

**ADDENDUM NO. 3**  
**FOR**  
**CONTRACT NO. 3 – WASTEWATER TREATMENT PLANT**  
**AND EDF EXPANSION AT GERALDINE AND SECTION**  
**FOR**  
**THE WATERWORKS, SEWER AND GAS BOARD OF THE TOWN OF SECTION**

**OCTOBER 3, 2024**

TO: ALL PLAN HOLDERS AND INTERESTED PARTIES

SUBJECT: Plans, Specifications, and Contract Documents are hereby amended, modified, and changed as follows:

I. Reference Plans

- A. Replace Plan Sheet No. 13 with the attached Sheet No. 13 marked "Addendum No. 3".
- B. Replace Plan Sheet No. 20 with the attached Sheet No. 20 marked "Addendum No. 3".
- C. Replace Plan Sheet No. 21 with the attached Sheet No. 21 marked "Addendum No. 3".
- D. Reference Plan Sheet E-9 – Section WWTP – Electrical Site Plan (Clarification):  
"The home run from flow transmitter "FIT-1" to "RTU" shall be – 1:TSP, 0.75".

II. Reference Part VI – Technical Specifications, Division No. 2 – Sitework, Section 02733 – Wastewater Pressure Piping, Valves and Accessories

- A. Add attached Section 02733 – Wastewater Pressure Piping, Valves and Accessories marked "Addendum No. 3".

III. Reference Part VI – Technical Specifications, Division No. 2 – Sitework, Section 02748 – Effluent Disposal Field (EDF)

- A. Replace Section 02748 – Effluent Disposal Field (EDF) with Section 02748 marked "Addendum No. 3".

IV. Reference Exhibits

- A. Remove Exhibit "A", Stated Allowance – Geraldine WWTP (Addendum No. 2). Revised Exhibit "A", Stated Allowance – Geraldine WWTP will be issued later.
- B. Remove Exhibit "B", Stated Allowance – Geraldine WWTP (Addendum No. 2). Revised Exhibit "B", Stated Allowance – Geraldine WWTP will be issued later.

V. Enclosed are Minutes from the September 26, 2024 Pre-Bid Meeting on Page ADM3-3 – ADM3-4.

VI. Clarification

- A. Contractor may self-perform or subcontract pour-in-place concrete tanks in lieu of using the listed poured-in-place concrete tank price on the Stated Allowance, at his option.
- B. Contractor may self-perform or subcontract Effluent Disposal Fields (required Advanced Level II Installer's License).
- C. Stated Allowances does not include Effluent Disposal Field (EDF) costs for material or labor.
- D. Equipment and installation in Stated Allowance shall be included for each WWTP.

THIS ADDENDUM ISSUED THIS 3<sup>RD</sup> DAY OF OCTOBER, 2024.

LADD ENVIRONMENTAL CONSULTANTS, INC.



Adam Lea, P.E.



PRE-BID CONFERENCE MINUTES

CONTRACT NO. 1- WASTEWATER MAINTENANCE BUILDING

CONTRACT NO. 2 – FYFFE COLLECTION SYSTEM REHAB

CONTRACT NO. 3 – WASTEWATER TREATMENT PLANT AND EDF EXPANSION AT GERALDINE AND SECTION

CONTRACT NO. 4 – GERALDINE PHASE 2 COLLECTION SYSTEM AND POWELL PUMP STATION AND FORCE MAIN

FOR

THE WATERWORKS SEWER AND GAS BOARD OF THE TOWN OF SECTION

87 CIRCLE DR NW, RAINSVILLE, AL 35986

SEPTEMBER 26, 2024

A Pre-Bid Conference for the above projects was held on Thursday, September 26, 2024, at the Board's Office at 10:00 P.M.

In Attendance were James Payton, Adam Lea, Alan Boydston, Darrell Sears, and Dani Pannell for Ladd Environmental Consultants Inc.; Eddie Tigue, Gerald Shankles, and Jerry Hammon for the Waterworks Sewer and Gas Board for the Town of Section; Mike Tramel and Nathan Smith from Vantage Construction; Wyatt Swiflett and Trent Langley for Jones Contracting; Mark Patton and Justin Johnson for Benchmark Construction; Scott McCollum and Mike Sams for Orenco; Andrew Palmer and Ty Elkins for Lambert Inc.; Kevin Sawyer for Lambert Contracting; Nick Sapp for Jimmy Traylor Construction; Robert Calhoun for Adman Electric and Rich Oden for White Electrical

James Payton and Adam Lea, the Consulting Engineers for the projects introduced everyone present and described the projects.

Contract 1

Questions were received from those in attendance.

A question was asked about the insulation for the pre-engineered metal building. This will be addressed in Addendum No. 3 for Contract 1.

A question was asked about the roof pitch for the pre-engineered metal building. This will be addressed in Addendum No. 3 for Contract 1.

A question was asked about the geotechnical report for the site. There is not a geotechnical report for the site. Contact the owner for on-site visits.

Contract 2

A question was asked about the testing on the point repairs. Testing is not required. This will be addressed in Addendum No. 2 on Contract 2

A question was asked whether the point repairs would be TV inspected after the point repairs were made. No, the point repairs will not need to be TV inspected after the repairs.

### Contract 3

A question was asked about a stated allowance issued in Addendum No. 2 and what the scope of work includes. This will be clarified in Addendum No. 3.

A question was asked about what equipment would be provided by the electrical contractor. This will be clarified in Addendum No.3.

### Contract 4

A question was asked whether an HDPE bore could be installed instead of a steel-cased bore. An answer will be provided in Addendum No. 3.

A question was asked about the pump station bypass pumping requirements including capacity. Capacities must match the specified pumps. Additional clarification will be provided in Addendum No. 3.

A question was asked about the stated trenching on the bid items. This was to distinguish between open cut and boring. Contractor may utilize either trenching or other open cut methods.

A question was asked about driveway bores listed as uncased bores only. This is not a separate bid item but is incidental to the open cut bid item. Refer to the bid item description on page III-9 in the specifications.

A question was asked about the distance from the house to the tanks. The standard pump lead is 60 ft. If controller has to be located more than 50 feet from the tank, a longer pump lead shall be ordered.

A question was asked if the house electrical would not support the additional pump how would this need to be addressed? The provision is to notify the engineer and handle it on a case-by-case basis. If there is no room in the breaker box the provision is listed in Explanation of Bid Item 18 for Bid Item No. 29.

A statement was made that the tanks would come preassembled.

A question was asked about the price of the tanks these are locked in after a purchase order has been placed. Currently, it is locked for 60-90 days. Mike Sams Updated this to 120 days as of 10/01/2024.

A statement was made about the construction timeline Contract 4 shall not be in service until Contract 3 is in place.

A question was asked whether the tanks would be inspected by the manufacturer after installation. A manufacturer representative will inspect the tanks.

SECTION 02733

WASTEWATER PRESSURE PIPING, VALVES AND ACCESSORIES

**PART 1 GENERAL**

1.01 Section Includes

- A. Sanitary sewerage force main piping.
- B. Wastewater valves, fittings and accessories.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ASTM A377 - Ductile Iron Pressure Pipe.
- B. ANSI/AWWA C151/A21.51 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
- C. ANSI/AWWA C104/A21.4 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- D. ANSI/AWWA C111/A21.11 - Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
- E. ANSI/AWWA C115/A21.15 - Flanged Ductile Iron Pipe with Threaded Flanges.
- F. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings, 3 Inch through 48 Inch for Water and Other Liquids.
- G. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
- H. ANSI/AWWA C905 - Poly (Vinyl Chloride) (PVC) Water Transmission Pipe, Nominal Diameters 14 Inch through 36.
- I. ANSI/AWWA C153/A21.53 - Ductile Iron Compact Fittings, 3 Inch through 16 Inch for Water and Other Liquids.
- J. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- K. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Elastomeric Seals.
- L. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fitting Material.
- M. Handbook of PVC Pipe Design and Construction - Uni-Bell Plastic Pipe Association.
- N. Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT Standard Specifications).

