control of the manufacturer.
 - d. Furnish all pipe in accordance with AWWA C900.

2. Fusion Technician Requirements
 - a. Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements

1. Pipe manufactured more than 2 years prior to installation date will not be accepted by the City.

B. Delivery and Off-Loading

1. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.
2. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.
3. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.
4. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
5. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
6. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to ensure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

C. Storage and Handling Requirements

1. Store and handle in accordance with the guidelines as stated in AWWA M23.
 - a. When long-term storage (more than 2-months) with exposure to direct sunlight is unavoidable, cover PVC pipe with an opaque material and provide adequate air circulation above and around the pipe as required to prevent excessive heat accumulation.
2. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.
3. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.
4. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

5. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
6. Pipe shall be stored and stacked per the pipe supplier’s guidelines.

1.11 FIELD CONDITIONS [NOT USED]

1.12 WARRANTY

A. Manufacturer Warranty

1. Manufacturer’s Warranty shall be in accordance with the General Provisions.

PART 2 - PRODUCTS

2.1 CITY-FURNISHED PRODUCTS [NOT USED]

2.2 MATERIALS

A. Manufacturers

1. Manufacturer List
 - a. Underground Solutions, Inc.
2. Substitution requests for manufacturers not indicated above shall be processed in accordance with the General Provisions.

B. Pipe

1. A Fusible polyvinylchloride pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standard.
2. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
3. Pipe for potable water shall be in accordance with NSF 61 and 372.
4. Pipe shall be approved by the Underwriter’s Laboratories, in accordance with UL 1285.
5. Pipe shall have a lay length of 40 feet except for special fittings or closure pieces necessary to comply with the Drawings.
6. Outside diameters must be equal to those of cast iron and ductile iron pipes.
7. The following minimum Dimension Ratio’s apply:

Application	Diameter (inch)	Min Pressure Class (psi)
Potable Water	12	DR 14

8. Pipe Markings
 - a. Meet the minimum requirements of AWWA C900. Minimum pipe markings shall be as follows and shall be applied at intervals of not more than 5 feet:
 - 1) NSF-PW seal
 - 2) Manufacturer’s name or trademark and production run record or lot code
 - 3) Nominal pipe size in inches and outer diameter base

- 4) Dimension Ratio
- 5) Pressure class
- 6) Hydrostatic integrity test pressure on all standard length hydrostatic-tested pipe.
- 7) AWWA C900
- 8) Mark of certifying agency for pipe intended for potable-water service or if not intended for potable water "NOT FOR POTABLE USE"
- 9) For deflectable joints, the maximum allowable axial joint deflection in degrees

C. Fusion Joints

1. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

D. Pressure and Deflection Design

1. Base pipe design on trench conditions and design pressure class specified in the Drawings. Pipe shall be designed in accordance with the methods indicated in AWWA M23 for trench construction, using the following parameters:
 - a. Unit Weight of Fill (w) = 130 pcf
 - b. Live Load = AASHTO HS 20
 - c. Trench Depth = 12 feet minimum or as indicated in Drawings
 - d. Maximum E' = 1,000 max
 - e. Deflection Lag Factor = 1.0
 - f. Working Pressure (P_w) = 150 psi
 - g. Surge Allowance (P_s) = 100 psi minimum
 - h. Test Pressure =
 - 1) No less than 1.25 times the stated working pressure (187 psi minimum) of the pipeline measured at the highest elevation along the test section.
 - 2) No less than 1.5 times the stated working pressure (225 psi minimum) at the lowest elevation of the test section.
 - i. Maximum Calculated Deflection = 3 percent
 - j. Restrained Joint Safety Factor (SF) = 1.5
 - k. Maximum Joint Deflection = 50 percent of the manufacturer's recommendations.
2. Verify trench depths after existing utilities are located.
 - a. Accommodate vertical alignment changes required because of existing utility or other conflicts by an appropriate change in pipe design depth.
 - b. In no case shall pipe be installed deeper than its design allows.
3. Provisions for Thrust
 - a. Pipes 16-inch and smaller
 - 1) Pipe installed in steel casing is required to be fully restrained at each joint in the casing and one joint beyond the casing.
 - 2) Provide concrete blocking as indicated in the construction documents.
 - 3) Mechanically restrain all bends, tees, plugs, or other fittings with retainer glands in accordance with MAG Specifications.
 - 4) Pipe joints shall be restrained by fusion methods. External pipe restraints will not be allowed except at joints or fittings.

- 5) Restrained joints, where required, shall be used for a sufficient distance from each side of the bend, tee, plug, valve, or other fitting to resist thrust which will be developed at the design pressure of the pipe. For the purpose of thrust the following shall apply:
 - a) Calculate valves as dead ends.
 - b) Design pressure shall be greater than both the pressure class of the pipe and the internal pressure (P_i).
- 6) The Pipe Manufacturer shall verify the length of pipe with restrained joints to resist thrust in accordance with the Drawings and the following:
 - a) Calculate the weight of the earth (W_e) as the weight of the projected soil prism above the pipe, for unsaturated soil conditions.
 - b) Soil density = 110 pcf (maximum value to be used), for unsaturated soil conditions
 - c) In locations where ground water is encountered, reduce the soil density to its buoyant weight for the backfill below the water table.
 - (1) Reduce the coefficient of friction to 0.25.

E. Detectable Markers

1. Tracer Wire/Detectable Metallic Tape in accordance with City of Buckeye Water Engineering Design Standards.

2.3 ACCESSORIES [NOT USED]

2.4 SOURCE QUALITY CONTROL [NOT USED]

PART 3 - EXECUTION

3.1 INSTALLERS [NOT USED]

3.2 EXAMINATION [NOT USED]

3.3 PREPARATION [NOT USED]

3.4 INSTALLATION

A. General

1. Install pipe, fittings, specials, and appurtenances in accordance with this Section, AWWA C600, AWWA C605, AWWA M23, and the pipe manufacturer's recommendations.
2. Installation guidelines from the pipe manufacturer shall be followed for all installations
3. Lay pipe to the lines and grades indicated in the Drawings.
4. Deflect the pipe only when necessary to avoid obstructions or to meet the lines and grades shown in the Drawings.
5. Joint deflection or bending radius shall not exceed 50 percent of the manufacturer's recommendation.
6. Excavate and backfill trenches in accordance with the Details and Specifications.
7. At the close of each operating day:
 - a. Keep the pipe clean and free of debris, dirt, animals, and trash – during and after the laying operation.

- b. Effectively seal the open end of the pipe using a gasketed night cap.
- 8. Embed pipe in accordance with MAG Specifications.
- 9. Installation of PVC pipe within casing is only permitted with restrained joints.
- 10. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force established by the pipe supplier shall not be exceeded.

B. Pipe Handling

- 1. Haul and distribute pipe at the project site.
- 2. Handle piping with care to avoid damage.
 - a. Inspect each joint of pipe and reject or repair any damaged pipe prior to lowering into the trench.
 - b. Use only nylon ropes, slings, or other lifting devices that will not damage the surface of the pipe for handling the pipe.

C. Pipe Jointing and Fusion Process

1. General

- a. Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.
- b. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.
- c. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.
- d. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:
 - 1) Heat Plate
 - a) Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's guidelines.
 - 2) Carriage
 - a) Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
 - 3) General Machine
 - a) Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
 - 4) Data Logging Device
 - a) An approved datalogging device with the current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

- e. Other equipment specifically required for the fusion process shall include the following:
 - 1) Pipe rollers shall be used for support of pipe to either side of the machine
 - 2) A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and /or windy weather, per the pipe supplier's recommendations.
 - 3) An infrared (IR) pyrometer for checking pipe and heat plate temperatures.
 - 4) Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
 - 5) Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

2. Joint Recording

- a. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

D. Detectable Markers

- 1. City of Buckeye Water Engineering Design Standards.

