



**FOUNTAIN'S WATER
DISTRIBUTION SYSTEM
DESIGN & CONSTRUCTION
SPECIFICATIONS MANUAL**

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CITY OF FOUNTAIN

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CHAPTER 1

AUTHORITY AND DEFINITIONS

1.1 Authority

- A. These Specifications are promulgated by the City of Fountain. The interpretation, enforcement and revision of these Specifications are hereby delegated to the Superintendent of the City of Fountain's Water Department, and his/her interpretation shall be binding and controlling in its application. These Specifications are to be adhered to for the design, installation, operation and maintenance of the water main system owned and operated by the City of Fountain. All references to documents or Specifications shall be the latest edition or revision thereof.
- B. Throughout these Specifications, many handling and installation procedures, tools, equipment, and materials will require approval by the Superintendent. Approval by the Superintendent shall in no manner render the City of Fountain liable for any injuries suffered or equipment damaged. Approval by the Superintendent is used solely as a means to insure quality control and safety.
- C. Safety of workers shall be provided by the Contractor as required by the Occupational Safety and Health Act (OSHA).

1.2 Effective Date of Specifications

- A. These Specifications shall be in effect after approval by the Superintendent of the City of Fountain's Water Department and shall supersede all of Fountain's prior Water Distribution System Design & Construction Specifications Manual's policies, standards and specifications within the City of Fountain.
- B. Any revisions, amendments or additions during the calendar year will be added to Chapter 8.

1.3 Non-Potable

- A. Non-potable water is defined as water that is not treated to the approved drinking water standards and is not suitable, nor intended for human consumption, but is produced and delivered to users for irrigation, commercial and industrial uses. Non-potable water includes treated wastewater (reclaimed water), raw (untreated)

groundwater and raw surface water.

- B. Non-potable water main systems shall abide by all clearances required in these Specifications, both horizontal and vertical. Non-potable water main systems are the sole responsibility of the Owner.

1.4 **Definitions**

As defined and used in these Specifications or in any of the drawings where Specifications govern, unless the context shall otherwise require, the following words defined shall have the meanings herein ascribed:

- A. **Appurtenance**

Any and all equipment, tools or instruments used to maintain and operate the water main system.

- B. **City of Fountain's Water Department**

The City of Fountain's Water Department organized and operated under the resolutions, ordinances, city code and charter as a home rule municipality providing public water service within its service area.

- C. **Contractor**

Person or persons, co-partnership or corporation employed by an Owner for the purpose of installing water main system extensions or replacements.

- D. **Customer Service Line**

The water conveyance system; from the curb stop to the premise, not including the curb stop.

- E. **Dedicated Fire Service Line**

For commercial, industrial and multi-family residential buildings with an automatic fire protection system (sprinkler), the automatic fire protection system shall have a connection to the Public or Private Main separated from the Domestic Water Service Line. The automatic fire protection service connection shall have a service valve conforming to the location and standards for the Domestic Water Service Valve for same size services.

- F. **Engineer**

The Engineer or Consultant of the City of Fountain, acting either directly, or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

G. Inspector

The authorized Representative of the City of Fountain assigned to the project.

H. Owner

Any person, association, corporation, entity or government agency desiring water service for premise(s) under their control, often a sub-divider or a developer.

I. Private Mains

Water main extensions as designated by the City of Fountain's Water Department to be located outside of public rights-of-way and/or easements. These mains shall be owned and maintained by an individual, property owner(s), corporation(s), homeowners association or partnership.

J. Public Mains

Water main system extensions as designated by the City of Fountain to be located within public rights-of-way and/or easements as determined by the City of Fountain's Water Department. These water mains and appurtenances shall be owned and maintained by the City of Fountain's Water Department.

K. Representative

An individual chosen to act or speak on behalf of those to whom decision-making authority has been given.

L. Specifications

Fountain's Water Distribution System Design & Construction Specifications Manual, including all chapters, addendums, standard drawings, references and documents.

M. Standard Drawings

The City of Fountain Water Department's Standard Drawings are provided to support documentation in conjunction with these Specifications.

N. Superintendent

The Superintendent of the City of Fountain's Water Department or his/her designated Representative.

O. Utility Director

The Utility Director of the City of Fountain so designated by the City Manager or his/her designated Representative.

P. Water Main (System)

Mains, together with all appurtenances and necessary valves, fire hydrants, taps, meters, service pipes, and associated materials, property and equipment distributing potable water to individual customers. That portion of the water

supply system, which transmits and distributes water of the City of Fountain from treatment or storage facilities to users, excluding customer service lines.

Q. Water Main (System) Extension

Water Mains constructed to supply and distribute water to and throughout areas or additions from the existing water main to the point or points of the property line of such premises farthest from the existing distribution main.

R. Water Service Line

Connection to the distribution main, the curb stop, and all pipe(s) in between those two locations.

1.5 Abbreviations

A.	ANSI	American National Standards Institute
B.	ASTM	American Society for Testing and Materials
C.	AWWA	American Water Works Association
D.	CIP	Cast Iron Pipe
E.	CSP	Corrugated Steel Pipe
F.	DIP	Ductile Iron Pipe
G.	DIPRA	Ductile Iron Pipe Research Association
H.	NSF	National Sanitation Foundation
I.	OSHA	Occupational Safety and Health Act
J.	PE	Polyethylene Pipe or Professional Engineer (P.E.)
K.	PPM	Parts per Million
L.	PPRBD	Pikes Peak Regional Building Department
M.	PRV	Pressure Reducing Valve
N.	PSI	Pounds per Square Inch
O.	PVB	Pressure Vacuum Breaker
P.	PVC	Polyvinyl Chloride Plastic Pipe
Q.	RP	Reduced Pressure

- R** USGS United States Geological Survey
- S** WRA Water-Reducing Admixture

CHAPTER 2

DRAWING SPECIFICATIONS

2.1 **General**

- A. These Specifications shall apply uniformly, unless otherwise stated, to both public and private water main extensions.
- B. The City of Fountain's Water Department will establish, and may amend from time to time, procedures to be followed by Owners for the construction of public or private water mains. These procedures shall include all requirements for project documentation, submittals, engineering design, construction and acceptance. Additional requirements to approved Construction Drawings shall supersede these Specifications.
- C. The City of Fountain's Water Department shall review all submittals for conformance with these Specifications and other applicable rules and regulations, and either approve the submittal or return it to the Owner for correction within ten (10) working days from the date of the submittal with redline comments. No work shall commence on any facilities until the Superintendent approves the plans for construction in writing. Final plans shall not be submitted for work that will not be installed within one (1) year of the approval date.

2.2 **Application Procedure - Public Water Main Extensions**

- A. An initial submittal by the Owner shall include an overall, or master, plan showing the area to be developed and any other adjoining proposed developments by the Owner. Large or difficult areas may require extensive study and analysis at the Owner's expense.

The City of Fountain's Water Department will return to the Owner its requirements for:

1. Points of connection to existing facilities;
2. Size of mains to be installed;
3. Locations of mains to be installed;
4. Special features such as pressure regulating valves, relief valves, booster pumps, etc.; and,
5. Acceptable materials.

B. For Both "Public Main" Extensions and "Private Main" Extensions

The Owner shall submit final plans prepared by a Professional Engineer registered in the State of Colorado per the City of Fountain's Planning Department requirements. This submittal shall contain all of the items enumerated in the procedures as established in Section 2.3 of these Specifications.

2.3 Plan and Profile Drawings

Plan and profile drawings are required for all pipe sizes 6" and larger. All plan and profile drawings for water mains shall be prepared at the expense of the Owner. Plan and profile drawings prepared by a consulting firm or individual shall bear the name and registration number of a Registered Professional Engineer (P.E.) in the State of Colorado.

The Owner or his/her Representative shall be responsible to review and coordinate all public and private infrastructure design and construction drawings to assure compatibility of all infrastructure elements affecting the water main system. Specific attention shall be given to assure all approved construction drawings are compatible and coordinated with the City of Fountain's Master Water Distribution Plan.

A. Design Documentation Required

1. Water Plan Applicable to the Development;
2. Subdivision Plat;
3. Drainage Report and Storm Sewer Construction Documents;
4. Street Improvement Construction Documents;
5. Wastewater Collection System Construction Documents;
6. Soils Report;
7. Non-Potable Water System Construction Documents; and,
8. Landscaping and Restoration Design Plan (if required) .

B. Plan and Profile Requirements

1. The scale for all plan and profile drawings shall be 1" = 50' Horizontal and 1" = 5' Vertical;
2. Lots and blocks;
3. All existing and proposed curb and gutter, to include size and type;
4. Sidewalk size and locations with respect to propertylines;
5. All existing or proposed utilities which may conflict with water installations, to include size, type and horizontal and vertical location;
6. All existing or proposed obstructions such as vaults, catch basins, traffic islands, etc.;
7. All utilities and obstruction crossing including top of pipe and bottom of pipe elevations and clearance distances;
8. The proposed alignment and size of the water lines to include the location of all proposed facilities such as valves, hydrants, fittings, etc.;
9. Service taps shall include size, location and material;
10. Line and curve data;
11. Street/water line alignment including stations;
12. Manhole inverts and rim elevations for storm water and waste water facilities;
13. Existing and proposed ground lines; and,
14. Easement(s) and/or right-of-way information to include the recorded book and page numbers, or any other data which could conflict with, or require deviations regarding the design of the water main.

2.4 **Additional Requirements**

- A. Plans shall be designed from an actual field survey referenced to land corners or other official survey control points and be of sufficient accuracy so that the facilities can be accurately staked for installation and readily located after installation for maintenance and tapping.
- B. Plans shall be of suitable scale to show all necessary information, larger scales shall be used when necessary to adequately show specific details of mains, connections and other installations.
- C. Plans shall show sufficient adjacent area to give the relationship of new facilities to existing facilities. Plans shall be neat, orderly and legible. Sloppy, smeared, or nonconforming plans shall be rejected (see Standard Drawings No. 2 & 3).
- D. Plans shall show the signature block (public/private) detailed at this end of this Chapter on the title sheet of the plans set, and also contain a space for the Water Department's stamp on any additional sheets that require a "STAMP" and Signature from the City of Fountain's Water Department.
- E. Be prepared in digital format, AutoCAD .dwg or .dxf file, with the assigned coordinate system:

Code: C083-CF

Description: NAD83 Colorado State Planes, Central

Referenced to: NAD83

EPSG Code: 2232

Unit: US Survey Feet

2.5 **Conflicts between Construction Drawings and Specifications**

- A. When a conflict occurs between or within the Specifications and the Construction Drawings, the Superintendent, pursuant to Section 1.1 of these Specifications shall make an interpretation.
- B. Should there be a conflict within the Specifications or on the Standard Drawings, the Superintendent shall decide which stipulation will provide the best installation and his/her decision shall be final.

- C. In the Construction Drawings, calculated dimensions shall take precedence over scaled dimensions and noted material over graphic or symbolic indication.

2.6 Noncompliance with Plans and Specifications

- A. Should noncompliance with approved plans and the Specifications, Standard Drawings and/or the City of Fountain's Water Code be determined during construction, inspection, and/or testing of any additions, modifications and/or repairs, work shall immediately cease.
- B. Work may resume and/or continue only after the Superintendent has determined that all elements of noncompliance shall be immediately corrected and/or otherwise resolved to the complete satisfaction of the Superintendent.
- C. Water service lines from the water main extension or portion thereof, shall not be provided until all elements of noncompliance are resolved to the complete satisfaction of the Superintendent.

2.7 Special Conditions

When applying for a water main extension, special conditions that involve another agency, such as crossing a railroad or highway, may exist. All conditions of the other agency must be satisfied. All designs, drawings and calculations submitted to another agency should also be submitted in duplicate to the City of Fountain for approval. Should a conflict in the plans and the Specifications occur between the City of Fountain and the other agency, the more stringent plans and Specifications yielding a higher quality product shall prevail. The City is not obligated to negotiate with other agencies for the installation or acceptance of utilities.

PUBLIC MAIN EXTENSIONS

Water Statement

The undersigned Owner agrees that the installation of these proposed water facilities will be made in accordance with City of Fountain's Water Distribution System Design & Construction Specifications Manual and shall provide the specified depth of cover over the water main(s). Any changes required to meet the City's Specifications and conditions of approval shall be at the expense of the Owner.

Signed: _____ **Date:** _____
Owner

D.B.A.: _____

Address: _____

All hydrants shall be installed according to the City of Fountain's Specifications.

