SECTION 331100
WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, fittings, hardware, appurtenances for domestic water mains, service lines, and typical fire suppression.

1.2 MEASUREMENT AND PAYMENT

A. **Distribution Main:** paid per Section 004100 per Linear Foot actually installed and field verified. Work includes all labor, materials, and equipment necessary to install water distribution facilities including connections, control valves, and other appurtenances.

B. **Gate Valve and Box:** Incidental to installation of water mains – no separate payment will be made. Includes excavation, gate valve, gate valve and valve box lid keys, box, thrust blocks, protection posts, backfilling, as-builts, site cleanup, and other appurtenances as necessary. Gate valves shall be installed at locations shown on the project plans.

C. **Miscellaneous Piping:** Paid as a Unit. Includes all other piping as shown on the project plans including piping to and from control building to instrumentation, piping to and from backwash tank, chemical feed lines, and drains to the sludge pond. Work shall include all excavation, bedding, pipe, backfilling, connections and valves necessary for operation.

D. Measurement and payment for water services shall be per service as per the bid schedule.

1.3 RELATED SECTIONS

A. Division 31.

1.4 REFERENCES

A. ASTM D2239 - Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.

B. ASTM D2466 – Poly (VinylChloride) (PVC) Plastic Pipe (SDR-PR)

C. AWWA B300 - Standard for Hypochlorites.

D. AWWA B301 - Standard for Liquid Chlorine.

E. AWWA C651 - Standards for Disinfecting Water Mains.

1.5 SUBMITTALS

A. Product and manufacturer data.

B. Test Reports: Indicate results compared to specified requirements.

1.6 PROJECT RECORD DOCUMENTS

A. Disinfection report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
5. Date and time of flushing start and completion.
6. Disinfectant residual after flushing in ppm for each outlet tested.

B. Bacteriological report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of EPA.
8. Copies of all reports shall be supplied to the Engineer within 48 hours of test completion.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with AWWA C651.

B. Submit name of EPA certified laboratory.

C. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.1 WATER PIPE

A. Manufacturers: J-M “Blue Brute”, or equal.

B. PVC Pipe: AWWA C900, elastomeric-gasket couplings, Class 200.

1. Fittings: AWWA C111, rubber-gasket joints, Ductile-Iron
2. Joints: ASTM D3139 compression gasket ring.
3. Trace Wire: Magnetic detectable conductor, plastic covering, imprinted with “Water Line” in large letters.

C. PVC Pipe: ASTM D2241, SDR-21 or 26 as shown on the drawings or bid schedule:

1. Fittings: ASTM D2466, PVC.
2. Joints: ASTM D2855, solvent weld.
3. Trace Wire: Magnetic detectable conductor, plastic covering, imprinted with “Water Line” in large letters.

2.2 GATE VALVES

A. Manufacturers: American Darling, Mueller, Clow, or Waterous, or equal.

B. Meet or exceed either AWWA C509 or C515, resilient seated gate valves 2 inch through 12 inch NPS, ductile iron body, trim, non-rising stem with square nut, single wedge, mechanical joint, flanged, or slip-on ends as specified in drawings, control rod, and extension box.

C. Furnish one valve key per contract or delivery order as applicable.

2.3 GATE VALVE BOX

A. Manufacturer: Tyler Pipe or equal, and compatible with the Owners’ standards.

B. Cast iron and of the sliding type, sized for use with the appropriate valve. Box lid marked "WATER." Box shall extend from the body of the valve to the finished grade.