3.5 REPAIR [NOT USED]

3.6 RE-INSTALLATION [NOT USED]

3.7 FIELD QUALITY CONTROL

A. Potable Water Mains

- 1. Hydrostatic testing of water mains:
 - a. Hydrostatically test the mains in accordance with MAG 611.

3.8 SYSTEM STARTUP [NOT USED]

3.9 ADJUSTING [NOT USED]

3.10 CLEANING

A. Potable Water Mains

- 1. Cleaning, disinfection, and bacteriological testing of water mains:
 - a. Clean, flush, pig, disinfect, and bacteriological test the mains in accordance with MAG 611.

3.11 CLOSEOUT ACTIVITIES [NOT USED]

3.12 PROTECTION [NOT USED]

3.13 MAINTENANCE [NOT USED]

3.14 ATTACHMENTS [NOT USED]

END OF SECTION

BID ITEM NO. 4: 12” Gate Valve

This item consists of furnishing and installing 12” Gate Valves at the locations shown on the plans, in accordance with the plan details. Gate Valve materials and installation shall meet the requirements of MAG Item 630.3 “Gate Valves”. This item includes Gate Valves for all depths.

Measurement and payment shall be at the contract unit price per each Gate Valve installed, complete in place. Payment shall be total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the work.

BID ITEM NO. 5: Connect to Existing Water Line

This item consists of installing a Connection to Existing Water Line at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Material shall be installed in accordance with MAG Item 610 and the details in the construction plans.

Measurement and payment shall be at the contract unit price for each Connection to Existing Water Line, complete in place. The contract price shall be the total compensation for the furnishing of all labor, material, tools, equipment, and incidentals necessary to complete the work and disposal of the material removed.

BID ITEM NO. 6: Trench Safety

This item consists of the basic requirements, which the contractor must comply with in order to provide for the safety and health of workers in a trench. The contractor shall develop, design and implement the trench safety protection system. The contractor shall bear sole responsibility for the adequacy of the trench safety system and providing “a safe place to work” for the workman.

The trench excavation safety protection system shall be used for all trench excavations deeper than five (5) feet. The Excavation and Trenching Operations Manual of the Occupational Safety and Health Administration, U.S. Department of Labor, shall be the minimum governing requirement of this item and is hereby made a part of this specification. The contractor shall, in addition, comply with all other applicable Federal, State and local rules, regulations and ordinances.

BID ITEM NO. 7: 2” Combination Air Release and Vacuum Valve

This item consists of furnishing and installing a 2” Combination Air and Vacuum Release Valve at the locations shown on the plans, in accordance with the plan details. Combination Air Release and Vacuum Valve materials and installation shall meet the requirements of MAG Item 630.6 “Air Release and Vacuum Valves” and the details. This item includes Combination Air Release and Vacuum Valve for all depths.

Measurement and payment shall be at the contract unit price per each Combination Air Release and Vacuum Valve installed, complete in place. Payment shall be total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the work.

BID ITEM NO. 8: Permanent Asphalt Pavement Repair

This item consists of furnishing all labor and materials necessary to perform permanent asphalt pavement repairs. All saw cuts; removal and replacement of asphalt pavement shall meet the requirements of MAG Item 336 “Pavement Matching and Surfacing Replacement” and shall be performed at the locations shown on the plans in accordance with the plan notes and details. The width of repair shall be as shown in the plans but shall be no more than 5-ft centered over the pipe and shall extend to the edge of pavement when the repair is within 48-in of the edge of pavement in accordance with MAG 201 Type A. Permanent asphalt pavement repairs shall be made with hot mix asphaltic concrete.

Measurement and payment shall be at the contract unit price per square yard of repair, complete in place. The contract price shall be the total compensation for the furnishing of all labor, material, tools, equipment, and necessary incidentals to complete the work.

BID ITEM NO. 9: Remove and Replace Asphalt Driveway

This item consists of furnishing all labor and materials necessary to perform permanent asphalt pavement repairs to the Jackie A. Meck Water Campus driveway. All saw cuts; removal and replacement of asphalt pavement shall meet the requirements of MAG Item 336 “Pavement Matching and Surfacing Replacement” and shall be performed at the locations shown on the plans in accordance with the plan notes and details. The width of repair shall be as shown in the plans and shall extend to the edge of pavement when the repair is within 48-in of the edge of pavement in accordance with MAG 201 Type A. Permanent asphalt pavement repairs shall be made with hot mix asphaltic concrete.

Measurement and payment shall be at the contract unit price per square yard of repair, complete in place. The contract price shall be the total compensation for the furnishing of all labor, material, tools, equipment, and necessary incidentals to complete the work.

BID ITEM NO. 10: Electrical, Instrumentation, and Controls Improvements

This item consists of all work, labor, materials, equipment, and incidentals necessary to complete in-place site electrical, instrumentation, and controls as shown in the plans and specifications. Electrical, instrumentation, and controls improvements shall include, but are not limited to, the following: conduit duct banks, wire and cable, fixtures and receptacles, grounding, panelboards, instrumentation, equipment rack and foundation, commissioning, relay settings and testing, programming and SCADA integration, and startup services.

Measurement and payment shall be at a lump sum price, complete in place. The contract price shall be the total compensation for the furnishing of all labor, material, tools, equipment, and necessary incidentals to complete the work.

BID ITEM NO. 11: Control Valve Assembly

This item consists of all work, labor, materials, equipment, and incidentals necessary to complete in-place the Control Valve Assembly as shown in the plans and specifications. The Control Valve Assembly shall include, but is not limited to, the following: ductile iron piping, fittings, gate valves, electronic flow control valve, magnetic flow meter, pipe supports, paint, foundations, analyzer taps, couplings, embedment backfill, and compaction.

Measurement and payment shall be at the contract unit price bid per lump sum price, complete in place. The limits of the control valve assembly are from STA. 0+36.41 to 0+77.82 on the Control Valve Assembly and Tank Connection Plan & Profile sheet. The contract price shall be the total compensation for the furnishing of all labor, material, tools, equipment, and necessary incidentals to complete the work.

BID ITEM NO. 12: Connection to Existing Reservoir

This item consists of all work, labor, materials, equipment, and incidentals necessary to perform and complete in-place the Connection to Existing Reservoir as shown in the plans and specifications. The Connection to Existing Reservoir shall include, but is not limited to, the following: ductile iron piping, fittings, gate valves, pipe supports, paint, rubber expansion coupling, cast-in-place concrete and rebar, coring, embedment, backfill, and compaction.

Measurement and payment shall be at the contract unit price bid per lump sum price, complete in place. The limits of the connection to existing reservoir are from the tank connection to STA. 0+36.41 on the Control Valve Assembly and Tank Connection Plan & Profile sheet. The contract price shall be the total

compensation for the furnishing of all labor, material, tools, equipment, and necessary incidentals to complete the work.

BID ITEM NO. 13: Site Restoration

Site restoration shall include restoring all properties impacted by the construction of the new water lines to the same or better condition in which the improvements existed prior to start of construction. This includes, but is not limited to, grades, fences, gates, vegetative state and existing improvements of the properties.

Measurement and payment shall be at the contract unit price bid per lump sum and shall be the total compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to complete the work. **The contractor shall prepare a video of existing properties impacted by the proposed construction to verify the condition of all grades, vegetative state and location and condition of all existing structures prior to the start of construction. A copy of this video shall be provided to the City Representative prior to beginning construction.**

BID ITEM NO. 14: Traffic Control

This item consists of all work, labor, materials, equipment, design, permitting, and incidentals necessary to provide traffic control for the project in accordance with MAG Item 401. The contractor is responsible for designing and submitting a traffic control plan for approval by the City prior to beginning construction.

