

Water Systems

A. Description

This work shall consist of furnishing and installing, or removing and relaying, pipes, and appurtenances at the locations shown or ordered, including the necessary joints, fittings, and connections as required.

B. Materials

Certificates of Compliance shall be submitted by the Contractor for each material to the City of Concord's Representative for review and approval.

The materials shall be subject to rejection at any time due to failure to meet any of the specification requirements. All fittings shall be of compatible construction materials and shall be used exclusively for the intended purpose of the manufacturer. All fittings used for repairs must first be approved by the Engineering Services Division prior to installation. Only new materials will be accepted for installation.

THE COMMUNITY DEVELOPMENT DEPARTMENT, ENGINEERING SERVICES DIVISION, RESERVES THE RIGHT TO REQUIRE A SAMPLE FOR EVALUATION OF ANY ITEM SUPPLIED. ALTERNATE ITEMS MUST RECEIVE PRIOR APPROVAL OF THE CITY ENGINEER.

Storage and Handling of Materials

1. All materials shall be handled in a manner to prevent warping, twisting, bending, breaking, chipping, rusting or any damage whatsoever. Pipe and structures shall be lifted and moved with the appropriate apparatus without being pushed, pulled or rolled by equipment.
2. All materials that have become so damaged as to be unfit for the intended use shall be promptly removed from the work site.
3. Prior to the storing of water pipe on the job site, the City of Concord's Representative **shall be notified at least 24 hours in advance** as to when pipe and fittings will arrive. Upon arrival, Engineering Services will visually inspect the pipe for class rating and evidence of mishandling.
4. After approval of the pipe and fittings, the contractor shall be required to provide a watertight seal at both ends of the pipe, with a minimum of 1.5 mil polyethylene plastic wrap. This shall be accomplished using sheet plastic or bags secured with duct tape.
5. All pipes shall be stacked on 4" x 4" timbers in tiers with chocks nailed at each end to prevent movement of the pipe. A maximum allowance for stacking height is included in the detail section according to pipe size
6. Loader forks are allowed for the unloading and stacking of pipe provided it is done with care. If pipe hooks are used in the ends of pipe for unloading purposes, they should be of special shape and padded so as to fit either the plain or bell end without damaging the

pipe lining. Lifting chains will not be allowed in place of pipe hooks due to safety precautions.

7. Moving the pipe from the stacked pile to the trench by loader using forks or approved hooks is acceptable provided it is done with care. The pipe may not be strung along the ditch line until Engineering Services has reviewed and approved the locations.
8. Fittings, valves and fire hydrants must be stored off the ground so they will not collect moisture or be damaged.

Water Mains

All materials coming in physical contact with drinking water must be certified to meet the ANSI/NSF Standard 61 by either the Underwriters Labs (UL) or the National Sanitation Foundation (NSF).

Ductile Iron Pipe:

1. Ductile Iron Pipe 3" to 10" diameter shall be Pressure Class 350. Diameters greater than 10" shall be Thickness Class 52. Pipe shall meet, or exceed, current AWWA C151 specifications for ductile iron water pipe.
2. Maximum length is twenty and a half feet (20.5'). Double cement lining, seal coating inside and bituminous outside coating shall meet, or exceed, AWWA C104.
3. Push-on joints shall conform to current AWWA 111.
4. Pipe to be furnished complete with gaskets and lubricant.

Gate Valves:

1. All valves to be **mechanical joint**.
2. For sizes 3-inch through 12-inch, gate valves shall be required. Gate valves will be resilient seat with non-rising stem and conform to, or exceed, current **AWWA** specification C509. Valves are to be supplied with all accessories.
3. Direction to open – **RIGHT (coded red)**
4. Acceptable makes and models:
 - a. Clow - (F series)
 - b. Kennedy - (Ken-Seal)
 - c. Mueller G.V. (A-2360)
 - d. M & H (style 4067)
 - e. AFC-2500
5. Post indicator gate valves will be resilient seat and shall open to the **LEFT (coded black)**.

Large Valves:

1. For valves larger than 12-inch, butterfly valves (valves shall have the same number of turns as a standard valve) or horizontal operating resilient wedge valves are required and must conform to or exceed current AWWA C504 unless otherwise approved by the City of Concord Representative. Valves are to be supplied with all accessories.
2. Direction to open – **RIGHT (coded red)**
3. Acceptable makes and models:
 - a. Clow 4500
 - b. Henry Pratt Co. "Groundhog"
 - c. M & H 4500
 - d. Mueller Linesal III
 - e. AFC-2500 series (horizontal operating)

Fittings:

1. Fittings shall be gray cast iron or ductile iron with mechanical joints. Fittings and accessories shall conform to or exceed current AWWA C153. Compact ductile iron fittings meeting AWWA C153 are acceptable. Fittings to be new, unused, free from rust, coated, and cement lined.
2. Ductile iron - Class 350.
3. Mechanical joints and accessories shall meet AWWA C111.
4. Double cement lining, inside seal coating and bituminous outside coating shall meet AWWA C104 for all fittings.
5. Restrained joints shall use Romac "Grip Ring / Meg-A-Lug" or approved equal.