Water Plan Approval:

Signed: _____ **Date:** _____
City of Fountain's Water Department

PRIVATE MAIN EXTENSIONS

Water Statement

The undersigned Owner agrees that the installation of these proposed water facilities will be made in accordance with City of Fountain's Water Distribution System Design & Construction Specifications Manual and shall provide the specified depth of cover over the water main(s). The undersigned understands that all water mains, fire hydrants and appurtenances as indicated on this water installation plan shall remain the property of the Owner and shall be maintained by the Owner. Any changes required to meet the City's Specifications and conditions of approval shall be at the expense of the Owner.

Signed: _____ **Date:** _____
Owner

D.B.A.: _____

Address: _____

All fire hydrants shall be installed according to the City of Fountain Specifications.

Water Plan Approval:

Signed: _____ **Date:** _____
City of Fountain's Water Department

CHAPTER 3

DISTRIBUTION SYSTEM DESIGN AND LAYOUT

3.1 Sizing of Distribution Mains

- A. All water main extensions within the City of Fountain's service area shall be made at the expense of the Owner. Extensions shall be made from the nearest adequate source as determined by the City of Fountain's Water Department to a point, or points, on the property line, farthest from the existing distribution main on the frontage of the applicants property, or to a point of tie-in to an existing main, as designated by the City of Fountain's Water Department.
- B. The City of Fountain's Water Department shall determine the size of main, location and required appurtenances, and the City of Fountain's Water Department's determination of size, location, appurtenances and point(s) of extension of water mains shall be final. All water mains shall be sized large enough to provide for domestic, irrigation and fire suppression flows. Water main sizing may also be dependent upon existing conditions or to provide for future development. In business and industrial areas, main sizes may be increased in adherence to the recommendations of the insurance rating agencies to provide adequate fire suppression flows.
- C. Fire sprinkler systems found in hotels, motels, public assembly places, warehouses, etc., is supplied by a dedicated fire line. The dedicated fire line shall be sized by the persons responsible for the structure it protects. The City of Fountain will not size dedicated fire lines.

3.2 Fire Protection

A. Fire Hydrants

The City of Fountain's Fire Department determines the number and location of fire hydrants in a given area. Normal practice is to install fire hydrants on the corners of street intersections (see Standard Drawing No. 4). If fire hydrants are to be installed at locations other than street intersections, they shall be located on lines, which are established by extending property lot sidelines into the streets. The City of Fountain's Water Department must approve any other proposed location. Fire flow requirements will be determined by the requirements of the current Fire Code

and the determination of the City of Fountain's Fire Department. Fire hydrant lateral lines shall be set at right angles to water mains. The hydrant shall be set at the end of the lateral line and shall face the lateral line. No horizontal or vertical bends or offsets shall be used in installing fire hydrant lateral lines unless approved by the City of Fountain's Water Department. Under no circumstances shall any size or manner of tap be made on a fire hydrant lateral line between the hydrant and hydrant valve.

B. Fire Sprinkler Line

The City of Fountain's Fire Department determines if a Fire Sprinkler System will be needed for new structures. These systems must be engineered and sized by a licensed Fire Protection Engineer working for the Developer.

C. Private Mains

When required in business, industrial, and building group areas where increased fire protection is necessary, private fire mains and hydrants may need to be installed. The location of these facilities shall be determined and approved by City of Fountain's Water Department. Domestic service, irrigation and/or fire sprinkler lines may be extended to the buildings and other areas, provided all service lines and meter installation requirements are complied with.

All private main extensions shall be limited to single platted lots. Extensions will not be allowed to cross lot lines for the purpose of serving two or more platted lots and building complexes or areas subject to separate ownership. Responsibility for a private main must remain with one property and by one owner.

Private main extensions, to include fire hydrants, shall be installed in accordance with these Specifications and shall be inspected by the City of Fountain's Water Department.

3.3 Distribution Regulation Installations

A. Regulating installations are required to control pressure, provide pressure relief and separate pump and gravity zones throughout the water distribution system. When water main extension plans are submitted for review, the need for regulating installations will be determined by the Superintendent, based on existing and proposed pressure zones, booster pump areas and the existing distribution system piping. Presently, regulating installations shall be categorized as follows:

➤ Pressure Regulating Station

- Pressure Relief
- Station Check Valve Station

- B. All regulation installations will be designed and installed by the Owner or their Representative subject to City of Fountain's Water Department review and approval.
- C. All required piping, regulators, fittings, valves, etc.; to be installed within the confines of a station shall be furnished by the Owner/Developer. Upon completion and acceptance of the station, the station shall become the property of the City of Fountain.
- D. All required concrete pits and concrete, reinforcing steel, manhole assemblies, and the total regulation installation shall be provided by the Owner in accordance with Standard Drawings No. 29 through 35. Any proposed deviations or changes from these Standard Drawings are only allowed with approval of the Superintendent.

3.4 Pumping Facilities

- A. Booster pumping facilities are only allowed when authorized by the Superintendent of the City of Fountain's Water Department. All proposed booster pumping facilities shall be considered a special feature and will be dealt with on a case-by-case basis.

3.5 Layout of the Distribution System

- A. All City of Fountain water mains shall be installed in dedicated public streets with a of fifty (50') feet minimum right-of-way width. When the City of Fountain determines it is not possible or feasible for an installation to be made in a dedicated street, the installation shall be made in the right-of-way or an easement. The conditions under which such an exception will be allowed will be determined on a case-by-case basis, and only the right-of-way and recorded easements which conform to the requirements of the City of Fountain's Water Department will be accepted. The minimum width right-of-way or easement which will be accepted by the City of Fountain's Water Department is a twenty (20') foot exclusive or a forty (40') foot non-exclusive easement, with the water main at a minimum of ten (10') feet from the edge of the easement. If at the determination of the City of Fountain's Water Department, it is not feasible to meet the above requirements, installations may be made in streets, alleys, rights-of-way or easements of other widths when authorized by the Superintendent.
- B. Pipe alignment shall be parallel to property lines. Normal practice is to lay the pipe on the north side or the east side of the street, ten (10') feet from the centerline of the street. In any case, pipe alignment shall always be within an established roadway, between the edges of the gutter pan. Minimum clearance from the edge of

the gutter pan shall be four (4') feet in all cases (see Standard Drawing No. 1). Only a maximum of ten (10) residential lots for a dead-end line will be allowed, unless otherwise accepted by the City. For depth of cover requirements, see Section 5.5 of these Specifications.

3.6 Line Valves

Line valves are required approximately every three-hundred (300') feet in the distribution system. Where blocks exceed three-hundred (300') feet in length, one or more line valves may be required between intersections. All tee and cross fittings in distribution mains shall be designed and constructed with a line valve on each side of all such fittings. Where necessary, the Inspector shall require the installation of additional line valves in order to avoid exposing existing customers to high chlorine residual and other adverse conditions during disinfection and flushing of new pipelines (see Standard Drawing No. 7).

3.7 Clearance for Sanitary and Storm Sewer Crossings

City of Fountain's Water Department requires a minimum of eighteen (18") inches separation between the crown of a sewer pipe and the bottom of the water Main or Service where the water Main or Service is laid above a sanitary sewer service line, sanitary sewer main or storm sewer main. Instances in which a minimum of eighteen (18") inches cannot be maintained will be addressed on a case-by-case basis (see Sections 5.19 and 5.20).

CHAPTER 4

MATERIALS TECHNICAL SPECIFICATIONS

4.1 Introduction

- A. Technical Specifications for the water main system materials are included in this Chapter. All Owners and Contractors shall comply with these Specifications and to all limitations on acceptable manufacturers and styles.
- B. All materials furnished shall be new, undamaged and the best available. Everything necessary to complete all installations in accordance with the Specifications of the City of Fountain's Water Department shall be furnished and installed whether shown on approved drawings or not. All installations shall be completed as fully operable, functioning parts of the City of Fountain's Water Main System.
- C. Acceptance of materials, or the waiving of inspection thereof, shall in no way relieve the Owner of the responsibility of furnishing materials which meet the requirements of these Specifications.
- D. New water industry products or materials will be tested and evaluated by the City of Fountain Water Department in the best interest of the City. The City of Fountain's Water Department will establish the criteria for testing or evaluating the product. The City of Fountain's Water Department reserves the right to accept or reject any product or material regardless of the test results.

4.2 Water Main Pipe

A. Ductile-Iron Pipe (DIP)

1. Thickness Class – 52, tested to 350 psi.
2. All ductile iron pipes shall be manufactured in accordance with AWWA Standard C150 and "Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids," unless otherwise specified for pipe sizes between four (4") inch and twenty (20") inch nominal diameters.
3. Joint Type: "Push-on Single Gasket" type conforming to applicable requirements of AWWA Standard C111, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."
4. Cement Mortar Lining: Ductile-Iron Pipe shall have standard thickness cement mortar linings in accordance with AWWA Standard C104 and ANSI A21.4, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water."

B. Polyvinyl Chloride Pipe

1. Polyvinyl Chloride Pipe (PVC): AWWA C900, DR14 all system pressures less than one-hundred and seventy (170) psi static pressure.
2. General: All polyvinyl pipe shall be manufactured in accordance with AWWA Standard C900, "Polyvinyl Chloride (PVC) Pressure Pipe, 4-Inch through 12-Inch, For Water," unless otherwise specified, for pipe sizes with 4-inch, 6-inch, 8-inch, 10-inch and 12-inch nominal diameters with ductile iron equivalent outside diameters.
3. Joint Type: Pipe joints shall be made using an integral bell with an elastomeric gasket push-on type joint.
4. Manufacturer: The only PVC pipe approved for installation within the City of Fountain's Water Main System shall be:
 - a. Vinyltech (Phoenix, Arizona) PVC water pipe, DR-14, meeting specifications ASTM D2241, AWWA C-900 and C-905.
 - b. JM Eagle (Livingston, New Jersey) PVC water pipe, DR-14, meeting specifications ASTM D2241, AWWA C-900 and C-905.
 - c. North American Pipe (Atlanta, Georgia) PVC water pipe, DR-14, meeting specifications ASTM D2241, AWWA C-900 and C-905.
 - d. Pipelife Jet Stream (Loam, Arizona) PVC water pipe, DR-14, meeting specifications ASTMD2241, AWWA C-900 and C-905.

4.3 Pipe Fittings

All fittings shall be made from ductile iron to be used in the City of Fountain's Water Department Water Main System, which shall meet the latest AWWA Standard Ductile-Iron Pipe C153 and shall be furnished with mechanical joint ends.

A. General

All ductile iron fittings shall be manufactured in accordance with the following AWWA Standards: C104, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water"; C111, "Rubber-Gasket Joints for Ductile-Iron and Cast-Iron Pressure Pipe and Fittings"; unless otherwise specified.

B. Cement Mortar Lining

All sizes of ductile iron fittings shall be furnished with a cement-mortar lining of standard thickness and given a seal coat of bituminous material and/or epoxy and use stainless steel bolts and wax tape.

C. Pressure Rating

All fittings shall be three-hundred and fifty (350) psi pressure rated.

4.4 Gate Valves

Gate valves shall be the same size as the main. Valves shall open to the left (counterclockwise).

A. General

All valves twelve (12") inches or less shall be resilient wedge or double disk and manufactured in accordance with AWWA Standard C515 unless otherwise specified and given a seal coat of bituminous material and/or epoxy.

B. Valve Stems

Valve stems shall be threaded so that the valve can be opened by turning to the left (counterclockwise). The stem shall be non-rising and all valves shall be equipped with a two (2") inch square operating nut.

C. Extension Stems

Extension stems shall be provided wherever operating nuts are five (5') feet or more below grade. The stems shall consist of solid steel shafting with an outside diameter not less than the outside diameter of the valve stem or galvanized steel pipe with an inside diameter not less than the outside diameter of the valve stem. Connect to the valve by flexible socket coupling bolted through the extension and operating nut on the valve.

D. Types of End Connections

All valves shall have a mechanical joint end with a gasket, gland and fasteners.

E. Manufacturer

The following manufacturers are acceptable for use in the City of Fountain's Water Main System:

1. American
2. Clow
3. Mueller
4. US
5. Waterous
6. AVK
7. Kennedy

4.5 Butterfly Valves

All valves fourteen (14") inches through forty-two (42") inches nominal diameter shall be butterfly valves and shall be the same size as the main. Butterfly valves shall open to the left (counterclockwise).

A. Pressure Class

The working pressure for all sizes with both flanged and mechanical joint connections shall be 250 psi. Flanged valves shall have Class 150 flanges or Class 300 flanges.

B. Materials

Butterfly valves shall be ductile iron or cast iron and shall be finished with a seal coat of bituminous material and/or epoxy.

