SECTION 400

WATER SUPPLY

INTRODUCTION

This section is subject to periodic revision to meet changing requirements for materials, and environmental regulations, etc. At the beginning of a project, users should verify that they have the latest edition.

The latest published edition of the following documents shall be the accepted standard for materials and/or procedures for the construction, modification, alteration, or expansion of the City of Fairfield's public water distribution system:

1. ***City of Fairfield Design, Construction, and Materials Specification Handbook.***
2. ***City of Fairfield Codified Ordinances.***
3. ***Ohio EPA Laws and regulations (OEPA).***
4. ***Ohio EPA Backflow Prevention and Cross Connection Control.***
5. ***American Water Works Association Standards. (AWWA).***
6. ***American National Standards Institute (ASNI).***
7. ***National Sanitation Foundation (NSF) Standard 61.***
8. ***Recommended Standards for Water Works; "The Great Lakes Upper Mississippi River Board" (G.L.U.M.R.B.) also known as the "Ten State Standards".***
9. ***Safe Drinking Water Act (SDWA).***
10. ***National Primary Drinking Water Regulation (NPDWR) "lead and copper rule".***
11. ***American Public Health Association (APHA).***
12. ***Water Pollution Control Federation (WPCF).***
13. ***National Fire Protection Association (NFPA).***
14. ***Insurance Service Office (ISO).***
15. ***Ductile Iron Pipe Research Association (DIPRA)***

If a conflict exists between reference sources, the more restrictive requirement shall prevail. The Public Utilities Director shall provide interpretation as requested.

Plan approval by the City of Fairfield does not imply nor assure approval by the Ohio EPA. Plans are approved subject to the conditions of compliance with all applicable laws, rules, regulations and standards. The proposed project may be constructed only in accordance with the approved plans. There may be no deviation from the approved plans without the written approval of the City. Approval of the plans does not constitute an assurance that the proposed project will operate in compliance with all Ohio laws and regulations. Plans should also note "All work within the right of way within City limits will require a permit from Public Works". Permits can be found at https://www.fairfield-city.org/448/Permits-Specifications

Plans shall be submitted to the Ohio EPA for approval, as required by the Public Utilities Director. The cost of submitting plans to the Ohio EPA and review by the Ohio EPA, shall be paid for by the developer. Construction shall not begin until such plans are approved by the Ohio EPA, or unless the Public Utilities Director issues a conditional release. Work that is within a roadway or public right of way will require additional review by the City of Fairfield Public Works Department.

The contractor shall give the City of Fairfield advance notice before making any connection to an existing public water main. The City of Fairfield Water Department shall close the valves on the existing main for work requiring a non-pressure installation. The work shall be performed quickly and continuously until the connection is complete, and the water service can be restored.

401.00 CONSTRUCTION REQUIREMENTS AND MATERIALS SPECIFICATIONS

401.01 Determination of Water Use

Water lines must be sized to meet present water consumption and projected average and maximum daily demands, including fire flow hazard. The design engineer shall provide calculations to establish water usage demands. Public water mains should be installed in the public right-of-way, or upon approval in a public utility easement. Using the water main as a centerline, there shall be a minimum total of 15 feet; and 7.5 feet off the center of the water main to include an open area for maintenance.

401.02 Dead Ends

Dead-ends shall be minimized by looping of water mains with multiple feed points. Where dead-ends occur, they shall terminate with a fire hydrant for flushing purposes. Water mains shall not exceed 750 feet without looping unless waived by the Public Utilities Director. Dead end mains shall be avoided if possible, by arranging for mains supplied from both directions.

401.03 Pipe Size

The minimum size of public water mains shall be 8 inches in diameter. Larger size mains will be required if necessary, to allow withdrawal of required firefighting flows while maintaining minimum pressure. Any change in sizing shall be justified by hydraulic analysis and only upon the approval of the Public Utilities Director.

401.04 Pressure

All water mains, including those not designed to provide fire protection, shall be designed to maintain a minimum pressure of 20 psi at ground level. All water mains shall have a maximum pressure of 200 psi at all points in the distribution system under all conditions of flow. Pressure reducing valves (PRV) are required to be installed on the water service when the static pressure is 80 psi or greater.

401.05 Service Valves

At least one service valve shall be installed at each source of water supply, except fire department connections. A DCDA shall be installed at each connection with the exception of fire hydrant leads where one hydrant exists solely for the Fire Department's firefighting water supply.

401.06 Depth of Cover

The top of the pipe shall be buried by 4 feet of cover. Depth of covering shall be measured from the top of pipe to finished grade, and due consideration shall always be given to future or final grade, and nature of soil.

402.00 WATER MAIN PIPE MATERIALS

402.01 Ductile Iron Pipe

Only AWWA C104 Cement-Mortar Lined Ductile Iron Pipe shall be used for the construction of public water mains. All ductile iron pipe shall be designed and manufactured in accordance with AWWA C150 and C151. In no case shall less than Class 53 (ductile iron pipe wall thickness) be used. All pressure pipe shall be clearly marked as to class by the manufacturer.

