

SECTION 22 13 00

PACKAGED WASTEWATER GRINDER PUMPING STATIONS

PART 1 GENERAL

1.1 Summary

- A. Provide factory-fabricated wet well/dry well grinder-pump station to receive, grind, and pump sewage and domestic waste.
- B. Related Sections
 - 1. Section 01 33 00 Submittal Procedures
 - 2. Section 01 78 23 Operation and Maintenance Data
 - 3. Section 33 30 00 Wastewater Utilities

1.2 Submittals

- A. The following shall be submitted in accordance with Section 01 33 00:
 - 1. Product Data:
 - a. Manufacturer's shop drawings showing dimensions, material of construction, pump information including pump curves
 - b. The capacity-head curve should indicate efficiency, kW, bhp, and NPSHR.
 - c. Motor characteristic curves or tabulated data (test or calculated) should indicate the speed, power factor, efficiency, current, and kilowatt input, all plotted or tabulated against percent load as abscissas.
 - d. Wiring diagrams
 - e. Operating and maintenance manuals
 - 2. Manufacturer's Installation Instructions: Submit all manufacturers' instructions for pump installation, connection, and testing.
 - 3. Manufacturer's Certificate: Certify pumps meet or exceed specified requirements.

1.3 Quality Assurance

- A. Perform Work in accordance with relevant ANSI/HI standards and per manufacturer's instructions.
- B. Maintain one copy of each product document on site.

1.4 Warranty

- A. Furnish one-year manufacturer's warranty for all pumps and accessories included in this specification.

PART 2 PRODUCTS

2.1 Manufacturers

2.2 Basis of Design: E/One Model DH152

- A. Environment One Corporation (518) 346-6161
- B. Engineer-approved equal

2.3 Operating Conditions

- A. Expected operating conditions for each septic system are given below:

Location	Flow (gpm)	Total Dynamic Head (feet)
Terminal Building	11	20

- B. The electrical power source will be 120/240V, 1 Phase.
- C. The system shall be constructed as a duplex configuration.
- D. The dimensions, pump discharge size, and piping materials for connecting piping are shown on the Drawings.

2.4 Tank and Accessway

- A. Corrosion-resistant polymer construction (HDPE or FRP).
- B. Double-wall corrugated sections with smooth interior; minimum corrugation amplitude 1½ inches.
- C. Minimum single-wall thickness 0.250 inch where used.
- D. All seams thermally welded and factory-tested for water tightness.
- E. Designed to withstand saturated-soil and hydrostatic pressures (150% of maximum)

2.5 Grinder Pumps

- A. Two semi-positive-displacement pumps driven by 1 hp, 1,725 rpm, capacitor-start motors, 120/240 V, 60 Hz, 1-phase, Class F insulation, thermal overload protection

2.6 Electrical Quick Disconnect (EQD)

- A. NEMA 6P, factory-installed radial seals
- B. 32 feet (25 feet usable) six-conductor tray cable, direct burial rated

2.7 Alarm/Control Panel

- A. Sentry Protect Plus Duplex package, NEMA 4X enclosure, UL/CSA/CE/NSF listed
- B. Audible/visual high-level alarm, predictive status display, hour meter, cycle counter

PART 3 EXECUTION

3.1 Installation

- A. Install per manufacturer's instructions (IOM pages 2–5).
- B. Excavate to allow concrete ballast per Ballast Calculations (IOM pp. 11–14).
- C. Adjust accessway height in \leq 6-inch increments using factory extender kits.

3.2 Testing

- A. All system components shall be fully tested at the factory for proper operation. Audits indicating these tests were performed shall be recorded and kept on file.
- B. Once installed, the Contractor shall complete the start-up report furnished by the factory. A copy of this report shall be kept with the Owner's records and another shall be sent to the system's manufacturer.

3.3 Startup & Commissioning

- A. Demonstrate pump operation, high-level alarms, and EQD engagement.
- B. Provide O&M training and factory test certificates.

3.4 Warranty

- A. Standard warranty shall be 12 months from date of installation or 18 months from date of manufacture, whichever comes first.

END OF SECTION

SECTION 33 14 00

WATER UTILITIES

PART 1 GENERAL

1.1 Work Included

- A. Pipes, materials, and appurtenances for potable water systems.
- B. Installation

1.2 Related Work

- A. Section 31 23 16 - Excavation and Fill

1.3 References

- A. AWWA:
 - 1. C110-12: Ductile-Iron and Gray-Iron Fittings 3" through 48" for water and other liquids.
 - 2. C600-17: Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 3. C651-14: Disinfecting Water Mains.
 - 4. C700-20: Cold water meters - displacement type.
 - 5. C900-22: AWWA Polyvinyl chloride (PVC) pressure pipe, 4 in. through 12 in. for water transmission and distribution
 - 6. C901-20: Polyethylene (PE) Pressure Pipe and Tubing, 3/4 in. through 3 in. for Water Service
 - 7. C906-15: Polyethylene (PE) Pressure Pipe and Fittings, 4 in. through 65 in. for Waterworks
- B. ASTM:
 - 1. A370-23: Mechanical Testing of steel products.
 - 2. A536-84(2019)e1: Ductile iron castings.
 - 3. D1330-04(2015)e1: Rubber sheet gaskets.
 - 4. D1598-23: Test for time-of-failure of plastic pipe under long-term hydrostatic pressure.
 - 5. D4976-12a(2020) - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
 - 6. D2239-22 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR)
 - 7. D2122-22 – Standard Test Method Determining Dimensions of Thermoplastic Pipe and Fittings.
 - 8. D2239-22 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
 - 9. D2241-20 Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
 - 10. D2447-03 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter (Withdrawn without replacement)

11. D2513-20- Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
12. D2609-21 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
13. D2657-07(2023) - Standard Practice for Heat Fusion Joining Polyolefin Pipe and Fittings.
14. D2683-20 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
15. D2774-21a – Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
16. D2837-22– Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Bases for Thermoplastic Pipe Products.
17. D3035-22 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
18. D3350-21 - Standard Specification for Polyethylene Plastics Pipe and Fitting Materials.
19. F412-23 - Standard Terminology Relating to Plastic Piping System.
20. F1248-96(2002)E1 - Standard Test Method for Determination of Environmental Stress Crack Resistance (ESCR) of Polyethylene Pipe. (Withdrawn 2007)
21. E8/E8M-22: Standard Method for Tension testing for metallic materials.

C. Plastic Pipe Institute (PPI):

1. Handbook of Polyethylene Pipe.
2. TR-33, Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe.

1.4 Submittals

- A. The following shall be submitted in conformance with Section 01 33 00.
1. Product Data (pipe sizes, materials and fittings)
 2. Manufacturer's installation instructions.
 3. Manufacturer's catalog information.