C. Specifications

1. All butterfly valves shall be manufactured in accordance with AWWA C-504 Class 250B valve body with the following additional requirements or exceptions:

- a. Butterfly valves shall be of the rubber-seat type, cast iron or ductile iron body manufactured in accordance with ASTM A126CL B A536.
- b. Valve discs shall be cast or ductile iron manufactured in accordance with ASTM A126 A536 and shall rotate ninety (90) degrees from the full open position to the tight shut position and have a positive stop.
- c. Butterfly valves shall have an approved epoxy coating both internally conforming to AWWA C550 and NSF 61 and externally conforming to AWWA C116.

D. Valve Operations

1. Valve operators shall be designed to hold the valve disc in any intermediate position between fully closed and fully opened without creeping or fluttering.
2. All butterfly valves shall be equipped with a two (2") inch square operating nut.
3. Butterfly valves shall be geared to open left (counterclockwise).

E. End Connections

1. Buried butterfly valves shall have mechanical joint ends with gasket gland and fasteners conforming to ANSI A21.11 and AWWA C111.
2. Butterfly valves mounted in valves shall have flanged connections and shall have either Class 125 ANSI 150 or Class 251/ANSI Class 300 drilled pattern per ASME ANSI B16.1. The type of flange is dependent upon the operating pressure of the butterfly valve and the flanged fitting it is being attached to.

F. Color

1. Potable water butterfly valves shall have a color per the manufacturer's specifications.
2. Non-Potable water butterfly valves shall have purple color Pantone 512 or Pantone 522.

4.6 Valve Boxes

All buried gate valves shall be provided with a six (6") inch slip type cast iron valve box. The valve box shall be of a design which will not transmit shock or stress to the valve and shall have enough extension capability to be raised to final street grade.

A. Materials

Valve box parts shall be made of gray cast iron. Use of an aluminum alloy as a casting material is not acceptable.

B. Approved Patterns

Valve boxes shall be the three-piece adjustable slip type and only the following pattern is acceptable:

- Tyler Slip Type 6-Inch Cast Iron Valve Box Assembly Series 6855 or equal, as determined by the Superintendent.

C. Cover

The cover shall be the deep socket type with the word "WATER" cast in top for water applications.

4.7 Fire Hydrants

A. General

All fire hydrants shall be designed and manufactured in strict compliance with AWWA Standard C502, "AWWA Standard for Dry-Barrel Fire Hydrants."

B. Color

The upper exposed section of the hydrant above ground shall be painted Rustoleum 1210 - Fire Hydrant yellow or equal. The buried portion of the hydrant shall be given a bituminous coating in accordance with AWWA's Standard C106.

C. Acceptable Brand

Within the City of Fountain's water main system where maintenance, repair, replacement, and parts stocking is the responsibility of the City of Fountain, only these hydrants listed are acceptable.

1. AVK Static Pressure Less than 200 PSI
2. Kennedy Static Pressure Less than 200 PSI

D. Size of Hydrant

Hydrants shall have a main valve opening size of five and one-fourth (5-1/4") inches and shall be ordered for a five and one-half (5.5') foot bury unless otherwise approved by the Superintendent or designated on the drawings.

Hydrant bury will be measured from the bottom of the hydrant lateral pipe to finish grade line. Hydrant bury shall be adjusted to provide the minimum required cover on all portions of the hydrant lateral piping.

E. Type of Hydrant

All hydrants shall be **Nostalgic Style** and traffic model break-away type. Hydrants shall be the three-way type with one (1) pumper nozzle and two (2) hose nozzles all located on the same horizontal plane.

F. Inlet Connection

Hydrant base shall be provided with a mechanical joint inlet to accommodate a six (6") inch diameter pipe, in accordance with ANSI A21.11 (AWWA Standard C111, "Rubber Gasket Joints for Ductile-Iron and Cast Iron Pressure Pipe and Fittings"). Incorporated into the base shall be two (2) lugs for rodding or strapping of pipe.

G. Main Valve Assembly

1. The main valve of the hydrant shall be five and one-fourth (5-1/4") inch diameter compression type which closes with the water pressure.
2. The gasket for the valve shall be a replaceable type, fabricated of a resilient material, with a threaded bottom plate or nut, complete with a seal to prevent leakage of the hydrant shaft.
3. The valve assembly shall include one or more drain valves which will work automatically with the main valve and drain the barrel when the main valve is in the closed position.
4. All parts of the main valve assembly shall be designed such that removal of the assembly from the barrel is accomplished without excavation.

H. Operating Shaft Nut

The operating nut shall have a one and one-half (1-1/2") inch pentagon cross section (see Standard Drawing No. 6). Bushings in the bonnet shall be constructed such that they will prevent the operating nut from traveling during opening or closing operation; the bushing shall house a gasket or seal to prevent moisture or foreign material from entering the lubricant reservoir. The hydrant shall open by turning the operating nut to the left in a counterclockwise direction and shall have an arrow on top of the bonnet to designate the direction of opening.

I. Pumper Nozzle and Cap

The pumper nozzle shall be four and one-half (4-1/2") inch nominal diameter with four (4) threads per inch (National Standard). Threads shall be right-handed (see Standard Drawing No. 6).

Nozzle cap shall be furnished with a synthetic rubber gasket installed in a retaining groove, and the dimensions and shape of the nozzle cap nut shall be the same as the operating shaft nut.

Nozzle caps shall be furnished with security chains with one end of each securely attached to the upper barrel section of the hydrant.

All nozzle caps shall be removed by turning counterclockwise.

J. Hose Nozzles and Caps

The two (2) hose nozzles shall be two and one-half (2-1/2") inch nominal diameter with seven and one-half (7-1/2) threads per inch (National Standard). Threads shall be right-hand (see Standard Drawing No. 6). Each hose nozzle shall include a nozzle cap with a nut, security chain and shall be removed by turning counterclockwise.

4.8 Corrosion Protection Systems

The testing of the corrosiveness of the soil which a water main passes through may be required by the Superintendent. If so required, the testing shall be accomplished by the Owner. The need for protection will be determined by the Superintendent based upon the information submitted by the Owner and/or other information. Unless otherwise specified, all metallic components shall be securely encased in polyethylene wrap as a minimum corrosion protection measure. Refer to Chapter 5.22 for complete Specifications.

4.9 Concrete Thrust Blocks, Anchors and Structures

Concrete thrust blocks and anchors shall be sized for the internal pipe pressure and soil bearing capacity of the project. Standard sizes and shapes of thrust blocks and anchors are shown on Standard Drawings No. 13 and No. 14.

Thrust reaction blocking shall be concrete, of a mix not leaner than one (1) part cement to two and one-half (2-1/2) parts sand and five (5) parts stone, and having a compressive strength of not less than four-thousand (4,000) PSI after twenty-eight (28) days. Concrete shall be mixed at a central transit mix plant and transported to the site in a concrete mixing transport truck.

A. Materials

1. Cement

All cement used shall be Portland cement acceptable under the "Standard

Specifications and Tests for Portland Cement," ASTM Designation C150 of the American Society for Testing and Materials. Cement used shall be Type II or II LA.

2. Aggregates

All of the fine and coarse aggregates shall meet soundness requirements, deleterious substance limits and grading limits as set forth in the latest edition of "Standard Specifications for Concrete Aggregates" ASTM Designation C33.

3. Water

The water used in all concrete shall be potable.

4. Admixtures

a. An air-entraining agent shall be used in all concrete. The agent used shall conform to "Standard Specification for Air-Entraining Admixtures for Concrete," ASTM Designation C260. The amount of air-entraining agent used shall be such as will affect the entrainment of five (5%) percent plus or minus (\pm) one (1%) percent of volume of the concrete.

b. A Water-Reducing Admixture (WRA) may be used unless otherwise noted by the City of Fountain. The admixture shall conform to ASTM Designation C494 for Type A or Type D chemical admixture, shall contain no calcium chloride, and shall be compatible with the cement being used.

c. As a result of the selection and use of any admixture such as a delay, difficulty in concrete placing and/or damage to concrete during form removal, the Contractor shall be responsible for any difficulties arising, or damages occurring.

B. Concrete Quality

All concrete shall have a minimum twenty-eight (28) day compressive strength of four-thousand (4,000) PSI and a maximum slump of four (4") inches.

C. Testing

When deemed necessary by the Superintendent, field control tests consisting of aggregate gradation tests, slump tests, air content tests, and making of compression test cylinders, shall be performed by qualified personnel in the presence of the Inspector.

D. Concrete Reinforcement

Reinforcements shall be accurately formed and shall be free from loose rust, scale and contaminants which reduce bond. Unless otherwise shown on the drawings or specified herein, all requirements shall conform to the latest ACI Standard 318 and the Uniform Building Codes. Reinforcements shall be accurately positioned on

supports, spacers, hangers, or other reinforcements and shall be secured in place with wire ties or suitable clips.

E. Reinforcement Material

All reinforcing bars shall conform to ASTM Standard A615, Grade 60.

F. Concrete Structures

All concrete structures are to be constructed of reinforced concrete and must have a power supply, unless otherwise stated by the Superintendent.

4.10 Mechanical Joint Restraint

Mechanical joint pipe restraints shall be used for restraining fittings, valves and hydrants to reduce the size of concrete reverse anchors, thrust reaction blocks and/or steel tie rods; however, anchors, thrust blocks and/or tie rods will still be required where indicated on plans.

A. When mechanical joint pipe restraints are installed on ductile iron pipe, the length of pipe to be restrained shall be determined in accordance with the "Ductile Iron Pipe Research Association" (DIPRA) recommendations, "Thrust Restraint Design for Ductile Iron Pipe" (see Standard Drawings No. 27 and No. 28).

B. Ductile iron pipe shall be restrained with Megalug Series 1100 mechanical joint ductile iron retainer glands manufactured by EBAA Iron Sales, Inc. or an approved equivalent.

C. Polyvinyl Chloride (PVC) Pipe may be restrained with the use of mechanical joint restraints subject to approval of the City of Fountain. PVC pipe mechanical joint restraints shall be series 2000 PV Megalug Retainer Glands manufactured by EBAA Iron Sales, Inc. or an approved equivalent.

D. All tie rods for mechanical joint restraints shall be galvanized and encased with polyethylene.

4.11 Pressure Regulation Valves and Accessories

A. Pressure Reducing and Pressure Sustaining Valves

1. Application: Reduce downstream pressure and sustain a minimum upstream pressure.

2. Type: CLA-VAL Model 692-01 Series
Hydraulically operated, pilot controlled diaphragm type; open and closing speed controls; pilot system shut-off cocks.

3. Body: Cast Iron, ASTM A48, globe body.

4. Accessories: Pressure gauges on inlet and outlet piping.

5. Size: As shown on approved plans.
6. Pressure Rating: To be determined in design.
7. Adjustment Ranges:
 - a. Downstream: As shown on approved plans.
 - b. Upstream: As shown on approved plans.

4.12 Casing Pipe

Installation of mains through rights-of-way or easements of others, such as highways, railroads, etc., may require steel casing pipes for bores within the City of Fountain's jurisdiction. For all others, the type of casing material and its properties will be specified by the agency granting permission to cross. Such crossing shall be subject to approval by the Superintendent to avoid conflicts in requirements or standards between the City of Fountain and the persons or agency granting permission to cross.

4.13 Responsibility for Materials

A. Material Furnished by Contractor

The Contractor shall be responsible for all materials and shall replace, at his/her own expense, any and all such materials found defective or damaged during handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed material discovered to be defective prior to Final Acceptance of the project.

B. Responsibility for Safe Storage

The Contractor shall be responsible for the safe storage and handling of material intended for the project for the duration of construction until it has been incorporated in the completed project. The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

- C.** The materials shall not be stored on the project site for more than ninety (90) days. All plastic material, all valves and all gasket material shall be protected from exposure to sunlight and adverse weather conditions.

4.14 Handling of Materials

A. Receiving Materials

All materials furnished by the Contractor, or to the Contractor, shall be received by the Contractor.

B. Unloading at the Project Site

All pipe, valves, fittings, hydrants and accessories shall be unloaded near the

installation location, and it shall be accomplished by lifting, so as to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe shall not be skidded or rolled against pipe already unloaded. Any pipe or fittings that are not acceptable to the City of Fountain shall be removed from the job site immediately. All pipe handling equipment and pipe handling methods shall be approved by the City of Fountain in conjunction with the methods and equipment recommended by the manufacturer.

C Care of Coatings and Linings

All materials shall be handled such that the coating and lining will not be damaged. If however, any part of the coating or lining is damaged, the replacement or repair of the damaged material shall be done to the satisfaction of the Superintendent. The Superintendent shall approve all material handling equipment and material handling methods.

