PLATTE CANYON
WATER AND SANITATION DISTRICT

WATER SYSTEM
STANDARDS AND SPECIFICATIONS

Revised: April 8, 2014
# WATER SYSTEM STANDARDS AND SPECIFICATIONS

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PLATTE CANYON WATER AND SANITATION DISTRICT
WATER SYSTEM STANDARDS AND SPECIFICATIONS

FORWARD

AUTHORITY

These Standards and Specifications are promulgated by the Board of Directors of Platte Canyon Water and Sanitation District. Administration of the Standards and Specifications including interpretation, enforcement, revision, waiver, and variance is delegated by the Board of Directors to the District Manager or his appointed representative. Any variance request must be submitted in writing to the District Manager for review.

EFFECTIVE DATE

These Standards and Specifications shall be effective on August 1, 2011 and shall supersede all former Water System Standards and Specifications of the Platte Canyon Water and Sanitation District.

REVISIONS, AMENDMENTS OR ADDITIONS

These Standards and Specifications may be revised, amended, or added to from time to time. Such revisions, amendments or additions shall be binding and in full force and effect upon adoption by the Board of Directors of Platte Canyon Water and Sanitation District.

PLATTE CANYON WATER AND SANITATION DISTRICT CONTROL

These Standards and Specifications shall apply to the installation, operation, and maintenance of all water facilities under the ownership and/or control of Platte Canyon Water and Sanitation District.

Notwithstanding any variance from these Standards and Specifications that occurred or was authorized in the past, or that may be authorized in the future, Platte Canyon Water and Sanitation District shall not be restricted or limited in the exercise of its lawful powers. No action in violation of these Standards and Specifications direct or indirect, of or by any person, including any owner, operator, or agent of an owner or operator of any water facility in making any connection, disconnection, repair, or otherwise doing work with respect to any water facility served with water from the Platte Canyon Water and Sanitation District system, shall continue after discovery of such violation, or the enforcement of corrective action as to such violation.
ORGANIZATION AND INTERPRETATION OF STANDARDS AND SPECIFICATIONS

These Standards and Specifications are composed of Administrative Procedures and Requirements, Technical Engineering Standards, Material Specifications, Standard Drawings and Construction Plan Notes and Exhibits. The interpretation of any section, or of differences between sections, shall be made by the District Manager or an appointed representative, and their interpretation shall be binding and controlling in its application.

Whenever there is a conflict between these Standards and Specifications and any referenced standard, specification or code the most stringent requirement shall apply and shall mean the latest edition.
DEFINITIONS

As used in these Standards and Specifications, unless the context shall otherwise require, the words defined in this paragraph shall have the meanings herein ascribed:

**Air-Gap**: The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device, and the flood level rim of said vessels. An approved air-gap will be at least double the diameter of the supply pipe, measured vertically, above the top of the overflow rim of the overflow rim of the vessel, and in no case less than one inch.

**American Backflow Prevention Association (ABPA) Certified Backflow Prevention Assembly Tester**: An individual with the proven ability to field test backflow prevention assemblies to the satisfaction of the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC FCCCHR) program. The certified individual is required to perform field tests and prepare reports on backflow prevention assemblies and shall be conversant in applicable laws, rules and regulations and experienced in plumbing or pipe fitting.

**American Society of Sanitary Engineering (ASSE) Backflow Prevention Assembly Tester**: An individual who has the proven ability in field testing backflow prevention assemblies to the satisfaction of the ASSE Series 5000 program. The certified individual is required to perform field tests and prepare reports on backflow prevention assemblies and shall be conversant in applicable laws, rules and regulations and experienced in plumbing or pipe fitting.

**Applicant for System Extension**: Any person, association, corporation, entity, or government agency desiring water service for premises under their control and having entered into an agreement for extension of water mains with the District; often a subdivider or developer. Also referred to as Applicant.

**Atmospheric Vacuum Breaker**: A backflow prevention assembly that is constructed with a 90 degree elbow and a hood that allows air to enter the system through a poppet valve that drops allowing air to enter when atmospheric pressure drops; it thereby breaks the siphon. This type of assembly is NOT approved by Denver Water.

**Back Pressure**: Backflow caused by a pump, elevated tank, boiler, pressure in pipe, or any means that could create greater pressure within a piping system than that which exists within the potable water supply.

**Backflow**: The flow of water or other liquids, mixtures, gases, or substances into the distribution pipes of a potable water supply, from any source other than its intended source.
**Backflow Prevention**: The prevention of the flow of any foreign liquids, gases or substances into the pipe lines of a potable supply of water by the installation of backflow prevention assemblies or the air-gap method.

**Backpressure**: An elevation in pressure in the downstream piping system that can cause a reversal in the normal direction of flow at a particular point. The elevation in pressure can be caused by pumping, air pressure, steam or the elevation of piping.

**Backsiphonage**: A form of backflow that is a result of negative or sub-atmospheric pressure within the water system.

**Board**: The Board of Directors of Platte Canyon Water and Sanitation District.

**Certified Welder**: A skilled welder, welding operator or tacker who has had adequate experience in the method of materials to be used and is qualified under the provisions of the American Welding Society Standard (AWS) D1.1 using test position 6G.

Welders shall be qualified by an independent, local, approved testing agency not more than six months prior to commencing work. Machine and electrodes similar to those used in the work shall be used in qualification tests.

**Commercial Property**: Real estate zoned for business and/or industrial use that consists of six or more units with a domestic, fireline or dedicated water irrigation service tap (defined as such for cross-connection purposes).

**Consumer**: Any person, firm, or corporation using or receiving water from the water system of the Platte Canyon Water and Sanitation District.

**Containment by Isolation**: The installation of a low hazard USC FCCCHR Double Check Valve backflow prevention assembly (containment) and a high hazard USC FCCCHR Reduced Pressure Principle backflow prevention assembly (isolation). They shall be installed on a designated branch line and are acceptable as a means of protecting private plumbing and the public water supply. Installation is at the discretion of the District.

**Contamination**: Potable water quality impairment by sewage, industrial fluids, waste liquids, compounds or other materials to a degree that creates an actual or potential hazard to public health.

**Contractor**: In the context of these Standards and Specifications, a Contractor employed by an Applicant for a distribution system extension.

**Control Valve**: A valve used to isolate conditions downstream from the meter on a specified branch line within a private plumbing system (irrigation system, boiler, fireline, etc.). This type of valve may also be referred to as an Isolation Valve.
**Cross-Connection Control**: An administered program that is designed to protect the public health, public drinking water supply and recycled distribution system by the regulation and monitoring of the installation and maintenance of backflow prevention assemblies on a potable water service connection.

**Containment Protection**: The installation of a USC FCCCHR approved backflow prevention assembly on a dedicated water service line that protects the public water system from an actual or potential cross-connection within a private plumbing system. Examples of potential cross-connections are listed in Section 2.03.

**Isolation Protection**: The installation of a USC FCCCHR approved backflow prevention assembly within a building or facility’s private plumbing system near the source(s) of pollution or contamination in order to protect the internal plumbing from an actual or potential cross connection; refer to Section 2.03.

**Degree of Hazard**: Refers to a pollutant (non-health risk) or contaminant (health risk) hazard and is determined by the conditions within a system. (See Low Hazard and High Hazard)

**Denver Water**: The plant, facilities, system, assets, and personnel controlled by the Denver Board of Water Commission pursuant to its Charter authority.

**Detector Check Valve**: An assembly that records low-volume water usage through a fireline service that is accepted and approved by the District and Denver Water. The Detector Check Valve may be combined with an appropriate backflow prevention assembly to form a Double Detector Check Valve Assembly or a Reduced Pressure Detector Check Valve Assembly.

**Design Engineer**: A civil engineer licensed to practice in the State of Colorado who is employed by the Applicant to perform engineering services.

**Distribution Main**: 12-inch or smaller diameter pipe that is installed in public streets or appropriate rights-of-way and used for the distribution of water to consumers.

**Distribution Main Valves**: Valves on Distribution Mains that are direct buried (as opposed to Transmission Main Valves that must be contained within a vault).

**Distribution System**: Mains of 12-inch and smaller diameter pipe, together with all appurtenant and necessary valves, fire hydrants, taps, meters, service pipes, and associated materials, property, and equipment receiving potable water from conduits and transmission mains distributing it to individual consumers.

**District**: The Platte Canyon Water and Sanitation District.

**District Engineer**: The engineering firm authorized by the Platte Canyon Water and Sanitation District to provide engineering services on behalf of the District.
**District Manager**: The Chief executive officer of the District designated as such by the District’s Board of Directors.

**Domestic Service**: Pipes, fittings and appurtenances that are needed to convey water from the tap on District facilities to the plumbing of consumer premises for human consumption.

**Double Check (DC) Valve**: An assembly composed of two independently acting approved check valves between two tightly closing resilient seated shutoff valves attached at each end and fitted with properly located resilient seated test cocks. This type of assembly is used on direct or indirect water connections through which pollutants may enter the potable water system in backflow conditions.

**Dual Water Supply Agreement**: An agreement between the District, Denver Water and a Property Owner declaring that the premises has or may have sources of water supply other than the District’s potable system. The Property Owner agrees that they will NOT cause or permit the presence of any condition or uncontrolled connection, either actual or potential, at the premises documented on the agreement. The property owner shall, at their cost, install a USC FCCHR backflow prevention assembly on the domestic service line supplied to the premises and shall hire an ABPA or ASSE certified tester to test the assembly upon installation and annually thereafter. A copy of the test reports shall be submitted to Denver Water’s Cross-Connection Control Section.

**Fireline**: Pipe, fittings and appurtenances for the conveyance of water from Distribution Mains to the consumer for fire protection purposes, specifically for automatic sprinkler systems. For the purposes of these Standards, the fireline extends from the corporation stop tapping valve or tee on the water main to the edge of the public right-of-way or easement that contains the water main.

**Head Loss**: The measure of the reduction in the total head of the liquid as it moves through a system. In the District’s system, head loss constraints are: 2 feet per thousand in distribution mains, 1.5 feet per thousand in transmission mains and 1 foot per thousand in conduits.

**High Hazard**: A vulnerability from a facility’s private plumbing system that would constitute a health risk to the internal plumbing and/or public water system by the introduction of a contaminant such as sewage, industrial fluids, waste liquids, compounds or other materials, the introduction of which would cause a poisoning of the water supply or the spread of disease.

**Hydrant Branch**: The portion of piping that extends from the water main to the fire hydrant.

**Hydraulic Grade Line**: In pipelines flowing under pressure, the hydraulic grade line is the level to which water would rise in a vertical tube (open to atmospheric pressure) at any point along the pipeline.
**Industrial Piping System:** Any system used by a consumer for the transmission or confinement, or storage of any fluid, solid, or gaseous substance other than an approved water supply, including all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey or store substances which are or may be polluted or contaminated.

**Irrigation Service:** Pipes, fittings and appurtenances that are used to convey water from the tap on the District’s facilities to the plumbing of consumer premises that is only used for irrigation.

**Isolation Valve:** A valve used to isolate conditions downstream from the meter on a specified branch line within a private plumbing system (irrigation system, boiler, fireline, etc.). This type of valve may also be referred to as a Control Valve.

**Low Hazard:** A vulnerability that is NOT considered a public health risk from a facility’s private plumbing system. It may constitute a nuisance, be aesthetically objectionable or could cause damage to the internal plumbing and/or public water system.

**Main Extensions:** Extensions to the water distribution system owned and controlled by the Platte Canyon Water and Sanitation District.

**Multi-Family Residential:** A dwelling with three or more units with a domestic, fireline and/or dedicated water service tap (defined as such for cross-connection purposes).

**Non-Toxic Substance:** Any substance of a non-poisonous nature that may create a minor or moderate hazard to the domestic water system.

**Pollution:** An impairment of the quality of the water to a degree which does not create an actual hazard to the public health, but which does adversely and unreasonably affect such waters for domestic use.

**Pressure Vacuum Breaker:** A vacuum breaker designed to prevent backsiphonage only. It consists of a spring loaded check valve, a spring loaded inlet opening, a tightly closing shut off valve on each side of the assembly and two appropriately located test cocks. This type of assembly shall NOT be subjected to backpressure.

**Reduced Pressure Principal Assembly:** A testable assembly comprised of two internally loaded, independently operating check valves with a hydraulic, automatic operating, differential relief valve located between the check valves. The assembly is specifically designed to maintain a continual zone of reduced pressure between the two check valves. The relief valve shall be located between two tightly closing upstream and downstream (resilient seated) shut-off valves, and four properly located test cocks for the testing of the valves. This assembly is used for the protection of the potable water supply wherever a direct or indirect connection is made to a point of use involving any substance that may present a health hazard. The unit shall be a USC FCCCHR approved backflow prevention assembly designed to protect against a non-health and/or health hazard condition.
**Service Line**: Pipe, fittings and appurtenances that are used for the conveyance of water from the distribution mains to the consumer for domestic use or for irrigation. For the purposes of these Standards, the service line extends from the corporation stop or tee on the water main to the first valve inside the premises after the water meter; i.e., to the stop-and-waste valve adjacent to the building for an outside meter set, the meter outlet valve for an inside meter set or the irrigation control valve for an irrigation service.

**Single Family Residential**: A single unit dwelling (defined as such for cross connection purposes).

**Stop Box**: A valve box, service box or curb box that is set over the property line valve or curb stop on a domestic water service.

**Stub-in**: A tap made for the purpose of installing service lines prior to the paving of streets. Any such connection shall include the fittings that are necessary to extend the service line to the valve at the property line. The conversion of a stub-in to an active service line shall be subject to conditions of the the District’s stub-in agreement.

**Tap**: Physical connection to a District water main which, together with appropriate permits, effects water service to individual customers.

**Toxic Substance**: Any substance (liquid, solid, or gaseous) including raw sewage and lethal substances which, when introduced into the water supply system, creates or may create a danger to the health and well-being of the consumer.

**Transition Main**: A 16 inch or 20 inch diameter pipe receiving recycled or potable water from a conduit and distributing it to individual consumers.

**Transmission Main Valves**: 16-inch and 20-inch valves that must be contained within a vault (as opposed to Distribution Main Valves that are direct buried).

**Water Feature**: A structural design element that is NOT intended for human contact; it is supplied by potable or recycled water and is located indoors or outdoors with items ranging from fountains, pools, ponds, cascades, waterfalls and streams normally powered by pumps. The use of recycled water is subject to approval of the District, Denver Water and the Colorado Department of Public Health and Environment; agreements for use shall be signed in conformance with the District requirements.

**Water Main or Distribution Main**: A 12 inch or smaller diameter pipe along public streets or appropriate rights-of-way used for distributing water to individual consumers.

**Water Play Feature**: A structural design element (e.g. interactive fountain) intended for recreational use (human contact) that is supplied with potable water normally powered by pumps. The use of irrigation, fire and/or recycled water is prohibited.
**Water-Potable:** Water from any source which has been investigated by the health agency having jurisdiction, and which has been approved for human consumption.

**Water-Nonpotable:** Water such as treated domestic wastewater, groundwater and well water which is suitable for various beneficial uses excluding human consumption.

**Water Supply-Auxiliary:** Any water source or system other than the public water supply that may be available in the customer’s building or premise.

**Water Supply-Unapproved:** A water supply, which has not been approved for human consumption by the official health authority having jurisdiction.

**Water System-Consumer:** Any water system located on the consumer’s premises whether supplied by a public potable water system or an auxiliary water supply.

**Water Service Connections:** The terminal end of a service connection from Platte Canyon’s water system; i.e., where Platte Canyon loses jurisdiction and quality control over the water at its point of delivery to the customer’s water system. The service connection will mean the downstream end of the meter. There should be no unprotected takeoffs from the service line ahead of any meter or a backflow prevention device located at the point of delivery to the customer’s water system. Service connection will also include water service connection from a fire hydrant, fireline, and any other temporary or emergency water service connection from Platte Canyon’s potable water system.

**Welder:** See Certified Welder.
## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AASHTO:</td>
<td>American Association Of State Highway And Transportation Officials</td>
</tr>
<tr>
<td>ABPA:</td>
<td>American Backflow Prevention Association</td>
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<tr>
<td>AC:</td>
<td>Asbestos Cement or Alternating Current</td>
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<td>AFBMA:</td>
<td>Anti-Friction Bearing Manufacturers Association</td>
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<tr>
<td>AG:</td>
<td>Air-gap</td>
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<td>ANSI:</td>
<td>American National Standard Institute, Inc.</td>
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<td>ASC:</td>
<td>Automatic Sprinkler Connection</td>
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<td>ASSE:</td>
<td>American Society of Sanitary Engineering</td>
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<td>ASTM:</td>
<td>American Society Of Testing And Materials</td>
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<tr>
<td>AV:</td>
<td>Air Valve</td>
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<td>AVE:</td>
<td>Avenue</td>
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<td>AWG:</td>
<td>American Wire Gauge</td>
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<td>AWS:</td>
<td>American Welding Society</td>
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<td>AWWA:</td>
<td>American Water Works Association</td>
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<tr>
<td>BFV:</td>
<td>Butterfly Valve</td>
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<td>BLDG:</td>
<td>Building</td>
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<td>BO:</td>
<td>Blowoff</td>
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<td>BOT:</td>
<td>Bottom</td>
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<td>BP:</td>
<td>Backpressure</td>
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<td>BFPA:</td>
<td>Backflow Prevention Assembly</td>
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<td>BRG:</td>
<td>Bearing</td>
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<td>Abbreviation</td>
<td>Definition</td>
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<td>BS</td>
<td>Backsiphonage</td>
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<td>BV</td>
<td>Ball Valve</td>
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<td>CAD</td>
<td>Computer Aided Drafting</td>
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<tr>
<td>CBI</td>
<td>Containment by Isolation</td>
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<td>CHKV</td>
<td>Check Valve</td>
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<td>CI</td>
<td>Cast Iron</td>
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<td>CL</td>
<td>Centerline</td>
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<td>DC</td>
<td>Direct Current, Double Check Valve</td>
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<td>DCDA</td>
<td>Double Check Detector Assembly</td>
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<td>DI</td>
<td>Ductile Iron</td>
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<tr>
<td>ERT</td>
<td>Encoder-Receiver-Transmitter</td>
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<tr>
<td>ESMT</td>
<td>Easement</td>
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<td>FL</td>
<td>Flow Line</td>
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<td>FLG</td>
<td>Flange</td>
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<tr>
<td>FMCT</td>
<td>Fireline Meter And Compound Torrent</td>
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<td>GV</td>
<td>Gate Valve</td>
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<td>HGL</td>
<td>Hydraulic Grade Line</td>
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<td>HYD</td>
<td>Hydrant</td>
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<td>IBC</td>
<td>International Building Code</td>
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<td>ID</td>
<td>Inside Diameter</td>
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<td>IEEE</td>
<td>Institute Of Electrical And Electronics Engineers</td>
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<td>IP</td>
<td>Iron Pipe</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>IRR</td>
<td>Irrigation</td>
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<tr>
<td>ISA</td>
<td>Instrument Society Of America</td>
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<tr>
<td>KVA</td>
<td>Kilo-Volt-Amperes</td>
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<tr>
<td>MEE</td>
<td>Machined Each End</td>
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<tr>
<td>MH</td>
<td>Manhole</td>
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<tr>
<td>MJ</td>
<td>Mechanical Joint</td>
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<tr>
<td>MOA</td>
<td>Machined Over All</td>
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<tr>
<td>MSS</td>
<td>Manufacturer’s Standardization Society Of Valve And Fittings</td>
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<tr>
<td>NEC</td>
<td>National Electrical Code</td>
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<tr>
<td>NEMA</td>
<td>National Electrical Manufacturer’s Association</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<td>NPT</td>
<td>National Pipe Thread</td>
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<td>NSF</td>
<td>National Sanitation Foundation</td>
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<tr>
<td>OC</td>
<td>On Center</td>
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<tr>
<td>OD</td>
<td>Outside Diameter</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety And Health Administration</td>
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<tr>
<td>PL</td>
<td>Property Line</td>
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<tr>
<td>PRV</td>
<td>Pressure Regulating Valve</td>
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<tr>
<td>PSF</td>
<td>Pounds Per Square Foot</td>
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<tr>
<td>PSI</td>
<td>Pounds Per Square Inch</td>
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<tr>
<td>PUD/PBG</td>
<td>Planned Unit Development/Planned Building Group</td>
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<tr>
<td>PVB</td>
<td>Pressure Vacuum Breaker</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
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<tr>
<td>ROW</td>
<td>Right(s)-of-Way</td>
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<tr>
<td>RPDA</td>
<td>Reduced Pressure Detector Assembly</td>
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<tr>
<td>RP</td>
<td>Reduced Pressure Principle</td>
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<tr>
<td>SAE</td>
<td>Society Of Automotive Engineers</td>
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<tr>
<td>SAN</td>
<td>Sanitary Sewer</td>
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<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>SD</td>
<td>Storm Drain, Supply Duct</td>
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<tr>
<td>SST</td>
<td>Stainless Steel</td>
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<tr>
<td>ST</td>
<td>Street</td>
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<td>STD</td>
<td>Standard</td>
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<tr>
<td>STL</td>
<td>Steel</td>
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<td>STRM</td>
<td>Storm Sewer</td>
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<tr>
<td>SWV</td>
<td>Stop &amp; Waste Valve</td>
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<tr>
<td>TOP</td>
<td>Top of Pipe</td>
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<tr>
<td>TYP</td>
<td>Typical</td>
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<tr>
<td>UBC</td>
<td>Uniform Building Code</td>
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<tr>
<td>UMC</td>
<td>Uniform Mechanical Code</td>
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<tr>
<td>UPC</td>
<td>Uniform Plumbing Code</td>
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<tr>
<td>USC FCCCHR</td>
<td>University of Southern California Foundation for Cross-Connection Control and Hydraulic Research</td>
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<tr>
<td>VB</td>
<td>Valve Box</td>
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<tr>
<td>WOG</td>
<td>Water-Oil-Gas</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td><strong>WRA:</strong></td>
<td>Water Reducing Agent</td>
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<td><strong>WSC:</strong></td>
<td>Water Service Contractor</td>
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<tr>
<td><strong>WSP:</strong></td>
<td>Working Steam Pressure</td>
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<tr>
<td><strong>WTR:</strong></td>
<td>Water</td>
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<tr>
<td><strong>WWF:</strong></td>
<td>Welded Wire Fabric</td>
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<tr>
<td><strong>W:</strong></td>
<td>With</td>
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<tr>
<td><strong>W/O:</strong></td>
<td>Without</td>
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<tr>
<td><strong>YD:</strong></td>
<td>Yard</td>
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CHAPTER 1

WATER SYSTEM ADMINISTRATIVE STANDARDS
1.01 WATER SYSTEM PLAN SUBMITTAL PROCEDURES AND GENERAL REQUIREMENTS

All plans for water main extensions, improvements and modifications shall be submitted to the Platte Canyon Water and Sanitation District for review and approval before any construction may occur. All plans must be approved by the District manager, District engineer, Denver Water Department, and applicable fire department prior to initiation of construction. Plans shall be submitted and reviewed in accordance with the following procedures and requirements.

A. Submittals

In order to initiate construction plan review the following items must be submitted to the District.

1. Construction Plans

Three sets of water system construction plans stamped and signed by a Professional Engineer licensed to practice in the State of Colorado. All plans and specifications submitted shall be in strict compliance with the Standards and Specifications contained herein and shall meet any special conditions that may be reasonably required. The design and installation of all facilities shall ensure development of an integrated water system. No work shall commence on any facilities until the plans and specifications are approved in writing by Platte Canyon Water and Sanitation District, Denver Water Department and the fire department having jurisdiction in the area. Plans and specifications should not be submitted for work that will not be installed within six months of the approval date.

a. Three sets of detailed plans and specifications for system extensions shall be submitted to the District for approval. The copies shall meet the requirements stated below:

   1. A cover sheet containing:

      a. The Project Name as well as the Section, Township and Range of its location.

      b. Name of the engineering firm.

      c. Engineering firm’s mailing address, email address, telephone and fax number.

      d. A general location map showing major roads within the project location.

      e. An index of the sheets within the plan set.
f. A list of the abbreviations and symbols and construction notes used along with identification of their meaning. (NOTE: *This list can become a separate drawing in the set at the discretion of the engineering firm*).

g. Fire flow data.

h. Fire Department signature block.

i. Summary of quantities table.

2. Water main in plan view (24” x 36” drawing) showing:

a. Location and dimensions of dedicated street, easements, and right-of-way.

b. Lots to be served.

c. Existing or proposed curb and gutter.

d. The proposed alignment of the water main and the location of all proposed water facilities such as valves, fire hydrants, fittings, etc.

e. A profile shall also be required on this plan for all transmission mains 16 inches in diameter and larger, and all water mains and transmission mains to be constructed within unpaved easements.

f. Proposed upstream and downstream hydraulic gradients on pressure regulating valves.

g. Proposed elevation, upstream and downstream hydraulic grade line and pressure on PRVs.

h. Meter location for domestic connections.

i. Location and size of taps, services, stub-ins, curb stops or property line valves and meters for firelines, domestic connections and irrigation services. Indicate irrigation and fire service lines to differentiate them from domestic services. A typical detail may be used, provided exceptions to the typical detail are clearly identified on the plan.

j. Dimensions from existing valves to proposed connections.

k. Existing water mains (valves, hydrants, size and type of pipe).
l. Isolation valves between proposed hydrants.

m. Domestic, fireline and irrigation services, including tap, curb stop or property line valve, and meter location shall be called out by size and service line to backflow prevention assembly. If a backflow prevention assembly is NOT required, show the service line to five feet past the meter pit or vault. If the curb stop/valve or meter pit/vault will be in a paved area, include a letter requesting variance that justifies why it is needed.

n. Backflow prevention assembly, including type, diameter and dimension in relationship to the meter and installation type.

3. Combined utilities plan view (separate from the water main plan) containing or showing:

   a. Location and dimensions of dedicated streets, easements and rights-of-way.

   b. Lots to be served.

   c. All existing or proposed curb and gutter.

   d. Existing and proposed utilities including but not limited to sanitary sewer mains, storm sewer mains, electrical, cable television and telephone conduits and natural gas distribution mains.

   e. Existing or proposed obstructions such as vaults, catch basins, traffic islands, etc.

   f. The proposed alignment of the water mains and the location of all proposed facilities, (i.e. valves, fire hydrants, fittings, etc.).

   g. Meter location for domestic connections.

   h. Location and size of taps, services, stub-ins, curb stops or property line valves and meters for firelines and domestic connections. A typical detail may be used, provided exceptions to the typical detail are clearly identified on the plan.

4. Typical street cross-sections showing:

   a. Property lines or easement lines.
b. Street curb and gutter, and existing or proposed utilities complete with dimensions to the property lines or easement lines.

5. Centerline profile of the streets showing:
   a. Official street grades.
   b. Existing ground line.
   c. Existing and proposed utility crossings of the proposed water main.
   d. Separation between water main and other utilities.
   e. Top of pipe profile of proposed 16-inch and larger transmission mains, and top of pipe profile of 12-inch water mains and all water mains within easements, if requested by the District.

6. A detail sheet showing all pertinent facility details such as: rodding, hydrant assemblies, blow-off installations, proposed crossings, etc. (see Chapter 4, Standard Drawings).

7. Plans shall meet the following requirements:
   a. Information on the drawings shall be clear and legible. the District reserves the right to reject any plans deemed to be unreadable.
   b. Plans shall be Architectural D (24”x36”) size or ANSI D (22”x34”) size.
   c. Drawings shall contain a title block in the lower right hand corner that contains pertinent information: project title, drawing scale, preparation date and a revision block to note the date of subsequent plan revisions.
   d. Drawings shall have the seal and signature of the Engineer of Record.
   e. Drawings shall be English Units at a scale shown on an Engineering Scale between 1” = 20’; 1” = 30’; 1” = 40’.
   f. Drawings (where applicable) shall contain a North Arrow with orientation to the top or left of the sheet preferred; however, the
orientation may be rotated in order to provide additional coverage and a larger, more readable plan.

g. Drawings shall bear the District’s approval stamp.

8. Additionally, all plans shall:

a. Be made from actual field surveys by a land surveyor registered in the State of Colorado, referenced to land corners or other official survey control points and be of sufficient accuracy so that the facilities can be accurately staked for installation and can be readily located after installation for maintenance, tapping and control.

b. Show the approved permanent water source which can supply sufficient water for chlorination, flushing, and hydrostatic testing and the anticipated water demand for this purpose.

c. Show sufficient adjacent area to identify the relationship between proposed new facilities and existing facilities.

d. Contain the following statement and appropriate signature on the cover sheet of the plans (insert the name of the fire department having jurisdiction):

```
“All fire hydrants shall be installed according to District and Denver Water Department Standards. The number and location(s) of fire hydrant(s) and fire flow as shown in this water main installation is correct as specified by the ______________________ Fire Department.

Fire Flow = ______________________________ g.p.m.

___________________________________________
Signature of Fire Chief or Designated Representative

__/______/______
Date Signed
```

e. Contain the signature and stamp of the Professional Engineer registered in the State of Colorado responsible for the design of the system extension.
9. The Specifications shall:

a. State that the trench shall be excavated and the pipe exposed for inspection at any location on the project if so ordered by the District or Denver Water Department.

b. State that sterilization and flushing of all mains shall be inspected by the District’s inspector and that the water shall be tested by a laboratory approved by the District and Denver Water. One copy of the certified laboratory test results shall be submitted to the District’s inspector.

10. Submittals for planned development complexes shall additionally show all existing and proposed structures, driveways, and parking facilities, on both the water main plan and combined plan.

11. After final District approval (prior to construction), the final water main Plans and Specifications shall be delivered to the District. Submittals shall include the following:

a. AutoCAD Drawing files.

b. One set of detailed bond Plans Architectural D (24”x36”) size and Specifications.

c. A title block on each sheet in the lower right hand corner that contains pertinent information concerning the map, including the project title, scale and date.

d. Lettering shall be mechanical or legible equivalent.

e. Horizontal scale shall be between 1” = 20’; 1” = 30’; 1” = 40’.

f. Aerial photography of the plan view is NOT acceptable.

Dedicated streets, easements and planned development complexes shall conform to the requirements of other Sections of these Standards. The copy of the recorded subdivision plat furnished in the final submittal, a recorded copy of the deed for the property involved, or a recorded copy of an easement shall be furnished to the District.
2. Applications and Agreements for Water Main Extensions

Four copies of the District’s Application and Agreement for Water Main Extensions. All copies must be signed as originals by individuals authorized to sign on behalf of the Applicant.

3. Payment of Plan Review and Construction Inspection Fees

Payment of applicable District and Denver Water Department plan review and construction inspection fees. A fee schedule is available from the District upon request. Fees are subject to change without notice.

