SOUTHGATE WATER DISTRICT
WATER SYSTEM SPECIFICATIONS

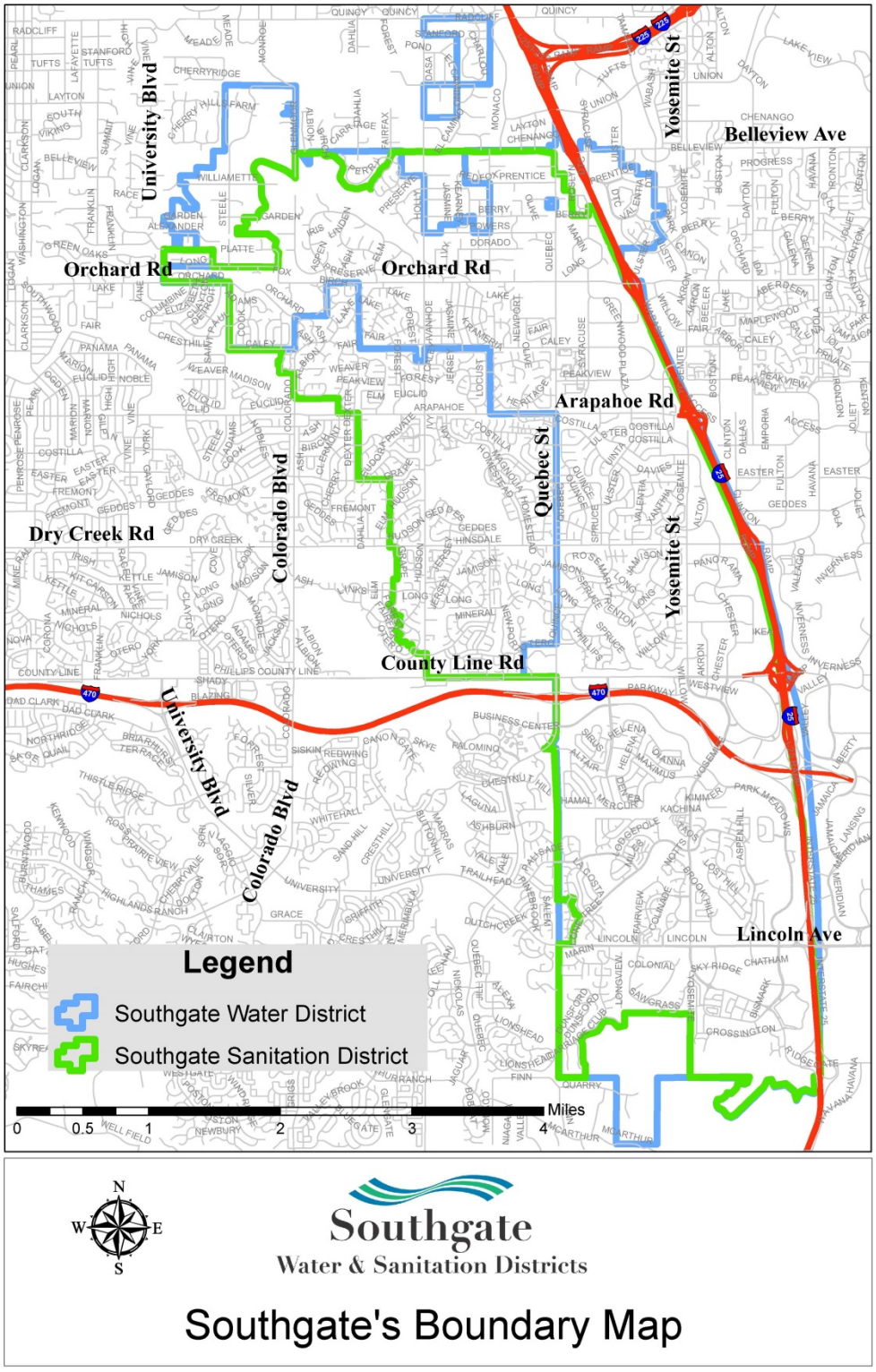
A SUPPLEMENT TO THE
DENVER WATER ENGINEERING STANDARDS

June 2016

Southgate Water and Sanitation Districts
3722 East Orchard Road
Centennial, CO 80121
(303) 779-0261
www.southgatedistricts.org

TABLE OF CONTENTS

SERVICE AREA



SECTION 1 – GENERAL

1.1. PURPOSE

These specifications set forth District regulations, engineering, design, materials specifications and construction procedures for all water facilities intended to become a part of the District System, and for privately owned water facilities connected thereto, to the extent regulated hereby. These Specifications supplement the Denver Water Engineering Standards and the District's Rules and Regulations. The Denver Water Engineering Standards are available for review or download from Denver Water's website www.denverwater.org. The District's Specifications are available for review or download free of charge from the District's website www.southgatedistricts.org.

All water systems shall comply with the requirements of these *Water System Specifications* and may include special criteria established by the District. Special criteria shall be outlined at pre-design meetings, as determined necessary by the District. Any correspondence with Denver Water regarding the Engineering Standards shall also include the District.

1.2. DISTRICT SERVICE AREA

The Southgate Water District Service Area consists of approximately 9,100 acres located in both Douglas and Arapahoe Counties, Colorado. Generally, the District is located south of East Quincy Avenue and west of Interstate Highway I-25. The District's Service Area is more particularly shown on the District Service Area Map found on the preceding page.

1.3. AUTHORITY

These Specifications shall be administered by the District, and all matters involving the interpretation and enforcement hereof shall be finally determined by the District.

1.4. REVISIONS

These Specifications are effective as of June 2016. Revisions to these Specifications may be made from time-to-time by the District and shall be in effect at the date of issuance by the District. Any person using these Specifications should contact the District for information relative to revisions.

1.5. DEFINITION OF TERMS

As used in these Specifications and the District Rules and Regulations, unless the context clearly indicates otherwise, the words defined below shall have the respective meanings set forth for them:

1.5.1. ACTUAL COSTS

Actual Costs comprise all direct and indirect costs attributable to any project or undertaking. Actual costs to the District shall include its engineering, legal, labor, material, equipment, administrative, and overhead expenses, calculated in accordance with the rates set forth in the Rules and Regulations, and all direct payments to third parties, at cost.

1.5.2. BOARD OR BOARD OF DIRECTORS

The duly constituted Board of Directors of the District.

1.5.3. CONTRACTOR

Any person who performs any work, either for oneself or another, on any water facilities, public or private, within the District, including all subcontractors, agents, employees, officers and other representatives of such person.

1.5.4. CONSTRUCTION PLANS

Plans and Specifications for the construction of a specific water system project which have been reviewed and signed by the District.

1.5.5. DENVER WATER; DENVER

The plant, facilities, system, assets, and personnel controlled by the Board of Water Commissioners as established by the Charter of the City and County of Denver.

1.5.6. DISTRICT

The Southgate Water District, Arapahoe and Douglas Counties, Colorado, its employees, agents, officers, directors, insurers, and professional consultants.

1.5.7. DISTRICT ENGINEER

The District's Staff Engineer.

1.5.8. DISTRICT MANAGER

The Manager of the Southgate Water District appointed by the Board of Directors, or any other person duly authorized to perform the duties of the District Manager.

1.5.9. DISTRICT SYSTEM

The facilities, systems, assets, and appurtenant property rights owned or directly controlled by the District, but excluding all privately-owned water facilities.

1.5.10. FOREIGN MATERIALS

Any objects or substances other than treated potable water.

1.5.11. LICENSE

The written authority to receive water at specified premises for specified purposes.

1.5.12. LICENSED PREMISES

The land area and improvements thereto to which water service is limited under any particular License.

1.5.13. MAIN OR WATER MAIN

Those pipes and appurtenant facilities used for distributing potable water, along public streets or appropriate rights of way deeded or licensed to the District, directly to various Licensed Premises.

1.5.14. MAIN EXTENSION

The construction of any facilities, or the facilities themselves, which are intended to become a part of the District System upon acceptance by the District in accordance with Article 6 of the Rules and Regulations.

1.5.15. PERMITTED PREMISES

The land area and improvements thereto to which potable water service is limited under any particular Tap/Service Connection Permit.

1.5.16. PERSON

Associations, corporations, firms, partnerships and bodies politic and corporate, as well as individuals.

1.5.17. PROJECT/WORK

The term "Work" shall mean and include all labor, materials, equipment, and all appliances, machinery, transportation and appurtenances necessary or convenient to the successful completion and performance of the construction plans, and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item indicated or described and as required by good practice to provide a complete and satisfactory system or structure. As used herein, "provide" shall be understood to mean "furnish and install, complete, in-place." "Work" and "Project" are synonymous and may be used interchangeably.

1.5.18. PROJECT ACCEPTANCE

A project can be accepted and may enter the warranty period if all of the following requirements have been fulfilled: satisfactory chlorine and clear water tests, completed final connection(s), completed set of compaction test results have been submitted to the District and applicable city/county, completed first lift of paving, completed punch list, surveyed record drawings have been submitted and approved by the District, recorded address plat (if applicable), and warranty funds have been submitted to the District in the form of a letter of credit or check equal to ten percent (10%) of the total cost of the water improvements.

1.5.19. PROPERTY OWNER/OWNER/DEVELOPER

All of these terms shall be synonymous with each other and shall mean any person who, whether solely or with others, owns real property within the District. When property is owned by more than one person, the term includes all owners thereof. As used in these Specifications, the term shall apply to such person only in connection with their ownership of any specific parcel of real property involved in any specific matter governed by these Specifications or Rules and Regulations.

1.5.20. RECORD OR AS-BUILT DRAWINGS

A separate set of scaled construction plans marked to indicate completely and accurately the field-installed condition of facility construction as completed, as required by Appendix E of these Specifications.

1.5.21. RULES AND REGULATIONS

The comprehensive set of operating rules and requirements, as now or hereafter constituted, adopted by the Board of Directors for the purpose of regulating the design, construction, operation, maintenance, use, repair and replacement of the District System.

1.5.22. SERVICE LINES

All pipe, fittings, and appurtenances, owned by Property Owner, which convey water from the District System to the plumbing of the Licensed Premises. The dividing point between the District System and privately-owned service lines is the plug on the corporation stop tapped into the Main or, where applicable, the discharge side of the tapping valve closest to the Main.

1.5.23. STUB-IN

A tap made for the purpose of installing service lines prior to the paving of streets. Such connection shall include fittings necessary to extend the service line to the valve at the property line.

1.5.24. TAP OR SERVICE CONNECTION

The physical connection to a District Main which, together with the Tap License for same, affects water service to any Licensed Premises.