Valve Boxes:

1. Base: 36-inch or longer to suit grade. No stacking of base sections is permitted.
2. Top: 5 1/4" x 24" or 26" with top flange - (Screw type is not acceptable).
3. Cover: marked "Water" supplied.
4. Two piece boxes are required.
5. Only North American Made valve boxes are acceptable.

Water Services**Backflow Prevention Devices:**

Approved non-testable double-check backflow prevention devices will be required for residential use. Any American Water Works Association (AWWA) or University of Southern California (U.S.C.) approved dual-check is acceptable. Example: Watts #7, Hersey (BSG), Febco 810, Ford (Style H.H.A. or H.H.S.).

Curb Boxes:

- 1. 5½' curb box complete with 36" rod (single piece) and cover.
- 2. Perma Rod Box with arch pattern base. Number 3 cover with pentagon brass plug and quick-release thread.
- 3. Opens **LEFT** – 1/4 turn.

Copper Tubing:

- 1. Tubing shall conform to or exceed current ASTM specification B-88.
- 2. Sizes ¾" and 1" American made type "K" soft in 60 or 100 foot coils.
- 3. 1½" & 2" - American made type "K" soft in straight lengths or coils.
- 4. **No 1¼" services.**
- 5. 3" Cement Lined Ductile Iron may be substituted for 2" copper tubing.

Brass Fittings - (For Underground Use):

- 1. Acceptable makes of fittings: ball valve, curb stops and plug type or ball valve type corporation stops with conductive compression connections:
 - a. Ford
 - b. Mueller
 - c. McDonald
 - d. Hays
- 2. **"Stop and Waste valves" are not allowed.**

Meter Settings:

- 1. 5/8" x 3/4" meter horn with backflow prevention device.
- 2. 1" meter horn with backflow prevention device.
- 3. Meter horns shall be isolated with full open valves per the City of Concord's Building and Plumbing Code Regulations and the International Plumbing Code, 2003 Edition.
- 4. Backflow prevention device (#7 Watts or acceptable dual-check) shall be installed on the downstream side of the meter horn.
- 5. Laying length of meters:

| | | | |
|-------------|-----------|--------------|---------|
| 5/8" x 3/4" | = 7-1/2" | 2" x ---- | = 17" |
| 1" x ---- | = 10-3/4" | 3" turbo x - | = 12"4" |
| 1-1/2"x - | = 13" | turbo x - | = 14" |

Hydrants

Acceptable makes and models:

1. Clow Eddy F2641
2. Darling B62B
3. Mueller Centurion 200

Features:

1. Direction to open – **LEFT**
2. Breakable flange (Traffic model).
3. Valve opening 5-1/4".
4. Two 2½” NST hose nozzles.
5. One 4½” NST pumper nozzle.
6. Operating nut and nozzle caps - NS pentagon 1½” flat to point.
7. Depth of trench - 6 foot.
8. Six inch mechanical joint connection with accessories for 7.10" O.D. ductile iron pipe.
9. Drain hole shall be plugged.
10. Marker flag with retro-reflective marker plate.
11. All hydrants shall be bagged until placed in service.

Sand Bedding / Blanket

Sand bedding and blanket material required for the installation of the water mains, services and appurtenances shall meet the following gradation requirements:

| <u>Sieve Size</u> | <u>% Passing</u> |
|--------------------------|-------------------------|
| 1/2 Inch | 100 |
| No. 200* | 0-12 |

*Fraction passing the #4 sieve

C. Construction Requirements

The Community Development Department in conjunction with the General Services Department will oversee all work related to these utilities. Unauthorized use of hydrants is strictly prohibited. Should a contractor desire to use City water for dust control, sewer testing and flushing operations, etc. the City will furnish a temporary meter. A deposit is required and the contractor will be charged for the water used. **Only qualified City of Concord personnel are authorized to manipulate hydrants.** Unauthorized usage of City water is subject to a minimum \$1,000.00 fine.