CHAPTER 5

WATER SYSTEM INSTALLATION

5.1 **Construction Procedure**

When the Construction Drawings are approved and the required preconstruction conference with all affected parties and the City of Fountain's Water Department has occurred, the Owner may proceed with construction. In addition to all construction requirements contained in other portions of these Specifications, the Owner and his/her Contractor shall observe the following:

- A.** Construction shall commence within one (1) year of the approval date shown on the plans or the plans must be resubmitted for review and approval. If construction on the main installation is halted for more than one (1) year, plans must be resubmitted for review and approval.
- B.** The Owner shall secure and pay for all licenses and permits required for the water main extension. Any permanent licenses required to construct, operate, maintain or replace water main extension shall be obtained with the permission of, and for the benefit of, the City of Fountain.
- C.** All materials needed to complete the work shall be on hand so that the project may proceed without delay. All materials shall be new and of reasonably current and recent manufacture.
- D.** Any material to be incorporated into the water main system shall not be stored on the site for more than ninety (90) days.
- E.** All material shall be adequately and completely protected from exposure to direct sunlight and adverse weather conditions.
- F.** All material to be incorporated into the water main system shall be inspected by the City of Fountain's Water Department and found acceptable prior to commencement of installation. Such determination of acceptability shall not affect the Owner's and/or Contractor's responsibility to provide a water main system suitable for the intended use in full compliance with these Specifications.
- G.** Water mains shall not be installed unless they can be extended to an approved permanent water source, which can supply sufficient water for chlorinating and flushing.
- H.** Mains shall be chlorinated in accordance with Section 5.24 of these Specifications.

- I. The Contractor shall be responsible for making all taps for water main extensions for both public and private water mains. Water mains shall only be tapped for service lines after the water main is installed, chlorinated, tested and flushed to the satisfaction of the Inspector.

5.2 **Surveying**

A Professional Land Surveyor, licensed to practice in the State of Colorado, shall establish line and grade for all water mains. Correct alignment and grade of the water mains shall be the responsibility of the Owner. Approval of the staked alignment and elevations by the Inspector does not relieve the Owner in any manner from the responsibility for field errors. Sufficient line shall be staked to ensure continual work progress. Under no circumstances shall pipe be installed without line and grade stakes set by the Professional Land Surveyor and approved by the Inspector.

A. **Placing Survey Lines**

Hubs and stakes shall be set on an offset line to mark the location of the centerline of the water main. Centerline hubs and stakes may be used in addition to the offset hubs and stakes; however, they may not be used in place of the offset hubs and stakes. Normal practice is to set offset hubs and stakes five (5') feet to ten (10') feet off the centerline of the water main.

Survey points shall be set a maximum distance of fifty (50') feet apart. All valves, crosses, tees, horizontal and vertical bends and hydrants shall be staked for location and grade. Points of curvature and points of tangency of curves, as well as points on the curve, shall be staked. All stakes shall be flagged to increase their visibility.

B. **Notice of Field Staking and Construction by the Owner**

It shall be the Owner's responsibility to notify the City of Fountain a minimum of five (5) working days prior to his/her intent to begin construction, including staking for line and grade for water mains. It shall also be the Owner's responsibility to see that the area of construction is free of debris, material, equipment or any other obstacles, which may obstruct the placement of stakes or access to reference points.

C. **Inspection and Preparation of Pipe and Fittings**

Before placing pipe in the trench, each pipe or fitting shall be thoroughly cleaned of all foreign material, kept clean at all times thereafter, and be carefully examined for cracks and other defects before installation. Bell ends and spigot ends are to be examined with particular care. Defective pipe or fittings shall be laid aside for inspection by the Inspector who will prescribe corrective repairs.

All lumps, blisters and excess coating shall be removed from the bell-and-spigot end of each pipe and fitting, and the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean, dry and free from oil and grease before the

pipe or fitting is installed. Dirt and any other material must be removed from the barrel of the pipe before installation.

5.3 Cutting of Pipe

Pipe shall be cut, whenever necessary, to conform to the location of fittings, line or grade. All cuts shall be straight and true, and in an approved manner so as to leave a smooth end without damaging the pipe, its lining or coating. All burs shall be removed from the ends of cut pipe, and the end lightly rasped or filed. All tools used in cutting pipe shall be approved by the Superintendent (see Standard Drawing No. 17).

5.4 Pipe Joint Lubrication

Joint lubricant shall be supplied by the pipe manufacturer, and approved by the Superintendent. Joint lubricant shall be non-toxic, and water soluble.

5.5 Pipe Alignment and Grade

A. In laying pipe, the intent is to position it to the approved design line and grade within a tolerance of three (3") inches plus or minus. On slopes of zero (0) grade, the intent is to lay the pipe to grade. Fittings, valves and hydrants shall be installed at staked locations and elevations; spigots centered in bells; and, all valve and hydrant stems plumb.

B. Street right-of-way and/or property line and lot corner points must be set and visible before water installations can precede. All water pipe line installation offset stakes for alignment and grade shall be set by the Owner's Professional Land Surveyor. Any replacement of stakes shall be at the expense of the Owner.

C. When laying pipe on curves, the intent is to lay to the staked alignment. The pipe shall be kept in alignment by placing bends on the curve (see Standard Drawing No. 16). Bends shall be used whenever individual deflections exceed those specified by the Superintendent.

D. All pipe diameters require a four (4') foot minimum with a five (5') foot maximum cover. The depth of fill over the pipe is measured from the proposed finish grade over the pipeline to the top of the pipe.

E. Any changes in alignment and grade must be authorized by the Inspector and shall be accomplished by the installation of additional fittings.

F. Where pipe is to be installed, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe upgrade.

5.6 Deviation from Alignment and Grade Occasioned by Other Structures

Whenever obstructions not shown on the plans, interfere to such an extent that alteration in the plans is required, the Superintendent shall have the authority to determine the best method of correction. The Superintendent may order a deviation

from the line and grade of the structures and/or removal, relocation and reconstruction of the obstructions.

5.7 Temporary Plugs

Whenever the pipe is left unattended, temporary plugs shall be installed at all openings. Temporary plugs shall be of such design as to prevent water, debris, people and/or animals from entering the pipe. All temporary plugs shall be approved by the Inspector. All temporary plugs shall be removed by the Contractor after use.

5.8 Frost

No pipe or appurtenant structure shall be installed upon frozen ground or at any time when the Inspector deems there is danger of ice formation or frost penetration at the bottom of the excavation. No pipe or appurtenant structure shall be installed unless backfilling can be completed before the formation of ice and frost.

5.9 Excavation, Bedding and Backfill

See Chapter 6 of these Specifications for Earthworks, Bedding and Backfill.

5.10 Lowering of Material into the Trench

Proper implements, tools and facilities satisfactory to the Inspector shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe fittings, valves and hydrants shall be carefully lowered into the trench, piece by piece, by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and their protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.

If damage occurs to any pipe, fitting, valve, hydrant or water main accessories in handling, the damage shall be immediately brought to the attention of the Inspector. The Inspector shall prescribe corrective repairs or rejection of the damaged items.

5.11 Laying of Pipe

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Inspector may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced home with a slow steady pressure without jerky or jolting movements and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tampered under it except at the bells. Precautions shall be taken to prevent dirt from entering the joint space. No wooden blocking shall

be left at any point under the piping.

No pipe shall be laid when, in the opinion of the Inspector, trench conditions are unsuitable.

5.12 Ductile Iron Pipe

There is only one nominal dimension of the spigot outside diameter and the bell inside diameter for each size of push-on joint pipe. In some existing older pipelines, caulked-joint bell and spigot pipe was installed. Similar dimensions of the caulked-joint pipe may vary with the class of pipe for each size. Therefore, when connecting to these existing caulked-joint lines, care should be exercised to ensure that the outside diameter of the existing line is the same as the outside diameter of the push-on joint or mechanical joint pipe being installed, otherwise a special adapter to join the two (2) lines may be necessary.

A. Push-On Joint

Immediately before joining two (2) lengths of ductile iron pipe, the inside of the bell, and the outside of the spigot end, and the rubber gasket shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter. The rubber shall be flexed inward and inserted in the gasket recess of the bell socket. Since different manufactured brands of pipe require different types of gaskets, the Contractor shall exercise caution to ensure that the correct type of gasket is used. A thin film of approved gasket lubricant shall be applied to either the inside face of the gasket, or the spigot end of the pipe or both.

The spigot end of the pipe shall be placed in the bell end with care to prevent the joint from contacting the ground. Pipe furnished without a depth mark on the spigot end shall be marked before assembly to assure insertion to full depth of the joint. The pipe shall be kept in straight alignment and the joint shall be completed by pushing the pipe home with a slow, steady pressure without jerky or jolty movements by using a forked tool or jack-type tool or other device approved by the Superintendent. If pipe is pushed home with a backhoe bucket, a wooden shield must be placed between the backhoe bucket and the end of the pipe. The spigot end of field cut pipe lengths shall be filed, or ground to resemble the spigot end of such pipe as manufactured.

Upon completion of joining push-on joint pipe, an inspection shall be made to assure that the gasket is correctly aligned in the gasket recess of the bell socket, and it has not been twisted or turned.

B. Mechanical Joint Pipe

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

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

<u>Size</u>	<u>Ft. Lbs.</u>
5/8 Inch	45-60
3/4 Inch	75-90
1 Inch	85-100
1 ¼ Inch	105-120

C. Polyvinyl Chloride Pipe (PVC)

1. Elastomeric Gasket Joint

Immediately before joining two (2) lengths of PVC pipe, the inside of the bell or coupling, the outside of the spigot and the elastomeric gasket shall be thoroughly cleaned to remove all foreign material.

2. Lubrication of the joint and rubber gasket shall be done in accordance with the pipe manufacturer's specifications.
3. Care shall be taken that only the correct elastomeric gasket, compatible with the annular groove of the bell, is used. Insertion of the elastomeric gasket in the annular groove of the bell or coupling must be in accordance with the manufacturer's recommendations. Pipe that is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.
4. The spigot and bell or coupling shall be aligned and pushed until the reference line on the spigot is flush with the end of the bell or coupling. Pushing shall be done in a smooth, steady motion. Upon completion of joining pipe, an inspection shall be made to assure that the gasket is correctly aligned in the gasket recess of the bell socket and has not been twisted or turned.

D. Tracer Wire

No. 6 Coated Copper Wire will be attached to all PVC pipe for the purpose of future location (see Standard Drawing No. 12).

E. Pipe Storage

Pipe stored outside shall be protected from adverse weather conditions with an opaque material such as canvas. Clear plastic sheets shall not be used to cover pipe. Air circulation shall be provided under the covering.

F. Handling of Pipe in Cold Weather

PVC pipe has reduced flexibility and impact resistance as temperatures approach and drop below freezing. Extra care should be used in handling and installing PVC pipe during cold weather per the Manufacture's Specifications.

5.13 Installation of Valves

Valves shall be handled in such a manner as to prevent any injury or damage. All joints shall be thoroughly cleaned before installation. Valves shall be located at the points on the main as indicated on the approved Construction Drawings unless specified otherwise by the Superintendent.

Valves shall be operated prior to installation to ensure good operating condition. Valves shall be set and joined to the pipe in the manner previously specified for cleaning, laying and joining push-on and mechanical joint pipe. Valves shall be set in such a manner that the valve stems are plumb.

Where necessary, the Inspector shall require the installation of additional valves and reversed anchors not shown on the plans.

5.14 Valve Boxes

A. Installation

A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve, and shall be centered and plumb over the operating nut of the valve, with the box cover set to the required elevation. It will be the responsibility of the Owner to insure that valve boxes are plumb and at the proper elevation.

B. Deep Valves

In valve boxes where the operating nut will be greater than 6' below final grade, a valve extension stem is required to bring the valve operating level to a depth specified by the Water Department.

C. Installation of Fittings

All fittings in the City's Water Distribution System shall be mechanical joint(s), in compliance with the material specifications. Fittings shall be secured with mechanical joint restraints and concrete thrust reaction blocks.

5.15 Fire Hydrants

Fire Hydrants shall be set so that the elevation of the center of the traffic flange is four (4") inches above the finish grade of the ground or top of the curb and/or sidewalk (see Standard Drawings No. 4 and 5).

A. Installation

All hydrants shall be staked for location and grade. Final location and grade shall be in accordance with the approved drawings. Offset stakes not further than twelve (12') feet from the fire hydrant are acceptable. All hydrants shall stand plumb and be installed as indicated on Standard Drawing No. 5.

Each hydrant shall be connected to the main by a six (6") inch branch line. An independent six (6") inch gate valve shall be installed on each fire hydrant branch. An anchor tee shall be used with the valve attached directly to the tee.

No water service line connections shall be installed between the fire hydrant and the fire hydrant control valve.