1.6. STANDARDS AND SPECIFICATIONS

These Specifications utilize and otherwise make reference to other Standards and Specifications. Where these references are made, they shall refer to the latest edition or revision thereof.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
ANSI	American National Standards Institute, Inc.
ASA	American Standards Association
ASTM	American Society of Testing Materials
ASCE	American Society of Civil Engineers
AWWA	American Water Works Association
OSHA	Occupational Safety Health Administration
UL	Underwriter's Laboratories
UNI	Uni-Bell Association
UPC	Uniform Plumbing Code

1.7. ABBREVIATIONS

DIP	Ductile Iron Pipe
DW	Denver Water
FPS	Feet Per Second
GPCD	Gallons Per Capita Per Day
GPD/SF	Gallons Per Day Per Square Feet Developed Floor Space
GPD/AC	Gallons Per Day Per Acre
Multi-Family	Attached Single-Family Residential Dwelling (e.g. Apartment Building)
N/A	Not Applicable
PVC	Polyvinyl Chloride Pipe
SEMSWA	Southeast Metro Stormwater Authority
SF	Square Feet Developed Floor Area
Single-Family	Detached Single-Family Residential Dwelling
Stu	Student
Townhome	Attached Single-Family Residential Dwelling

SECTION 2 – SUPPLEMENT TO DENVER WATER ENGINEERING STANDARDS

CHAPTER 2 – MAIN EXTENSIONS

2.1. SECTION 2.03 – ENGINEERING STANDARDS TO APPLY

All water lines, appurtenances, and related public water system within the Southgate Water District shall be designed in accordance with these Specifications and the Denver Water Engineering Standards. Any deviation from these Specifications shall require the written approval of the District prior to design or construction. Design of all water system construction plans shall be performed under the direct supervision of a Professional Engineer, registered in the State of Colorado. The intent is to provide a consistently designed, long-term, reliable system which can be easily located and maintained by the District.

2.2. SECTION 2.05 – PLANS AND SPECIFICATIONS

Construction plans for water systems shall meet the guidelines set forth in the Denver Water Engineering Standards, the Water System Plan Requirements check list, and General Notes found in the Appendix. The Check List and General Notes are guidelines and, as such, some items may not be applicable to all projects as determined by the District.

Construction plans will be reviewed by the Southgate Water District and Denver Water for conformance with these specifications, the Denver Water Engineering Standards, and the Southgate Water District's Rules and Regulations.

SECTION 3 – SUPPLEMENT TO DENVER WATER ENGINEERING STANDARDS

CHAPTER 5 – SYSTEM DESIGN AND LAYOUT

3.1. SECTION 5.03 - SIZING OF DISTRIBUTION MAINS

Water lines shall be designed to transport average annual, peak day, peak hour, and fire flow demands in accordance with Denver Water Section 5.03, these Specifications, and the District's Water Master Plan, using a pipe network reviewed by the District.

A variety of peak demand or critical demand conditions exist for different types of developments. Peak conditions shall be reviewed by the designing Engineer with the highest demand condition being used to size water lines. Some typical peak demand conditions include: peak hour demand, and peak day demand plus fire flow with one feed closed.

No public water line shall be less than six inches (6") in diameter, unless specifically requested by the District. Water systems shall be looped systems and shall provide a level of service consistent with the Southgate Water District, the Denver Water Engineering Standards, and appropriate Fire Protection District Standards.

The maximum allowable head loss in peak hour conditions for water lines six inches (6"), eight inches (8"), and twelve inches (12") in diameter, shall be two feet (2') of water per thousand feet (1000') of pipe. Maximum allowable head loss in peak hour conditions for water lines sixteen inches (16") and twenty inches (20") in diameter shall be one and one-half feet (1.5') of water per thousand feet of pipe. A Hazen-Williams "C" factor of 130 shall be used for all new Ductile Iron Pipe (DIP) and Polyvinyl Chloride Pipe (PVC).

Summary of Design Requirements	
Design Factor	**District Requirement**
Maximum Head Loss (6"-12")	2.0-feet per 1000-feet of pipe
Maximum Head Loss (16"-20")	1.5-feet per 1000-feet of pipe
Hazen-Williams "C" Factor	130 for all DIP and PVC

3.2. SECTION 5.04 – FIRE PROTECTION SYSTEMS

The Southgate Water District is overlain by two (2) fire protection jurisdictions being: the South Metro Fire Rescue Authority, and the Littleton Fire Protection District. It is the owner's responsibility to contact the appropriate Fire Protection Agency and establish the minimum required fire flow and hydrant locations for each specific project. Final fire hydrant locations must be approved by the District.

3.3. SECTION 5.11 – LAYOUT OF THE DISTRIBUTION SYSTEM

3.3.1. 5.11B - ALIGNMENT

Where water lines are located in street right-of-way, they shall be designed to the following guidelines.

- In streets running generally north and south, the water line shall be located ten feet (10') east of the street centerline.

- In streets running generally east and west, the water line shall be located ten feet (10') north of the street centerline.

Water lines may be designed on curvilinear streets parallel to street centerline using deflected pipe joints. Joint deflections shall be within the manufacturer's maximum recommended deflection per joint. Bending of PVC water lines to achieve a change in alignment is not permitted. Where conditions require multiple joint deflections or bend fittings, installation of fusible PVC water lines meeting at least the manufacturer's minimum allowable bending radius may be accepted on a case-by-case basis.

In streets shaped as a "U" or on streets having unusually sharp turns, the water line will conform to the above Specifications as near as is practical, but the final location shall be determined by the District. Where water lines are proposed to cross the street centerline, they shall be designed to cross the street using 45° horizontal bends.

In cul-de-sacs, water lines shall be located in conformance with the "Water Distribution System Typical Plan for Cul-de-sacs" detail, found in the Standard Drawings of the Denver Water Engineering Standards. Where stubouts are to be provided for service to future areas, they shall be located in conformance with the "Stubout Configurations" detail, found in the Standard Drawings of the Denver Water Engineering Standards.

In no case shall the water line be designed closer than five feet (5') to the lip of a crosspan, or gutter, or ten feet (10') to any right-of-way line or easement boundary.

3.3.2. RELATION TO OTHER UTILITIES

Water lines in streets shall be designed to provide a minimum separation of ten (10) horizontal feet measured between the centerline of any sanitary sewer line and any water line or appurtenance. Horizontal separation with utilities other than sanitary sewer lines shall be five (5) horizontal feet minimum, but shall in all cases allow for future excavation of the water line without causing damage to the adjacent utility.

Where water lines are proposed to cross sanitary sewer lines or other utility lines, they shall be designed to cross at an angle close to ninety degrees (90°). Minimum vertical clearance between the edge of any water line and edge of any other water line or utility shall be eighteen inches (18") minimum.

3.3.3. WATER SYSTEM LAYOUT AT CREEK CROSSINGS

Where water lines are proposed to cross creeks or drainage ways, they shall be designed to cross perpendicular to the creek or drainage way centerline. Valves with marker posts shall be provided on each side of the crossing to isolate the crossing in the event of a line break. A specific geotechnical investigation shall be performed by the owner for each proposed crossing to evaluate potential 100-year flood scour depths of the creek or drainage way at ultimate development of the drainage basin.

After the investigation has been reviewed by the District, a minimum water line depth will be established, as well as encasement and/or erosion protection requirements. Generally, waterlines shall be installed in steel casing pipe extending well into the stabilized drainage way banks. The downstream channel shall also be stabilized or permanently established to prevent washout and erosion. Review by the County, SEMSWA, or Urban Drainage and

Flood Control District may be required.

3.3.4. ENCASEMENTS, CASINGS AND INSULATION

Concrete Encasements:

Concrete encasements shall be required by the District under the following conditions:

- Where water lines are at a depth too shallow to sustain traffic load or any other load to which they are subjected.
- At any other location designated by the District.

Concrete encasements shall provide concrete and reinforcement in accordance with the "Concrete Encasement" detail, found in the Standard Construction Drawings of these Specifications, and shall be of a length to completely span the condition encountered. The concrete encasement detail is generally acceptable for most conditions; however, the District may require a special, site specific concrete encasement detail on a case by case basis.

Pipe Casings:

Pipe casing shall be used where waterlines cross under utilities 36” in diameter or larger and where bores or protective installations are required by the District. All pipe casings shall be constructed to conform to the "Steel Casing for Carrier Pipe" detail, found in the Standard Construction Drawings of these Specifications.

Water Line Insulation:

The District may require that water lines be insulated from freezing where cover considerations, bridge crossings, culvert crossings, or other special freezing related considerations warrant. The minimum limits of the insulation shall be determined by the District.

Insulation material shall have a minimum compressive strength of 40 psi and shall be Dow Styrofoam HIGHLOAD brand polystyrene foam or approved equal. Insulation shall be a minimum of 4-inches in thickness. See Detail W-17 for additional information.

SECTION 4 – SUPPLEMENT TO DENVER WATER ENGINEERING STANDARDS

CHAPTER 6 – MATERIALS

4.1. SECTION 6.01 – MATERIALS AND TESTING

All water system materials, construction and testing shall be in accordance with these Specifications and the most current Denver Water Engineering Standards. Any material proposed as "an equal" must be reviewed and found acceptable by the District, prior to design or construction. Any correspondence with Denver Water regarding the Engineering Standards shall also include the District.

4.2. SECTION 6.04 – SELECTION OF PIPE

Polyvinyl Chloride Pipe

Polyvinyl Chloride Pipe (PVC) is the pipeline material preferred for use for all sizes of lines in water systems within the Southgate Water District. PVC pipe shall be designed in accordance with AWWA C900/C905 Specifications, latest revision. Minimum design working pressure shall be 150 psi. Minimum design transient or water hammer pressure shall be: 120 psi for 6- and 8-inch lines, 110 psi for 12-inch diameter lines, and 80 psi for 16- and 20-inch diameter lines. Pipe design calculations shall be submitted to the District, upon request.

Ductile Iron Pipe

Ductile Iron Pipe (DIP) for main line construction shall be approved for use by the District. Typically, PVC should be used. Ductile Iron Pipe shall be designed in accordance with ANSI/AWWA C150/A21.50 Specifications, latest revision. Minimum design working pressure shall be 150 psi. Minimum design transient or water hammer pressure shall be: 120 psi for 6- and 8-inch lines, 110 psi for 12-inch diameter lines, and 80 psi for 16- and 20-inch diameter lines. Pipe design calculations shall be submitted to the District, upon request.

Flanged DIP for use in vault installations (butterfly valve vaults, pressure regulating valve vaults, etc) shall be coated with a minimum 10-mil epoxy coating system with NSF-61 certification for use in potable water applications. Contractor shall submit proposed coating system to the District for approval.