Measurement and payment shall be at the contract unit price bid per lump sum and shall be the total compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to complete the work.

BID ITEM NO. 15: ITS PULL BOX per COB STD DTL 66124

This item consists of installing each ground box at the locations shown in the plans and coordinated with the City. Pull boxes shall be installed and tested in accordance with MAG Item 345, the City of Buckeye Engineering Design Standards, and the details in the construction plans. Payment for the work performed and materials furnished in accordance with this item will be paid for at the unit price bid for “ITS Pull Box per COB STD DTL 66124”. The price shall be full compensation for excavating and backfilling; for constructing, furnishing, and installing the pull boxes and concrete rings when required; for concrete and reinforcing steel; and for all labor, tool, equipment, and incidentals necessary to complete the work.

BID ITEM NO. 16: 18/14 Millimeter HDPE 7-Way Micro-Duct This item consists of installing an 18/14 millimeter HDPE 7-Way Micro-Duct at the locations shown on the plans in accordance with MAG Item 360, plan details, Technical Specifications, and the City of Buckeye Engineering Design Standards. Contractor shall account in pricing for areas where the duct will be in a joint trench with the water line or separate trench. At cased crossing locations, the contractor may elect to install the duct within the steel casing with the water line or install by other methods at no additional cost to the City. Measurement and payment shall be per linear foot of 18/14 Millimeter HDPE 7-Way Micro-Duct installed and shall include all costs, material and labor required for placement of the specified backfill material wherein a separate trench. The bid price shall also include all costs associated with the excavation of any rock encountered during the conduit installation, connections to existing vaults, tracer wires, markers, and testing.

ALTERNATE 1

BID ITEM NO. A2-1: 16" DR 11 HDPE Waterline

This item consists of installing water pipe at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Pipe shall meet the requirements of Section 33 14 14 High Density Polyethylene (HDPE) Pipe. Pipe shall be installed and tested in accordance with MAG Item 610, Section 33 14 14, and the details in the construction plans.

Measurement and payment shall be per linear foot of Water Pipe installed and MAG Item 610.16 and shall include all costs, material and labor required for placement of the specified backfill material. The bid price shall also include all costs associated with the excavation of any rock encountered during the water line installation, tracer wires, water markers, and testing the lines.

BID ITEM NO. A2-2: 30" Steel Casing 0.375" Thick with 16" DR 11 HDPE Waterline (Installed by Bore)

This item consists of installing water pipe inside of steel casing installed by bore at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Pipe shall meet the requirements of Section 33 14 14 High Density Polyethylene (HDPE) Pipe. Pipe shall be installed in accordance with MAG Item 602 "Trenchless or Open Cut Installation of Steel Casing" and the details in the construction plans.

Measurement and payment shall be per linear foot of Water Pipe installed inside of steel casing and per MAG 602 and shall include all costs, material and labor required for placement of the specified backfill material. The bid price shall also include all costs associated with the excavation of any rock encountered during the water line installation, tracer wires, water markers, and testing the lines.

BID ITEM NO. A-18: FUSION MACHINE AND INSERTS Contractor to purchase and deliver equipment shown below as part of this project. This equipment shall be delivered new and unused.

- T618 Series 2 HF F/M Pkg AT1830002
- 16DIPS Insert Set 2412117 McElroy
- 12DIPS Insert Set 2411826 McElroy
- Pipestand w/Chain Height Adj all Fusion Equipment IS

ALTERNATE 2

BID ITEM NO. A2-2: 12" DR-14 C900 Fusible PVC Waterline

This item consists of installing water pipe at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Pipe shall meet the requirements of Section 33 14 12 Fusible Polyvinyl Chloride (PVC) Pressure Pipe. Pipe shall be installed and tested in accordance with MAG Item 610, Section 33 14 12, and the details in the construction plans. Measurement and payment shall be per linear foot of Water Pipe installed and MAG Item 610.16 and shall include all costs, material and labor required for placement of the specified backfill material. The bid price shall also include all costs associated with the excavation of any rock encountered during the water line installation, tracer wires, water markers, and testing the lines.

BID ITEM NO. A2-3: 30” Steel Casing 0.375” Thick with 12” DR-14 C900 Fusible PVC Waterline(Installed by Bore)This item consists of installing water pipe inside of steel casing installed by bore at the locations shown on the plans, in accordance with the plan details and the Technical Specifications. Pipe shall meet the requirements of Section 33 14 12 Fusible Polyvinyl Chloride (PVC) Pressure Pipe. Pipe shall be installed in accordance with MAG Item 602 “Trenchless or Open Cut Installation of Steel Casing” and the details in the construction plans. Measurement and payment shall be per linear foot of Water Pipe installed inside of steel casing and per MAG 602 and shall include all costs, material and labor required for placement of the specified back fill material. The bid price shall also include all costs associated with the excavation of any rock encountered during the water line installation, casing spacers, end seals, tracer wires, water markers, and testing.

BID ITEM NO. A-18: FUSION MACHINE AND INSERTS Contractor to purchase and deliver equipment shown below as part of this project. This equipment shall be delivered new and unused.

- T618 Series 2 HF F/M Pkg AT1830002
- 16DIPS Insert Set 2412117 McElroy
- 12DIPS Insert Set 2411826 McElroy
- Pipestand w/Chain Height Adj all Fusion Equipment IS

**ATTACHMENT C
REVISED PLANS**

[PLEASE SEE CITY WEBSITE]

**ATTACHMENT D
FUSIBLE POLYVINYL CHLORIDE
(PVC) PRESSURE PIPE**

SECTION 33 14 12
FUSIBLE POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible Polyvinyl Chloride (PVC) Pressure Pipe 6-inch through 16-inch for potable water and reuse applications, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe by direct bury.

B. Deviations from this City of Buckeye Standard Specification:

1. None.

C. Related Specification Sections include but are not limited to:

1. City of Buckeye Water Engineering Design Standards.
2. MAG Uniform Standard Specifications and Details for Public Works Construction.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment

1. Measurement

- a. Measured horizontally along the ground surface from center line to center line of fitting, manhole, or appurtenance of Fusible PVC Water Line installed.

2. Payment

- a. The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid per linear foot for "Fusible PVC Water Line" installed for:
 - 1) Various sizes.
 - 2) Various types of backfill.

3. The price bid shall include:

- a. Furnishing and installing Fusible PVC Water Line as specified by the Drawings
- b. Furnishing and installing Ductile Iron Fittings in accordance with MAG Specifications.
- c. Pavement removal
- d. Pavement repair
- e. Fence removal, repair, and replacement
- f. Relocation of mailbox, sign, dumpster
- g. Excavation
- h. Hauling
- i. Disposal of excess material
- j. Furnishing, placement and compaction of embedment
- k. Furnishing, placement and compaction of backfill
- l. Thrust restraint
- m. Cut and plug of existing water line
- n. Cut and pressure plug of existing water line
- o. Connection to existing water line

- p. Gaskets
- q. Clean-up
- r. Disinfection
- s. Testing

1.3 REFERENCES

A. Abbreviations and Acronyms

- 1. PVC – Polyvinyl Chloride

B. Reference Standards

- 1. Reference standards cited in this Section refer to the current reference standard published at the time of the latest revision date logged at the end of this Section unless a date is specifically cited.
- 2. American Association of State Highway and Transportation Officials (AASHTO).
- 3. ASTM International (ASTM):
 - a. D1784, Standard Specification for Rigid Poly(Vinyl-Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - b. D3139, Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - c. F477, Standard for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- 4. American Water Works Association (AWWA):
 - a. M23, PVC Pipe – Design and Installation.
- 5. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C600, Installation of Ductile-Iron Water Mains and their Appurtenances.
 - b. C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipes and Fittings for Water.
 - c. C900, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 IN through 60 IN, for Water Transmission and Distribution.
- 6. NSF International (NSF):
 - a. 14, Plastics Piping System Components and Related Materials
 - b. 61, Drinking Water System Components – Health Effects.
 - c. 372, Drinking Water System Components – Lead Content.
- 7. Underwriters Laboratories, Inc. (UL).
 - a. 1285, Standard for Pipe and Couplings, Polyvinyl Chloride (PVC), and Oriented Polyvinyl Chloride (PVCO) for Underground Fire Service

