SECTION 33 11 00

WATER DISTRIBUTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work Included: Work of this section includes, but is not limited to:

1. Water line.
2. Hydrants.
3. Fittings
4. Valves
5. Extension valve boxes.
6. Valve wrench.
7. Testing and disinfection.
8. Obtain and pay for plumbing permits, inspection fees, capacity charges, front footage fees, tapping charges, and street repaving bonds and other governmental fees applicable. Pay all costs involved in providing meter. File necessary drawings and specifications.
9. Obtain Health Department Certificate of Inspection and Approval and submit to Architect prior to request for final payment.
10. Comply with utility company minimum standards and special requests to conform to their requirements. Requests may include meter arrangement, backflow preventers, special valves or pipe type change.
11. Excavate street, curb and sidewalks and connect to water main. Repair street, curb and sidewalks.
12. Excavate and connect to existing water main. Backfill as required.

1.02 RELATED SECTIONS

A. Excavation and Backfill: Section 31 30 00.

B. Cast-In-Place Concrete: Section 03 30 00.

1.03 SUBMITTALS

A. Conform completely to the requirements of the General Conditions and Section 01 33 23.

B. Reference Standards

C. Special Guarantees and Warranties

D. Installer Certification

E. Material Certification

F. Test Reports: Provide 2 copies of test reports certified by an independent testing agency.

G. As-Built Drawings: Indicate deviations from original Construction Documents. Include all buried, concealed utility services, water, fire, etc., dimensioned from a fixed control point, including depth of bury.

H. Manufacturer's Product Data: Submit for the following:

1. Valves
2. Accessories
3. Pipe
4. Hydrants

1.04 PROJECT CONDITIONS

A. Location of Existing Lines

1. Make connections to existing lines and new building services as shown and required.
   a. Location of each existing pipe line shown on the Drawings was determined from available construction records and should be considered approximate.
   b. Determine the exact location of existing pipes to which connections will be made, or which may be affected by the work in any way.

B. Taking Existing Lines Out of Service

1. Coordinate all utility service shutdown or outages with the Architect and the Owner. Shut downs shall conform to all utility company requirements. Avoid inconveniencing the Owner and provide temporary service during the curtailment, as required by the Architect or Owner.
2. Existing lines may not be taken out of service unless approved by the Architect.
3. Notify the Architect for approval, at least 48 hours in advance of the desired time for taking any line out of service.

D. Work on Existing Lines

1. Install temporary plugs in ends of cut lines to keep out mud and debris.
2. Provide all necessary adapters, fittings and pipe required to make connections to existing pipe.
3. Conform to the specifications herein when reinstalling cut pipe or constructing modifications to existing piping.

E. Connections to Existing Lines: Provide fittings shown or as required to make

proper connections.

F. Abandoned Lines

1. Remove only to the extent necessary to make connections or replace existing lines as indicated.
2. Suitably cap or plug open ends of abandoned lines.

G. Locations and Verifications

1. Coordinate work of this Division with all Civil, Structural, Architectural, Electrical and Plumbing Drawings, including Drawings of associated trades, before installation of this Work or the submission of required Drawings for review or approval.
2. Verify at the Site all locations, elevations, grades and utility service connections, as indicated on the Drawings and serving the Project.

1.05 DELIVERY, STORAGE AND HANDLING

A. Conform to the manufacturer's recommendations and instructions.

B. Handling of Material

1. Use approved equipment and tools for safe and convenient handling and laying of pipe and fittings.
2. Do not drop, roll or skid pipe.

C. Defective Materials

1. Examine piping, fittings and specials to be installed and reject those which are defective or in poor condition.
2. Remove all items which are found to be defective after installation.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Pipe

1. Reference: ANSI A21.51 (AWWA C151).
2. Thickness: Class 52.
3. Cement Lining: ANSI A21.4, standard thickness.
4. Coating: Inside and outside, approved bitumastic or coal tar coating.

B. Fittings

1. Reference: ANSI A21.10.
2. Class: Same as pipe.

3. Coating: Inside and outside, approved bitumastic or coal tar coating.

C. Joints

1. General: Use type indicated on drawings or specified herein.
2. Flanged: ANSI B16, Class 125.
3. Mechanical or Push-On: ANSI A21.11.
4. Plain: Use with flexible couplings.
5. Restrained: Push-on or mechanical type; use for all exterior pressure pipe. Type which reduces the thickness of the pipe beyond the minimum thickness is not acceptable.