4. Subdivision Plat

One sepia mylar of the recorded subdivision plat. If the plat has not been recorded, two blue line copies of the most current preliminary plat shall be submitted. A sepia mylar of the recorded plat must be furnished as soon as it becomes available.

5. Easement Checklist

Two copies of the District’s easement checklist together with all supplemental information specified in Section A.2. This information is required for all facilities to be constructed outside of dedicated public rights of way.

6. Soils Information

Geotechnical information specifying the resistivity of the soil may be required at the sole discretion of the District.

7. County Approvals

A written statement from a representative of the appropriate county planning department stating that none of the proposed facilities lie within or impact a Flood Plain Overlay Zone or Geo-Hazard Area. In the event facilities do lie within, or impact, a Flood Plain Overlay Zone District or Geo-Hazard Area, proof that the Applicant has applied for a Flood Plain Development Permit or Geo-Hazard Development Permit will be required. In addition, the Applicant must furnish a statement from the appropriate county approving the design of the facilities impacting the Flood Plain or Geo-Hazard Area.

B. Engineering

All plans and specifications submitted to the District for review, comment, and approval of a water system extension or modification shall be prepared by, or under the direct supervision of a professional engineer registered by the State of Colorado. Said
professional engineer shall be responsible for preparation of the design plans, determining the material specifications and conducting the field survey. All submitted plans and specifications shall include the professional engineer’s seal prior to approval for construction.

The applicant, contractor, and professional engineer associated with said plans shall be responsible for the adequacy and satisfactory performance of the designs and the installation of all items therein, and any failure or unsatisfactory performance of the system, so constructed, shall not be a cause for action against the District. The District does not perform engineering services for any person or entity in connection with its review of plans. Approval of plans by the District signifies only that the plans meet the minimum requirements of these Standards and Specifications based upon the information provided to the District by the professional engineer and/or owner/developer and makes no finding, representation, or warranty that the system and associated components will perform any certain function.

If the professional engineer responsible for the plans disagrees with any changes made to the submitted plans that may be required by the District as a result of the District’s review of the plans, such disagreement must be brought to the attention of the District for resolution prior to construction of the project set forth in said plans. The seal of the professional engineer on plans so corrected and approved for construction will signify that he has reviewed, approved and authorized said corrected plans for construction.

C. Surveying

Line and grade for water mains shall be established by a professional engineer or by a surveyor licensed to practice in the State of Colorado or his authorized representative. All work shall be done in workmanlike manner.

Correct alignment and elevation of the water mains as shown on the approved drawings is the responsibility of the professional engineer. Inspection of the staked alignment and elevations by the District does not relieve the professional engineer in any manner from the responsibility for field errors. Sufficient pipe shall be staked to ensure continual work progress. Except as specified below, no pipe shall be installed without line and grade stakes set by the professional engineer or land surveyor.

Exception: If a main is to be extended in an existing street and if the professional engineer who prepared the plans can show that the finished grade of the street is to remain unchanged, no grade stakes need to be set. The main shall be installed with 4½ feet of cover.
D. Plan Review Process

Upon receipt of all information described under section A.1.1, the District will initiate review of the construction plans and other pertinent information. The plans will be reviewed by the District and the District engineer. If modifications to the plans are required, the plans will be returned to the design engineer for revision.

Upon approval of the plans by the District, they will be submitted to the Denver Water Department for review and approval. If further modifications are required, the plans will be returned by Denver Water to the District for return to the design engineer. When revised, the plans must be returned to the District for review prior to re-submittal to the Denver Water Department.

**NOTE:** The approval of water system construction plans signifies only that the plans meet the minimum requirements of the District’s Standards and Specifications based on the information provided by the design engineer, Applicant, and contractor. Approval is not a representation or warranty that the system and associated components will perform any certain function.

Approved plans will be stamped with the District stamp and be signed by the District manager and District engineer.

E. Expiration of Plan Approval

Plans and specifications are approved for a six month period only. If construction has not begun within this six month period, or if it has been halted and not restarted prior to expiration of the approval period, the plans must be resubmitted for review and approval.

F. Preconstruction Meeting

When construction plans and all other pertinent information has been approved by the District and Denver Water, the approved plans will be retained by the District until a preconstruction meeting is held. The preconstruction meeting will be scheduled by the District upon request of the contractor, design engineer, or Applicant.

Representatives of the Applicant, contractor, design engineer, Denver Water, District, and/or District engineer must be in attendance at the preconstruction meeting.

G. Authorization to Proceed

Authorization to commence construction will be granted by the District upon approval of plans by the District and the Denver Water Department, payment of applicable District
and Denver Water Department construction inspection fees, and completion of the preconstruction meeting.

A copy of the construction plan review and construction inspection fee schedule is available upon request. Fees are subject to change without notice.
1.02 EASEMENTS AND LICENSES

A. General

The following procedures have been developed to provide guidelines for the timely submittal and processing of easements granted to the District and licenses granted by the District. The guidelines are designed to provide the District with accurate and uniform drawings, legal descriptions, ownership and title information and specifications. Submittals that do not follow these procedures and required submittals will not be considered.

All information referenced in the submittal section of these procedures must be presented to, and processed by the District prior to approval of construction plans. Submittals must be accompanied by the District’s Easement Preparation and Submittal Procedures Checklist (Exhibit A).

B. Granting an Easement to the District

When an Applicant or property owner is required to grant permanent easements to the District for the installation of water mains, the following procedures shall be followed:

1. **Procedure:** The following items shall be submitted in one complete package to the District with the initial submittal of water plans as described in Section A.1.1.

   Partial submittals or those not conforming to these requirements will be returned to the submitting party with a request to complete the submittal. Construction plans will not be approved until all items have been received and processed.

   a. The District’s Easement Preparation and Submittal Procedures Checklist identifying the full and legal name of the property owner granting the easement and the names and titles of the persons authorized to sign the easement agreement and those who will attest the authorized signer, if applicable.

   b. **Property Description:**

      Two copies of the written legal description of the easement shall be signed and sealed by a licensed surveyor in the State of Colorado. Property descriptions that do not comply with the following format are not acceptable and shall be returned to the plan preparer.

      1. **Size:** 8½ x 11 inches (letter-size) documents.

      2. **Font:** Except for the title, text within the description shall not be **bold face**, *italics*, or ALL CAPS.
3. Title: All caps and shall be referred to as the “Property Description” at the top of the document.

4. Caption: The Section number and aliquot part, tract, or government lot thereof; Township; Range; Principal Meridian; County; and City or Town if applicable; and State must be included. A “Subdivision, Lot and Block” description shall be used when appropriate. Any Deeds along with its corresponding date and recording information shall be used when appropriate (i.e. Reception No., Book and Page).

5. Basis of Bearing: The basis of bearing shall appear as the first element in the body of the description. Descriptions will be written to proceed from the Point of Commencement to the Point of Beginning. The Point of Commencement should be an aliquot corner (or tract corner) in the Public Land Survey System, with its position marked by an acceptable found monument.

   a) Whenever possible, parcels should be tied to monuments for which the District has established coordinate values. These corner locations have been compiled from information obtained from various municipal and other entities in the metropolitan area. No claim is made as to the accuracy of the information contained therein. If the submitter has found discrepancies in the information, or has tied to corners not included in the database, he/she is encouraged to submit the location and monument description information so that the database may be kept as up to date as possible.

   b) An Acceptable Monument shall comply with 38-51-104 Colorado Revised Statues (CRS), and Rules for Professional Land Surveying Practice 6.4 from the Bylaws and Rules of the State Board of Licensure for Architects, Professional Engineers and Professional Land Surveyors.

1) Examples of possible basis of bearing wording:

   • Commencing at the northeast corner of Section 5, whence the north ¼ bears (bearing), said line being the basis of bearing for this description.

   • Commencing at the Northeast corner of Section 5, and considering the North line of said Northeast ¼ to bear (bearing), said line forming the basis of bearings for this legal description.
6. Body: Descriptions shall be written so that the parcel is described in a clockwise direction.

a) Point of Beginning (aliquot descriptions excepted).

b) Descriptions of existing lines or bounds being followed or encountered, such as, but not limited to, aliquot, ROW, platted lot, and deed lines, shall be identified.

c) Courses shall be reported in bearings and distances. Right angles or deflection angles are discouraged. Distances are to be US Survey feet at ground level.

d) Curves shall be identified as being to the left or right. The “concave northerly” style of usage, instead of left or right, is discouraged.

e) Curve information must include radius, central angle, arc length, bearing to the radius point, chord bearing and distance.

f) All curves must be tangential when creating/describing a new parcel, whose lines run independent of previously legally defined lines, unless absolutely necessary. In cases where curves are not tangential, they must be identified as such, at both the start and/or the finish, as appropriate.

1) Examples of possible curve wording:

- Thence along the arc of a non-tangent curve to the left, whose radius point bears (bearing) from the point of curvature, having a central angel of (angel) and a radius of X feet, an arc distance of X feet (chord bears (bearing), a distance of X feet).

g) When existing (deed, plat, easement, ROW, etc.) lines are used, full recording information must be included for the document creating said line (County, Reception number, book & page, date, file & map, etc.).

h) Area shall be reported in acres, to three decimal places, followed, parenthetically, by the area in square feet to zero decimal places. Customarily “more or less” is appended to this square footage value. Areas for parcels smaller than 0.5 acres should be reported in square feet only.
7. Approval Block: A signature block identifying the surveyor and the name of his/her company is required, in compliance with 38-35-106.5 CRS.

8. Closure Calculations: The closer calculation sheet must be included, showing the closure as the description is written. Geometric closure of the parcel must exceed 1:20,000.

c. AutoCAD Drawing:

An electronic copy of the AutoCAD Drawing file shall be submitted with the recorded easement, made in model space, NOT paper space using the layers, line types, colors, templates, and pen sizes as defined in Section A.2.4.

1. Drawings that do not comply with this Section are not acceptable.

2. Size: Overall 8½ x 11 inches.

3. Title Block: Shall be established by the individual Distributor.

4. Scale: The drawing shall be to an appropriate recognized civil engineering scale. The scale used shall be large enough so that all dimensions are clearly shown. Whenever possible, the entire easement should be on one sheet. Break lines, except in the land corner, ties, are not acceptable.

5. Tie: Parcels shall have a direct tie, or one with a maximum of two courses, to the two nearest available recognized land corners (i.e., section corner, quarter section corner, range point). If the easement is located within a plat subdivision, a tie shall be made to a lot corner, tract corner, or subdivision corner of that subdivision.

Basis of bearings shall be established using NAD83 State Plane Coordinates projected to ground values with project scale factor, elevation factor and combined factor represented. The State Plane Coordinate information shall be clearly identified on the AutoCAD Drawing.

2. Document Preparation: The District will prepare the easement agreement on a standard District form and return the document to the grantor for signatures.

3. Construction: The construction of the water main shall not be authorized to commence until the easement is accepted by the District and the easement agreement has been recorded.
C. Obtaining a License to Use or Cross District Property or District Easements

When requesting permission to use or cross District property, an Applicant shall request a revocable license for routine right angle utility crossings of strip properties and easements, or for temporary uses. The following procedures shall be followed:

1. **Procedure**: A letter requesting the District’s permission to use or cross its property shall be submitted to the District’s. The letter of request shall contain the exact name of the company, corporation, partnership, etc., that will own, operate, and maintain the proposed facilities, the names and titles of the persons authorized to sign the agreement, and include the following enclosures:

   a. A legal description and survey drawing meeting the following requirements. Drawings that do not comply with these requirements are not acceptable:

      1. **Size**: Overall 8½ x 11 inches as shown in Denver Water Engineering Standards Section 4.06 (copy is available upon request).

      2. **Title Block**: Dimensions and lettering as shown in Denver Water Engineering Standards Section 4.06 (copy is available upon request). The initials of the person who prepared the drawing shall be entered in the area marked “DRN.”

      3. **Scale**: The drawings shall be to an appropriate recognized engineering scale. The scale used must be large enough so that all dimensions are clearly shown. Whenever possible, the entire crossing should be on one drawing. Break lines, except in the land corner ties are not acceptable.

      4. **Tie**: All crossings shall have a direct tie, or one with a maximum of two courses, to the nearest available recognized land corner (i.e., section corner, quarter section corner, range point, or the nearest available intersection of two dedicated public road right-of-way lines).

         Basis of bearings shall be established using NAD83 State Plane Coordinates, with the State Plane Coordinate information clearly identified on the drawing.

      5. All distances shown on the drawing shall be to the nearest hundredth of a foot.

      6. All drawings shall have a typical profile of the crossing as shown on the specimens.

   b. A check payable to Platte Canyon Water and Sanitation District for the applicable license preparation fee shall accompany the letter of request. If the request for the License Agreement, after the District’s review, is denied, one-
half of the applicable, then-current licensing fee will be returned. The remaining half will be retained to cover associated review and administrative costs.

c. Requests should include prints of the plans of the overall job in the area of the crossing, when available, and prints of new or proposed subdivisions whenever this information would clarify or identify the location of the request.

2. **Document Preparation**: The District will prepare the License Agreement on a standard District License Agreement form and return the document to the Licensee for signatures. A copy of the completed Licensed Agreement shall be kept at the job site at all times.

3. **Instructions for Preparation of District Exhibit Drawings**: All easement exhibits shall be prepared in compliance with Denver Water Engineering Standards Section 4.06 Specimen Sheets Illustrating Procedures. A copy of said Section 4.06 is available at [http://www.denverwater.org/docs/assets/B4903F70-E](http://www.denverwater.org/docs/assets/B4903F70-E) or upon request from the District.
1.03 WATER SYSTEM CONSTRUCTION PROCEDURES AND GENERAL REQUIREMENTS

Construction may commence pending approval of water system construction plans and completion of the preconstruction meeting. The District and Denver Water require a minimum of 48 hours notice prior to initiation of construction.

A. Preconstruction Meeting Minutes

Minutes of the preconstruction meeting will be sent to all parties in attendance and other interested parties. The Applicant shall ensure compliance with all provisions and requirements stipulated in the minutes. Any questions or disagreements with the minutes must be brought to the attention of the District inspector in writing. The terms and conditions outlined in the preconstruction meeting minutes will be final unless modified in writing by the District.

B. Placing Survey Line

Hubs, stakes, or appropriate approved survey control markers shall be set on an offset line to mark the location of the centerline of the water main. Centerline hubs and stakes may be used in addition to the offset hubs and stakes; however, they may not be set in place of the offset hubs and stakes. Normal practice is to set the offset hubs and stakes 5 to 10 feet off the centerline of the water main.

Survey points shall be set a maximum distance of 100 feet apart. All valves, crosses, tees, horizontal and vertical bends, and fire hydrants shall be staked for location and grade. Points of curvature and points of tangency of curves, as well as points on the curve, shall be staked for location and grade. All stakes shall be flagged to increase their visibility.

Stakes shall be positioned so that the survey hub is between the stake and the water main. The side of the stake facing the water main shall be marked to show the point being referenced and the distance from the hub to the centerline of the water main. The back side of the stake shall be stationed. Grade stakes shall be set at each hub and shall state the vertical distance from the top of the hub to the top of the pipe. This vertical distance will be based on the fact that the distance from the official street elevation to the top of the pipe shall be 4½ feet.

C. Inspections

Installation of all new water facilities within the District shall be inspected by the District inspector and a designated representative of Denver Water.
Problems which may require sound field judgment, in lieu of strict interpretation of the specifications, shall be resolved by the Design engineer and the Contractor to the satisfaction of the District and Denver Water.

District personnel are not responsible for Contractor work site safety compliance or enforcement of applicable safety regulations and standards, including OSHA compliance regulations on the work site.

All appropriate permits shall be on the job-site and shall be available for inspection by the District inspector before starting and during construction.

The District shall not supervise nor set out work or give line and grade stakes.

All materials used shall be subject to the inspection and acceptance of the District at all times and shall not be used prior to inspection and approval by the District. Failure or neglect on the part of the District to condemn or reject work materials not in accordance with these Standards and Specifications shall not be construed to imply acceptance should their inferiority become evident at any time.

Inspection should in no way be considered a guarantee of the contractor’s work. Construction inspection does not relieve the contractor of his obligation to construct facilities in accordance with these Standards and Specifications, and the approved construction plans.

After receipt of approved plans from the District, the Contractor shall give **at least 48 hours** notice to the District and Denver Water prior to starting construction.

During construction, no work is allowed to be backfilled, including bedding material above the spring line of the pipe, until the construction has been inspected and accepted by the District inspector.

The Applicant is responsible for reimbursement of all costs related to the District’s construction inspection.

If construction work is halted for more than three (3) workings days, 24 hour notice must be given to the District’s inspector prior to restarting construction.

**D. Contractors**

The District reserves the right to pre-qualify all contractors working on facilities owned by the District of facilities that are to be conveyed to the District.

No work shall commence until a preconstruction meeting has been conducted and the installing contractor has an approved set of plans and specifications in his possession. All work shall be performed in strict compliance with the compliance with the approved
plans and specifications and shall be inspected by the District. Any modifications, field changes, etc., to the approved plans must be approved by the District and Denver Water prior to proceeding with the work.

Contractors performing all work for both main extensions and private pipe extensions shall be competent, licensed firms with adequate manpower and equipment to accomplish the work in accordance with these specifications. A representative of the contractor shall be present at the job-site whenever work is being conducted by subcontractors.

If construction work is halted for more than three (3) working days, 24 hours notice must be given to the District’s inspector prior to restarting construction. This requirement may be waived at the discretion of the District manager.

**E. Guarantee of Workmanship, Materials and Equipment**

The Contractor and Surety on the Maintenance Bond shall be jointly responsible for a period of one year following the final acceptance of work performed. They are responsible for the satisfactory repair or replacement of work, material, services and equipment which becomes defective during this period, as a result of faulty materials, faulty installation or improper handling of material and equipment installed by the Contractor.

**F. Phasing of Construction**

Unless designated on the approved construction plans or approved in the preconstruction meeting minutes, phasing of a construction project will generally not be allowed. A desire to obtain acceptance and release for water taps on only a portion of a construction project designated on the approved plans requires the written approval of the District manager. A request for said approval must be submitted in writing and should include a description and drawing of the exact limits of the phased construction. The provision of looped water service and compliance with the District’s integrated water system will be strongly considered in the District’s review of the proposed phased construction.

**G. Acceptance of Construction**

Applicants are cautioned that all construction is undertaken at their risk. Approval of construction plans does not constitute a guarantee that construction will be accepted nor a guarantee that facilities will be conveyed to the District. Nor does approval of construction plans and inspection of construction guarantee that a project will meet any intended purposes or obligations.
Only acceptance of construction and initiation of probationary maintenance as designated by the District’s execution of the Application and Agreement for Water Main Extensions shall constitute acceptance by the District of the constructed facilities.
1.04 WATER SYSTEM CONSTRUCTION ACCEPTANCE PROCEDURES AND GENERAL REQUIREMENTS

Pending completion of construction, the District will accept the facilities for probationary maintenance in accordance with the following procedures and requirements.

**A. Conditions for Acceptance of Construction**

The following conditions must be met and information submitted and approved by the District prior to approval of construction and release of any water main for service.

1. The water main(s) and all appurtenances have been installed to the satisfaction of the District Inspector, all notes and field measurements have been made, and two full size blue line prints and two full size reproducible mylar prints of the as-built drawings have been supplied to, and approved by, the District Inspector.

2. The water mains have been successfully tested to the requirements designated in the technical specification section of this publication.

3. All compaction test results required by the District inspector have been submitted and accepted.

4. All easements have been accepted and recorded by the District.

5. The Applicant has submitted a letter to the District inspector documenting the construction costs for the project.

6. The District Easement Certification form including drawings identifying the “as constructed” location of water mains and appurtenances within the boundaries of recorded easements has been submitted and accepted by the District inspector. Certification drawings must be signed and stamped by a registered Land surveyor licensed to practice in the State of Colorado. The drawings are in addition to the full size “as built” drawings described in Section A.3.1.1.

Examples of easement certification submittals are available upon request.

7. One full size reproducible mylar copy of the recorded subdivision plat has been provided.

8. All plan review and construction inspection fees have been paid.

9. A maintenance bond or letter of credit as specified in the Application and Agreement for Water Main Extensions has been submitted to, and approved by, the District.
10. The Applications and Agreements for Water Main Extensions have been signed by the District manager for construction approval and initiation of probationary maintenance.

**B. Execution of Application and Agreement for Water Main Extension**

Upon District approval of all items listed in section A.3.1 above, the Applications and Agreements for Water Main Extensions will be dated and signed by the District manager. Execution of the Applications shall constitute District acceptance of the facilities for probationary maintenance and initiation of the warranty period.

The probationary maintenance and warranty period shall be as designated in the Applications and Agreements for Water Main Extensions. The Applicant guarantees all facilities against failure for a minimum period of one year from the date of acceptance. In addition, the condition and operability of the valve boxes, valves, manholes, and fire hydrants remains the Applicant’s responsibility until streets are paved and all facilities inspected and accepted by the District.

**C. Maintenance During Warranty**

Maintenance performed by the District during the warranty period consists of inspection and routine maintenance of the facilities. All remedial repairs and non-routine maintenance remains the responsibility of the Applicant. Failure of the Applicant to have all repairs carried out when requested by the District shall result in the District conducting the repairs at the Applicants expense.

**D. Issuance of Water Taps Permits**

No water tap permits shall be issued nor water taps allowed until the Applications and Agreements for Water Main Extensions have been executed for acceptance of construction.
E. Final Acceptance

Final acceptance and conveyance of the facilities to Platte Canyon shall occur as specified in the Applications and Agreements for Water Main Extensions, but no sooner than one year after probationary acceptance or after street paving, whichever is later. Final acceptance shall be subject to reinspection of all facilities by the District and correction of any deficiencies by the Applicant.

After proper notice, failure of the Applicant to correct deficiencies found during final inspection shall be cause for the District to correct the deficiencies at Applicant expense.
1.05 RESPONSIBILITY OF THE APPLICANT, DESIGN ENGINEER, AND CONTRACTOR

The following summarizes the responsibilities of the Applicant, design engineer and contractor.

A. Responsibility for Design

The Applicant is responsible for ensuring that the water system construction plans are designed to accommodate the water service requirements of the planned development. The District reviews construction plans in order to promote compliance with the minimum standards of the District and does not guarantee the adequacy of the plans to perform any certain function nor to protect against any specific condition applicable to the proposed construction site.

The District is not performing engineering services for the Applicant. It is the responsibility of the Applicant, his engineer and contractor to prepare the design and plans, determine the material specifications and soil conditions, and construct the project in accordance with the specifications of the Platte Canyon Water and Sanitation District and Denver Water Department.

B. Preconstruction Meeting

The contractor shall be responsible for arranging a preconstruction meeting prior to the start of any construction. Representatives of the District, District engineer, Applicant, design engineer, contractor, and Denver Water must be represented at this meeting.

C. Notice of Initiation of Construction

The contractor is responsible for notifying the District at least 48 hours prior to the start of any construction. If work is suspended for any period of time after initial start-up, the contractor must notify the District’s inspector 24 hours prior to re-starting construction, unless waived by the District inspector.

D. Construction in Accordance with Approved Plans

The contractor is responsible for performing construction in accordance with District standards and specifications and the construction plans approved by the District. The contractor must notify the District’s inspector of any modifications to the approved plans prior to accomplishing construction contemplated by the modifications. Failure of the District to approve proposed changes in writing will require that construction be completed in accordance with the approved plans.
E. Verifying Location of Existing Facilities

At all points of connection of new water mains to existing mains, the contractor will be responsible for excavating and verifying the location of existing mains prior to the installation of new facilities.

F. Termination of Service to Existing Customers

If it is necessary to shut down any portion of the existing water system and thereby terminate service to existing customers, the contractor must notify the District inspector at least 48 hours prior to the need to terminate service. The District will advise customers of the impending water outage and determine the appropriate measures required to satisfy the customer’s needs during the outage. The contractor shall be fully responsible for carrying out the temporary water supply measures prescribed by the District. All necessary arrangements to provide temporary water service must be made by the contractor prior to termination of service. Use of District labor and materials to supply temporary water service will be charged to the Applicant.

G. Operation of Existing Valves

All existing valves shall be operated only by District personnel. THE CONTRACTOR IS NOT PERMITTED TO OPERATE EXISTING VALVES WITHOUT THE APPROVAL OF THE DISTRICT’S INSPECTOR.

H. Inspections

No pipe or appurtenance shall be backfilled, nor covered with bedding material, above the spring line of the pipe prior to inspection and acceptance by the District’s inspector. It is the sole responsibility of the contractor to ensure that all construction is inspected before backfilling. Any pipe covered prior to inspection and acceptance shall be excavated by the contractor to allow for inspection. This shall be accomplished at no expense to the District.

I. Repairs During Warranty Period

The Applicant shall be responsible for providing repair services to all portions of the construction project during the warranty period. The District reserves the right to perform any cleaning, repairs, or other maintenance, during the warranty period at the expense of the Applicant.

The Applicant shall be responsible for the correct alignment, cleanliness, and operation of all valve boxes, valves, fire hydrants, and manholes during the warranty period or until
the street is paved, whichever is longer. Written notification of deficiencies discovered during this period will be provided by the District. If the deficiencies are not corrected during the prescribed time limits, the corrections shall be completed by the District at the expense of the Applicant.

**J. Payment of Plan Review and Construction Inspection Fees**

The Applicant is responsible for payment of all fees associated with the District’s and the Denver Water’s plan review and construction inspection services. Fee schedules are available from the District and Denver Water upon request. Fees are subject to change without notice.

**K. Variance to District Specifications**

The Applicant may request a variance to materials specifications in writing. Such requests will be reviewed by the District engineer and the District manager on a case by case manner.
1.06 RELOCATION OF DISTRICT FACILITIES

The following provisions shall apply to requests to relocate existing District facilities.

A. Responsibility for Relocation Costs.

The cost to relocate any existing District owned facility or facilities shall be the responsibility of, and paid by, the entity engaging in the activity that necessitates the relocation, including, but not limited to, any county, city, town, special district, regulated public entity or private party.

B. Definition.

“Cost of relocation” includes all costs and expenses properly attributable to the requested relocation, including, but not limited to, costs for survey, right-of-way acquisition, design engineering, inspection, materials, construction, permits and licenses, transportation, administrative overhead, and any reasonable costs necessarily incurred to modify or repair any other District facility where such repair or modification is made necessary by the relocation.

C. Increased Capacity.

Nothing herein contained shall prevent the District from requiring an increase in the capacity of or the over-sizing of the relocated facility; provided, however, that should the same occur, the District will be responsible for paying that share of the relocation cost attributable to said increase in capacity or over-sizing.

D. Performance of the Work.

The District shall have the right to design and construct, or cause to be designed and constructed, the facility or facilities to be relocated, all costs to be paid by the party requesting relocation in accordance with this policy statement. The District, at its option, may allow the party requesting relocation to design and construct the relocation of any District facility, provided the same is done pursuant to a written agreement entered into between the District and the relocating party, which is approved by the District’s Board of Directors, and which allocates the cost of relocation in accordance with this policy statement.

E. Determination of the Extent and Necessity for Relocation.

In all cases, the necessity and extent of any relocation of District facilities shall be made by the District.
F. Policy Considerations.

The allocation of relocation costs is intended to be fair and equitable to all parties and promote sound public policy by distributing said costs to the beneficiaries of the new project rather than adding them to the costs previously assumed by the District’s taxpayers and customers. In addition, by imposing relocation costs upon the entity that seeks to disturb the status quo, the District seeks to:

1. Deter over-zealous and needless project planning by creating an economic incentive to avoid unnecessary utility relocations;

2. Recognize and promote the District’s legitimate monetary and budgetary expectations with regard to the construction of its facilities and the useful life thereof;

3. Recognize the physical, legal and practical limitations and constraints on the District to defray the cost of relocations required by other entities; and

4. Reduce waste and the allocation of scarce resources.

G. Procedure for Requesting Relocation.

The following procedures shall apply to all requests to relocate water mains and appurtenances owned by the Platte Canyon Water and Sanitation District. In all cases the necessity and extent of the relocation of facilities shall be determined by the District.

1. A written request for relocation of a District owned water main or appurtenance shall be submitted to the District Manager. The letter shall contain at least the following information.

   a. Name, address, telephone number and contact person for the party requesting relocation.

   b. Description of facility to be relocated.

   c. Location of existing facility.

   d. Proposed location and description of relocated facility, if known.

   e. Reason for proposing relocation.

   f. Requested time schedule for accomplishing the relocation.

   g. Ownership of property where existing facility is located and ownership of property proposed for the relocated facility.
h. Disposition of existing facility (abandoned in place or removed).

2. If the District determines that it may be possible to accommodate the relocation request a meeting will be scheduled between the District and the requesting party to discuss specific details regarding the proposed relocation.

3. Following the meeting between the requesting party and District representatives, the District will decide at its sole discretion whether it is in the best interest of the District to design and relocate the facility or if the party requesting relocation will be allowed to design and relocate the facility. However, regardless of who designs and relocates District facilities, all costs associated with the relocation including, but not limited to, administrative, engineering, legal, construction materials, and labor costs shall be the responsibility of the party requesting said relocation.

4. At the discretion of the District a Utility Relocation Agreement defining the rights, duties, and obligations of the District and the party requesting relocation shall be prepared by the District’s attorney.

5. The relocation will proceed in accordance with the Utility Relocation Agreement.
CHAPTER 2

WATER SYSTEM TECHNICAL STANDARDS
A. Sizing of Water Mains and Appurtenances

All public water mains will be a minimum of four inches (4”) in diameter. Sizing shall be determined by the design engineer and approved by the District engineer. All mains shall be sized large enough to provide for domestic, irrigation, and fire protection flows to the area requesting service. The maximum acceptable head loss for 4, 6, 8, and 12-inch mains is two feet per 1,000 feet of main for the maximum hour flow using a C factor value of 130. The two feet per 1,000 feet of main criterium does not apply under fire flow conditions. The District reserves the right to size mains to provide service for future needs. Pipe in sizes ten inches (10”) or fourteen inches (14”) will not be allowed.

Distribution mains shall also be sized for fire protection utilizing maximum day flows plus needed fire flow resulting a minimum residual pressure of not less than 20 psi in the localized area of interest. The District reserves the right to size mains in order to accommodate future needs.

The sizing of Distribution Mains generally follows a standardized grid based upon careful consideration and analysis of results of distribution system studies utilizing network simulation. This grid requires a twelve inch main every half mile with alternating six-inch and eight-inch mains in the streets within the quarter section and a six-inch or eight-inch main in the street at approximately the 1/16 line to eliminate half mile runs in the system.

In residential areas the main shall be eight inches in diameter. Six inch diameter pipe may be used where it completes a grid, but it is not to be used in blocks more than 600 feet in length unless approved by the District. Four-inch mains are acceptable in cul-de-sacs serving only six taps or less.