B. Anchorage

The bowl of each hydrant shall be well braced against the unexcavated earth at the end of the trench with a concrete thrust block. The bottom of hydrant bowl and the hydrant valve shall be supported with eighteen by eighteen by four (18x18x4) inch pre-cast concrete blocking slabs. The hydrant shall be tied to the hydrant valve and the hydrant valve tied to the tee with anchor pipe or with two (2) three-quarter (3/4") inch all-thread galvanized rods as shown on Standard Drawing No. 5.

Whenever a fire hydrant is installed at the termination point of a water main extension (such as in a cul-de-sac), tie rods and concrete reverse anchors will be required for both the fire hydrant valve (which in this case is also a line valve on the main) and the fire hydrant lateral or branch line connected to the fire hydrant (see Standard Drawing No. 5). Additional concrete anchors may be required at the direction of the Inspector.

If bends are needed to bring a hydrant to a desired horizontal or vertical position, special concrete reverse anchors, and/or anchor pipe or all thread tie back rods, or a combination of all these along with a riser may be required. In any case, a riser no longer than two (2') feet will be acceptable and it will be the Contractor's responsibility to set the safety flange at the proper grade.

C. Drainage

Whenever a hydrant is set, drainage shall be provided at the base of the hydrant by placing rocks from the bottom of the trench, to at least twelve (12") inches above the barrel flange of the hydrant, and to a distance of twelve (12") inches around the elbow. The minimum distance from the bottom of the trench to the bottom of the hydrant elbow shall be six (6") inches. The minimum amount of rocks placed shall be one-third (1/3) cubic yard. The rocks shall be a well-graded gravel, cobble, or crushed rock, free of dirt, and covered with plastic sheeting.

D. Hydrant Protection in Corrosive Soils

All ductile iron branch lines and hydrants shall be protected from corrosion. At a minimum, all pipe, rods and fittings, from finished ground level on the hydrant barrel up to and including the tee, shall be encased in polyethylene wrap.

5.16 Dead Ends

Blow-offs will only be allowed at the direction of the Superintendent.

A. Temporary

1. Temporary dead ends for new water mains shall be closed with a plug or a cap; such dead ends shall be equipped with suitable concrete anchors. A valve will also be required at the phase line and the water main between the valve and the plug or cap will not be charged.
2. Fire hydrants are acceptable as temporary dead ends.

B. Permanent

Permanent dead ends for new water mains shall end with a fire hydrant.

5.17 Thrust Blocks and Anchors

A. Installation

Thrust blocks and/or anchors shall be constructed at all bends, tees, plugs and fittings which require reaction support due to unbalanced line thrust. Care shall be taken not to block outlets or to cover bolts, nuts, clamps or other fittings or to make them inaccessible. The Standard Drawings No. 13 and 14 show size and shape of thrust blocks and anchors. Bearing surface areas are minimum areas to bear against the undisturbed trench wall. If in the opinion of the Superintendent, the soil bearing capacity is not sufficient to provide adequate restraint based on minimum bearing areas shown on the Standard Drawings, then the minimum bearing area shall be increased to a size that will ensure adequate restraint. In every instance, the thrust block or anchor shall bear against undisturbed earth. When it is impossible, through over excavation or other cause, to pour a thrust block or anchor against undisturbed earth, harness rods shall be required to anchor the fittings to the water main.

Thrust blocks will be required on 4" and larger taps, regardless of whether a tapping sleeve or tapping saddle is used, and will be treated the same as a tee. Refer to Standard Drawing No. 14 for tap and main size combinations requiring thrust block installation.

Tie back rods and lugs shall be used at all bends and fittings where thrust blocks cannot be used due to existing field conditions or where tie back rods and lugs are specifically required by these Specifications, installation plans, or the Inspector.

B. Form Work for Thrust Blocks and Anchors

All forming for concrete thrust blocks and anchors will be done by bulk-heading around the shape of the thrust block or anchor with burlap or reinforced paper sacks filled with sand or earth. Sacks shall be of a size easily handled when full, and shall be left in place in the trench. Wood forms may be used in some cases; however, all wood will be removed before backfilling.

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

C. Concrete and Curing Time

Thrust blocks shall be a concrete of a mix having a compressive strength of not less than four-thousand (4,000) PSI after twenty-eight (28) days.

D. Compaction of Fill over Thrust Blocks and Anchors

Backfill may be placed over thrust blocks and anchors once the surface has set sufficiently to resist the weight of the backfill. However, no tamping or compacting shall be allowed above the thrust block or anchor for a minimum of thirty-six (36) hours after placement or as directed by the Inspector.

5.18 Vaults

Vaults may be precast or poured-in-place and shall be constructed in accordance with these Specifications. Precast vaults shall be so designed that all joints and corners are waterproof. Precast and poured-in-place vaults shall be waterproof after construction by use of sealants, epoxies or other approved methods. All dimensions, locations and elevations shall be coordinated by the Owner and/or Contractor and meet the requirements of the Superintendent (see Standard Drawing No. 34 and 35 for details).

All vaults shall be constructed to meet H.S. 20-44 traffic loading conditions and three-hundred (300) PSF surcharge load or as directed by the Superintendent.

5.19 Bridging and Encasement of Pipe

Under certain conditions when the water main is to be installed over and under an existing or proposed utility or structure, the Superintendent may require bridging or encasement of the pipe. If, in the opinion of the Superintendent, there exists the possibility of settlement of the pipe being installed over an existing utility or structure, then bridging of the pipe shall become necessary. This condition shall also apply to other underground utilities or structures being installed over existing water mains. The Superintendent shall determine the size and location of the concrete bridging (see Standard Drawing No. 21).

5.20 Encasement or Sleeve Pipe

Wherever it is necessary to provide an encasement or sleeve for the water main, the water main shall not be inserted into the encasement or sleeve pipe without providing

insulating skids for each joint of the water main. Insulating skids shall be of a type such as "PSI Model C 12, G 2 Steel Casing Insulators" or equivalent. In addition, no encasement or sleeve pipe shall be installed without protecting the ends of the pipe with adequate manufactured end seals which will deter dirt and debris from entering, but at the same time will allow water to escape from the encasement or sleeve pipe. Encasement pipes shall be protected both inside and out with corrosion resistant materials having a bituminous base. Encasement or sleeve pipe, size, length, type and sidewall thickness will be determined by the Superintendent.

5.21 Connections to the City of Fountain's Water System

A. Connections

Connections to the City of Fountain's system shall be in a neat and approved manner. An Inspector shall be present at all times during the construction of the connection. The connection is subject to approval by the Superintendent. Under no circumstances shall a non-disinfected main, which cannot be isolated, be connected to an existing water main in service.

B. Tapping Existing Water Mains

The Contractor shall be responsible for coordination regarding taps for all water main extensions. The Contractor shall notify the Superintendent a minimum of forty-eight (48) hours prior to tapping. Once the tap is complete, the Contractor shall be responsible for protection of the tapping sleeve or saddle and the tapping valve against freezing or other damage. The Contractor shall also be responsible for all backfill, compaction, paving, curb and gutter, etc. No tapping of dry mains shall be allowed.

C. Operation of Valves

In connecting to the City of Fountain's water main system, it may be necessary to operate existing valves. Valves on the City of Fountain's water main system that must be operated to make a connection shall be operated by the City of Fountain's Water Department personnel only. The Contractor shall give the Inspector forty-eight (48) hour notice to make arrangements for operating valves. It is imperative that both the Contractor and the Inspector shall be present when the valves are operated.

D. Interruption of Service

Outages shall be kept to a minimum. Installation of a connection that will require closing existing valves may cause an interruption of water service to existing City of Fountain customers. Contractor shall notify customers forty-eight (48) hours in advance.

The local fire department for the affected area shall also be notified forty-eight (48) hours in advance. A description of the boundary of the affected area and the location of all fire hydrants in that area shall be provided to the City's Fire

Department.

The Inspector will arrange for all notifications to both residential customers and the Fire Department; however, the Contractor will be responsible for furnishing the Inspector with all the necessary information as to the date and time the interruption will begin and the total time required on completing installation.

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

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

5.22 Corrosion Protection Systems

This work consists of providing all materials and labor for the installation of cathodic protection in accordance with these Specifications and in conformity with the requirements shown on the plans.

Sacrificial Anode

Prepackaged high potential magnesium anodes shall conform to the requirements below:

HIGH POTENTIAL - CHEMICAL COMPOSITION

Magnesium Alloy:

Aluminum	0.010% maximum
Manganese	0.5-1.30%
Zinc	0.05% maximum

Impurities:

Silicon	0.02% maximum
Copper	0.02% maximum
Nickel	0.001% maximum
Iron	0.03% maximum total
Other	0.30% maximum each

Magnesium:

Balance

Anodes will be packaged in closely woven, permeable, cloth with at least one (1”) inch of well compacted backfill. The bag end will be securely tied to prevent shifting of the anode and backfill material within the package.

The backfill material within the package will be of the following composition:

Ground Hydrated Gypsum	75%
Powdered Bentonite	20%
Sodium Sulfate	5%

The backfill particle size will be fifteen (15%) percent maximum retention by weight on a U.S. Standard No. 20 sieve and seventy-five (75%) percent maximum retention on a U.S. Standard No. 100 sieve.

The core will be of a size and shape that will ensure an electrical and physical bond to the anode. Standard lead wire is ten (10’) feet of No. 12 AWG solid copper wire with Type TW insulation silver soldered to the core primed and sealed with an insulating asphalt potting compound at the factory.

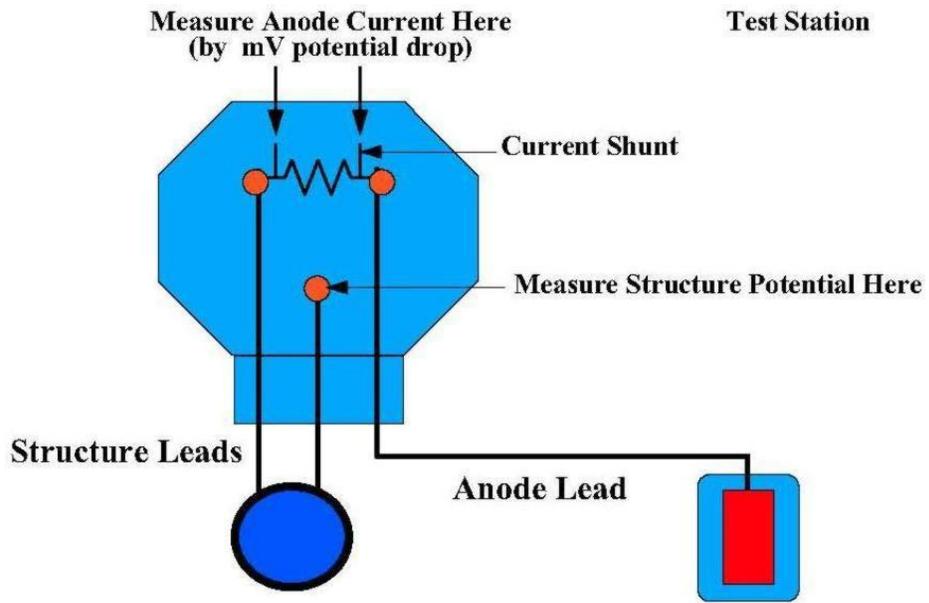
The weight of the bare anode prior to packaging anodes shall be as indicated below:

SACRIFICIAL ANODE SIZE

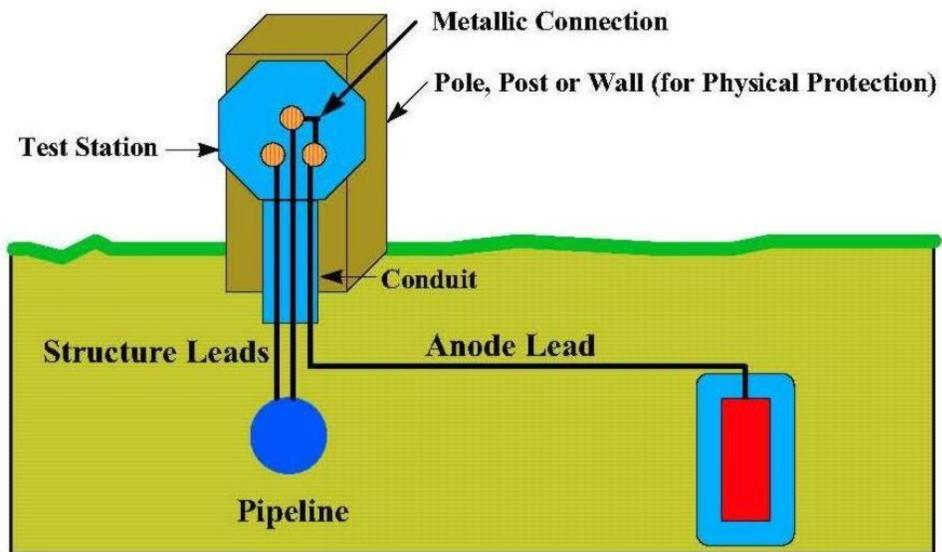
<u>Valve Size</u>	<u>Bare Anode Weight</u>
4 inches	5 pounds
6 inches	9 pounds
8 inches	9 pounds
10 inches	17 pounds
12 inches	17 pounds