2.02 PVC PIPE AND FITTINGS

A. PVC Pipe

1. Material: Virgin polyvinylchloride (PVC) conforming to Class 12454-A or Class 12454-B compounds as defined in ASTM D1784.
2. Reference: AWWA C900.
3. Hydrostatic Design Basis Rating: 4000 psi for water at 73° F.
4. Thickness: Class 150 meeting requirements of DR-18.
5. Diameters: Equal to cast iron pipe outside diameters.
6. Joints: Integral bell; steel band reinforced gasket seal. Conform to ASTM D3139.
7. Test Requirements: Each length of pipe, including integral bell, shall be pressure tested to 4 times the rated pressure for a minimum of 4 seconds.
8. Markings: Each pipe section shall be marked with diameter, dimension ratio (DR), AWWA pressure class, manufacturer's name and seal of testing agency.
9. Manufacturer: CAPCO or equal.
10. Accessories: Necessary adaptors for connection of pipe to other types of pipe, fittings and valves.

B. Fittings: Ductile iron.

1. Reference: ANSI A21.10.
2. Class: Same as pipe.
3. Coating: Inside and outside, approved bitumastic or coal tar coating.

C. Flange Adapter: Ductile iron, conforming to ASTM A536, Grade 65-45-12.

1. Drilling: In accordance with ANSI B16.1.
2. Reference: Meet requirements of AWWA 900.

2.03 PRESTRESSED CONCRETE CYLINDER PIPE

A. Design

1. Reference: AWWA C301. Type A, except as hereinafter modified.

2. Design Conditions
   a. Working Pressure: 150 psi.
   b. Surge Pressure: 100 psi.
   c. Normal Earth Cover: 8 feet minimum.
   d. Truck Loading: AASHO H-20.
   e. Safety Factor: 2.
   f. Field Condition: B.
3. Additional Encasement or Blocking: Design pipe and fittings to withstand design pressures without use of additional encasement or blocking, except as hereinafter specified.

B. Details

1. Accessories: Provide bevel pipe, outlet connections on straight pipe, closure assemblies, and other accessories as required to satisfactorily install the new water main.
2. Air Release Lines: Provide 2 inch MUELLER threaded adapters.
3. Service Line Connections
   a. 3/4 inch taps where indicated.
   b. Locate at an angle of 45° from the horizontal in the top quadrant of the pipe.
   c. Provide plugs for use during testing.

2.04 VALVES AND VALVE BOXES

A. Gate Valves

1. Reference: AWWA C500.
2. General: Iron body, bronze mounted, double-disc, parallel seats and non-rising stem.
3. Direction of Opening: Counterclockwise.
4. Operating Nut: 2 inch AWWA standard
5. Ends: Mechanical conforming to ANSI A21.11.
6. Seals: "O" ring in lieu of stuffing box.
7. Mounting: Vertical mounting in line.
8. Extension Stem: When operating nut is below 4 ft. from the finish grade, furnish an extension stem to locate the operating nut approximately 2 feet below finish grade.
9. Manufacturer: CLOW CORPORATION; DRESSER MFG.; EDDY-IOWA; M-H; KENNEDY or equal.

B. Extension Valve Boxes

1. Type: Three-piece, screw type, cast iron, CLOW F2450, KENNEDY or equal.
2. Coating: Inside and outside with approved asphalt or coal tar enamel.
3. Bases: Fit size of valve.
4. Cover: Clearly and permanently marked "WATER".
5. Extension: 4 to 6 feet.

C. Valve Wrench: Furnish one valve wrench or key of each type required to operate all valves and/or stops.

D. Tapping Sleeves: Mechanical joint type with split end gasket and two piece glands suitable for pipe being tapped. Provide with longitudinal gaskets fit tight against end gaskets providing an enclosed watertight seal. CLOW No. F-5220 or equal.

E. Tapping Valves: AWWA C500 compatible with tapping sleeve, 175 psi minimum working pressure. Iron body, bronze mounted, double disc, parallel seat, non-rising stem, left hand open, 2 inch square operating nut, flanged inlet and mechanical joint outlet connections. O-ring type packing. CLOW No. F-5093 or equal.

F. Glands, Gaskets, Bolts and Nuts: AWWA C111.

2.05 FIRE HYDRANTS

A. Assemblies: Includes tee, valve, valve box, adapter pipe and hydrant.

B. General Description: AWWA C502, compression type, with 5-1/4 inch main valve opening with 6 inch mechanical joint inlet and a replaceable "breakable" barrel section and an automatic barrel drain.