- O. ASTM D2774 - Standard Recommended Practice for Underground Installation of Thermo Plastic Pressure Piping.
  - P. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
  - Q. ANSI/AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, 1/2 Inch through 3 Inch for Water Service.
  - R. ANSI/AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 Inch through 63 Inch for Water Service.
  - S. Construction Standard for Excavation - OSHA (29CFR Part 1926.650.652 Subpart P).
  - T. ASTM D1785 – Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
- 1.04 Submittals
- A. Submit under provisions of Section 01300.
  - B. Product Data: Provide data indicating pipe, pipe accessories and fittings. Comply with Specifications.
  - C. Manufacturer's Installation Instructions: Indicate special products required to install products specified.
- 1.05 Project Record Documents
- A. Submit documents under provisions of Section 01700.
  - B. Record location of pipe runs, connections, valves and related items.
  - C. Identify and describe discovery of uncharted utilities.
- 1.06 Regulatory Requirements
- A. Conform to applicable code for materials and installation of the Work of this Section.
  - B. OSHA - Construction Standards for Excavations (29CFR Part 1926.650.652 Subpart P).
  - C. Comply with all OSHA Regulations and Guidelines.
- 1.07 Field Measurements
- A. Verify that field measurements and elevations are as indicated.
- 1.08 Coordination
- A. Coordinate Work under provisions of Section 01039.

**PART 2 PRODUCTS**

2.01 Pipe Materials

A. Ductile Iron Pipe and Fittings

1. ANSI/AWWA C151/A21.51 unless otherwise indicated on Drawings, pressure class of each pipe size shall be as follows:

<b>PIPE SIZE</b>	<b>PRESSURE CLASS (psi)</b>
3" - 12"	350
14" - 20"	250
24" - 64"	200

Nominal thickness specified per AWWA C151 shall be minimum thickness for each pipe size and pressure class.

2. Slip Joint and Mechanical Joint Pipe and Fittings: ANSI/AWWA C111.
3. Flanged Joint Pipe and Fittings: ANSI/AWWA C115.
4. Compact Fittings: ANSI/AWWA C153.
5. Standard Fittings: ANSI/AWWA C110.
6. Interior of Pipe and Fittings:
  - a. Cement-mortar lined as specified in ANSI/AWWA C104 unless otherwise noted.
  - b. Where indicated on Drawings, piping subject to high corrosion (hydrogen sulfide, etc.) shall be polyethylene lined equal to Polybond as manufactured by ACIPCO, Protecto 401 Ceramic Epoxy (40 mil thick) as manufactured by Protecto Division of Vulcan Painters, Inc., Bessemer, AL, or equal.
7. Glass Lining: Where shown on Drawings, ductile iron pipe and fittings to be glass lined as recommended by pipe manufacturer for each specific condition.
8. Exterior Coating: Exterior of all ductile iron piping and fittings, except where specifically indicated to be primed and painted, shall have a standard asphaltic coating as specified in ANSI/AWWA C151.
9. Exposed Piping: All exposed piping to be primed and painted. See 09900.
10. **Manufacturer**: Manufacturer of ductile iron pipe and fittings shall be U.S. Pipe & Foundry Company, American Cast Iron Pipe Company, McWane, Inc., or approved equal.

B. Restrained Joint Ductile Iron Pipe

1. Restrained joint pipe shall be ductile iron manufactured in accordance with requirements of AWWA C151.
2. Push-on type joints shall be in accordance with AWWA C111.

3. Pipe thickness shall be in accordance with AWWA C150.
  4. Restrained joint fittings shall be ductile iron in accordance with AWWA C110 or AWWA C153.
  5. Cement mortar lining and seal coating shall be in accordance with AWWA C151 for pipe and AWWA C110 for fittings.
  6. Pipe and joints shall be designed for working pressure of 350 psi in sizes 4-inch through 24-inch and 250 psi for sizes 30-inch through 54-inch.
  7. Joints shall be capable of being deflected after assembly.
  8. **Manufacturer:** Restrained joint pipe and fittings to be equal and similar to: U.S. Pipe TR FLEX Restrained Joint Pipe; American Cast Iron Pipe Company Flex Ring Restrained Joint Pipe; Clow Super Lock Restrained Joint Pipe; or approved equal.
- C. Retainer Glands for Mechanical Joints (Ductile Iron)
1. Retainer glands shall be cast from ductile iron, grade 60-42-10 and equipped with special alloy steel cupped end set screws.
  2. Restraint against possible separation of unblocked joints due to internal pressure shall be provided.
  3. Pressure rating 350 psi for pipes 3-inch through 6-inch; 250 psi for pipes 8-inch through 16-inch; 200 psi for pipes 18-inch through 20-inch; 150 psi for pipes larger than 20-inch.
- D. Joint Restraint for Bell and Spigot Ductile Iron Pipe
1. Boltless push-on restrained joints shall be designed as a part of the ductile iron joint.
  2. **Manufacturer:** Restrained joint piping shall be FASTITE as manufactured by American DI Pipe; Thrust-Lock as manufactured by McWane; or approved equal.
- E. Plastic (PVC) Pipe and Fittings: ASTM D1784 and ASTM 2241.
1. Slip Joint Pipe and Fittings: ASTM D2241 with standard dimension ratios summarized as follows:

PIPE CLASS (psi)	SDR
125	32.5
160	26
200	21

2. Joints shall be watertight, slip type with elastomeric compression seal conforming to ASTM D3139.
3. **Solvent weld joints WILL NOT BE ALLOWED.**
4. Pipe shall be solid green in color to enable ease of identification as a wastewater line.
5. See Paragraph F. for piping smaller than 2 inches.



F. Plastic (PVC) Service Pipe and Fittings: ASTM D 1785. **NOT USED.**

1. Piping smaller than 2 inches shall be Schedule 40 conforming to ASTM D1785.
2. Solvent weld joints are allowed for service piping.
3. Piping is not required to be green in color.

G. High Density Polyethylene (HDPE) Pipe and Fittings: ASTM D3350.

1. Polyethylene, PE 3408 high density, very high molecular weight, ASTM D3350. Jointing shall be by butt fusion method.
2. Minimum pipe pressure rating at 73.4°F shall be as follows:
  - a. Hydrostatic Design Basis (HDB): 1600 psi
  - b. Hydrostatic Design Stress (HDS): 800 psi
  - c. Safety Factor: 2.0
  - d. Design Life: 50 Years (Minimum)

STANDARD DIMENSION RATIO (SDR)	PIPE PRESSURE CLASS (PSIG)
21	80
17	100
15.5	110
13.5	128
11	160
9.3	193
9	200
7.3	254

3. Pipe shall meet requirements of ANSI/AWWA C901 and ANSI/AWWA C906 for water distribution piping.
4. Pipe shall be green in color or have a minimum of three green stripes permanently extruded into the pipe.
5. Manufacturer: Pipe and fittings shall be DriscoPlex 4300 Series as manufactured by Performance Pipe, HDPE Pipe as manufactured by ISCO Industries, LLC, or approved equal.

