

General Construction and Water Notes:**Main Extension Notes:**

1. All materials and workmanship shall be in conformance with Denver Water's Engineering Standards, Materials Specifications, and Drawings. All main installations/system modifications will be approved and inspected by Denver Water.
2. Contractors shall maintain a copy of the current Engineering Standards on-site at all times during construction. See the chart below for a quick reference to the frequently used material specifications.

Material Specification Quick References:

Material Specification	Description
MS 01	DI Pipe
MS 02	PVC Pipe
MS 03	Fittings
MS 4, MS 5	Valves
MS 8	Tapping Valves
MS 9	Tapping Sleeves
MS 12	Valve Boxes (Recycled water system valve boxes shall be fitted with triangular covers cast with the words "Denver Water Recycles" and shall be coated with a fusion bonded epoxy coating, pantone 2577U in color.)
MS 13	Dry Barrel Fire Hydrants
MS 23	Brass and Bronze Goods
MS 29	Restraint Device

3. Tracer wire, 12 gauge, shall be installed on all non-metallic water mains.
4. For all pipe installations, the depth of cover over the pipe, measured from official street grade to the top of the pipe, shall be a minimum of 4-1/2 feet and shall be

known as the *cover over the pipe*. If difficulties arise when crossing interference, and where specifically approved by Denver Water, deviations from 4-1/2 feet of cover will be permitted. The cover over the pipe shall be a minimum of 4-1/2 feet and a maximum of 10 feet. Refer to Standard Drawing Sheet 16.

5. Any changes in alignment and grade shall be authorized by Denver Water and shall be accomplished by the installation of additional fittings. The deflection of joints is permitted only when installing pipe on horizontal or vertical curves.
6. The Contractor shall adjust all valve boxes and fire hydrants to the final finished grade.
7. All bends, tees, fire hydrants, blow-offs, and plugs at dead-end mains shall be protected from thrust with mechanical restraint and concrete thrust blocks in accordance with Denver Water's Engineering Standard Drawings Sheet 28 and 32.
8. All valves are to be located on property line extensions, except for tapping tees where an additional valve shall be placed on the tapping tee. Other valve locations may be required as shown on the plans.
9. When it is necessary to lower or raise water lines at storm drains and other utility crossings, a minimum clearance of 1.5 feet shall be maintained between the outside of the pipes.
10. The Contractor shall have one signed copy of the approved water plans in his/her possession at all times.
11. Only one point of connection will be allowed until the testing of the new installations is complete.
12. Newly installed water mains and firelines shall be hydrostatically tested in accordance with Denver Water Engineering Standards, Section 8.25.
13. Prior to the installation of water mains, road construction must have progressed to at least the sub-grade state. Sub-grade is defined as an elevation of no more than 7 inches below the finished street grade.
14. The Contractor is responsible for:
 - a. Notifying customers who may be affected by a water outage during construction.
 - b. Obtaining, at the Contractor's expense, applicable licenses, permits, bonds, etc. that are required for the main installation/system modification.
 - c. Contact Denver Water's Construction Engineering personnel for the Pre-construction Meeting and Inspection, 303-628-6038, at least 48 hours prior to beginning construction. In the event of an emergency in Denver or in a Total Service Area after working hours, call Denver Water's Westside Dispatcher: 303-628-6390. In a Master Meter District, please contact the representative of the District in which the Project is taking place.
 - d. Paying all additional charges for inspection outside normal work hours.

Note: Be advised that on occasion valves in our system may be inoperable. On such occasions, it may become necessary to back up an additional block for the shut out. If that occurs, make additional notifications to customers with the mandatory 24 hours advance notice. When valve maintenance is required, a delay of several days should be expected.

Tap and Meter Notes (for Denver, Total Service, and Read and Bill Areas only. In Master Meter Districts, please refer to the Specification for that District).