1.5 General Requirements

- A. Pipes, fittings and materials to be new, of highest quality and shall be in excellent condition when installed.
- B. Pipe, fittings, and appurtenances of the same type and made by the same manufacturer.
- C. Provide labor, equipment, and materials for pipe field testing.
- D. Contact and coordination with utility's owner is the full responsibility of the Contractor.

1.6 Handling and Storage of Pipe and Appurtenances

- A. Pipe, valves, and other appurtenances shall, unless otherwise directed, be unloaded, hauled and laid as follows:

1. Pipe and appurtenances shall be lifted by hoists with broad well-padded contact surfaces, or rolled on skidways in such a manner to avoid shock.
 2. Under no circumstances shall pipe or appurtenances be dropped.
 3. Pipe must not be rolled or skidded against pipe already on the ground.
- B. The Contractor shall be responsible for the safe storage of material furnished by or to him and accepted by him, and intended for the work, until it has been installed in the completed project.
- C. Installation:
1. In distributing material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.
 2. Pipe shall be handled in a manner that only a minimum amount of damage to the pipe exterior will result. Damaged piping shall be repaired in a manner satisfactory to the Engineer or replaced.
 3. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt and foreign matter at all times.

1.7 Quality Assurance

- A. Ductile Iron:
1. Tests:
 - a. ASTM E8: Tension Testing of Metallic Materials.
 - b. ASTM E23: Impact Test.
 2. Marking: cast on each pipe length:
 - a. Weight, class, nominal thickness, and casting period.
 - b. Manufacturer's name, year of production and the letters "DI" or the words "Ductile Iron."
- B. Valves:
1. Valves shall be built and equipped for the type of operation shown on the Plans or as directed by the Engineer.
 2. All valves shall be of standard makes approved by the Engineer and shall have the name, monogram, or initials of the manufacturer cast thereon.

PART 2 PRODUCTS

2.1 Materials and Fabrication

- A. Polyethylene Products
1. Manufacturers:
 - a. ISCO Industries.
 - b. Polypipe, Inc.
 - c. Performance Pipe, Inc.
 - d. Substitutions: Permitted with the Engineer's approval.
 2. Polyethylene Pipe: Pipe shall be provided in diameters, pressure classes, and dimension ratios (DR) as shown on the plans and in accordance with ASTM D3035.

- a. HDPE pipe shall be manufactured from extra high molecular weight polyethylene pipe materials meeting the requirements of cell classification PE345464C Standard PE Code Designation PE3408 as defined by ASTM D3350.
 - b. Fittings: AWWA C901, C906, molded.
 - c. Joints: Butt fusion by a qualified technician, trained by an approved manufacturer's representative, and in accordance with the manufacturer's recommended procedures.
 3. Typical Material Physical Properties: All PE pipe and fitting materials shall meet these typical physical properties:
 4. HDPE Fittings:
 - a. The fittings shall be manufactured from the same cell class resin and fully pressure rated to the same pressure rating as the designed piping system.
 - b. Shall have a controlled outside diameter and produced to the SDR/DR rating for the pressure specified by the Engineer.
 - c. Shall be specifically manufactured to the standardized dimensions noted on the Drawings.
 - d. Where applicable, fittings shall meet the requirement of AWWA C906.
 - e. Butt fusion fittings shall be manufactured from the same material as the extruded pipe, shall be rated for the pressure service at least equal to that of the system pipe, and shall have outlets manufactured to the same DR as that of system pipe.
 - f. Molded fittings shall be manufactured in accordance with ASTM D3261.
 - g. Socket fittings shall be manufactured in accordance with ASTM D2683.
- B. Ductile Iron Pipe for Water Service:
 1. Pipe:
 - a. Ductile iron pipe shall meet ANSI/AWWA A21.51/C151 specifications:
 - 1) ANSI A21.51 (AWWA C151).
 - 2) ASTM A536, Grade 60-42-10.
 2. Fittings:
 - a. Ductile iron, ANSI A21.10 (AWWA C111).
 - b. ASTM A536, Grade 80-60-03 or 70-50-05.
 - c. Hydrostatic test: three times rated working pressure.
 3. Threaded connections: ANSI B2.1 NPT.
 4. Joints:
 - a. Mechanical: 350 psi working pressure.
 - b. Flange: DI; ANSI A21.14 or Bl6.1, 125 lb.
 - ~~c.~~ Gaskets: ASTM DI330, Grade I.
 - ~~e.d.~~ Bolts: ANSI/AWWA C111/A21.11
 - ~~d.e.~~ Push-on gaskets: neoprene or other synthetic rubber, D412 and D395. Natural rubber not acceptable.
 - ~~e.f.~~ Lubricant: Heavy vegetable soap solution suitable for potable water use.
 5. Flanged adapters:
 - a. Body: ASTM Class 30 cast iron.
 - b. Flanges: DI ANSI A21.15.
 - c. Bolts: Steel with heavy hex nuts, ASTM A576.

- d. Gaskets: Fastite neoprene.
- 6. Expansion Joints:
 - a. For flanged and slip-on ductile iron pipe: ASTM A36.
 - b. Gaskets: Fastite neoprene with lubricating rings.
 - c. Expansion joints shall be Redflex type J-1 as manufactured by the Red Valve Company, Inc. or approved equal.
 - 1) The expansion joints shall have a rubber inner tube, a body constructed of multiple plies of fabric impregnated with synthetic rubber, and a protective outer cover of synthetic rubber to provide resistance to deterioration from weather and ozone. Special covers shall be applied to resist weather, and ozone. Steel wire shall be imbedded in the body for additional strength. The elastomer and fabric material shall be determined by the temperature and chemical compatibility requirements.
 - 2) Flanges shall be constructed integrally with the body to resist stresses. Flanges shall be full-pattern so that gaskets are not necessary. Flanges shall be drilled to ANSI B16.5, Class 150#, or as specified. Retaining rings shall be Stainless Steel.
 - 3) The expansion joint shall be triple arch. Joint dimensions, movement, and spring rates for all variations shall follow Fluid Sealing Association guidelines. Joints shall be manufactured in the U.S.A.
 - 4) Number of Control Rods to be used shall follow manufacturers recommendations for required testing pressures. Required testing pressure covered in Section 3.2.B. of this specification.
- 7. Tapping Saddles:
 - a. Ductile iron with galvanized steel straps and rubber sealing gasket.
 - b. Pressure rating: 250 psi.
- C. Polyvinyl Chloride for Water Service
 - 1. Materials shall be inspected to verify that they meet these specifications and match the approved submittals. Materials not meeting these requirements shall not be permitted to be installed. Install all materials and equipment in strict accordance with the manufacturer's recommendations, applicable codes and regulations, and these specifications.
 - 2. The unloading, handling, and storage of the pipe and materials shall be conducted in a safe manner. Handle pipe with padding between metal machinery and pipe. Keep dirt and foreign material away from pipe interiors and sealing surfaces. Lower pipe carefully into the trench without dropping, rolling or dumping the pipe.
 - 3. General: Inspect all materials prior to installation to ensure that they are in new condition. Ensure that pipe, fittings and materials are free from defects and damage at the time of delivery and prior to installation in the trench. Plastic pipe with scratches, gouges, or grooves deeper than 10% of the wall thickness or ultraviolet discoloration shall be rejected. Remove all materials from site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications within 24-hours of discovery.