In business and industrial areas an eight inch main is used only where it completes a grid. Twelve-inch mains are used for long runs not interconnected.

Planned building groups are treated the same as industrial or business areas because of the high fire risk, the large number of long single feeds and the minimal intersection of mains.

Looping of water mains shall be done in conjunction with the main extension whenever feasible.

B. Operating Pressures Within the Distribution System

Pressures within the distribution system shall be a minimum of 40 psi during the maximum hour demand and a maximum of 110 psi static pressure in the main. The maximum pressure fluctuation at any location in the distribution system between maximum hour demand and minimum hour demand shall not exceed 30 psi.
1. **Pressure Regulating Valves**: Pressure regulating valve (PRV) installations are used to control pressures within distribution systems. When main extension plans are submitted for review the need for a pressure regulating valve installation will be determined based on existing pressure zones and the existing distribution system layout. PRV setting(s) are to be included on plans with the following information: elevation, upstream and downstream hydraulic grad line and pressure.

An individual pressure reducing valve shall be installed within the water service piping downstream of the water meter in all areas that exceed 70 psi static pressure.

**C. Layout of the Water Distribution System**

1. **General**: Water mains shall be installed in dedicated public streets of the width defined below and of such grade, alignment, curvature, and other characteristics as to permit them to be laid and maintained in the normal and usual manner. When the District determines it is not feasibly for any installation to be made in a dedicated street, the installation shall be made in a District easement.

The conditions under which such an exception will be allowed will be determined for each individual case, and only easements which conform to the terms of the District’s standard easement form and these Standards and Specifications will be accepted.

2. **Alignment**: Water main alignment shall be parallel with dedicated right-of-way or easement lines. Normal practice is to lay the main on the north or east side of the street five feet or ten feet from the centerline of the street. In all cases where main alignment is within an established public or private roadway, the main shall be installed between the limits of curb and gutter pan, roadside drainage ways, or other such roadway limits except as specifically authorized by the District. Also, there shall be a minimum of ten feet from any edge of the dedicated right-of-way or easement to the centerline of the main, except as otherwise approved by the District.

3. **Easement Width Requirements**:
   a. **Dedicated Street**: The cross section of a dedicated public roadway shall meet the minimum requirements of a 28 foot surfaced roadway flow line to flow line with an additional 2½ feet on each side for the installation of fire hydrants, behind sidewalks and curbs, as shown on Sheet 2 of the Standard Drawings.

   b. Public dedicated roadways designed with islands at entrances to developments must comply with the following criteria:
The island must be located in the middle of the roadway (approximately) and/or in such a manner as to allow for an unencumbered minimum width of 20 feet from back of curb of island to back of curb of roadway. The water main must be installed on the side of the island that is at least 20 feet wide as described above and preferably have no other utilities installed within that 20 foot wide area.

c. Private Roadways: The easement shall have a minimum width of 30 feet and the District shall have exclusive use of 20 feet thereof, except for right angle utility crossings. The cross section of a private roadway must have as a minimum:

1. Twenty-six feet of surfaced roadway with a 4-foot wide attached sidewalk, making a total of 30 feet of surfaced area from back of curb to back of sidewalk as shown on Sheet 4 of the Standard Drawings,

OR

2. Twenty-nine feet of surfaced roadway with 6-inch wide concrete curbs, making a total of 30 feet of surfaced area from back of curb to back of curb, as shown on Sheet 4 of the Standard Drawings,

OR

3. Thirty-feet of surfaced roadway with permanent delineation on both sides, the type, material and location of which is pre-approved by the District as a part of the plan review process, and where neither cross section on Sheet 4 of the Standard Drawings is practical.

4. Roadways designed with islands at entrances to developments shall have easements that extend across the entire roadway including the island, with the island located (approximately) in the middle. The water line shall be installed on a side of the island that is at least 20 feet wide from back of curb to back of curb and will have no other utilities installed therein. All other utilities shall be confined to the opposite side of the island.

An easement conforming to the terms of the District’s standard form of easement agreement shall be granted to the District.

d. Undeveloped Areas: The minimum width easement in which distribution mains will be installed is 30 feet.
4. **Valve Locations:**

Valves shall be located, where possible, at a point on the main which would be intersected by the extension of a property line. Valves are required approximately every 600 feet where blocks exceed 600 feet in length, or if two or more fire hydrants are connected to the same main, additional valves may be required in the middle of the block. Street intersections carrying heavy traffic, or containing major water mains may require four valves; one on each extended property line. A valve is required between fire hydrants.

5. **Fire Hydrants:**

The number and location of fire hydrants in a given area is determined by the appropriate fire protection bureau. Normal practice is to install fire hydrants on the northeast corner of the street intersections. If hydrants are to be installed at locations other than street intersections, they shall be located on lines, which are established by extending property lot side lines into the streets.

Fire hydrant branch lines shall be set at right angles to street mains. The hydrant shall be set at the end of the branch line and shall face the branch line. No horizontal or vertical bends or reducers shall be used in fire hydrant branch lines unless specifically approved by the District. Under no circumstances shall any size or manner of tap be made on a fire hydrant branch line.

All fire hydrants shall be installed within dedicated streets or in the easements as defined above. When the District determines it is not possible or feasible for a hydrant to be installed in this manner, it shall be installed in an easement contiguous to said street. The fire hydrant easement shall have a minimum width of 10 feet, if the length is 25 feet or less. Fire hydrant easements shall have a minimum width of 30 feet when the length of the easement is more than 25 feet. The easement shall extend a minimum of 5 feet beyond the center of the hydrant.

A dead-end main shall have no more than one fire hydrant connected to it, except as specifically approved in writing by the District.
2.02 SERVICE LINES, FIRE LINES AND APPURTEANCES

A. Service Lines

1. **General Layout:** The service line shall be arranged to provide convenient access to the curb stop and meter pit, or vault, for meter reading, operation and maintenance. Wherever possible, the pit or vault shall be accessible from a paved street or District easement that is accessible to maintenance vehicles and shall have line-of-sight to a public street. The curb stop or property line valve shall be located behind the curb line of the street, as close to the curb as possible, in a landscaped or grassy area.

   The water meter pit or vault shall be located no less than two feet and no more than five feet after the curb stop or property line valve, in a landscaped area. If there is a tree lawn between the curb and sidewalk, the stop box and meter setting must be installed in the tree lawn; location in the public right-of-way or easement is preferred over locating the meter on private property. The meter setting must be within five feet of the public right-of-way or District easement. Curb stops and meter settings shall NOT be placed so that they are behind existing or future fences or walls that may block access from the public right-of-way or easement. The area around the stop box and meter vault must be kept free of vegetation, structures or other objects that may interfere with access or with the transmission of meter reading radio signals from the AMR device.

   In urban landscape areas, stop boxes and meters may be placed in paved walkways with the prior approval of the District Inspector. Stop box and meter pit or vault lids must be carefully adjusted to match the finished surface of the paved walk; special meter pit or vault lids and AMR device configurations may be required.

   Stop boxes and meter pits or vaults shall be located to provide a minimum of five feet of clearance from any building, retaining wall, fence, transformer pedestal, fireline or other permanent obstruction, measured from the outside wall of the valve box or meter pit or vault.

2. **Location:** The premises to be served shall have a minimum frontage of 10 feet on the street or easement containing the water main to be tapped and the main must extend a minimum of eight feet along the front lot line of the premises. The tap and service line shall be located entirely on or in front of the premises to be served.

3. **Setbacks:** The service line (to a point five feet past the meter pit or vault) must be a minimum of five feet from any side property line. In the case of corner lots with frontage on two streets with water mains, the property may be served from either the front or the side of the lot. The tap at the main must be at least five feet from the side property lines extended to the main and at least three feet from any pipe joint or fitting or from the end of any pipe segment.
4. **Alignment:** The service line shall be installed in a continuous straight line, perpendicular to the front property line or curb, from the tap to a point five feet past the back wall of the meter pit or vault. The tap, stop box and meter pit, or vault, shall be in a straight line.

5. **Cul-de-Sac Streets:** If service is requested for lots at the end of a cul-de-sac street, the water main layout must conform to that shown in the Standard Standard Drawings. The main to be tapped must be within 50 feet of the front property line of every lot in the cul-de-sac that is to be served.

6. **Depth of Service Line:** Service lines shall be installed at least 4.5 feet but no more than six feet below the official street grade of the surface of the ground. If the water main is less than 4.5 feet or more than six feet below grade, the service line shall be brought to an acceptable depth as close to the main as possible. In no case shall the depth from finished ground to the curb stop or property line valve operating nut exceed six feet. After a service line has been installed: if the grade of the surface is raised or lowered the licensee is responsible for the lowering or relocation of the service so as to maintain at least 4.5 feet of cover.

7. **Paved areas:** Care shall be taken to ensure that service lines do NOT enter the property at a driveway or walkway. Service lines installed prior to the layout of the property improvements may require reconstruction or relocation prior to activation in order to avoid driveways and other paved areas. Bends, offsets and similar modifications of the straight-line layout requirements will NOT be permitted. In cases where no landscaped area exists between the building and the street or easement, the curb stop and meter may be installed in the sidewalk, or similar paved surface, provided the installation is not subject to vehicle traffic, with the written approval of the District inspector and Denver Water customer service field manager. Special construction details will be required and curbs stops must be placed under road boxes instead of curb boxes.

8. **Stub-Ins:** When a stub-in connection is installed to permit street paving or in advance of future development, it shall be located so as to provide a future connection that will conform to applicable standards at the time it is activated. There is no assurance that any stub-in will meet the requirements for conversion to a service at the time of activation. A contractor or consumer who installs a stub-in does so with the understanding that it shall be the responsibility of the contractor or consumer to modify, reconstruct, relocate, replace or remove the stub-in (as necessary) prior to converting it to a service line so that it meets applicable Standards. Stub-ins and converted service lines may NOT be located in a manner that will place it and the stop box and meter setting beneath a driveway, sidewalk, street or parking area or within specified limits of side lot lines and permanent obstructions. Any stub-in that is not activated within the time limits specified in the Operating Rules shall be cut off at the main at the expense of the licensee. No water may be taken from a stub-in for any purpose.
9. **Compaction:** Backfill material around service lines, stop boxes and meter settings shall be carefully compacted in accordance with the requirements of Section 2.05 (K).

10. **Installation:** Water service line installations shall be in accordance with AWWA C-800, and in accordance with the standards and specifications of the District and Denver Water.

   All two-inch (2") and smaller taps shall be made by Denver Water.

11. **Ownership and Maintenance:** The service pipe and fittings through which a property receives water service from facilities of the District shall be owned and installed at the expense of the property owner.

   The owner shall maintain all privately owned piping, including the service pipe and all fittings and fixtures, except the water meter.

   The curb stop, service box, and meter pit shall be kept conveniently accessible, in good working order, and properly capped and clean of debris. Any box or pit not conforming to these Standards shall be cleaned, repaired or relocated by the owner of the premises within a reasonable time after notification by the District. Failure by the owner to comply may cause the District to do the necessary maintenance work and charge the cost to the premises served.

   The District will not be responsible for the thawing of frozen service pipe or appurtenances or repair of stub-in connections installed to permit street paving.

12. **Pumps and Tanks:** Pumps and/or tanks shall not be allowed for the sole purpose of decreasing the size of the tap/meter and service line.

13. **Backflow Prevention:** An approved backflow prevention assembly must be installed on water service connections that supply a fire protection system. On firelines that are required to have detector check valve assemblies, either Double Check Detector Assembly or Reduced Pressure Detector Assembly, an approved assembly that incorporates backflow prevention into the detector check valve is acceptable.

14. **Separate Trenches:** Service pipes may not be installed in trenches containing conduits which carry any substance other than potable water, and a service line shall be separated laterally from foreign conduits by a minimum of 10-feet.

   **Exception:** A service pipe may be placed in the same trench with other pipe provided the following conditions are met and the District provides prior written approval for said instructions:

   1. The foreign pipe shall be cast iron or ductile iron.
2. The bottom of the service pipe shall be at least 12-inches above the top of the foreign pipe and shall be placed on a shelf excavated on one side of the common trench.

15. Combination Service Pipes:

A property requiring a new domestic service line and a new fireline connection may be served from a single tap in some cases at Denver Water’s discretion. Separate fireline and domestic services will be required in any case where the ratio of fireline diameter to domestic service diameter is less than 4:1 or greater than or equal to 8:1 as shown below.

<table>
<thead>
<tr>
<th>Fireline</th>
<th>Domestic Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>1½” ASC</td>
<td>Not allowed</td>
</tr>
<tr>
<td>2” ASC</td>
<td>Not allowed</td>
</tr>
<tr>
<td>3” ASC</td>
<td>Allowed: ¾”</td>
</tr>
<tr>
<td>4” ASC</td>
<td>Allowed: ¾”, 1”</td>
</tr>
<tr>
<td>6” ASC</td>
<td>Allowed: 1”, 1½”</td>
</tr>
<tr>
<td>8” ASC</td>
<td>Allowed: 1½”, 2”</td>
</tr>
<tr>
<td>10” ASC</td>
<td>Allowed: 1½”, 2”</td>
</tr>
<tr>
<td>12” ASC</td>
<td>Allowed: 2”, 3”</td>
</tr>
</tbody>
</table>

Firelines shall be sized to meet NFPA standards maximum flow velocity of 15 feet per second for systems requiring fire pumps and 20 feet per second for systems without fire pumps. The fireline connection shall extend straight from the main to the property line and shall have a gate valve located between two feet and five feet from the property line on the street side of the property line, but NOT in the flowline of the street. A tee, or tap, shall be placed on the fireline connection on the inlet side of the property line gate valve for the domestic service line with the curb stop or property line valve placed adjacent to the gate valve on the fireline and the same distance from the property line. The tee, or tap, must be at least three feet and no more than six feet from the inlet side of the property line gate valve; the domestic service line shall run parallel to the fireline at a distance such that there is at least five feet of clearance between the fireline and any part of the domestic service line, meter pit or vault. No more than one domestic service connection (tap or tee) shall be installed on a fireline connection; the domestic service must be installed before activation of the fireline. In general, combination services will NOT be allowed if the domestic service line length of the combination service is greater than would be required for a direct tap on the water main. Combination services are NOT permitted for irrigation-only services.

16. Connections For Water:

a. Small Taps, 2-Inches and Smaller: Connections for domestic, irrigation or fire service taps that are 2-inches and smaller shall be made by Denver Water. The connection shall be made using a corporation stop of the same size as the service line through a bronze tapping saddle, both of which shall be supplied
by the owner. The corporation stop shall be as specified in Section 2.04 (K),
and in MS-23 and the tapping saddle shall conform Section 2.04 (J)(2)(b) and
MS-24. Taps shall be made ONLY after the following conditions have been
satisfied:

1. The main has been released by the District and Denver Water
   following the completion of all required conditions and tests.

2. A Water Tap Permit has been issued by the District and a Water
   Supply License has been obtained from Denver Water.

3. The appropriate fees and charges have been paid to the District and
   Denver Water.

4. The first placement of concrete for the building foundation, except
   for irrigation-only services and for stub-ins.

5. The street opening permit has been obtained from the appropriate
   jurisdiction.

6. Underground utilities in the vicinity of the tap are marked.

7. Tapping materials are on-site.

8. The front property corners are clearly staked and the service
   address is visibly posted.

9. The water main valves are marked or staked.

10. Safety equipment and procedures are in place, including trench
    shoring.

11. The service line and curb stop are installed and ready for
    connection to the corporation stop.

12. The tapping location on the main is excavated and the water main
    surface is exposed and cleaned.

b. Large Taps, 3-Inches and Larger: Service connections to the main for
service lines that are larger than 3-inches shall be by a tee connection.
Domestic service taps larger than 3-inches may be installed by Denver Water
or by a Contractor. For Denver Water installed connections, the Contractor
shall excavate the ditch and excavate around the water main in order to expose
it on all sides. Denver Water will provide and install the tapping saddle,
tapping sleeve or cut-in tee at cost. The Contractor shall connect to the outlet,
install the piping, set the valve boxes and backfill the trench.
**Exception:** Contractors installing mains may also install firelines and tee connections for domestic service lines provided that the connections involved are larger than 2-inches and provided that the service line is installed in conjunction with the main extension. Such an installation is subject to the proper release of tap application papers, the payment of appropriate fees and the approval of the appropriate Fire Department.

c. Insulators: Domestic service lines of dissimilar metals shall be electrically insulated by means of a District approved insulating fitting or gasket. Care shall be taken to properly install corporation stops and provide enough slack in the service lines in order to protect against pullout problems.

d. Tapping Polyethylene Encased Pipe: In tapping mains, it is necessary to dig out bedding material and apply two or three wraps of adhesive tape completely around the polyethylene encased pipe to cover the area where the tapping saddle and machine will be mounted. This method minimizes possible damage to the polyethylene during the tapping procedure. After the tapping machine is mounted, the corporation stop is installed directly through the tape and polyethylene. After the tap is complete, the entire circumferential area shall be closely inspected for damage and repaired if necessary. Any bedding material removed during excavation shall be replaced in kind and compacted in accordance with Section 2.05(K).

e. The Spacing of Service Taps: Multiple taps on the same side of the main shall be a minimum of five feet apart, measured longitudinally along the centerline of the main. Multiple taps on opposite sides of the main shall be staggered by a minimum of 2-½ feet, measured longitudinally along the centerline of the main. No tap shall be made within three feet of any main line pipe fitting.

17. **Taps And Saddles:** The size of tap and the tapping method for a given type and size of water line shall be as follows:

Tapping saddles with a tap size of 2-inches and smaller for ductile iron and asbestos cement pipe shall consist of a bronze body with two bronze straps. Saddles for PVC shall be single strap bronze saddle.

Taps that are 2-inch and smaller shall NOT be allowed in PVC pipe which contains water under pressure.

Refer to Section 2.04(J)(2)(b) for further information on tapping saddles.
18. Size:

**a. General:** Taps and service lines shall be of a size that is adequate to supply the requirements of the property being served while not being so large as to cause inaccuracies in metering low flows. The minimum size allowable for a service line shall be ¾-inch.

The tap, corporation stop, meter and that portion of the service line between the corporation stop and five feet past the meter shall be the same size. The service line may be increased in size beginning five feet downstream of the meter to the next approved larger pipe diameter. This is permitted to satisfy maximum pressure loss criteria; it is NOT for the purpose of achieving greater flow using a smaller tap.

Taps and services shall be sized to produce a water velocity that is not greater than 10 feet per second at peak demand, as estimated by an accredited Fixture Unit methodology. Additionally, the total pressure drop in the service line from the main to the building shall NOT exceed 25 psi without backflow prevention or 35 psi and a minimum residual pressure of 20 psi at the building beyond any backflow prevention under peak demand flow.

19. Abandonment Or Removal Of Service Lines and Tap Cuts: From time to time, it may become necessary to remove or abandon a service line or stub-in due to inactivity, redevelopment and changes in water requirements for the premises or to relocate a service due to changes in the configuration of the premises. An abandoned or relocated service line shall have the tap cut at the main or fireline to ensure that it cannot be used to remove water from the system. Service line tap cuts shall be witnessed by a District Inspector

**a. Services 2-Inches and Smaller:** The service connection shall be excavated where the corporation stop is inserted into the water main. The corporation stop shall be closed, the service tubing or piping shall be removed from the corporation stop and a section of the water service line at least 12-inches long shall be cut off. A cap shall be placed on the threaded outlet of the corporation stop to prevent leakage. The curb or valve box over the curb stop shall be removed in its entirety or cut off at least 18-inches below finished grade. The meter shall be delivered to the District’s or Denver Water’s Meter Shop for a final test and reading. The meter may NOT be used again in the Denver Water system. The meter pit, if present, may be removed in its entirety, or, if left in place, cut off at least 18-inches below finished grade and filled with sand or other fill material.

**b. Services 3-Inches and Larger:** The service connection shall be excavated over the service tee on the water main. The tapping valve shall be closed, a length of service pipe at least 12-inches long shall be removed, and the
tapping valve shall be plugged or capped. The property line valve box shall be removed or cut off at least 18-inches below finished grade. The meter shall be delivered to the District’s or Denver Water’s Meter Shop for a final test and reading. The meter may NOT be used again in the Denver Water system. The meter vault, if present, may be removed in its entirety, or, if left in place, cut off at least 18-inches below finished grade and filled with sand or other fill material.

c. The Demolition of Buildings Containing Inside Water Meters: Before demolishing a building with an inside meter setting, the owner must either install a meter pit or vault with a new meter and AMR device in an outside setting or cut the tap in accordance with this section.

B. Firelines

Connections made to existing water mains and extended to the property line to provide water for fire protection systems are known as firelines and their sizes are determined by those persons responsible for protecting the structure served.

Firelines shall be installed at right angles to the Distribution Mains and shall run straight from the mains to the property lines. No horizontal or vertical bends shall be installed in these lines, except in the case of making a wet tap where the tap location conflicts with an existing pipe joint or where interference prohibits a straight line installation. Such horizontal or vertical bends shall be used only when specifically approved by the District.

An approved backflow prevention assembly must be installed on all water service connections that supply a fire protection system.

1½ inch and 2 inch firelines activated after July 1, 2005 shall have a Detector Check Valve Assembly of equivalent size. The meter shall be equipped with an appropriate AMR device. The detector check valve and meter shall be installed in a standard 48 inch diameter meter vault near the front property line of the premises. In cases where there is insufficient space for a 48 inch vault, the detector check valve and meter may be installed inside the building with prior approval from Denver Water’s Meter Inspector. A separate backflow prevention assembly will be required for 1½ inch and 2 inch firelines.

Multiple fire protection appurtenances, including any combination of fire hydrants and fire lines for any single project site, are NOT allowed on a dead end main. Additional consideration will be given in the case of single family residential homes on a cul-de-sac where firelines are required.
A. General Cross Connection Control

Platte Canyon and Denver Water are responsible for protecting the public water system from contamination due to backflow occurrences through residential, multi-family, and/or commercial property water service connections (i.e. cross-connection). The District needs the assistance and cooperation of the public and consumers to assure this responsibility is met. Denver Water may request access to a property and/or facility to conduct an on-site cross connection control audit.

The most effective method of protecting the public Water supply from high hazard cross connections is with a properly designed Air Gap. When an Air Gap cannot be applied, a Reduced Pressure Principle (RP) backflow prevention assembly shall be installed. Platte Canyon and Denver Water require the installation of containment assemblies on all commercial property service lines. In low hazard applications, a Double Check (DC) valve assembly may be installed at the discretion of the District.

B. Approved Backflow Prevention Assembly

Any backflow prevention required shall be a model that has been manufactured in full conformance with AWWA C511 and shall have met the specifications of the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) of the University of Southern California (USC).

- 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/

C. Requirements for Backflow Prevention Assembly Installations

1. A commercial domestic water service line tap:
   a. Requires an approved USC FCCCHR Reduced Pressure Principle or Double Check Valve backflow prevention assembly to be installed either on the domestic water service line five feet downstream from the meter pit or immediately upon entry into a
heated part of the building five feet (maximum) from the wall or floor before any connections.

2. A commercial fire water service line tap:
   
a. Installed as wet pipe with chemical injection or pumps, requires an approved USC FCCCHR Reduced Pressure Principle backflow to be installed on the fireline downstream from the tapping valve and immediately upon entry into a heated part of the building five feet (maximum) from the wall or floor before any connections.

b. Installed as wet or dry pipe without chemical injection or pumps, requires a Double Check Valve backflow prevention assembly to be installed on the fireline downstream from the tapping valve and immediately upon entry into a heated part of the building five feet (maximum) from the wall or floor before any connections.

c. No branch lines or taps are allowed on fire water service lines downstream from the designated containment backflow prevention assembly for any purpose other than fire protection.

3. A commercial irrigation water service line tap:
   
a. Requires an approved USC FCCCHR Reduced Pressure Principle backflow prevention assembly to be installed on the irrigation water service line five feet downstream from the meter pit; the line must be above ground before any connections.

b. No branch lines or taps are allowed on dedicated irrigation water service lines for domestic (potable) use (e.g., drinking fountain, play feature, swimming pool, restroom facilities, etc.).

4. A commercial drinking fountain domestic water service line tap:
   
a. Requires an approved USC FCCCHR Double Check Valve backflow prevention assembly to be installed on the domestic water service line five feet downstream from the meter pit below ground (wall to wall) in an approved manhole/vault or above ground five feet downstream from the meter pit.

b. Must be installed according to the Standard Standard Drawings for services with only a drinking fountain in order to avoid water quality issues by minimizing the amount of water in the service line between the main and the drinking fountain.

5. A commercial recycled water service line tap:
a. Requires an approved USC FCCCHR Reduced Pressure Principle backflow prevention assembly to be installed on the water service line five feet downstream from the meter pit; the line must be above ground before any connections.

1. If chemical injection is used downstream from the meter.

2. If pumps are used downstream from the meter.

3. If the existing or proposed system poses a risk to the integrity of the recycled water system.

b. No branch lines or taps are allowed on recycled water service lines for domestic (potable) use (i.e., drinking fountain, play feature, swimming pool, restroom facilities, etc.).

6. A domestic water service line tap on the premises where recycled water service exists:

a. Requires an approved USC FCCCHR Double Check Valve backflow prevention assembly to be installed on the domestic water service line five feet downstream from the meter pit either below ground (wall to wall) in an approved manhole/vault or above ground before any connections.

7. A multi-family domestic water service line tap:

a. Requires an approved USC FCCCHR Reduced Pressure Principle or Double Check Valve backflow prevention assembly (containment) to be installed on the domestic water service line five feet downstream from the meter pit or immediately upon entry into a heated part of the building five feet (maximum) from the wall or floor before any connections.

1. If the premises is over three stories (greater than 30-feet).

2. If the premises has a fire protection system.

3. If the premises has a common boiler.

4. If the premises is served by an auxiliary water supply (i.e. raw water, well, lake, pond, ditch, etc.).
5. If the premises has a swimming pool.

6. If the premises has an irrigation system tapped off the dedicated domestic water service line.

8. A single-family domestic water service line tap with a Dual Water Supply Agreement:

   a. Requires an approved USC FCCCHR Double Check Valve backflow prevention assembly to be installed on the domestic water service line five feet downstream from the meter pit below ground (wall to wall) in an approved manhole/vault.

   b. It is at the discretion of the District and Denver Water to determine if the existing auxiliary water supply poses a high risk to the potable distribution system. This may require the installation of a USC FCCCHR Reduced Pressure Principle backflow assembly five feet downstream from the meter pit in an above ground heated enclosure before any connections.

9. It is at the discretion of the District and Denver Water to approve a variance request related to a proposed backflow prevention assembly installation.

D. Examples of Backflow Prevention Assembly Installations

1. The following are examples of facilities that represent high hazard commercial applications that must be contained from the District’s distribution system by a USC FCCCHR approved containment Reduced Pressure Principle (RP) backflow prevention assembly:

   Amusement parks
   Autopsy
   Auxiliary water supply
   Battery shops
   Car wash facilities
   Chemical plants
   Cooling towers
   Community gardens
   Dental clinics
   Dry cleaners
   Electrical and electronic component manufacturers
   Firefighting systems
   Food and beverage processing plants
   Golf Courses
Greenhouses  
Health spas  
Hospitals  
Hotels  
Hydraulic testing facilities  
Irrigation systems  
Jewelry manufacturers  
Kennels  
Laboratories  
Laundromats  
Manufacturing facilities  
Medical facilities  
Metal plating industries  
Morgues  
Mortuaries  
Motels  
Multi-story building (excess of 30 feet above finished grade)  
Packing plants  
Parks & Recreation Centers  
Petroleum refineries  
Pet Shops  
Photographic film processing facilities  
Printing or screen printing shops  
Radiator shops  
Radioactive material processing plants  
Recycled water systems (chemical injection, booster pumps, or high risk scenarios)  
Rendering plants  
Salons  
Schools  
Sewage treatment plants or facilities  
Steam generating facilities  
Stock yard facilities  
Swimming pools  
Tanneries  
Tattoo Parlors  
Taxidermy shops  
Warehouses  
Water Feature  
Water Play Feature  
Waterfront facilities  
Zoo  

2. A USC FCCCHR approved Reduced Pressure Principle (RP) backflow prevention assembly is required when:
a. High-level security or restricted commercial properties do not allow the District and Denver Water to gain access in order to conduct a cross-connection control audit of the property and/or facility; an approved RP assembly shall be installed five feet downstream from the existing meter pit in an above ground heated enclosure.

b. Solar heating units are installed at a facility or residence; an approved RP assembly shall be installed on the designated water service line to the premises.

c. Fire protection systems are installed with chemical injection or pumps; an approved RP assembly shall be installed on the designated water service line entering the building (e.g., mechanical room or pump room).

d. A landscape irrigation system is designed for direct injection of chemicals into the service line; an approved RP assembly shall be installed on the designated service line entering the building five feet downstream from the meter pit.

e. A temporary service line (stub-in) is permitted for construction water use for street paving or future developments, an approved RP assembly shall be installed at the stub-in service connection.

3. A USC FCCCHR approved Reduced Pressure Principle (RP) backflow prevention assembly may be installed as a Containment by Isolation assembly when:

a. A low hazard DC backflow prevention assembly (containment) is installed on a water service line downstream from the meter, and a high hazard RP backflow prevention assembly (isolation) is installed on the internal plumbing as a means of protecting the internal plumbing and the public water supply. This will be accepted as containment by isolation and is at the discretion of the District and Denver Water. Both the containment assembly and the containment by isolation assembly shall be tested and reported to Denver Water’s Cross-Connection Control Section on an annual basis.

4. A Pressure Vacuum Breaker (PVB) backflow prevention assembly may be installed when:

a. Landscape irrigation systems (2-inch diameter or less) are not subject to backpressure or chemical injection is introduced; an approved PVB assembly may be installed on the irrigation system
water service line five feet downstream from the meter pit above ground. The PVB must be installed at least 12-inches above the highest sprinkler head.

5. A Double Check (DC) valve backflow prevention assembly is required when:

   a. There is an auxiliary water supply (i.e. raw water, well, pond, ditch, etc.) on the premises and/or a Dual Water Supply Agreement exists; an approved DC assembly shall be installed on the domestic water service line five feet downstream from the meter pit below ground (wall to wall) in an approved manhole/vault.

      1. It is at the discretion of the District and Denver Water to determine if the existing auxiliary water supply poses a high-risk to the potable distribution system. This may require the installation of a USC FCCCHR Reduced Pressure Principle backflow assembly five feet downstream from the meter pit (above ground in a heated enclosure) before any connections.