1. Before any taps are made from mains, application(s) for the taps must be received and approved by the Distributor and by Denver Water.
2. Denver Water will make all taps that are 2 inches and smaller.
3. Individual service line PRVs are required when area pressure exceeds 80 psi.
4. Services and Meters:
 - a. The Contractor shall hold an on-site pre-construction conference with the Meter Inspector for all taps, service lines, and meters larger than one inch, and for projects involving more than one tap and service. To schedule a pre-construction conference call 303-628-6145.
 - b. A copy of these plans with Denver Water's approval sticker must be present on-site at the time the tap is made and at the time the meter is inspected or installed.
 - c. Prior to the tap being made, the service address shall be posted, along with the curb valve, meter yoke, and meter pit/vault installed. Upon tap installation, the contractor may request the Meter Inspection after the first pour of concrete has occurred. The service address shall remain posted until the meter setting passes inspection.
 - d. A Soil Amendment inspection will be required prior to the completion of the Certificate of Occupancy. Contact Conservation at 303-628-6670 for information and to schedule a soil amendment inspection.
 - e. Meters cannot be set or inspected, or services activated, until the requirements for backflow prevention have been completed. Contact the Backflow Prevention Program personnel at 303-628-5940 for further information.
 - f. Allow at least 3 working days advance notice when scheduling taps. To schedule a tap call 303-628-6701; for questions related to a meter inspection call 303-628-6145. Service activation will take place when the service and meter setting pass inspection.
 - g. All meter and Automatic Meter Reading device locations shall be approved by a Denver Water meter inspector, except in Master Meter Distributor Districts.
 - h. Meter pits and vaults must be set flush with the final grade of the landscape, including proper depth of soil amendment. If final grading has not been completed at the time of meter inspection, the Owner will be required to raise or lower the meter pit/vault when final grade is established. Adjustment of the pit may require adjustment of the meter setting within the pit.
 - i. Meter setting, valves, and service lines from the main to the Backflow Preventer Assembly, if present, or to 5 feet after the meter vault, must meet all applicable Engineering Standards in effect at the time of activation. If necessary to comply with current standards, modifications may be required from the details on these plans.
 - j. No present or future fences or walls are permitted between the Right Of Way (ROW) or easement and the meter setting. There shall be no permanent obstructions within 5 feet of the outside wall of the meter pit or vault.

- k. Tap relocation (from what is shown on these plans) may be necessary to avoid paved areas or other obstructions that are not shown on the plans. Deviations from these plans and standards must be approved prior to construction.
- l. Inside the City of Denver and in Total Service and Read & Bill Distributor Districts, meters must be furnished with Automatic Meter Reading (AMR) devices as specified by Denver Water. The AMR devices will be installed by Denver Water at the time of service activation.
- m. Meter pits and vaults shall have appropriate lids based on the location and the application. Contact Meter Inspection at 303-628-6145 to determine the correct lid configuration.
- n. The Contractor shall provide a remote AMR device mounting box when required. Install a double-gang 4x4 electrical junction box; mount as directed 7 feet above grade. Install Belden #9451 cable in 3/4-inch or larger conduit from the meter to the mounting box. Two boxes and two cables are required for compound meters.
- o. Inside the City of Denver, all multi-family dwellings with a single tap, service line, and meter are required to sub-meter each individual unit (Sec 401.3.2 of Denver modifications to the International Plumbing Code, Ordinance Number 576, Series of 2004). Call the City and County of Denver Plumbing Inspector for information at 720-865-2625.
- p. Inside the City of Denver, all service lines must be installed to avoid existing or proposed street trees. Contact the City and County of Denver's Forester at 720-913-0647 for information.
- q. Existing services must be metered at all times until the tap has been cut at the main and witnessed by Denver Water.

Cross-Connection Control Requirements:

The licensees listed below shall be in conformance with Denver Water's Engineering Standards, Chapter 5.05, *Cross-Connection Control and Backflow Prevention*. Backflow prevention assemblies are required to be installed on the following water service lines:

1. **Commercial Properties:** Real estate zoned for businesses and/or industrial use that consist of six or more units with a domestic, fireline, or dedicated water irrigation service tap (defined as such for cross-connection purposes).
 - o Domestic, dedicated irrigation, fireline and/or recycled water service lines.
2. **Multi-Family Residential:** A dwelling with two to five units with a domestic, fireline, and/or dedicated water service tap (defined as such for cross-connection purposes).
 - o Premises over three stories/greater than 30 feet, fire protection system, common boiler, auxiliary water, swimming pool and irrigation systems.
3. **Single Family Residents:** A single unit dwelling (defined as such for cross-connection purposes)
 - o Dual Water Supply Agreement.