Under no conditions shall pipeline deflection measured between joints exceed manufacturers published recommended standard for that type of pipe. The maximum deflection at push-on joints and/or mechanical joints shall be 5 degrees. If deflections of 5 degrees are closer together than the standard length of pipe (approximately 20 feet), thrust restraints shall be installed in accordance with the plans, or as directed by the Public Utilities Director. **See AWWA C600, Standard for the Installation of Ductile-Iron Water Mains, and Their Appurtenances. See also the Restrained Joint Lengths drawing on Page 20 of the Standard Construction Drawings.**

402.02 Polyethylene Encasement

Water main piping, fittings and valves shall be encased in 8 mil polyethylene encasement as outlined in AWWA C105. On fire hydrant branches, the encasement shall be installed up to and including the flange at the fire hydrant foot valve. Where thrust blocking is required, encasement will be completed before any concrete is placed. Install polyethylene encasement prior to the placement of concrete anchors, collars, support or thrust blocks. Repair all polyethylene material damaged during construction.

402.03 Pipe Joint

All pipe joints shall conform to AWWA C111/A21.11. Gasket material shall be standard styrene butadiene copolymer (SBR) per this standard. Bolts shall be high-strength, and corrosion resistant alloy conforming to AWWA C111.

402.04 Fittings

Ductile Iron, mechanical joint fittings, 3 inch through 24 inch shall conform to ANSI for ductile iron compact fittings, and AWWA C153. All fittings shall be supplied with ductile iron glands as per ASTM A536 and all required connecting bolts, nuts, glands, gaskets and accessories. Fittings are defined as those items, which are installed in a pipeline to change direction and include all bends, tees, crosses, and wyes necessary to provide a smooth transition from one direction to another.

402.05 Tapping Sleeves and Tapping Valves

Tapping sleeves shall be used for water services larger than 2 inch in diameter. All tapping sleeves shall be either ductile iron body with mechanical joint, or 304 Stainless steel body, full circumferential seal with a ductile iron flange. Ductile iron body tapping sleeves shall be: American-Darling 1004 tapping sleeve; Clow F-5205 tapping sleeve; or Mueller H-615 tapping sleeve. Stainless steel body tapping sleeves shall be: Ford “Fast”; Romac “SST”; or Mueller H-304 with ductile iron flange. All tapping valves shall conform to AWWA C509 or C515. Valves shall have a 2-inch square operating nut for key operation and “O” ring type stem seals. All valves shall open counterclockwise, and be of the non-rising stem type. The valve sealing mechanism shall be a wedge design of ductile iron completely encapsulated with a molded resilient covering permanently bonded to the iron wedge to meet ASTM D429 testing. Tapping sleeve and valve shall be tested per manufacturer’s recommendations.

402.06 Tapping Saddles

Tapping saddles shall be utilized only when exceeding the maximum recommended direct tap size as shown in the most current Ductile Iron Pipe Research Association installation guide. Tapping saddles shall be bronze, brass, or stainless steel. They shall be band-type, or double strap type, with an AWWA tapered thread inlet.

402.07 Water Main Valve Boxes

All buried valves shall be provided with domestic manufactured cast iron valve boxes. Valve boxes shall have a screw type extension sleeve if required, and also be designed for the size of valve on which it is to be used, and with the required depth of cover. There shall be an insulating centering device between the valve box and valve. The water main valve box shall be coated with an asphaltic coating by the manufacturer. The cover shall have the word “WATER” cast in it.

402.08 Gate Valves

All valves shall be AWWA C509 or C515 (resilient seated) for water supply service. Gate valves shall be of the iron body fusion bonded epoxy, bronze mounted type and shall have non-rising bronze stems. Gate valves shall open by opening to the left (counter-clockwise) and shall be fitted with a 2-inch square operating nut. All bonnet bolts and nuts for iron body valves shall be stainless steel. Mechanical joint end connections shall conform to AWWA C111. Adjust and test valve prior to backfill. Valve shall be certified to NSF 61 Drinking Water System Components-Health Effects.

402.09 Location Frequency

Sufficient valves shall be provided on water mains so inconvenience and public health hazards are minimized during repairs. Valves shall be located no less frequently than one per block, or at 800-foot intervals. Valve clusters are required at street intersections and in every direction from a tee or cross fitting. The number of required valves and their location shall be approved by the Public Utilities Director.

403.00 FIRE HYDRANTS AND FIRE LINES (SEE ALSO SECTION 600 FIRE SERVICES)

403.01 Fire Hydrants

Fire hydrants shall conform to the "AWWA Standard for Dry-Barrel Fire Hydrants" AWWA C502 and subsequent revisions. Fire hydrants shall be connected only to water mains adequately sized to carry fire flows. The minimum size for a public fire main shall not be less than 8 inches. All fire hydrants and auxiliary valves shall be positively locked to the water main by restrained mechanical joints. The thread sizing on the 2 ½ inch hydrant nozzles shall be 3.187 x 7. All hydrants shall be provided with an integral 5" Storz fitting and cap with connecting cable. Hydrants shall have a dual rating of AWWA and FM-1510 approval. No chains connecting the 2 ½ inch caps to the hydrant or each other will be allowed.

Hydrants shall be permanently marked with the following information, which should be cast into the barrel:

a) Manufacturer's name or trademark.
b) Model or type designation.
c) Maximum rated working pressure.
d) Size of main valve opening.
e) Year of manufacture.
f) FM Approval mark.
g) The hydrant top shall have stamped on it the word "OPEN" and an arrow, showing the counterclockwise direction for opening.
h) The hydrant shall be a minimum rated working pressure of 250 psi.