      2. It is at the discretion of the District and Denver Water to approve a variance request to install the backflow prevention assembly greater than five feet from the meter and/or immediate entry to the premises (due to driveways, sidewalks, trees, etc.).

   b. Fire protection systems are installed without chemical injection or pumps; an approved DC assembly shall be installed on the designated water service line entering the building (e.g., mechanical room or pump room).

E. Examples of Commercial Properties supplied with recycled water or auxiliary water sources that require a RP or DC backflow prevention assembly

   1. Where a recycled water irrigation system is designed to inject chemicals and the use of pumps installed downstream from the meter and/or the proposed irrigation system poses a risk to the integrity of the recycled water system, an approved USC FCCCHR RP assembly shall be installed on the designated service line to the premises five feet downstream from the meter pit.

   2. Where auxiliary water is used for irrigation on a commercial, multifamily or residential premises, an approved USC FCCCHR backflow prevention
assembly shall be installed five feet downstream from the meter pit on the domestic water service line. The backflow prevention assembly type is determined by the degree of hazard downstream from the meter by the District and Denver Water.

F. Testing Requirements for Backflow Prevention Assemblies Installed on Potable and Recycled Water Services

The consumer is required to have a certified American Backflow Prevention Association (ABPA) or American Society of Sanitary Engineering (ASSE) tester inspect and test an existing or newly installed containment backflow prevention assembly on dedicated water service lines and recycled water service lines (if applicable) upon installation and annually thereafter. These tests will be conducted at the expense of the customer and backflow prevention assemblies shall be repaired or replaced when found to be defective. Records of tests, repairs and replacements will be kept by the customer and a copy of the annual test shall be provided to Denver Water.

Installed backflow prevention assemblies that fail to meet the requirements of this section, but were approved assemblies at the time of installation, shall be excluded from the requirements if they have been properly maintained and pass annual testing. Whenever such an assembly is relocated from its present location or requires the replacement of an internal setting, the unit shall be replaced by an approved backflow prevention assembly that meets the aforementioned requirements.

1. Tester Responsibilities:

a. Backflow assembly testing must be completed within 48 hours of Denver Water’s setting of the meter and turning on the water service.

b. The tester is responsible for submitting a copy of their official ABPA or ASSE certification to Denver Water’s Cross-Connection Control Section each time the certification is renewed.

c. The tester shall submit a copy of the test kit calibration certification on an annual basis.

d. The tester is responsible for completing the backflow prevention assembly test report to the best of their knowledge and required to submit a copy of the ‘containment’ backflow prevention assembly reports to Denver Water’s Cross-Connection Control Section within 24 hours of testing.

e. The tester is responsible for completing the backflow prevention assembly test report to the best of their knowledge and required to submit a copy of the ‘containment’ backflow prevention assembly
reports to Denver Water’s Cross-Connection Control Section within 24 hours of testing.

f. The tester is required to indicate either containment or containment by isolation on the test report.

g. The tester is required to indicate isolation on the test report; however, the submission of isolation test results to Denver Water is NOT required by the Colorado Department of Public Health and Environment.

h. The tester is required to indicate the type of usage (i.e. domestic, irrigation, fireline or recycled) on the test report.

i. The tester shall confirm the premises ID, service address, meter number (if applicable), Denver Water tap number (if applicable), and backflow prevention assembly serial number and record the values on the test report.

j. The tester shall contact Denver Water’s Cross-Connection Control Section for meter or backflow assembly discrepancies or meter information.

k. The tester shall sign and date the test report.

l. All required testing reports shall be submitted to Denver Water’s 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

2. Failed Assemblies:

a. If the backflow prevention assembly fails and cannot be repaired on the day of its failure, Denver Water’s Cross-Connection Control Section must be verbally notified by the certified ABPA or ASSE tester within 24 hours and must submit a copy of the failed test report within 3-calendar days to Denver Water’s Cross-Connection Control Section.
b. The property owner is responsible for making the necessary repairs and retesting for the backflow prevention assembly within 5-calendar days and submit a passing test report to Denver Water’s Cross-Connection Control Section. Failure to comply may result in suspension of water service.

c. If the premises has a high hazard backflow assembly and is deemed a threat to public health (via the private plumbing system), it is at Denver Water’s discretion to suspend the dedicated water service line immediately. The customer is required to repair or replace the backflow assembly before the water service will be restored.

G. Exemptions

Single Family Residential customers are exempt from the District’s cross-connection control requirements unless the premises is served by an auxiliary water supply (i.e., raw water, well, lake, pond, ditch, etc.) which requires a “Dual Water Supply Agreement” between the District, Denver Water and the property owner.

Multi-Family Residential customers are exempt from the District’s cross-connection control requirements unless the premises falls under the criteria as per Section 2.03(C)(7).
**2.04 WATER SYSTEM MATERIALS**

**A. Materials and Testing**

Detailed technical specifications for purchase or approval of materials are included in the Materials Specifications of these Standards. All materials shall conform to the Materials Specifications and to all limitations on acceptable makes and styles.

Materials furnished shall be new and undamaged. Everything necessary to complete installations in accordance with the Standards and Specifications of the District shall be furnished and installed whether shown on approved drawings or not; and installations shall be completed as fully operable, functioning parts of the District’s water system.

Where mains are extended by Applicants, it shall be their responsibility to provide all materials necessary for the installation. No materials will be supplied to the Applicant by the District.

Acceptance of materials, or the waiving of inspection thereof, shall in no way relieve the Applicant of the responsibility for furnishing materials meeting the requirements of the Materials Specifications.

New water industry products or materials will be tested if it is the opinion of the District Engineer that the product or material has some merit. The District will establish the criteria for testing and evaluating the product. The District reserves the right to accept or reject any product or material regardless of the test results.

**B. Size of Water Mains**

The size of mains shall be in accordance with Section 2.01. Standard acceptable nominal diameters of distribution mains are 4, 6, 8, and 12 inches. Standard acceptable nominal diameters of transmission mains are 16 and 20 inches.

**C. Pipe Classes**

The District has established minimum design safety factors for system piping considering working pressures of 150 psi concurrent with water hammer surge pressure of 120 psi for 4, 6, and 8 inch pipe, 110 psi for 12 inch pipe and 70 psi for 16 inch and larger pipe.

Based upon these considerations, the following minimum AWWA Standard pressure classes for acceptable types of pipe are required:
Ductile Iron Pipe (DI)  
- Special Class 50 (6, 8, 12 & 16 inch)  
- Special Class 51 (4, 20 & 24 inch)  

Plastic Pipe (PVC)  
- C90 DR 14 (4 inch)  
- C90 DR 18 (6, 8 & 12 inch)  
- C905 DR 18 (16 & 20 inch)  
- C909 Class 200 (4 inch)  
- C909 Class 150 (6, 8 & 12 inch)  

D. Pipe Selection

In general, selection of type of pipe shall be left to the discretion of the Professional
Engineer in charge of design. However, the District reserves the right to deny use of
certain types of materials in specific circumstances.

Where joint restraint is required, the designer shall select a pipe together with an
approved system of restraint. It should be noted that installation of any metallic pipe,
rods, clamps, etc. in corrosive soil areas will require corrosion protection systems.

Installation of mains through tunneled crossings such as at railroads, highways, canals,
etc., will require the selection of metallic pipe with approved joint restraint systems.
Bridge hangings will also require selection of metallic pipe with joint restraint.

Installation of mains through hazardous areas, at depths greater than 10 feet and in the
roadways of State and Federal highways may require the selection of pressure classes in
excess of the minimum stated in Section 2.01. Special comprehensive studies of
applicable laws, regulations, and detailed engineering calculations shall be submitted for
review by the District in these instances.

Whenever the installation of metallic pipe is contemplated, a soil resistivity survey of the
construction area shall be performed. The survey data and calculations, together with the
service history of other existing pipe in the area, shall be submitted to the District.
Resistivity surveys shall utilize the Wenner four-pin method.

When water mains are to be constructed in soils that have a resistivity of less than 1,000
ohm-centimeters, or where stray current corrosion is expected to be severe, an approved
non-metallic pipe system shall be selected. When water mains are to be constructed in
soils that have a resistivity of more than 1,000 ohm-centimeters, either metallic or non-
metallic pipe material may be selected. All metallic pipe, joint restraint, fittings, tie rods
and appurtenances, regardless of soil resistivity, shall be protected against corrosion by
polyethylene wrap in accordance with Material Specification MS-14.
E. Pipe Fittings

1. Joints: Joints and fittings shall conform to applicable AWWA Standards, and shall bear at least the pressure rating of the straight pipe involved. Acceptable types for straight lengths of pipe are push-on and mechanical joint. Mechanical joints for straight lengths of pipe will be allowed only under specific situations receiving approval of the District.

Pipe fittings may be mechanical joint or push-on joint fittings and shall conform to Material Specification MS-03. Exception: Fire hydrant tees shall be mechanical joint ends. Flanged joints are permitted where specified in the Materials Specifications.

The use of wyes is strictly prohibited.

2. Closure Fittings: Bolted Sleeve Type Couplings in accordance with AWWA C219 shall be of a gasketed, sleeve-type, with diameter to properly fit the pipe. Tolerance on pipe and coupling, together with proper bolt and gasket arrangements, shall be sufficient to insure permanent watertight joints under all conditions. Couplings shall be sufficiently wide, so that each type of pipe joined will have as much pipe end inserted in the couplings as is provided by the standard push on or mechanical joint for the pipe size and type involved.

The following table contains the minimum center sleeve dimensions for bolted sleeve type couplings:

<table>
<thead>
<tr>
<th>Pipe Diameter (Inches)</th>
<th>Center Sleeve Thickness (Inches)</th>
<th>Center Sleeve Width (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.250</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>0.250</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>0.250</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>0.375</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td>0.375</td>
<td>7</td>
</tr>
<tr>
<td>20</td>
<td>0.375</td>
<td>7</td>
</tr>
<tr>
<td>24</td>
<td>0.375</td>
<td>7</td>
</tr>
</tbody>
</table>

Cast or ductile iron sleeves shall have mechanical joints of the proper size and tolerance to assure a water tight fit.

“Long bell” closure pieces shall be of at least equal strength to the straight pipe being joined and shall contain push on joints of the proper tolerance to insure watertight connections.
“Compression” fittings for small diameter pipe (less than 3 inch diameter) may be utilized for connection or repair only with approval of the District.

Where pipes of different types are connected together, or where pipe is connected to fittings or valves of different materials, great care shall be taken to insure that the proper ring, insulating gasket, or adapter is selected.

3. **Miscellaneous Pipe Fittings**: Flanged adapters, plugs, end caps, bulkheads, cut-in sleeves, anchor couplings, repair fittings, and other appurtenances shall be used where appropriate throughout the system, subject to the approval of the District. The District does not intend to unreasonably limit the installation of any type of fitting, joint, or proprietary device, however, the installation of any such fitting, not specifically approved by these Standards, is subject to the approval of the District. Written request for approval of deviating items shall be made in advance through the District.

4. **Clamps, Rods and Joint Restraint Devices**: Harnessing of joints may be accomplished either by use of the clamp and rod system shown on Sheets 32 and 33 of the Standard Drawings, or by use of one of the mechanical joint restraint systems as shown on Sheet 34 or 35 of the Standard Drawings, and specified in Material Specification MS-29, or by use of one of the several proprietary joint restraint systems supplied by pipe manufacturers. The proprietary systems will require approval of the District prior to use. Regardless of the system used, restrained lengths of pipe for various fittings, where harnessing is utilized or required, shall be at least equal to the lengths shown on Sheet 28 of the Standard Drawings. Details and materials of clamps, rods and nuts, washers, rod couplings, and flange lugs used by the District are shown on Sheets 29 through 33 of the Standard Drawings.

Where joint restraint is required on PVC pipe, the designer may use a joint restraint system of the type supplied by pipe manufacturers and approved by the District or switch to a metallic pipe and use rods and clamps. The use of rods and clamps on PVC pipe is not allowed unless specific approval is granted by the District.

5. **Mechanical Joint Restraint Devices**: The harnessing of joints may be accomplished by the use of one of the mechanical joint restraint systems as shown on 34 or 35 of the Standard Drawings and specified in MS-29, or by the use of one of the several proprietary joint restraint systems supplied by pipe manufacturers. The proprietary systems will require approval of the District Engineer prior to use. Regardless of the system used, restrained lengths of pipe for various fittings, where harnessing is utilized
or required, shall be at least equal to the lengths shown on Sheet 28 of the Standard Drawings.

Where joint restraint is required on PVC pipe, the designer may use a joint restraint system of the type supplied by pipe manufacturers and approved by the District Engineer or switch to a metallic pipe. The use of rods and clamps on PVC pipe is not allowed.

F. Valves

1. **Line Valves**: Line valves shall be gate valves conforming to Material Specification MS-04 or resilient seat gate valves, as specified in Material Specification MS-05. The valves shall be of the same size as the main. Valves shall open to the right (clockwise). Valves with operators which open to the left (counter clockwise) shall not be used, unless required by or approval is obtained from the District.

2. **Pressure Regulating Valves**: A pressure regulating valve (PRV) is used for keeping downstream pressure at a uniform pressure less than that in the upstream main.

   Pressure regulating valves shall conform to Material Specification MS-10. They shall be sized so that the velocity through the valve at maximum demand does not exceed 25 feet per second. If a wide range of flow rates is anticipated, more than one valve may be required. Care shall be taken to ensure adequate pressure differential across the valve under all ranges of flow to accomplish hydraulic throttling. When pressure differentials greater than 45 psi are expected, or when the downstream pressure will be low relative to the differential, special valve materials or a special valve design may be required.

   Pressure regulating valves shall be properly supported, and shall have an adequate clearance above and below the valve to facilitate servicing. A manual bypass is required for all single valve installations. Telemetering of data may be required. Each PRV shall have a gate valve on each side for isolation. General arrangement shall be as shown on Sheets 16 through 19 of the Standard Drawings.

3. **Butterfly Valves**: Butterfly valves shall conform to AWWA C-504 latest revision with a minimum working water pressure of 150 PSIG and shall be supplied with flanged connections and shall be suitable for buried service installation. The pivot axis of the disc shall be mounted in the horizontal position and provided with geared operators and position indicators. Operator manholes shall be provided as shown on Sheet 24 of the Standard Drawings. Valve operators shall have two-inch (2”) square
operating nuts with a position indicator and shall open counter clockwise (left) and be sized to develop output torques for Class 150B operating service.

4. **Tapping Valves and Sleeves:** A tapping valve and sleeve are used together to tap an existing main that is in service and under pressure, without interrupting service. A tapping valve does not replace a property line valve, which shall be required in addition to the tapping valve. A property line valve may not be required if a main’s out-distance is 15 feet or less.

Connections 2-inches and smaller to mains shall be by a corporation stop of the same size as the service line.

Connections larger than 2 inches made to mains shall be either by an existing tee, by cutting a tee into a dewatered line if permitted by the District, or by use of a tapping valve and a tapping sleeve. Whichever method is used, care shall be exercised to select sleeves and gaskets which are properly sized to fit the type and class of pipe to be tapped. Where tapping sleeves larger than 2-inches are used, a thrust block shall be formed and placed behind the tapping valve to prevent possible damage to the main from pressure shocks, which develop as valves are first opened. Tapping sleeves shall conform to Material Specification MS-09. Thrust blocks shall conform to Sheets 26 and 27 of the Standard Drawings.

5. **Air and Vacuum Release Valves:** Combination air release and vacuum relief valves may be required for transmission mains at the discretion of the District. Air release and vacuum valve assemblies as shown on Sheets 22 and 23 of the Standard Drawings shall be installed at high points in the transmission main, where there is an abrupt change of slope and at line valves where the transmission main slopes away from the valve or as determined by the District.

6. **Blow-Off Valve Assemblies:** Blow-off assemblies shall be installed at each low point in all water mains of sixteen inches (16”) and larger and on all major transmission lines twelve inches (12”) in size. Such blow-off assemblies shall be fire hydrants as shown on Sheet 14 of the Standard Drawings.

Whenever a main is dead-ended, that is, the end of the main is not connected to another main, a blow-off assembly shall be installed. This criteria shall apply to both temporary and permanent dead-ends.

The blow-off shall be installed at a right angle to the main and on the side that will allow the water to drain away from the main to the nearest gutter.
The standard required blow-off assembly shall be as depicted on Sheet 15 of the Standard Drawings. Under special conditions, such as a long run with few taps, a non-standard blow-off larger than 2-inches may be required.

7. **Check Valves**: A check valve permits flow in one direction only, closing when the flow stops so that no reversal can occur. Check valves shall conform to Material Specification MS-07. They shall be used where shown in typical meter installation. Check valves shall not be located in concrete manholes of the same specifications as required for PRV manhole installations as shown on Sheets 16 through 19 of the Standard Drawings. Check valves are not a substitute for backflow prevention assemblies.

8. **Stop and Waste Valves**: All service lines shall have a stop and waste valve on the service line inside the residence near the location where the service line enters the residence. The stop and waste valve shall have a drain plug located on the valve body such that, when the valve is shut off, the drain plug can be removed and all water above the valve drained out. Stop and waste valves shall be approved by the District. See Sheets 54 through 67 of the Standard Drawings for typical locations. Stop and waste valves shall conform to Material Specification MS-24.

9. **Valve Boxes**: All buried gate valves 12 inches and smaller shall be provided with a 6-inch cast iron valve box, and large oval base. The valve box shall be of a design, which will not transmit shock or stress to the valve and shall have enough extension capability to be raised to final street grade. Valve boxes shall conform to Material Specification MS-12. The top section of the valve box shall be acceptable for use with a butterfly valve as shown on Sheet 24 of the Standard Drawings.

10. **Valve Reference Marker Posts**: When valves are installed where adequate physical reference points are not available, a valve reference marker post shall be required. Reference marker posts shall conform to Sheet 40 of the Standard Drawings.

11. **Water Meters**: All water meters used in the District shall conform to the most current Engineering Standards, Material Specifications and Standard Drawings of Denver Water.
G. Fire Hydrants

Fire hydrants shall conform to AWWA C-502 latest revision. Hydrants shall have a main valve opening size of five and one-quarter inch (5¼”). They shall be three way type with one (1) pumper nozzle and two (2) hose nozzles.

The pumper nozzle shall be 4½-inch nominal diameter and be threaded in accordance with the fire department having jurisdiction at the site of the fire hydrant installation. Where no standards apply, the pumper nozzle shall have six (6) threads per inch. Threads shall be right handed. The two hose nozzles shall be 2½ inch nominal diameter and be threaded in accordance with the requirements of the fire department having jurisdiction at the site of the hydrant installation. Where no fire Department standards apply, the hose nozzles shall have seven and one half (7½) threads per inch. All pumper and hose nozzles shall have nozzle caps with 1-3/8 inch nuts and be secured to the hydrant barrel with security chains.

The hydrant operating nut shall be pentagon shaped with a height of 1-1/8 inch and a dimension of 1-3/8 inch from point to flat. Bushings in the bonnet shall prevent the operating nut from traveling during opening and closing and shall prevent foreign matter or moisture from entering the lubricating reservoir.

Hydrants shall be designed to operate under 150 PSI working pressure and shall open clockwise (right) unless specified otherwise. Fire hydrants shall be cast iron and bronzed mounted. Fire hydrants shall have an auxiliary six-inch (6”) gate valve, anchored directly to or as near as possible to the main line tee as shown on Sheet 50 of the Standard Drawings. The hydrant lateral shall be six-inch (6”) cast iron or ductile iron, shall be wrapped in polyethylene, and shall be restrained from tee to hydrant shoe. In addition to restraint, the hydrant shall have a thrust block installed in accordance with Sheet 26 of the Standard Drawings.

The manufacture and model of fire hydrants approved for installation within the District is limited to the following:

1) **Meuller Company**  
   Centurion Model A-473

2) **Waterous Company**  
   Pacer Model WB-67-250

H. Fire Lines

Firelines supplying sprinklers shall be sized by the appropriate fire protection bureau and the persons responsible for the structure it protects. The District will not size firelines.

The fireline shall be restrained ductile iron pipe. A fireline shall have a valve two feet from the property line on the street side of the property line as shown on Sheet 51 of the Standard Drawings.

2-30
Fire sprinkler lines shall be installed at right angles to the distribution mains and shall runs straight from mains to the property lines. No horizontal or vertical bends shall be installed in these lines, except in the case of making a wet tap where the tap location conflicts with an existing pipe joint or where interference prohibits a straight line installation. Such horizontal or vertical bends shall be used only when specifically approved by the District.

**I. Vaults and Manholes**

All butterfly valve manholes, air relief and vacuum valve vaults, pressure reducing valve vaults, meter vaults, and other vaults shall be pre-cast concrete and conform to ASTM C478 and MS-20. Design of manholes and vaults shall be for HS-20 traffic loading and shall include aluminum rungs, cast iron rings and covers of a pattern approved by the District, with the word “WATER” cast thereon, and shall be in accordance with MS-20 of the Standard Drawings for butterfly valve vaults and air relief and vacuum valve vaults.

**J. Service Lines**

1. **General:** Service lines shall be sized to adequately supply the requirements of the property being served. The minimum size line shall be ¾-inch. The only acceptable material for a service line is seamless copper tube, Type K (soft) for sizes up to 3-inches and ductile iron pipe for sizes 3-inches and larger. Service lines shall be of the same type material from beginning to end, unless the appropriate insulator is installed at the junctions of the dissimilar metals. Refer to Section 2.02 and the Standard Drawings for additional information. Unless otherwise approved by the District, there shall be no bends or changes in the size of the service line between the tap and a point five feet past the meter pit or vault for outdoor meter settings, or between the tap and a point five feet past the curb stop for indoor meter settings.

   No connection to a District owned water main will be allowed prior to the purchase of a District tap permit.

   Tap permits will not be issued prior to District acceptance of the water main to be tapped, District receipt of a release from the appropriate health department, and payment of all tap fees to the District and Denver Water Department.

2. **Connection Materials:**

   a. **Connection to Asbestos-Cement and Polyvinyl Chloride Pipe:** Tap connections on either asbestos cement (AC) or polyvinyl chloride
(PVC) pipe shall be made with an approved saddle and strap used for each tap connection. Direct taps to these types of pipe will not be permitted. Under no circumstances is a machined-over-all (MOA) asbestos-cement pipe to receive a corporation stop. Machined-over-all (MOA) polyvinyl chloride pipe may receive a corporation stop.

b. **Tapping Saddles:** All tapping saddles shall consist of a bronze body with two bronze straps and shall be manufactured for connection to ductile iron, steel, and asbestos cement pipe materials.

c. **Installation of Saddles on PVC Pipe:** Connections to polyvinyl chloride pipe shall require a bronze saddle with full support around the circumference of the pipe area with sufficient width along the axis of the pipe so when the saddle is installed and tightened there will be no pipe distortion.

d. **Taps and Saddles:** The size of the tap and the tapping method for a given type of water line shall be as follows:

<table>
<thead>
<tr>
<th>Size of Pipe</th>
<th>Ductile Iron Pipe</th>
<th>¾”</th>
<th>1”</th>
<th>1½”</th>
<th>2”</th>
<th>Asbestos-Cement and PVC Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>¾”</td>
</tr>
<tr>
<td>4”</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>NO</td>
<td>NO</td>
<td>S</td>
</tr>
<tr>
<td>6”</td>
<td>DT</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>NO</td>
<td>S</td>
</tr>
<tr>
<td>8”</td>
<td>DT</td>
<td>DT</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>12”</td>
<td>DT</td>
<td>DT</td>
<td>S</td>
<td>S</td>
<td>--</td>
<td>S</td>
</tr>
<tr>
<td>16”</td>
<td>DT</td>
<td>DT</td>
<td>S</td>
<td>S</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>20”</td>
<td>DT</td>
<td>DT</td>
<td>S</td>
<td>S</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

“S” = Tapping saddle required - all saddles shall have the AWWA taper on its threads.

“DT” = Direct tap required.

“NO” = No tap permitted with or without a saddle.

A tee connection may be permitted if specifically authorized by the District and Denver Water.
Tapping saddles for tap size 2-inches and smaller for ductile iron and asbestos-cement pipe shall consist of a bronze body with two (2) bronze straps. Saddles for PVC shall be “full support, wide bearing” type.

Existing steel mains 12-inches in diameter or less, shall be tapped using an approved tapping saddle.

Single bronze strapped tapping saddles for use with steel pipe only shall meet the requirements of Material Specification MS-24.

Double bronze strapped tapping saddles for use with ductile iron and asbestos-cement pipe shall meet the requirement of Material Specification MS-23.

Bronze saddles for polyvinyl chloride pipe shall provide full support around the circumference of the pipe and have a bearing area of sufficient width along the axis of the pipe so that the pipe will not be distorted when the saddle is tightened. Bronze saddles for use with PVC pipe shall meet the requirements of Material Specification MS-23.

Pressure Reducing Valves: The District requires the installation of individual pressure reducing valves on water service pipes whenever static pressure equals or exceeds 70 psi to protect customers property in the event of pressure surges or fluctuations.

K. Corporation Stops

Corporation stops provide the connection for the service line to the main. By utilizing a corporation stop, a service can be connected to the main without taking the main out of service. Corporation stops are also used in air and vacuum valve and large butterfly valve installations as shown in Sheets 22 through 24 of the Standard Drawings. Corporation stops are made in standard sizes ¾-inch, 1-inch, 1½-inch, and 2-inch. Refer to Section 2.02, Material Specification MS-23 and Sheets 54 and 67 of the Standard Drawings.

L. Curb Stops

Curb stops are set on the service line near the property line and provide a means to shut off the service line. For outside meter settings, the curb stop must be placed from two to five feet from the inlet side of the meter pit. Placement of the curb stop and stop box may vary from a maximum of 5 feet outside the property line (in the street or easement) to a maximum of 5 feet inside the property line (on the customer’s property). Placement of
the curb stop and stop box outside the property line is preferred. Curb stops and boxes will be located in landscaped areas unless otherwise approved by the District. Where the curb stop must be placed beneath a roadway, street or parking lot, it shall be located where vehicles cannot park over it. See Sheets 54 and 67 of the Standard Drawings and MS-23 for further details.

M. Curb Stop Boxes

Curb stop service boxes shall be cast iron, Buffalo type. The bottom part shaped like an inverted U straddling the service line shall have a flanged bottom so as to support itself. Curb stop boxes shall conform to MS-24.

N. Meters and Meter Settings

All water meters, meter settings and meter pits shall conform to the Engineering Standards of Denver Water. For reference, Denver Water Material Specifications for water meters and appurtenances are incorporated herein as Material Specification MS-15 to MS-19. Standard Drawings for water meters and appurtenances are shown on Sheets 57 to 75.

O. Corrosion Protection Systems

Metallic pipe and fittings shall be protected against corrosion.

1. Polyethylene Encasement Material: Polyethylene wrap shall be used on all cast iron or ductile iron pipe, fittings, rods, and appurtenances. Polyethylene material shall conform to Material Specification MS-14 and Sheet 37 of the Standard Drawings.

   Twenty-four inch flat width tubing shall be used with 4 inch, 6 inch, and 8 inch pipe. Thirty inch flat width tubing shall be used with all 12 inch pipe. Thirty-six inch flat width tubing shall be used for 16 inch pipe. Fifty-two inch flat width tubing shall be used with 20 inch pipe.

   Harness rods shall be covered by 4-inch flat width polyethylene tubing. The entire joint shall be covered by a cigarette-wrap of 48 inch wide polyethylene sheet material over each set of lugs. Irregular shaped valves and fittings shall be covered with flat 48-inch wide polyethylene sheet material.

2. Insulators: Insulators shall be installed at the outlet end of the corporation stop as shown on Sheets 54 and 67 of the Standard Drawings. Insulators shall be in accordance with Material Specification MS-24. See Sheet 36 of
the Standard Drawings and Material Specification MS-24 for other insulators, which may be required.

**P. Kickblocks**

Concrete kickblocks shall be sized for the working pressure plus water hammer surge pressures as stated in Section 2.06 and the soil bearing capacity. Standard shapes and sizes of kickblocks are shown on Sheets 26 and 27 of the Standard Drawings.

The kickblocks shall be of Class B concrete conforming to Material Specification MS-20, or of a pre-measured, sacked industrial mix such as Sakcrete, Dri-mix, or an approved equal. Ready-mixed concrete mixes shall be approved by the District.

**Q. Protective Concrete Pads Over Pipe**

Under unusual circumstances it may be necessary to lay pipe at shallow depths. Concrete pads shall be used over the pipe to protect it from the traffic loading. The pads shall be designed to support loads from traffic without transmitting the load, to the pipe. Approved Insulation as approved by the District shall be required between the pipe and the concrete pad to protect the pipe from frost. This situation, and its solution, shall be subject to approval by the District.

**R. Casing Pipe**

Installation of mains through Platte Canyon rights-of-way or rights-of-way or easements of others, such as highways, railroads, etc., may require casing pipes to facilitate the installation of the main. The type of casing material and its properties will be specified by the agency granting permission to cross. Such crossing shall be subject to approval by the District to avoid conflicts in requirements or standards between the District and the persons or agency granting permission to cross.

See Sheets 35 and 44 of the of the Standard Drawings for details. Final approval of the boring and casing methods and materials shall be obtained from the District prior to construction. Where a bore is not required to cross interference, the District may require that the water main be installed under the interference in conformance with Sheets 35 and 44 of the Standard Drawings.

**S. Miscellaneous Metalwork and Piping**

All fabrication shall be equal to the best practice in modern fabricating shops. Welding shall be performed by certified welders, with all exposed welds ground smooth. All weld splatter shall be properly removed to the satisfaction of the District.
All exposed hardware, including nuts, washers, bolts and anchor bolts, shall be galvanized.

All exposed metal that is to be buried shall be given two coats of CA-1200 mastic cold coating as manufactured by Protecto Wrap Company, Denver, Colorado, or equal, except for metal with shop applied coating approved by the District.

All metal exposed to weather shall be painted with one coat of a rust inhibiting priming paint and two coats of aluminum paint, unless otherwise directed by the District. Surfaces to be painted shall be cleaned of oil, grease, weld spatters, burrs, grit, dust or other objectionable surface irregularities. Cleaning solvent used shall be mineral spirits. Copper, aluminum or galvanized pipe need not be painted, unless so directed by Denver Water.

All miscellaneous piping shall be installed in the best workmanlike manner. All threads on steel pipes shall be cut with sharp dies to standard depth, left clean cut, and tapered. Threaded pipe joints shall be properly sealed with an approved joint compound applied on the male threads only.

All concealed joints for copper water tubing within buildings shall be soldered or brazed in conformance with the appropriate building code. The joint of the copper pipe shall be properly cleaned, flux applied, and soldered with 95-5 tin-antimony solder, all applied in accordance with the best plumbing practice. All parts to be soldered shall be thoroughly cleaned before flux is applied. All copper piping, where the pipe is in direct contact with pipe hangers or other metal supports, shall be protected with a copper saddle soldered to the underside of the pipe. Saddles may be made of split copper pipe.