Minimum Design Transient/Water Hammer	
Pipeline Diameter	**Pressure Requirement**
6”-8”	120 psi
12”	110 psi
16”-20”	80 psi

4.3. SECTION 6.05 – PIPE FITTINGS

All fittings, joints, couplings, and mechanical joint restraint devices shall be lined and coated with fusion-bonded epoxy in accordance with AWWA C116. All bolts, nuts and washers shall be Type 304 or Type 316 stainless steel. Tie rods shall also be Type 304 or Type 316 stainless steel

meeting strength requirements of ASTM A193 B8 or B8M respectively.

4.4. SECTION 6.06 – LINE VALVES

Valves on 6, 8, and 12-inch diameter lines shall be direct-bury gate valves.

Direct bury gate valves shall be resilient seat with non-rising stem and shall be the same size as the main. Valves shall be equipped with mechanical joint ends in accordance with AWWA C111 with tee-head bolts and hexagon nuts fabricated from stainless steel. Valves shall have 2-inch (2") square operating nuts and shall open by turning the nut clockwise (right). Nuts shall be painted red.

Valves on 16-inch diameter lines and larger shall be flanged butterfly valves in vaults.

Butterfly valves shall be designed and manufactured in strict compliance with AWWA C504, except as modified herein. Valves shall have 2-inch (2") square operating nuts and shall open by turning the nut clockwise (right). Nuts shall be painted red.

Butterfly Valve Vault Requirements:

- Manufacturer shall supply design and structural calculations stamped by a Professional Engineer registered in the State of Colorado certifying capacity of the structure and indicating the structure's ability to resist all applicable loads.
- Vault interior shall be a smooth finish throughout with white coating for improved lighting and cleanliness.
- Provide C-55 black damp-proofing coating on exterior bottom half of vault.
- Close all penetrations through the vault wall with "Link-Seal" style seals.
- See Detail W-11 for all other requirements.

4.5. SECTION 6.07 – PRESSURE REGULATING VALVES

Pressure reducing valve shall be Singer Model S106-PR, full port, rolling diaphragm, pressure reducing control valve, Class 150 flange body, stainless steel X107 position indicator, oxynitride stem, stainless steel pilot strainer with stainless steel blow-down, stainless steel isolation ball valves, stainless steel braided hose and fittings, stainless steel pilot with 20-200 psi spring range. Pressure set point will be determined on a case by case basis.

PRV Vault Requirements:

- Manufacturer shall supply design and structural calculations stamped by a Professional Engineer registered in the State of Colorado certifying capacity of the structure and indicating the structure's ability to resist all applicable loads.
- Vault interior shall be a smooth finish throughout with white coating for improved lighting and cleanliness.
- Provide C-55 black damp-proofing coating on exterior bottom half of vault.
- Provide 3" thick R21 spray-on polyurethane foam insulation on vault top section.
- Close all penetrations through the vault wall with "Link-Seal" style seals.

PRV Appurtenances:

- Provide pressure gauge assemblies upstream and downstream of valve. Pressure gauges shall be stainless steel and installed through a service saddle assembly with ball valve isolation. Provide dual scale, glycerine filled, 4" diameter face. Assemblies shall include an additional threaded port with plug on the gauge side of the ball valve (see Detail W-09).
- All ball valves shall be Apollo 82-100 threaded, bronze, 3-piece, full port ball valves.
- Flange adapters, if required, shall be Smith-Blair Model 911 with Cam-Lock joint restraint or District approved equal. Flange adapters with ring style gaskets are not acceptable. Service saddle (required at pressure gauges) shall be Smith-Blair #372 stainless steel with double stud.
- Bolted steel transition couplings (BTSC) shall be a restrained dismantling joint. Provide Romac DJ400 with stainless steel nuts, bolts and limiting rods or District approved equal. See Section 4.12 for additional information.
- All pipe sections and flanged fittings shall be ductile iron in conformance with ANSI/AWWA C110/A21.10 and ANSI B.16 Class 125 Standards. Epoxy coating system shall be provided per Section 4.2.
- Provided stainless steel ASTM F593 hex bolts, ASTM F594 hex nuts, and SAE stainless steel washers used throughout.
- All flange gaskets shall be full face 1/8" thick Toruseal flange gaskets.
- See Detail W-09 for all other requirements.

4.6. SECTION 6.17 – CONCRETE STRUCTURES – (ENCASEMENTS)

4.6.1. GENERAL

Reinforced concrete encasements shall be constructed to the limits shown on the construction drawings. However, should field conditions differ from the reviewed and signed plans (e.g. ground elevations, creek locations), the encasement limits shall be reviewed in the field by the District, prior to any encasement construction.

4.6.2. MATERIALS

Encasements shall be constructed of concrete made from well-graded aggregate and Type II cement, having a minimum twenty-eight (28) day compressive strength of 4000 psi, slump of 2"-4", and air entrainment of 3% to 5%.

Reinforcement steel used in encasements shall be ASTM A36 steel.

4.6.3. INSTALLATION

Reinforced concrete encasement shall be installed in accordance with the "Concrete Encasement" construction detail, found in these Specifications. Minimum clear distance between steel reinforcement and the edge of the concrete encasement shall be three inches (3"). The encasement shall be formed using undisturbed soils or concrete formwork. Concrete shall be vibrated around steel reinforcement using vibration equipment or manual poling and shall not be placed on a frozen or unstable foundation. Suitable concrete protection shall be provided to reduce rapid moisture loss and to protect the concrete from freezing.

4.6.4. TESTING

The Contractor shall submit the concrete mix design to the District for review at least 48 hours prior to encasement construction. The District may require that concrete cylinders be sampled on-site and tested at twenty-eight (28) days to show conformance with the required twenty-eight (28) day compressive strength requirement of 4000 psi. Slump and air entrainment may also be tested at the time of concrete pour, at the District's discretion.

4.7. SECTION 6.23 – MANUFACTURER AND MODELS OF FIRE HYDRANTS

Allowable fire hydrants within the Southgate Water District service area shall be Mueller Super Centurion Model A-423, Waterous Pacer Model WB-67-250 (w/ bronze brushed shoe and shaft coupling), and AVK Series 27. All fire hydrants installed shall be red (Rustoleum 7400 System, #1210402 "Fire Hydrant Red" or District-approved equal).

For new fire hydrant installations, a maximum of one (1) two-foot extension will be allowed to raise the hydrant to the proper elevation above final grade. For existing infrastructure, a maximum of two (2) two-foot extensions will be allowed to raise the hydrant to the proper elevation in the event of changes to final grade. The District reserves the right to require installation of a new hydrant assembly as part of any new grading operations.

4.8. SECTION 6.24 – FIRELINE CONNECTIONS TO MAINS

Firelines shall be sized in accordance with the appropriate Fire Protection Bureau (South Metro Fire Rescue Authority or the Littleton Fire Protection District). Connection of firelines to District infrastructure will be witnessed by the District. Inspection, testing, and acceptance of the fireline will be subject to the appropriate Fire Protection Bureau.

4.9. SECTION 6.25 – SERVICE LINES

Denver Water shall install all taps for services two inches (2") in diameter or smaller. Service connections larger than two inches (2") may be installed by the Owner's Contractor in accordance with the Denver Water Engineering Standards.

4.10. SECTION 6.28A – POLYETHYLENE ENCASEMENT

Encasement material shall be high density cross-laminated polyethylene film with a minimum thickness of 4 mils conforming to AWWA C105/A21.5.

4.11. SECTION 6.32 – CARRIER PIPE

Carrier pipe shall be fusible PVC or an internally locking-joint PVC pipe. CertainTeed Certa-Lok PVC pipe is not an approved material.

4.12. SECTION 6.34 – AIR AND VACUUM VALVES

All air and vacuum valves shall be combination air and vacuum valve. Air vacuum/air release valve is not an acceptable alternative. Acceptable manufacturers shall be Val-Matic Series 200, APCO Williamette Series 140C, ARI Flow Control D040 (< 3") or D060 (3" and >).

Design shall conform to AWWA C512 and be heavy-duty air and vacuum valve, water style. Valve shall be single body type and rated not be less than that specified for the pipe. Body and cover shall be cast iron and float shall be stainless steel. All internal parts shall be stainless steel.

Provide valves with internal deflector and external adjustable discharge orifice to control leakage or blow-by of liquid. All ball valves shall be Apollo 82-100 threaded, bronze, 3-piece, full port ball valves.

Inflow preventers shall be provided to close in the event of a flooded vault preventing contaminated water from reaching the air valve outlet. Acceptable product shall be Wager 2100 Mushroom Check Valve or approved equal. Inflow preventer shall be fully automatic, float operated, and designed to allow the combination air and vacuum valve to perform its normal function of admitting and discharging air under normal operating conditions.

See Detail W-10 for additional information.

4.13. BLOWOFF ASSEMBLY

Permanent blowoff assemblies for locations where a water line dead ends (i.e. cul-de-sacs) shall conform to Denver Water Standard Detail Sheet 76 (2" Blowoff Hydrant) except that a 2" threaded gate valve shall replace the 2" curb stop to isolate the main from the blowoff hydrant assembly. All other requirements of Sheet 76 shall apply. Gate valves for blowoff assemblies shall be AVK Series 03, American Flow Control Series 2500, or District approved equal, with NPT threaded ends meeting the requirements of AWWA C509. Stem and bolts shall be stainless steel with fusion-bonded epoxy coating inside and outside per AWWA C550.

4.14. FLANGED COUPLING ADAPTERS

Acceptable manufacturer of flange coupling adapters shall be Smith-Blair Model 911 with Cam-Lock joint restraint or District approved equal.

All flanged coupling adapters shall be of the restrained type (RFCA). Flanged end and body shall conform to AWWA C219 and coupling end to be compression gland type with follower ring. Flanged adapters shall be made of steel per ASTM A36, Grade C or ductile iron conforming to ASTM A536. Flanged end bolt circle, bolt size, and spacing shall conform to the applicable provisions of ANSI B16.1 and shall be drilled Class 125. Bolts and nuts shall be Type 304 stainless steel. Restraint for the flange adapter shall consist of a plurality of individual actuated gripping wedges. Torque limiting actuating screws shall be used to ensure proper initial set of gripping wedges. The adapter shall have a pressure rating not less than the connecting pipe. Anchor studs shall not be used where joint restraint is required. Furnish adapters with tie rod harness assemblies where indicated. Interior and exterior body of the flange adapter shall be coated with fusion-bonded epoxy.

4.15. DISMANTLING JOINT (IN VAULTS)

Acceptable manufacturer of dismantling joint shall be Romac Model DJ400 or District approved equal conforming to AWWA C219.

Design shall consists of a mechanical joint fitting located between two pipe flanges with restraining rods across the mechanical joint section, providing a restrained system with integral space for removal of adjacent equipment. Body shall be fusion epoxy bonded coated and lined, minimum 200 psi working pressure, and fully restrained. Bolts, nuts and rods shall be stainless steel. An insulating flange kit is required when connecting dissimilar material.