- A. All backflow prevention assemblies shall be a model manufactured in compliance with AWWA C510 and C511 and shall have met the specifications by the University of California Foundation for Cross-Connection Control and Hydraulic Research:

Foundation for Cross-Connection Control and
Hydraulic Research
School of Engineering MC-2531
University of Southern California
P.O. Box 77902
Los Angeles, CA 90007
Foundation Office: (866) 545-6340
<http://www.usc.edu/dept/fccchr/>

- B. The licensee is required to have a certified American Backflow Prevention Association (ABPA) or American Society of Sanitary Engineering (ASSE) tester inspect and test the existing and/or newly installed containment backflow prevention assemblies on the dedicated water service lines (domestic, dedicated irrigation, fireline, and recycled) upon installation and annually thereafter.
- C. The ABPA or ASSE certified backflow tester is responsible to meet the requirements listed in the Engineering Standards, Chapter 5.05.
- o If the ABPA or ASSE certified backflow tester is testing a backflow prevention assembly installed on a recycled water service line, the tester is required to have a dedicated recycled water test gauge.
- D. Within 48 hours of Denver Water setting the meter and turning on the water service, the ABPA or ASSE certified backflow tester is required to submit the containment backflow assembly test report(s) to the Cross-Connection Control Office:

Phone: 303-628-5969
Fax: 303-794-8325
E-mail: CrossConnectionControl@denverwater.org
Mailing Address: Denver Water
Attn: Cross-Connection Control
6100 W. Quincy Avenue
Denver, CO 80235

- E. There shall be no unprotected takeoffs from the service line ahead of any meter or ahead of a backflow prevention assembly located at the point of delivery to the customer's water system.
- F. No branch lines or taps are allowed on dedicated commercial irrigation water service lines or recycled water service lines for domestic (potable) use (e.g., drinking fountains, water play features, swimming pool, restroom facilities, etc.):
1. Between the irrigation tap and the meter.
 2. Between the meter and the backflow prevention assembly.
 3. Downstream from the backflow prevention assembly.

4. Commercial Irrigation Water Service Line Taps:

- Comply with the Cross-Connection Control requirements listed above (A-F).
- Require an approved USC FCCCHR Reduced Pressure Principle (RP) backflow prevention assembly to be installed 5 feet downstream from the meter pit as an above ground installation before any connections. *Refer to the manufacturer's installation instructions for height and orientation requirements.*
 - If the backflow prevention assembly cannot be installed 5 feet downstream from the meter pit, include a variance letter justifying the need for relocation.

5. Recycled Water Service Lines Taps:

Backflow prevention assemblies are required to be installed on commercial recycled water service line taps:

- If chemical injection is used downstream from the meter.
- If pumps are used downstream from the meter.
- If the existing or proposed system poses a risk to the integrity of the recycled water system.
 - Comply with the Cross-Connection Control requirements listed above (A-F).
 - Require an approved USC FCCCHR Reduced Pressure Principle (RP) backflow prevention assembly to be installed 5 feet downstream from the meter pit as an above ground installation before any connections. *Refer to the manufacturer's installation instructions for height and orientation requirements.*
 - If the backflow prevention assembly cannot be installed 5 feet downstream from the meter pit, include a variance letter justifying the need for relocation.
 - Backflow prevention assemblies installed on recycled water service lines shall be identified as "Recycled Water."

6. Recycled or Raw Water (ditch water, pond, well, etc.) used for irrigation on the premises:

- Comply with the Cross-Connection Control requirements listed above (A-F).
- Requires an approved USC FCCCHR backflow prevention assembly (containment) to be installed 5 feet downstream from the meter pit on any potable water service line.
 - The backflow assembly type is determined by the 'Degree of Hazard' downstream from the meter; refer to Denver Water's Engineering Standards, 1.06, *Degree of Hazard*, or contact Cross-Connection Control at 303-628-5940.

7. It is at the sole discretion of Denver Water's Cross-Connection Control section to approve a variance request related to a proposed backflow prevention assembly installation.