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with the City of Buckeye Water Engineering Design Standards.
- B. All submittals shall be approved by the City prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

A. Product Data

- 1. For PVC Pressure Pipe that is used for water distribution or wastewater gravity mains, including:

- a. PVC Pressure Pipe
 - b. Manufacturer
 - c. Dimension Ratio
 - d. Joint Types
2. Restraint
 - a. Retainer glands
 - b. Thrust harnesses
 - c. Any other means of restraint
 - d. Recommended Minimum Bending Radius
 - e. Recommended Maximum Safe Pull Force
 3. Gaskets
 4. Other
 - a. Fusion technician qualification indicating conformance with this specification

B. Certificates

1. Furnish an affidavit certifying the PVC Pressure Pipe meets the provisions of this Section, all inspections have been made, and all tests have been performed in accordance with AWWA C900.

1.7 CLOSEOUT SUBMITTALS

- A. The following as-recorded data is required from the contractor and/or fusion provider to the owner at the completion of the project.
 1. Approved datalogger device reports
 2. Fusion joint documentation containing the following information:
 - a. Pipe size and thickness
 - b. Machine size
 - c. Fusion technician identification
 - d. Job identification
 - e. Fusion joint number
 - f. Fusion, heating, and drag pressure settings
 - g. Heat plate temperature
 - h. Time stamp
 - i. Heating and cool down time of fusion
 - j. Ambient temperature

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

A. Qualifications

1. Manufacturers
 - a. All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.
 - b. Finished pipe shall be the product of 1 manufacturer for each size, unless otherwise approved by the City.
 - 1) Change orders, specials, and field changes may be provided by a different manufacturer upon City approval.
 - c. Pipe manufacturing operations shall be performed under the control of the manufacturer.
 - d. Furnish all pipe in accordance with AWWA C900.

2. Fusion Technician Requirements
 - a. Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements

1. Pipe manufactured more than 2 years prior to installation date will not be accepted by the City.

B. Delivery and Off-Loading

1. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.
2. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.
3. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.
4. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
5. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
6. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to ensure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

C. Storage and Handling Requirements

1. Store and handle in accordance with the guidelines as stated in AWWA M23.
 - a. When long-term storage (more than 2-months) with exposure to direct sunlight is unavoidable, cover PVC pipe with an opaque material and provide adequate air circulation above and around the pipe as required to prevent excessive heat accumulation.
2. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.
3. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.
4. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

5. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
6. Pipe shall be stored and stacked per the pipe supplier's guidelines.

1.11 FIELD CONDITIONS [NOT USED]

1.12 WARRANTY

A. Manufacturer Warranty

1. Manufacturer's Warranty shall be in accordance with the General Provisions.

PART 2 - PRODUCTS

2.1 CITY-FURNISHED PRODUCTS [NOT USED]

2.2 MATERIALS

A. Manufacturers

1. Manufacturer List
 - a. Underground Solutions, Inc.
2. Substitution requests for manufacturers not indicated above shall be processed in accordance with the General Provisions.

B. Pipe

1. A Fusible polyvinylchloride pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standard.
2. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
3. Pipe for potable water shall be in accordance with NSF 61 and 372.
4. Pipe shall be approved by the Underwriter's Laboratories, in accordance with UL 1285.
5. Pipe shall have a lay length of 40 feet except for special fittings or closure pieces necessary to comply with the Drawings.
6. Outside diameters must be equal to those of cast iron and ductile iron pipes.
7. The following minimum Dimension Ratio's apply:

Application	Diameter (inch)	Min Pressure Class (psi)
Potable Water	12	DR 14

8. Pipe Markings
 - a. Meet the minimum requirements of AWWA C900. Minimum pipe markings shall be as follows and shall be applied at intervals of not more than 5 feet:
 - 1) NSF-PW seal
 - 2) Manufacturer's name or trademark and production run record or lot code
 - 3) Nominal pipe size in inches and outer diameter base

- 4) Dimension Ratio
- 5) Pressure class
- 6) Hydrostatic integrity test pressure on all standard length hydrostatic-tested pipe.
- 7) AWWA C900
- 8) Mark of certifying agency for pipe intended for potable-water service or if not intended for potable water “NOT FOR POTABLE USE”
- 9) For deflectable joints, the maximum allowable axial joint deflection in degrees

C. Fusion Joints

1. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier’s written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

D. Pressure and Deflection Design

1. Base pipe design on trench conditions and design pressure class specified in the Drawings. Pipe shall be designed in accordance with the methods indicated in AWWA M23 for trench construction, using the following parameters:
 - a. Unit Weight of Fill (w) = 130 pcf
 - b. Live Load = AASHTO HS 20
 - c. Trench Depth = 12 feet minimum or as indicated in Drawings
 - d. Maximum E' = 1,000 max
 - e. Deflection Lag Factor = 1.0
 - f. Working Pressure (P_w) = 150 psi
 - g. Surge Allowance (P_s) = 100 psi minimum
 - h. Test Pressure =
 - 1) No less than 1.25 times the stated working pressure (187 psi minimum) of the pipeline measured at the highest elevation along the test section.
 - 2) No less than 1.5 times the stated working pressure (225 psi minimum) at the lowest elevation of the test section.
 - i. Maximum Calculated Deflection = 3 percent
 - j. Restrained Joint Safety Factor (SF) = 1.5
 - k. Maximum Joint Deflection = 50 percent of the manufacturer’s recommendations.
2. Verify trench depths after existing utilities are located.
 - a. Accommodate vertical alignment changes required because of existing utility or other conflicts by an appropriate change in pipe design depth.
 - b. In no case shall pipe be installed deeper than its design allows.
3. Provisions for Thrust
 - a. Pipes 16-inch and smaller
 - 1) Pipe installed in steel casing is required to be fully restrained at each joint in the casing and one joint beyond the casing.
 - 2) Provide concrete blocking as indicated in the construction documents.
 - 3) Mechanically restrain all bends, tees, plugs, or other fittings with retainer glands in accordance with MAG Specifications.
 - 4) Pipe joints shall be restrained by fusion methods. External pipe restraints will not be allowed except at joints or fittings.

- 5) Restrained joints, where required, shall be used for a sufficient distance from each side of the bend, tee, plug, valve, or other fitting to resist thrust which will be developed at the design pressure of the pipe. For the purpose of thrust the following shall apply:
 - a) Calculate valves as dead ends.
 - b) Design pressure shall be greater than both the pressure class of the pipe and the internal pressure (P_i).
- 6) The Pipe Manufacturer shall verify the length of pipe with restrained joints to resist thrust in accordance with the Drawings and the following:
 - a) Calculate the weight of the earth (W_e) as the weight of the projected soil prism above the pipe, for unsaturated soil conditions.
 - b) Soil density = 110 pcf (maximum value to be used), for unsaturated soil conditions
 - c) In locations where ground water is encountered, reduce the soil density to its buoyant weight for the backfill below the water table.
 - (1) Reduce the coefficient of friction to 0.25.