All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to the curb, with the pumper nozzle facing the curb. The horizontal centerline of the large outlet port shall be a minimum of 18 inches and a maximum of 30 inches above the final grade. In all cases the manufacturer's recommended relative elevation of the break flange to the final grade shall be maintained. The barrel shall have a breakable safety section and/or bolts just above the ground line. Hydrants shall have a main valve opening of 5 ¼ inches; a 6-inch mechanical joint inlet to be suitable for setting in a trench 4 feet deep. Each hydrant must be equipped with an auxiliary valve with valve box. The valve shall be a compression type, opening against the pressure so the main valve remains closed if the barrel is broken off. The hydrant shall provide automatic drainage when the valve is closed. Hydrants shall be effectively blocked by the placement of concrete thrust-blocking, or approved mechanical anchor. **See the Fire Hydrant Installation drawings on Pages 17 and 18 of the Standard Construction Drawings.**

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All underground water service pipe systems shall be thoroughly flushed before connection to any fire suppression system; **Refer to the "Disinfection of Water Mains" section 411.01.**

403.02 Color of Hydrants

Fire hydrants shall be coated by the manufacturer as per the City of Fairfield requirements with industrial epoxy exterior grade paint. Public fire hydrants shall be painted OSHA safety yellow. Private fire hydrants shall be painted OSHA safety red.

403.03 Spacing

a) Travel distance is defined as the route taken by fire apparatus on any surface to which it can support the weight of a fire apparatus not to be less than 75,000 lbs.
b) Spacing of fire hydrants shall be 400 feet in public rights-of-way.
c) In residential zoned areas, hydrants must be within 800 feet travel distance to a building with a flow rate of at least 1000 gpm.
d) In commercial and industrial zoned areas, hydrants must be within 400 feet of travel distance to all areas of the building with a flow rate of at least 1000 gpm. If the building is equipped throughout with an approved sprinkler system, the distance may be increased to 600 feet.
e) The number of hydrants to be provided shall be based on the required fire flow which also will be based on building construction and occupancy use.
f) All dead-end water mains shall have a hydrant. If the potential exists for an extension of the dead-end water main, a main line tee, valve and auxiliary valve shall be installed.
g) All the above-mentioned requirements under hydrant spacing are subject to change by the authority having jurisdiction.

403.04 Location

Fire hydrants shall be located to provide complete accessibility, and minimize the possibility of damage from vehicles or injury to pedestrians. When placed behind a curb, the hydrant barrel shall be set so that the pumper, or hose nozzle cap will be a maximum of 5 feet from the curb area. No fire hydrants shall be installed closer than 2 feet from the curb, street, driveway, or other traffic edge or 5 feet from any driveway apron or cross street. No portion of the hydrant or nozzle cap shall cause an obstruction to a sidewalk, or pedestrian traffic. Fire hydrants that are connected in close proximity to the public main and within the public right of way or public

easement shall be considered a public fire hydrant. Fire hydrants that are connected to a private main, or that are installed for the sole purpose of fire protection on private property shall be considered privately owned fire hydrants and labeled as such on any plans.

403.05 Double Check Detector Assembly *(DCDA)*

When it is necessary for any customer to have full line flow for fire protection purposes, there shall be installed in the line a device known as a "Double Check Detector Assembly". A metered by-pass shall be provided of sufficient size to carry normal usage without activating the assembly. The detector check valve shall be as manufactured by Ames, Watts or an approved equal. A full flow meter may be used as approved by the Director of Public Utilities or his/her designee. **See the Double Check Detector Assembly drawings on Pages 22 and 23 of the Standard Construction Drawings.**

403.06 Fire Line Vault

In all cases a fire line vault is preferred; however, when a structure is more than 200 feet from the public water main, a fire line vault is required. The vault shall be constructed of ODOT QC2 concrete for the accommodation of a DCDA, and shall conform to AWWA C510-92. All pipe and fittings for fire protection purposes shall comply with all applicable NFPA requirements. The pipe supplied from the public main to a point 10 feet beyond the vault shall be Ductile Iron class 53 and comply with Section 402 of this specification. Privately owned pipe materials supplied starting 10 feet beyond the vault must comply with all AWWA standards. If a non-metallic fire line is installed after the City's metering device, the fire line shall be buried with a continuous 12ga tracer wire attached to the crown of the pipe. The tracer wire should be brought to grade in a valve box, meter pit, or vault to allow for locating equipment connections. The vault shall have a sump pump or floor drain which must discharge at a point that provides positive drainage away from the vault. The access door to vault shall be an aluminum double hatch door Bilco JD-AL Series or Halliday H-W model. The size of the vault doors shall be determined by the vault proportions and approved by the Public Utilities Director. **See the Fire Line Meter Vault With Double Check Detector Assembly drawing on Page 23 of the Standard Construction Drawings.**

403.07 Post Indicator Valve (PIV)

Connections to public water systems shall be controlled by post indicator valves of an approved type, and located not less than 40 feet from the protected building. The post indicator valves shall be placed where they will be readily accessible in case of

fire. Post indicator valves shall be set so that the top of the post will be 36 inches above the final grade. Included with each PIV shall be a wrench and break away lock. Post indicator valve shall be properly protected against mechanical damage. Post indicator valves shall conform to NFPA 24.

403.08 Operating Test

Each hydrant and watch valve shall be fully opened and closed under system water pressure, and dry barrel hydrants checked for proper drainage. Where fire pumps are available, this shall be done with the pumps running. All testing shall comply with the most current version of NFPA requirements.