Test Station

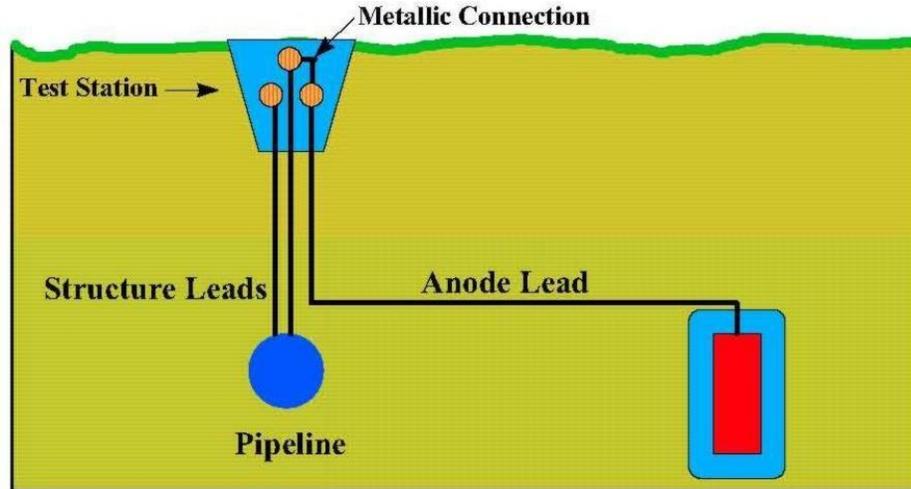
The locations of test stations shall be coordinated with the City of Fountain’s Water Department. Test stations shall either be above the ground surface in connection boxes or in below ground test stations mounted flush on grade as directed by the City of Fountain’s Water Department. Lead wires shall be of No. 12 AWG solid copper wire with Type TW insulation. Conceptual test station schematics are presented below. Submittals for test stations shall be approved by the City of Fountain’s Water Department prior to installation.



Test Station Schematic.



Above Ground Test Station Schematic.



Below Ground Test Station Schematic.

5.23 Anode Installation

It shall be the Contractor's responsibility to contact the City of Fountain's Water Department forty-eight (48) hours prior to installation of anodes and test stations. Anodes shall either be installed at the same relative elevation or below the protected valve. No portion of the anode shall be installed any closer than five (5') feet from the protected valve. Lead wires from the test station shall be welded to the protected valve using thermite welding. Exposed lead wires and welds shall be completely covered using a cold applied corrosion protection coating (such as Roskote A-51 Plus) or approved alternate.

A. Insulating Joints

Whenever it is necessary to join pipe of dissimilar metal or when designated by the City of Fountain's Water Department, a method of insulating against the passage of electrical current shall be provided. Special care shall be exercised during the installation of these joints to prevent electrical conductivity across the joints (see Standard Drawing No.'s 9, 10 and 11).

B. Polyethylene Encasement Material

Metallic pipe and all appurtenances, except valve boxes, shall be wrapped in polyethylene. The polyethylene encasement shall prevent contact between the pipe and bedding material, but is not intended to be a completely air-tight and water-tight enclosure.

Prolonged exposure to sunlight will eventually deteriorate polyethylene film. Exposure to sunlight shall be kept at a minimum.

A two (2") inch wide, ten (10) mil thickness polyethylene pressure-sensitive tape

shall be used to close seams, secure to pipe or hold overlaps.

Polyethylene pipe wrap material shall be applied to line pipe in the manner shown on the Standard Drawing No. 9. Damage to polyethylene wrapped pipe in the trench prior to and during backfill shall be repaired to the satisfaction of the City of Fountain's Water Department.

Before the Contractor taps a water main, the trench, pipe and polyethylene wrapping shall be in a state of readiness. The Contractor digging the trench shall repair or replace any damaged polyethylene prior to tapping.

C. Insulating from Concrete

Areas of metal pipe and appurtenances which are to be in contact with thrust blocks, bridging blocks, anchors or encasement shall be protected against corrosion prior to installing concrete. The following types of protection systems are acceptable:

1. Application of cold-applied mastic coating with high electrical resistivity, similar to Roskote Mastic A-51, manufactured by Royston Laboratories.
2. Application of a cold-applied primer and corrosion resistant pipe wrap, similar to the primer and pipe tape manufactured by the Protecto Wrap Company.
3. Other proposed protection systems may be accepted following review and approval of the City of Fountain's Water Department.

5.24 Disinfection

A. The following procedure shall apply to all water main extensions within the City of Fountain's Water Service Area. Pipe extensions shall be chlorinated in accordance with AWWA C651, "Disinfecting Water Mains." The Contractor shall provide material for disinfection of all water mains.

B. Calcium Hypochlorite Granule with a minimum of sixty-five (65%) percent available Chlorine shall be used for disinfection.

<u>Pipe Size</u>	Ounces of Granules Required Per 20-Ft.
	<u>Length of Pipe</u>
4"	0.13-oz.
6"	0.30-oz.
8"	0.54-oz.
12"	1.21-oz.

- C. After the Calcium Hypochlorite has been placed in the pipeline by the Contractor, disinfection must be completed within ten (10) calendar days.
- D. After the pipe is filled with water and Chlorine, and unless approved otherwise by the City of Fountain, the chlorinated water shall be held in contact with the pipe for twenty-four (24) hours.
- E. The pipeline shall then be thoroughly flushed to remove the heavily chlorinated water. All wasted water must be captured and disposed of, or otherwise discharged through a de-chlorination device supplied by the Contractor. Care shall be taken in flushing the pipeline to prevent property damage and danger to the public.
- F. Samples of water will be collected by the contractor for bacteriological examination before the pipe is put into service. Testing of residual Chlorine shall be performed by the City of Fountain. Sampling and submittal for bacteriological examination to a certified Lab will be done by the Contractor.
- G. No main which has been disinfected and flushed shall stand stagnant for more than fifteen (15) days without being re-flushed.

5.25 Pressure Testing

No water main or Fire Sprinkler Line will be charged or pressurized without the approval of the Inspector.

All mains, Fire Sprinkler Lines and appurtenances shall be subject to pressure testing performed by the Contractor. No Pressure Test shall occur until a pipe has passed a bacteriological examination. All mains shall be subjected to a test pressure of one-point-five (1.5) times the static pressure at the lowest point in the portion of the system being constructed, or 200 PSI, whichever is greater. The test pressure shall be placed on the pipeline and the line isolated from other water sources. A 15-minute settlement period shall be allowed at the start of the test for the pressure to stabilize. If the pressure does not After a two (2) hour period, the pressure shall have dropped no more than 5 PSI from the stabilized pressure achieved during the 15-minute settlement period, else the pipe has failed.

5.26 Acceptance and Release for Taps

A new main shall be accepted by the City of Fountain's Water Department and released for taps when the following conditions have been met:

- A. The main and all appurtenances have been installed to the satisfaction of the Inspector and all pertinent notes and measurements have been made;
- B. Disinfection has been completed and the main has been flushed and charged;
- C. Pressure testing has been completed satisfactorily; and,
- D. All tapping methods have been approved by the City of Fountain.

5.27 Acceptance of Mains and Water Service Lines Including Curb Stops

A. Preliminary Acceptance

1. Preliminary Acceptance of water mains and water service lines to include curb stops will be granted by the City following the Owner's completion of all curbs, gutters, grading and paving, plus all curb stops and street valve boxes being set to proper grade. The Owner or their Representative shall provide a Letter of Certification that the installation of water mains and water services has been accomplished in accordance with the plans, and accepted by the City of Fountain subject to the Bill of Sale.
2. The Owner and the City will inspect the part of the system requested for Preliminary Acceptance and generate a Punch List of items to be repaired, replaced or changed.
3. The Owner shall be responsible for repairing any deficiencies in the work within a period of six (6) months after Preliminary Acceptance. This shall include but not be limited to the removal and replacement of surfacing materials (pavement, curb and gutter, sidewalk) which are damaged due to soil settlement.

B. Final Acceptance

1. Approximately one (1) year following the Preliminary Acceptance, the City of Fountain's Water Department will re-inspect the curb stop and street valve boxes for centering, plumb and grade. The Contractor and Owner will be notified of any defects in materials and construction and these defects must be promptly corrected in accordance with these Specifications. Corrections must be made immediately. If no defects are found, or corrections are made as required by the Inspector, a Letter of Acceptance can be granted in phases of development after all the conditions of current specifications have been met.

2. Final Acceptance requires that the Record Drawings and other documents have been submitted and accepted showing as-constructed conditions.

C. Repair and Maintenance prior to Final Acceptance

Repair and maintenance of mains and services prior to Final Acceptance by the City of Fountain will be the sole responsibility of the Owner and/or Contractor. Repair and maintenance will be accomplished to the current City of Fountain's Specifications Manual.

5.28 Inspection

- A.** New installation or replacement of any existing facilities in the Water Main System shall be inspected and approved by the City of Fountain's Water Department Inspector.
- B.** The Inspector shall ensure that the provisions of these Specifications are carefully complied with, especially with regard to the quality of workmanship and materials. The Contractor, to the satisfaction of the Inspector, shall resolve problems which may require sound field judgment in lieu of strict interpretation of the Specifications.
- C.** The City of Fountain's Water Department Inspector shall be allowed to enter any site at any time for inspection of materials or the construction of all Public/Private water main installations.
- D.** All work shall be performed in accordance with accepted practices and these Specifications. Any work not accepted by the Inspector shall be redone until compliance with these Specifications is achieved at the Owner's expense.
- E.** All appropriate permits and a copy of the approved water plans shall be kept on the job site and shall be checked by the Inspector before starting construction.
- F.** The Inspector shall not supervise nor set out work or give line and grade stakes. The Contractor shall be at the project site at all times while construction is in progress. The Inspector shall discuss the work with the Contractor or his/her Representatives only. Any directions given to the workmen will be given to them by the Contractor. If at any time during construction it is found that the Contractor is not at the project site, then such a situation shall be grounds for the Inspector to stop work until the Contractor is present at the project.
- G.** Prior to paving, a final inspection is required and can be arranged by contacting the Inspector. Inspections should be requested forty-eight (48) hours in advance of paving. A copy of the paving letter must be available at the inspection site for proper validation. Paving of any street requires that all existing valve boxes be located and prepared for final adjusting in order to complete the finished street surface as shown on Standard Drawing No. 8.

- H.** All materials used shall be subject to the inspection and approval of the Inspector at all times. The Inspector has the right to perform any testing deemed necessary to insure compliance of the material with these Specifications. No material shall be used before being inspected and approved by the Inspector. Failure or neglect on the part of the Inspector to condemn or reject inferior materials, or work, shall not be construed to imply their acceptance should their inferiority become evident at any time prior to Final Acceptance. Materials rejected by the Inspector shall be immediately removed from the job site.
- I.** After receipt of approved plans from the City of Fountain, the Contractor shall give at least forty-eight (48) hour notice to the Superintendent prior to starting construction. No construction shall commence sooner than forty-eight (48) hours after receipt of approved plans.
- J.** The City of Fountain allowable working hours are from 7:00 A.M. to 7:00 P.M., Monday through Friday; 8:00 A.M. to 5:00 P.M. Saturday; and, 9:00 A.M. to 4:00 P.M. Sunday. Inspections or other direct involvement by City of Fountain personnel outside of these normal working hours shall be scheduled with the City of Fountain's Water Department during normal working hours. It is requested that at least forty-eight (48) hour notice be given should any direct involvement by City of Fountain personnel be required outside of normal working hours. There may be a charge by the City of Fountain to the Contractor for direct involvement by City of Fountain personnel outside of normal working hours.

CHAPTER 6

EARTHWORKS AND EXCAVATION

6.1 General Provision

- A. Unless otherwise indicated on the drawings, all excavations shall be made by open cut. Provisions for installation of water pipelines and appurtenances, other than by open cut conditions, shall be specifically detailed in the drawings and contract documents for the project. Earthworks shall include all clearing, grubbing, grading, excavation, fill, backfill, compaction, excess excavation, bedding material, borrow material, testing of materials and surface restoration as may be required to complete the work.
- B. Pipeline installation shall follow trench excavation within fifty (50) lineal feet. Trench backfill shall follow pipe installation within fifty (50) lineal feet. Approved cleanup shall follow trench excavation within no less than two-hundred (200) lineal feet. The area disturbed by construction activities shall be confined within the construction limits as shown on the plans.