E. Detectable Markers

1. Tracer Wire/Detectable Metallic Tape in accordance with City of Buckeye Water Engineering Design Standards.

2.3 ACCESSORIES [NOT USED]

2.4 SOURCE QUALITY CONTROL [NOT USED]

PART 3 - EXECUTION

3.1 INSTALLERS [NOT USED]

3.2 EXAMINATION [NOT USED]

3.3 PREPARATION [NOT USED]

3.4 INSTALLATION

A. General

1. Install pipe, fittings, specials, and appurtenances in accordance with this Section, AWWA C600, AWWA C605, AWWA M23, and the pipe manufacturer's recommendations.
2. Installation guidelines from the pipe manufacturer shall be followed for all installations
3. Lay pipe to the lines and grades indicated in the Drawings.
4. Deflect the pipe only when necessary to avoid obstructions or to meet the lines and grades shown in the Drawings.
5. Joint deflection or bending radius shall not exceed 50 percent of the manufacturer's recommendation.
6. Excavate and backfill trenches in accordance with the Details and Specifications.
7. At the close of each operating day:
 - a. Keep the pipe clean and free of debris, dirt, animals, and trash – during and after the laying operation.

- b. Effectively seal the open end of the pipe using a gasketed night cap.
- 8. Embed pipe in accordance with MAG Specifications.
- 9. Installation of PVC pipe within casing is only permitted with restrained joints.
- 10. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force established by the pipe supplier shall not be exceeded.

B. Pipe Handling

- 1. Haul and distribute pipe at the project site.
- 2. Handle piping with care to avoid damage.
 - a. Inspect each joint of pipe and reject or repair any damaged pipe prior to lowering into the trench.
 - b. Use only nylon ropes, slings, or other lifting devices that will not damage the surface of the pipe for handling the pipe.

C. Pipe Jointing and Fusion Process

1. General

- a. Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.
- b. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.
- c. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.
- d. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:
 - 1) Heat Plate
 - a) Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's guidelines.
 - 2) Carriage
 - a) Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
 - 3) General Machine
 - a) Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
 - 4) Data Logging Device
 - a) An approved datalogging device with the current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

- e. Other equipment specifically required for the fusion process shall include the following:
 - 1) Pipe rollers shall be used for support of pipe to either side of the machine
 - 2) A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and /or windy weather, per the pipe supplier's recommendations.
 - 3) An infrared (IR) pyrometer for checking pipe and heat plate temperatures.
 - 4) Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
 - 5) Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

2. Joint Recording

- a. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

D. Detectable Markers

- 1. City of Buckeye Water Engineering Design Standards.

3.5 REPAIR [NOT USED]

3.6 RE-INSTALLATION [NOT USED]

3.7 FIELD QUALITY CONTROL

A. Potable Water Mains

- 1. Hydrostatic testing of water mains:
 - a. Hydrostatically test the mains in accordance with MAG 611.

3.8 SYSTEM STARTUP [NOT USED]

3.9 ADJUSTING [NOT USED]

3.10 CLEANING

A. Potable Water Mains

- 1. Cleaning, disinfection, and bacteriological testing of water mains:
 - a. Clean, flush, pig, disinfect, and bacteriological test the mains in accordance with MAG 611.

3.11 CLOSEOUT ACTIVITIES [NOT USED]

3.12 PROTECTION [NOT USED]

3.13 MAINTENANCE [NOT USED]

3.14 ATTACHMENTS [NOT USED]

END OF SECTION

**ATTACHMENT E
FLOW CONTROL VALVE**

△ SECTION 40 05 67
FLOW CONTROL VALVE

PART I - GENERAL

1.1. SUMMARY

A. Section Includes:

1. Electronic flow control valve (JMWC-PRV-02) that can operate in Modulating service to provide flow control, based on loop control and meter signal. Furnish all materials, equipment, and labor and incidentals necessary to provide, install and put into operation one flow control valve as specified herein and shown on the drawings.
2. Pressure sustaining flow control valve (JMWC-PRV-03) that can operate hydraulically in Modulating service to maintain constant upstream pressure within close limits. Furnish all materials, equipment, and labor and incidentals necessary to provide, install and put into operation one flow control valve as specified herein and shown on the drawings.

B. Related Specifications include, but are not necessarily limited to:

1. City of Buckeye Water Engineering Design Standards.
2. MAG Uniform Standard Specifications and Details for Public Works Construction.
3. Division 09 – Finishes
4. Division 26 – Electrical
5. Division 40 – Process Interconnections

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment

1. Work associated with this Item is included in the total lump sum price for the control valve assembly.

1.3 REFERENCES:

American Society for Testing and Materials (ASTM).

ASTM A48 Standard Specification for Gray Iron Castings.

ASTM A126 Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

ASTM A436 Standard Specification for Austenitic Gray Iron Castings.

ASTM A536 Standard Specification for Ductile Iron Casings.

1.4 SYSTEM DESCRIPTION:

- #### A.
- The arrangement shown on the drawings is based upon the best information available to the Engineer at the time of design and is not intended to show exact dimensions to any specific equipment unless otherwise shown or specified. Therefore, it may be anticipated that the structural supports, foundations, and connected piping shown may have to be changed in order to accommodate the equipment furnished. No additional

payment will be made for such changes. All necessary calculations and drawings for any related redesign shall be submitted to the Engineer for his approval prior to beginning the work.

- B. The valve shall be designed to operate with the following working conditions without damage to the valve.

Upstream Pressure Range*	70 psi – 115 psi
Downstream Pressure	0 psi
Normal Flow Range	0 – 600 gpm
Maximum Flow Rate	1500 gpm

* Valve shall include a pressure sustaining feature which will ensure a minimum upstream pressure at all times. Contractor shall coordinate and verify with the City and Engineer on the minimum pressure prior to the valve being manufactured.

- C. The flow control valve shall operate satisfactorily over the complete operating range shown. The equipment to be provided under this section shall be suitable for installation and operation at elevations for about 667 feet above sea level inside a vault structure. Outside ambient temperatures range between 10 and 130 degrees F, and reported water temperatures vary between 50 and 105 degrees F. Relative humidity is expected to range between 5 and 100 percent. The valve shall be capable of being submerged periodically.

1.5 QUALITY ASSURANCE:

- A. The valve shall be the product of a manufacturer regularly engaged in the manufacture of hydraulic valves having similar service and size. The valves covered by the specifications are intended to be standard equipment of that has proven ability. Only the following manufacturers and models are acceptable.

Manufacturer

Cla-Val Model 131-BW BCNPSY KOX D/S CL 150FL with VC-22D Electronic Valve Controller

Cla-Val Model 50-90 BPKOX D/S CL 150L

- B. All other valves will be considered a substitution, and will be required to submit in writing as specified in the General Provisions. The Engineer shall be the sole judge of the acceptability of any substitution requested. If the substitution request is found to be unacceptable by the Engineer then the contractor shall provide the listed equipment at no additional expense to the City. The Contractor shall be responsible for any delays as a result of a substitution request.
- C. The listing above does not imply that the pump or the manufacturer's standard product is acceptable. The successful manufacturer will be required to conform to all specifications.

- D. Unit Responsibility and Coordination:

The Contractor shall cause all equipment specified under this section to be furnished by the valve manufacturer who shall be responsible for the adequacy and compatibility

of all unit components including but not limited to the valve, actuator and extension stems. Any component of each complete unit not provided by the valve manufacturer shall be designed, fabricated, tested, and installed by factory-authorized representatives experienced in the design and manufacture of the equipment. This requirement, however, shall not be construed as relieving the Contractor of the overall responsibility for this portion of the work.

1.6 SUBMITTALS:

- A. Submittals required after award of contract and prior to shipping:
 - 1. Technical bulletins and brochures on flow control valve.
 - 2. Certification of compliance with specifications.
- B. Submittals required prior to final walk through:
 - 1. Operation and Maintenance Manual.

1.7 SPARE PARTS AND TOOLS:

- A. None required.