C. Nozzles

1. Hose: Two, 2-1/2 inch.
2. Pumper: One, 4-1/4 inch.
3. Threads: ANSI B26, National Standard.

D. Bury Length: Provide for 5 feet of cover unless otherwise indicated.

E. Direction of Opening: [Clockwise] [Counterclockwise].

F. Operating Nut: AWWA C502.

G. Painting: Yellow.

H. Manufacturer: M & H No. 29-T; EDDY No. F1640 or equal. (As approved by West Licking Fire Department)

I. Drainage Material: ASTM D448, size number 5.

2.06 BLOCKING AND SUPPORTS

A. Provide cast-in-place concrete blocking and supports for pipe bends, tees, valves, fire hydrants and strapping anchors. Refer to city of Reynoldsburg and Columbus Division of Power and Water standard drawings for details. See Section 03 30 00 for concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which water system materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Verify location and elevation of utility lines and mains to be crossed.

B. Verify location, elevation, pipe class and dimensions of lines to which connections are to be made prior to proceeding with connection.

3.03 EXCAVATION AND BACKFILL

A. Existing Utilities

1. Before starting grading and excavating, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting and supports as the work progresses.

    a. Locate utilities which require tie-in work before performing work on new utility extension. Verify location and depth of existing utility. Notify Architect of discrepancies in actual field verified inverts and elevations and those indicated on drawings. Do not proceed with utility line work until procedure directions have been obtained from Architect.

2. Protect active utility services.

3. Notify Architect when interference with existing utility is necessary.

4. Replace utilities disturbed or destroyed with new materials of same size, quality and dimensions as directed by Architect, at Contractor's expense.

5. Maintain or permit maintenance of existing overhead, surface, or sub-surface utilities encountered.

6. Remove abandoned utility service lines from areas of excavation. Cap, plug or seal abandoned lines and identify termination points at grade level with markers.

7. Accurately locate and record abandoned and active utility lines rerouted or extended on Project Record Documents.

B. General:

1. Trench Excavation: Follow lines and grades as indicated on plans.
   a. Exact positions shall be subject to and adjusted to interferences with other work.
2. Width of Trench: Approximately 2 feet wider than pipe diameter.
   a. Additional trench width will be permitted, as approved by the Architect, when using sheeting, bracing or timbering in the pipe zone.
3. Depth
   a. Excavate to depths required to provide a minimum of 5'-0" of cover.
   b. Existing ground elevations shown on the Drawings represent approximated grades at the time the Drawings were prepared.
   c. Excavate trench bottoms to a point that undercuts the entire pipe a minimum of 6 inches, including the joints. Backfill undercut with granular material to a point so that a template or hand shovel can be used to shape the material to fit the lower quadrant of the pipe in its entire length between joints. AWWA C600 Sections 6.5 and 6.10 do not apply.
4. Leave trenches open until work is inspected.
5. Uncover existing pipes and cables ahead of trenching for new work.

C. Backfill:

1. Material: Backfill with ODOT 304 granular material
2. Compaction: Compaction shall meet 98% compaction with placement in maximum 4" lifts.

3.04 INSTALLATION

A. General

1. Conform to AWWA C600 "Standard for Installation of Ductile-iron Water Mains and their Appurtenances. Maintain a copy of this standard at the job site.
2. Lay pipe and fittings true to line and grade and in accordance with manufacturer's recommendations.
3. Use approved equipment and tools for safe and convenient handling and laying of pipe and fittings.
4. Examine all pipe and fittings before installation for apparent defects. Mark individual defective materials with paint and promptly remove from site.
5. Remove and replace defective pipe or fittings that are incorporated in the work.

6. Thoroughly clean pipe and fittings prior to laying and maintain in clean condition until accepted by Owner.
7. Schedule work so that a maximum of 200 feet of trench is open at any one time unless otherwise approved by Architect. A trench is considered closed when it is completely backfilled and the temporary or permanent pavement has been placed.
8. Field touch-up protective coatings prior to backfilling.

B. Manufacturer's Representative

1. Secure the services of a competent manufacturer's installation specialist when pipe laying begins.
2. Retain foregoing specialist on job until the competency of the laying crew has been demonstrated to the satisfaction of the Architect.
3. The above requirements may be waived if in the opinion of the Architect such services are unnecessary.