Health Notes/Water Quality:

1. The Colorado Department of Public Health & Environment (CDPHE) regulates asbestos activities through the Air Pollution Control Division (APCD) and the Solid Waste and Materials Management Division (SWMMD) when soil contamination is involved. Denver Water will require contractors and developers to follow the procedures below when cement asbestos pipe is encountered:
 - The pipe must be removed from the excavation for proper disposal.
 - The Contractor/Developer will manage the pipe in accordance with the following regulations:
 - Colorado Air Regulations No 8 – Control of Hazardous Air Pollutants
 - OSHA 29 CFR 1910.1001 – General Industry Standards – Asbestos
 - OSHA 29 CFR 1926.1101 – Construction Standards – Asbestos
 - If large amounts of cement asbestos pipe are anticipated to be removed, the material must be managed by an appropriate asbestos abatement contractor (**160 square feet or 260 linear feet will require a permit**).

Note: Cement Asbestos Pipe is considered a non-friable asbestos material, defined as containing more than 1% asbestos by weight, and cannot be crumbled, pulverized, or reduced to powder by hand pressure. Therefore, a release of asbestos fibers is not likely during normal use and handling of this material.

2. Denver Water personnel are **not** responsible for work site safety or the compliance/enforcement of safety regulations and standards established by other agencies. All safety compliance/enforcement at the work site shall be the Contractor's sole responsibility.
3. The Water Quality Control Division of The Colorado Department of Public Health and Environment (CDPHE) requires all water line contractors to possess a current Discharge Permit for discharges of chlorinated and process waters associated with the installation of new mains or conduits. Contact CDPHE Water Quality Control Division at 303-692-3539 for information on obtaining the required permit.
4. Chlorination and Flushing: All water mains shall be installed and chlorinated in accordance with Denver Water's Engineering Standards, Section 8.24. The lines shall be chlorinated in accordance with AWWA C-651, "Disinfecting Water Mains." The preferred method is to use sufficient chlorine tablets to produce a 25 mg/l solution. Tablets should be attached to the top of the pipe with an approved adhesive certified to NSF Standard 61, prior to pipe installation in the trench. Chlorination of 16 inch and larger pipe requires a chlorine slurry. The chlorination of any finished pipeline shall be completed prior to hydrostatic testing.

Irrigation Notes:

1. Irrigation of medians and other public landscaped areas less than 25 feet in width must be done in accordance with Denver Water Operating Rule 14.02.3. (Call DW Conservation Section at 303-628-6343 for information regarding irrigation systems.)

- For strips of land less than 6 feet in width – Spray irrigation shall be prohibited. Low-flow irrigation systems are required.
 - For strips of land between 6 feet and 15 feet in width – Only low flow irrigation, or spray irrigation using low-angle spray nozzles designed for the specific width to be irrigated shall be permitted. All spray heads must be pressure reducing and designed to prevent low head drainage.
 - For strips of land more than 15 feet in width – Only gear-driven rotors with low angle nozzles may be used to irrigate turf areas. Planting beds may be irrigated with low-flow or spray irrigation. All spray heads must be pressure reducing and designed to prevent low head drainage.
2. Irrigation service lines require an approved University of Southern California (USC) Reduced Pressure Principle (RP) backflow prevention assembly (containment) to be installed 5 feet downstream from the meter pit as an above ground installation before any connections. *Refer to the manufacturer's installation instructions for height and orientation requirements.*
 3. If recycled or raw water (ditch water, pond, well, etc.) is used for irrigation on the premises, an approved University of Southern California (USC) backflow prevention assembly (containment) shall be installed 5 feet downstream from the meter pit on **any potable water service line**. The backflow assembly type is determined by the degree of hazard downstream from the meter (RP-High Hazard installed above ground or DC-Low Hazard installed below ground – 60 inch diameter manhole). For additional information, please reference Denver Water's Engineering Standards, 6.11, or contact Cross-Connection Control at 303-628-5940.
 4. A soil amendment will be required on every property requiring new water service.

DISCLAIMER: Denver Water Standard Operating Procedures represent recommended practices that should be applicable to most situations encountered. These procedures should be followed to the extent applicable; however, they by no means represent the only method to perform the tasks they describe. It is understood that field conditions, emergencies, and other circumstances may require deviation from Standard Operating Procedures.