H. Fusible PVC: ASTM D1784, ASTM D2241 and AWWA C-900. **NOT USED.**

1. Pipe shall conform to the following dimensional and properties table.

Pipe Application	Nominal Diameter (Inches)	Material	DR	Color	Min. Wall Thickness (Inches)	Pressure Class (psi)	Required Inner Diameter (Inches)
HDD Carrier	4	Fusible C-900 DIPS	18	Green	0.27	235	4.23
HDD Carrier	6	Fusible C-900 DIPS	18	Green	0.38	235	6.09
HDD Carrier	8	Fusible C-900 DIPS	18	Green	0.50	235	7.98
HDD Casing	6	Fusible C-900 DIPS	14	White/Gray	0.49	305	5.85
HDD Casing	10	Fusible C-900 DIPS	18	White/Gray	0.62	235	9.79
HDD Casing	12	Fusible C-900 DIPS	18	White/Gray	0.73	235	11.65

2. Pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in either AWWA C-900 or ASTM D2241. All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784.
3. Fusible PVC pipe shall be extruded with plain ends. No bells or gaskets shall be used.
4. Pipe shall be manufactured in a standard 40 foot nominal length and marked per industry standards.
5. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters or other visible deleterious faults.
6. Pipe shall be field assembled with butt-fused joints.
7. Pipe shall be handled, stored and installed per the pipe supplier's recommendations.
8. See Part 3 for fusion process requirements.
9. The annular space between the Fusible C-900 PVC pipe casing and the carrier pipe shall be grouted for directional bore applications where casing spacers cannot be installed.
10. Manufacturer: Fusible PVC shall be manufactured by Underground Solutions, Inc., Poway, CA; or approved equal.

2.02 Pipe Accessories

A. Fittings

1. Fittings 4 Inches Diameter and Smaller: Fittings shall be manufactured of same material with same pressure rating as the adjoining pipe, with same type of joint.

2. Ductile Iron Pipe: Fittings 6 inches diameter and larger will be ductile iron fittings, same class and pressure rating as the adjoining pipe with same type of joint.
  3. PVC Pipe: Fittings 6 inches diameter and larger will be the same as specified above for ductile iron with same type of joint as the PVC pipe.
  4. HDPE Pipe and Fusible PVC: All fittings shall be by the same manufacturer as the adjoining pipe. Fittings shall be of the same material, density, molecular weight, and pressure rating as the adjoining pipe, with same type of joint.
- B. Valves and Accessories: All valves shall have joints suitable to the piping installation and shall be pressure rated equal to the adjoining pipe. With HUB adapters used for PVC pipe, concrete underlay required.
1. Plug Valve
    - a. Valves shall be of the 90 degree turn, non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the Drawings. Flanged valves shall be faced and drilled to the ANSI 125/150 pound standard. Mechanical joint ends shall be to the AWWA Standard C111-64, grooved ends per AWWA C-606-87. Screwed ends shall be to the NPT Standard.
    - b. Valve bodies shall be of ASTM A126 Class B cast iron. Bodies in 4 inch and larger valves shall be furnished with a 1/8 inch welded overlay seat of not less than 90 percent pure nickel, machined to mate with the resilient faced plug. **Valves that do not provide positive mating of the resilient faced plug with the nickel seat SHALL NOT BE ACCEPTABLE.**
    - c. Seat area shall be raised, with raised surface completely covered with weld to insure that the plug face contacts only nickel. **Screwed-in seats SHALL NOT BE ACCEPTABLE.**
    - d. Design of the valve shall provide for a rectangular port that allows contact between the welded nickel seat and the plug to occur only in the final 3 degrees of the plug movement. Round ported valves will be accepted.
    - e. Plugs shall be of ASTM A126 Class B cast iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The interference between the plug face and the body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in line under pressure. The plug shall be completely coated with Buna-N suitable for use with sewage.
    - f. Valves shaft seals shall be of the multiple V-ring type and shall be externally adjustable and re-packable without removing the bonnet or actuator from the valve under pressure. **Valves utilizing O-ring seals or non-adjustable packing SHALL NOT BE ACCEPTABLE.**
    - g. Valve pressure ratings shall be 175 psi through 12 inch and 150 psi for 14 inch through 72 inch. Valves shall provide driptight shutoff up to the full pressure rating with pressure in either direction. Each valve shall be given a hydrostatic and seat test with the test results being certified in accordance with ANSI B16.1.
    - h. Valve actuators for manual valves shall have lever or gear actuators and tee wrenches, extension stems, floor stand, extended bonnet, etc., as indicated on the Drawings. All extended bonnets must have gear located at the operator. **Stem extensions with handwheel operators ARE NOT ACCEPTABLE EQUIVALENT.**

- i. All valves 6 inch and larger shall be equipped with gear actuators. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings.
- j. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque and to provide seat adjustment to compensate for change in pressure differential or flow direction change. All exposed nuts, bolts and washers shall be zinc plated.
- k. Valve and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts and washers shall be stainless steel.
- l. Electric Valve Actuators shall be provided as indicated on the Drawings. See 2.03.
- m. **Manufacturer: DeZURIK, Sartell, MN; Henry Pratt Co., Aurora, IL; or approved equal.**

2. Butterfly Valve

- a. Valves shall meet or exceed the latest revision of AWWA Standard C504 for Class 150B butterfly valves and shall meet or exceed the requirements of this specification.
- b. Valves 12 inch and smaller shall have a working pressure of 200 psi. All valves shall be tested at and shall be capable of withstanding bi-directional line hydrostatic test pressures up to 225 psi without leaking.
- c. Valves bodies shall be of cast iron per ASTM A126 Class B. Flanged end valves shall be of the short body design with 125 pound flanged ends faced and drilled per ANSI B16.1 Standard for cast iron flanges. Mechanical joint end valves shall meet the requirements of AWWA C111/ANSI 21.11.
- d. Disc shall be offset to provide an uninterrupted 360 degree seating edge and shall be cast iron per ASTM A48, Class 40C. The disc seating edge shall be solid 316 stainless steel. Sprayed mating seating surfaces are not acceptable.
- e. The disc shall be securely attached to the valve shaft utilizing a field removable/replaceable 304 stainless steel torque screw on sizes 3 inch to 12 inch, a tangential pin locked in place with a set screw on sizes 4 inch to 20 inch, or 304 stainless steel taper pins on valves 24 inch and larger.
- f. Valve shaft shall be Type 304 stainless steel. Valve shafts seals shall be self-compensating V-type packing with a minimum of 4 sealing rings. **One-piece molded shaft seal and O-ring shaft seals ARE NOT ACCEPTABLE.**
- g. Seat shall be of Buna-N for water, or as required for other services, and shall be molded in and vulcanized to the valve body. The seat shall contain an integral shaft seal protecting the valve bearings and packing from any line debris.
- h. For valves 24 inch and larger, the seat shall be retained within a dovetail groove in the valve body and locked in place by an epoxy compound wedge. Compression between the seat and disc edge shall be adjustable from both the upstream and downstream side of the valve disc

and the seat shall be field replaceable without disassembly of the disc and shaft. Seats vulcanized to cartridge inserts in the valve body and seats on the disc are not acceptable.