Water Mains

1. Water mains and services must be bedded on a 6-inch sand cushion and covered with a minimum 12-inch layer of compacted sand – no stones. Where unsuitable/unstable material is encountered below pipe grade it will be removed and replaced with crushed stone or suitable gravel fill below the sand bedding as directed.

2. Laying depth must be 5 feet 6 inches (5.5-feet) compacted from the top of the pipe to the finished grade of the proposed roadway. Where extra depth may be required at utility crossings the pipe must return to the specified laying depth by the use of fittings as directed by the Engineering Services Division. In no case will the pipe depth be allowed in excess of 6-feet at water main valves.
3. The use of insulation installed over the top of the pipe when the required depth cannot be achieved, will not be permitted without the approval of the City of Concord Representative.
4. Joint deflection of ductile iron pipe is NOT acceptable.
5. Water mains must be separated from storm drain systems for frost protection. Should the separation be less than 3 feet from a storm drain manhole, catch basin, or pipeline; 2" rigid polystyrene thermal insulation with a minimum "R" value of 10 will be required two-feet each side of the utility and a distance to be specified by the City of Concord's Representative, (a minimum of 8' is required). The City of Concord's Representative shall be contacted prior to the installation of the insulation.
6. State regulations require water mains to be separated from sanitary sewer mains by a minimum of 10-feet (horizontally). Sanitary sewer services shall also be separated a minimum of 10 feet from water services unless otherwise directed by a City of Concord representative. This applies for new construction and renovations to existing structures.
7. Should construction operations reveal or expose a water main running under, approximately parallel to (less than 10-feet from a proposed sewer installation), and where it is not practical to relocate the sewer, the sewer shall be reconstructed of ductile iron pressure class pipe until the minimum 10-foot separation can be achieved.
8. Whenever sewers must cross over water mains, the sewer shall be constructed of (replaced with) ductile iron pressure class pipe for a minimum distance of 9 feet each side of the crossing. Joints shall be water pressure rated with zero leakage when tested at 25 pounds per square inch for gravity sewers and 1½ times working pressure for force mains, and joints shall not be located within 9 feet of the crossing point.
9. Should the vertical separation of the sewer and water main be less than 18", the water main or the sewer main must be relocated to achieve the required separation.
10. When utilities cross under a **cast iron** water main and the vertical distance between the bottom of water main and the top of the other utility is four feet or greater; the water main shall be cut out and replaced with ductile iron pipe. The new ductile iron pipe section shall span the excavation back into original ground. This procedure will require approval and inspection by the City of Concord's Representative.
11. In conflicts requiring the relocation of utilities, preference shall be given:
 - a. to utilities with grade restrictions.
 - b. to existing utilities already in service.
12. No trench shall be left open at the end of the workday. Contractor shall take all the necessary precautions to "button-up" the work zone for the general public during the night. Precautions include but not limited to, placing steel plates over the trench,

barricades, lighting, signs, etc. Contractor shall contact the City of Concord's Representative before leaving the site at the end of the day, to ensure that work zone has been adequately closed up for the safety of the public.

13. A "**watertight plug**" must be inserted as each length or fitting is installed. This "end plug" will be left in place at the end of the workday.
14. Detectable "Water" marking tape shall be installed 12-inches above the crown of the pipe.
15. Prior to directional boring/drilling and or jacking, all utilities (communication, electric, gas, sewer, water, storm drain, etc) in close proximity, shall be exposed to verify location. A fully detailed plan showing the proposed construction activity shall be submitted to the City Engineer for review at least two (2) weeks prior to the commencement of the construction activity. The proposed sleeve shall consist of either steel or HDPE with a traceable wire placed over the utility.

Mechanical Fittings and Accessories

1. Retaining glands, tie rods or a combination of poured concrete thrust blocks and retainers must be used on all mechanical fittings. A durable flat surfaced rock may be substituted should it possess adequate bearing area against undisturbed earth. If tie rods are used, they shall be coated with an approved rust proofing agent.
2. A torque wrench must be used on all fittings to insure manufacture's recommended torque.

Generally Accepted Torques:

- 70 lbs.** on set screws
- 75-90 lbs.** on glands with 3/4" - (19)mm bolts
- 60 lbs.** on glands with 5/8" - (16)mm bolts

3. Assembly Instructions For Ductile Iron Pipe:

Clean bell and spigot end and lubricate gasket with approved pipe lubricant. Set gasket into position to assure even seating in the bell. When gland is in position, insert bolts and tighten with fingers. Tighten bolts to the normal range of bolt torque while maintaining approximately the same distance between the gland and the face of the socket. A proper joint is accomplished by: 1) partially tightening the bottom bolt, 2) the top bolt; 3) the bolts at both sides; and 4) the remaining bolts. Repeat this process until all bolts are within the appropriate torque range.