403.09 Fire Department Connections (FDC)

All required fire department connections or hose couplings shall be 5-inch Storz fittings and shall be placed within 100 feet of an accessible fire hydrant. All FDCs shall be red in color and 36" to their top elevation. Each FDC shall be clearly labeled with a 12" x 12" reflective sign, which is red in color with 2 inch white lettering. FDCs mounted to a building are not approved. The FDC and PIV shall be located in close proximity to each other as approved by the Fire Chief or his/her designee. **See the Double Check Detector Assembly drawings on Pages 22 and 23 of the Standard Construction Drawings.**

404.00 WATER SERVICE CONNECTIONS

404.01 Cross Connections

There shall be no connection between the water distribution system and any pipes, pumps, hydrants or tanks where there is a chance that contaminated water or other material may be discharged or drawn into the public water system. See AWWA manual 14, Backflow Prevention and Cross Connection Control and City ordinances pertaining to backflow.

404.02 Dead Ends

All dead ends on new mains shall be terminated with a valve and fire hydrant to facilitate flushing and the future extension thereof at the discretion of the Public Utility Director or his/her designee, As-Built or GPS location verification may be required.

404.03 Water Services

The Contractor shall provide each lot with an individual water service. For each water service line, the Contractor shall purchase from the City and install the corporation stop, meter setting and meter pit, curb stop and curb box in a suitable manner. Taps shall be made no closer than 2 feet from a bell connection or pipe end, nor shall they be made any closer than 4 feet to each other. The elevation of the service line shall be established so that it is no less than 4 feet below the finished grade. The depth of the curb box shall be no more than 5½ feet. The service shall be set at the middle of the lot. The location of curb boxes for properties on cul-de-sac roadways shall be determined by the Director of Utilities and/or his/her designee. Water services shall not be connected to fire hydrant leads and shall extend directly from the public main whenever practical. All underground water service pipe systems shall be thoroughly flushed before a connection to any private system. The location of each curb stop shall be clearly marked with a "W" imprinted in the concrete curb, near the top before the concrete hardens. All installation work for the water service shall be performed prior to the construction of new sidewalk and the street roadway. **See the Water Service Installation drawing on Page 15 of the Standard Construction Drawings.**

All water service lines ¾", 1", 1 ½", and 2" shall be flexible Type "K" copper pipe. The minimum water service size shall be a ¾" inch diameter size. The service shall be installed from the water main into each lot. Fittings for copper service branches shall be high quality copper brass with AWWA C800 Dimensions and meeting AWWA Standards. All privately owned water services after the metering device shall comply with all AWWA standards. If a non-metallic water service is installed after the City's metering device, the service shall be buried with a continuous 12 ga tracer wire attached to the crown of the pipe. The tracer wire should be brought to grade in a valve box, meter pit or vault to allow for locating equipment connections.

404.04 Corporation Stop

Corporation stops for use with saddles shall be bronze alloy with AWWA tapered thread, and outlet thread compatible with connecting pipe, without special adapters. Corporation stops for direct tapping shall be bronze alloy with AWWA tapered inlet thread, and with outlet thread compatible with connection pipe, without special adapters. All corporation stops 3/4", 1", 1 ½", or 2" shall be Ford, Mueller or AY McDonald ball type. The corporation stop shall be installed at either the 2 o'clock or 10 o'clock position on the pipe and rotated to allow easy access to the shut off dial.

404.05 Curb Stop

Service stops shall be bronze with coupling threads conforming to AWWA C800. The stop must be designed that water pressure from the inlet side of the body shall provide additional sealing action. The stop must open counter-clockwise and be manufactured with a ¼ turn stop. All curb stops 3/4", 1", 1 ½", or 2") shall be Ford, Mueller or AY McDonald quarter turn ball valve type. Service boxes shall be manufactured of cast iron and the covers shall have the word "WATER" cast in raised letters fastened by a bronze or brass bolt. The Contractor shall insure that the curb stop is free of mud and debris, and be operational at all times. Curb stop boxes shall be installed and maintained vertically so that the access to the stop-key is unobstructed. The curb stop and box shall be installed between the curb and the sidewalk for each lot. Each curb box shall be marked with a wooden stake painted blue, and inserted 18 inches into the ground next to the curb box. The blue stake shall be 36 inches above the ground level. The location of each curb stop shall be clearly marked with a "W" imprinted in the concrete curb, near the top before the concrete hardens. **See the Utility Service Location Designation drawing on Page 11 of the Standard Construction Drawings.**

405.00 METER SETS

405.01 Classification of Meter Sets

Meter sets are classified by location into two categories: Outdoor meter sets and indoor meter sets. Indoor meter sets shall only be used when outdoor meter sets cannot be used. Indoor meter sets require the approval of the Public Utilities Director. Meter sets are further classified by the use as follows: Domestic water meters and irrigation meters.

405.02 General Requirements for Meter Sets

a) All meters shall be set in an approved non-hazardous place and accessibility shall be maintained at all times.

b) The size of the meter shall be the same size as the water service, except a smaller sized meter may be installed based upon pressure available, the length of the service line and/or where it can be shown the water demand is less than the rated capacity of the meter.

c) Meters shall be installed on water service lines as soon as practical after installation of the line, but in no case will a certificate of occupancy be issued until/unless a meter is installed.

d) Meters shall be owned and maintained by the Public Utilities Department.

e) Remote meter touchpads or radio read equipment shall be installed by authorized employees of the Public Utilities Department only. The Public Utilities Department shall not be responsible for defacement or damage to property caused by necessary holes, fastenings or other work required for proper installation.

The Public Utilities Department will maintain remote reading devices under the same provisions as meters. A charge for repairs to any remote reading device or connections thereto, necessitated by damage or neglect by the consumer or owner shall be made in addition to any other charge provided.