- i. Valve shaft bearings shall be non-metallic and permanently lubricated.
  - j. Interior and exterior metallic surfaces shall be shop painted per the latest revision of AWWA C504 unless otherwise indicated. The interior of the body shall have a full rubber lining vulcanized to the valve body. Mechanical joint valves shall be fully rubber lined to point of pipe insertion. **Rubber lining on the flange face and boot style seats IS NOT ACCEPTABLE.**
  - k. Valve actuator shall be sized to operate the valve at the rated working conditions of the valve, and shall be as shown on the Drawings. Ten position locking levers shall be required for 3 inch to 6 inch valves. Provisions must be made for locking in any of the ten positions using a standard padlock.
  - l. Each valve and actuator shall be assembled, adjusted and tested as a unit per the latest revision of AWWA C504, by the valve manufacturer. Valves with actuators mounted outside of the valve manufacturing facility **ARE NOT** in accordance with AWWA latest revision and **shall NOT BE ACCEPTABLE.**
  - m. Shop leakage tests shall follow the requirements of AWWA C504 except that the test pressure shall be 225 psi.
  - n. Electric Valve Actuators shall be provided as indicated on Drawings. See 2.03.
  - o. **Manufacturer: DeZURIK, Sartell, MN; Henry Pratt Co., Aurora, IL; or approved equal.**
3. Check Valve
- a. Flanged swing check, cast iron body, Class 125 flanges, 150 psi working pressure, stainless steel fitted, equipped with external backflush lever and stainless steel spring.
  - b. Valve shall be specifically designed for operation on discharge side of sewage pump as recommended by manufacturer. Valve shall be essentially leak free in preventing reverse flow. There shall be no leakage around the shaft.
  - c. **Manufacturer: Mueller Company, Decatur, IL; GA Industries, Inc., Mars, PA; Clow Valve Company, Oskaloosa, IA; or approved equal.**
4. Valve Box
- a. Cast iron, adjustable, minimum 5-1/4 inch diameter shaft including base, cover.
  - b. Castings shall be coated with minimum 2 coats coal-tar pitch or equal as approved by the Engineer.
  - c. **Manufacturer: Mueller Company; Vulcan Foundry Co.; McKinley Iron Works, Inc.; Campbell Foundry Co.; or approved equal.**
5. Combination Sewage Air Release and Air/Vacuum Valve
- a. Valve shall be of the type that automatically exhausts large quantities of air during the filling of a system, releases pockets of air which accumulate while the system is in operation and un-

der pressure, and allows air to re-enter during draining or when a vacuum occurs. It shall be designed specifically for use with wastewater.

- b. All wastewater force mains shall have air and vacuum release valves installed as indicated on the Plans.
- c. The body of these valves shall be conical shaped to maintain maximum air gap with the spring loaded float and seal plug connection combining to ensure no contact between the sewage and the seal.
- d. The valve shall have a double float design with the upper float being enclosed in the upper section of the valve and shall be made of polypropylene. The lower float shall be in the main body of the valve and shall be constructed of polypropylene.
- e. The body shall have a funnel shaped lower body to automatically drain sewage back into the system.
- f. All internal metal parts are to be made from corrosion resistant stainless steel, with all operating parts in the upper section to be non-metallic plastic materials. The hinge for operation for the opening and closing of the seal on the orifice shall be made of EPDM rubber. All hardware shall be of stainless steel bolts and nuts with plastic washers under the bolt and nut.
- g. The rolling resilient seal shall provide smooth positive opening, closing, and leak free sealing over the anticipated pressure range. The minimum working pressure shall be 150 psi and tested to 230 psi.
- h. Unless specifically stated otherwise on the Plans, the minimum valve size and connection shall be as follows and as recommended by the manufacturer for each specific installation with an isolation brass ball valve as specified herein of the same size as the valve connection:

<u>PIPE DIAMETER</u>	<u>VALVE SIZE</u>
16-inch and smaller	2-inch threaded
18-inch and larger	3-inch threaded

- i. **Manufacturer:** The valve shall be model ARI D-025 as manufactured by ARI Flow Control Accessories or approved equal.

j. **Body Material:** Type 316 stainless steel or reinforced nylon.

6. Valve Box and Cast Iron Lid and Frame for Combination Sewage Air Release and Air/Vacuum Valve:

a. Concrete Meter Box

- (1) Concrete meter box, minimum 17" x 28" with steel traffic cover.
- (2) Meter box shall be constructed of minimum 4,000 psi concrete.
- (3) Meter box extension is required to accommodate valve assembly.
- (4) Steel traffic cover shall have "SEWER" stamped on the top or be plain and painted with green enamel paint.

(5) **Manufacturer:** Concrete meter box shall be Brooks Series #65-T as manufactured by Brooks Products, Inc., El Monte, CA, or approved equal.

7. Brass Ball Valve

- a. Brass ball valve shall be full port and rated for a minimum of 400 psi working pressure. **Valves that are not full port will not be accepted.**
- b. Valve shall have threaded connections and be designed for use in wastewater systems.
- c. If valve is used as an isolation valve for wastewater force mains, the valve shall be installed in a concrete meter box. Concrete box shall be a minimum of 12" x 20", 4,000 psi concrete with cast iron traffic cover stamped "SEWER".

C. Expansion Joints – NOT REQUIRED.

1. Flanged, spool type, with retaining ring and control rods.
2. **Manufacturer:** Expansion joint shall be the Mercer Invincible Style 500-700 with standard control unit assembly as manufactured by Mercer Rubber Co., Bellmawr, NJ; Proco Products, Inc., Stocton, CA; UNIFLEX, Inc., Pompano Beach, FL; or approved equal.

D. Pressure Gage

1. Specifically designed for use with sewerage.
2. Minimum 4-1/2 inch diameter; indicating range as required by point of installation; measuring pounds per square inch with full scale accuracy as per ANSI B40.1 Grade B or better.
3. Stainless steel with glass window glycerin filled.
4. The unit shall be equipped with pressure gage diaphragm seals, removable type, to isolate and protect sensing element.
5. Unless otherwise noted, all pressure gage installations shall include a snubber valve.
6. All gages shall be mounted only in vertical position. Coordinate with Engineer.

E. Utility Marker (Where Required) – NOT REQUIRED.

1. Valve markers shall be glass fiber, flexible, resistant to rust, will not become brittle in cold weather nor soften in hot weather.
2. Color shall be green, highly visible day or night and permanent throughout the marker.
3. The marker shall be approximately 62 inches long and 3-3/4 inches wide.
4. A decal shall be applied at the top of the marker including the name of the Owner, telephone number, and the words "Wastewater Valve".
5. Markers to be set at least 2 feet deep with appropriate post driver as recommended by the manufacturer.