All copper joints installed underground shall be flared or brazed. Flaring and brazing shall be performed with the best plumbing practices.

T. Vent Pipes

Vent pipes are used in vaults and pits to provide proper ventilation. Installations that contain electrical equipment shall have a locally controlled, power operated blower attached to the vent system. Vent pipes shall be field located at the nearest intersection of the street property line and the side lot line. See Sheets 41 through 43 of the Standard Drawings for vent pipe installation details. A residential vent pipe assembly as shown on Sheet 43 may be used where an inconspicuous installation is desirable.

Above ground vent pipe shall be 6-inch nominal diameter galvanized steel pipe, conforming to ASTM A 53. The vent screen shall be a ¾-inch No. 9-11 flattened expanded galvanized metal screen. See Sheet 41 of the Standard Drawings. Below ground vent pipe shall be 6-inch, schedule 40 PVC with glued joints. A PVC glued joint by standard pipe thread female adapter shall be used to connect the steel pipe to the PVC
pipe at ground level. Where the residential vent pipe assembly is used this adapter is not needed. PVC pipe is not allowed with 8-foot above ground risers.
2.05 EARTHWORK AND EXCAVATION

A. Earthwork Defined

Earthwork shall include clearing, grubbing, grading, excavation, fill, backfill, excess excavation, bedding and pipe zone material, borrow material, and surface restoration that may be required to complete the work.

B. Exploratory Excavation

Underground utilities and structures that may interfere with construction shall be exposed and the location verified sufficiently in advance to permit necessary relocations without delays.

C. Excavation To Line And Grade

Excavations shall be made to the lines and grades as established by the approved plans. Pipe trenches shall be excavated to a minimum depth of 6-inches below the bottom of the pipe. Deviation from grades will be allowed when approved by the District, in accordance with Sections 2.06 (F) and 2.06 (G).

D. Trenching Operations

1. **Trench Width**: Existing asphalt or concrete surfacing shall be cut vertically in a straight line, and removed from the jobsite prior to starting the trench excavation. This material shall not be used in any fill or backfill.

   The trench shall be excavated so that a minimum clearance of 6-inches shall be maintained on each side of the pipe for proper placement and densification of the bedding and pipe zone or backfill material. The maximum trench width, measured at the top of the pipe shall be the outside diameter plus 24-inches regardless of the type of pipe, type of soil, depth of excavation or the method of densifying the bedding and backfill. See Sheets 11 and 12 of the Standard Drawings.

2. **Trench Support**: The trench shall be adequately supported and the safety of workers provided for as required by OSHA.

   Sheeting and shoring shall be utilized where required to prevent any excessive widening or sloughing of the trench, which may be detrimental
to human safety, to the pipe or appurtenances being installed, to existing utilities, to existing structures, or to any other existing facility or item.

Excavated material shall not be placed closer than two feet from the top edge of the trench. Heavy equipment should not be used, or placed, near the sides of the trench unless the trench is adequately braced.

3. **Trenching Operations in Dipping Claystone Bedrock Overlay District:** For all pipe installed within Jefferson County’s designated Dipping Claystone Bedrock Overlay District, the trench shall be excavated in accordance with Standard Drawing 12, Bedding Detail for Expansive Soil. Information pertaining to the boundaries of the Dipping Claystone Bedrock Overlay District may be obtained from Jefferson County Planning and Zoning Department or Platte Canyon Water and Sanitation District.

**E. Excavation For Structures**

Except as otherwise dictated by construction conditions, the excavation shall be of such dimensions as to allow for the proper installation and removal of concrete forms, or precast slabs and panels, and to permit the construction of the necessary pipe connections. Care shall be taken to insure that the excavation does not extend below established grades. If the excavation is made below such grades, the resulting excess excavation shall be filled in with sand or graded-gravel, deposited in horizontal layers not more than 6-inches in thickness after being compacted, and shall be moistened to within 2% of the optimum moisture content required for compaction of that soil. After being conditioned to have the required moisture content, the layers shall be compacted to the density as specified in Section 2.06 (K)(2).

**F. Surplus Excavation Material**

All surplus excavation material shall be removed from the jobsite and disposed of properly. If the surplus excavation material is disposed of on private property, written permission shall be obtained from the owner and a copy provided to the District.

**G. Blasting**

In general, blasting will be allowed in order to expedite the work if a permit by the local authority having jurisdiction is granted. All explosives and appurtenances shall be transported, handled, stored and used in accordance with the laws of the local, state, and federal governments, as applicable.

All blasting shall be controlled so as not to injure any existing structure or facility. The hours of blasting shall be fixed by the District. Owners or occupants of nearby structures
or facilities shall be notified at least 72 hours in advance of blasting, in writing. The notice shall state the date, the time of blasting and who is responsible for the blasting.

Blasting shall be controlled so as not to make any excavation unduly large or irregular as to shatter the rock on the bottom or sides of any excavation or surface upon or against which concrete is to be placed. If, in the opinion of the District, blasting is liable to damage rock foundations or supports, concrete or structures, all blasting shall be terminated and excavation shall be continued by jackhammering, barring, wedging or other methods.

Blasting in a trench shall not be done until the trench walls have been shored or braced in a manner satisfactory to the District. All liability for blasting shall be placed solely on the person or persons conducting the blasting operation.

**H. Dewatering**

All pipe trenches or structure excavation shall be kept free from water during pipe laying and other related work. The method of dewatering shall provide for a completely dry foundation at the final lines and grades of the excavation.

Dewatering shall be accomplished by the use of well points, sump pumps, rock or gravel drains placed below subgrade foundations or subsurface pipe drains. All water shall be disposed of in a suitable manner without being a menace to public health or causing public inconvenience in accordance with any required permit. No water shall be drained into other work being completed or under construction.

The dewatering operation shall continue until such time as it is safe to allow the water table to rise in the excavations. Pipe trenches shall contain enough backfill to prevent pipe flotation of the carrier or casing pipe. When pipe is laid in a casing or tunnel longer than 30 pipe diameters, the pipe inside said casing or tunnel shall be secured so flotation does not occur when the pipe is empty.

Water shall not be allowed to rise until the concrete has set a minimum of 24 hours, and the forms have been removed. Water shall not be allowed to rise unequally against unsupported structural walls.

**I. Foundations On Unstable Soil**

If the bottom of the excavation is soft or unstable, and in the opinion of the District, cannot satisfactorily support the pipe or structure, a further depth and width shall be excavated and refilled to 6-inches below grade with rock uniformly graded between ¾-inch and 1½-inch.
**J. Pipe Bedding And Pipe Zone Material**

1. **Installation of Bedding and Pipe:** After completion of the trench excavation and proper preparation of the foundation, 6-inches of bedding material shall be placed on the trench bottom for support under the pipe. Bell holes shall be dug deep enough to provide a minimum of 2-inches of clearance between the bell and bedding material. All pipe shall be installed in such a manner as to insure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade, and the joint is made, the pipe zone material shall be carefully placed and tamped under the haunches of the pipe and in the previously dug bell holes.

Tamping is herein defined as the act of placing approved pipe zone material under the haunches of the pipe, paying particular attention to voids, bell hole, and sling holes. The purpose of tamping is to ensure uniform support for the pipe.

The limits of bedding and pipe zone material shall be from 6-inches below the bottom of the pipe to 6-inches above the top of the pipe. Approved backfill may then be installed to the ground line. For backfill and compaction of backfill see Section 2.06 (K).

Compaction of bedding is not required. The only requirement is sufficient tamping to achieve uniform support under the pipe. See Sheet 11 of the Standard Drawings for a typical trench cross section.

2. **Frost:** No pipe or appurtenant structure shall be installed upon a foundation into which frost has penetrated, or at any time when the District inspector deems there is danger of ice formation, or frost penetration at the bottom of the excavation. No pipe or appurtenant structure shall be installed unless backfilling can be completed before the formation of ice and frost.

3. **Type of Bedding and Pipe Zone Material:** The bedding and pipe zone material shall be a clean, free draining well-graded sand or squeegee sand and shall conform to the following limits when tested by means of laboratory sieves:
## Well Graded Sand

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Total Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
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<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>70 - 100</td>
</tr>
<tr>
<td>No. 8</td>
<td>36 - 93</td>
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<tr>
<td>No. 16</td>
<td>20 - 80</td>
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<tr>
<td>No. 30</td>
<td>8 - 65</td>
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<tr>
<td>No. 50</td>
<td>2 - 30</td>
</tr>
<tr>
<td>No. 100</td>
<td>1 - 10</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 - 3</td>
</tr>
</tbody>
</table>

## Squeegee Sand

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Total Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8-inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 - 3</td>
</tr>
</tbody>
</table>

Approved bedding and pipe zone material shall be stockpiled on the jobsite to be used in the event natural materials become unsatisfactory. The District reserves the right to require the use of the specified bedding and pipe zone material at any time.

### K. Backfill And Compaction

1. **Pipes:** The pipe trench shall be backfilled to the limits as shown in the Standard Drawings. The backfill shall be compacted by vibrating, tamping, or a combination thereof, to 70% relative density for sand material as determined by ASTM D 4253 and D 4254, or to 95 percent of maximum dry density for cohesive soils as determined by ASTM D 698.

   It is expected that the trench excavation will provide suitable backfill material. Wet, soft, or frozen material, asphalt chunks, or other deleterious substances shall not be used for backfill. If the excavated material is not suitable for backfill, as determined by the District, suitable material shall be hauled in and utilized, and the rejected material hauled away and disposed of properly.

   Backfilling shall be conducted at all times in a manner to prevent damage to the pipe or its coating and shall be kept as close to the pipe laying
operation as possible. Backfilling procedures shall conform to the additional requirements, if any, of appropriate agencies or private right-of-way agreements.

2. Structures: Backfill and fill within three feet adjacent to all structures, and for full height of the walls, shall be selected nonswelling material. It shall be relatively impervious, well graded, and free from stones larger than 3-inches. Material may be job excavated, but selectivity will be required.

Stockpiled material, other than topsoil from the excavation, shall be used for backfilling unless an impervious structural backfill is specified. The backfill material shall be free from rubbish, stones larger than 3 inches, clods, and frozen lumps of soil. All backfill around the structures shall be consolidated by mechanical tamping. The material shall be placed in 6-inch loose lifts within a range of 2% above to 2% below the optimum moisture content and compacted to 95% of maximum dry density for cohesive soils as determined by ASTM D 698 or to 70% relative density as determined by ASTM D 4253 and D 4254.

Impervious structural backfill, where shown or specified, shall consist of material having 100% finer than 3-inches in diameter and a minimum of 20% passing a No. 200 U.S. Standard sieve. The material shall be placed in 6-inch loose lifts within a range of 2% below the optimum moisture content, and compacted to 95% of maximum dry density as determined by ASTM D 698.

L. Controlled Low Strength Material (CLSM)

1. Permission to use CLSM commonly called “Flow Fill” or “Flowable Concrete Backfill” shall be requested from the District for backfill in pipe zone and other backfill locations. The request to use CLSM shall be in writing and include a mix design from a ready-mixed concrete producer. CLSM shall conform to Material Specification MS-21.

2. Controlled Low-Strength Material (CLSM):

   A. Cementitious Materials:
      1. Cement: Type II Portland cement conforming to ASTM C 150.
      2. Fly Ash: Class C or Class F conforming to ASTM C 618.

   B. Aggregates:
      1. Fine Aggregates: Conform to grading and quality requirements of ASTM C 33.
2. Coarse Aggregates: Conform to grading and quality requirements of ASTM C 33 for Size No. 57 or No. 67.

C. Water: Conform to ASTM C 94.

D. Admixtures:
1. Chemical admixtures that do NOT contain calcium chloride and which conform to ASTM C 494 for concrete may be used in CLSM mix.
2. Compatible with cement and other admixtures in the batch.

E. CLSM Proportions:
1. Total cementitious material: 50-95 lb/cy.
2. Fly ash by weight: Maximum 40% of total cementitious materials.
3. Air entrained to total air content: 4%-8%.
4. Minimum slump: 6 inches; maximum slump: 8-inches, when tested in accordance with ASTM C 143.
5. Fine aggregates: Between 50% and 60% by volume of total aggregates in CLSM mix.

3. Flash Fill:
   A. Batch flash fill with mixture of fly ash and water in following proportions:
      1. 1850 lbs of fly ash per cubic yard batched.
         a) Class F fly ash: 83% - 86% of total fly ash used by weight.
         b) Class C fly ash: 14% - 17% of total fly ash used by weight.
      2. Maximum 100 gallons of water per cubic yard.

   B. Meter water during introduction of fly ash.

M. Cleanup

Upon completion of the work, all rubbish, unused materials, concrete forms and other like material shall be removed from the jobsite. All excess excavation shall be disposed of as specified and the areas shall be left in a state of order and cleanliness.

N. Surface Restoration

1. Unsurfaced Areas: All surface cuts shall be, as a minimum, restored to a condition equal to that prior to construction. All streets shall be restored in
accordance with the regulations and requirements of the agency having control or jurisdiction over the street, roadway, or right-of-way.

2. **Surfaced Areas**: All surface cuts shall be, as a minimum, restored to a condition equal to that prior to construction. All gravel or paved streets shall be restored in accordance with the regulations and requirements of the agency having control or jurisdiction over the street, roadway, or right-of-way.

3. **Easements, Cultivated or Agricultural Areas**: In easements, cultivated or agricultural areas, topsoil, to a depth of 8-inches, shall be removed from the area of general disturbance and stockpiled. After installation of all pipelines, appurtenances and structures, and completion of all backfill and compaction, the stockpiled topsoil shall be redistributed evenly over all disturbed areas. Care should be taken to conform to the original ground contour or final grading plans.

**O. Subgrade And Road Preparation**

Prior to installation of water mains in dedicated streets, road construction must have progressed to at least the subgrade stage. Subgrade elevation is defined as an elevation which lies no more than 7-inches below the finished street grade. The road surface shall be smooth, clear of debris and free from deep holes, ruts, and large rocks which may hamper main installation.

Water mains shall be laid where the ground surface is near its final elevation, whether it is located in a dedicated street or not.
2.06 PIPE INSTALLATION

A. Approval By the District

Many handling and installation procedures, tools, equipment, and materials require approval by the District. Approval by the District shall in no manner render the District liable for any injuries suffered or equipment damaged. Approval by the District is used solely as a means to insure quality control.

Safety of workers shall be provided as required by OSHA.

B. Handling Of Materials

Pipe and fittings shall be loaded and unloaded by lifting so as to avoid shock or damage. Under no circumstances shall such material be dropped. If, however, any part of the coating or lining is damaged, the replacement or repair of the damaged pipe shall be done to the satisfaction of the District. Any pipe or fittings that are not acceptable to the District shall be removed from the job site immediately. Pipe handling equipment and pipe handling methods shall be approved by the District.

C. Preparation And Inspection Of Pipe And Fittings For Installation

Before placing pipe in the trench, each pipe or fitting shall be thoroughly cleaned of all foreign material, kept clean at all times thereafter, and carefully examined for cracks and other defects before installation. Bell ends and spigot ends are to be examined with particular care.

D. Pipe Joint Lubricant

Joint lubricant shall be as supplied by the pipe manufacturer, and approved by the District. Joint lubricant shall be non-toxic, water soluble, and certified to meet NSF Standard 61.

E. Cutting And Fitting Of Pipe

Pipe shall be cut, whenever necessary, to conform to location of fittings, line, or grade. All cuts shall be straight and true, in a workmanlike manner so as to leave a smooth end without damaging the pipe. All burrs shall be removed from the ends of cut pipe, and the end lightly rasped or filed. All tools used in cutting pipe shall be approved by the District.
POWER-DRIVEN SAWS WITH ABRASIVE DISCS (MASONARY BLADES) SHALL NOT BE USED FOR DRY CUTTING OR BEVELING ASBESTOS-CEMENT PIPE. IN RECOGNITION OF EFFORTS TO REDUCE THE INCIDENCE AND CORRESPONDING DANGER OF AIRBORNE ASBESTOS FIBERS, MOA PVC PIPE MAY BE USED IN PLACE OF MOA ASBESTOS-CEMENT PIPE WHEREVER CUTTING IS NECESSARY.

F. Pipe Alignment And Grade

In laying pipe, the intent is to lay to set line and grade within a tolerance of 3-inches plus or minus. On slopes of zero grade, the intent is to lay to grade. Fittings, valves, and hydrants shall be installed at specified locations and elevations.

When laying pipe on curves, the intent is to lay to the alignment. The pipe shall be kept in alignment by placing the joints or bends on the curve. Short lengths shall be used as necessary to accomplish the curvature without exceeding individual deflections specified by the pipe manufacturer. Bends shall be used whenever individual deflections exceed those specified by the manufacturer.

For all pipes, the depth of cover over the pipe measured from official street grade to the top of the pipe shall be a minimum of 4½-feet and shall be known as the cover over the pipe. If difficulties arise when crossing interference and where specifically approved by the District, deviations from 4½-feet of cover will be permitted. Cover over the pipe shall be a minimum of 3-feet and a maximum of 10-feet.

Any changes in alignment and grade shall be authorized by the District and shall be accomplished by the installation of additional fittings. Breaking of joints is permitted only when installing pipe on horizontal or vertical curves.

Pipe shall be laid with bell ends facing the direction of laying, unless directed otherwise by the District.

G. Deviation From Alignment And Grade Occasioned By Other Structures

Whenever obstructions not shown on the plans interfere to such an extent that an alteration in the plans is required, the District shall have the authority to determine the best method of correction. The District’s inspector may change the plans and order a deviation from line and grade, or arrangements may be made with the owners of the structure for its removal, relocation, or reconstruction.
H. Temporary Bulkheads

Whenever the pipe is left unattended, temporary plugs shall be installed at all openings. Temporary plugs shall be watertight and of such design as to prevent children and animals from entering the pipe. All temporary plugs shall be approved by the District.

I. Frost

No pipe or appurtenant structure shall be installed upon a foundation into which frost has penetrated, or at any time when the District inspector deems there is danger of ice formation, or frost penetration at the bottom of the excavation. No pipe or appurtenant structure shall be installed unless backfilling can be completed before the formation of ice and frost.

J. Ductile Iron Pipe

1. **Push-on Joint**: Immediately before joining two lengths of ductile iron pipe, the inside of the bell, the outside of the spigot end, and the rubber gasket shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. The rubber gasket shall be flexed inward and inserted in the gasket recess of the bell socket. Caution shall be exercised to ensure the correct type of gasket is used.

   A thin film of joint lubricant shall be applied to either the inside face of the gasket, or the spigot end of the pipe, or both.

   The spigot end of the pipe shall be placed in the bell end with care to prevent the joint from contacting the ground. The joint shall be completed with a slow, steady pressure without jerky or jolting movements. Pipe furnished without a depth mark shall be marked before assembly to assure insertion to full depth of the joint. The spigot end of field cut pipe lengths shall be filed, or ground to resemble the spigot end of such pipe as manufactured.

2. **Mechanical Joint**: Before joining mechanical joint cast iron fittings to ductile iron pipe, the outside of the spigot, the inside of the bell, and the rubber gasket shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter.

   Normal practice is to lubricate the joint with a soap solution; however, in cold weather the joint may be assembled dry if approved by the District. Extreme care shall be exercised in making dry joints.
The gland shall be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket, or bell end. The rubber gasket shall be placed on the spigot end with the thick edge toward the gland.

The pipe shall be pushed in until the spigot end fully penetrates the bell. The gasket shall then be pressed into place within the bell evenly around the entire joint. The cast iron gland shall be moved along the pipe into position for bolting; the bolts inserted, and the nuts screwed finger tight, then tightened with a torque limiting wrench. Torques for the various sizes of bolts shall be as follows:

<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Bolt Size (inches)</th>
<th>Range of Torque (foot-pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5/8</td>
<td>45 - 60</td>
</tr>
<tr>
<td>4 - 24</td>
<td>3/4</td>
<td>75 - 90</td>
</tr>
<tr>
<td>30 - 36</td>
<td>1</td>
<td>100 - 120</td>
</tr>
<tr>
<td>42</td>
<td>1 1/4</td>
<td>120 - 150</td>
</tr>
</tbody>
</table>

Nuts spaced 180 degrees apart shall be tightened alternately in order to produce equal pressure on all parts of the gland.

All mechanical joint fittings shall be wrapped with polyethylene encasement material in accordance with Section 2.06(Y).

3. **Bolted Sleeve Type Couplings:** When installing bolted sleeve type couplings, care shall be taken that the connecting pipe ends, couplings, and gaskets are clean and free of all dirt and foreign matter with special attention given to the contact surfaces of the pipe, gaskets, and couplings. These couplings shall be assembled and installed in conformity with the recommendation and instructions of the coupling manufacturer.

Bolted sleeve type couplings shall be wrapped with polyethylene encasement material in accordance with Section 2.06(Y).

Wrenches used in bolting couplings shall be of a type and size recommended by the coupling manufacturer. Coupling bolts shall be tightened so as to secure a uniform annular space between the end rings and the body of the pipe and all bolts tightened approximately the same amount. Diametrically opposite nuts shall be tightened progressively and evenly. Final tightening shall be done with a torque limiting wrench set for the torque recommended by the coupling manufacturer.
K. Polyvinyl Chloride Pressure Pipe

1. Elastomeric Gasket Joint: Immediately before joining two lengths of PVC pipe, the inside of the bell or coupling, the outside of the spigot and the elastomeric gasket shall be thoroughly cleaned to remove all foreign material.

Lubrication of the joint and rubber gasket shall be done in accordance with the pipe manufacturer’s specifications.

Care shall be taken that only the correct elastomeric gasket, compatible with the annular groove of the bell, is used. Insertion of the elastomeric gasket in the annular groove of the bell or coupling shall be in accordance with the manufacturer’s recommendations. Pipe that is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.

The spigot and bell or coupling shall be aligned and pushed until the reference line on the spigot is flush with the end of the bell or coupling. Pushing shall be done in a smooth, steady motion.

2. Pipe Storage: Pipe stored outside, and exposed to sunlight for more than 30 days, shall be covered with an opaque material such as canvas. Clear plastic sheets shall not be used to cover pipe. Air circulation shall be provided under the covering.

3. Handling of Pipe in Cold Weather: PVC pipe has reduced flexibility and impact resistance as temperatures approach and drop below freezing. Use extra care should be used in handling PVC pipe during cold weather.

4. Underground Location and Warning Tape: Install 6-inch wide detectable aluminum foil plastic backed tape indicating for buried water line below and installed, 12-inches to 18-inches below surface grade. Tape must be blue in color and be manufactured by Thortec or equal.

5. Tracer Wire Installation: Install 12 gauge single strand copper tracer wire to pipe with 2-inch wide PVC tape. Splicing of tracer wire shall be per manufacturer’s recommendation. The tracer wire shall run to a test station or valve box located next to a fire hydrant. 3M Ball Markers, 1400 series, can be used in lieu of tracer wire.

L. Installation Of Valves

Valves shall be handled in such a manner as to prevent injury or damage. Valves shall be set and joined to pipe in the manner previously specified for cleaning, laying and joining.
mechanical and push on joints. Valves shall be set in such a manner that the valve stems are plumb. Valves shall be wrapped with polyethylene encasement material in accordance with Section 2.06 (Y).

Valves shall be located at the point on the main, which would be intersected by the street property line extended and as outlined in Section 2.01 (C)(4). Any deviations from this shall be at the discretion of the District.

If so ordered by the District, valves shall be operated prior to installation to ensure good operating condition.

**M. Installation Of Valve Boxes**

A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve, and shall be centered and plumb over the wrench nut of the valve, with the box cover set to the elevation determined by the District. It will be the responsibility of the Applicant to insure that valve boxes are plumb and raised to the proper elevation.

**N. Installation Of Fittings**

All fittings may be mechanical joint or push on joint except fire hydrant tees, which shall be mechanical joint. Fittings shall be set and joined in the manner described in 2.06 I.2. The use of wyes in main extensions or private pipe extensions is strictly prohibited.

Where PVC pipe is inserted into cast iron or ductile iron fittings, beveled portions of the spigots shall be removed to accommodate the expansion characteristics of the plastic to the lesser depth of bell.

All repair fittings and stainless steel repair clamps shall be wrapped with polyethylene encasement material as described in Section 2.06 (Y), when installed during a main repair.

**O. Installation Of Tapping Saddles**

A tapping saddle is used to make a wet connection to an existing main without taking the main out of service. A tapping saddle and tapping valve are not a substitute for a property line valve. A valve box shall be installed with the tapping valve.

Tapping saddles may be installed side by side when specifically approved by the District. A 12-inch space shall be required between adjacent saddle plates. In an intersection, two tapping saddles may be used to run lines out of both sides of the pipe if the alignment of the pipe is kept straight out of the tapping saddle. The use of two tapping saddles, either
side by side or back to back, as a substitute for a cross is strictly prohibited. A 6-inch tap on a 6-inch main and an 8-inch tap on an 8-inch main will be approved, a 12-inch on a 12-inch main will not be approved.

P. Fire Hydrants

1. **Installation:** All hydrants shall be field staked for location and grade. Final location shall be in accordance with approved drawings. Fire hydrants shall be set so that the elevation of the center of the traffic flange is 3-inches above the finished grade of the ground or top of the curb. All hydrants shall stand plumb and be installed as indicated on Sheet 50 of the Standard Drawings.

   Each hydrant shall be connected to the street main by a 6-inch branch line. The branch line shall be ductile iron pipe only. An independent 6-inch gate valve shall be installed on each fire hydrant branch. The valve shall be firmly anchored to either a mechanical joint tee with a 6-inch anchor coupling (also called swivel adapter or locked hydrant adapter) or to a mechanical joint anchor tee (also called swivel tee or locked hydrant tee).

   The fire hydrant branch shall be anchored to the valve by means of megalugs.

   **Exception:** When making a wet tap for a fire hydrant, a tapping valve and saddle shall be used in place of the mechanical joint tee, swivel adaptor and valve.

2. **Hydrant Drainage:** Drainage shall be provided at the base of the hydrant by placing rock from the bottom of the trench, to at least 12-inches above the barrel flange of the hydrant, and to a distance of 12-inches around the elbow. The minimum distance from the bottom of the trench to the bottom of the hydrant elbow shall be 6-inches. The minimum amount of rock placed shall be 1/3 cubic yard. The rock shall be a well-graded gravel, cobble, or brick size crushed rock.

3. **Hydrant Protection from Corrosion:** The ductile iron branch line, and fittings, from the hydrant base up to and including the tee, shall be encased in polyethylene wrap. The type of polyethylene and manner in which it is to be installed shall conform to Section 2.06 (Y)(3). Bedding and pipe zone material shall be used from a point 6 inches below to a point 6 inches above the branch line. Bedding and pipe zone material shall be as specified in Section 2.05 (J).
Q. Fireline Connections

The installation of fireline connections shall conform to Sheets 51 and 52 of the Standard Drawings and to Section 2.02. Fireline connections shall be restrained, ductile iron pipe only. The fireline connection shall have a valve two feet from the property line on the street side of the property line. The fireline connection shall be protected from corrosion.

Fireline connections for residential usage only are available in one inch and 2-inch sizes if approved by the District. Requests for these connections must be submitted with drawings to the District for approval.

R. Kickblocks

The following standard shall apply to kickblocks as shown on Sheet 26 and 27 of the Standard Drawings.

1. **Installation:** Kickblocks shall be constructed at all bends and fittings which require support due to unbalanced line thrust, and which are not restrained. Care shall be taken not to block outlets or to cover bolts, nuts, clamps or other fittings or to make them inaccessible. A bond breaker shall be placed between the pipe and the kickblock to aid in ease of future removal. For the same reason, if a large kickblock is to be placed, it shall be separated into sections by a suitable material. Sheet 26 of the Standard Drawings show sizes and shape of kickblocks. Bearing surface areas are minimum areas to bear against the undisturbed trench wall. If, in the opinion of the District, the soil bearing capacity is not sufficient to provide adequate support based on minimum bearing areas shown on the Standard Drawings, then the minimum bearing area shall be increased to a size that will ensure support restraint. In every instance, the kickblock shall bear against undisturbed earth. When it is impossible, through over excavation or other cause, to place a kickblock against undisturbed earth, restraint shall be required to anchor the fittings to the main.

   Before placing concrete, equipment for mixing and transporting the concrete shall be clean. Debris, water or ice shall be removed from the place to be occupied by the concrete. Concrete shall not be placed on frozen subgrade. Concrete shall be placed only in the presence of the Inspector unless inspection has been waived prior to the placement.

2. **Formwork for Kickblocks:** Forming for concrete kickblocks and anchors will be done by bulkheading around the shape of the kickblock or anchor with wood, burlap sacks, or reinforced paper sacks filled with sand or earth. Sacks shall be of a size easily handled when full, and shall be left in place in the trench. Wood forms shall be removed before backfilling.
If the main must be placed immediately into service, harness rods may be used in lieu of kickblocks or wood may be used to form up kickblocks. Wood forms shall be of such design as to support the thrust until the concrete has set and shall not be considered a substitute for the concrete kickblock.

No horizontal struts or braces required for trench shoring shall remain in the concrete kickblocks. Prior to placing concrete, the forms and ditch bank shall be inspected and approved by the District.

When concrete is deposited against ground without the use of forms, the ground shall be thoroughly moistened or other provisions made to prevent the ground from drawing water from the concrete.

3. **Minimum Kickblock Curing Time**: Newly placed concrete shall be allowed to set, undisturbed, for a minimum of 24 hours.

4. **Compaction of Fill Over Kickblocks**: Backfill may be placed over kickblocks once the surface has set sufficiently to resist the weight of the backfill. However, no tamping or compacting shall be allowed above the kickblock for a minimum of 24 hours after placement.

**S. Blowoff Assembly**

In all installations where the main will be permanently dead ended, such as a cul-de-sac, a blowoff assembly shall be installed. Where the main will be temporarily dead ended, such as the boundary of a subdivision filing, a blowoff shall be installed, unless a fire hydrant, which can serve additionally as a blowoff, is located at the main’s temporary end. The blowoff shall be installed at a right angle to the main and on the side that will allow the water to drain away from the main to the nearest gutter.

The standard required blowoff assembly for 12-inch and smaller mains shall be a 2-inch as shown on Sheet 15 of the Standard Drawings. Under special conditions, such as a long run with few taps, a nonstandard blowoff larger than 2-inch may be required.

The standard required blowoff for 16 inch and larger ductile iron pipe shall be a 6 inch as shown on Sheet 13 of the Standard Drawings.

**T. Concrete Structures**

1. **Formwork**: Forms shall produce shapes, lines and dimensions of the concrete structures as shown on the Drawings.
The formwork shall be designed according to the loads and allowable stresses set forth in ACI 347.