405.03 Outdoor Meter Sets

All outdoor meter sets shall be installed by a private contractor and shall conform to the following requirements:

a) Meter Pits – For services 2 inches and smaller

1) Meter sets shall be placed at the right of way line, when possible, at such location as to prevent an accumulation of water within the meter pit.

2) Meter sets shall require curb stops on public property in front of the property to be serviced.

3) Meters shall be set in a pit and in the arrangement as shown in the Standard Drawing Section of this manual. **See the Residential Meter Pit drawing on Page 16 of the Standard Construction Drawings.**

4) Outdoor meters must be in a location accessible to Public Utilities Department vehicles.

b) Meter Vault – For services 3 inches and larger

Meter vaults shall be of adequate size, and readily accessible for inspection, operation, testing, maintenance, and removal of equipment contained therein. They shall be constructed and arranged to properly protect the installed equipment from movement of earth, freezing, and accumulation of water. The pit shall be poured in place, or pre-cast reinforced concrete as approved by the Public Utilities Director.

405.04 Indoor Meter Sets

All indoor meter sets must be approved by the Public Utilities Director before installation can begin. All indoor meter sets shall be installed by a private contractor and shall conform to the following requirements:

a) Meters shall not be set higher than 4 feet to center of connection above the floor.

b) Meters shall not be concealed and obstructed by cabinets, benches or other built-in fixtures.

c) Indoor meters sets shall be made as near as possible to the point where the service line enters the building.

d) Clear access to the meter set shall be maintained at all times.

e) Meter set shall be made in such a locality that reading and changing of meter shall in no way interfere with the customer's normal course of business.

f) Water meters shall be installed in a horizontal position as close as possible to the main stop. Where an approved basement is not or will not be available, the water meter shall be placed within the building or structure in an accessible location in the utility room and if no utility room is available, the meter shall be placed in an accessible location in the kitchen or other location as approved by the Public Utilities Department. The water meter shall always be located to provide protection from mechanical injury.

g) Meter Space. Accessible meter space shall be installed for all water services. Meters shall be so installed so as to be level. All meters shall be located as near as practicable to the point of entrance and in a position giving ample protection against freezing and other external damage. Water meters shall not be installed in sheds, garages, storage buildings, etc. that are not of standard construction or not properly heated.

405.05 Meters

It is the contractor’s responsibility to properly size the water service and metering system. Meters shall be sized to handle peak flows at 90 percent of rated capacity. Water meters shall be approved by the Public Utilities Director for the appropriate type of service. The applicant shall provide expected flow ranges for low, average, and peak flows, and type of metering system. All water meters shall be purchased from the City of Fairfield Public Utilities Department. Meters shall be installed by

the contractor in a clean pipeline, free from foreign materials. The meter shall be installed horizontally, with the register facing upward; with the direction of flow as indicated by the arrow cast in the meter case; protected from freezing, damage, and tampering.

Meters remain under the sole control and ownership of the Public Utilities Department and shall not be removed or tampered with by unauthorized persons. Unserviceable or defective meters will be replaced by the Public Utilities Department. Maintenance of the meter is the responsibility of the Public Utilities Department. If a customer wishes his meter tested for accuracy, the City will comply in accordance with section 921.05 of the City of Fairfield Codified Ordinances, Inspection of Meters.

405.06 Servicing of Meters

The maintenance of meters shall occur during normal working hours of the Public Utilities Department. In the event that this procedure inconveniences a customer, they may request that the meter be changed after normal working hours; however, the customer will be required to bear the cost of this service.

405.07 Charges for Change of Meters

Whenever it is requested by the customer to change an existing meter for one of a different size, the authorization for such action shall be given in writing to the Public Utilities Department. The costs for changing meters shall be borne by the customer making the request. The customer will be required to pay the difference in the increased meter size as per the effective schedule of fees. No refund fees will be given for a reduction in meter size.

405.08 Protection of Meters

The property owner will be held responsible for the meter in his custody and shall pay all costs of damage from any cause over which he has control such as freezing or hot water or vandalism. If the meter is stolen or lost, the replacement cost shall be paid by the owner.

405.09 Meters Required

All water service branches shall be metered.

405.10 Number of Meters

Only one water meter is required for each building or development complex.

However, at the owner's option, a meter may be installed for each dwelling unit. The Public Utilities Director has the authority to require any new or existing building/complex to install a master meter to meter all incoming water consumption.

The supply of water from the service connection may be measured by one or more meters. When more than one meter is used in a commercial or multi-family setting, the meters shall be set in an area not under the control of any tenant and accessible to the Public Utilities Department at all times. The minimum charge for each meter shall be based on the size of each meter. When more than one meter is used, each separate service shall be subject to the same rules and regulations as a service where one branch serves a single meter.

Proper provision shall be made to permit the City to discontinue service either by:

a) Installation of separate curb stop valves in public right-of-way or easements and separate lines from the curb stop to the meter,

Or

b) One valve and one line to the meter room and installation of lockout valves on the individual meters; and the right to enter upon private property by the Public Utilities Department to the location of the meters and lockouts. Denial of the right of entrance will result in the turn-off of water at the water main.

It is expected that the situation detailed in b) above will be for multi-family units where one service is run into the meter room and each individual service is taken from a manifold.

Meter readings shall be used to calculate utility charges. However, the Public Utilities Department shall be authorized to use other means, such as estimation, to calculate charges when it is apparent that a meter has not been operating properly, if it has been removed or cannot otherwise be read.