4. Pipe: All pipe shall be listed under the National Sanitation Foundation (NSF) Part 61. The standard pipe length shall be 20 feet. Each length of pipe shall be clearly marked with the following: Manufacturer, Nominal Pipe Size, PVC Cell Classification, Type PSM PVC Sewer Pipe, ASTM Designation and Pipe Class.
5. Polyvinyl Chloride Pipe (PVC): PVC pipe shall meet the requirements of NSF 14.
6. PVC Pipe and Fittings (2-inch): PVC pipe shall be SDR 21 (200 psi). Each joint of pipe shall carry the NSF seal of approval for pipes for potable water. Pipe shall conform to ASTM D2241 and ASTM D1784. Fittings shall be 2-inch SDR-21 gasketed fittings with the PVC material conforming to ASTM D1784, NSF 14, joints conforming to ASTM D3139, and gaskets (elastomeric seals) conforming to ASTM F477.
7. PVC Pipe and Fittings (4-inch to 12-inch): PVC pipe and joints shall conform to the requirements of ANSI/AWWA C900 DR 18 or C909 DR18 pressure class 235 (minimum), Standard for Polyvinyl Chloride (PVC) Pressure Pipe, with gaskets meeting ASTM F477 joints conforming to ASTM D3139, and gaskets (elastomeric seals) conforming to ASTM F477 or as otherwise defined on the Bid Schedule.

2.2 Appurtenances

A. Compression Joints:

1. For connections between flanged ductile iron pipe.
2. Gaskets: Fastite neoprene with lubricating rings.
3. Compression joints shall be style SB1-SGL braid as manufactured by Flexicraft, or approved equal.
 - a. The compression joints shall be capable of 1-inch of compression due to building settlement.
 - b. 8-inch braided metal compression joints shall be a minimum of 24 inches in length.
 - c. 4-inch braided metal compression joints shall be a minimum of 20 inches in length.
 - d. The core hose and end materials shall be stainless steel.

B. Resilient Wedge Gate Valves:

1. Size as shown on Drawings.
2. Mueller or Engineer approved equivalent.
3. Valves shall conform to AWWA C-509 and comply with its latest revisions.
4. The wedge shall be cast iron, fully encapsulated in molded rubber including the guides. The bronze stem nut must be rigidly enclosed in the wedge to maintain alignment.
5. The stem shall have two O-rings above and one O-ring below the collar. Stem seats must be replaceable with the valve under pressure.
6. The stem material shall be stainless steel (AISI420) or Engineer-approved equivalent.
7. The waterway shall be full size to allow for tapping use; no cavities or depressions are permitted in the seat area.

8. Valve body and bonnet shall be electrostatically applied, fusion bonded and epoxy coated, both inside and out, by the valve manufacturer. The coating shall meet the requirements of AWWA C-550. Coating to be applied only at the valve manufacturer's facilities.
 9. The bonnet bolts shall not be exposed to the environment or, alternatively, be in 316 stainless steel.
 10. O-ring style seals shall be used as gaskets on the bonnet and on the stuffing box.
 11. All valves must be tested by hydrostatic pressure equal to the requirements in the AWWA C-509 specifications prior to shipment from the manufacturer.
 12. 2-inch AWWA operating nut for valves in below-ground service; handwheel for aboveground service.
 13. Mechanical joint ends for pipe or as shown on drawings.
- C. Check Valves:
1. Manufacturer: Valmatic or Engineer-approved equal.
 - a. 4-inch and larger: ductile iron body, Buna-N with alloy steel and nylon reinforcement disc, ASTM A666 T302 disc accelerator, mechanical indicator, ANSI class 125 flanged ends.
 - b. 250 psi working pressure.
 - c. 4-inch model 7204.
 - d. 8-inch model 7208.
- D. Air Pressure and Vacuum Relief Valves:
1. Cast iron body, cover and baffle; stainless steel trim and float.
 2. Sized for up to 250 gpm; 0 - 250 psi.
 3. Seat: Buna-N.
 4. 3-inch and smaller: NPT threaded outlet.
 5. 4-inch and larger: Plain outlet with steel protector hood.
 6. Val-Matic, Crispin or Engineer-approved equivalent.
- E. Valve Boxes:
1. Cast iron, adjustable extension, traffic type.
 2. Minimum thickness of metal at any point: 3/16 inch.
 3. Removable cast iron cover.
 4. All valve boxes for plug valves shall be designed for integral installation of the required valve position indicator.
 5. Cast iron boxes: Factory painted inside and out with manufacturer's recommended asphalt paint.
 6. Cover marked "Water."
- F. Gauges:
1. All gauges shall be 3 inches in diameter.
 2. Each gauge shall be installed with block and bleed valves, and with a snubber and dielectric coupling.
 3. Range shall be 0 to 150 psi unless otherwise noted
- G. Flow Meters:
1. Magmeters shall be ABB Water Master or Engineer-approved equal.