C. Pipe and Fittings

1. Do not damage coating, particularly on inside of pipe/fittings.
2. Use combination of fittings and/or small joint deflections wherever changes in line or grade do not correspond to standard fitting alignment.
3. Do not exceed maximum joint deflection recommended by AWWA C600.
4. Use mechanical joint anchoring fittings where indicated.

D. Pipe Supports

1. Provide concrete backing for all tees and bends 11-1/4° and larger.
2. Provide concrete anchoring blocks as required per city of Reynoldsburg Standard Drawings.
3. See Section 03 30 00 for concrete.

E. Valves

1. Install at locations indicated on drawings.
2. Install in strict accordance with manufacturer's recommendations.
3. Provide concrete valve supports. Do not encase or permit concrete to spill on bolts, operator or joints.
4. Thoroughly tamp backfill around base of valve to insure proper vertical alignment.

F. Valve Boxes

1. Adjust tops of all valve boxes shall be adjusted to top of pavement or to 1" above finish grade unpaved areas.
   a. Concrete collars shall be provided in unpaved areas.
2. Do not allow base to contact valve body. Provide 2 inch clearance.
3. Maintain plumb during backfilling operations.

G. Tapping Sleeves and Valves

1. Install where indicated on the drawings.
2. Install under pressure in strict accordance with manufacturer's recommendations.
3. Test under 150 psi pressure prior to cutting operations. If leaks appear, make repairs and retest.

H. Fire Hydrant

1. Locate approximately as shown on drawings with final location and setting determined in field by Architect.
2. Install hydrants with suitable concrete backing and gravel fill for drainage.
3. Do not obstruct drain openings.
4. Individually valve all new fire hydrant leads.
5. Provide valve and valve box.

I. Connections to Existing Mains: Provide fittings shown or as required to make proper connections.

J. Abandoned Lines

1. Remove to extent necessary to make connections or replace existing line.
2. Cap or plug open ends of abandoned lines.

K. Additional Fittings

1. Base water main bids on fittings indicated or as required to install the water main as indicated.
2. Install additional fittings as ordered in writing by the Architect.
3. If fittings different than those indicated on the drawings are required, the differences in weights will be paid for at the Unit Price Bid.

3.05 TESTING

A. General: The following tests are minimum requirements:

1. Provide all materials and equipment necessary to perform tests.
2. Contractor will furnish water.

B. Testing Mains

1. Hydrostatic Test: Conform to the requirements of AWWA C600, except as modified herein.
2. Before testing, brace line and partially backfill to extent required to prevent line movement from water pressure.

3. Plug unconnected end, fill pipe with water and expel air.
4. Expel air through hydrants and corporation stops where effective or through taps installed for this purpose.
5. Fill line with water 24 hours before test.
6. Test piping at 1-1/2 times working pressure or at 125 PSIG, whichever is greater, for 2 hours with no pressure drop.
7. Maximum allowable leakage shall be determined by Standard Formula outlined in AWWA C600.
8. Leakage shall be determined from amount of water added during test period to maintain test pressure. Accurately measure added water by measuring amount withdrawn from barrel or other container or by other means approved by Architect.
9. If a leak occurs, defective piece or joint shall be replaced at Contractor's expense. Caulking is prohibited.
10. Repeat tests until line passes.
11. After testing and approval, complete backfill operations as specified.

C. Testing Service Lines

1. Test under normal operating water pressure.
2. Repair leaks before backfilling.
3. Following testing of mains and service lines and before backfilling service lines, open all corporation stops and close all curb stops.
4. Blow out service lines after completion.

3.06 DISINFECTION

A. Conform to requirements of AWWA 651, except as modified herein.

1. Before being placed in service, flush and disinfect all new mains and repaired portions or extensions of existing mains.

2. Use special precautions specified in AWWA C651 Section 11 when cutting into existing lines.
3. Flush lines as thoroughly as possible prior to chlorination and after testing has been completed.
4. Disinfect, using chlorine solution made from liquid chlorine or from HTH or similar chlorine bearing compounds in water. Apply a dose of 50 to 100 mg/l to the water when using the continuous feed system.
5. Flush treated water from the pipe line until the replacement water proves to be comparable in quality to that provided by the water supply system. Satisfactory quality water delivered by the new main should continue for at least two days as demonstrated by laboratory analysis of samples.

B. Repeat procedures until satisfactory results are obtained.

C. Testing Laboratory: Hired and paid for by the Contractor. Laboratory selected must be approved by Architect prior to hiring.

END OF SECTION