6.2 Site Conditions

A. Sheeting, Shoring, and Bracing

Except where trench banks are cut back on a stable slope, provide and maintain all sheeting necessary to protect adjoining grades and structures from caving, sliding, erosion or other damage. Comply with the most recent standards adopted by the Occupational Safety & Health Administration (OSHA). Do not remove any sheeting unless the pipe strength is sufficient to support the trench loads based on trench width measured to the back of sheeting. Remove sheeting and shoring as excavations are backfilled in a manner to protect the water pipelines, appurtenances, other structures, utilities and/or property. Do not remove any sheeting after backfilling.

B. Blasting

Blasting will be allowed in order to expedite the project if a permit by the local authority having jurisdiction is granted, and a copy of said permit is presented to the City of Fountain's Water Department. All explosives and appurtenances shall be transported, handled, stored and used in accordance with the laws of the local, state and federal governments, as applicable.

All blasting shall be controlled, so as not to damage any existing structure or facility. The protection of life and property and all liability for blasting shall be placed solely on the person(s) conducting the blasting operation. The hours of blasting shall be determined by the Inspector in accordance with the permit of the local authority.

Customers or occupants of nearby structures or facilities must be notified in writing by the Contractor at least seventy-two (72) hours prior to blasting. The notice shall state the date, the time of blasting and who is responsible for the blasting. The City of Fountain’s Water Department shall be notified a minimum of forty-eight (48) hours in advance of any blasting.

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

6.3 Products

A. Embedment Materials

All water mains and service lines are to receive one of the following embedment materials extending from the bottom of the excavation to twelve (12”) inches over the pipeline.

1. **Granular Material**

Well-graded crushed stone or gravel that meets the requirements of ASTM C33, Gradation 67 (3/4" to No.4).

Well-Graded Sand

<u>Sieve Size</u>	<u>Total Percent Passing by Weight</u>
3/8 inch	100
<u>Sieve Size</u>	<u>Total Percent Passing by Weight</u>
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	10 - 30
No. 100	2 - 10

2. Squeegee Sand/Gravel

<u>Sieve Size</u>	<u>Total Percent Passing by Weight</u>
3/8 inch	100
No. 200	0-5

B. Backfill Materials

1. Suitable Material

Soil obtained from the excavation that is free of frozen material, stumps, roots, brush, other organic matter, debris and other items.

2. Upper Portion of Trench

Material placed within two (2') feet of pavement subgrade or finished surface in unimproved areas shall be soil free from rocks, greater than six (6") inches in nominal diameter.

3. Other Portions of Trench

Material within six (6") inches below and twelve (12") inches above the pipe shall contain particles of a size to conform to the embedment class required but in no case shall it contain rocks greater than one and one-half (1-1/2") inches in any dimension. From a point twelve (12") inches above the pipeline to within two (2') feet of the pavement subgrade or finished surface in unimproved areas, the maximum size of any rock in the trench backfill shall be six (6") inches nominal diameter.

4. Public Highways

Provide and install material in conformance with the Colorado Department of Transportation requirements where they do not conflict with other provisions of these regulations. Should a conflict exist, submit a request for clarification to the Superintendent in writing prior to proceeding with work.

6.4 Preparation of Trenching

A. Pavement Removal

Compliance with City of Fountain, El Paso County or the Colorado Department of Transportation Standards for the removal and replacement of pavement is required.

B. Clearing

Remove all stumps, roots, brush, other vegetation and debris from areas that will be disturbed by the construction operations.

C. Sod Removal

In lawn areas, cut and roll back sod before trenching. Store sod for reinstallation after completion of backfilling operations.

D. Top Soiling

Strip existing topsoil from areas to be disturbed by construction operations. Stockpile in areas designated by the Contractor/Engineer. Keep topsoil segregated from non-organic trench excavation materials and debris.

E. Drainage and Protection

Maintain the excavations and site free from water throughout the work. Remove any water encountered in the trench to the extent necessary to provide a firm subgrade, to permit joints to be made dry at the final grade and to prevent entrance of water into the pipeline. Accomplish the foregoing by the use of sumps and gravel blankets, well points, drain lines and/or other means approved by the City of Fountain.

1. All work must be done in a dry trench and no water will be permitted to enter the pipe previously laid. The discharge from pumping shall be laid to an approved natural drainage channel or other location to prevent damage to public or private property.
2. Discharge from dewatering shall be subject to the regulations and permit requirements of the Colorado Department of Public Health and Environment. The Contractor shall be solely responsible for full compliance with those requirements.
3. The dewatering operation shall continue until such time as it is safe to allow the water table to rise in the excavations. Pipe trenches shall contain enough backfill to prevent pipe flotation. When pipe is installed in a casing or tunnel longer than thirty (30) pipe diameters, the pipe inside the casing or tunnel shall be secured so flotation does not occur when the pipe is empty.
4. Water shall not be allowed to rise until any concrete has set and the forms have been removed. Water shall not be allowed to rise unequally against unsupported structural walls.

6.5 Excavation - Open Cut and Removal

A. Pipe Clearance in Rock

Where rock excavation is necessary, over excavate the trench bottom a minimum of six (6") inches below the bottom of the pipe for pipes twenty-four (24") inches in diameter or less and nine (9") inches for pipes larger than twenty-four (24") inches. If excavation is made below established grades, the resulting excess excavation shall be filled in with approved material deposited in horizontal layers not more than six (6") inches in thickness, after being compacted, as directed by the Superintendent.

- B. Remove waste excavated materials not suitable or not required for backfilling from the site. All surplus excavation shall be removed from the job site and disposed of properly. If the surplus excavation is disposed of on private property, written permission shall be obtained from the owner of the property and a copy given to the City of Fountain's Inspector.

6.6 Pipe Subgrade

- A. Shape the pipe subgrade or bedding material to provide a continuous uniform bearing support. If the bottom of the excavation at subgrade is found to be soft or unstable or to include refuse, vegetation or other organic material, or large pieces or fragments of inorganic material that, in the opinion of the Inspector, cannot satisfactorily support the pipe or structure, the Contractor shall further excavate and remove such unsuitable material to the width and depth specified by the Inspector. Before the pipe or structure is installed, the subgrade shall be made as specified by the Superintendent.
- B. Where the bottom of the trench at subgrade is found to consist of material that is unstable to such a degree that, in the opinion of the Superintendent, it cannot be removed and replaced with an approved material which will support the pipe or structure properly, the Contractor shall be required to construct a special foundation or support for the pipe or structure as specified by the Superintendent.

6.7 Pipe Embedment

- A. Placement of Embedment Material. Embedment material shall be placed in the trench on prepared subgrade in accordance with the requirements of these Specifications. The embedment material shall be brought to a density beneath the proposed pipeline as required herein. The embedment material shall be shaped to conform to a cylindrical surface with a radius equal to the radius of the outside of the pipe with a width sufficient to allow sixty (60%) percent of the width of the pipe barrel to be uniformly supported by the bedding. Bedding material shall then be placed in two (2) lifts, each being compacted to the densities specified herein to a depth of twelve (12") inches above the top of the pipe.
- B. Embedment Classes
 - 1. Class A - Concrete Cradle or Arch
 - a. Concrete Cradle. The pipe shall be bedded in a monolithic cradle of plain or reinforced concrete per the approved drawings, having a minimum thickness of one-fourth (1/4) the inside pipe diameter or a minimum of four (4") inches under the barrel and extending up the sides for a height equal to one-fourth (1/4) the outside diameter. The cradle shall have width at least equal to the outside diameter of the pipe barrel plus eight (8") inches. Backfill, above the

cradle and extending to twelve (12") inches above the crown of the pipe, shall be compacted carefully.

- b. Concrete Arch. The pipe shall be embedded in carefully compacted granular material having a minimum thickness of one-fourth (1/4) the outside diameter between barrel and bottom of trench excavation and extending halfway up the sides of the pipe. The top half of the pipe shall be covered with reinforced concrete arch having a minimum thickness of one-fourth (1/4) the inside diameter of the crown and having a minimum width equal to the outside pipe diameter plus twelve (12") inches.

2. Class B - Granular Bedding for all Mains and Services

Granular material or fine granular material is required at a minimum based on trench conditions encountered, and shall be compacted in accordance with trench backfill requirements. If select backfill is not readily available for the upper portion of the bedding requirement, granular material may be substituted. Material shall be relatively impervious, well graded, and free from stones larger than three (3") inches in diameter. Material may be job excavated, but selectivity will be required.

6.8 Trench Backfilling and Compacting

- A. Backfill with the granular material specified in Section 6.7. No backfilling will be allowed in freezing weather except by permission of the Superintendent. No additional backfill will be allowed over any frozen material already in the trench.

Place backfilled material above embedment materials in a manner to prevent damage or misalignment of the pipeline. Backfill shall be mechanically compacted by means of tamping rollers; sheep foot rollers, pneumatic tire rollers, vibrating rollers and/or other mechanical tampers. Compaction by water jetting shall not be permitted.

- B. Backfill Density Requirements. Unless otherwise specified or required by the local governing authority, all backfill should be placed in a manner to achieve the densities specified below. The laboratory determination of density shall incorporate the Standard Proctor Density Testing, ASTM-D698.

Ninety-five (95%) percent of maximum density is required for sodded or lawn areas over a dedicated easement or right-of-way, six (6") inches below to twelve (12") inches above pipe, paved roadways, sidewalks, other areas to receive pavement and gravel roadways for the entire trench depth. Densities shall be in accordance with the laws, rules and regulations of the state and federal governments for areas outside of the City of Fountain's jurisdiction. Where another governing agency having jurisdiction over work within a road right-of-way has specifications requiring a

greater backfill density, the requirements of the more stringent specification shall apply.

6.9 Construction Water

- A. All water required for backfill and compaction operations can be furnished from a designated fire hydrant near the project. The Contractor will be charged in accordance with the current cost for construction water. The Contractor will be responsible for furnishing all required personnel, valve(s), hose(s) and other equipment needed to deliver the water to the desired location on the project. The City of Fountain will designate the fire hydrant to be used and must be notified when water is required.
- B. The City may provide Construction Water from a non-potable source, if available.

6.10 Field Quality Control

A. Test Frequency

The City of Fountain's Water Department shall determine the location of all density testing to be accomplished. At a minimum, three (3) tests, spaced approximately uniformly, at three (3) different levels in the trench for every one-thousand (1,000) lineal feet of trench shall be performed. The tests shall be taken approximately one (1') foot above the pipe, mid-trench depth and within the top one (1') foot of the trench. The Contractor shall excavate backfilled material to the depths directed by the Superintendent to accommodate the testing and backfill test holes in accordance with these regulations.

B. Density Testing and Control

Density testing may be required by the City of Fountain's Water Department, and shall be the responsibility of the Contractor. Results of such density testing shall be reported directly to the City of Fountain's Water Department by the testing agency. All reports shall be submitted with the seal and signature of a Registered Professional Engineer (P.E.) experienced in the testing of soil materials.

C. Soil Compaction Tests

Conduct in accordance with the requirements of ASTM D698 or AASHTO T99, "Standard Method of Test for Moisture Density Relations of Soils Using a 5.5 lb. Rammer and a 12-inch Drop." Use Method A, B, C or D as appropriate on soil condition and judgment of the testing laboratory. Samples tested shall be representative of materials to be placed (or altered). Obtain optimum moisture density curve for each type of material or combination of materials encountered or utilized. Use test results as a basis for compaction control. Testing includes Atterberg Limits, grain size determination and specific gravity. The area of water main installation is required to be graded to the subgrade elevation prior to testing.

D. Density Control

Conduct tests for density control during the compaction operations in accordance with the requirements of:

1. ASTM D2922 - Tests for Density of Soil and Soil - Aggregate In-Place by Nuclear Methods;
2. ASTM D1556 - Tests for Density of Soil and Soil - Aggregate In-Place by the Sand Cone Method; or
3. ASTM C2167 - Test for Density of Soil In-Place by the Rubber-Balloon Method.

6.11 Project Completion

- A.** Upon completion of the water main extension installed outside of the public street right-of-way, but within an easement or right-of-way dedicated for water main installations, the Owner shall be responsible to provide restoration and landscaping adequate to prevent erosion caused by surface run-off. Landscaping and restoration construction shall be designed in such a manner that minimum future maintenance will be required. A landscaping and restoration design plan shall be submitted with the water plans for approval and will be subject to a Subdivision Public Improvements Agreement (SPIA), Contract or Performance Agreement.
- B.** Replace and repair any surface improvements damaged or removed. Meet the requirements specified for the particular type of improvements to be repaired or replaced. All surface improvements shall meet the requirements of the local governing agency and/or the requirements shown on the construction drawings as approved by the City of Fountain. Upon completion of the work, all rubbish, unused materials, concrete forms and other like materials shall be removed from the jobsite. All excess excavation shall be disposed of as specified and the areas shall be left in a state of order and cleanliness.