405.11 Manifolded Meters

a) Manifolded public meter sets are prohibited in new installations, unless authorized by the Public Utilities Director.

b) Meters set inside a building in an existing manifold shall be set and maintained in accordance with Public Utilities Department Standards.

c) Meters may not be placed in manifold unless the total of such meters

satisfies the minimum requirements determined by the size of the service branch being utilized.

d) All water meters placed in manifold shall have the inlet valve equipped with padlock wings.

e) All rules which apply to the billing and collecting for individual service shall apply to every meter in manifold.

f) A meter set in manifold shall be considered an active account until the inlet valve is locked in the off position and the account is placed in hold status.

405.12 Deduct Meters; Water-Only Meters

When a considerable amount of water delivered to any premises is not returned to the City's wastewater collection system, the customer may apply to the City to allow for the installation of a separate water meter (also known as sewer deduct meter) to accurately quantify the amount of such water not returned to the wastewater disposal system. If approved by the Public Utilities Director or designee, the customer shall not be billed sewer use charges for such metered water not returned to the sewage disposal system. The cost of the water meter and its installation shall be the responsibility of the customer. The manner of installation of the meter and other related conditions must be specifically approved by the Public Utilities Director.

For irrigation purposes, and depending on the plumbing configuration, the customer may apply to the City to allow for the installation of a separate water-only meter as an alternative to a sewer deduct meter. This configuration requires an independent irrigation water line tapped from the public main separately from the domestic line, or the irrigation line tapped off the domestic water service prior to the primary water meter. If approved by the Public Utilities Director or designee, the customer shall only pay water charges on usage registered through the water-only meter. The cost of the water meter and its installation shall be the responsibility of the customer. The manner of installation of the meter and other related conditions must be specifically approved by the Public Utilities Director.

406.00 SEPARATION OF WATER MAINS AND SEWERS

406.01 Separation of Water Mains and Sewers

In all cases, the most recent revision of *Recommended Standards for Water Works* and *Recommended Standards for Wastewater Facilities* shall be followed. The

following factors should be considered in providing adequate separation between water mains and sewers:

a) Materials and joint placement for water and sewer pipe.
b) Soil conditions.
c) Service and branch connections into the water main and sewer pipe.
d) Compensating variations in horizontal and vertical separation between water main and sewer pipe.
e) Space for repair and alterations between water mains and sewer pipe.
f) Off-setting of pipes around manholes and other obstructions.
g) No water pipe shall pass through or come into contact with any part of a sewer, or sewer manhole.

406.02 Parallel Installation of Water and Sewer Lines

Under normal conditions, water mains shall be laid at least 10 feet horizontally from any sanitary sewer, storm sewer, or sewer manhole. The distance shall be measured from edge of pipe to edge of pipe. When conditions prevent a horizontal separation of 10 feet, a water main may be laid closer to a storm or sanitary sewer provided that the bottom of the water main is at least 18 inches above the top of the sewers. Where this vertical separation cannot be obtained, the sewer shall be constructed of materials with joints that equivalent to water main standard of construction. In addition, they shall be pressure tested to assure water tightness prior to backfilling.

406.03 Crossing of Water and Sewer Lines

Under normal conditions, water mains shall not cross lateral sewers, or sanitary sewers. Water mains shall be laid to provide a vertical separation of at least 18 inches between the bottom of the water main and the top of the sewer. When conditions prevent a vertical separation of 18 inches, sewers shall be constructed of materials with joints that equivalent to water main standards of construction, and shall be pressure tested to assure water tightness before backfilling.

All water mains passing under a sewer shall have the following additional protection:

a) A vertical separation of at least 18 inches between the bottom of the sewer and top of the water main.
b) Adequate structural support for sewers to prevent excessive deflection of joints and seepage.

c) The length of the water pipe centered at the point of crossing, so water main joints shall be equidistant from the sewer, and as far away as possible from the sewer.
d) No water pipe shall pass through, or come in contact with any part of the sewer manhole.

407.00 PROTECTION AND INTERRUPTION

407.01 Protection of Existing Underground Utilities

The accuracy and location of existing underground utilities as shown on plans is not guaranteed. It shall be the duty of the Contractor to locate these utilities in advance of excavation, and to protect same from damage after uncovering. The Contractor shall contact the owners of the utilities for assistance in locating these service lines. The Contractor shall call the Ohio Utilities Protection Service (8-1-1 or 1-800-362-2764) at least 48 hours in advance of digging. Any expense incurred by reason of damaged or broken lines shall be the responsibility of the Contractor.

407.02 Service Interruptions

It is the responsibility of the Contractor to notify the Public Utilities Department in advance, when it becomes necessary for the purpose of making connections, or to shut off, or to turn on the water in existing mains. Such work shall not be performed outside the City's normal business hours or during City observed holidays. These holidays can be found on the City of Fairfield's website. The Contractor shall notify the City Water Division as to when, and for how long the water service will be interrupted. No valve or other control on the existing system shall be operated for any purpose by the Contractor. The City of Fairfield will operate all valves, hydrants, blow-offs, and curb-stops.