SECTION 5 – SUPPLEMENT TO DENVER WATER ENGINEERING STANDARDS

CHAPTER 7 – EARTHWORK

5.1. SECTION 7.04 – TRENCHING OPERATIONS – (LIMITS OF EXCAVATION)

Length - Except by expressed written permission of the District the maximum length of open trench shall be 600 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is smaller. The distance is the collective length at any location, including open excavation, pipe laying, appurtenance, construction, and backfill. The trench shall not be left open when the Contractor has left the project site and is not engaged in construction operations. Traffic Barriers shall be placed as required by the representative City or County, or as stipulated by local conditions, to ensure construction safety at all times.

5.1.1. FOUNDATIONS AND SUBGRADE

General

All vault foundations and pipe subgrade installation shall be in a stable condition. Any and all questions relative to foundation and subgrade stability shall be coordinated through District and the Developer's Geotechnical Engineer. The Geotechnical Engineer will be responsible for determining if the foundation and/or subgrade are stable prior to the utility installation.

Stable Foundations and Subgrade

The trench bottom shall be excavated six inches (6") below the invert of the pipe unless otherwise designated on the plans. Before the pipe is laid, the foundation shall be prepared by backfilling with bedding material conforming to these specifications. The bedding shall be thoroughly tamped to achieve a relative density of 70% as determined by ASTM D-2049.

5.2. SECTION 7.09 – FOUNDATIONS ON UNSTABLE SOIL

When excessively wet, soft, spongy, or similarly unsuitable materials is encountered at the surface upon which the bedding material is to be placed, dewatering shall be performed and unsuitable materials shall be removed to a depth as determined in the field by the Owner's Geotechnical Engineer and the District.

The degree of soil instability will determine the limits of over excavation. In general, over excavation will be required, and stabilization rock shall be installed as indicated on the "Special Bedding" detail until the foundation and/or subgrade is stable as determined by the Owner's Geotechnical Engineer and the District.

5.2.1. FOUNDATIONS IN ROCK

Where rock is encountered, it shall be removed below grade. The trench shall be backfilled with clean imported bedding material to provide a compacted foundation cushion. The minimum clearance between rock and the pipe shall be nine inches (9").

5.3. SECTION 7.10 - PIPE BEDDING AND PIPE ZONE MATERIAL

General

All pipe bedding materials for stable and unstable installation conditions shall be reviewed by the Owner's Geotechnical Engineer and the District prior to delivery of bedding to the construction site. The area indicated in the bedding details from the trench bottom to twelve inches (12") above the pipe shall be referred to as the "pipe zone". Bedding materials and installation shall meet or exceed the requirements of this section.

Bedding Material

The pipe bedding, using either clean imported sand, squeegee, or 3/4-inch gravel conforming to these specifications shall be placed in the pipe zone and compacted to the requirements set forth in this section. The following classes of bedding are permitted:

Class A Bedding

Class A bedding shall be used for the bedding of water mains at normal depths of cover (i.e. 4.5 feet to 10 feet of cover). Class A bedding shall consist of placing select bedding material (known as "squeegee") as defined below, from the pipe foundation to a point twelve inches (12") above top of pipe.

Class A bedding material shall conform to the following limits:

Class A Bedding (Squeegee)	
Sieve Size	**Total % Passing by Wt.**
3/8”	100%
No. 8	65-100%
No. 50	10-30%
No. 100	0-10%
No. 200	0-5%

Class B Bedding

Class B bedding shall be reviewed for use by the District for bedding of PVC or ductile iron water lines when depths of cover exceed ten feet (10’). Class B bedding shall consist of placing crushed aggregate, as defined below, from the pipe foundation to a point twelve inches (12") above the top of the pipe in accordance with the provisions of this section. Class B bedding shall be clean crushed aggregate conforming to ASTM D 448, as follows:

Class B Bedding	
Sieve Size	**Total % Passing by Wt.**
1”	100%
3/4”	90-100%
3/8”	20-55%
No. 4	0-10%
No. 8	0-5%

Bedding Installation

The pipe shall be bedded as indicated on the "Standard Bedding" and "Special Bedding" details, found in the Standard Construction Drawings. The Contractor shall accurately shape the pipe subgrade to fit the bottom of the pipe. The intent is to relieve the bell of the pipe of all loading and provide continuous bearing of the pipe barrel on the bedding. Use of a drag template shaped to conform to the outer surface of the pipe will be required if other methods do not give satisfactory results.

The pipe shall be centered in the trench, adjusted to line and grade and bedding shall be simultaneously placed on both sides of the pipe so as not to disturb alignment and grade. The bedding material shall be sliced under the haunches of the pipe to fill all voids. The slicing shall be performed when the bedding material covers approximately one-third (1/3) of the pipe's diameter.

Bedding Compaction

All bedding material shall be compacted to a minimum Relative Density of 70%, as determined by ASTM D2049. Each lift shall be solidly tamped with the proper tools so as not to injure, damage, or disturb the pipe. Backfilling shall proceed simultaneously on each side of the pipe. Water settling for compaction is not permitted.

Bedding Testing Requirements

Bedding material shall be tested by the Owner's Geotechnical Engineer for gradation requirements set forth herein, and test reports shall be submitted to the District prior to delivery of any bedding material to the project site. Bedding compaction shall be tested using the "Sand Cone Method" in conformance with ASTM D1556 or other methods reviewed by the District. Compaction test results shall be submitted to the District on the working day following the test. If test results do not meet these specifications, the area shall be reworked and retested until these specifications are met. The location and frequency of bedding compaction testing will be determined by the District on a case-by-case basis.

5.4. SECTION 7.11 – BACKFILL AND COMPACTION

General

All trenches shall be backfilled after pipe, fittings and appurtenances have been installed and reviewed by the District and Denver Water.

When a compaction requirement is specified herein, the optimum moisture content and density shall be determined in accordance with the appropriate ASTM specification.

Backfill Material

Backfilling shall be done with on-site material, sand or gravel. No oil cake, bituminous pavement, concrete, rock or other lumpy material shall be used in the backfill unless these materials are scattered and do not exceed 3" in any dimension. Material or perishable, organic, spongy, frozen debris, or otherwise unacceptable nature shall not be used in

backfilling. No material greater than 3" in any dimension shall be placed within 1 foot of any pipe, manhole or structure. Backfill material shall be subject to the review of the District.

Within the street right-of-way, the road subgrade and final grade, including base course and asphalt placement, shall be replaced in strict accordance with the appropriate jurisdictional City or County.

Backfill Installation

In street rights-of-way, the portion of the trench above the "pipe zone" to the finished roadway surface shall be backfilled, compacted, and/or consolidated by methods reviewed by the District to obtain a Standard Proctor Density of 95% (ninety-five percent) or equivalent relative density. In easements and other areas outside street rights-of-ways, the portion of the trench above the "pipe zone" shall be backfilled, compacted and/or consolidated by methods reviewed by the District's geotechnical consultant to obtain a Standard Proctor Density of 90% (ninety percent) or equivalent relative density.

Backfill to be compacted by heavy compaction equipment shall be placed in uniform horizontal lifts not exceeding 12" or as specified by the District.

Heavy compaction equipment shall not be used closer than three feet to walls at the top of any structure nor closer than three feet to the top of the pipe. Before each lift is compacted, the material therein shall be brought within 1% above or 3% below the optimum moisture content for the specified compaction.

Flooding, pooling, or jetting shall not be allowed for consolidation of backfill.

Any damage to the pipe as a result of the Contractor's backfill and compaction operation shall be repaired and/or replaced by the Contractor.

Backfill Compaction Tests

Compaction tests shall be performed by a qualified testing laboratory at locations acceptable to the District. All expenses involved in these tests shall be borne by the Contractor or Developer.

Copies of test results shall be provided to the District. In all cases where the tests indicate sub-standard compaction, additional compaction effort and tests will be required until these specifications are met. Final acceptance of the lines by the District will be contingent upon satisfactory compaction results. Testing of water lines, as outlined in Chapter 8 of the Denver Water Engineering Standards, shall not be allowed until backfill compaction meets the standards set forth within these specifications.

The location and frequency of compaction testing shall be per the City, County, or District Specifications, whichever is more stringent. The minimum testing interval is as follows:

Minimum Testing Interval		
Location	**Horizontal Interval**	**Vertical Interval**
Water Line Trench	250 feet	Every 1 foot
Water Line Structure	Every Structure	Every 1 foot
Service Line	Random Representation	Every 1 foot

5.5. SECTION 7.13 – CLEAN-UP

Prior to project acceptance, the contractor shall clean street right-of-ways and easements of all rubbish, excess materials, temporary structures and equipment and shall leave the same areas to plus or minus 1/10 of a foot from the elevations that existed prior to construction or the final grades as shown on the reviewed and signed construction plans.

SECTION 6 – SUPPLEMENT TO DENVER WATER ENGINEERING STANDARDS

CHAPTER 8 – PIPE INSTALLATION

6.1. GENERAL CONSTRUCTION STANDARDS

The following is in addition to Denver Water Engineering Standards Chapter 8 - Pipe Installation.

All excavations affecting or involving any part of the District System, and all work on Main Extensions, Taps, or other District facilities shall be performed in conformity with and are subject to the requirements and conditions set forth herein. Whenever any provision of these Specifications or the Rules and Regulations imposes a duty addressed in this Section upon a Contractor, the term "Contractor" in such context shall be deemed to apply also to the Property Owner.

6.1.1. 8.01 – APPROVAL BY DENVER WATER

Contractor shall comply with all District, Denver Water, State and Federal Rules, Regulations, Standards and Specifications.

6.1.2. PERMITS

The Contractor shall be solely responsible for determining and obtaining any and all permits required for the work from other governmental entities or agencies having jurisdiction, and shall perform the work in accordance with any and all applicable ordinances, regulations, laws and orders of, or permits issued by such entities or agencies.

6.1.3. SUBSURFACE STRUCTURES

The District will make available to the Contractor record drawings showing the location of its facilities and such information as it has about other subsurface structures in the vicinity of the work, but the Contractor shall be finally and solely responsible for notifying all owners or operators thereof of the intent to excavate in the area, and determining the existence and location of all subsurface structures in such area.

If a Contractor damages any District facilities during construction, the Contractor shall immediately notify the District and take such measures as may be reasonably necessary or appropriate to minimize damage to the District System, prevent the escape of water from the District System, and prevent and mitigate damage from fugitive water. The District shall perform all repairs of District facilities and may assess the costs thereof to Contractor, as provided in Sections 9-5 and 9-8 of the Rules and Regulations.