6. **Manufacturer:** Carsonite Utility Marker and manufactured by Carsonite International, Carson City, NV; GDS and Associates, Carson City, NV; Buhzl Plastics, Seattle, WA; or approved equal.
- F. Tapping Sleeve and Valve
1. All wet connections shall be made using AWWA approved tapping sleeve and valve.
  2. Tapping Valve
    - a. Tapping valve shall be gate valve meeting requirements of ANSI/AWWA C500. The valve shall include resilient seats nonrising stem, mechanical joint type end connections adequate for and designed specifically for the type of connecting pipe. Minimum pressure rating shall be 150 pounds per square inch unless otherwise indicated.
    - b. **Manufacturer:** Tapping valve shall be Mueller No. H-667 as manufactured by Mueller Co., Decatur, IL; M & H No. 3751-NRS as manufactured by M & H Valve Co., Anniston, AL; or approved equal.
  3. Tapping Sleeve
    1. Tapping sleeve body shall be stainless steel (Type 304) with stainless steel bolts (Type 304), flanged, full circumferential sealing gasket and designed specifically for the type pipe being tapped. The sleeve shall be designed for a minimum pressure rating of 250 psi unless otherwise indicated.
    2. **Manufacturer:** The stainless steel tapping sleeve shall be the JCM No. 432 as manufactured by JCM industries, Nash, TX, or approved equal.
- G. Emergency Bypass Valve Assembly – NOT USED.
1. Emergency bypass valve assembly shall be used to isolate the individual grinder pump station from the existing septic tank when the septic tank is to remain in service as an emergency backup system, as indicated on the Drawings.
  2. The emergency bypass valve assembly shall consist of a brass ball valve, size equal to adjacent piping, PVC Sch. 80 adapters (solvent weld to threaded connection) and plastic meter box for each gravity service line (one to pump station and one to the septic tank). Brass ball valve and plastic meter box shall meet the specifications included herein.
  3. Valves shall be fully operational in each meter box.
  4. PVC Backwater (Check) Valve
    - a. A PVC Backwater (Check) Valve shall be installed between the brass ball valve and the existing septic tank. The valve shall be installed with a riser pipe and cap, sized to allow full access to the valve parts.
    - b. The valve shall be specifically designed to prevent groundwater or sewage from flowing back through the valve in horizontal gravity installations.
    - c. The valve shall have a replaceable PVC flapper with EPDM gasket that insures a watertight seal while allowing unrestricted flow through the valve.



- d. The valve is not required to be rated for pressure service, but shall withstand 10 psi.
- e. The valve shall have a removable large diameter, top-mounted threaded cap for visual inspection or cleaning with Sch. 40 DWV connections.

H. Flushing Connection Assembly

1. Flushing connection assembly shall be designed for a 2-1/2 inch threaded hose connection with PVC cap to permit flushing of the wastewater line.
2. The assembly shall include a 2-1/2 inch brass ball valve as specified herein.
3. Solvent weld joints are allowed for flushing connection piping.
4. The assembly shall be connected to the wastewater main with a 90° Ell (terminal) or gasket tee (in-line) with fittings as required.
5. Assembly shall be installed in a concrete meter box. Concrete box shall be a minimum 12" x 20", 4,000 psi concrete with cast iron traffic cover stamped "SEWER".
6. Box extension is required to accommodate height of flushing connection assembly. Valve shall be fully operational within the box.
7. **Concrete Meter Box Manufacturer: Concrete meter box and cast iron traffic cover shall be Brooks Series # 37-T as manufactured by Brooks Products, Inc., El Monte, CA or approved equal.**

I. Lateral Assembly

1. Contractor shall furnish and install a lateral assembly at the right-of-way for each individual grinder pump service line.
2. Lateral assembly shall consist of a PVC or brass ball valve curb stop, PVC swing check valve and plastic meter box.
3. Ball Valve Curb Stop
  - a. Ball valve curb stop shall be constructed of PVC with EPDM seals or brass for use with service piping.
  - b. Ball valve shall be designed to withstand a working pressure of 150 psi minimum.
4. PVC Swing Check Valve
  - a. Swing check valve shall be manufactured of PVC with EPDM seat and Buna N flapper.
  - b. Check valve shall be designed to withstand a working pressure of 150 psi minimum.
5. Lateral Assembly Box: Plastic meter box as specified herein.

J. Service Saddle

1. Hinged singlestrap type, constructed from 85-5-5 brass alloy per ASTM B-62 and AWWA C800 with rubber gasket.

2. The saddle shall be specifically designed for use with the type of pipe being tapped and a certificate of recommended pipe use shall be provided by the manufacturer.
3. **Manufacturer:** The saddle shall be the Ford Style S70 as manufactured by The Ford Meter Box Company, Inc., Wabash, IN, or approved equal.

K. Plastic Meter Box

1. Plastic meter box shall be constructed of high density, ultraviolet resistant plastic with plastic lid.
2. Box dimensions shall be a minimum of 14 x 19 inches inside by 12 inches deep, tapering out at the bottom.
3. Plastic lid shall have "SEWER" molded in the top and be green in color.
4. **Manufacturer:** Plastic meter boxes shall be Jumbo Utility Boxes as manufactured by Pentek Access Boxes, Sheboygan, WI, or approved equal.

2.03 Electric Valve Actuators

- A. All electric actuators shall conform to the requirements of AWWA Standard C540-93.
- B. Actuators shall contain motor, gearing, manual over-ride, limit switches, torque switches, drive coupling, integral motor controls, position feedback transmitter (where required) and mechanical dial position indicator (where required).
- C. The motor shall be specifically designed for actuator service. The motor will be of the induction type with Class F insulation and protected by means of thermal switches imbedded in the motor windings. Motor enclosure will be totally enclosed, non-ventilated. The motor size shall be as recommended by the manufacturer for each actuator condition.
- D. Motors will be capable of operating on 460 volt – 3 phase – 60 hertz power except quarter turn valves 16 inches and smaller which shall operate on 120 volt – single phase – 60 hertz power.
- E. Actuator enclosure shall be NEMA 4 (watertight). All external fasteners on the electric actuator will be stainless steel. Fasteners on limit switch and terminal components shall be captured to prevent loss while covers are removed.
- F. All gearing shall be grease lubricated and designed to withstand the full stall torque of the motor.
- G. Manual over-ride shall be by hand wheel. Manual operation will be via power gearing to minimize required rim pull and facilitate easy change-over from motor to manual operation when actuator is under load. Return from manual to electric mode of operation will be automatic upon motor operation. A seized or inoperable motor shall not prevent manual operation.
- H. Limit switches shall be furnished at each end of travel. Limit switch adjustment shall not be altered by manual operation. Limit switch drive shall be by counter gear. Limit switches must be capable of quick adjustment requiring no more than five (5) turns of the limit switch adjustment spindle. One set of normally open and one set of normally closed contacts will be furnished at each end of travel where indicated. Contacts shall be of silver and capable of reliability switching low voltage DC source from the control system furnished by others.

- I. Mechanically operated torque switches shall be furnished at each end of travel. Torque switches will trip when the valve load exceeds the torque switch setting. The torque switch adjustment device must be calibrated directly in engineering units of torque.
  - J. All wiring shall be terminated at a plug and socket connector.
  - K. Quarter turn actuators will be furnished with mechanical stops that restrict the valve/actuator travel.
  - L. Actuator must be capable of a 60 second closing time speed.
  - M. Actuators will be capable of operating in an ambient temperature range of -20 to +175 degrees F (without motor controls) and -20 to +160 degrees F (with motor controls).
  - N. All actuators in open/close service will be furnished with integral motor controls consisting of reversing starters, control transformer, phase discriminator, monitor relay (to signal fault conditions such as thermal switch trip, torque switch tripped in mid-travel, wrong phase sequence or phase failure), "open-stop-close" pushbuttons, "local-off-remote" selector switch in addition to red and green indicating lights. An interface with the control system must be furnished with optical isolators to separate incoming voltage signals from the internal motor controls.
  - O. Actuators in modulating service will be selected such that the required dynamic valve torque is no more than 60% of the electric actuator's maximum rated breakaway torque. Power gearing in modulating actuators shall have zero backlash between the motor and actuator output.
  - P. All actuators in modulating service will be furnished with a feedback potentiometer in addition to the following motor controls: reversing starters, control transformer, phase discriminator, monitor relay, positioner, "open-stop-close" pushbuttons, "local-off-remote" selector switch in addition to red and green indicating lights. The positioner shall be capable of accepting a 4-20 mADC command signal and positioning the valve by comparing the command signal with the present valve position as indicated by the feedback potentiometer mounted inside the actuator. The positioner shall be field adjustable to fail to the "open", "closed" or "last" position on loss of 4-20mADC command signal.
  - Q. **Manufacturer**
    - 1. **All actuators shall be manufactured by AUMA Actuators, Inc. of Pittsburg, Pennsylvania; Rotork Actuation, Bloomfield Hills, MI; or approved equal.**
- 2.04 **Bedding Materials**
- A. See Section 02225.
- 2.05 **Concrete Kickblocks**
- A. Concrete shall be mixture of Portland Cement, washed natural sand and washed graded gravel or crushed limestone with minimum compressive strength of 2000 pounds per square inch.
  - B. Size, type and location of kickblocks shall be as shown on the Drawings.
  - C. All fittings, nuts and bolts to be wrapped and completely covered with 6 mil black polyethylene prior to pouring concrete kickblocks.