408.00 EXCAVATION

408.01 Trenching and Excavation

a) No trenching or laying of pipe and fittings shall be done until grade stakes have been set. The Contractor shall use excavating equipment that produces an even trench foundation. The trench shall conform to the *Typical Trench Detail* found in the *Standard Construction Drawings*. All water lines shall be installed with a minimum cover of 48 inches. The open trench ahead of pipe-laying shall be kept to a minimum, and shall not be in excess of 25 feet at the end of the working day, or at the ceasing of work.

b) Open cut trenches shall be sheeted and braced as required by governing state laws, and municipal ordinances, and as may be necessary to protect life, property, the work, or as ordered by the project engineer, or inspector. To protect persons from injury, and to avoid property damage, adequate barricades, construction signs, torches, red lanterns, and guards shall be placed and maintained during the progress of the construction work until it is safe.

c) The width of the trench shall be ample to permit the pipe to be laid and joined properly, and the backfill to be placed and compacted as specified. Trenches shall be of such extra width, when required, to permit the convenient placing of timber supports, sheeting and/or bracing.

d) Whenever wet or unstable soil is incapable of properly supporting the pipe in the trench bottom; such soil shall be removed to the depth and length as determined by the engineer or project inspector. The trench shall be back filled to grade with a controlled or non-shrinkable type of back fill as determined by the City of Fairfield.

e) All grading in the vicinity of a trench excavation shall be controlled to prevent surface water from flowing into the trench. Any water accumulating in the trench shall be removed by pumping or other approved method. Material excavated from the trench shall be stacked in an orderly manner at a safe, sufficient distance away from the trench edge. The project inspector will have the contractor remove materials unsuitable for backfilling. The Contractor will keep the City informed a reasonable time in advance of the location and time that the Contractor intends to work. Any unauthorized excavation below grade shall be backfilled at the Contractors expense with good, well-compacted material.

f) All trenching, grade and cover work shall conform to the lines and grades given by the engineer. Work shall be done according to the drawings and specifications; subject to such modifications as the City of Fairfield may determine necessary during the project period. **See the Trench Detail drawing on Page 3 of the Standard Construction Drawings.**

g) For public and private work within the City's right-of-way, the contractor performing the work is required to restore any disturbed areas in the right-of-way within 48 hours after the completion of the work.

408.02 Allowable Removal of Pavement

No trenching or tunneling shall be permitted in a public roadway, or right of way, unless authorized by permit and review by the Public Works Department. The Contractor shall utilize full depth sawing to assure the breaking of pavement along straight lines. The face of the remaining pavement shall be approximately vertical. If the Contractor removes or damages pavement or surfaces beyond the limits specified, such pavement and surfaces shall be repaired or replaced at the Contractors expense. The Public Works Department must be notified 24 hours in advance and an inspector present for any pavement restoration to be acceptable.

408.03 Trenchless Methods

Trenchless methods (Boring, tunneling, etc.), when necessary, shall be done under the supervision of the engineer or project inspector. No trenchless work shall be permitted in a public roadway or right-of-way, unless authorized by permit and review by the Public Works Department. The Public Works Department must be notified 24 hours in advance and an inspector must be present. **See the Casing Pipes drawing on Page 19 of the Standard Construction Drawings.**

408.04 Protection of the Public

During the period that any work is being performed within the public right-of- way, or that an open trench or pit exists within the limits of said right-of-way, the Contractor shall furnish and utilize such signs, lights, barricades, and safety devices in order to properly guide and protect the public. The Contractor shall conduct his work to not interfere with public travel. Whenever it is necessary to cross or interfere with railroads, intersecting streets, driveways, public or private, crosswalks, or approaches to any buildings, the Contractor shall provide and maintain a safe bridge or crossing for public travel. The Contractor shall promptly remove any temporary structures when requested by the city. The Contractor shall post, where directed by the engineer, suitable signs indicating that the street is closed, and necessary detour signs for the proper maintenance of traffic compliant with the most recent version of the *Ohio Manual and Uniform Traffic Control Devices.*

409.00 INSTALLATION

409.01 Installation

a) Pipe and fittings shall be handled in such a manner as to insure delivery to the work in a sound, undamaged condition. All pipe shall be inspected for

defects before installation. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials, protective coatings, and linings. Under no circumstances shall the water main materials be dropped, or dumped into the trench.

b) All pipe or fittings shall be carefully examined for cracks, and other defects while suspended above the trench immediately before installation into final position. Defective pipe or fittings shall be laid aside for inspection by the engineer, or inspector who will prescribe corrective repairs or rejection.

c) The pipe and fittings shall be thoroughly cleaned by swabbing before being lowered into the trench, and shall be kept clean until the joints are completed. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. All open ends are to be closed to with caps or plugs at all times, unless pipe is actually being laid. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by watertight plug or other means approved by the engineer, or inspector. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

d) Deflections from a straight line or grade, as required by vertical or horizontal curves, shall not exceed manufacturer's recommendations and approval by the engineer or project inspector. Valve boxes shall have the interiors cleaned of all foreign matter before installation.

e) Mechanical joints shall be installed under the provisions of the recommendations of the joint manufacturer. Fittings at bends or dead-ends shall be firmly blocked against the vertical face of the trench to prevent fittings from being blown off the lines when under full pressure. Thrust blocking shall conform to City of Fairfield specifications. Where pipe ends are left for future connections, they shall be valved, plugged, or capped as shown on the plans. Where connections are made, between any new work and existing mains, the connections shall be made by using the fittings as required by the City of Fairfield.

409.02 Thrust Blocking

When required on existing mains, all bends over 5 degrees, shall be securely blocked against movement with concrete blocking placed against undisturbed earth

in accordance with AWWA C600. All concrete shall be Class QC1/QC Misc. **See the Thrust Blocking drawing on Page 21 of the Standard Construction Drawings.**

Concrete thrust blocking shall be placed at least 2 days in advance of testing mains. All caps or plugs used in mains to undergo hydrostatic testing, shall be properly installed and thrust blocked in advance. All securing and blocking of caps shall be inspected by the City Water Division, or project inspector.