1.8 SHIPPING INSTRUCTIONS:

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.
- B. All equipment and parts must be properly protected against any damage during a prolonged period at the site.
- C. The finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.
- D. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- E. Storage and Protection: Take special care to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, preventing any deformation.

1.9 WARRANTY:

- F. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the City. Warranty shall be for a period of two (2) years and begin on the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MAIN VALVE:

- A. The valve shall be hydraulically operated, single diaphragm-actuated, globe pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearing installed, and the diaphragm assembly. No separate chambers

shall be allowed between the main valve cover and body. Valve body and cover shall be of cast material. No fabrication or welding shall be used in the manufacturing process.

- B. The valve shall contain a resilient, synthetic rubber disc with a rectangular cross-section contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. No o-ring type discs (circular, square, or quad type) shall be permitted as the seating surface. The disc guide shall be of the contoured type to permit smooth transition of flow and shall hold the disc firmly in place. The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks. No hour-glass shaped disc retainers shall be permitted and no V-type or slotted type disc guides shall be used.
- C. The diaphragm assembly containing a non-magnetic 303 stainless steel stem; of sufficient diameter to withstand high hydraulic pressures shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. The seat shall be a solid, one-piece design and shall have a minimum of a five-degree taper on the seating surface for a positive, drip-tight shut off. No center guides shall be permitted. The stem shall be drilled and tapped in the cover end to receive and affix such accessories as may be deemed necessary. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion the valve, separating operating pressure from line pressure.
- D. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The diaphragm shall not be used as the seating surface.
- E. The main valve seat and the stem bearing in the valve cover shall be removable. The valve seat in 8" and larger size valves shall be retained by flat head machine screws for ease of maintenance. Cover bearing, disc retainer, and seat shall be made of the same material. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline. Packing glands and/or stuffing boxes shall not be permitted and components including cast material shall be of North American manufacture.
- F. The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of shipment, provided the valve is installed and used in accordance with all applicable instructions. Electrical components shall have a one-year warranty.
- G. The valve manufacturer shall be able to supply a complete line of equipment from 1 1/4" through 48" sizes and a complete selection of complimentary equipment. The valve manufacturer shall also provide a computerized cavitation chart which shows flow rate, differential pressure, percentage of valve opening, Cv factor, system velocity, and if there will be cavitation damage.

2.2 MATERIAL SPECIFICATION:

JMWC-PRV-02

Valve size: 6"

Main Valve Body and Cover: Ductile Iron / ASTM A-536

Main Valve Trim: Stainless steel with anti-cavitation

Stem: 303 Stainless Steel

End Detail: ANSI B16.42 150 LB. FLG.
Pressure Rating: 250 PSI
Temperature Range: -40 to +180 Degrees F
Rubber Material: Buna "N"
Coating: Epoxy coated by baked on resin fusion method process 5-7 mils thick internal & external
Desired Options: See model number listed above

JMWC-PRV-03

Valve size: 6"
Main Valve Body and Cover: Ductile Iron / ASTM A-536
Main Valve Trim: Stainless steel with anti-cavitation
Stem: Nylon Reinforced Buna "N"
End Detail: ANSI B16.42 150 LB. FLG.
Pressure Rating: 250 PSI
Temperature Range: -40 to +180 Degrees F
Rubber Material: Buna "N"
Coating: Epoxy coated by baked on resin fusion method process 5-7 mils thick internal & external
Desired Options: See model number listed above

2.3 PILOT CONTROL SYSTEM:

- A. Electronic Flow Control Valve (JMWC-PRV-02):
1. Valve Controls consist of solenoids and VC-22D electronic controller to provide the interface between a remote computer system and a hydraulic control valve to provide remote electronic control operation of the valve. The electronic controller shall be supplied with pre-programmed valve application templates used to setup and configure the controller to match the desired function of the valve in the piping system.
 2. The controller display shall be a color TFT screen to graphically display valve application with integral real-time system information.
 3. A panel mount enclosure shall be provided to house the controller for environmental protection. An anodized aluminum mounting bracket suitable for mounting on pipe or wall shall be supplied as standard. The controller shall feature a multi-PID loop control with local or remote set point input. The controller shall include six (6) configurable analog inputs; six (6) dry contact digital inputs; six (6) 4-20mA analog outputs; and two (2) solid-state relays.
 4. The controller shall have a configurable set point ramping to protect against system surges and shall also include a configurable flow totalizer. High speed logging data (1000Hz) shall be downloadable to a portable memory device such as a USB drive. Security codes shall be provided to protect against unauthorized changes.
 5. The electronic controller shall be capable of data retransmission to SCADA or similar control systems and shall be capable of generating and sending signal loss

warnings and other configurable control actions. Alarm outputs shall be provided as standard rather than an optional feature.

6. Each VC-22D controller enclosure and supporting AC/DC power supply conversion box enclosure shall include their own individual universal bracket(s), allowing for versatility of installation. If require, clips for mounting to DIN rail shall be supplied by Contractor.
7. Sufficient clearance around controller enclosure should be made for adequate access/wiring. Considerations should be made to comply with all the various local codes, standards and best practices.
8. Utilizing electronic digital control, solenoid pilots equipped onto the control valve(s) are actuated by electrical signals received from the Electronic Valve Controller which enables remote computer control over the diaphragm valve operations. The solenoids either add or relieve line pressure from the cover chamber of the diaphragm valve, causing it to open or close as directed by the Electronic Valve Controller. Each solenoid is controlled by a solid-state relay with zero switching voltage. The total cycle time between each pulse shall be programmable.
9. In either digital or analog control, the Electronic Valve Controller shall accept an analog 4-20mA feedback signal. Upon receiving the remote set-point command from the computer system or local command from the operator, the Electronic Valve Controller shall provide a digital signal or 4-20 mA analog signal to the appropriate pilot(s) and maintain the desired set-point value. When the feedback signal is within a programmable dead band zone, the appropriate electronic pilot(s) on the control valve will not activate; control valve will maintain position. When the feedback signal deviates from or approaches the set-point, the appropriate electronic pilot(s) will be activated, smoothly modulating the valve to its set-point. Preinstalled valve application templates allow the Electronic Valve Controller to be configured to perform a wide range of control valve functions, such as: pressure management, pressure reducing, pressure sustaining, rate of flow control, level control or valve position.
10. Cla-Val EPC Power Converter shall be supplied, and is a self-contained device used to convert an AC power source to 24VDC to operate the Cla-Val Model VC-22D Electronic Valve Controller.
11. The EPC Power Converter also converts the 24VDC solenoid outputs from the VC-22D controller to 120 VAC; to operate control valves that are equipped with the AC solenoids.
 - a. EPC Power Converter enclosure is panel mount.
 - b. Each power converter box enclosure shall be provided standard with a mounting bracket.
 - c. MATERIALS
 - d. Enclosure
 - e. Enclosure Material Flame retardant UL rated PC/ABS plastic
 - f. Enclosure Connections (12) ½" Cable Glands with Plugs
 - g. Enclosure Dimensions 6.50" (165 mm) H x 4.375" (111 mm) W x 3.250" (83 mm) D
 - h. Enclosure Weight 2 lbs. (.91 kg)

- i. Environmental panel mount, 2 meter for 48 hours
 - j. Mounting Bracket Anodized Aluminum
 - k. Internal Power Supply
 - l. Input Voltage Range 90-264VAC 47-440Hz or 100-375VDC
 - m. Relays (2) Solid State
 - n. Safety Agency Certification UL/CSA/CE marking
 - o. Output Ratings
 - p. Output Voltage 24V
 - q. Maximum Current 1A
 - r. Power 40W
 - s. Recommend External Fuse 3.15A Slow Blow Type
 - t. The Power Converter shall be the CLA-VAL Company Model No. EPC, as manufactured by Cla-Val Co., Newport Beach, CA 92659-0325.
6. Valve shall have a solenoid that shall be utilized to close the valve completely upon a signal from a remote point or local tank level control. A manual operator shall be installed on the solenoid. The pilot assembly shall include a fixed orifice assembly, opening and closing speed control needle valves and pilot system strainer.
- B. Pressure Sustaining Flow Control Valve (JMWC-PRV-03):
1. The pressure relief/sustaining pilot shall be a direct-acting, adjustable, spring-loaded, diaphragm valve designed to permit flow when controlling pressure exceeds the adjustable spring setting. The pressure relief pilot control is normally held closed by the force of the compression in the spring above the diaphragm and it opens when the pressure acting on the underside of the diaphragm exceeds the spring setting. Pressure relief pilot control sensing shall be upstream of the pilot system strainer so accurate control may be maintained if the strainer is partially blocked. Pilot shall comply with NSF/ANSI 61 and certified lead free to NSF/ANSI 372 as a safe drinking water system component.