- H. Pressure Transmitter
 - 1. Manufacturer: ABB or Engineer approved equal.
 - 2. Model: 261GSDKB52H
 - 3. The transmitter shall utilize a 4 – 20 mA signal for communication.
- I. Locator Tape:
 - 1. Tape shall be 6 inches wide and shall consist of one layer of metalized foil laminated between two layers of inert plastic film.
 - 2. Laminated bonding that can be separated by hand is not acceptable.
 - 3. Tape shall be a minimum of 5 mils thick with a minimum tensile strength of 84 lb per 3-inch width strip.
 - 4. Tape shall be imprinted with a continuous warning message repeated a minimum of every 30 inches as follows:
 - a. Blue colored tape: Caution Water line Buried Below
 - 5. Tape shall be inductively locatable and conductively traceable using standard pipe and cable locating device for a minimum of 8 years after direct burial.
 - 6. Test results showing a minimum of 8 years life and full compliance of these specifications and a sample of the tape may be required to be furnished to the Taos County Right-of-Way Administrator.
- J. Tracer Wire
 - 1. Manufacturer: Copperhead Industries, LLC. Or Agave Wire LTD
 - a. 10 AWG copper clad steel wire or 10 AWG solid copper wire.
 - b. Minimum 261-lb break load with 30 mil high molecular weight polyethylene jacket, blue color, or approved equal.
 - c. Test stations shall be Snake Pit Magnetized Tracer Boxes (or engineer approved equal).
 - d. Tracer box shall be rated for heavy traffic.
 - e. Tracer wire shall be properly grounded at all dead ends/stubs using drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 red HDPE insulated copper clad steel wire connected to anode (min 0.5 lb), specifically manufactured for this purpose.
- K. Sentry Posts:
 - 1. Metal posts.
 - 2. Water pipeline warning sign.
 - 3. Color: blue.
- L. Hangers and Supports
 - 1. Bolts:
 - a. Carbon steel: ASTM A307
 - b. Galvanized steel:
 - 1) Carbon steel, hot-dip galvanized, ASTM A153
 - 2) Zinc Plates, ASTM A164 type GS.
 - 2. Nuts:
 - a. Same material as bolts
 - b. Carbon steel: ASTM 307, Grade B, heavy hexagonal.
 - c. Self-locking: prevailing torque, IFI-100, Grade A.
 - 3. Washers:

- a. Same material as bolts
- b. Flat: ANSI B27.2.
- c. Locking: spring-type, ANSI B27.1.
4. Pipe rollers and supports
 - a. B-Line System Inc. product as shown on plans or Engineer approved.

M. Yard Hydrants

1. Type: Freezeless yard hydrant with automatic drain-back feature
2. Inlet Connection: $\frac{3}{4}$ inch NPT or 1 inch NPT, brass
3. Outlet Connection: $\frac{3}{4}$ inch hose thread with anti-siphon vacuum breaker (where required by code), brass
4. Operation:
 - a. Handle and screw
 - b. Self-draining design to prevent freezing when closed
5. Rod: Galvanized steel or stainless steel
6. Pipe: Galvanized steel pipe, minimum Schedule 40
7. Valve Body: Cast iron or bronze construction with corrosion-resistant finish
8. Depth of Bury: As indicated on plans; minimum 3 feet
9. Approvals: NSF/ANSI 61 and 372 listed for potable use

N. Fire Hydrants:

1. Latest revision of AWWA C-502.
2. Mueller A423 Super Centurion 200 or Engineer-approved equivalent.
3. $1\frac{1}{2}$ -inch Pentagon bronze operating nut equipped with elastomer weather seal between the top casting and the operating nut.
4. Sealed oil reservoir will inmate a system of ford lubrication of the thrust collar area each time the hydrant is operated.
5. Two 2.5-inch and one 4.5-inch nozzles with National Standard fire hose threads mechanically connected into the barrel, O-ring sealed with National Standard nozzle caps.
6. Steel safety stem coupling with stainless steel fasteners and two-piece breakaway safety flange.
7. Centerline of hose nozzle will be a minimum of 18 inches above ground line.
8. $5\frac{1}{4}$ -inch-diameter main valve opening.
9. Upper valve plate shall be all bronze.
10. All internal surfaces of the shoe, the lower valve plate and cap nut shall be coated with a factory-applied, two-part, thermosetting epoxy coating with a minimum thickness of 4 mil.
11. The bronze valve seat shall be threaded into a bronze drain ring or shoe bushing; the drain channel shall be all bronze.
12. The hydrant shall have two drain outlets above the lower flange of the hydrant shoe assembly.
13. 200 psi working pressure, and be certified as such by the manufacturer.
14. Lower barrel to shoe connection will have a minimum of six bolts made of stainless steel.
15. All hydrants furnished will have a standard 10-year warranty certified by the manufacturer.
16. Painted chrome yellow.

~~16,17. One Manufacturer's hydrant wrench supplied with each hydrant installed~~
~~17. One Manufacturer's hydrant wrench supplied with each hydrant installed.~~

2.3 Corrosion Protection

A. Ductile Iron:

1. Outside coating:
 - a. Bituminous, ANSI/AWWA C110, approximately 1 mil thick.
 - b. Strongly adherent to complete exterior of pipe.
 - c. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun.
2. Inside coating: Cement lined, in accordance with AWWA C-104.
3. Polyethylene encasement:
 - a. ANSI A21.5 Seamless tube black, ASTM D1248.
 - b. Type I, Class C, Grade G-1.
 - c. Thickness: Min. 8 mil.
 - d. Joint tape: Self-sticking PVC, 10 mil thick.
 - e. Strapping: Non-metallic, water resistance FS PPP-S-760.
 - f. Buried ductile iron pipe where scheduled.
4. Hangers and Supports
 - a. Per drawings and details.

PART 3 EXECUTION

3.1 Installation

A. General:

1. Install as indicated on Drawings and AWWA C600: Installation of Ductile-Iron Water Mains and Their Appurtenances and AWWA C605: Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
2. Excavation and Backfilling: Section 31 23 16.
3. Pipe Cutting:
 - a. Pipe cutting measurement taken at site.
 - b. Cutting of pipe or inserting valves, fittings, or closure pieces shall be done in a neat and workman like manner without damage to the pipe.
4. Direction of Bells:
 - a. Unless otherwise directed, pipe shall be laid with bell ends facing the direction in which work is progressing.
 - b. Pipe laid on an appreciable slope shall be laid with bell ends facing uphill.
5. Pipe Plugs: At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer.
6. Pipe Cleanliness:
 - a. Clean all pipe, fittings, and appurtenances before use.
 - b. Foreign materials or objects shall be prevented from entering the pipe while it is placed in the trench.

7. Temporarily support, adequately protect and maintain all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of work.
- B. Pipe Alignment and Grade
1. All pipe shall be laid and maintained to the required lines and grades; with fittings and valves at the required locations, with joints centered and spigots home; and with all valve stems plumb.
 2. Deviations:
 - a. Wherever existing utility structures or branch connections leading to main sewers or to main drains, or other conduits, ducts, pipes or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated, or reconstructed by the Contractor through cooperation with the owner of the utility, structure, or obstruction involved.
 - b. No deviation shall be made from the required line or grade except with the written consent of the Engineer.
 - c. The Contractor shall make all necessary explorations to determine the location of existing pipes, valves, or other underground structures. The Owner and Engineer shall furnish all available information; however, such information cannot be guaranteed as accurate.
 3. Depth of Bury:
 - a. Depth of bury shall be as shown in the Plans.
 - b. Minimum depth of bury is measured from the established road grade or the surface of the permanent improvement to the top of the barrels of the pipe.
- C. Pipe Laying:
1. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work.
 2. All pipe fittings, valves and hydrants shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and protective coatings and linings.
 3. Under no circumstances shall water main materials be dropped into trench.
 4. Trench shall be dewatered prior to installation of pipe.
- D. Tracer Wire:
1. Test stations shall have a minimum spacing of 500 feet.
 2. All tracer wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the tracer wire connection and the terminal for the grounding anode wire connection. Trace wire access boxes shall be provided with an adequate number of terminals for each location.
 3. Tracer wire shall be securely attached to top center of PVC piping at 6-foot intervals using tape or zip ties.
 4. Tracing wire shall be installed in the same trench as pipe during installation. The wire shall be securely bonded at all wire joints with an approved watertight connector to provide electrical continuity, and it shall be accessible at all trace wire access points.