Any Contractor who damages District facilities shall indemnify and hold the District harmless against any and all claims for damage resulting therefrom, and shall indemnify and hold the District harmless against any and all claims for damage to any such structures.

6.1.4. WARRANTY

All materials and workmanship furnished by the Contractor shall conform to the Denver Water Engineering Standards, these specifications and to all plans and design approved by

the District, and shall be free from all defects due to faulty or non-conforming materials or workmanship.

6.1.5. INDEPENDENT INVESTIGATION

Contractor shall thoroughly examine the work site to ascertain all soil, geological, groundwater and other conditions to be encountered which might affect the work being undertaken. The Contractor shall enter into such work relying on their own investigation and information, and not on any statements or representations, if any, that have been made by the District.

6.1.6. INDEMNIFICATION

By undertaking any work subject to this section, Contractor agrees to indemnify and hold harmless the District from any and all liability, claims, and demands, on account of injury, loss, or damage, including without limitation claims arising from bodily injury, personal injury, sickness, disease, death, property loss or damage, or any other loss of any kind whatsoever, which arise out of or are in any manner connected with any work subject to this section if such injury, loss, or damage is caused in whole or in part by, or is claimed to be caused in whole or in part by, the act, omission, error, professional error, mistake, negligence, or other fault of Contractor, or which arise out of any Worker's Compensation claim of any employee of the Contractor. Contractor agrees to investigate, handle, respond to, and to provide defense for and defend against such liability, claims or demands at the sole expense of Contractor. The Contractor also agrees to bear all other costs and expenses related thereto, including court costs and attorney fees, whether or not any such liability, claims, or demands alleged are groundless, false, or fraudulent. Nothing in this subsection shall be deemed to impose upon Contractor any obligation to defend or hold the District harmless against claims for damages legally caused by any unlawful act or omission of the District.

6.2. REQUIRED SUBMITTALS

No Contractor shall begin work on any Main Extension, Tap, or other District facilities until the Contractor has obtained the prior approval of the District therefor, and has submitted, in addition to any other materials required elsewhere herein, the following, approved as to form by the District:

6.2.1. WRITTEN AGREEMENT

If required by the District, a writing duly signed by Contractor (1) acknowledging their consent to be bound by the provisions of Section 6.1 of these Specifications; (2) warranting that the work will conform to such provisions and will be free from defects due to faulty or non-conforming materials and workmanship; (3) agreeing to indemnify the District as provided in Section 6.1.6 of these Specifications, and (4) agreeing to pay any and all applicable fees and charges provided by these Specifications and the Rules and Regulations in connection with the work.

6.2.2. FEES

The full amount of all fees payable in advance, or any required costs deposits, or both.

6.3. STOP WORK ORDERS

6.3.1. ORDER

The District may revoke any approval for work and issue a Stop Work Order upon a determination that the Contractor has violated or is about to violate any condition of any plan approval, any provision of these Specifications or Rules and Regulations, or any other standard, specification, or rule imposed by the District. A Stop Work Order shall take effect immediately upon the entry thereof by the District and notice to the Contractor, and shall remain in full force and effect until rescinded in writing by the District.

6.3.2. EFFECT

It is unlawful for any person to do any work in violation of the terms of any Stop Work Order issued pursuant to this section except such as may be permitted by the District in order to render the construction site safe and secure.

6.4. CURE OF DEFECTS

6.4.1. ORDER TO CURE

If the District determines that any part of the work was not performed in conformity with these Specifications, Rules or Regulations or approved plans, or is defective, of poor or unworkmanlike quality, or is otherwise not in conformity, with any applicable warranty, it may give written notice thereof to the Contractor. Such notice shall specify the nonconformity, direct the Contractor at their cost to perform specified remedial work, and specify the period of time determined by the District reasonably necessary for completion of the remedial work.

6.4.2. DISTRICT CURE

If the Contractor fails within the time stated following such notice to cure the nonconformity specified therein, the District, in addition to and without waiving any of its other remedies, may perform the work and charge the Contractor for its actual costs incurred in connection therewith, calculated in accordance with the rates set forth in the Rules and Regulations applicable to invoicing and collection of fees and charges shall apply to any charges assessed to Contractor under this section.

6.5. PRE-CONSTRUCTION

A Pre-Construction Meeting shall be arranged by the District and held prior to the start of any work. The District Engineer, Denver Water, Contractor, Soils Engineer, Surveyor, and Developer, or Developer's Engineer, must be represented at this meeting, which shall generally be held at the District Office. After the Pre-Construction Meeting is held, the Contractor shall, at least 48 hours prior to the start of construction, notify the District of its construction schedule and start date.

6.6. CONSTRUCTION PLANS

Construction plans shall be reviewed and signed by the District. The signed plans and a copy of these Specifications shall be kept on the project site by the Contractor at all times.

6.7. DEFECTIVE MATERIALS

All materials not conforming to the requirements of the District or the Denver Water Engineering Standards shall be considered defective. Whether in place or not, such material shall be removed immediately from the site of the work, unless otherwise permitted by the District. Rejected material, the defects of which have been subsequently corrected, shall not be used until the District has reviewed them and found them acceptable. The District will not consider conveyance and acceptance of a project if the contractor fails to comply promptly with any order of the District made under the provisions of this section.

6.8. DESIGN REVISIONS DURING CONSTRUCTION

Should the Contractor encounter field conditions that prevent construction to occur in conformance with the reviewed and signed plans, a meeting shall be scheduled by the Contractor with the Owner's Engineer and District to discuss an alternative design. The Contractor's construction shall not deviate from the signed plans without the prior review and approval of the District, and the Owner's Engineer.

6.9. WATER SHUTOFF AND NOTIFICATIONS

Existing valves owned and operated by the District may only be operated by District personnel. The Contractor shall be responsible for notifying Southgate a minimum of 2 business days prior to any necessary valve operation. Valves installed by the Contractor may be operated by the Contractor until the District accepts the system.

The Contractor shall be responsible for notifying any affected homeowner or business owner a minimum of 48 hours prior to any water shutoff. The Contractor shall schedule the work in order to minimize service outages to affected customers.

6.10. CONNECTIONS BY WET TAP

Connections to District infrastructure by wet tap are acceptable only when deemed appropriate by the District. Connections must conform to all requirements of the Denver Water Engineering Standards and be performed by a contractor on Denver Water's Prequalified Contractor List which can be found for review from Denver Water's website (www.denverwater.org).

6.11. CONSTRUCTION WATER

The Contractor shall be responsible for obtaining any water required for various phases of construction. Arrangement and coordination of permits shall be made through Denver Water and thereafter the District. A hydrant-specific permit must be applied for through the District and applicable fees shall be paid at the District office. An approved water meter and subsequent meter permit must first be obtained from Denver Water. Information regarding temporary water service through Denver Water can be found at Denver Water Operating Rules Chapter 3 – Temporary Water Service.

6.12. RECORD DRAWINGS

See APPENDIX E for a complete listing of how record drawings shall be processed by the Owner and approved by the Engineer.

6.13. REPLACEMENT OF EXISTING IMPROVEMENTS

In areas where existing pavement, concrete improvements, storm or drainage improvements are removed during construction, they shall be replaced in kind to the limits disturbed by water line construction. All replacement shall be in accordance with the appropriate City, County, or State Highway Department.

6.14. REPAIR OF EXISTING DISTRICT INFRASTRUCTURE

Repair of existing District infrastructure will be evaluated on a case-by-case basis. When leaks or damage to existing waterlines can be repaired by use of a repair clamp, the repair clamp shall be Smith-Blair Model 262 or District-approved equal. When damage to existing waterlines exceeds the capabilities of a repair clamp, the extents of damaged piping shall be removed and replaced with similar-sized PVC piping conforming to the Denver Water Engineering Standards. Connections to undamaged PVC or ductile iron piping shall be made by restrained solid sleeves. Connections to undamaged asbestos concrete piping shall be made by transition couplings.

6.15. SAFETY AND TRAFFIC CONTROL

The Contractor shall determine, initiate, maintain and supervise all measures necessary to protect the public during construction. It is the Contractor's responsibility to obtain and maintain any necessary permits as required by the jurisdictional City, County, or State Highway Department.

Traffic shall be controlled at those locations throughout the project area in order to maintain an efficient and orderly vehicular and pedestrian traffic flow. All traffic control, construction signing, vehicular traffic and residential access, etc., shall be handled in conformance with the Uniform Traffic Control Manual and the appropriate City, County, or State Highway Department Standards.

The Contractor shall furnish, construct, maintain, and finally remove detours, road closures, lights signs, fences, barricades, flares, miscellaneous traffic devices, flaggers, drainage facilities, reconstruct paving and such other items and services as are necessary to adequately safeguard the public, both traveling and otherwise, from hazard and inconvenience. The Contractor shall erect and maintain such warnings and directional signs as may be requested by the City, County, or State Highway Department.

Should the progress of construction require closure of residential access, the Contractor shall notify the residents which may be affected at least 24 hours in advance and provide temporary access. Prior to the start of construction, the Contractor shall notify affected residents as well as the appropriate police and fire departments, giving the approximate starting date expected, completion date, and the name and telephone number of a responsible person representing the Contractor who may be contacted at any hour.

6.16. CONSTRUCTION OBSERVATION

The District shall decide any and all questions that may arise during construction as to the quality and acceptability of the materials furnished, the work performed, or the manner of performance of the work.

No observation or testing will be performed by the District on weekends or holidays without the express agreement of the District secured in advance. Whenever any observation or testing is

required by any specific provision of these Specifications or the Rules and Regulations, or by the terms of any permit or plan approval, the Contractor shall give the District such notice as is required and shall not cover or otherwise obscure the work until the observation or testing has been made. The Contractor shall at their cost uncover or otherwise make such work accessible for observation or testing when ordered to do so by the District if he violates this requirement.

The observations, testing and reviews performed by the District are for the sole and exclusive benefit of the District. No liability shall attach to the District by reason of any observations, testing, or reviews required or authorized by these Specifications or the Rules and Regulations, or by reason of the issuance of any approval or permit for any work subject to this section.

The District is not a guarantor of the construction Contractors' obligations and performance of contract.

Observations of work in progress and on-site visits are not to be construed as a guarantee by the District of the Contractors' performance.

The District is not responsible for safety in, on, or about the Project site, nor for compliance by the appropriate party of any regulations relating thereto.

The District exercises no control of the safety or adequacy of any equipment, building components, scaffolding, forms, or any other work aids used in or about the project, or in the superintending of the same.