2.4 MATERIAL SPECIFICATION FOR PILOT CONTROL:

1. Body & Cover: Cast Bronze ASTM B62
2. Pressure Rating: 300 PSI
3. Trim: 303 SS
4. Rubber Material: Buna "N"
5. Tubing and Fittings: Bronze & Copper
6. Operating Fluids: Potable Water
7. Voltage: 120/60 Volt AC (JMWC-PRV-02)
8. Adjustment Range: 20-105 PSI
9. Enclosure Type: Panel mount
10. Desired Options: Manual Operator

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. All pump control valves shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings.
- B. Installation and adjustment shall be checked and approved by a manufacturer's factory representative. After acceptance, the representative shall address a letter to the Engineer outlining all installation and start up procedures. The letter shall include a statement that the valves are installed per the manufacturer's recommendations. The manufacturer or his qualified representative shall conduct training session for the City's personnel in the operation and maintenance of the valves.
- C. The valve manufacturer shall provide a factory representative to calibrate the valve and verify operation during start up.

END OF SECTION

**ATTACHMENT F
CHLORINE ANALYZER**

SECTION 40 75 21
CHLORINE ANALYZER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Furnish labor, materials, equipment and incidentals necessary to install a chlorine analyzer for continuous measurement of free or total chlorine as specified herein.

B. Related Specification Sections include but are not necessarily limited to

1. City of Buckeye Water Engineering Design Standards.
2. MAG Uniform Standard Specifications and Details for Public Works Construction.
3. Division 09 – Finishes
4. Division 26 – Electrical
5. Division 40 – Process Interconnections

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment

1. Work associated with this Item is included in the total lump sum price for the control valve assembly.

1.3 REFERENCES

A. Reference Standards

1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
2. American National Standards Institute (ANSI).
3. American Society for Quality Control (ASQC).
4. American Society of Mechanical Engineers (ASME).
5. American Society for Testing Materials (ASTM).
6. American Water Works Association (AWWA).
7. The Chlorine Institute (CI).
8. Institute of Electrical and Electronics Engineers (IEEE).
9. International Standards Organization (ISO).
10. National Electrical Code (NEC).
11. National Electrical Manufacturers Association (NEMA).
12. National Fire Code (NFC).
13. National Institute of Occupational Safety & Health (NIOSH).
14. Occupational Safety and Health Administration (OSHA).

15. Standard Fire Code (SFC).
16. Uniform Fire Code (UFC).
17. Arizona Department of Environmental Quality (ADEQ) Regulations.

1.4 ADMINISTRATIVE REQUIREMENTS [NONE]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with the City of Buckeye Water Engineering Design Standards.
- B. All submittals shall be approved by the City prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 1. Sufficient information to show that the equipment meets this specification.
 2. Electrical wiring diagrams as required for the installation.
 3. Diagram and plan for providing SCADA monitoring
 4. Equipment Mounting
 5. Manufacturer's literature, illustrations and specification sheets defining materials of construction, dimensions and weights.
 6. Operation and maintenance manual.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. The equipment and material to be furnished under this Contract shall be tested at the factory prior to delivery and shall be free from defects.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements
 1. Secure and maintain a location to store the material in accordance with the manufacturer's recommendations.

1.11 SITE CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 CITY-FURNISHED PRODUCTS [NOT USED]

2.2 MATERIALS

- A. Manufacturers
 1. Manufacturer List

- a. ProMinent – DACb Free Chlorine Residual Analyzer/Controller
2. Substitution requests for manufacturers or models not indicated above shall be submitted in writing as specified in the General Provisions.

B. General

1. The method of measuring total chlorine will be with a three-electrode amperometric sensor immersed into an electrolytic medium with a membrane, selective to chlorine, separating it from the sample.

C. Performance / Design Criteria



1. Measurement range: 0 – 2 ppm of free chlorine ~~0 to 20 ppm chlorine for total chlorine~~
2. Total Chlorine:
 - a. Low Limit Of Detection (LOD): 30 ppb (0.03 ppm) or better
 - b. Limit Of Quantitation (LOQ): 90 ppb (0.09 ppm) or better
 - c. Repeatability/precision: 30 ppb or 3%, whichever is greater
 - d. Response time: ~100 s for 90% change (T_{90})
 - e. Interference: Chlorine Dioxide, Ozone, and chalk deposits
3. Drift: <10% with regular calibration
4. Specificity/Selectivity: Non-specific to a certain chlorine form, responds to any chlorine species and other oxidizers as noted in the interference section
5. Calibration method: One-point (zero or slope) calibration.
6. Verification procedure: One-point process calibration (slope) against a standard reference method.

D. Environmental Requirements

1. Operational Criteria
 - a. Operating ambient temperature: 10 – 130 °F
 - b. Relative humidity: 5 – 100%, non-condensing
2. Sample Requirements
 - a. Maximum back pressure the chlorine sensor can manage without failure:
 - 1) 0.5 bar, no pressure impulses and/or vibrations
 - b. Water temperature: 33 – 115 °F
 - c. Temperature compensation range: 5 to 45 °C (41 to 113 °F)
 - d. Flow: 0 – 600 gpm - normal, 1500 gpm - maximum
3. Storage Requirements
 - a. Electrolyte: 15 to 25°C (59 to 77°F)
 - b. Chlorine sensors: 0 to 50°C (32 to 122°F) dry without electrolyte
 - c. Panel: -20 to 60°C (-4 to 149°F)

E. Manufactured Unit

1. Chlorine Analyzer shall include:
 - a. Three-Electrode Amperometric Chlorine sensor
 - b. Chlorine sensor flow cell with integrated flow sensor
 - c. pH flow cell with grab sample port
 - d. Digital gateway for communication between probes and controller
 - e. Stainless steel panel

F. Equipment

1. Controller
 - a. Include three 4-20mA outputs and four relays
 - b. Enclosure must be wall mounted and rated NEMA 4X
 - c. Display shall be graphic dot matrix LCD with LED backlighting, display size of 1.89 x 2.67 inches and resolution of 240 x 160 pixels
 2. Amperometric Cell shall consist of:
 - a. Gold cathode
 - b. Stainless Steel counter electrode
 - c. Silver/silver chloride reference electrode
 - d. pH buffered electrolyte
 - e. Sensor membrane to filter chlorine species selectively and to provide interface between the electrochemical cell and the sample
 3. Wetted materials as follows:
 - a. Chlorine Measuring Cell: PVC
 - b. Chlorine Sensor Body: PVC
 - c. Chlorine Sensor Flow Cell: Acrylic
 - d. pH Sensor Flow Cell: PVC
 4. The sensor interface to the controller is through a digital gateway.
 5. The chlorine sensor automatically compensates for temperature utilizing an embedded temperature sensor.
 6. The electrolyte provides internal, buffered pH compensation in the range of 4-9 pH units.
 7. The sensor includes proprietary Cal Watch self-diagnostic technology.
 8. The panel assembly includes a flow cell that integrates a flow meter and control valve.
- G. Components
1. Standard Equipment
 - a. Stainless Steel Mounting Panel
 - b. Chlorine Sensor with Membrane and Electrolyte
 - c. Chlorine Sensor flow cell
 - d. Flow meter with control valve
 - e. Digital gateway to SC controller with cable
 - f. User Manual
 2. Dimensions
 - a. Controller
 - 1) 9.84"W x 8.66"H x 4.80"D
 - b. Backboard
 - 1) 30"W x 24"H
 3. Weight
 - a. Controller: 3 lbs.
 - b. Complete backboard panel with pH sensor: approximately 20 lbs.