5. Tracer wire shall be laid flat and securely affixed to the pipe at all joints and the middle of the pipe. The wire shall be protected from damage during construction, and no breaks or cuts in the tracer wire or the tracer wire insulation shall be permitted.
 6. Test stations shall be installed on the north or east side of valves.
 7. Test stations shall not be recessed into cast-in-place concrete and should have positive drainage from lids.
 8. The grounding anode at dead ends /stubs shall be installed in a direction 180 degrees opposite the tracer wire, at the maximum possible distance.
 9. Do not coil excess wire from grounding anode. Trim the wire prior to connecting to tracer wire with a mainline to lateral lug connector.
 10. Where the anode wire will be connected to a trace wire access box, a minimum of 18-inches of excess/slack wire is required after meeting the final elevation.
- E. Jointing and Assembling:
1. Joints shall be installed in accordance with the manufacturer's written Installation and Operation Manual and approved submittals.
 2. Lubricants: Plant based soap solution suitable for use in potable water systems.
 3. Take care to prevent entrance of soil and other contaminants.
 4. All lumps, blisters, burrs or excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any other foreign materials.
- F. Clean all lines by repeated flushing after installation.
- G. Disinfection: Per AWWA C651-14.
- H. Pipe Sleeves:
1. For all pipes passing through concrete or masonry.
 2. Install where practical before concrete is placed.
 3. Sleeve seal: watertight, modular sealing element when sleeve is placed in slabs with one side against soil.
- I. Joint restraint:
1. Joints shall be restrained at all tees and fittings, per the drawings.
 2. Concrete thrust blocks are acceptable where mechanical restraints are not practical.
 3. All aboveground piping and appurtenances shall be restrained or connected by flanges.
 4. Install blocking so joints are accessible for repair.
- J. Valves: Installed as shown on Drawings with valve boxes and blocking as necessary.
- K. Hangers and Supports
1. Workmanship and materials shall conform to the New Mexico State Highway and Transportation Department's Standard Specifications for Highway and Bridge Construction, 2000 Edition or Latest Edition, and Special Provisions.

2. All associated hardware shall be hot dipped galvanized fabrication in accordance with ASTM A123.
3. All associated hardware shall be B-Line products or Engineer approved equal.
4. Install rods from top of deck. Prior to placing rod, the holes shall be thoroughly cleaned of dust, drilling debris and other deleterious materials. Holes shall be saturated with water, and shall have all free water removed and dried to a saturated surface dry condition. (NMSHTD section 523.33)
5. Grout rods in cored holes with neat cement grout (NMSHTD section 523.22) or mortar (NMSHTD section 523.21)
6. After curing, give washer plates, tops of rods, washers and double nuts one coat of zinc primer. Then run a bead of silicon sealer around the perimeters of the steel washers plates. The deck surface and the surface of the plates shall be clean before applying the silicon sealer

3.2 Field Quality Control

- A. All pipes and fittings tested in the presence of and to the satisfaction of the Engineer. AWWA C600 and C605 should be followed for proper pipe installation procedures and hydrostatic testing methods.
- B. Test Conditions (PVC):
 1. Medium: Water.
 2. Perform test at 150 psi for one hour per 1,000 linear foot of pipe or 2 hours minimum.
- C. Testing Equipment:
 1. Pressure gauge used to perform pressure test shall be a digital type gauge with the ability to display testing pressure to one hundredth (0.01) of a psi. The pressure gauge shall be rated for at least the required testing pressure.
 2. All equipment for use in supplying water for the testing procedure shall be for potable water use only. A suitable amount of chlorine should be added to the storage device in order to disinfect such device. Prior notice will be given to engineer of method used for supplying water for testing.
 3. When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check-valve assembly between the test and supply main, or by other means approved by the Engineer.
 4. All testing equipment is subject to and shall be disinfected per AWWA 651 prior to any test. All equipment must pass a bacteriological test prior to being placed in service.
- D. Procedure (HDPE):
 1. Disconnect fixtures, equipment and accessories that may be damaged by test pressure.
 2. Plug ends as required.
 3. Water shall be applied by means of a pump connected to the pipe in a satisfactory manner.
 4. All air shall be expelled from the pipe prior to pressure testing.

5. No installation will be accepted unless the leakage is less than the number of gallons per hour as determined by the following formula:

$$L = (N D P_y) / 7,400$$

where: L = allowable leakage in gallons per hour.

N = number of joints in pipeline tested.

D = nominal diameter of pipe in inches.

P = test pressure, psi.

6. Leakage shall be defined as the quantity of water that must be supplied into the pipe section being tested to maintain a pressure within 5 psi of the specified leakage-test pressure after the pipe has been filled with water and the air in the pipeline has been expelled.
7. All joints showing visible leaks shall be properly repaired. Any cracked or defective pipes, fittings, valves, or hydrants discovered in consequence of this pressure test shall be removed and replaced by the Contractor with sound material, and the test repeated.
8. Retest repaired joints, pipes, and fittings until system is tight and test results are satisfactory to the Engineer.
9. Pipe testing and preparation for use should strictly follow AWWA C605 Section 7: Preparation for use.
10. Ductile Iron pipe hydrostatic pipe testing shall be done in accordance with section C600: Installation of Ductile-Iron Water Mains and Their Appurtenances. Previously described procedures for hydrostatic testing is for Polyvinyl Chloride (PVC) pipe only.

3.3 Pipe Schedule

- A. Ductile Iron Pipe:
 1. Pipe sizes 3-inch through 12-inch, pressure class 350 psi.
 2. Flanged connections
- B. Repair and/or replacement of existing water lines damaged during construction: Material generally to match existing or at least quality required by this section.
- C. Provide sizes as shown on the Drawings and as provided for in the Bid Schedule.