4. All main line valves at pipe intersections (including hydrant valves) are to be placed within 2-feet of the tees.
5. Large valves (10-inches or greater) must be supported with blocking to prevent the pipe from supporting the valve's weight during installation.
6. Install valve boxes with a cushion of sand between the valve and the valve box. A Gate Box Aligner shall be required under the operating nut. In wet areas, washed stone is to be placed around the valve box with a layer of hay or a geotextile fabric to prevent fine soil from mixing with stone during initial backfill.

7. Exercise each valve in the presence of the inspector. The number of turns must be recorded before the valve is installed.
8. Stainless steel tapping sleeves are acceptable.
9. No contractor will operate City valves or curbstops without the explicit permission of the City.

Hydrants

1. Hydrants are to be installed at the proper depth and a concrete slab or large flat rock is to be used to support the hydrant's weight. Use of a level to assure proper alignment is required. Hydrant extension kits will be required for height adjustments to assure the proper break point, visibility, and accessibility of the hydrant.
2. The Contractor shall be responsible for hydrant painting. Requirements for hydrant painting are included in the City of Concord Construction Details.
3. Hydrants located further than 20-feet from the water main will require an 8-inch feed.
4. Contractor is responsible for the installation of the "marker flag" as show on the hydrant detail.
5. All hydrants shall be bagged until the hydrants are operational and then removed by City of Concord personnel.

Water Service Lines

1. Corporations will be installed at either the two o'clock or the ten o'clock position on the pipe circumference.
2. An (S) loop must be provided in the tubing nearest the corporation, and set no higher than the water main.
3. Any service longer than sixty feet from the main to the curbstop must be a minimum of one-inch diameter to provide for adequate flow.
4. Saddles are required for service taps over 3/4" on 6" diameter mains and smaller; and double strapped saddles with a AWWA taper thread (CC Thread) is required for service taps over 1" on mains larger than 6" diameter.
5. Curb valves will be set on the Street Line in City Streets. If curb box extensions are needed, no more than one - 12" galvanized or black iron nipple with coupling will be allowed. The maximum depth for curb valves is 6 feet while the minimum depth is 5 feet-6 inches.
6. Curb boxes shall not be set in driveways or walkways unless field conditions do not permit the installation. The City of Concord's Representative shall be contacted if the requirement cannot be met prior to the installation.

7. State regulations require water mains to be separated from sanitary sewer mains by a minimum of 10-feet (horizontally). Sanitary sewer services shall also be separated a minimum of 10 feet from water services unless otherwise directed by a City of Concord representative. This applies for new construction and renovations to existing structures.
8. Adjacent curb boxes must be set at least 4-feet apart.
9. Minimum distances for service lines:
 - a. From an underground utility shall be: 5-feet
 - b. From a septic tank shall be: 10-feet
 - c. From a leach bed or dry well shall be: 25-feet
10. The minimum depth of the water service shall be 5½-feet. Should the water service line be less than 5½-feet deep, 2" rigid polystyrene thermal insulation with a minimum "R" value of 10 will be required two-feet each side of the utility and a distance to be specified by the City of Concord's Representative, (a minimum of 8' is required). The City of Concord's Representative shall be contacted prior to the installation of the insulation.
11. Detectable "Water" marking tape shall be installed 12-inches above the crown of the service.
10. A contractor installing a new or larger water service shall be responsible for properly discontinuing the abandoned service connections. The contractor shall not disconnect any service connections without the proper authorization from Engineering Services.

Discontinued service connections are normally retired at the water main. A copper service can be cut and capped at the property line should circumstances exist where access to the water main is impracticable. Discontinued service connections of lead or iron piping shall be abandoned at the water main.

Back-Flow Prevention Devices:

1. For cases of single family and attached townhouse residential units, dual-check devices or setters with dual-checks are required.
2. Non-residential or lawn irrigation system installations shall require either a testable **double-check (DCVA)** or a **reduced pressure principle (RP)** device. The Contractor is to contact Engineering Services, to arrange for a sanitary survey and/or site analysis for confirmation.
3. All water piping and fittings to the backflow device are to be copper, brass, or cement lined ductile iron pipe.

Metering

1. Temporary meters shall be required for City water use during construction. The Contractor must agree to adhere to City operational procedures. Seasonal requirements may apply such as a hydrant being pumped after each use in winter conditions. The contractor can be fined a minimum of \$1,000.00 without the proper authorization from the City of Concord.