2.3 ACCESSORIES

- A. ProMinent – DACb Free Chlorine Residual Analyzer/Controller and wall mount hardware

- B. CL 10 stainless steel panel mounting hardware, determined by manufacturer or Contractor
- C. pH sensor
- D. Sample conditioning kit with pressure regulator
- E. Pressure reducing valve – set to a maximum 65 psi

2.4 SOURCE QUALITY CONTROL [NOT USED]

PART 3 - EXECUTION

3.1 INSTALLERS [NOT USED]

3.2 EXAMINATION [NOT USED]

3.3 PREPARATION [NOT USED]

3.4 INSTALLATION

- A. Chlorine analyzer shall be installed in accordance with the instructions of the manufacturer. Installation and adjustment shall be checked and approved by a manufacturer's factory representative.
- B. ProMinent – DACb Free Chlorine Residual Analyzer/Controller and panel shall be mounted in accordance with manufacturer recommendations or as determined by Contractor.
- C. Provide electrical and SCADA connections as detailed in Division 26.

3.5 REPAIR [NOT USED]

3.6 RE-INSTALLATION [NOT USED]

3.7 SITE QUALITY CONTROL [NOT USED]

3.8 SYSTEM STARTUP

- A. The chlorine analyzer equipment manufacturer shall furnish the services of a qualified field engineer to check installation, start-up and instruct operating personnel in the proper operation and maintenance of the equipment.

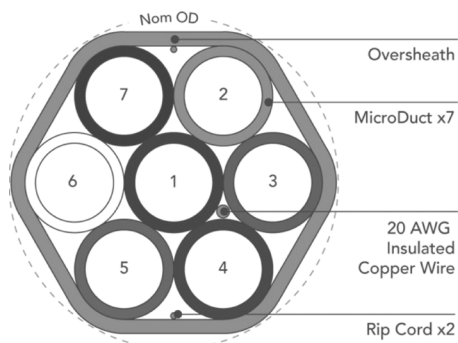
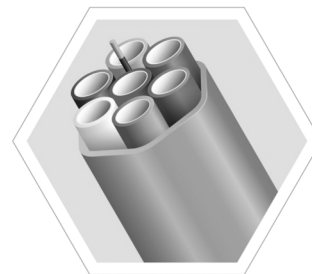
- 3.9 ADJUSTING [NOT USED]**
- 3.10 CLEANING [NOT USED]**
- 3.11 CLOSEOUT ACTIVITIES [NOT USED]**
- 3.12 PROTECTION [NOT USED]**
- 3.13 MAINTENANCE [NOT USED]**
- 3.14 ATTACHMENTS [NOT USED]**

END OF SECTION

ATTACHMENT G
FUTUREPATH 7-WAY 18/14 MM

FUTUREPATH

7-way 18/14 mm



MicroDuct OD/ID	18/14 mm
Nominal OD	2.27 in
MicroDuct Min ID	14 mm
Oversheath	0.07 in
Weight	0.656 lb/ft
Bend Radius Sup	31 in
Bend Radius UnSup	52 in
Conduit SWPS	3522 lbs

STANDARD DETAILS	
DETAILS	FuturePath is a unit of bundled MicroDucts. Manufactured from flexible HDPE (High Density Polyethylene)
INSTALLATION TYPES	Subdivided Conduit, Overrides, Plow, Trench, Directional Bore, MicroTrench, Tray
FILL RATIO	Choose the correct MicroDuct size based on the Outer Diameter (OD) of desired MicroCable. Dura-Line recommends a fill ratio of 50% to 75% for optimal cable placement performance. Several factors impact jetting distance including the condition of route, bends, and equipment.
COLORS	Oversheath: Orange MicroDucts: (1) Blue, (2) Orange, (3) Green, (4) Brown, (5) Grey, (6) White, (7) Red
CONDUIT MARKINGS	Permanent marking along FuturePath includes: material, relevant standards, production info, and sequential feet or meter markings. Custom options available.
CO-EXTRUDED LINING	SILICORE® ULF (Ultra-Low Friction) is co-extruded inside the HDPE wall creating a slick, permanent, interior lining. SILICORE® ULF exhibits no loss in performance over time or in extreme temperature conditions.
INTERNAL RIBS	Standard (except 3.5mm ID MicroDucts which are designed with a standard smooth interior)
LOCATE WIRE	Includes a 20 AWG insulated copper wire
RIP CORD(S)	For easy opening of the oversheath
OPTIONS	
THICKER OVERSHEATH	Available in most configurations to meet your needs for more rugged projects

† Safe working pull strength is calculated at 80% of tensile or breaking strength

* Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.

**ATTACHMENT H
TABLE OF CONTENTS
TECHNICAL SPECIFICATIONS**

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

Contractor shall refer to the following documents for Technical Specifications, unless otherwise noted in the contract documents:

City of Buckeye Water Engineering Design Standards – June 2020

MAG Uniform Standard Specifications and Details for Public Works Construction – 2022 Revision to the 2020 Edition (Incorporated by Reference)

Division 09 – Finishes

09 91 00 Piping and Equipment Painting

Division 26 – Electrical

26 00 10 Electrical General Provisions
 26 01 10 Raceways
 26 01 20 Wire and Cable
 26 01 94 Distribution Panelboards
 26 01 97 Enclosed Circuit Breakers
 26 04 50 Grounding
 26 09 10 Instrumentation
 26 09 30 SCADA

Division 33 – Utilities

⚠ 33 14 12 Fusible Polyvinyl Chloride (PVC) Pressure Pipe
 33 14 14 High Density Polyethylene (HDPE) Pipe

Division 40 – Process Interconnections

⚠ 40 05 67 Flow Control Valve
 40 75 21 Chlorine Analyzer
 40 91 16 Electromagnetic Meters

Appendix A – Geotechnical Report

MAG Standard Specifications List

All specifications applicable to construction for this project are identified as follows:
 Applicable specifications listed below can be found on MAG’s website at the address below:

https://azmag.gov/Portals/0/Documents/MagContent/2022_MAG_Uniform_Standard_Specifications_for_Public_Works_Construction_SPECS_FINAL.pdf

Part 300 – Streets and Related Work

- 336 Pavement Matching and Surfacing Replacement
- 337 Asphalt Pavement Crack Sealing and Crack Filling

Part 600 – Water, Sewer, Storm Drain and Irrigation

- 601 Trench Excavation, Backfilling and Compaction
- 602 Trenchless or Open Cut Installation of Steel Casing
- 604 Placement of Controlled Low Strength Material
- 610 Water Line Construction
- 611 Water, Sewer and Storm Drain Testing
- 630 Tapping Sleeves, Valves and Valve Boxes on Water Lines

Part 700 – Materials

- 701 Aggregate
- 702 Base Materials
- 725 Portland Cement Concrete
- 728 Controlled Low Strength Material
- 790 Paint

END OF SECTION

**ATTACHMENT I
TECHNICAL SPECIFICATIONS**

[PLEASE SEE CITY WEBSITE]