~~3.4 Valve Schedule~~

<u>Valve ID</u>	<u>Valve Type</u>	<u>Material</u>	<u>Size, inches</u>	<u>Number of Valves</u>
BV-101	Ball Valve	PVC	1	20
BV-201	Ball Valve	PVC	2	9
GV-301	Gate Valve	DI	3	4
GV-401	Gate Valve	DI	4	3
CV-401	Cheek Valve	DI	4	1
GV-601	Gate Valve	DI	6	2
CV-601	Cheek Valve	DI	6	1
GV-801	Gate Valve (in building)	DI	8	1
GV-802	Gate Valve (buried)	DI	8	45

CAV-801	Combination Air/Vacuum Relief	DI	8	12
ACV-801	Altitude Control Valve	DI	8	1
GV-1001	Gate Valve	DI	10	2

3.53.4 Demonstration

- A. Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineer's representative. If the trace wire is found to be not continuous after testing, the Contractor shall repair or replace the failed segment of the wire. Passing test results shall be provided for all pipe segments within the Engineer of Record's as-built data and plan set.

END OF SECTION

SECTION 33 30 00

WASTEWATER UTILITIES

PART 1 GENERAL

1.1 Section Includes

- A. Septic tank, grinder pumps, wastewater piping, fittings, and appurtenances.

1.2 Related Work

- A. Section 31 23 16 Excavation and Backfill
- B. Section 33 30 00 Wastewater Utilities
- C. Section 33 32 13 Packaged Wastewater Pumping Stations

1.3 Submittals

- A. The following shall be submitted in conformance with Section 01 33 00.
 - 1. Product Data (septic tank, pipe sizes, pumps, assemblies, materials and fittings)
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's catalog information.

1.4 General Requirements

- A. Pipes, pumps, fittings, and materials to be new, of highest quality and shall be in excellent condition when installed.
- B. Pipe, pumps, fittings, and appurtenances of the same type and made by the same manufacturer.
- C. Provide labor, equipment and materials for pipe field testing.
- D. Contact and coordination with utility's owner is the full responsibility of the Contractor.
- E. All products and work will meet the requirements of New Mexico Administrative Code (NMAC) 20.7.3 – Liquid Waste Disposal and Treatment.

1.5 Handling and Storage of Pipe and Appurtenances

- A. Pipe, valves, and other appurtenances shall, unless otherwise directed, be unloaded, hauled and laid as follows:
 - 1. Pipe and appurtenances shall be lifted by hoists with broad well-padded contact surfaces, or rolled on skidways in such a manner to avoid shock.
 - 2. Under no circumstances shall pipe or appurtenances be dropped.
 - 3. Pipe must not be rolled or skidded against pipe already on the ground.
- B. The Contractor shall be responsible for the safe storage of material furnished by or to them and accepted by them, and intended for the work, until it has been installed in the completed project.

- C. Installation:
1. In distributing material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.
 2. Pipe shall be handled in a manner that only a minimum amount of damage to the pipe exterior will result. Damaged piping shall be repaired in a manner satisfactory to the Engineer or replaced.
 3. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt and foreign matter at all times.

PART 2 PRODUCTS

2.1 Septic Tanks

- A. Septic tanks shall be manufactured by a manufacturer approved by the New Mexico Environment Department Liquid Waste Bureau, and tanks shall meet all the requirements listed in NMAC 20.7.3.502.
- B. Septic tanks shall be rated for at least incidental traffic loading, H10.
- C. Septic tank shall have a 2,500-gallon capacity and installed as shown on the Drawings.
- D. Manufacturer shall be Albuquerque Vault Company or Engineer approved equivalent.

2.2 Sanitary Sewer Piping

- A. PVC Pipe
1. ASTM D1785, PVC 1120, Type I, Gr. 1, Cell Classification 12454, Schedule 40 or ASTM D2241 PVC (SDR Series) Cell Classification 12454 per drawings
 2. Fittings: ASTM D2467 PVC plastic pipe fittings Schedule 40
 3. Fittings: ASTM D2672 Joints for IPS PVC Pipe Using Solvent Cement
 4. Solvent ASTM D2564
 5. Location: below grade
 6. Size: as shown on Drawings
- B. PVC Fittings
1. Push on or threaded
 2. Match pipe material
- C. HDPE Piping
1. Manufacturers:
 - a. ISCO Industries.
 - b. Polypipe, Inc.
 - c. Performance Pipe, Inc.
 - d. Substitutions: Permitted with the Engineer's approval.
 2. Polyethylene Pipe: Pipe shall be provided in diameters, pressure classes, and dimension ratios (DR) as shown on the plans and in accordance with ASTM D3035. Also:
 - a. HDPE pipe shall be manufactured from extra high molecular weight polyethylene pipe materials meeting the requirements of cell

classification PE345464C Standard PE Code Designation PE3408 as defined by ASTM D3350.

- b. Fittings: Molded.
- c. Joints: Butt fusion by a qualified technician, trained by an approved manufacturer's representative, and in accordance with the manufacturer's recommended procedures.
- 3. Typical Material Physical Properties: All PE pipe and fitting materials shall meet these typical physical properties:
- 4. HDPE Fittings:
 - a. The fittings shall be manufactured from the same cell class resin and fully pressure rated to the same pressure rating as the designed piping system.
 - b. Shall have a controlled outside diameter and produced to the SDR/DR rating for the pressure specified by the Engineer.
 - c. Shall be specifically manufactured to the standardized dimensions noted on the Drawings.
 - d. Where applicable, fittings shall meet the requirement of AWWA C906.
 - e. Butt fusion fittings shall be manufactured from the same material as the extruded pipe, shall be rated for the pressure service at least equal to that of the system pipe, and shall have outlets manufactured to the same DR as that of system pipe.
 - f. Molded fittings shall be manufactured in accordance with ASTM D3261.
 - g. Socket fittings shall be manufactured in accordance with ASTM D2683.

2.3 Ball Valves (Plastic)

- A. Manufacturer: Spears True Union 2000
 - 1. Example Part Number: 1829-005 (½-inch Socket/ASME B1.20.1 threads; EPDM)
- B. Description: Thermoplastic ball valves: True Union 2000 Industrial type manufactured to ASTM F1970 and constructed from PVC Type I, ASTM D1784 Cell Classification 12454 or CPVC Type IV, ASTM D1784 Cell Classification 23447. O-rings: EPDM or Viton®. Safe-T-Shear® stem with double O-ring stem seals. Polypropylene valve handles with built-in lockout mechanism. Valve union nuts with Buttress threads. Safe-T-Blocked® seal carriers. All valve components shall be replaceable.
- C. Rating: All ½-inch through 2-inch valves shall be pressure rated to 235 psi, all 2½-inch through 8-inch venturied, and all flanged valves shall be pressure rated to 150 psi for water at 73°F.
- D. Assembly Methods: welded or ASME B1.20.1 threads

2.4 Gate Valves

- A. AWWA C509 resilient wedge gate valve.
- B. Valves shall conform to the latest version of AWWA Standard C-509 covering Resilient Seated gate Valves for Water Supply Service.