409.03 Restrained Joint Systems

When restraint is required on new water mains, connections must be restrained by restraining joint systems, or locking gaskets provided that sufficient length is available. Retraining joint systems are acceptable when designed in accordance with "Thrust Restraint Design for Ductile Iron Pipe" and shall meet ASTM A536-80. **See the Restrained Joint Lengths drawing on Page 20 of the Standard Construction Drawings.**

409.04 Pipe Cutting

Cutting the pipe shall be kept to a minimum, and shall be done in a neat and skillful manner without damage to the pipe. Cutting shall be done by means of an approved mechanical cutter. Wheel type cutters shall be used when practical.

409.05 Connection to City Mains

Newly installed piping shall not be connected to existing City mains until disinfected per AWWA C651 and have passed pressure and leakage tests. Test plugs, corporation stops, connecting sleeves, and temporary piping to a water source, shall be furnished by the Contractor.

410.00 BACKFILLING

410.01 Backfilling of Trenches

a) The Contractor shall remove and properly dispose of all surplus materials from the work site. In addition, the Contractor shall restore berm, and unpaved driveways to original condition. The Contractor shall reinstall any fencing, mail boxes, signs, poles, etc. that were removed for the installation of the water mains. The removal and disposal of surplus materials shall be done at the Contractors expense.

b) The Contractor shall use sod or seeding to restore any grass areas damaged or destroyed by the installation of the water mains. The use of sod or seeding shall be determined and mutually agreed upon by the Contractor and the Public Utilities Director. Reasonable protection and care, including any necessary watering of sod or seed, shall be maintained by the Contractor until a satisfactory stand of grass has been established.

c) Backfilling shall not be done in freezing weather, except by permission of the Public Utilities Department or the project inspector. Backfilling shall not be made with frozen material. No fill shall be made where the material already in the trench is frozen.

410.02 Backfilling Under Pavement

Flowable controlled density fill (Low Strength Mortar –LSM 50) shall be per ODOT 613 under the roadway and curb. Granular backfill item 304 may be used under private driveways. **See the Trench Detail drawing on Page 3 of the Standard Construction Drawings.**

411.00 TESTING, DISINFECTING, AND FLUSHING MAINS

411.01 Disinfection and Flushing of Water Mains

The Contractor shall pay for the costs of disinfecting, and flushing of the water mains as well as the cost for all required bacteriological tests. The Contractor shall furnish all labor, pumps, pipe connections, additional line plugs, adapters, caps, and other necessary apparatus and materials. All work shall conform to the "AWWA Standard for Disinfecting Water Mains"; AWWA C-651.

412.00 PRESSURE AND LEAKAGE TEST

412.01 Pressure Testing

The Contractor shall pay for the costs of hydrostatic and/or leakage testing of all new water mains. The Contractor shall furnish all labor, pumps, pipe connections, additional line plugs, adapters, caps, and other necessary apparatus and materials. All work shall conform to AWWA Standard "Installation of Ductile Iron Mains and their Appurtenances" and the most current version of DIPRA's Installation Guide for Ductile Iron Pipe.

412.02 As-Builts

Within thirty days after completion of construction work on any part of the water system, the contractor shall provide a complete set of certified, reproducible as-built drawings to the Public Utilities Director or his/her designee, for all water improvements and repairs, including those constructed in subdivisions and on private property. These plans must be clearly marked "As-built" on every sheet with all water services, fire hydrants and main valve locations verified by a post construction survey made at the Contractor's expense.

As-built plans shall be provided on reproducible sheets measuring 24 inches by 36 inches and sealed and signed by the engineer to certify that the as-builts are per field conditions and along with an AutoCAD file (.dwg or .dxf).

413.00 BACKFLOW PREVENTION, CROSS-CONNECTION CONTROL, AND BOOSTER PUMPS

413.01 General

If, in the judgment of the Public Utilities Director and/or his/her designee, an approved testable backflow prevention device is necessary for the safety of the public water system, notice will be given to the water customer to install and maintain such an approved device. The water consumer, at their own expense, shall install such an approved device at a location and in a manner approved by the Director and shall have inspections and tests made of such approved devices on an annual basis.

All provisions of the most current edition of Chapter 3745-95 of the Ohio Administrative Code (OAC) are hereby incorporated into this Handbook.

413.02 Booster Pumps

No person shall install or maintain a water service connection where a booster pump has been installed, unless an approved method is in place and is operational to maintain a minimum suction pressure. The water consumer, at his own expense, shall have inspections and tests made of any approved device installed for the purpose of minimum suction pressure maintenance on an annual basis. Tests shall be performed to certify to the supplier of water that the device is in proper working order.

All provisions of the most current edition of Chapter 3745-95 of the Ohio Administrative Code are hereby incorporated into this Handbook.

413.03 Violations

a) The supplier of water shall deny or discontinue, after reasonable notice to the occupants thereof, the water service to any premises wherein any required backflow prevention device is not installed, tested and maintained in a manner acceptable to the supplier of water, or if it is found that the backflow prevention device has been removed or bypassed or if an unprotected cross-connection exists on the premises or if a required low pressure cut-off device is not installed and maintained in working order or if the supplier of water or the Public Utilities Director or the authorized representative of either, is denied entry to determine compliance with this section.

b) Water service to such premises shall not be restored until the consumer has corrected or eliminated such conditions or defects in conformance with all applicable provisions of OAC 3745-95 and to the satisfaction of the supplier of water.