2.06 Underground Utility Marking Device

A. Detector Wire – Non-Metallic Pipe

1. Wire: Minimum 12-gauge solid or stranded, insulated copper wire.
2. Installation: The detector wire shall be installed with all non-metallic, buried wastewater lines.
3. Bury: The wire shall be buried in the trench below the pipe. The wire shall not touch or be in contact with the pipe at any point.
4. Marking Tape: For all installations of detector wire, non-detectable marking tape shall also be installed directly above pipe.

B. Non-Detectable Marking Tape – Metallic and Non-Metallic Pipe

1. Tape: Plastic (Ultra-high Molecular Weight Polyethylene); minimum 4.0 mil (0.004 inch) overall thickness; minimum two inches in width; alkaline and corrosion resistant; minimum 10.64 pounds/inch tensile break strength.
2. Detectable Core: None.
3. Color: The tape shall be color bonded with the AWWA recommended color for wastewater force mains – BROWN.
4. Lettering: The tape shall be inscribed with permanent, corrosion resistant, 1-1/2 inch tall black letters, repeated every 20 to 36 inches as follows.

**“CAUTION SEWER LINE BELOW”**

5. **Manufacturer**: The non-detectable marking tape shall be the "SHIELDTEC" as manufactured by Thor Enterprises, Inc., Sun Prairie, WI, or approved equal.
6. Installation: The non-detectable marking tape shall be installed with all metallic, buried wastewater lines and with all non-metallic, buried wastewater lines utilizing detector wire.
7. Bury: The burial depth shall not exceed 36 inches below the backfilled grade and shall be a minimum of 12 inches above the top of the pipe. The tape shall not touch or be in contact with the pipe at any point.

C. Detectable Marking Tape – Service Force Mains Only

1. Tape: Plastic (Ultra-high Molecular Weight Polyethylene); minimum 5.0 ml (0.005 inch) overall thickness; minimum two inches in width; alkaline and corrosion resistant; minimum 25 pounds/inch tensile break strength.
2. Detectable Core: The detectable tape shall include a 35 gage (0.0035 inch) solid aluminum foil core, making the tape capable of detection by either conductive or inductive location techniques.
3. Color: The tape shall be color bonded with the AWWA recommended color for sewer force mains – BROWN.
4. Lettering: The tape shall be inscribed with permanent, corrosion resistant, 1-1/2 inch tall black letters, repeated every 20 to 36 inches as follows:

"CAUTION SEWER LINE BELOW"

5. **Manufacturer:** The detectable marking tape shall be the "Alarm Tape" as manufactured by Thor Enterprises, Inc., Sun Prairie, WI, or approved equal.
6. **Installation:** The detectable marking tape shall be installed with all gravity service lines over 10 feet in length. The tape shall be properly connected to fittings so that the sewer line can be relocated with a pipe detector after burial.
7. **Bury:** The burial depth shall not exceed 36-inches below the final backfilled grade and shall be 6-inches above the top of the pipe. The tape shall not touch or be in contact with the pipe at any point.

**PART 3 EXECUTION**

3.01 Trenching

- A. Excavate pipe trench in accordance with Section 02225. Hand trim as required for placement of pipe.
- B. Trenches shall be of sufficient width to ensure proper bedding, haunching, compaction and backfill under and around pipe in order to facilitate pipelaying, however, the trench width shall be maintained as narrow as possible, consistent with the pipelaying requirements. In all cases the trench shall be sufficient for the safety of the persons in and around the trench.

3.02 Examination

- A. Verify that trench cut is ready to receive Work and excavations, dimensions and elevations are as shown on Drawings.

3.03 Preparation

- A. Hand trim excavations to required elevations as required.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- C. In general, all lines should be run parallel or perpendicular to the center line of the adjacent roadway or building.

3.04 Bedding

- A. Place bedding material at trench bottom, level materials in continuous layer as specified in Section 02225.
- B. Bedding material must be free from projecting rocks and with sufficient clearance at bell to ensure that dirt and small rocks are not caught when the jointing is made.

3.05 Installation - Pipe

- A. Install ductile iron pipe in accordance with ANSI/AWWA C600.

- B. Install PVC pipe in accordance with ASTM D2774 and Handbook of PVC Pipe Design and Construction.
- C. Install HDPE pipe by butt fusion method in accordance with ASTM D2774 and manufactures instructions, except as modified herein.
- D. Interior of pipe and all joint surfaces shall be clean and wiped dry before pipe is lowered into trench.
- E. Position pipe carefully to insure full bedding and a true straight line. Breaks in line or grade shall not exceed one half the maximum deflection recommended for the joint.
- F. Construction, trenching, pipelaying, materials, depth of cover and related appurtenances in traffic areas and within Highway Department rights-of-way shall be as required by the ALDOT Std. Spec..
- G. All piping, valves and fittings to be field inspected by the Engineer and approved for use prior to installation. Any defective pipe or fittings, in the opinion of the Engineer, will not be acceptable for installation. Defects shall include, but not be limited to, ripples, cracks, chips, improper beveling, improper compression ring, improper jointing and brittle material.
- H. The Contractor shall allow no trench water, mud, dirt or debris to enter the pipe before or after laying. Watertight plug or cap shall be inserted into open end of pipe when pipelaying is not in progress.
- I. The Contractor shall lay all pipe continuous without any skips unless specifically authorized by the Engineer. No payment will be made for pipe installed contrary to this until the skips have been removed.
- J. Piping Installed Under Structures: All piping installed under concrete slabs, foundations, buildings, structures and similar facilities shall be totally and completely flushed, cleaned, pressure tested and inspected prior to the construction of the structure or facility over the pipe.
- K. Concrete Kickblocks: See Paragraph 2.04. Install against undisturbed earth.
- L. Connection to Existing Manhole
  - 1. Core (saw) circular opening as small as possible in existing manhole wall.
  - 2. Install flexible piping sleeve inside cored opening. Connect pipe to sleeve with SS strap
- M. PVC Pipe Fusion – NOT USED.
  - 1. Fusion technician shall be qualified by the pipe supplier to install fusible PVC pipe of the type(s) and sizes(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.
  - 2. Fusible PVC pipe shall be handled in a safe and non-destructive manner before, during and after the fusion process and in accordance with the pipe supplier's guidelines.
  - 3. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine.
  - 4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process.
  - 5. The fusible PVC pipe will be installed in a manner so as not to exceed the recommended bending radius.