- C. The valves shall have a cast iron body, bonnet and wedge. The wedge shall be totally encapsulated with rubber.
- D. The sealing rubber shall be permanently bonded to the wedge to meet ASTM tests for rubber metal bond ATSM D249.
- E. Valves shall be supplied with O-Ring seals at all joints (no gaskets are used in the valve design).
- F. The valves shall be rising stem, opening by turning left, and provided with 2-inch square operating nut.
- G. Waterway shall be smooth, unobstructed and free of all pockets, cavities, and depressions in the seat area. Valves shall accept a full-size tapping cutter.
- H. The body, bonnet and stuffing plate shall be coated with fusion bonded epoxy, both interior and exterior on body and bonnet. Epoxy shall be applied in accordance with AWWA C550 and be NSF 61 NSF372 certified. PIV plates shall be painted black.
- I. Each valve shall have a maker's name, pressure rating, and year in which it was manufactured cast in the body. Prior to shipment from the factory, each valve shall be tested by hydrostatic pressure equal to requirements of both AWWA and UL/FM.
- J. All internal parts shall be accessible without removing the body from the line.
- K. Valves shall be assembled in the USA and shall be manufactured by Mueller Company or equal.

2.5 Air Release Valve

- A. Manufacturer:
 - 1. Val-Matic or
 - 2. Engineer-approved equal
- B. Pressure rating up to 150 psi
- C. NPT inlets/outlets
- D. Body:
 - 1. 2-inch NTP cleanout
 - 2. 1-inch NPT drain connections
 - 3. ASTM A126 Class B cast iron
- E. Vault:
 - 1. Pre-fabricated fiberglass vault, anti-float if not in the roadway. Concrete vault if in the roadway.
 - 2. 4-foot diameter round basin, 4 feet deep
 - 3. 2-inch drain in the bottom center
 - 4. 48-inch fiberglass cover with 2-inch mushroom vent

2.6 Valve Boxes:

- A. Cast iron, adjustable extension, traffic type.

- B. Minimum thickness of metal at any point: 3/16 inch.
- C. Removable cast iron cover.
- D. For valves on wash water and irrigation system only: Class 200 PVC pipe.
- E. All valve boxes for plug valves shall be designed for integral installation of the required valve position indicator.
- F. Cast iron boxes: Factory painted inside and out with manufacturer's recommended asphalt paint.

2.7 Wastewater Treatment Effluent Flow Meter

- A. Toshiba 2" Electromagnetic Flowmeter (Model #2"-GF632) or Engineer-approved equal.
- B. Manufacturer: Ultra Mag or Engineer-approved equal
- C. Basis of Design: 02-1SME-HL
- A-D. The meter shall have a 0.5% accuracy rating. It shall be meant for wastewater and not impede flow. The meter shall have a 2-year warranty.

PART 3 EXECUTION

3.1 Examination

- A. Verify excavations are to required grade. Do not overexcavate.

3.2 Installation

- A. General:
 - 1. Excavation and Backfilling: Section 31 23 16.
 - 2. Pipe Cutting:
 - a. Pipe cutting measurements taken at site.
 - b. Cutting of pipe or inserting valves, fittings, or closure pieces shall be done in a neat and workman like manner without damage to the pipe.
 - 3. Pipe Plugs: At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer.
 - 4. Pipe Cleanliness:
 - a. Clean all pipe, fittings, and appurtenances before use.
 - b. Foreign materials or objects shall be prevented from entering the pipe while it is placed in the trench.
 - 5. Temporarily support, adequately protect and maintain all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of work.
- B. Pipe Alignment and Grade
 - 1. All pipe shall be laid and maintained to the required lines and grades; with fittings and valves at the required locations, with joints centered and with all valve stems plumb.

2. Deviations:
 - a. Wherever existing utility structures or branch connections leading to main sewers or to main drains, or other conduits, ducts, pipes or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated, or reconstructed by the Contractor through cooperation with the owner of the utility, structure, or obstruction involved.
 - b. No deviation shall be made from the required line or grade except with the written consent of the Engineer.
 - c. The Contractor shall make all necessary explorations to determine the location of existing pipes, valves, or other underground structures. The Owner and Engineer shall furnish all available information; however, such information cannot be guaranteed as accurate.
 3. Depth of Bury:
 - a. Depth of bury shall be as shown in the Plans.
 - b. Minimum depth of bury is measured from the established road grade or the surface of the permanent improvement to the top of the barrels of the pipe.
- C. Pipe Laying:
1. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work.
 2. All pipe fittings and valves shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and protective coatings and linings.
 3. Under no circumstances shall water main materials be dropped into trench.
 4. Trench shall be dewatered prior to installation of pipe.
- D. Tracer Wire:
1. Test stations shall have a minimum spacing of 500 feet.
 2. All tracer wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the tracer wire connection and the terminal for the grounding anode wire connection. Tracer wire access boxes shall be provided with an adequate number of terminals for each location.
 3. Tracer wire shall be securely attached to top center of piping at 6-foot intervals using tape or zip ties.
 4. Tracing wire shall be installed in the same trench as pipe during installation. The wire shall be securely bonded at all wire joints with an approved watertight connector to provide electrical continuity, and it shall be accessible at all tracer wire access points.
 5. Tracer wire shall be laid flat and securely affixed to the pipe at all joints and the middle of the pipe. The wire shall be protected from damage during construction, and no breaks or cuts in the tracer wire or the tracer wire insulation shall be permitted.
 6. Test stations shall be installed on the north or east side of valves.
 7. Test stations shall not be recessed into cast-in-place concrete and should have positive drainage from lids.
 8. The grounding anode at dead ends /stubs shall be installed in a direction 180 degrees opposite the tracer wire, at the maximum possible distance.

9. Do not coil excess wire from grounding anode. Trim the wire prior to connecting to tracer wire with a mainline to lateral lug connector.
10. Where the anode wire will be connected to a trace wire access box, a minimum of 18 inches of excess/slack wire is required after meeting the final elevation.

E. Jointing and Assembling:

1. Joints shall be installed in accordance with the manufacturer's written Installation and Operation Manual and approved submittals.
2. Take care to prevent entrance of soil and other contaminants.
3. All lumps, blisters, burrs or excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any other foreign materials.