Forms may be made of wood, metal or other acceptable material approved by the District. The forms shall produce a smooth concrete finish to the tolerances described in ACI 301. Form material with raised grain, torn surfaces, worn edges, patches, dents or other defects, which will impair the texture of the concrete surface, shall not be used.

Forms shall be mortar tight and braced or tied to maintain proper position and shape during and after concrete placement. Embedded metal ties with snap-off ends shall be used for internal form ties. Use of ordinary wire ties is not be allowed. Withdrawal of form ties through the walls will not be permitted.

All exposed edges shall be chamfered with a ¾-inch, 45 degree bevel.

All surfaces of forms and embedded items shall be cleaned of all foreign material before concrete is placed. The recommendations of ACI 347 for form removal times under normal conditions shall be followed. The District shall determine if additional time is required before form removal.

Forms shall be removed in a manner, which will insure the integrity of the structure and its surfaces.

2. **Mixing and Placing**: Equipment used in mixing and transporting concrete shall be clean. Debris, water or ice shall be removed from the places to be occupied by the concrete. Concrete shall not be placed on frozen subgrade. Wooden forms shall be thoroughly wetted (except in freezing weather) or a form release agent shall be applied.

Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C 94. Water may be added one time immediately upon arrival at the job site to bring the slump within the required limits.

The concrete shall be conveyed from the mixer to the place of final deposit by methods, which will prevent separation. Equipment for chuting, pumping and conveying concrete shall be of such size and design as to ensure a continuous flow of concrete at the discharge end without separation of materials. Concrete shall not free fall a vertical distance greater than five feet during discharge into the forms.

Concrete shall be deposited as nearly as possible in its final position to avoid segregation due to handling or flowing. Concrete shall be placed at a rate such that it is, at all times, plastic and flows readily between
reinforcing steel. Concrete that has partially hardened or is contaminated by foreign materials shall not be allowed.

Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on or against concrete, which has hardened sufficiently to cause the formation of seams or planes of weakness within the area or section. Concrete shall not be placed in lifts exceeding 18 inches in thickness.

The accumulation of water on the surface of the concrete due to water gain, segregation or other causes during placement and consolidation shall be prevented by adjustments in the mix design.

When placing concrete during cold weather as defined in ACI 306, the temperature of the concrete mix during placing shall not be lower than 55°F and all concrete work shall follow the recommended practices of ACI 306. When placing concrete during hot weather as defined in ACI 305, the temperature of the concrete mix during placing shall not be higher than 85°F and all concrete work shall follow the recommended practices of ACI 305. Cooling or warming plastic concrete mixtures shall not be undertaken without the approval of the District.

3. Consolidation: All concrete immediately after depositing shall be thoroughly consolidated with internal vibrators as recommended in ACI 309. The District shall approve the size, type and number of vibrators used for each concrete placement. The concrete shall be thoroughly worked around the reinforcing steel, around embedded items and into the corners of the forms. Vibrators shall be supplemented by spading, rodding or forking to eliminate all honeycomb at the form face and voids around embedded items.

4. Finishing: Where concrete surface finishes are not shown on the Drawings, unformed flat surfaces shall be screeded and wood float finished and interior floor surfaces shall be steel trowel with light broom finished to Class A tolerance in accordance with ACI 301.

No wetting of concrete surfaces during slab finishing operations shall be permitted. No concrete finishing operation shall be performed while there is water on the surface.

5. Construction and Contraction Control Joints: Construction joints not indicated on the plans must have specific approval of the District. All concrete surfaces where joints are made shall be thoroughly cleaned and laitance removed prior to placing adjoining concrete. Contraction control joints shall be cut one quarter the depth of the slab. When power saw cutting methods are used, joints shall be cut as soon as the concrete
surface is firm enough not to be torn or damaged by the saw blade. Water employed in cutting, washing and rinsing of concrete contraction control joints shall not stain, discolor or affect exposed surfaces of the structures, or damage the environment of the project or adjacent areas. Methods of waste water disposal shall be subject to approval by the District.

6. **Curing and Protection**: Concrete shall be cured by a method recommended by ACI 308. When the daily mean ambient temperature is above 40°F, the finished concrete shall be cured continuously for a minimum of seven (7) days or for the time necessary to attain 70% of the specified compressive strength, whichever period is less. When the mean daily ambient temperature is 40°F or lower, the finished concrete shall be continually cured at a minimum temperature of 55°F for the period recommended by ACI 306 to prevent damage from early-age freezing and provide the service category strengths required for each placement.

Concrete curing on formed surfaces shall be initiated immediately after removal of the forms or as directed by the District.

Concrete curing on slabs shall be initiated immediately after the water on the surface of the slab has evaporated or as directed by the District.

7. **Surface Repair**: Surface defects, including fins, tie holes, and honeycombed areas shall be repaired down to solid concrete in accordance with ACI 301.

**U. Reinforcing Steel For Concrete Structures**

1. **Installation**: Reinforcing steel shall be accurately formed to the dimensions indicated on the plans. Bends in bars shall be made cold. Bars with kinks or bends not shown on the plans shall not be used.

Splices shall be located where shown on the plans. Splices at other locations must be approved by the District. Welded wire mesh shall be lapped one space and securely wired together.

Before the reinforcement is embedded in concrete, the surfaces of the bars, and bar supports, shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease, or other foreign substances, which are objectionable. Reinforcement will be inspected for compliance with requirements as to size, shape, length, splicing position, and amount after it has been placed.

2. **Placing of Reinforcing Steel**: Reinforcing steel surfaces and supports shall be cleaned of flakey rust, loose mill scale, dirt, grease or other foreign substances.
Steel reinforcing bars and welded wire fabric shall be placed accurately within the forms and be well secured with annealed wire before concrete is placed. Steel reinforcing bars in walls shall be tied at a minimum of every other intersection or as directed by the District. Steel reinforcing bars in slabs shall be tied at every intersection. Steel reinforcement in slabs shall be supported on chairs of metal, plastic or concrete in a manner to prevent any steel reinforcement dislocation during slab construction.

Splices other than those shown on the Drawings shall not be constructed without the approval of the District.

Reinforcing steel shall be protected by the thickness of concrete indicated on the plans. Where not otherwise shown, the thickness of concrete over the reinforcement shall be as follows:

a. Where concrete is deposited against ground without the use of forms, not less than 3-inches.

b. Where concrete is exposed to the weather, or exposed to the ground but placed in forms, not less than 2-inches for bars more than 5/8-inch diameter and 1 ½-inches for bars 5/8-inch diameter or less.

c. In formed surfaces not in contact with the ground or exposed to the weather, not less than ¾-inch.

V. Joint Restraint Devices

Joint restraint devices shall be used at all bends and fittings where kickblocks cannot be used due to existing field conditions or where joint restraint devices are specifically required. Joint restraint devices shall be required for the following installations:

1. Fire hydrants
2. Fireline connections
3. Three inch and larger domestic line connections
4. Vertical bends
5. Reducers
6. Vertical and horizontal offsets
7. Bends, line valves and fittings
8. 90° horizontal bends
9. Bulkheads and plugs
10. Bored casings
11. When it is not possible to place against undisturbed earth
12. When, in the opinion of the District, the bearing capacity of the soil is not sufficient to provide adequate restraint

Horizontal and vertical offsets and reducers shall be restrained on each side of the fitting. For all other fittings, the length of tied pipe shall be in accordance with Sheet 28 of the Standard Drawings. All joint restraint devices and appurtenances shall conform to Section 2.04 (E) and the Standard Drawings.

W. Sewer Crossing

When, during the course of installation, the main or associated piping crosses over or under a sanitary or storm sewer constructed of either vitrified clay or concrete pipe, the sewer shall be replaced or protected as shown on the plans and as described below or as otherwise directed by the District.

When the sewer is 15-inches or less in diameter and crosses over the water main or associated piping, and protection is not otherwise shown on the plans, where applicable, the sewer shall be replaced with poly-wrapped Special Class 50 ductile iron pipe manufactured in accordance with AWWA C151 or Type PSM SDR 35 PVC sewer pipe manufactured in accordance with ASTM D 3034. Re-connections to the existing sewer pipe shall be made with watertight, flexible couplings approved by the District and the Authority having jurisdiction over the sewer being replaced. All drains that exist under the sewer shall be restored in a manner that will prevent any flow in the drain from entering the trench in which the water main or associated piping is installed.

If the sewer is greater than 15-inches in diameter, all necessary precautions shall be taken to protect the sewer during installation of the main or associated piping. All drains that exist under the sewer shall be restored in a manner that will prevent any flow in the drain from entering the trench in which the water main or associated piping is installed.

When the water main or associated piping crosses over the sewer with less than 2-foot clear distance between the pipes, the sewer shall be encased with a minimum of 6-inches of concrete from springline to 6-inches above the top of the sewer. The encasement shall extend along the centerline of the sewer a minimum of one foot beyond the OD of the water main or associated piping at each end of the encasement.

In addition, when the water main or associated piping crosses under a sewer, the bedding material shall be replaced around the sewer to a point at least one foot above the top of the sewer pipe for sewers 15-inches in diameter and smaller and to at least springline for sewers larger than 15-inches in diameter, and thoroughly compacted and consolidated to support the sewer.

Sewers may not be cut without the express consent of the authority having jurisdiction over the sewer.
See Sheet 11 of the Standard Drawings for typical trench sections.

X. Connections To the District’s System

1. **Connections**: Connections to the District’s water system shall be in a neat and workmanlike manner. The District shall be present at all times during the construction of the connection. The connection is subject to approval by the District. Only one connection to the existing system will be permitted until the conditions and tests outlined in 2.06 (BB) have been met.

The District does not guarantee water tightness of its valves on existing facilities. If existing valves leak, the District will assist in reducing the leakage, but the Contractor shall use appropriate methods to work with the resulting leakage.

No connection will be installed or allowed by the District unless the water supply is protected as required against actual or potential backflows. Water service to any premise will be discontinued by the District if a backflow prevention device that is required is not installed, tested, and maintained, or if it is found that a backflow prevention device has been removed, by passed, or if an unprotected cross-connection exists on the premises. Service will not be restored until such conditions or defects are corrected.

An approved backflow prevention device shall also be installed on each service line and fireline within a customer’s water system, immediately following the meter, and in all cases, before the first branch line leading off the service line wherever the following conditions exist

a. In the case of premises having an auxiliary water supply which is not or may not be of safe bacteriological or chemical quality and which is not acceptable as an additional source by the District and Denver Water, the District’s water system shall be protected against backflow from the premises by installing an approved backflow prevention device in the service line and fireline appropriate to the degree of hazard.

b. In the case of premises on which any industrial fluids or any other objectionable substance is handled in such a fashion as to create an actual or potential hazard to the District’s water system, the District’s system shall be protected against backflow from the premises by installing an approved backflow prevention device in the service line
appropriate to the degree of hazard. This shall include the handling of process waters originating from the District’s system which have been subject to deterioration in quality.

c. In the case of premises having internal cross-connections that cannot be permanently corrected and controlled, or having intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impractical or impossible to ascertain whether or not dangerous cross-connections exist, the District’s water system shall be protected against backflow from the premises by installing a backflow prevention device in the service line.

2. **Operation of Valves**: In connecting to the District’s system, it may be necessary to operate existing District valves. Valves on the District’s system that must be operated to make a connection **shall be operated by the appropriate District personnel only**. The Contractor shall give the District 48 hours notice to arrange for operating valves. Both the Contractor and the District shall be present when the valves are operated.

3. ** Interruption of Service**: Installation of a connection that will require closing existing valves may cause an outage of water to existing the District customers. Affected customers shall be notified, in writing, 24 hours in advance. The notices shall be delivered by hand to each residence. An attempt shall be made at each residence to deliver the notice personally to the occupant. If the occupant cannot be contacted, the written notice shall be left at the door. Notification must be done by the Contractor.

The appropriate fire prevention bureau for the affected area shall be notified 48 hours in advance. A description of the boundaries of the affected area, and the location of all fire hydrants in that area shall be provided to the appropriate fire prevention bureau. Notification shall be done by the Contractor.

A normal outage shall be a maximum of 8 hours. If the outage will be greater than 8 hours, the work shall be done in a manner to minimize the inconvenience to customers, such as working at night in a continuous operation until service is restored. A connection which will require an outage longer than 8 hours shall be subject to review by the District as to the appropriate timing of the connection.

If in the process of installing a connection there exists an industry or building in the area that cannot be out of water, such as a hospital,
appropriate means shall be taken to provide and convey water. The water and the means of conveyance shall be approved by the District.

Y. Corrosion Protection Systems

1. Dissimilar Materials: Cathodic protection and insulation shall be installed as required by the District. Particular care shall be taken to insulate between dissimilar materials.

2. Insulating Joints: Whenever it is necessary to join pipe of dissimilar metal, a method of insulating against the passage of electrical current, approved by the District, shall be provided. Special care shall be exercised during the installation of these joints to prevent electrical conductivity across the joints. After the insulating joint installation is completed, the District will test the joint. Should the insulated joint fail the test, it shall be removed, inspected and any necessary repairs made. The joint shall then be reinstalled and tested. This process shall continue until the joint is successfully tested. Typical insulated joints are shown on Sheet 36 of the Standard Drawings and referred to in Section 2.04 (O).

3. Polyethylene Encasement Material: Metallic pipe, joint restraint, fittings, tie rods and appurtenances regardless of soil resistivity, shall be polyethylene encased. The polyethylene encasement shall prevent contact between the pipe and bedding material, but is not intended to be a completely airtight and watertight enclosure.

Polyethylene pipe wrap material shall be applied to line pipe in the manner shown on Sheet 37 of the Standard Drawings, and Section 2.04 (O). The polyethylene shall have a minimum thickness of 8 mils and conform to Section 2.04 (O). A 2-inch wide 10 mil thickness polyethylene pressure-sensitive tape shall be used to close seams or hold overlaps. Prolonged exposure to sunlight will eventually deteriorate polyethylene film. Keep exposure to sunlight to a minimum.

Before the District will allow a water main to be tapped, the trench, pipe and polyethylene wrapping shall be in a state of readiness. Damage to polyethylene pipe wrap in the trench prior to and during backfill shall be repaired to the satisfaction of the District. Damage to the pipe wrap caused by tapping the main shall be repaired by the Contractor.

Z. Chlorination

All main extensions and private pipe extensions shall be chlorinated in accordance with AWWA C651, and the local health authority having jurisdiction,
prior to acceptance by the District. The chlorinating agent, and method of application, shall be approved by the District.

The chlorination of the finished pipeline shall be done prior to the hydrostatic testing. Before filling the pipe with water, the pipe shall be clean and free of debris to the satisfaction of the District. The District will not provide labor or material for disinfection to Applicant’s installing mains under private contract.

Chlorine tablets may be used for disinfection in 12-inch and smaller pipe. Sixteen inch and larger pipe requires a chlorine slurry fed into the water used in filling the pipe. Chlorine tablets shall be attached to the inside top of the pipe with an approved adhesive certified to NSF Standard 61 prior to the pipe installation in the trench. An approved adhesive is Dow Corning 748 Multi-Purpose Sealant.

<table>
<thead>
<tr>
<th>Number of Hypochlorite Tables of 5 Gram Strength Required for a Dose of 50 Milligrams/Liter (Mg/l)*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipe Length (Feet)</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>13 or less</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>

* Based on 3½ gram available chlorine per tablet.

After the pipe is filled with water and chlorine, the chlorinated water shall be held in contact with the pipe for 24 hours. At the end of the 24 hour period, the water in the pipeline shall be tested by the local health authority or their designated representative to insure a residual chlorine content of not less than 25 milligrams per liter. Then the pipeline shall be thoroughly flushed to remove the heavily chlorinated water. This activity requires a permit, prior to flushing, from the Colorado Department of Public Health and Environment (CDPHE) Water quality Control Division (WQCD). The application for the permit can be obtained through the Division at http://www.cdphe.state.co.us/permits.html or by calling (303) 692-3500. The permit will require dechlorination, consumptive use or land applications prior to discharge. Care shall be taken in flushing the pipeline to prevent property damage and danger to the public.

Samples of water will be collected for bacteriological examination and residual chlorine content testing before the pipe is put into service. Testing of residual
chlorine, and sampling will be done by the local health authority or their designated representative.

**AA. Hydrostatic Testing**

No hydrostatic tests shall be made on any portion of the pipeline until field placed concrete has had adequate curing time as defined for kickblocks in Section 2.06 (R).

The District shall be notified 24 hours in advance of testing. **All testing shall be made in the presence of the District inspector and a Denver Water representative.**

Only the following methods are acceptable for supplying potable water for hydrostatic testing:

1. Water may be taken from a nearby pressurized water source which has been previously chlorinated, tested and accepted, such as a fire hydrant.

2. Water may be delivered to the site in a chlorinated water truck having a minimum capacity of 300 gallons. The water truck shall be used exclusively for the transportation of potable water.

3. Any previously tested, chlorinated and accepted water main, which is pressurized and is to serve the new main extension may be tapped on the pressurized side of the closed valve.

The method of supplying water as well as the source of water for hydrostatic testing must be certified and approved by the District. Use of barrels, sanitary or otherwise, to supply water for hydrostatic testing is strictly prohibited.

The District will furnish only the calibrated meter but not the pump for testing. The pipeline shall be properly backfilled and shall be in a state of readiness for testing. All bulkheads, pumps, taps and appurtenances necessary to fill the pipeline and maintain the required pressure shall be in place. The pipeline shall be filled with water and the test pressure of 150 pounds per square inch shall be applied to the pipeline by means of a continuously operating pump, equipped with a bypass valve for regulating pressure. When filling the pipeline, it shall be filled at a rate, which will not cause any surges, nor will it exceed the rate at which the air can be released.

All air in the line shall be properly purged. Where blowoffs or hydrants are not available or are not effective in purging air from the line, the District shall require
a tap to purge the line. The location and size of tap shall be at the District’s discretion.

While the test pressure is maintained, an examination shall be made of the pipeline in general, and any leaks shall be repaired. Any pipe or fitting found to be faulty shall be removed and replaced. No leakage is allowed through the bonnet of the line valve. Any valve leaking through the bonnet shall be repaired in place or removed and replaced. Cutting and replacing pavement, excavating and backfilling may all be necessary parts of locating and repairing leaks discovered by pressure testing of pipe.

After all visible leaks have been stopped, the full test-pressure shall be maintained for two continuous hours. Allowable leakage for each section between line valves shall not exceed the following leakage rates for 4-inch through 20-inch distribution and transmission mains:

<table>
<thead>
<tr>
<th>Pipe Size (Inches)</th>
<th>Allowable Leakage Per 1,000 Feet of Pipe (Gallons Per Hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.33</td>
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<tr>
<td>6</td>
<td>.50</td>
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<tr>
<td>8</td>
<td>.66</td>
</tr>
<tr>
<td>12</td>
<td>.99</td>
</tr>
<tr>
<td>16</td>
<td>1.32</td>
</tr>
<tr>
<td>20</td>
<td>1.66</td>
</tr>
</tbody>
</table>

Should testing show a leakage rate in excess of the rates shown, the pipeline shall not be accepted. The pipeline shall be repaired, rechlorinated as described in Section 2.06 (Z) and retested until it meets the test requirements.

**BB. Acceptance And Release For Taps**

A main shall be accepted by the District and released for taps when the following conditions have been met:

1. **Installation:** The main and all appurtenances have been installed to the satisfaction of the District and all pertinent notes and measurements have been made.

2. **Tests:** The following tests have been passed and notification of passing has been sent to the District
A. Chlorination test and any other test(s) required by the local health authority; see Section 2.06 (Z).

B. Compaction test performed under the direction of a registered professional engineer indicating the trench backfill meets the District requirements; see Section 2.05 (K).

C. Hydrostatic test; see Section 2.06 (AA).

D. Valve and valve box inspection.

3. **As Built Drawings**: One printable mylar copy, two blue line copies and one computer disk of the “As-Built” plans have been submitted to and approved by the District.

4. **Maintenance Guarantee**: A warranty maintenance bond, letter of credit or other acceptable from of financial guarantee for the one year warranty has been approved by the District.

5. **Easements**: Recorded easements have been received by the District.

6. **Easement Certification**: The District has approved the standard form of certification that all water mains and appurtenances have been installed within the boundaries of the recorded easements signed and stamped by a Land Surveyor registered in the State of Colorado.

7. **Subdivision Plat**: One printable mylar copy and two blue line prints of the recorded subdivision plat have been submitted to the District.

8. **Certificate of Costs**: A letter or invoice certifying the actual cost of construction of the water mains and appurtenances has been submitted to and approved by the District.

9. **Payment of Inspection Fees**: All review and inspection fees have been Paid.

**CC. Horizontal Directional Drilling**

With the approval of the District, Horizontal Directional Drilling (HDD) may be used as a method of installing PVC or Ductile Iron distribution mains. HDD is a trenchless methodology of installing pipe that consists of three primary stages: piloting, drilling of a pilot hole; reaming, pilot hole enlargement; and pullback, installation of the carrier pipe.
The directional drilling machine generally consists of a hydraulically powered system that rotates and pushes a hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable boring head.

Prior to any work, the Contractor must submit to the District a pilot bore plan with the vertical scale of 1” = 2’ and the horizontal scale of 1” = 20’. The plan shall include the following: bore entry point and angle, bore exit point and angle, finished grade, deflection and radiiuses of the pilot bore and existing utilities with minimum vertical and horizontal clearances. The Contractor shall confirm the alignment and elevation of critical utilities by potholing, using vacuum excavation or another suitable excavation method.

The Contractor must utilize a self-contained, closed, drilling fluid mixing system of sufficient size to mix and deliver drilling fluid (composed of bentonite clay, potable water and appropriate additives) to lubricate the cutting head during the drilling operation and to stabilize the reamed bore path prior to and during pull-back.

An electronic walkover tracking system shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. It shall enable the driller to guide the drill head by providing real-time feedback regarding the azimuth (horizontal direction) and inclination (vertical direction) of the tool face. Readings shall be recorded every 10 feet and plotted on a scaled drawing made available to the District. The District shall approve the location of the pilot hole prior to the reaming of the hole.

The bore hole diameter shall be increased to 1.2 to 1.5 times the outside diameter of the largest part of the carrier pipe to accommodate the pullback operation. The type of hole opener or back reamer to be used shall be chosen by the Contractor with regard to the types of subsurface conditions that were identified during the pilot hole drilling operation. The open bore hole shall be stabilized by bentonite drilling slurry that is pumped though the inside diameter of the drill pipe and through openings in the reamer.

The carrier pipe shall be assembled according to the manufacturer’s specifications and installed using either the cartridge or the assembled-line methods. The cartridge assembly method assembles individual sections of pipe in a secured entry and assembly pit. The assembled-line method consists of the pre-assembly of multiple pieces of pipe with a subsequent pulling installation into the bore hole as a long pipe string. For both methods, a pulling eye shall be attached to the pulling head on the lead stick of pipe that in turn shall be attached to a swivel on the end of the drill pipe. The end of the pipe shall be sealed to prevent contamination during the pullback operation.

Tracer wire or polyethylene encasement, as required for the particular type of carrier pipe, shall be adequately secured to the pipe prior to the pullback operation. The Contractor should follow manufacturer’s recommendations regarding the installation of polyethylene encasement which includes making the final overlap opposite to the direction of the pull. The carrier pipe must be adequately supported as it enters the bore.
hole to minimize forces on the pipe during pullback. The pullback shall be carried out in a continuous manner until the pipe reaches the original entry side of the bore. The manufacturer’s recommendations regarding bend radius and tensile strength shall be observed. Following pullback, the Contractor should allow the pipe to achieve mechanical and thermal equilibrium with its surroundings prior to cutting the pipe at either end.

The Contractor is responsible for drilling fluid disposal and other restoration and must comply with regulations regarding the proper disposal of the drilling fluid. Cleaning, flushing and hydrostatic testing of the pipe shall be conducted as specified elsewhere in these Standards.

The Contractor shall furnish an as-built plan and profile drawing to the District based on the electronic walkover system readings showing the actual location, horizontally and vertically, of the installation.
A. General

New developments are now commonly designed with curved streets, only one or two access roadways and many cul-de-sacs. Water mains supplying these subdivisions often cannot be sized using the hydraulic grid system. In some instances the maximum water demand within these developments exceeds the allowable design capacity of a 12-inch distribution main but is often considerably under that of a 24-inch conduit. As a result, it is necessary to approve installation of 16-inch and 20-inch transmission mains.

B. Other Standards To Apply

Section 2.07 addresses only 16-inch and 20-inch transmission mains. All standards that apply to 4-inch through 12-inch mains shall additionally apply to 16-inch and 20-inch mains along with the following requirements or exceptions. In case of conflict with any other chapter or section in these Standards and Specifications, this section shall govern for 16-inch and 20-inch pipe.

C. Design Of Transmission Mains

Sixteen inch and 20-inch water transmission mains shall be sized and designed in accordance with Section 2.01 with the following additional requirements.

1. Dual Feeds: All 16-inch and 20-inch lines shall be supplied by dual feeds unless otherwise directed by the District.

2. Placement: Line valves shall be optimally placed such that service outages during repairs or construction are minimized. Generally this will require the ability to isolate and alternately supply all mains extending from the transmission main but in no instance should the spacing between valves exceed 1,200 feet.

Twelve inch gate valves conforming to Material Specification MS-05 and 16-inch mechanical joint or flanged end butterfly valves conforming to Material Specification MS-06 shall be allowed on 16-inch transmission mains. Line valves to be used on 20-inch transmission mains shall be either 16-inch or 20-inch mechanical joint or flanged end butterfly valves.

The size and type of valve to be used shall be clearly indicated on all submitted plans.
If the District requires the installation of electronic monitoring and remote operation equipment, the line valve shall be a butterfly valve with a rectangular vault housing the motor operator and telemetry equipment. Each installation will require individual approval.

3. **Restraint System**: All bends, bulkheads, and fittings which require restraint due to unbalanced line thrust shall be restrained by using both harness rods and kickblocks in accordance with the Standard Drawings. All restraint requirements shall be in accordance with line size. Other restraint systems must be approved by the District.

4. **Headloss**: The maximum design headloss for 16-inch mains is 2 feet per 1,000 feet of main. The maximum design headloss for 20-inch mains is 1½ feet per 1,000 feet of main. Headloss is calculated using the maximum hour flow and using a C value of 130.

5. **Blowoff Assemblies**: Blowoff assemblies as shown on Sheet 13 of the Standard Drawings shall be installed at all low points in transmission mains and wherever a transmission main is dead ended unless a fire hydrant, which can serve additionally as a blowoff, is provided at these locations.

6. **Cathodic Protection**: Cathodic protection requirements for transmission mains will be determined by the District on an individual basis. Mains being installed in corrosive soils will be protected using methods as determined by the District. This may consist of the installation of anodes, the bonding of pipe, polyethylene encasement or other requirements determined by the District in addition to the requirements in Section 2.04 (O).

7. **Special Conditions**: Each transmission main shall be examined individually to determine any special condition and/or requirements (e.g. air valves, pressure regulating valves, etc.).

**D. Plans And Specifications**

Detailed plans and specifications for transmission main extensions shall be prepared for approval in accordance with Section 1.01 and shall contain a top of pipe profile showing the following additional requirements

1. Existing ground line.

2. Official street grades where transmission mains are located beneath roadways.
3. Proposed final ground surface where transmission mains are installed within an easement and not located in a roadway.

4. The elevation of grade breaks, slope of pipe, location of bends and fittings and minimum clearances to all interference.

E. Material

All pipe shall conform to MS-01 and/or MS-02.

F. Sewer Crossings

The provisions of Section 2.06 (W) shall apply to 16-inch and 20-inch transmission mains.

G. Easement Width Requirements

The easement width requirements specified in Section 1.02 shall apply to the installation of 16-inch and 20-inch transmission mains with the following additional requirements.

1. Dedicated Street: The cross section of a dedicated public roadway must have as a minimum a 32 foot surfaced roadway flow line to flow line.

2. Private Roadways: The cross section of a private roadway must have as a minimum 30 feet of surfaced roadway and a 4 foot attached walk, or 34 feet of surface roadway. The easement shall have a minimum width of 34 feet.
CHAPTER 3

WATER SYSTEM MATERIAL SPECIFICATIONS
Note: Platte Canyon Water and Sanitation District has adopted the Material Specifications of Denver Water as set forth in Denver Water Engineering Standards, 13th Edition effective September 9, 2010. The specifications are provided for standardization purposes only and represent minimum design standards that may require revision for specific applications.

These material specifications are available on the Denver Water website at:

CHAPTER 4

STANDARD DRAWINGS
STANDARD DRAWINGS

**Note:** *Platte Canyon Water and Sanitation District has adopted the Standard Drawings of Denver Water as set forth in Denver Water Engineering Standards, 13th Edition effective September 9, 2010. The Standard Drawings are provided for standardization purposes only and represent minimum design standards that may require revision for specific applications.*

These drawings are available on the Denver Water at:

CHAPTER 5

Exhibits
EXHIBIT A
PLATTE CANYON WATER AND SANITATION DISTRICT

Owner/Applicant Information Form

Construction of water and sanitary sewer mains within Platte Canyon Water and Sanitation District requires submittal of Application and Agreement for Water and/or Sanitary Sewer Main Extension forms. The Applications will be prepared by the District upon receipt of the documentation described herein. The applications must be executed exactly as the applicant is doing business.

No water or sanitary sewer construction may commence until all documents listed on the Plan Review Checklist are approved by the District and construction plans are stamped and signed by the District engineer and District manager.

Please complete the following and return to the District accompanied with the required documentation. If the Applicant is doing business in a form of organization not listed below, please contact the District for instructions on the information required. To promote efficiency in processing construction plans, you are encouraged to designate a local representative to respond to questions and receive comments regarding the plans and other required documents.

Owner Name:
Address:
Telephone No.: Fax No.:

Proper Owner Name
(if different than above:)
Address:
Telephone No.: Fax No.:

Contact Person Name:
Address:
Telephone No.: Fax No.:

Engineer Name:
Address:
Telephone No.: Fax No.:

Form of Organization
Please complete the appropriate section below:

**CORPORATION**

If Application will be executed by a Corporation, please provide the following:

Name of Corporation: 

State in which Corporation is registered: 

Registered Agent for Corporation: 

Name of Corporate Officer authorized to sign Applications: 

Name of Corporate Officer who will attest signature of above: 

A COPY OF THE ARTICLES OF INCORPORATION OR CERTIFICATE OF INCORPORATION MUST BE RETURNED WITH THIS FORM.