6. Where fusible PVC pipe is installed by pulling in tension, the recommended safe pulling force, according to the pipe supplier, shall not be exceeded.
7. The fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, or approved equal.

8.

3.06 Backfill

- A. Backfill, including haunching, initial backfill and final backfill as specified in Section 02225.
- B. Backfill Material: See Section 02225.
- C. Install underground utility marking tape as indicated in 2.05 and 3.10.

3.07 Installation - Valves and Accessories

- A. Install valves as indicated for piping and as recommended by manufacturer.
- B. Utility marker to be installed at all valve locations, where indicated on Drawings.

3.08 Field Quality Control

- A. Request inspection prior to and immediately after placing bedding, immediately after haunching, and immediately after initial backfill.
- B. Field inspection and testing will be performed under provisions of Section 01400.

C. Sewer Force Main Pressure Test

1. Fill pipe with water and expel all entrapped air (see Paragraph 3.08 F).
2. Test pressure shall be approximately equal to the pressure rating of the pipe. The test pressure shall not exceed the pipe pressure rating at the lowest elevation within the segment being tested. Tests shall be conducted between two adjacent valves, or provide temporary valves and/or plugs as necessary.
3. Test duration shall be 2 hours. A recording pressure gage will be used for the entire 2 hour period. The recorded pressures shall be maintained as Project Records (see Section 01700).
4. The maximum pressure loss shall not exceed 5 pounds per square inch at the end of the two hour test period for the section being tested.

D. Leakage Testing

1. Immediately following the pressure test as outlined above, the same pipe section shall be tested for leakage. Hydrostatic testing procedures as required by AWWA C600 shall apply except as specifically modified herein.
2. The leakage test shall be for a 4 hour duration and the recording pressure gage shall again be used for the entire 4 hour period as noted for the pressure test. The average test pressure shall be the same as the pressure rating (class) of the pipe.
3. The maximum allowable leakage during the 4 hour test shall be based on the following formula:

$$L = ((1000)*(D)*(p^{0.5}))/266,400.$$

Where: L = Maximum allowable leakage, in gallons per hour per 1000 feet (GPH/1000 feet).

D = Nominal diameter of pipe, in inches.

P = Average test pressure during the leakage test, in pounds per square inch (gage).

4. Enclosed as Table No. 02733-1 is a summary of the maximum allowable leakage (based on the above formula) for various pipe diameters for three common pipe classes. **The Contractor is advised that the maximum allowable leakage is more stringent than the allowable leakage as specified in AWWA C600.** For any pipe class (test pressure) or pipe diameter not listed, the formula as noted above shall be used to calculate the maximum allowable leakage.
5. If the pipeline section under testing contains sections of pipe of various diameters, the maximum allowable leakage shall be the sum of the calculated allowable leakage for each section based on its length and diameter.

TABLE NO. 02733-1			
ALLOWABLE LEAKAGE IN GALLONS PER HOUR PER 1000 FEET			
OF PIPELINE (GPH/1000 FEET)			
NOMINAL PIPE DIAMETER (Inches)	AVERAGE TEST PRESSURE (POUNDS PER SQUARE INCH)		
	250	200	160
2	0.119	0.106	0.095
3	0.178	0.159	0.142
4	0.237	0.212	0.190
6	0.356	0.319	0.285
8	0.475	0.425	0.380
10	0.594	0.531	0.475
12	0.712	0.637	0.570
14	0.831	0.743	0.665
16	0.950	0.849	0.760
18	1.068	0.956	0.855
20	1.187	1.062	0.950
24	1.424	1.274	1.140
30	1.781	1.593	1.425

- E. **Line Flushing:** Prior to any testing, all force mains will be thoroughly cleaned by flushing with an appropriate size sewer ball, squeegee or pig. Additional cleaning and flushing by high velocity water jet may be required by the Engineer, if deemed necessary. The force main will not be accepted by the Owner until the engineer is satisfied that the pipe has been thoroughly cleaned, flushed and tested.



- F. **Air Removal:** Removal of all entrapped air is required. The Contractor shall provide any temporary air release valves as may be required. The temporary air release valves are not separate pay items and are included in the pipeline cost.

3.09 Protection

- A. Protect finished installation under provisions of Section 01500.
- B. Protect pipe and aggregate cover from damage or displacement at all times.

3.10 Utility Marking Device

- A. See Part 2 for installation procedure.

3.11 Schedule

- A. See Drawings for quantity, size and type of piping, valves, fittings and related items required by the project.

END OF SECTION

[2276.3]  
[REV.08/2013]

SECTION 02748  
EFFLUENT DISPOSAL FIELD (EDF)

**PART 1 GENERAL**

1.01 Section Includes

- A. Effluent Disposal Fields.

1.02 Related Sections

- A. Applicable to Work of this Section are the Drawings and General Provisions of the Contract, including: Part IV, General and Supplementary Conditions; Part V, Special Conditions; Part VI, Technical Specifications; Division No. 1, General Requirements.

1.03 References

- A. ANSI A21.11 - Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings.
- B. ANSI/ASTM A74 – Cast Iron Soil Pipe and Fittings.
- C. ANSI/ASTM D3033 – Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- D. ANSI/ASTM D3034 – Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.04 Submittals

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate plan, location and inverts of filter field, inverts of connecting piping.
- C. Product Data: Provide data on tank accessories and piping.
- D. Manufacturer's Installation Instructions: Indicate special procedures for septic tank installation.

1.08 Project Record Documents

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations and inverts of buried pipe, components, and connections.

1.09 Regulatory Requirements

- A. Conform to applicable code and regulations for Work of this Section.
- B. Drip tubing installer is required to be a Level II installer licensed by the AOWB.

1.10 Coordination

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the work with connections to building sanitary sewer piping outlet.

**PART 2 PRODUCTS**

2.01 Septic Tanks – **NOT USED.**

- A. See Section 02747.

2.02 Connecting Pipe Materials

- A. Ductile Iron Pipe: ANSI/AWWA C151, Class 51 for 4 inch diameter and smaller; Class 50 for pipe diameter greater than 4 inch; mechanical joint (ANSI/AWWA C111).
- B. Plastic Pipe (PVC): ASTM D3034 Type PSM Poly (Vinyl Chloride) (PVC); elastomeric gasketed joints meeting requirements of ASTM D3212; minimum wall thickness based on SDR 26.
- C. Plastic Pipe (PVC Schedule 40): ASTM D1785 Schedule 40, Poly (Vinyl Chloride) (PVC), bell and spigot style solvent sealed joints.
- D. Plastic Pipe (PVC A-2000): ASTM D1785 Schedule 40, Poly (Vinyl Chloride), resin cell classification R454B or R454C, manufacturer per ASTM F949; elastomeric gasketed joints meeting requirements of ASTM F477.
- E. High Density Polyethylene (HDPE) Pipe and Fittings – See Section 02733 for requirements.

2.03 Effluent Disposal Field Materials

- A. 4" perforated plastic field line in combination with 12" deep x 36" wide gravel fill and filter cloth.
- B. 1/2" wastewater drip tubing with emitters spaced 24" O.C., pressure compensating rated for 0.6 gph, with Nano-Rootguard®, as manufactured by Geoflow, Greensboro, NC, or approved equal.

2.04 Bedding Materials for 4" Plastic Drain

- A. Aggregate Bedding Material: Fill Type B coarse aggregate as specified in Section 02223.