6.17. GEOTECHNICAL OBSERVATION

Geotechnical observation and backfill density tests will be performed by the Owner's Soils Engineer to provide acceptable fill control, bedding compaction, and foundation suitability. All supervision necessary to control fill and compaction tests will be at the expense of the Owner. If the first compaction test does not meet with the Specifications, the sub-standard areas shall be reworked and additional compaction tests will be performed until the Specification is met. Any deviation from the plans, Specifications, or soils report must be corrected by the Contractor to the satisfaction of the District. Copies of all compaction tests shall be provided to the District on the working day following the test. The location and frequency of compaction testing shall be per Section 5.4 of these Specifications.

6.18. FEES

Contractor will pay the District all fees imposed and assessed by the District for reviews, observation, tests, approvals, and any other undertakings performed by the District or its professional consultants in connection with the administration and enforcement of these Specifications and the Rules and Regulations, as provided by Article 7 of the Rules and Regulations.

6.19. IMPROVEMENTS AGREEMENT

Conveyance and acceptance by the District of facilities intended to be owned and operated by the District shall be accomplished as provided in Article 6 of the Rules and Regulations.

SECTION 7 – CONSTRUCTION DETAIL DRAWINGS

Denver Water Sheet # :

1 Water Distribution System Typical Plan (See Denver Water)
2 Water Distribution System Typical Plan for Curved Streets (See Denver Water)
3 Water Distribution System Typical Plan for Cul-De-Sac (See Denver Water)
4 Typical Street Cross Section and Street Centerline Profile (See Denver Water)
5 Typical Private Street Cross Section (See Denver Water)
6 Typical Quarter Section Hydraulic Grid System (See Denver Water)
7 Piping at Street Intersections for Future Connections (See Denver Water)
8 Plan, Profile, and Location for Fire Hydrants, Mains, and Valves (See Denver Water)
9 3" and Larger Domestic and Fireline Connections (See Denver Water)
10 Fireline Connection with Domestic Service Tap (See Denver Water)
11 NFPA 13D Residential Sprinkler Services (See Denver Water)
12 ~~Typical Trench Section~~ (See W-01 - Standard Bedding for Water Lines)
13 ~~Typical Trench Section for Pipeline in Dipping Bedrock~~ (See W-02 – Special Bedding for Water Line)
14 Ditch or Canal Crossing
15 Storm and Sanitary Sewer Crossing
16 Open Cut Crossing Over or Under Conduit or Conflicting Utility
17 Bored Crossing Beneath Conduits
18 ~~Bore Casing Detail~~ (See W-03 – Steel Casing for Carrier Pipe)
19 Valve Operation
See Also W-04 – Gate Valve
20 Recycled Water System Pentagon Operating Nut
21 Valve Box Support Plate
22 Valve Operator Extension
23 Valve Operator Guide
24 Standard Adjustable Support
25 Heavy Duty Adjustable Support
26 6" ø Industrial Vent Pipe and Screen
27 6" ø Residential Vent Pipe
28 Concrete Kickblocks Bearing Surfaces and Installation
29 Concrete Kickblock Requirements for Water Main and Tap Size Combos
30 Stud Nut Tightening Sequence
31 Flange Lug Detail
32 Length of Restrained Pipe
33 Polyethylene Wrap on Pipe and at Tap Installation
34 Insulated Joints, Rods, and Bolted Sleeve Type Couplings
35 Ductile Iron Pipe Joint Bonding
36 Cadweld Protection (See also Detail W-06 – Cathodic Protection and Test Station)
37 Tracer Wire Installation for PVC Water Main
38 Traffic Impediment Bollard
39 ~~Reference Post~~ (See W-07 – Standard Steel Post and W-08 – Redwood Marker Post)
40 Pressure Regulating or Check Valve Manhole Installation Typical Plan
41 Pressure Regulating or Check Valve Manhole Installation Typical Cross Section
42 Pressure Regulating or Check Valve Rectangular Vault Typical Plan

43 Pressure Regulating or Check Valve Rectangular Vault Typical Cross Section
44 Typical Concrete Manhole Installation
45 Standard Design for 2" Blowoff Manhole
46 Temporary Blowoff Installation for 12" and Smaller Pipe
47 Transmission Main Blowoff Installation
48 ~~Air Valve Assembly with Access Manhole~~ (See W-10 – Combination Air Valve Assembly)
49 ~~Air Valve Assembly~~ (See W-10 – Combination Air Valve Assembly)
50 Access Manhole
51 Pitot Installation
52 ~~16", 20", and 24" Conduit or Transmission Main, Flanged Butterfly Valve Installation~~ (See W-11 – Flanged Butterfly Valve Vault Installation for 16" to 24" Pipe)
53 General Meter & Service Notes
54 2" and Smaller Service Line, Stop Box, and Outside Meter Installation
55 Outside Setting for 3/4" and 1" Meters
56 Outside Setting for 1 1/2" and 2" Meter with Check Valve and Bypass in Manhole
57 Large Meter in Vault
58 Outside Setting for 1 1/2" and 2" Meter and Bypass in Manhole with Inside Backflow Prevention Assembly
59 Outside Setting for 1 1/2" and 2" Double Check Valve Assembly in Manhole
60 Outside Setting for 2" & Smaller Reduced Pressure Principle Assembly in Enclosure
61 Outside Setting for 4" & Larger Reduced Pressure Principle Assembly N-Type, Above Ground
62 Service Line Stop Box & Inside Meter Installation for Existing ¾" & 1" Meter
63 Inside Setting for Existing 3/4" & 1" Meter with AMR
64 Inside Setting for Existing 1 1/2" & 2" Meter & Bypass with Inside Backflow Prevention Assembly
65 Inside Setting for 3" & Larger Meter
66 Remote AMR Device Installation on Outside Building Wall
67 Outside Setting for 2" Detector Check Valve in Manhole
68 Inside Setting for 2" Detector Check Valve
69 Irrigation Outside Setting for 2" & Smaller Reduced Pressure Principle Assembly in Enclosure
70 Drinking Fountain Double Check Valve Above Ground Installation
71 Drinking Fountain Double Check Valve Below Ground Installation
72 Standard Design for Hydrant Interconnection
73 Standard Hydrant Meter Installation
74 Submerged Butterfly Valve with Torque Tube & Actuator Stand
75 Chlorination Tap (Ductile Iron Pipe)
76 2" Blowoff Hydrant

Additional Southgate Water District Details:

W-05 Typical Utility Cross Section in Easement
W-09 PRV Vault Piping and Appurtenances
W-12 Standard 24" Ring and Cover
W-13 Aluminum 24" Ring and Bolt Down Cover
W-14 36"x24" Double Ring and Cover
W-15 CLSM Cut-off Wall
W-16 Concrete Encasement Detail
W-17 Water Main Trench Insulation Detail
W-18 PVC to Asbestos Concrete Transition
W-19 Southgate Water District General Notes

APPENDIX A - WATER SYSTEM PLAN REQUIREMENTS CHECK LIST

GENERAL DRAWING REQUIREMENTS

1. Correct sheet size (24" x 36").
2. Vicinity Map.
3. Location Map.
4. Index to drawings.
5. List of quantities.
6. List of agencies, including Surveyor, Soils Engineer, and all involved agencies for the project.
7. General notes (Refer to Appendix Item 2.)
8. Professional Engineer, State of Colorado, seal and signature on every sheet.
9. North arrow on vicinity map, location map and each plan view.
10. Title block on each sheet.
11. Bench mark, including U.S.G.S. datum, location, elevation and monument type.
12. Street alignment, existing and proposed, shown on overall plan.
13. Street names shown.
14. Horizontal curve data for street centerline and all curbs shown on plan, or recorded plat included in plan set.
15. Street grades, existing and proposed shown on profile.
16. Typical street cross-section(s).
17. Street addresses for all lots and/or buildings indicated on plan, or address plat included in plan set.
18. Lot and block numbers.
19. Front lot dimensions.
20. Property, easement and tract lines shown on plan.
21. Private improvements identified.
22. Existing improvements identified.
23. Match lines and sheet references called out in plan and profile.
24. Street cross-pans shown.
25. Center line of drainage channel(s) shown.
26. 100-year flood plain limits shown.
27. Estimated construction cost and proposed development build-out schedule submitted.
28. Recorded plat and address plat submitted.
29. Project in conformance with overall water system master plan.

APPENDIX B – WATER LINE DRAWING REQUIREMENTS

A. General

1. Water line horizontal alignment generally 10' north and east of street centerline; 5' min. from lip of flow line or cross pan; 10' min. from R.O.W. line.
2. All water mains shown in both plan and profile.
3. Water demands, including peak fire flow and maximum hour use, shown at connection(s) to existing system. Number and type of units.
4. Water easement drawings and legal descriptions submitted with PLS seal and signature affixed.
5. Water system notes included (refer to attached).
6. Water system details included.
7. Service tees not allowed.
8. Service tap locations, including size, to buildings, shown on as-builts.

B. Water - Plan View Requirements

1. Scale: 1" = 50', minimum.
2. Water line stationed.
3. Pipe size and material called out.
4. All valves, fittings, fire hydrants, wet taps, thrust blocks, restraint lengths, blow-offs and other appurtenances called out.
5. Water line linear footage between valves, fittings and appurtenances called out.
6. Radius of deflected water line called out. Three degrees (3°) maximum deflection per joint.
7. Water lines dimensioned from street centerline, ~~or~~ property line, and from other utilities, curb and gutter and other appurtenances.
8. Connections to existing system shown on plan and tied to property corner or section corner.
9. At least a 10' workable easement margin on each side of the water line.
10. Valves located at property line extensions. Valves required to isolate all fire hydrants, both ends of a water line through an easement or creek crossing and spaced to minimize the number of units put out of service during water line maintenance and repair work.
11. Valve and fitting markers included for water line outside of paved right-of-way.
12. Fire lanes called out.
13. PRV size and inlet and outlet pressures shown.
14. Match lines and sheet references.
15. All utility improvements including sanitary sewer and storm sewer, shown on plans.
16. All gate valves numbered.

C. Water - Profile View Requirements – (Required For All Water Main)

1. Scales: 1" = 50' (horizontal)
   1" = 5' (vertical)
2. Water line stationed.
3. Pipe size, linear footage and grade called out between all grade breaks and fittings.
4. Top of pipe elevations called out at all grade breaks, fire hydrants, blow-offs, air and vacuum valves, plugs, connections to existing water system and match lines.
5. 4-1/2' minimum cover from finished grade to top of pipe.
6. 6-1/2' minimum cover for air and vacuum valve vaults.
7. Restrained pipe length shown on profile.

8. Connections to existing system shown on profile.
9. Crossings with other utilities shown on profile (1-1/2 minimum separation from outside of pipe to outside of pipe).
10. Match lines and sheet references.