2. It is the responsibility of the owner/developer/contractor to install meter setter horns or flanges in which the City will place the permanent meter. The meter is supplied and owned by the General Services Department.
3. The General Services Department's policy concerning the number of City meters at any building is as follows:
 - a. Single units (residential or otherwise), and each unit within multiple attached units (such as townhouses or duplexes) that have their own cellar or first floor space shall have its own individual water service and City water meter.
 - b. For apartment or condominium type units within shared buildings, (which are either new or conversions), and when there is no common first floor space: the owner can choose to: 1) service each unit on an individual water line, or 2) service multiple units from one water line. In the former a City meter will be set for each unit, and an account will be established for those meters. In the latter one or more City meters can be set according to the owner's wishes. If one City meter is desired then one account will be established for that complex.
 - c. The owner is not precluded from installing their own private meters downstream (after the City meter), for the purpose of splitting the usage to tenants; but the City of Concord, General Services Division will not provide individual billing.
 - d. Multiple billing accounts can be established for each unit. A monthly fee will be levied on each additional account after the first City meter.
 - e. Secondary City meters used to determine the usage for a specific purpose such as irrigation or other non-sewered consumption shall only be allowed for "closed" systems that do not have threaded fittings for hose connections. Secondary meters shall be installed in parallel, and will be charged an additional monthly fee.
4. Meters shall be placed where they will be easily accessible for reading and maintenance. The General Services Department will install and seal the meter.
5. Prior to having the meter installed the following must occur:
 - a. Application for service made at the General Services Department Utility Billing Office - 311 North State Street.
 - b. All fees and charges including Special Investment Fees if applicable are paid.
 - i. Water Investment Fee (WIF)
 - ii. Sewer Investment Fee (SIF)
 - c. Final Inspection of the project by the Engineering Services Division. No water meter will be installed until all outstanding project related issues, if any, are addressed.

ENGINEERING SERVICES WILL NOT "SIGN-OFF" FOR A CERTIFICATE OF OCCUPANCY PERMIT UNTIL THE WATER METER IS INSTALLED AND ALL OUTSTANDING PROJECT RELATED (ONSITE AND OFFSITE) ISSUES ARE ADDRESSED.

D. Inspection Requirements

The Engineering Services Division's representative shall perform full time inspections to assure that all water work conforms to City standards.

Visual Inspections: Visual inspections of water main installation will be performed to assure compliance with construction standards. Pipelines are to be true to grade and alignment. Pipe must be sound and flawless. Cracked, chipped or deformed pipe, fittings or accessories must be replaced.

E. Testing Requirements

Water Line Testing

1. Testing shall be scheduled with and performed in the presence of a City of Concord Representative.
2. The contractor shall provide all materials necessary for water line testing including; corporations, ball valves, blow-offs, etc. for main line testing.
3. Fire hydrants shall be used as "blow-off valves", venting, etc. When field conditions do not allow the use of a fire hydrant, use of a blow-off valve (type and location) shall be determined by the City of Concord Representative; the contractor shall not install a blow-off valve without the proper authorization.

Pressure Testing

All water mains and services shall be pressure tested. A pressure test is required before any water supply main will be accepted. Water mains will not be tested during disinfection.

1. Services and mains 2-inches in diameter or greater must be pressure tested as follows. Pressurize the water line to 150 psi (min) or 1.5 times the static pressure in excess of 100 psi - **not to exceed 200 psi**. The static pressure must hold for one hour to be acceptable.
2. Services less than 2" shall be tested by one of two methods.
 - a. Pressurize the water line from the meter horn back to a closed valve to a pressure of 100 psi. The pressure must hold for 15 minutes to be acceptable.
 - b. Static test using the pressure from the adjacent water main. With, 1) the valve open, 2) the service bled and shut off inside the building or crimped at the building, and 3) the trench open and accessible to the inspector with appropriate safety measures available (trench box, etc.), the service shall not show any signs of leaking for a minimum of 15 minutes.
3. Tests will be performed by the Contractor or a reputable testing firm. A City of Concord Representative shall be present to witness the test. The test results shall be forwarded to Engineering Services or their consultant for review and acceptance.

Bacterial Testing / Disinfection

All water lines greater than two inches in diameter must be disinfected. Disinfection shall be in accordance with the American Water Works Association (AWWA) standard **C651-86** (Disinfecting Water Mains). The contractor will use a liquid disinfectant to clean the pipeline. Engineering Services recommends a chlorine concentration of 100 ppm. An

Engineering Services Inspector must be present to witness the disinfection and operate all City valves. The Contractor will take water samples for bacterial analysis to a State certified testing laboratory. The reports shall be directed to the Community Development Department – Engineering Services Division.