2.05 Filter Aggregate

- A. Filter Aggregate Materials: Fill Type C coarse aggregate as specified in Section 02223.

2.06 Accessories

- A. Pipe Coupling: Solid plastic (PVC) used with perforated piping as instructed by manufacturer.
- B. Filter Cloth: Water previous type, black polyolefin or polyester.

2.07 Effluent Header

- A. The effluent header shall consist of 2" solenoid valves, true unions, ball valves, check valves and 2" water meters.
- B. The solenoid valves shall be suitable for dirty water applications, solenoid operated, diaphragm, reverse flow globe type, with 200 psi CWP rating having NPT threads.
- C. Model: The solenoid valves shall be Weathermatic 11000 series or approved equal.
- D. The water meters shall be in-line helical axial turbine with maximum working pressure of 230 psi.

- E. The meter shall have magnetically driven sealed stainless steel registers, glass encapsulated and guaranteed against fogging due moisture. The flow meter shall produce a pulse output to be connected to SCADA System for remote monitoring.
  - F. Model: The water meters shall be Netafim turbine meters or approved equal.
  - G. Both the solenoid valves and water meters shall be removable using Schedule 80 PVC true unions and shut off valves.
  - H. The effluent header for EDF Site No. 2 shall be installed at the EDF per the design drawings.
  - I. The True Union Check Valve to be Sch. 80 PVC.
  - J. Model: The True Union Check Valve to be equal to Speers, True Union 2000 Industrial Ball Check Valve.
  - K. The True Union Ball Valve to be Sch. 80 PVC.
  - L. Model: The True Union Ball Valve to be equal to Speers, True Union 2000 Industrial Ball Valve.
- 2.08 Effluent Pressure Pipe
- A. Effluent pressure pipe and fittings shall be PVC, Sch. 40 conforming to Section 02733.
- 2.09 Secondary Distribution Box Globe Valves
- 1. Globe valve shall be constructed of heavy bodied PVC with double union nuts and designed to regulate flow.
  - 2. Globe valves shall be controlled with a polypropylene handle accessible in the distribution box.
  - 3. Globe valves shall be full bore bronze or brass and shall be rated for a minimum of 150 psi. Valves shall be 2-1/2" unless specified otherwise.
  - 4. Manufacturer: Globe valves shall be manufactured by Powell Valves, Nibco Valves, or equal.
- 2.10 Primary Distribution Box
- 1. Concrete distribution box with aluminum lids. See Plans.
  - 2. Distribution box shall be constructed of minimum 4,000 psi concrete.
- 2.11 Secondary Distribution Box
- A. The Secondary Distribution Box shall be equal to Old Castle Enclosure Solutions, Irrigation Market.
  - B. Body to be reinforced concrete with steel frame, Model No. 31" x 43", straight wall, Performance: H20, AASHTO M309.
  - C. Cover to be steel checker plate, flush 2 piece, Model # 28" x 40", Performance H20, AASHTO M309.
  - D. Box to have 12" gravel fill underneath walls and entire bottom of box.
- 2.12 Drip Tubing
- A. Pipe size and material shall be as specified on the approved design drawings, unless otherwise approved by the Owner and Engineer.

- B. Drip tubing shall be installed in accordance with the manufacturer's requirements and recommendations.
- C. Drip tubing shall be Geoflow, pressure compensating, or approved equal. Flow rate for emitters shall not exceed 0.6 GPH, with emitter spacing at 24" O.C.
- D. Filtration System
1. One automatic 4-filter disc filter rack shall be provided including all valves, fittings and filters.
  2. Filters shall be 2" Spin Kleen" filters, providing 100 (minimum) micron filtration as manufactured by Netafim, or approved equal.
- E. Drip Irrigation Control Panel
1. One drip irrigation control panel shall be provided to operate the filters, valves, pumps and dosing schedule including a PLC.
  2. Panel shall be mounted in a NEMA 4X stainless steel panel and include all necessary components for proper operation, adjustment and control. Panel shall have a single point power connection rated 480 volt, 3 phase with a minimum short circuit current rating of 25 KA, and shall be UL labeled.
  3. The PLC shall be capable of Modbus Serial Communications.
  4. Control panel shall be Model GE08-230-DUP-AUT series designed for the specification application as manufactured by Geoflow or approved equal. Must accommodate 7.5 HP pumps and 10 effluent zones designed for 12,000 gal/day/zone.
- F. Air/Vacuum Release Valves
1. Air Vent/Vacuum valves shall be located at the high point of each zone (mushroom top), and one air vent/vacuum relief valve shall be located on distribution header (Elbow top).
  2. Valves shall be Model APVBK100M (Mushroom Top) and APVBK100L (Elbow top) as manufactured by Geoflow, or approved equal.
- G. Pressure Relief Valves
1. Pressure relief valves shall be located for each zone or as shown on the Drawings.
  2. Pressure relief valves shall be Model PR-40 HF, 40-45 psi outlet pressure at 90 GPM (min.).
- H. Solenoid Valves
1. Each EDF zone shall have a solenoid valve located as shown on the Drawings. The solenoid shall be manufactured and installed in accordance with drip tubing provider's instructions and recommendations.
- I. Flow Meters
1. Each EDF zone shall have a flow meter located as shown on the Drawings. Flow meter shall be rated for use with wastewater and measure within range of designated pump flow. Flow meters shall have analog output to PLC.

- J. Pumps – See Section 11393.

**PART 3 EXECUTION**

3.01 Examination

- A. Verify existing conditions under provisions of Section 01039.  
B. Verify that sanitary sewer connection, size, location and invert are as indicated.

3.02 Installation - Conventional

- A. Install and join EDF in accordance with manufacturer's instructions.  
B. Place field pipe header at constant elevation as shown on Drawings.  
C. If installing 4" perforated pipe, insert a 16 ft. 2" x 4" into the pipe to maintain alignment both horizontally and vertically, then slide the 2" x 4" forward as the gravel backfill is added.  
D. Lay pipe to slope gradients noted on Drawings; with maximum variation from true slope of 1/8 inch in 10 feet.  
E. For perforated piping, place pipe with perforations facing down.  
F. Install pipe couplings as instructed by manufacturer.  
G. On 4" perforated pipe, install Type C coarse aggregate at sides, over joint covers and top of pipe. Provide top cover compacted minimum thickness of 12 inches.  
H. Place filter fabric over surface of aggregate cover prior to subsequent backfilling operations.  
I. Place aggregate in maximum 6 inch lifts, consolidating each lift to depth as shown on Drawings.  
J. Refer to Section 02223 for final backfill. Do not displace or damage pipe when compacting.

3.03 Installation – Drip Tubing

- A. Install supply piping, backflush piping, valves, drip tubing and flow meters in accordance with approved design drawings and manufacturer's requirements and recommendations.  
B. Drip tubing to be installed at a minimum depth of 9 inches and a maximum depth of 12 inches.  
C. Drip tubing is to be installed within boundaries as shown on design drawings.

3.04 Field Quality Control

- A. Field inspection and testing will be performed under provisions of Section 01400.  
B. Request inspection by Engineer prior to placing aggregate cover over piping.  
C. Compaction testing will be performed in accordance with ANSI/ASTM D698 and Section 01400.  
D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

- 3.05 Protection of Finished Work
- A. Protect finished Work under provisions of Section 01500.
  - B. Do not permit vehicular traffic over drainage field.

END OF SECTION

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