F. Wastewater Treatment Effluent Flow Meter: Installed per manufacturer's instructions.

1. Flow meter shall be tested for at least 6 dosing cycles prior to install.

3.3 Field Quality Control

A. Test Conditions (PVC):

1. Medium: Water.
2. Perform test at 150 psi for one hour per 1,000 linear foot of pipe or 2 hours minimum.

B. Testing Equipment:

1. Pressure gauge used to perform pressure test shall be a digital type gauge with the ability to display testing pressure to one hundredth (0.01) of a psi. The pressure gauge shall be rated for at least the required testing pressure.
2. All equipment for use in supplying water for the testing procedure shall be for potable water use only. A suitable amount of chlorine should be added to the storage device in order to disinfect such device. Prior notice will be given to engineer of method used for supplying water for testing.
3. When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check-valve assembly between the test and supply main, or by other means approved by the Engineer.
4. All testing equipment is subject to and shall be disinfected per AWWA 651 prior to any test. All equipment must pass a bacteriological test prior to being placed in service.

C. Procedure (HDPE):

1. Disconnect fixtures, equipment and accessories that may be damaged by test pressure.
2. Plug ends as required.
3. Water shall be applied by means of a pump connected to the pipe in a satisfactory manner.
4. All air shall be expelled from the pipe prior to pressure testing.
5. No installation will be accepted unless the leakage is less than the number of gallons per hour as determined by the following formula:

$$L = (N D P_y)/7,400$$

where: L = allowable leakage in gallons per hour.

N = number of joints in pipeline tested.

D = nominal diameter of pipe in inches.

P = test pressure, psi.

6. Leakage shall be defined as the quantity of water that must be supplied into the pipe section being tested to maintain a pressure within 5 psi of the specified leakage-test pressure after the pipe has been filled with water and the air in the pipeline has been expelled.
7. All joints showing visible leaks shall be properly repaired. Any cracked or defective pipes, fittings, valves, or hydrants discovered in consequence of this pressure test shall be removed and replaced by the Contractor with sound material, and the test repeated.
8. Retest repaired joints, pipes, and fittings until system is tight and test results are satisfactory to the Engineer.

3.4 Demonstration

- A. Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineer's representative. If the trace wire is found to be not continuous after testing, the Contractor shall repair or replace the failed segment of the wire. Passing test results shall be provided for all pipe segments within the Engineer of Record's as-built data and plan set.

END OF SECTION

SECTION 33 34 00

ON-SITE WASTEWATER DISPOSAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Installation of septic
 - 2. Installation of low-pressure distribution field
 - 3. Pressure piping, orifices, and flushing assemblies.
 - 4. Inspection ports and cleanouts.

1.2 REFERENCES

- A. ASTM C33 – Standard Specification for Concrete Aggregates
- B. ASTM D1785 – Standard Specification for PVC Plastic Pipe, Schedules 40, 80
- C. ASTM D2241 – Standard Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe
- D. ASTM D2321 – Standard Practice for Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

PART 2 PRODUCTS

2.1 SEPTIC TANK

- A. Polyethylene or concrete, 2-chamber, IAPMO-approved, with integral inlet and outlet filters
- B. Sized as shown on the Drawings
- C. Septic tanks shall be rated for traffic loading, H-20.
- D. Septic tank shall be of 2,500-gallon capacity or as shown on the Drawings.

2.2 PRESSURE LATERAL PIPING

- A. Pipe: PVC, Schedule 40, ASTM D1785 or SDR-21 per ASTM D2241
 - 1. Diameter: 1-1/4 inch or 2 inch as specified on plans.
 - 2. Perforated with factory or field-drilled orifices 1/8-inch diameter at 5-foot spacing.
 - 3. Fittings: Schedule 40 PVC or solvent-welded fittings suitable for pressure systems.
 - 4. Orifices:
 - a. Drill clean, burr-free holes on bottom of pipe (6 o'clock).
 - b. Include orifice shields or gravel covers to prevent clogging.

2.3 MANIFOLD AND BLOW-OFF PIPE

- A. Supply and return manifolds: PVC Schedule 40 or SDR-21.
- B. Blow-off pipe
 - 1. Ball valve with union.
 - 2. Access riser to grade with secure cap.

2.4 CLEANOUTS AND INSPECTION PORTS

- A. PVC risers, 2-inch or 4-inch diameter as required.

B. Secure, removable caps at grade

2.5 Plastic Irrigation-Style Boxes

A. Manufacturers:

- 1. NDS, Inc.
- 2. Carson Industries
- 3. Fernco
- 4. Or Engineer-approved equal

B. Body and Lid:

- 1. High-density polyethylene (HDPE), UV-resistant
- 2. Color: green
- 3. Structural load rating per ASTM D 638, minimum 3,000 psi tensile strength

C. Flush Mounting:

- 1. Designed to sit flush with finished grade; provide adjustable collar or riser
- 2. Include sealing lip to prevent ingress of soil and moisture

D. Insulation:

- 1. Rigid closed-cell foam insert, minimum R-3
- 2. Full-coverage wrap around valve body, secured under lid
- 3. Rated for temperatures down to -30°F (-34°C)

2.6 Circular Plastic Valve Cans (Non-Traffic Areas)

A. Manufacturers:

- 1. Rain Bird
- 2. Toro
- 3. Hunter Industries
- 4. Or Engineer-approved equal

B. Body and Lid:

- 1. Rotationally molded polyethylene, UV-stabilized
- 2. Minimum wall thickness: 0.25 inch
- 3. Load rating: pedestrian ≥ 2,000 lb

C. Flush Mounting:

- 1. Designed for native soil or gravel; flush with finished grade
- 2. Locking lid option

D. C. Insulation:

1. Rigid closed-cell foam insert, minimum R-3
2. Or engineer approved alternative
- B.3. Frost protection rated to -20°F (-29°C)

PART 3 EXECUTION

3.1 TRENCH EXCAVATION

- A. Excavate trenches to depths and widths indicated on plans.
- B. Maintain level trench bottoms; slope manifolds as required for drainage.
- C. Remove smeared or compacted soil from trench bottom.

3.2 SYSTEM INSTALLATION

- A. Install pressure laterals:
 1. Ensure pipe is level.
 2. Align orifices horizontally.
 3. Secure pipe to prevent movement during burial.
- B. Install flushing assemblies and connect to manifolds.
- C. Backfill with native material:
 1. Do not compact over trench.

3.3 FIELD QUALITY CONTROL

- A. Perform hydrostatic or pressure test.
- B. Flush each lateral and confirm even distribution.
- C. Verify cleanout and flushing port accessibility.

3.4 PROTECTION

- A. Mark trench location and restrict traffic.
- B. Protect cleanouts from damage until project completion.

END OF SECTION