APPENDIX C – SOUTHGATE STANDARD EASEMENT AGREEMENT

EASEMENT AGREEMENT

(Distributor Performance Non-Exclusive)

THIS EASEMENT AGREEMENT, hereinafter "Agreement", effective the _____ day of _____, 2016, is made between **[GRANTOR'S LEGAL NAME]**, a [type of company, ex: Colorado Corporation], and any assigns or successors in interest, hereafter called "Grantor", (whether grammatically singular or plural) and **SOUTHGATE WATER DISTRICT**, Arapahoe and Douglas Counties, Colorado, a quasi-municipal corporation and political subdivision of the State of Colorado, hereinafter called "Distributor," whose legal address is 3722 East Orchard Road, Centennial, Colorado 80121.

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 [Arapahoe or Douglas], State of Colorado, and more fully described on **Exhibit A** 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 on 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 11 (eleven) 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 from finished grade or to two (2) feet below the bottom of the water line as determined by the Distributor. 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 did not cause Environmental Contamination,, the Grantor, for itself, its successors and assigns, shall indemnify the Distributor against any liability, damages, costs, expenses, causes of action, claims, losses, settlements, fines and penalties, and reasonable attorneys' fees claimed 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 (4½) 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 ½) 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.

18. **SPECIAL PROVISIONS:**

APPENDIX D – SOUTHGATE STANDARD IMPROVEMENTS AGREEMENTS

IMPROVEMENTS AGREEMENT (WATER)

1. **PARTIES.** The PARTIES to this AGREEMENT are the **SOUTHGATE WATER DISTRICT**, Arapahoe and Douglas Counties, Colorado, a quasi-municipal corporation and political subdivision of the State of Colorado (the "DISTRICT") whose legal address is 3722 East Orchard Road, Centennial, Colorado 80121, and, **[APPLICANT'S LEGAL NAME]** a [TYPE OF COMPANY] (the "APPLICANT) whose legal address is [APPLICANT'S ADDRESS].

2. **RECITALS AND PURPOSE.** The APPLICANT is the owner of certain real property as further described herein. The APPLICANT has determined to undertake water system improvements associated with the development of the property. The DISTRICT is a Title 32 special district organized under Colorado law which provides service to its customers for which monthly service charges are imposed. DISTRICT's service is contingent upon APPLICANT's extension of the applicable main lines to or within the property to be serviced and then upon APPLICANT's purchase of taps pursuant to DISTRICT Rules and Regulations. The purpose of this AGREEMENT is to set forth the terms and conditions concerning APPLICANT's extension of the necessary main lines. Accordingly, the PARTIES agree to the following provision in consideration of the mutual covenants set forth herein. No express or implied reservation or limitation of capacity is made herein.

3. **LEGAL DESCRIPTION OF PROJECT.** The APPLICANT desires to develop that certain parcel of real property located in the **[SECTION, TOWNSHIP, RANGE, COUNTY, STATE THAT PROJECT IS LOCATED IN],** commonly known as **[COMMONLY KNOWN NAME]**. For purposes of this AGREEMENT, the term "PROJECT" or "PROPERTY" shall mean the property so described. The map provided in this AGREEMENT is for reference only and is not a binding legal description of the PROPERTY. The APPLICANT agrees to furnish a reproducible copy of the approved plat or improvements plan to the DISTRICT and the conditions and restriction of said plat or plan are expressly incorporated in this AGREEMENT. Any subsequent change or alteration in the area, size, shape, usages, requirements, or timing of development of the PROJECT which may affect the size or configuration of main or service lines needed to service the PROJECT shall be subject to further engineering review and plan revisions by the DISTRICT.

4. **DESIGN SPECIFICATIONS AND CONSTRUCTION.**

   4.1 The main line extension(s) which are required to service the PROJECT are: as set forth on plans entitled "**[TITLE OF CONSTRUCTION DRAWINGS]**", as prepared by [A/E COMPANY'S NAME ON DWGS] for DISTRICT Project Number [Project #], stamped and dated by **[**RESPONSIBLE ENGINEER'S NAME ON DWGS] on [DATE DWGS WERE STAMPED BY ENGINEER].

   4.2 It is agreed, as a condition precedent to service to the PROJECT, that all necessary main and service lines and appurtenant facilities which are to be constructed both within and without the PROJECT and which are necessary to connect with the main lines of the DISTRICT as presently engineered and installed, or as proposed for construction pursuant to this AGREEMENT, shall be in accordance with design and engineering standards and specifications as established by the DISTRICT and which may be modified or amended from time to time.

   4.3 Within thirty calendar days of execution of this AGREEMENT, APPLICANT shall submit detailed construction plans and engineering designs to the DISTRICT for its review and approval prior to the commencement of any construction of said extension or extensions. The APPLICANT and DISTRICT's Engineer shall schedule and conduct a preconstruction meeting prior to any construction.

4.4 The PARTIES understand and agree that the APPLICANT and APPLICANT's successors in interest or in title shall be solely and exclusively responsible for service lines (those lines which run from the individual tap to the individual structure or facility serviced) pursuant to DISTRICT's Rules and Regulations.

4.5 APPLICANT agrees that the actual installation and construction shall be subject to the supervision and inspection by the DISTRICT and all costs of engineering study, review and approval and inspection shall be at the cost of, and paid by, APPLICANT. APPLICANT further agrees to give the DISTRICT, through the DISTRICT's Engineer, adequate notice but in no event less than two working days, prior to commencement of construction, of the date when such construction shall begin.

4.6 Conditions precedent to the DISTRICT'S providing service to the PROJECT shall include but not be limited to completion of construction, testing, inspection and approval by the DISTRICT's Engineer, payment of all construction costs and fees and charges of the DISTRICT, and delivery to the DISTRICT of a complete and accurate set of "as built" drawings showing the exact location of all constructed lines and facilities, including service lines.

4.7 Upon execution of this AGREEMENT, or at such time or times as may be requested by DISTRICT, APPLICANT agrees to furnish DISTRICT a topographical survey of the PROPERTY described in this AGREEMENT; or a recorded subdivision plat (or individual plats if the PROJECT is phased) approved by appropriate regulatory agencies, together with requirements and conditions fixed by such agencies for development and evidence of the APPLICANT's compliance or plan for compliance.

5. EASEMENTS NECESSARY TO SERVE PROJECT.

5.1 APPLICANT shall furnish, at APPLICANT's expense, a title insurance commitment or other evidence of title pursuant to DISTRICT's Rules and Regulations. APPLICANT shall thereafter furnish, at APPLICANT's sole expense, all easements, rights-of-way, or consents within the PROJECT (other than dedicated utility easements or rights of way designated in any recorded plat) which may be required before the construction of any portion of the main lines and appurtenant facilities which may be needed to service the PROJECT. Such easements, rights-of-way or consents shall be provided prior to commencement of construction.

5.2 APPLICANT shall coordinate with the DISTRICT to obtain all easements and rights-of-way which are necessary to extend the main lines from the DISTRICT's existing facilities to the boundary of the PROPERTY. APPLICANT shall be solely responsible for and pay, directly or indirectly, all costs and expenses of whatever kind which may be required or associated with the acquisition of such easements and rights-of-way. In the event that such easements and rights-of-way are required to be obtained from any private party or entity, such costs and expenses shall include the consideration paid to such property owner for such easement or easements, together with all costs and expenses which the DISTRICT may incur in obtaining such easements through eminent domain or other process, including without limitation, real estate appraisals, expert witness fees, attorneys fees, court costs, mediation/arbitration expenses, and all other costs and expenses incurred in conjunction therewith. Nothing herein shall be construed as imposing any requirement upon, or consent by, the DISTRICT to utilize its powers of eminent domain.

5.3 All such easements, rights of way or consents, including any dedications, shall be free of any prior lien or encumbrance. DISTRICT, at its discretion, may require a properly executed and acknowledged release to exempt such easements and rights-of-way from the prior lien of any mortgage or deed of trust.

5.4 All easements and rights-of-way granted to the DISTRICT shall consist of a legal description certified by a land surveyor licensed by the State of Colorado, and an accurate survey drawing of such property or properties indicating the easements and their dimensions. The actual documents of conveyance shall be subject to and in conformity with DISTRICT's standard

procedures and approved forms as may be amended from time to time or at any time in the DISTRICT's sole discretion.

6. **CONVEYANCE OF MAIN LINES AND FACILITIES.** Upon completion, approval and acceptance of the work by the DISTRICT, as shown by the authorized signature of the DISTRICT's authorized representative set forth below, this AGREEMENT shall operate as a sale, conveyance, transfer and assignment by the APPLICANT of all APPLICANT's rights, title, interest and ownership in said main lines and facilities constructed pursuant to this AGREEMENT, such conveyance warranted by the APPLICANT to be free and clear of all claims, liens or encumbrances of any kind or nature whatsoever. APPLICANT shall warrant and defend (or indemnify and hold harmless the DISTRICT at its request) such conveyance against any and all persons or entity's claims or assertions. In addition to the satisfactory performance of all other conditions and terms of this AGREEMENT, the following shall be express conditions precedent to the DISTRICT's acceptance of the work:

6.1 A duly executed written statement that all suppliers of labor and materials, including all subcontractors, have been paid in full, with appropriate executed lien waivers attached.

6.2 All deeds or other instruments conveying such easements and rights of way as set forth in paragraph 5 herein have been accepted and approved by the DISTRICT.

6.3 Adequate security has been posted with the DISTRICT in accordance with paragraph 7 herein.

7. **WARRANTY AND SECURITY FOR REPAIRS/REPLACEMENT.** Upon conveyance of the lines and facilities pursuant to this AGREEMENT, APPLICANT warrants, covenants and agrees that the work is in full compliance with the laws of the State of Colorado, and all other governmental subdivisions, agencies and units and in accordance with the design standards and other engineering and construction specifications and requirements of the DISTRICT. Following completion, approval, full acceptance, conveyance and transfer of lines and facilities to the DISTRICT, the DISTRICT shall assume all responsibility thereafter, and all operational maintenance pursuant to its Rules and Regulations, except as to the 12 month warranty period in accordance with this paragraph 7. APPLICANT shall warrant to the DISTRICT the lines and facilities, as installed, against faulty workmanship and materials for a period of 12 months from date of final acceptance and shall, during said period, pay all cost and expense to cure, repair or replace at the request of the DISTRICT any part or parts of the extension or constructed facilities which the DISTRICT reasonably determines were not designed or constructed in conformity with DISTRICT Rules and Regulations, approved plans, construction notes or its specifications or standards, that the DISTRICT reasonably determines to be defective, of poor or un-workmanlike quality or are not performing to DISTRICT standards for any other reason. Following expiration of the 12 month warranty period and satisfactory remediation of any outstanding warranty issues, the APPLICANT shall be released from all warranty responsibilities owed to the DISTRICT.