C. Furnish one valve box key per contract or delivery order as applicable.

2.4 ACCESSORIES

A. Thrust Blocks: Refer to Section 033000 (Cast-In-Place Concrete).

B. Marker Post

1. Manufacturers: Carsonite, Greenline

2. Flexible fiberglass, dual-sided.

3. Blue decal label on both sides as specified in drawing.

C. Protection Post

1. Black iron, 3 inch diameter, 6 feet long, buried 3 feet.

2. Cover each post at the top with 2 coats of yellow reflectorized paint or tape for a band 3 inches wide.

3. Metallic Tracer Tape, magnetic detectable conductor, plastic covering, imprinted with "Water Line" in large letters.

A.5CURB STOPS - UP TO 2 inch

A. Manufacturer: McDonald Model 6104 - 33 (substitutions permitted).

B. Brass body, TFE coated brass ball supported by two Buna-N-Seats, IPS ends, 300 PSI rating.

2.6 SADDLES

A. Manufacturers:
1. Ford Model S70 and S90
2. James Jones Co., Model J995 and J996
3. Substitutions: Will be permitted.

2.7 CORPORATION STOPS

A. Manufacturers:
1. Ford FB1101
2. James Jones Co., Model J1936
3. Substitutions: Will be permitted.

2.8 COPPERSETTERS

A. Manufacturers:
1. Ford Model VH72
2. Substitutions: Will be permitted.

2.9 CURB BOXES

A. Manufacturer: McDonald, Minneapolis Pattern - with foot piece, 5½-inch (substitutions permitted).

2.10 WATER METERS

A. Manufacturer: Sensus SR-EB11 (substitutions permitted per approval).

2.11 WATER BOXES

A. Christy Model B9 Box with B9G Lid marked “WATER” (substitutions permitted).

2.12 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite, and AWWA B301, Liquid Chlorine.

2.13 FLOW METERS

A. Manufacturer: Water Specialties or approved equal

B. Flow meters are to be installed at locations shown on the project plans. Flow meters are to be propeller meters sized per piping to accommodate a maximum flow rate of 175 gpm.

C. Total raw water intake and treated water outflow are to be measured with flow meters integral to the membrane plant.

2.14 DOUBLE-CHECK, BACKFLOW-PREVENTION ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ames Fire & Waterworks; a division of Watts Regulator Co.
   b. Conbraco Industries, Inc.
   c. FEBCO; SPX Valves & Controls.
   d. Flomatic Corporation.
   e. Watts Water Technologies, Inc.
   f. Wilkins; a Zurn company.

B. Standard: AWWA C510.

C. Operation: Continuous-pressure applications, unless otherwise indicated.

D. Pressure Loss: 5 psi maximum, through middle 1/3 of flow range.

E. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved or steel with interior lining complying with AWWA C550 or that is FDA approved. Stainless steel for NPS 2-1/2 and larger.

F. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.

G. Configuration: Designed for horizontal, straight through flow.

H. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

PART 3 EXECUTION

3.1 INSTALLATION - WATER SERVICE LINE

A. Coordinate with the Owner for connection of new water facilities to existing water distribution system. Contractor to install all other components of the new water system.

B. Excavate pipe trench according to Section 312300. Hand trim trench where necessary.

C. Establish elevations of buried piping for minimum of 36 inches of cover.

D. Connect the service line to the house plumbing with fittings or adapters manufactured for the conditions encountered to provide a strong, durable, watertight connection. Provide a gate valve and hose bib with vacuum breaker.

E. Set water meter and box in accordance with the drawings and the requirements of the public utility.

F. Backfill and compact according to Section 312300.

3.2 DISINFECTION AND BACTERIOLOGICAL TESTING

A. Examination

1. Verify that piping system has been cleaned, inspected, and pressure tested.
2. Perform scheduling and disinfecting activity with start-up, testing, adjusting, and demonstration procedures, including coordination with related systems.

B. Execution

1. Provide and attach required equipment to perform the work of this Section.
2. Inject treatment disinfectant into piping system.
3. Maintain disinfectant in system for 24 hours.
4. Flush, circulate, and clean until required cleanliness is achieved; use domestic water.

C. Pressure Test for Water Main

1. Notify Inspector forty-eight (48) hours prior to pressure testing.
2. Provide required equipment to perform pressure test. Pressure gages used in testing shall be graduated in no more than 5 PSI increments.
3. Pressure test PVC pipe 2-inches or greater in diameter for 2 hours based on the test section working pressure at the lowest point of elevation.

AVERAGE WORKING PRESSURE OF TEST SECTION	TEST PRESSURE
Less than 65 psi	100 psi
65 to 95 psi	140 psi
Greater than 95 psi	195 psi

4. Leakage rates are total leakage allowed for a two hour test per 50 pipe joints as follows:

Pipe Size	100 psi	140 psi	195 psi
2 inch	0.27 gal	0.32 gal	0.38 gal
4 inch	0.54 gal	0.64 gal	0.75 gal
6 inch	0.81 gal	0.96 gal	1.13 gal
8 inch	1.08 gal	1.28 gal	1.51 gal

5. Repair leaks and retest if leakage is above acceptable rates.
6. Leakage rates shall be adjusted proportionally for pipeline lengths greater than or less than 50 pipe joints.
7. The number of pipe joints being tested shall be calculated as the length of pipeline being tested divided by the standard pipe length used on the job, with no allowances for joints caused by the use of couplings or for joints at fittings.

END OF SECTION 331000