**GENERAL PARTNERSHIP**

If Application will be executed by a General Partnership, please provide the following:

Name of Partnership: 

Name of all general partners: 

Name and title of partner(s) who will sign Applications (if fewer than all general partners will sign application, please submit documentation authorizing the individual(s) who do sign): 

A COPY OF A RECORDED TRADE NAME AFFIDAVIT FOR THE GENERAL PARTNERSHIP MUST BE RETURNED WITH THIS COMPLETED FORM.
LIMITED PARTNERSHIP

If Application will be executed by a Limited Partnership, please provide the following:

Name of Limited Partnership: ________________________________

Name(s) of general or managing partners: __________________________

Name(s) of limited partners: __________________________

Name(s) of general partner who will sign Applications (if fewer than all general partners are listed, please submit documentation in the form of a certificate of limited partnership or other document authorizing said individual to sign):

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

A STAMPED COPY OF THE CERTIFICATE OF LIMITED PARTNERSHIP FILED WITH THE COLORADO SECRETARY OF STATE MUST BE RETURNED WITH THIS FORM.

LIMITED LIABILITY COMPANY

If Applications will be signed by a limited liability company, please provide the following:

Name of limited liability company: ________________________________

Name and title of individual(s) who will sign Applications:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

A DATE STAMPED COPY OF THE ARTICLES OF ORGANIZATION FILED WITH THE COLORADO SECRETARY OF STATE FOR THE LIMITED LIABILITY COMPANY MUST BE RETURNED WITH THIS FORM.
INDIVIDUAL

If Application will be executed by an individual, please provide the following:

Name of individual: ____________________________________________
EXHIBIT B
APPLICATION AND AGREEMENT FOR EXTENSION OF WATER MAINS

THIS APPLICATION AND AGREEMENT ("Agreement") is made and entered into in quadruplicate original between ___________________________ (hereinafter referred to as "Applicant"), whose address is ___________________________ and PLATTE CANYON WATER AND SANITATION DISTRICT, a quasi-municipal corporation of the State of Colorado (hereinafter referred to as "District"), whose address is 8739 West Coal Mine Avenue, Littleton, Colorado 80123, and whose telephone number is (303) 979-2333.

WITNESSETH:

WHEREAS, Applicant desires to install water mains identified and known by the parties as the ___________________________ Water Main Extension, and to have those mains and related appurtenances become a part of the District’s public water system; and

WHEREAS, Applicant may retain a contractor to install the water mains and related appurtenances which are the subject of this Agreement; and

WHEREAS, Applicant and District desire to execute an agreement setting forth the terms and conditions pursuant to which such water mains and related appurtenances will be conditionally accepted by the District and allowed to connect to the District’s public water system and, if finally accepted by the District, shall become a part of the District’s public water system for all purposes including maintenance.

NOW, THEREFORE, the parties hereto agree as follows:

1. Definitions.

1.1 The term “water lines” and “water distribution mains” shall mean the water lines and related appurtenances such as valves, valve boxes and fire hydrants, etc., as shown and only as shown on Applicant’s approved plans; provided, however, the term “water lines” shall not under any circumstances, include private service lines.

1.2 “Approved Plans” shall mean the latest set of plans and specifications approved for construction by the District’s consulting engineer.

1.3 “Project” shall mean the water lines as shown on Applicant’s Approved Plans.
1.4 “Applicable Governmental Authority” shall mean the District or any governmental, municipal or quasi-municipal entity that has jurisdiction with respect to the Project.

2. Approved Plans.

Applicant covenants the Project will be constructed in accordance with the Approved Plans and any approved modifications or additions made thereto. Further, Applicant warrants that the Project will be constructed in a workmanlike manner and that, once constructed, the Project will be fit for its intended purpose.

Applicant further warrants that the Project will be constructed upon real property owned by Applicant or upon real property upon which Applicant has permission to enter for the purpose of constructing the Project and performing all of Applicant’s warranty and other obligations contained herein.


The District shall have no responsibility to supervise or direct construction of the Project. Applicant or Applicant’s contractor will supervise and direct construction of the Project and will be responsible for the means, methods, techniques, sequences and procedures of construction.

4. Applicant’s Warranty.

a) Applicant warrants and guarantees to the District that, without exception, the Project will be free from any defects (including but not limited to defects in materials and workmanship) for a period of one (1) year from the date of conditional acceptance by District or until the date the Project is finally accepted by the District, whichever period is longer. No exceptions shall be permitted to this warranty provision.

b) The Applicant additionally agrees that during the one (1) year period subsequent to the date of conditional acceptance of the Project by District, Applicant will promptly perform all work and supply all materials or cause its contractor to perform all work and supply all materials necessary to remove, replace, maintain or repair the Project constructed hereunder when said work is required by the District for any reason, notwithstanding that said work does not arise out of any negligent or willful acts or omissions of the Applicant or Applicant’s contractor. In the event any of the maintenance and/or repair obligations required under this subparagraph (b) are not performed within twenty (20) days following written notice to Applicant, the District may cause said maintenance and/or repairs to be performed and charge the costs thereof to Applicant. Applicant agrees to pay all District bills for maintenance and repairs of the Project within thirty (30) days after receipt of the District invoice, together with all costs of collection, including reasonable attorney’s fees and interest thereon at the rate of 1.5 percent per month on amounts that are past due.
c) Applicant agrees that any work required by the District hereunder, whether performed by Applicant or Applicant’s contractor or by the District in the event of the refusal or inability of Applicant and/or Applicant’s contractor to perform the work until the Project is finally accepted by the District, shall not impair or void the Applicant’s warranty and guarantee under this paragraph 4 or any other obligation or liability of the Applicant imposed by law or contract.

d) Applicant further agrees that in emergency situations, the District shall have the right to perform whatever maintenance or repairs the District determines are necessary to protect the public health and safety without giving advance written notice to Applicant. Applicant agrees to pay all costs incurred by the District in performing emergency repairs and maintenance within thirty (30) days after receipt of the District’s invoice thereof, together with all costs of collection, including reasonable attorney’s fees and interest thereon at the rate of 1.5 percent per month on amounts that are past due. The term “emergency” shall mean any situation where, in the District’s determination, the public health or safety would be jeopardized or endangered by waiting for Applicant or Applicant’s contractor to initiate and perform the needed maintenance and/or repairs.


a) To induce the District to execute this Agreement and to provide additional assurance that Applicant will fully perform all of Applicant’s warranty, maintenance and repair obligations contained herein, and as a precondition of the District’s approval of the Project for conditional acceptance as described in paragraph 9, Applicant agrees to deliver to District concurrent with this Agreement additional warranty security in a form and amount as described in subparagraph 5a, 5b, or 5c below.

b) A fully executed Warranty and Maintenance Bond in the form attached hereto as Exhibit “A” issued by a surety acceptable to the District and in an amount to be determined by the District, but in no event greater than twenty-five percent (25%) of the Project construction cost as determined by the District in the reasonable exercise of its discretion. Until the Project is finally accepted by the District, the performance of any warranty, maintenance or repair work upon the Project by the Applicant, Applicant’s contractor or the District, shall under no circumstances, release, discharge or modify in any way Applicant’s obligations under the Warranty and Maintenance Bond.

c) An Irrevocable Letter of Credit issued by an institution acceptable to the District and in an amount to be determined by the District, but in no event greater than twenty-five percent (25%) of the Project construction cost as determined by the District in the reasonable exercise of its discretion. Until the Project is finally accepted by the District, the performance of any warranty, maintenance or repair work upon the Project by the Applicant, Applicant’s contractor or the District, shall under no circumstances, release, discharge or modify in any way Applicant’s obligations under the Letter of Credit.

d) A cash deposit in an amount to be determined by the District, but in no event greater than twenty-five percent (25%) of the Project construction cost as determined by the District in the reasonable exercise of its discretion. Said sum shall be held by the District as a
security deposit for the faithful performance by Applicant of all of Applicant’s warranty and maintenance obligations under this Agreement. If Applicant defaults with respect to any of its warranty or maintenance obligations hereunder, including but not limited to those obligations as set forth in Paragraph 4 above, District may, (but shall not be required to) use, apply, or retain all or any part of the deposit for the payment of any amount which District may spend or become obligated to spend by reason of Applicant’s default or to compensate District for any other loss or damage which District may suffer by reason of Applicant’s default. District will not segregate the cash deposit from its other funds and District shall be entitled to all interest, if any, earned on said deposit. The District shall return the security deposit less any amount or amounts thereof that had been applied to Applicant’s warranty and maintenance obligations hereunder within sixty (60) days after the water lines and related appurtenances are finally accepted by the District.

6. Inspection.

The District and its representatives will at all times have access to the construction site and will be permitted to inspect the work, materials and any relevant documents or records necessary for the purpose of determining whether the Project is constructed in accordance with the Approved Plans. All inspections, tests, and reviews shall be conducted at the sole cost of the Applicant and shall be paid by the Applicant within thirty (30) days of invoice by the District.

7. Ownership.

Until dedicated to and conditionally accepted by the District, the Project shall be owned by Applicant and Applicant shall have full and complete responsibility for the Project including the safety conditions at the construction site. By way of explaining and not limiting the foregoing provisions of this Paragraph 7, Applicant agrees that until the District conditionally accepts the Project in accordance with the provisions of Paragraph 10 below, the District shall have no obligation pursuant to Section 9-1.5-103 C.R.S., to locate any water main or related appurtenance that is a part of the Project. Until conditional acceptance of the Project by District, said locate obligation, if any, shall be the sole responsibility of Applicant.

8. Tap Permits.

No water tap permits shall be issued or sold for connection to the Project and no such taps shall be made to the Project until the District has conditionally accepted the Project in the manner as set forth in paragraph 9 below.


Each of the following conditions shall be a condition precedent which must be satisfied before the District will conditionally accept the Project:

a) Approved Plans. The District, in its sole discretion, is satisfied that the Project has been constructed in accordance with the Approved Plans; and
b) **Easements.** The District is satisfied that all easements have been obtained for the Project and that the Project as constructed is located within said easements or other suitable public rights-of-way; and

c) **Record Drawings.** Receipt by the District of record drawings for the Project, certified compaction test results, and any survey certifications that the District’s manager may require;

d) **Contemplated Use.** Without in any way being limited by the specificity of the foregoing, the District, in its sole discretion, is satisfied that there are no matters outstanding which would prohibit or unreasonably interfere with the use of the Project for its intended purpose.

10. **Conditional Acceptance.**

Conditional acceptance shall be accomplished only by the District’s manager and/or engineer, if applicable, affixing his or their signatures to the Agreement in the space provided for on page 9. As of the date of conditional acceptance, all of Applicant’s right, title and interest in and to the Project, including but not limited to, all mains, pipelines, valves, and related parts and materials which comprise the Project, shall automatically and immediately pass to and be conveyed to the District with no additional transfer proceedings or documents being necessary; provided, however, that the Applicant’s shall remain obligated to perform said Applicant’s warranty, maintenance and repair obligations for a period of one (1) year from the date of conditional acceptance or until the Project is finally accepted by the District, whichever period is longer.

11. **Contractor Warranties.**

Applicant may cause its contractor to warrant and guarantee to District Contractor’s work performed on the Project. Any such warranty by Applicant’s Contractor shall be in addition to and not in lieu of Applicant’s warranty and guarantee obligations to District as set forth in this Agreement.

12. **Conditions to Final Acceptance.**

One (1) year from the date of conditional acceptance, the District’s manager and/or consulting engineer, as the case may be, will inspect the Project for final acceptance. Each of the following conditions shall be a condition precedent which must be satisfied before the District shall finally accept the Project:

a) **Full Performance.** Applicant has faithfully and fully performed its obligations under this Agreement.

b) **No Damage.** There has been no damage or destruction to the Project; and if there has been damage or destruction, the same has been repaired, and the cost of such repair has been paid by Applicant.
c) **Compliance with Approved Plans.** Any deviation in the construction of the Project from the Approved Plans has been corrected. Without in any way limiting the generality of the foregoing sentence, attention shall be paid to assure that all fire hydrants, valve vaults, valve boxes, manholes and manhole covers are at finished grade and that all valve boxes are centered over the valve operating nut and are free and clear of sand, gravel, stones or other foreign material, and that all fire hydrants are operational.

d) **Contemplated Use.** Without in any way being limited by the specificity of the foregoing, the District, in its sole discretion, is satisfied that there are no matters which would prohibit or unreasonably interfere with the use of the Project for its intended purpose.

13. **Final Acceptance.**

Final acceptance shall be accomplished only by the District’s manager and/or engineer, as the case may be, affixing his or their signatures to this Agreement in the space provided on Page 9. As of the date of final acceptance, the District accepts the project for all purposes, including maintenance and repairs and the Applicant’s obligation to pay for same shall cease; provided, however, that Applicant’s indemnification obligation as set forth in paragraph 15 below shall survive final acceptance.

14. **Valve Boxes.**

Notwithstanding any other provision contained in the Agreement to the contrary, if the water lines that are subject to this Agreement are installed in private or public streets and the surface of the street is not paved by the time of final acceptance, Applicant shall remain responsible of raising the valve boxes to finished street grade in accordance with applicable County specifications when the street is paved. Applicant shall notify the District when the work to raise the valve boxes is complete so that the District may inspect the work. As part of the work on the valve boxes, Applicant shall insure that the valve boxes are clean of debris and are operational. If the Applicant does not raise the valve boxes as required herein, the District may perform the work at Applicant’s sole cost and expense within thirty (30) days after notice to Applicant. Applicant shall make payment to the District within thirty (30) days after invoice. In the event payment is not timely made, Applicant agrees to pay all costs of collection (including reasonable attorneys fees) together with interest on the unpaid delinquent amount at the rate of 1.5 percent per month or part thereof.

15. **Indemnification.**

Applicant shall indemnify and hold harmless the District, its officers, agents and employees, from all claims and demands or liability of whatsoever kind or nature, (including attorneys’ fees) arising out of or encountered in connection with the construction of the Project or its operation or maintenance, whether such claim, demand or liability is caused in any way by Applicant, its agents or employees, or by Applicant’s contractor or subcontractor, their agents or employees, or by any product or materials installed on the Project by Applicant, its contractors or subcontractors; excepting only such injury or harm as may be caused solely and exclusively by the District’s negligence.
This indemnification shall extend to all claims, demands or liabilities, (including reasonable attorney’s fees) for injury to persons, property or financial loss occurring before final acceptance of the Project as well as for a period of two (2) years after the date of final acceptance of the Project.

16. No Duty No Reliance.

The District, by its review and approval of the plans for the Project, does not assume any duty of care with respect to the Applicant or the Project. It is the Applicant’s sole responsibility to prepare and design the plans and select the materials for the project in accordance with the District’s specifications and all applicable District rules and regulations. It is also Applicant’s sole responsibility to construct the Project in accordance with the Approved Plans.

Applicant represents that Applicant has read thoroughly the Approved Plans for the Project, examined the Project site, and ascertained all soil, geological, groundwater and other conditions to be encountered which might affect the construction, operation and maintenance of the Project. Applicant agrees that it enters into the Project relying on its own investigation and information not on any statements or representations, if any, that have been made by the District, its officers, agents or employees.

If Applicant or Applicant’s professional engineers disagrees with any part or portion of the Approved Plans for specifications for the Project, such disagreement shall be brought to the attention of the District Manager for resolution prior to the construction of the Project. Nothing herein contained shall be construed to place any obligations on the District to modify, deviate or change its standards and specifications as a result of any disagreement or objection lodged by the Applicant.

17. Insurance.

The following insurance coverages, issued by insurance companies acceptable to the District, shall be obtained, paid for and kept in full force and effect by Applicant until conditional acceptance of the Project, provided, however, that if Applicant contracts for the construction of the Project, then Applicant’s Contractor shall cause the following insurance coverages, issued by insurance companies acceptable to the District, to be obtained, paid for and kept in full force and effect until conditional acceptance of the Project:

a) Workmen’s compensation insurance covering all workmen engaged in performance of the work on the Project in amounts not less than minimum coverage required by law, including employer liability coverage for not less than $100,000.00;

b) Liability insurance, including automobile liability and property damage coverage at least equivalent to the 1986 Commercial General Liability Insurance Policy form. Such policy or policies shall be written on an “occurrence” basis and maintained in minimum amounts of $500,000.00 per occurrence, with a $1 million general aggregate limit and a $500,000.00 product/completed operations aggregate limit. Said policies shall contain an
endorsement naming the District as an additional insured and providing that any insurance maintained by the District is excess and non-contributing with the insurance required hereunder.

c) Any policy of insurance required hereunder shall contain a contractual liability endorsement covering indemnity and defense obligations of Applicant and such other coverages as may reasonably be required by the District. Such policy will, among other things, make specific reference to this Agreement.

d) Any policy insuring against loss caused by physical damage to any portion or all of the Project, or to materials to be incorporated into the Project, or covering Applicant or Applicant’s contractor’s tools, supplies, machinery or equipment shall contain an endorsement providing that the insurer waives its right of subrogation against the District and any other named insured. Nothing contained in this paragraph shall give or create in any third party any claim or right of action against the District, except which may exist irrespective of this paragraph.

18. Proof of Insurance.

Prior to the commencement of any construction on the Project, Applicant or Applicant’s Contractor as the case may be, shall furnish to the District certificates of insurance or copies of policies showing that such insurance required herein is in force and that the premiums due thereon have been paid and that the District is named as an additional insured. Such certification or policies shall provide that the insurance may not be cancelled, terminated or modified without fifteen (15) days advance notice thereof to the District. No policy shall contain any provisions for exclusion from liability other than the provisions for exclusion forming a part of the standard basic, unamended and unendorsed form of policy; provided, however, in no event shall any exclusions be permitted which conflict with any coverage required by this Agreement.

19. Modification.

This Agreement can be modified only by a written agreement signed by both parties hereto.

20. Interpretation of Agreement.

This Agreement and the Approved Plans are intended to supplement one another. However, in the event of a conflict, the conflict shall be brought to the attention of the District’s manager, who shall have final authority to resolve any conflicts.


This Agreement shall be construed in accordance with and governed by the laws of the State of Colorado.
22. **Assignment.**

Applicant may not assign this Agreement without the express written consent of the District.

**IN WITNESS WHEREOF,** this Agreement has been executed in quadruplicate by the parties hereto as of the day and year opposite their signatures.

**APPLICANT**

By: _______________________________

Date: _______________________________

**ATTEST:**

By: __________________________________

Secretary

**STATE OF _______________ )**

**COUNTY OF _______________ )**

The above foregoing instrument was acknowledged before me this _____ day of ____________________, 20__, by ________________________________.

Witness my hand and official seal.

My Commission expires:___________________

________________________________________

Notary Public
APPROVALS BY THE DISTRICT

a) Approval of Application:

Date: ____/____/____

____________________________
District Manager

b) Conditional Acceptance of Project:

Date: ____/____/____

____________________________
District Manager

c) Final Acceptance of Project:

Date: ____/____/____

____________________________
District Manager
EXHIBIT A

PLATTE CANYON WATER AND SANITATION DISTRICT

WARRANTY AND MAINTENANCE BOND
(Water Improvements)

KNOW ALL MEN BY THESE PRESENTS, that we
________________________________________________________, hereinafter called Principal, and
_____________________________________________________, hereinafter called Surety, are held and
firmly bound unto the Platte Canyon Water and Sanitation District, a quasi-municipal corporation of the
State of Colorado, hereinafter called “District”, in the sum of ______________________ dollars
($______________), lawful money of the United States of America for the payment whereof the
Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns,
jointly and severally, firmly, by these presents:

WHEREAS, Principal has applied to the District for permission to install the water lines and
related appurtenances generally described on Exhibit “A” which is attached hereto and incorporated
herein by this reference (the “Project”), for the purpose of obtaining water service for a development
known as __________________________________________________ ; and

WHEREAS, as a condition of the District’s approval of the Project, Principal and District have
entered into the Application and Agreement for Extension of Water Mains attached hereto as Exhibit “B”
(hereinafter called the “Contract”) which Contract is by this reference made a part hereof; and

WHEREAS, the Contract contains: a) Principal’s warranty that the Project will be free from
defects for the period beginning with the date of conditional acceptance and ending with the date the
project is finally accepted by the District; and, b) Principal’s promise to maintain and repair the Project
until the same has been finally accepted by the District and to raise the valve boxes to paved street level at
such time the street is finally paved, even if the same occurs after final acceptance of the Project; and

WHEREAS, the approval of the Project by the District and Principal’s authorization to proceed
with the construction thereof is in part conditioned upon Principal’s furnishing of an adequate warranty
and maintenance bond to the District guaranteeing that Principal will perform or cause to be performed all
of Principal’s warranty, maintenance and other obligations that arise under the Contract from and after
the date the same is conditionally accepted by District.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal
shall promptly, faithfully and fully perform all the undertakings, covenants, terms, conditions and
agreements of said Contract arising after conditional acceptance of the Project by the District, including
but not limited to Principal’s maintenance, repair, warranty and valve box raising obligations; and shall
also well and truly perform all undertakings, covenants, terms, conditions and agreements, of any and all
duly authorized modifications of said Contract that may hereinafter be made, notice of which
modifications to the Surety being hereby waived, then this obligation shall be null and void; otherwise it
shall remain in full force and effect for a period of eighteen months from the date of this Bond as set forth
below.

5-17
AND THE SAID SURETY, for value received, hereby stipulates and agrees that whenever the Principal shall be, and is declared by District in default of its post-conditional acceptance obligations under said Contract, the District having performed its obligations thereunder, the Surety may promptly remedy the default or shall promptly (1) perform the Principal’s post-conditional acceptance obligations in accordance with the terms and conditions of the Contract, or (2) obtain a bid or bids for submittal to the District for completing said post-conditional acceptance obligations of the Principal in accordance with the terms and provisions of the Contract and upon a determination by the District and the Surety of the lowest responsible bidder, arrange for a contract between such bidder and the District and make available as work progresses (even though there should be a default or a succession of defaults under the Contract of completion arranged under this paragraph) sufficient funds to pay the cost of completion in an amount up to but not exceeding the dollar amount of this Bond.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the District named herein or the successors and assigns of the District. Any suit under this Bond must be instituted before the expiration of two years from the date on which the Project is finally accepted by the District.

Nothing herein contained is intended to cause the Surety to guarantee that the Project will be constructed in the first instance. Surety’s obligations hereunder arise only at such time as the Project is conditionally accepted by the District.

IN WITNESS WHEREOF, the Principal and Surety have executed this Bond as of this ____ day of____________________, 20__.

PRINCIPAL:

By: ______________________________
Title:

[S E A L]

ATTEST: [S E A L]

SURETY:

By: ______________________________

PCWarrantyMaintenanceBond.water.FORM.doc
revised: April 4, 2001

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5-18
EXHIBIT C
Platte Canyon Water and Sanitation District

Easement Preparation and Submittal Procedures and Checklist

These procedures have been prepared in order to provide general guidelines for the submittal of information necessary for the preparation of water and sanitary sewer easements granted to Platte Canyon Water and Sanitation District. This information generally includes legal descriptions and drawings, an overall easement drawing, and a title commitment. Information contained herein should be used in conjunction with the District's Water and Sewer System Standards and Specifications.

All information required in the submittal section of these procedures must be presented to the District prior to the approval of and release of construction plans. Submittals must be accompanied by this form with Part A completed by the Easement Grantor or his designated representative.

All legal fees and costs associated with preparation of the easement documents will be charged to the grantor.

Submittal

The following information must be presented in two copies to the Platte Canyon Water and Sanitation District.

1. A legal description of each easement parcel. The legal description must conform to the requirement set forth in Section 1.02(B)(1)(b) of Platte Canyon Water and Sanitation District’s Water System Standards and Specifications.

2. A paper and electronic copy of a drawing for each easement parcel. The drawing shall conform to the requirements set forth in Section 1.02(B)(1)(c) of Platte Canyon Water and Sanitation District’s Water System Standards and Specifications.

Each separate property ownership requires a separate legal description and drawing. Legal descriptions and drawings shall be numbered consecutively as parcel number 1, parcel number 2, etc.

The acreage of the proposed easements shall be indicated on the legal descriptions and drawings.

3. An overall survey drawing, stamped by a registered land surveyor, showing the boundaries of the development, the proposed easements, and all existing easements, ditches, and structures.

If off site easements are requested and not shown on the overall survey drawing, a separate overall drawing indicating the relationship of offsite easements to the proposed development
shall be submitted. Encroachments and/or encumbrances on the proposed offsite easements, such as existing easements, ditches, and structures, must be identified on the overall drawing.

4. Proof of ownership as described in Part A (below).

**Easement Checklist**

Part A (to be completed by Grantor)

1. On the lines provided below, please type or print the name of the Grantor for each easement exactly as the Grantor's name appears on the Deed by which the Grantor took title to the property. If the Grantor is a corporation, please list the State in which the corporation was incorporated, plus the names of all officers. If Grantor is a general partnership, a copy of the recorded trade name affidavit must be furnished along with the names of the general partners. If Grantor is a limited partnership, a certificate of limited partnership must be furnished along with the names of the partners.

<table>
<thead>
<tr>
<th>Easement No.</th>
<th>Name, title, address and telephone number of persons who will be signing Easement Deed</th>
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</table>

2. Please provide the name, address, and telephone number of the party to whom the prepared documents should be forwarded for signature.

<table>
<thead>
<tr>
<th>Easement No(s)</th>
<th>Name, address and telephone number</th>
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5-21
3. A request is made to include the following special provisions within the Easement Deed. Please list by parcel number and explain the reasons such special provisions are desired.
4. Please list name, address, and telephone number for the party responsible for payment of costs associated with preparation of easement documents.

________________________________________
________________________________________
________________________________________

Part B (To be completed by District Representative)

1. Please provide the information requested below:

<table>
<thead>
<tr>
<th>Easement Parcel</th>
<th>Water or Sewer Easement</th>
<th>Exclusive or Non-Exclusive</th>
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2. The legal descriptions, drawings, and proposed locations of utilities have been compared and reviewed, and are recommended for acceptance by the District.

(District Representative)     (Date Approved)

Part C (To be completed by District Representative)

1. Please state any special considerations or time constraints which should be brought to the attention of the District's attorney. Include a brief background statement describing location and extent of development as well as proposed points of connection to existing mains.
2. I have reviewed the proposed easements and recommend that they be accepted by the District.

(District Representative)  (Date Approved)

Part D (To be completed by District Representative)

1. For each easement, please provide the following information.

<table>
<thead>
<tr>
<th>Easement No.</th>
<th>Date Recorded</th>
<th>County</th>
<th>Reception No. or Book and Page No.</th>
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</table>
2. Copies of all easements have been mailed to (please indicate date mailed):

_____________________________  Grantor
(Date Mailed)

_____________________________  District Attorney (with copy of Easement checklist)
(Date Mailed)

_____________________________  Denver Water Department (Water Easements Only)
(Date Mailed)

_____________________________  (District Representative)  (Date Approved)
EXHIBIT D

Sample Easement Agreement Forms
EASEMENT AGREEMENT

THIS EASEMENT AGREEMENT, made and entered into as of the ____ day of __________________, ____, by and between:

hereinafter called “Grantor”, (whether grammatically singular or plural) and the:

hereinafter called “Distributor”.

WITNESSETH:

For and in consideration of the sum of TEN AND NO/100 DOLLARS ($10.00) and other good and valuable consideration to the Grantor in hand paid by the Distributor, the receipt whereof is hereby acknowledged, the Grantor hereby grants to the Distributor, its successors and assigns, the permanent right to enter, re-enter, occupy and use the described property to construct, maintain, repair, replace, remove, enlarge and operate one or more water pipelines and all underground and surface appurtenances thereto, including electric or other related control systems, underground cables, wires and connections and surface appurtenances. By way of example and not by way of limitation, the parties intend to include within the terms “pipelines” and “appurtenances” the following: mains and conduits, valves, vaults, manholes, control systems, ventilators, and the like, in, through, over and across the following described parcel of land situate, lying and being in the County of _______________ and State of Colorado, to-wit:

(For Legal Description, please see Exhibit “A”, attached hereto and made a part hereof)

IT IS HEREBY MUTUALLY covenanted and agreed by and between the parties hereto as follows:

1. The Distributor shall have and exercise the right of ingress and egress in, to, over, through and across the above described property for any purpose needful for the full enjoyment of any other right of occupancy or use provided for herein. The easement area shall be free of obstacles throughout the length of the easement. Due to variations in topography, the easement and the pipe may take on an uphill or downhill direction having a slope of greater than 4%; however, sloping within the easement across its width may not exceed 4% to insure stability of maintenance equipment and vehicles. A slope across the width of the easement greater than 4% may be allowed upon prior written permission of the Distributor and Denver Water.
2. The Grantor shall not construct or place any structure or building, fence, retaining wall, street light, power pole, yard light, mail box, sign, trash receptacle, temporary or permanent, or plant any shrub, tree, woody plant or nursery stock, on any part of the above described easement. Any structure or building, fence, retaining wall, street light, power pole, yard light, mail box, sign, trash receptacle, temporary or permanent, or shrub, tree, woody plant or nursery stock, of any kind situated on the above described easement as of the date of this Agreement, may be removed by the Distributor without liability for damages arising therefrom.

3. The Grantor, for itself, its successors and assigns, shall provide to the Distributor any information within its possession about past and currently existing Environmental Contamination in the easement area. Such information shall include but not be limited to environmental studies, reports, samples, agreements, letters, and any remediation work that has been done or is ongoing to clean the area or is planned to occur. If contaminated soils exist in the easement area upon the effective date of this Agreement, for which the Grantor or its successors or assigns are responsible under applicable state or federal laws, the Grantor, at Grantor's sole expense, shall take Corrective Action to clean the contamination to the full width of the easement area and a depth of at least twelve (12) feet, if necessary. Contamination shall be cleaned to the appropriate state and federal standards set forth by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment or to the standards of Corrective Action plans for the property currently approved by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment. Grantor shall provide documents verifying Corrective Action to the Distributor prior to the installation of pipeline facilities.

4. To the extent it legally may, and as long as the Distributor was not negligent, the Grantor, for itself, its successors and assigns, shall indemnify the Distributor to the extent required by state and federal laws to indemnify the Distributor, against any liability, damages, costs, expenses, causes of action, claims, losses, settlements, fines and penalties, and reasonable attorneys' fees claimed by a third party against the Distributor relating to (1) the existence, mitigation, or remediation of Environmental Contamination in the easement area; (2) any Corrective Action in the easement area; (3) any Environmental Contamination in the easement area that occurs or is discovered after conveyance of the easement; or (4) the occurrence, disturbance, or movement of existing contaminated soils resulting directly or indirectly from any work conducted by the Distributor in exercise of the Distributor's functions.

5. As used in this Agreement, "Corrective Action" shall refer to risk assessment, active remediation, passive remediation, voluntary cleanup, investigation and/or monitoring of Environmental Contamination.