7.1 To ensure such repairs and replacements will be accomplished, APPLICANT shall furnish to the DISTRICT an irrevocable letter of credit or other security acceptable to the DISTRICT in an amount equal to 10% of the total costs of construction and installation of the lines and facilities, but not less than $1,000, or such greater amount as the DISTRICT may require in its sole discretion is necessary to adequately protect itself on account of special circumstances arising from the construction of the extension/appurtenances or any portion thereof. Such security shall be maintained for a period of 15 months from the date of final acceptance, and shall be restored to the full amount within 10 calendar days after written notice to the APPLICANT in the event that the DISTRICT draws against such security to effect repairs or replacement. Upon expiration of 15 months following final acceptance, the security required by the DISTRICT shall be released to the APPLICANT. The security may either be extended or called upon at the DISTRICT's discretion if there are any pending claims or assertions which arose during the 12 month warranty period which remain unresolved. In any event, the security shall be maintained until such time as all claims or assertions are resolved to the DISTRICT's satisfaction.

7.2 In the event that the costs and expense of curing any defect, or repairing or replacing any portion of the extension or facilities exceeds the security posted pursuant to this AGREEMENT, the

APPLICANT covenants, warrants and agrees that it will reimburse the DISTRICT within 30 calendar days of presentment or pay directly the full costs and expenses of such remedial work.

8. **SERVICE FROM IMPROVEMENTS.** APPLICANT covenants and agrees that it will not make any warranties or representations to any contractor, home builder, other developer, home owner, lessee, tenant, individual property owner, or any other person or entity, regarding the DISTRICT's system, its capabilities, availability, pressures, or flows, and expressly including the timing of acceptance of any improvements or their authorized activation.

9. **DISTRICT FEES AND REGULATIONS.** The obligations, duties, rights and responsibilities of each party arising under this AGREEMENT shall be subject to all applicable Rules and Regulations of the DISTRICT and applicable review, observation and other fees implemented by the District applicable to the Project which may be amended from time to time. APPLICANT shall have the sole responsibility for inquiring as to the current Rules and Regulations and fee schedule of the DISTRICT.

10. **GOVERNMENTAL REGULATIONS.** All provisions of this AGREEMENT to the contrary notwithstanding, the obligation of the DISTRICT to furnish service under this AGREEMENT, to accept any improvements, and to perform any and all other duties and obligations arising hereunder is limited by, and subject to, all orders, requirements and limitations which may be imposed by federal, state, county or any other governmental or regulatory body or agency having jurisdiction or control over the DISTRICT and the operation of its system pursuant to any statute, regulation, or agreement.

11. **PARAGRAPH CAPTIONS.** The captions of the paragraphs are set forth only for convenience and reference, and are not intended in any way to define, limit, or describe the scope or intent of this AGREEMENT.

12. **ADDITIONAL DOCUMENTS OR ACTION.** The PARTIES agree to execute any additional documents and to take any additional action necessary to carry out this AGREEMENT.

13. **INTEGRATION AND AMENDMENT; PRIOR AGREEMENTS.** This AGREEMENT represents the entire AGREEMENT between them and there are no oral or collateral agreements or understandings. This AGREEMENT may be amended only by an instrument in writing signed by the PARTIES. The APPLICANT shall reimburse the DISTRICT for any expenses incurred by the DISTRICT in connection with any amendment of this AGREEMENT requested by the APPLICANT. If any provision of this AGREEMENT is held invalid or unenforceable, no other provision shall be affected by such holding, and all of the remaining provisions of this AGREEMENT shall continue in full force and effect. All prior agreements and contracts between the PARTIES and regarding the sale and purchase of taps are hereby rescinded. By execution of this AGREEMENT, each of the parties acknowledges that it has had the opportunity to fully review and seek legal counsel regarding the content hereof.

14. **ALTERNATIVE DISPUTE RESOLUTION.** In the event of any dispute or claim arising under or related to this AGREEMENT, the PARTIES shall use their best efforts to settle such dispute or claim through good faith negotiations with each other. If such dispute or claim is not settled through negotiations within 30 calendar days after the earliest date on which one party notifies the other party in writing of its desire to attempt to resolve such dispute or claim through negotiations, then the PARTIES agree to attempt in good faith to settle such dispute or claim by mediation conducted under the auspices of the Judicial Arbiter Group (JAG) of Denver, Colorado or, if JAG is no longer in existence, or if the PARTIES agree otherwise, then under the auspices of a recognized established mediation service within the State of Colorado. Such mediation shall be conducted within 60 calendar days following either PARTY's written request therefore. If such dispute or claim is not settled through mediation, then either PARTY may initiate a civil action in the District Court for County of either Arapahoe or Douglas County, as applicable for the location of the PROPERTY.

15. **ASSIGNMENT.** If APPLICANT is not in default hereunder, APPLICANT may assign this AGREEMENT without the prior consent of the DISTRICT, provided said assignment is in writing and further provided that the assignment is made in conjunction with a transfer of all or substantially all of the PROPERTY described herein. No assignment shall, however, be effective upon the

DISTRICT unless and until the DISTRICT receives written notice and a copy of the assignment including the name and address of the assignee. If assignment is made by APPLICANT, the DISTRICT reserves the right to require proof of financial capacity to perform the terms of this AGREEMENT of any assignees and to reject such assignment based upon its review thereof.

16. **BINDING EFFECT.** This AGREEMENT shall inure to the benefit of, and be binding upon, the PARTIES, and their respective legal representative, successors, and assigns; provided, however, that nothing in this paragraph shall be construed to permit the assignment of the AGREEMENT except as otherwise specifically authorized herein.

17. **INDEMNIFICATION/INSURANCE.** APPLICANT hereby warrants and agrees that it will indemnify and hold DISTRICT, its Board of Directors, consultants and employees harmless from any and all claims, demands, judgments or awards resulting from any third party loss, injury or property damage (specifically including claims involving property disputes, infringements, wrongful takings or encroachments) which occurs as a result of, or arises from, the construction, installation, or conveyance of the line extension or extensions, easement acquisition, or the performance of any other obligation of APPLICANT arising hereunder. Such indemnification shall extend to all of DISTRICT's costs and expenses, (including reasonable attorneys fees, court costs, costs of litigation, mediation, arbitration or dispute resolution) which it may incur in investigating, processing, and/or defending such claim or demand. The DISTRICT shall be named as an additional insured on all APPLICANT insurance policies related to the PROJECT subject to this AGREEMENT.

18. **EXHIBITS.** All exhibits referred to in this AGREEMENT are, by reference, incorporated in this AGREEMENT for all purposes.

19. **SURVIVAL OF WARRANTIES.** Except as provided in paragraph 7 above, all warranties and representations, and specifically including the obligation of indemnification shall survive completion and conveyance, and shall continue thereafter for a period of three years from date of execution of this AGREEMENT, provided however that if any claim is made against the DISTRICT during such three year period, APPLICANT's obligations shall extend beyond such three year period until such claim is resolved, paid or otherwise compromised.

20. **STATUS OF APPLICANT.** APPLICANT, its employees or contractors shall not represent itself as employees or contractors of the DISTRICT nor in any way authorized to bind the DISTRICT, take action on behalf of or make statements to any third parties on behalf of the DISTRICT.

21. **SPECIAL PROVISIONS.**

APPENDIX E – RECORD DRAWING PROCEDURES

1. Record Drawing Requirements

Surveyed Record Drawings of the main extension project shall be submitted for review and approval as a condition for project Acceptance, and subsequently a condition of releasing the project for tap sales.

2. Construction Plans

The Contractor shall maintain on the job site, a dedicated, full-set of approved construction plans marked to fully indicate field installed conditions (contractor redlines). These drawings shall be maintained in a current condition at all times until completion of the work and shall be available for review by Southgate at all times. All variations from the approved Construction plans, including those occasioned by optional materials or those required by coordination between trades, shall be indicated. These variations shall be shown in the same general detail utilized in the original design.

3. Field Survey Requirements

The following Datum shall be used:

Vertical: **NAVD 88**

Horizontal: **NAD 83 Colorado Central State Plane (modified to ground)**
Conversion factor shall be provided to convert back to State Plane (grid)

For water projects: All surface appurtenances shall be surveyed (valves, fire hydrants, etc.). Note on drawings if survey was performed prior to, or after final lifts of paving.

For sewer projects: All surface appurtenances shall be surveyed (e.g. manholes, etc.). All manhole pipe inverts shall be surveyed prior to manhole barrel and/or cone sections being placed. Note on drawings if rims were surveyed prior to, or after final lifts of paving.

4. Record Drawing Plan Submittal

There are **2 STEPS** to follow in order to complete the Record Drawing process:

STEP 1 – Draft Plan Submittal and Review

Upon completion of the work, the marked set of construction plans (contractor redlines) and a copy of the certified Field Survey Notes obtained from the surveyor's as-built collection points shall be furnished to the Project Engineer. The Project Engineer shall prepare a *draft* version of the Record Drawings for Southgate review.

The following items shall be included as part of the 1st Draft Plan Submittal:

1. Certified Field Survey Notes – if in electronic format, points shall clearly identify the feature

being referenced

2. Contractor redlines

3. Draft Surveyed Record Drawings submitted for review including the following:

    a. Every sheet shall be stamped "Surveyed Record Drawing"

    b. Engineer Certification – every sheet shall be attested to and sealed by a Colorado Registered Engineer (signature required only on final submittal)

    c. Surveyor Certification – this shall be provided, as a minimum, on the cover sheet (signature required only on final submittal)

    d. Surveyed Northings and Eastings (N/Es) shall be updated and noted – update N/Es by striking through original N/Es and adding actual N/Es.

    e. CAD files shall reflect the actual physical location of the updated N/Es by moving valves, manholes, etc. to their new locations.

    f. Pipe inverts, pipe lengths, pipe slopes, etc. (including hydraulic calculations on the plans) shall be updated by striking through original data and adding actual data.

    g. Plans indicate whether rims were surveyed prior to, or after final lift of paving.

    h. Quantity list is updated to include materials (manufacturer/model) used.

    i. The following construction information added to the Cover Sheet:

        i. Date Installed:

        ii. Contractor:

        iii. Southgate Field Representative:

        iv. Owner/Developer:

        v. Project Engineer:

        vi. Soils Engineer:

        vii. Surveyor:

STEP 2 – Final Plan Submittal

Following Southgate's review the draft submittal, the Project Engineer will then prepare the final submittal package based on Southgate's review comments and submit to Southgate. The final submittal package shall include the following items:

1. Two bound, signed, half-sized print sets (11" x 17")

2. A disc containing both electronic file (latest version of AutoCAD) and .pdf files
    a. Electronic drawings shall include appropriate linetypes/styles per Southgate CAD Standards.

Note that Surveyed Record Drawings must be completed prior to purchasing tap.