6. As used in this Agreement, "Environmental Contamination" means the presence within the easement area of any hazardous material, including but not limited to any substances defined as or included in the definition of "hazardous substance," "hazardous material" or "toxic substances" in the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601, et seq., the Hazardous Materials Transportation Act, 49 U.S.C. § 5101, et seq., the Resource Conservation and Recovery Act, 42 U.S.C. § 6901, et seq., or any other federal,
7. The water pipeline and all appurtenances shall be installed in accordance with then current Distributor and Denver Water Engineering Standards.

8. The Distributor shall have and exercise the right of subjacent and lateral support to whatever extent is necessary or desirable for the full, complete, and unmolested enjoyment of the rights hereinabove described. It is specifically agreed between the parties that the Grantor shall take no action which would impair the earth cover over, or the lateral or subjacent support for any water pipeline or lines and appurtenances within the easement. Denver Water's Engineering Standards require no less than four and one-half feet (4½) and no more than ten-feet (10) of earth cover, measured vertically from the top of any pipeline or lines. Deviation from this requirement will be permitted only upon specific prior, written permission from Denver Water and the Distributor. If such modification undertaken by the Grantor requires alterations to any pipeline facility, such alteration shall be at the Grantor's expense.

9. The Grantor, at Grantor's sole expense, shall construct and maintain a private surfaced roadway over the entire easement herein described, excepting the portions that are for fire hydrants and fire hydrant “branch lines” only. Planters, islands, or medians are not permitted within the above-described easement, except as specified by Denver Water Engineering Standards and/or as specified in writing by the Distributor.

10. The Grantor retains the right to use the easement for ingress and egress, including vehicular traffic, insofar as such use and occupancy is consistent with and does not impair any grant herein contained. Parking within the easement is prohibited.

11. The Distributor agrees that other public utilities such as sanitary sewer, storm sewer, gas, and electric lines, may be installed in the above described easement as long as they do not interfere with the Distributor's rights herein granted and as long as piping crossing the waterline at the discretion of the Distributor is metallic or concrete or is encased in an acceptable material. Any piping or cable crossing the waterline must be installed in accordance with Denver Water's Engineering Standards. Any and all utilities which parallel the Distributor's facilities will not be permitted within ten-feet (10) of Distributor facilities without prior consent from the Distributor. The intent is to reserve for the Distributor's water lines at least twenty-feet (20) of the easement width.

12. The Grantor, at Grantor's expense, shall be solely responsible for the maintenance of streets, surfacing, curbs, and gutters within the easement, except as specified in this paragraph. When the Distributor deems it necessary to reconstruct, repair, relocate, remove, replace, enlarge, operate or in any way maintain its water mains or pipes, and appurtenances thereto, the Distributor will backfill, compact, and resurface the area of excavation, to include replacement of
asphalt and/or concrete pavement, curbs and gutters, damaged by the Distributor’s activity, to the grade and condition existing immediately prior to excavation, as nearly as reasonable. The Distributor will exercise all reasonable means to prevent damage to pavement, curbs and gutters which are situated within the easement but outside of the immediate area of excavation. In the event said improvements are damaged due solely to Distributor negligence, the Distributor will repair and/or replace said improvements at its expense.

13. The Distributor is acquiring the rights in the subject property in order to assure to the Distributor a dominant easement for the exercise of the Distributor’s functions, and that the exercise of any rights in the subject property other than those retained by the Grantor shall be within the discretion of the Distributor. The Distributor agrees to permit and authorize such other uses of the subject property, not reserved in the Grantor, as will not impair the Distributor’s dominant rights, upon such terms, limitations, and conditions as the Distributor shall find reasonably necessary to protect its dominant right of occupancy of the subject property for the purpose of the Distributor without undue or unnecessary injury to or impairment of the estate retained by the Grantor.

14. If the Distributor abandons use and operation of the pipeline facilities laid pursuant to this easement, such abandonment shall not constitute abandonment of its rights under this easement.

15. The Grantor warrants that Grantor has full right and lawful authority to make the grant contained herein, and promises and agrees to defend the Distributor in the exercise of its rights hereunder against any defect in Grantor’s title to the land involved or Grantor’s right to make the grant contained herein.

16. Each and every one of the benefits and burdens of this Agreement shall inure to and be binding upon the respective legal representatives, heirs, executors, administrators, successors and assigns of the parties.

17. Unless special provisions are listed below and/or attached, the above constitutes the whole agreement between the parties and no additional or different oral representation, promise or agreement shall be binding on any of the parties with respect to the subject matter of this instrument. To the extent that any special provisions are in conflict with any other provisions, the special provisions shall control and supersede any other terms or provisions.

SPECIAL PROVISIONS:
EASEMENT AGREEMENT

THIS EASEMENT AGREEMENT, made and entered into as of the ___ day of _________________, ____, by and between:

hereinafter called "Grantor", (whether grammatically singular or plural) and the:

hereinafter called "Distributor".

WITNESSETH:

For and in consideration of the sum of TEN AND NO/100 DOLLARS ($10.00) and other good and valuable consideration to the Grantor in hand paid by the Distributor, the receipt whereof is hereby acknowledged, the Grantor hereby grants to the Distributor, its successors and assigns, the sole, exclusive and permanent right to enter, re-enter, occupy and use the described property to construct, maintain, repair, replace, remove, enlarge and operate one or more water pipelines and all underground and surface appurtenances thereto, including electric or other related control systems, underground cables, wires and connections and surface appurtenances. By way of example and not by way of limitation, the parties intend to include within the terms "pipelines" and "appurtenances" the following: mains and conduits, valves, vaults, manholes, control systems, ventilators, and the like, in, through, over and across the following described parcel of land situate, lying and being in the County of ______ and State of Colorado, to-wit:

(For Legal Description, please see Exhibit "A", attached hereto and made a part hereof)

IT IS HEREBY MUTUALLY covenanted and agreed by and between the parties hereto as follows:

1. The Distributor shall have and exercise the right of ingress and egress in, to, over, through and across the above described property for any purpose needful for the full enjoyment of any other right of occupancy or use provided for herein. The Distributor shall have the right to construct and maintain an all-weather roadway of varying width, as needed in the opinion of the Distributor, along the length of the easement. Both parties agree that the purpose of this roadway is to allow the Distributor vehicular access. The easement area shall be free of obstacles throughout the length of the easement. Due to variations in topography, the easement and the pipe may take on an uphill or downhill direction having a slope of greater than 4%; however,
sloping within the easement across its width may not exceed 4% to insure stability of maintenance equipment and vehicles. A slope across the width of the easement greater than 4% may be allowed upon prior written permission of the Distributor and Denver Water.

2. The Grantor shall not construct or place any structure or building, fence, retaining wall, street light, power pole, yard light, mail box, sign, trash receptacle, temporary or permanent, or plant any shrub, tree, woody plant or nursery stock, on any part of the above described easement. Any structure or building, fence, retaining wall, street light, power pole, yard light, mail box, sign, trash receptacle, temporary or permanent, or shrub, tree, woody plant or nursery stock, of any kind situated on the above described easement as of the date of this Agreement, may be removed by the Distributor without liability for damages arising therefrom.

3. The Grantor, for itself, its successors and assigns, shall provide to the Distributor any information within its possession about past and currently existing Environmental Contamination in the easement area. Such information shall include but not be limited to environmental studies, reports, samples, agreements, liens, letters and any remediation work that has been done or is ongoing to clean the area or is planned to occur. If contaminated soils exist in the easement area upon the effective date of this Agreement, for which the Grantor or its successors or assigns are responsible under applicable state or federal laws, the Grantor, at Grantor’s sole expense, shall take Corrective Action to clean the contamination to the full width of the easement area and a depth of at least twelve (12) feet, if necessary. Contamination shall be cleaned to the appropriate state and federal standards set forth by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment or to the standards of Corrective Action plans for the property currently approved by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment. Grantor shall provide documents verifying Corrective Action to the Distributor prior to the installation of pipeline facilities.

4. To the extent it legally may, and as long as the Distributor was not negligent, the Grantor, for itself, its successors and assigns, shall indemnify the Distributor, to the extent required by state and federal laws to indemnify the Distributor against any liability, damages, costs, expenses, causes of action, claims, losses, settlements, fines and penalties, and reasonable attorneys’ fees claimed by a third party against the Distributor relating to (1) the existence, mitigation, or remediation of Environmental Contamination in the easement area; (2) any Corrective Action in the easement area; (3) any Environmental Contamination in the easement area that occurs or is discovered after conveyance of the easement; or (4) the occurrence, disturbance, or movement of existing contaminated soils resulting directly or indirectly from any work conducted by the Distributor in exercise of the Distributor’s functions.

5. As used in this Agreement, “Corrective Action” shall refer to risk assessment, active remediation, passive remediation, voluntary cleanup, investigation and/or monitoring of Environmental Contamination.

6. As used in this Agreement, “Environmental Contamination” means the presence within the easement area of any hazardous material, including but not limited to any substances
defined as or included in the definition of "hazardous substance," "hazardous material" or "toxic substances" in the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601, et seq., the Hazardous Materials Transportation Act, 49 U.S.C. § 5101, et seq., the Resource Conservation and Recovery Act, 42 U.S.C. § 6901, et seq., or any other federal, state or local statute, law, ordinance, code, rule, regulation, order, decree or other requirement of governmental authority regulating, relating to or imposing liability or standard of conduct concerning any hazardous, toxic or dangerous substance or material, as now or at any time hereafter in effect, and in the regulations adopted, published and/or promulgated pursuant to said laws.

7. The water pipeline and all appurtenances shall be installed in accordance with then current Distributor and Denver Water Engineering Standards.

8. Fencing existing at the time of this agreement which is disturbed or destroyed by the Distributor or its agents in constructing its facilities shall be replaced by the Distributor to its original condition as nearly as reasonable; however, the Grantor shall not construct new fencing across or within the easement.

9. The Distributor shall have and exercise the right of subjacent and lateral support to whatever extent is necessary or desirable for the full, complete and unmolested enjoyment of the rights hereinabove described. It is specifically agreed between the parties that the Grantor shall take no action which would impair the earth cover over, or the lateral or subjacent support for any water pipeline or lines and appurtenances within the easement. Denver Water's Engineering Standards require no less than four and one-half feet and no more than ten feet of earth cover, measured vertically from the top of any pipeline or lines. Deviation from this requirement will be permitted only upon specific prior, written permission from Denver Water and the Distributor. If such modification undertaken by the Grantor requires alterations to any pipeline facility, such alteration shall be at the Grantor's expense.

10. After construction of any water pipeline or lines, the general surface of the ground, except as necessarily modified to accommodate appurtenances, shall be restored, as nearly as reasonable, to the grade and condition immediately prior to construction. Topsoil shall be replaced in cultivated and agricultural areas, and any excess earth resulting from installations by the Distributor shall be removed from the easement at the sole expense of the Distributor. The Distributor agrees that for a period of one year following construction which involves disturbance of the surface of the ground, the Distributor will maintain the surface elevation and quality of the soil by correcting any settling or subsiding that may occur as a result of the work done by the Distributor.

11. The Grantor has retained the right to the undisturbed use and occupancy of the subject property insofar as such use and occupancy is consistent with and does not impair any grant herein contained and except as herein otherwise provided.

12. The Distributor is acquiring the rights in the subject property in order to insure to the Distributor a dominant easement for the exercise of the Distributor's functions, and that the
exercise of any rights in the subject property other than those retained by the Grantor shall be within the discretion of the Distributor. The Distributor agrees to permit and authorize such other uses of the subject property, not reserved in the Grantor, as will not impair the Distributor's dominant rights, upon the payment of reasonable compensation to the Distributor and upon such terms, limitations, and conditions as the Distributor shall find reasonably necessary to protect its dominant right of occupancy of the subject property for the purpose of the Distributor without undue or unnecessary injury to or impairment of the estate retained by the Grantor.

13. If the Distributor abandons use and operation of the pipeline facilities laid pursuant to this easement, such abandonment shall not constitute abandonment of its rights under this easement.

14. The Grantor warrants that he has full right and lawful authority to make the grant contained herein, and promises and agrees to defend the Distributor in the exercise of its rights hereunder against any defect in his title to the land involved or his right to make the grant contained herein.

15. Each and every one of the benefits and burdens of this Agreement shall inure to and be binding upon the respective legal representatives, heirs, executors, administrators, successors and assigns of the parties.

16. Unless special provisions are listed below and/or attached, the above constitutes the whole agreement between the parties and no additional or different oral representation, promise or agreement shall be binding on any of the parties with respect to the subject matter of this instrument. To the extent that any special provisions are in conflict with any other provisions, the special provisions shall control and supersede any other terms or provisions.

SPECIAL PROVISIONS:
EASEMENT AGREEMENT

THIS EASEMENT AGREEMENT made and entered into as of the _____ day of
__________________________, ______, by and between:

hereinafter called "Grantor", (whether grammatically singular or plural) and the:

hereinafter called "Distributor".

WITNESSETH:

For and in consideration of the sum of TEN AND NO/100 DOLLARS ($10.00) and other
good and valuable consideration to the Grantor in hand paid by the Distributor, the receipt
hereof is hereby acknowledged, the Grantor hereby grants to the Distributor, its successors and
assigns, the permanent right to enter, re-enter, occupy and use the described property to construct,
maintain, repair, replace, remove, enlarge and operate one or more water pipelines and all
underground and surface appurtenances thereto, including electric or other related control
systems, underground cables, wires and connections and surface appurtenances. By way of
example and not by way of limitation, the parties intend to include within the terms "pipelines"
and "appurtenances" the following: mains and conduits, valves, vaults, manholes, control
systems, ventilators, and the like, in, through, over and across the following described parcel of
land situate, lying and being in the County of and State of Colorado, to-wit:

(For Legal Description, please see Exhibit "A", attached hereto and made a part hereof)

IT IS HEREBY MUTUALLY covenanted and agreed by and between the parties
hereto as follows:

1. The Distributor shall have and exercise the right of ingress and egress in, to, over,
through and across the above described property for any purpose needful for the full enjoyment
of any other right of occupancy or use provided for herein. The Distributor shall have the right to
construct and maintain an all-weather roadway of varying width, as needed in the opinion of the
Distributor, along the length of the easement. Both parties agree that the purpose of this roadway
is to allow the Distributor vehicular access. The easement area shall be free of obstacles
throughout the length of the easement. Due to variations in topography, the easement and the
pipe may take on an uphill or downhill direction having a slope of greater than 4%; however,
sloping within the easement across its width may not exceed 4% to insure stability of

- 1 -
maintenance equipment and vehicles. A slope across the width of the easement greater than 4% may be allowed upon prior written permission of the Distributor and Denver Water.

2. The Grantor shall not construct or place any structure or building, fence, retaining wall, street light, power pole, yard light, mail box, sign, trash receptacle, temporary or permanent, or plant any shrub, tree, woody plant or nursery stock, on any part of the above described easement. Any structure or building, fence, retaining wall, street light, power pole, yard light, mail box, sign, trash receptacle, temporary or permanent, or shrub, tree, woody plant or nursery stock, of any kind situated on the above described easement as of the date of this Agreement, may be removed by the Distributor without liability for damages arising therefrom.

3. The Grantor, for itself, its successors and assigns, shall provide to the Distributor any information within its possession about past and currently existing Environmental Contamination in the easement area. Such information shall include but not be limited to environmental studies, reports, samples, agreements, liens, letters and any remediation work that has been done or is ongoing to clean the area or is planned to occur. If contaminated soils exist in the easement area upon the effective date of this Agreement, for which the Grantor or its successors or assigns are responsible under applicable state or federal laws, the Grantor, at Grantor's sole expense, shall take Corrective Action to clean the contamination to the full width of the easement area and a depth of at least twelve (12) feet, if necessary. Contamination shall be cleaned to the appropriate state and federal standards set forth by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment or to the standards of Corrective Action plans for the property currently approved by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment. Grantor shall provide documents verifying Corrective Action to the Distributor prior to the installation of pipeline facilities.

4. To the extent it legally may, and as long as the Distributor was not negligent, the Grantor, for itself, its successors and assigns, shall indemnify the Distributor to the extent required by state and federal laws to indemnify the Distributor, against any liability, damages, costs, expenses, causes of action, claims, losses, settlements, fines and penalties, and reasonable attorney's fees claimed by a third party against the Distributor relating to (1) the existence, mitigation, or remediation of Environmental Contamination in the easement area; (2) any Corrective Action in the easement area; (3) any Environmental Contamination in the easement area that occurs or is discovered after conveyance of the easement; or (4) the occurrence, disturbance, or movement of existing contaminated soils resulting directly or indirectly from any work conducted by the Distributor in exercise of the Distributor's functions.

5. As used in this Agreement, “Corrective Action” shall refer to risk assessment, active remediation, passive remediation, voluntary cleanup, investigation and/or monitoring of Environmental Contamination.

6. As used in this Agreement, “Environmental Contamination” means the presence within the easement area of any hazardous material, including but not limited to any substances defined as or included in the definition of “hazardous substance,” “hazardous material” or “toxic
substances" in the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601, et seq., the Hazardous Materials Transportation Act, 49 U.S.C. § 5101, et seq., the Resource Conservation and Recovery Act, 42 U.S.C. § 6901, et seq., or any other federal, state or local statute, law, ordinance, code, rule, regulation, order, decree or other requirement of governmental authority regulating, relating to or imposing liability or standard of conduct concerning any hazardous, toxic or dangerous substance or material, as now or at any time hereafter in effect, and in the regulations adopted, published and/or promulgated pursuant to said laws.

7. The water pipeline and all appurtenances shall be installed in accordance with then current Distributor and Denver Water Engineering Standards.

8. Fencing existing at the time of this Agreement which is disturbed or destroyed by the Distributor or its agents in constructing its facilities shall be replaced by the Distributor to its original condition as nearly as reasonable; however, the Grantor shall not construct new fencing across or within the easement.

9. The Distributor shall have and exercise the right of subjacent and lateral support to whatever extent is necessary or desirable for the full, complete and unmolested enjoyment of the rights hereinafter described. It is specifically agreed between the parties that the Grantor shall take no action which would impair the earth cover over, or the lateral or subjacent support for any water pipeline or lines and appurtenances within the easement. Denver Water’s Engineering Standards require no less than four and one-half (4½) feet and no more than ten-feet (10) of earth cover, measured vertically from the top of any pipeline or lines. Deviation from this requirement will be permitted only upon specific prior, written permission from Denver Water and the Distributor. If such modification undertaken by the Grantor requires alterations to any pipeline facility, such alteration shall be at the Grantor’s expense.

10. After construction of any water pipeline or lines, the general surface of the ground, except as necessarily modified to accommodate appurtenances, shall be restored, as nearly as reasonable, to the grade and condition immediately prior to construction. Topsoil shall be replaced in cultivated and agricultural areas, and any excess earth resulting from installations by the Distributor shall be removed from the easement at the sole expense of the Distributor. The Distributor agrees that for a period of one-year following construction which involves disturbance of the surface of the ground, the Distributor will maintain the surface elevation and quality of the soil by correcting any settling or subsiding that may occur as a result of the work done by the Distributor.

11. The Distributor agrees that other public utilities such as sanitary sewer, storm sewer, gas, and electric lines, may be installed in the easement as long as they do not interfere with the Distributor’s rights herein granted and as long as piping crossing the waterline at the discretion of the Distributor is metallic or concrete or is encased in an acceptable material. Any piping or cable crossing the waterline must be installed in accordance with Denver Water Engineering Standards. Any and all utilities which parallel the Distributor’s facilities will not be permitted within ten-feet (10) of Distributor’s facilities without express prior permission from
the Distributor. The intent is to reserve for the Distributor's water lines at least twenty-foot (20) of the easement width.

12. The Grantor has retained the right to the undisturbed use and occupancy of the subject property insofar as such use and occupancy is consistent with and does not impair any grant herein contained and except as herein otherwise provided.

13. The Distributor is acquiring the rights in the subject property in order to insure to the Distributor a dominant easement for the exercise of the Distributor's functions, and that the exercise of any rights in the subject property other than those retained by the Grantor shall be within the discretion of the Distributor. The Distributor agrees to permit and authorize such other uses of the subject property, not reserved in the Grantor, as will not impair the Distributor's dominant rights, upon the payment of reasonable compensation to the Distributor and upon such terms, limitations, and conditions as the Distributor shall find reasonably necessary to protect Distributor's dominant right of occupancy of the subject property for the purpose of the Distributor without undue or unnecessary injury to or impairment of the estate retained by the Grantor.

14. If the Distributor abandons use and operation of the pipeline facilities laid pursuant to this easement, such abandonment shall not constitute abandonment of its rights under this easement.

15. The Grantor warrants that Grantor has full right and lawful authority to make the grant contained herein, and promises and agrees to defend the Distributor in the exercise of its rights hereunder against any defect in Grantor's title to the land involved or Grantor's right to make the grant contained herein.

16. Each and every one of the benefits and burdens of this Agreement shall inure to and be binding upon the respective legal representatives, heirs, executors, administrators, successors and assigns of the parties.

17. Unless special provisions are listed below and/or attached, the above constitutes the whole agreement between the parties and no additional or different oral representation, promise or agreement shall be binding on any of the parties with respect to the subject matter of this instrument. To the extent that any special provisions added are in conflict with any other provisions, the special provisions shall control and supersede any other terms or provisions.

SPECIAL PROVISIONS:
EASEMENT AGREEMENT
(Distributor Performance Non-Exclusive)

THIS EASEMENT AGREEMENT, effective the ___ day of ____________, 20___,
is made between ____________________________, hereafter called “Grantor”, (whether grammatically singular or plural) and

__________________________, hereinafter called “Distributor,” whose legal address is ____________________________

WITNESSETH:

For good and valuable consideration, the receipt and sufficiency whereof are acknowledged, Grantor hereby grants to the Distributor, its successors and assigns, a permanent non-exclusive right to enter, reenter, occupy and use the property situate in the County of ________________, State of Colorado, and more fully described on Exhibit ________________ attached hereto and incorporated herein by reference (the “Property”) to construct, lay, install, inspect, monitor, maintain, repair, renew, substitute, change the size of, replace, remove, and operate one or more underground water pipelines and all underground and surface appurtenances thereto, including electric or other related control systems, underground cables, wires and connections and surface appurtenances in, through, over and across the Property. By way of example and not by way of limitation, the parties intend to include within the terms “pipelines” and “appurtenances” the following: mains and conduits, valves, vaults, manholes, hydrants, control systems, ventilators, and the like, of such size and capacity as necessary or required by the Distributor.

IT IS HEREBY MUTUALLY CONVENANTED AND AGREED by and between the parties as follows:

1. The Distributor shall have and may exercise the right of ingress and egress in, to, over, through and across the Property for any purpose needful for the full enjoyment of any other right of occupancy or use provided for herein.

2. Grantor shall neither cause nor permit the parking or storage of vehicles or other goods or equipment, or the construction or placement of any structure or building, street light, power pole, yard light, mailbox or sign, temporary or permanent, or the planting of any tree, woody plant or nursery stock, of any kind, on any part of the Property. Where paved roadways are installed on all or any part of the surface of the Property they shall be installed and maintained by Grantor and over the entire width thereof, with no planters, islands or median structures. The lateral edges of the Property shall be clearly delineated by permanent surface features approved in advance by the Distributor. Any prohibited use or installation located on the Property as of or after the date of this Agreement, including utility installations not conforming to Paragraph 7 hereof, may be removed by the Distributor at Grantor’s expense without liability for damages arising therefrom.
3. The Grantor, for itself, its successors and assigns, shall provide to the Distributor any information within its possession about past and currently existing Environmental Contamination in the easement area. Such information shall include but not be limited to environmental studies, reports, samples, agreements, liens, letters and any remediation work that has been done or is ongoing to clean the area or is planned to occur. If contaminated soils exist in the easement area upon the effective date of this Agreement, for which the Grantor or its successors or assigns are responsible under applicable state or federal laws, the Grantor, at Grantor’s sole expense, shall take Corrective Action to clean the contamination to the full width of the easement area and a depth of at least twelve (12) feet, if necessary. Contamination shall be cleaned to the appropriate state and federal standards set forth by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment or to the standards of Corrective Action plans for the property currently approved by the U.S. Environmental Protection Agency and Colorado Department of Public Health and Environment. Grantor shall provide documents verifying Corrective Action to the Distributor prior to the installation of pipeline facilities.

4. To the extent it legally may, and as long as the Distributor or a third party was not negligent, the Grantor, for itself, its successors and assigns, shall indemnify the Distributor, to the extent required by state and federal laws to indemnify the Distributor or third parties, against any liability, damages, costs, expenses, causes of action, claims, losses, settlements, fines and penalties, and reasonable attorneys’ fees claimed by a third party against the Distributor relating to (1) the existence, mitigation, or remediation of Environmental Contamination in the easement area; (2) any Corrective Action in the easement area; (3) any Environmental Contamination in the easement area that occurs or is discovered after conveyance of the easement; or (4) the occurrence, disturbance, or movement of existing contaminated soils resulting directly or indirectly from any work conducted by the Distributor in exercise of the Distributor’s functions.

5. As used in this Agreement, “Corrective Action” shall refer to risk assessment, active remediation, passive remediation, voluntary cleanup, investigation and/or monitoring of Environmental Contamination.

6. As used in this Agreement, “Environmental Contamination” means the presence within the easement area of any hazardous material, including but not limited to any substances defined as or included in the definition of “hazardous substance,” “hazardous material” or “toxic substances” in the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601, et seq., the Hazardous Materials Transportation Act, 49 U.S.C. § 5101, et seq., the Resource Conservation and Recovery Act, 42 U.S.C. § 6901, et seq., or any other federal, state or local statute, law, ordinance, code, rule, regulation, order, decree or other requirement of governmental authority regulating, relating to or imposing liability or standard of conduct concerning any hazardous, toxic or dangerous substance or material, as now or at any time hereafter in effect, and in the regulations adopted, published and/or promulgated pursuant to said laws.

7. Fences existing as of the date hereof which are disturbed or destroyed by the Distributor in the exercise of its rights hereunder shall be replaced by the Distributor to their original condition as nearly as may reasonably be done. Grantor shall not, however, construct or install new fencing across or within the Property without the written approval of the Distributor.

8. All pipelines installed within the Property shall be laid not less than four and one-half (4 1/2) feet below the surface of the adjacent ground.

9. The Distributor shall have and exercise the right of subjacent and lateral support to whatever extent is necessary or desirable for the full, complete and unmolested enjoyment of the rights herein granted.
Grantor shall neither take nor permit any action which would impair the lateral or subjacent support for any water pipelines or appurtenances or cause the earth cover over any water pipeline within the Property to be less than four and one-half (4 1/2) feet or more than ten (10) feet, measured vertically from the top of the pipeline. Grantor shall not modify the earth cover over a Distributor water pipeline without advance written authorization from the Distributor, which shall provide for full payment or reimbursement to the Distributor of all costs of adjusting Distributor facilities made necessary by such modification.

10. After any construction or other operations by the Distributor which disturb the surface of the Property, the Distributor will restore the general surface of the ground, including paving and authorized appurtenances, as nearly as may reasonably be done to the grade and condition it was in immediately prior to construction, except as necessarily modified to accommodate Distributor facilities. Topsoil shall be replaced in cultivated and agricultural areas, and any excess earth resulting from installations by the Distributor shall be removed from the Property at the sole expense of the Distributor. For a period of one year following disturbance of the surface of the Property by the Distributor, the Distributor will maintain the surface elevation and quality of the soil by correcting any settling or subsiding that may occur as a result of the work done by the Distributor.

11. Service lines from adjacent properties receiving service from Distributor facilities in the Property, and other public utilities such as sanitary sewer, storm sewer, gas, electric, telephone, and TV cable lines, may be installed in the Property, provided that they do not interfere with the Distributor’s rights herein granted. Public utilities which cross the Property shall cross at approximately right angles, and utilities which parallel the Distributor’s facilities shall not be located closer than ten (10) feet thereto. Except for utilities as herein authorized and for roadways, all surface and subsurface uses of the Property, including fences, must be approved in writing by the Distributor before installation.

12. Grantor retains the right to the undisturbed use and occupancy of the Property insofar as such use and occupancy are consistent with and do not impair any grant or covenant herein contained.

13. The Distributor is acquiring its rights in the Property in order to insure to it a dominant easement for the exercise of the Distributor’s functions. The exercise of any rights in the Property other than those expressly retained by Grantor shall be within the discretion of the Distributor. The Distributor may permit and authorize such other uses of the Property not reserved in Grantor as will not impair the Distributor’s dominant rights, upon payment of reasonable compensation to the Distributor and upon such terms, limitations and conditions as the Distributor shall find reasonably necessary to protect its dominant right of occupancy without undue or unnecessary injury to or impairment of the estate retained by the Grantor.

14. If the Distributor, by written instrument, abandons or releases its rights herein granted and ceases to use the same, all right, title and interest of the Distributor hereunder shall cease and terminate, and the Grantor or its successors in title shall hold the Property, as the same may then be, free from the rights so abandoned or released and shall own all material and structures of the Distributor so abandoned or released, but nothing herein shall be construed as working a forfeiture or abandonment of any interest derived hereunder and not owned by the Distributor at the time of the termination of the Distributor’s rights.

15. Grantor warrants that it has full right and lawful authority to make the grant herein contained, and promises and agrees to defend the Distributor in the exercise of its rights hereunder against any defect in title or in Grantor’s right to make said grant, subject to general taxes for the year this instrument is recorded, and subject further to easements, encumbrances, exceptions, limitations, restrictions and reservations contained in instruments of record prior to the date of this Agreement.
16. Each and every one of the benefits and burdens of this Agreement shall inure to and be binding upon the respective legal representatives, heirs, executors, administrators, successors and assigns of the parties hereto.

17. This writing constitutes the whole agreement between the parties and no additional or different oral representation, promise or agreement shall be binding on any of the parties hereto with respect to the subject matter of this instrument. Any special provisions added hereto which conflict with printed provisions set forth above shall control and supersede such conflicting printed provisions.

SPECIAL PROVISIONS:
EXHIBIT E
CERTIFICATION AS TO WATER AND SEWER LINE PLACEMENT IN EASEMENTS

for

(Name of Project)

I, ________________________________________________________, a professional land surveyor registered in the State of Colorado, hereby certify to the Platte Canyon Water and Sanitation District that the attached Improvement Location Certificate(s) of the following Easement Deed(s) and/or Easement Agreement(s) recorded upon the public records of Jefferson County, Colorado at: ____________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Was (were) prepared by me on the ____________ day of __________________, 20_____. I further certify to the Platte Canyon Water and Sanitation District that, except as indicated, all water and sewer lines, including fire hydrants, installed in connection with the above-referenced project, as of __________________________, 20____, are located within the boundaries of said recorded easements as shown on the attached Improvement Location Certificate(s), except for lines located in dedicated public rights-of-way.

(STAMP)

By: __________________________________________

(Signature)

Type or Print Signature

License Number

Date