CHAPTER 7

WATER SERVICE LINES AND WATER METERS

7.1 Tapping

A. General Provision

Excavation, safety, backfilling and compaction of water service line construction are the responsibility of the Contractor in accordance with the specifications of the governing body in whose jurisdiction the work is being done (i.e., City of Fountain, El Paso County or State of Colorado).

B. Tapping Permits

Tapping permits must be applied for at the City of Fountain's Utilities Office located at 116 South Main Street, Fountain, CO 80817, Phone Number: (719) 322-2000, and paid for at least forty-eight (48) hours prior to tapping.

C. Taps

All water service line taps on water mains within the water main system shall be performed by the Contractor, who shall notify the City of Fountain's Water Department a minimum of forty-eight (48) hours prior to tapping. Taps on PVC mains shall be made with only a shell cutter bit.

D. Markings for Tapping Holes

No water taps shall be made unless property corners are clearly marked so measurements of taps and curb boxes can be made at the time of tapping.

E. Excavation of Tapping Holes

Excavation of the tapping hole is the responsibility of the Contractor.

F. Tap Sizes

The minimum size tap for a water service line is three-fourths (3/4") inch. The Contractor shall be responsible for furnishing all necessary materials. For water service line sizes in excess of two (2") inches, the corporation shall be a tapping gate valve with a two (2") inch operating nut. The main shall be tapped sixty (60) degrees from the top of pipe either in the 10 o'clock or the 2 o'clock location.

G. Replacement of Existing Corporation Stops

Where an existing, non-faulty, corporation stop is to be replaced with a new corporation stop of equal or larger size, the Owner of the property shall be responsible, at his/her expense, to have the old corporation stop excavated and shall contact the City of Fountain's Water Department to shut off the old corporation at no expense to the Owner. Backfill, compaction and replacing of the non-faulty

corporation, stop following shut off by the City of Fountain's Water Department, is the responsibility of the property Owner at his/her expense.

H. Abandoning Existing Taps

Where an existing water tap is to be abandoned, the Owner of the property shall be responsible, at his/her expense, to have the corporation stop excavated and then contact the City of Fountain's Water Department to shut off the corporation at no expense to the Owner. Backfill and compaction will be the responsibility of the property Owner at his/her expense.

I. Multiple Taps

No water service line within the City of Fountain's water service area will serve more than one customer. Each house, building or business shall have an individual tap and water service line from the water main to the house, building or business, and an individual meter. Multi-customer buildings will be reviewed on a case-by-case basis and require Superintendent approval.

J. Bedding

All service line components including saddles and service line piping shall be bedded with Class B Bedding.

K. Tapping Sleeves

Allowable tapping sleeve for taps larger than 2" shall be Ford Tapping Sleeve or Romac.

7.2 Service Line Location, Excavation and Alignment

A. Angles

The water service line must enter the lot as near ninety (90°) degrees to the street, or radial, as is practical. Extreme angles are not allowed unless otherwise approved.

B. Water Service and Separation of Water Service and Building Sewer

In public rights-of-way, the water service line and the building drain or building sewer shall be not less than ten (10') feet apart horizontally and shall be separated by undisturbed or compacted earth. On a single-family residential lot, the water service line may be placed in the same trench with the building drain or building sewer provided approval is given by the Regional Building Department and the following conditions are met:

1. The bottom of the water service line at all points shall be at least eighteen (18") inches above the top of the sewer line at its highest point;
2. The water service line shall be placed on a solid shelf excavated at one side of the common trench;
3. The materials and joints of sewer and water service lines shall be installed in such a manner and shall possess the necessary strength and durability to

prevent the escape of solids, liquids and gases therefrom under all known adverse conditions such as corrosion, strains due to temperature changes, settlement, vibrations and superimposed loads; and,

- 4. The domestic water service and the dedicated fire line are allowed in the same trench for commercial applications, but they are required to have three (3') feet of separation.

C. Connections

All PE service lines connecting to PVC water main shall be installed utilizing a Ford Meter Box Co. Model 202BS Tapping Saddle or Romac equal.

D. Flag Lots

Flag lots, when permitted, curb stops will be installed in front sidewalks for that individual flag lot.

7.3 Service Line Installation and Material

- A. An expansion loop (three-fourth (3/4") inch through two (2") inch only) must be left in the service line where it is connected to the corporation stop at the water main to allow for expansion and contraction. Existing water services or taps, which are not three-fourth (3/4") inch or larger and do not consist of copper or polyethylene tubing or that will not meet the specifications referred to in this section, will not be permitted. If an existing tap has been deleted from the water system at the time of demolition, under no circumstances will the City of Fountain allow that service to be reconnected; it would constitute a new tap and service.
- B. Water service line material between the corporation and the curb stop shall be as follows:

Polyethylene Pipe

Pressure Rating:	200 psi minimum, SDR 7
O.D. Base:	Iron Pipe Size
End Treatment:	Stainless Steel Stiffener Insert
Conformance:	ASTM D-2239 PE 3408
Acceptable Product:	Driscopipe
Acceptable Manufactures:	Phillips Petroleum Co. Johns Manville (JM)

C. Water Service Line Joints

Polyethylene pipe shall have compression fittings without flaring.

- D. All water service lines shall have a minimum cover of four (4') feet and a maximum cover of five (5') feet except at the expansion loop.
- E. Where any water service line crosses another utility or any underground structure, the water service line shall preferably pass over the other utility or structure, but in no instance shall there be less than six (6") inches clearance between the water service line and the other utility or structure. The space between the water service line and the utility or structure shall be backfilled with sand when the clearance is less than twelve (12") inches. Where any water service line passes under a sewer main, the sewer main shall be constructed of ductile iron for six (6') feet each side of the water service or the water service line shall be encased in a steel, ductile iron or PVC C-900 casing pipe with a minimum of four (4") inches in diameter for nine (9') feet each side of the sewer main or sewer service line.
- F. When a service pipe is installed, the City of Fountain will require a six (6) gauge stranded copper wire with THHN insulation to be installed with the service line and taped every three (3') feet to the pipe for the purpose of locating the service. The copper wire shall extend from the water main to the curb stop and from the curb stop to the building. The copper wire shall also be extended up the outside of the curb stop box to the ground surface with the specified wire splices (Nicropress sleeve or equal).
- G. New water service lines on single family units will be installed to enter the property three (3') feet inside of the side property line farthest from the garage and/or driveway unless otherwise approved by the Superintendent. The water service line shall be located such that no concrete or bituminous driveway pavement will be placed over any portion of the water service line from the curb to the curb stop.
- H. The length of the service line from the corporation to the house or other building will be limited as follows:

<u>Size</u>	<u>Maximum Length</u>
¾"	75 Feet
1"	100 Feet
1¼" – 1½"	150 Feet

- I. Authorized lengths of service lines two (2") inches and larger will be determined by the Superintendent on a case-by-case basis.
- J. Service taps must be spaced a minimum of forty-eight (48") inches apart and forty-eight (48") inches away from any fittings or joints.

7.4 Curb Stop and Curb Box

- A. All water service lines, regardless of size, must have a curb stop and a curb box installed in accordance with Standard Drawing No. 38. The curb box shall be centered over the curb stop and shall be plumb.
- B. All curb stop boxes will be located eight (8') feet behind the curb at the street right-of-way line, or where a front yard public improvement or utility easement exists, at the side line of the front yard easement unless designated otherwise by the Superintendent. For approved flag lots, the curb stop will be installed in front of the sidewalk for that individual flag lot.
- C. The responsibility of the Contractor for the curb box ends only when sidewalks, curbs, driveways and other public and private improvements have been installed and all backfilling and compaction has been completed and accepted by the City of Fountain.
- D. The Owner and his/her representative shall coordinate with the Contractor installing curb and gutter to provide an impression in the curb head while concrete remains plastic marking the location of a water service. An impression with the letter "W," a minimum of two (2") inches in height and one-fourth ($\frac{1}{4}$ ") inch deep shall be provided at a location immediately above the water service line and opposite of a water curb stop box.
- E. Immediately after completion of backfill of water curb stop boxes, two (2) steel fence posts (tee posts) shall be placed approximately twelve (12") inches each side of the stop box. Orange webbed construction fencing shall be wrapped around the two posts immediately above the stop box location in order to provide notice and protection for each facility.
- F. Only corporation stops (FB-1001) and curb stop (B46-333) by Ford Meter Box Co. shall be permitted in the system.

7.5 Water Meters and Pits

- A. All water supplied by the City of Fountain's Water Department to any property must be metered. The only exceptions are fire lines. The Superintendent, in advance of construction, must approve the location of the meter pit.
- B. All water meters are owned, supplied, installed, and maintained by the City of Fountain's Water Department except for water meters one and one-half ($1\frac{1}{2}$ ") inches and larger, which will be purchased by the Contractor and installed by the City of Fountain's Water Department.
- C. Acceptable locations for three-fourth ($\frac{3}{4}$ ") inch and one (1") inch water meters shall be limited to the basement, utility room or utility closets unless otherwise approved. The location for one and one-half ($1\frac{1}{2}$ ") inch or larger water meters shall

be approved by the Superintendent prior to installation of the water meter loop. Outside water meter pits shall be used when specific review and approval of the Superintendent has been given. Water meter locations selected shall provide adequate protection against freezing.

- D.** Inside residential water meter locations must be in the basement or other lowest level of the residence. When installed in a crawl space with an earth floor, a rock-filled sump, one and one-half (1½') foot deep, one and one-half (1½') foot in diameter shall be installed beneath the meter location. Where plastic pipe is used for inside installations, plastic will not be used within three (3') feet of the meter loop.
- E.** Inside three-fourth (¾") inch and one (1") inch water meter locations shall be such that the water meter is unobstructed on one side (i.e., easily accessible for reading or servicing, with a minimum of twelve (12") inches clearance around the remainder of the meter with a minimum of three (3') feet of clearance above the meter). Meter locations shall not require stooping or crawling to gain access to the meter. Approval prior to construction for crawl space installation may be granted by the Superintendent.
- F.** Inside three-fourth (¾") inch and one (1") inch water meter loop installation shall include an inlet and outlet valve as shown on the Standard Drawing No. 41. Inlet and outlet valves shall be a full opening water way, hand wheel operated, compression valves which shall be installed to close in the direction of the flow.
- G.** Plans for inside water meter loop (to include support) installations for one and one-half (1½") inch and larger water meters shall be submitted to the Superintendent for approval prior to installation of the meter loop and should be similar in design to the meter loop piping and support shown on the Standard Drawing No. 41 except that the bypass piping may also be extended under or over the meter and that adequate meter loop support may require a different design.
- H.** Pit installation of meters three-fourths (¾") inch through one (1") inch are normally acceptable in the City of Fountain's service area. Any deviations from this policy must be approved in advance by the Superintendent on a case-by-case basis.
- I.** The locations of the meter pit for three-fourths (¾") inch through one (1") inch water meters will be one (1') foot inside of the curb stop. If a problem arises on the location, the decision will be determined by the Inspector.
- J.** The only pit acceptable to the City of Fountain's Water Department for three-fourth (¾") inch and one (1") inch meter is plastic (PVC) or corrugated steel pipe (CSP) pit, twenty (20") inches inside diameter by approximately thirty-six (36") inches in height, with a frost-proof cover (see the Standard Drawing No. 38 and the accompanying general notes). Sprinkling system devices are not acceptable in the twenty (20") inch pit.

- K.** The meter loop in the pit (three-fourths (3/4") inch through one (1") inch water meters) must be with a copper setter with an inlet valve and only FORD Series VB-82. The copper setter will be installed so that the loop is twelve (12") inches below the top of the meter pit lid.
- L.** The location of the meter pit for one and one-half (1½") inch or larger water meters can vary from that of the small meter pit, but must meet the approval of the Superintendent.
- M.** Meter pits for water meters one and one-half (1½") inch or larger must be large enough to accommodate meter, meter bypass, all valves and piping (see the Standard Drawing No. 45 through 49 and accompanying general notes).
- N.** All pits housing a meter one and one-half (1½") inch or larger will have a twelve (12") inch wide metal ladder installed in the pit. Wooden ladders will not be accepted.
- O.** Meter pits must have an approved ring and cover of sufficient size (twenty-five and one-half (25½") inches minimum) opening for installation and removal of the meter.
- P.** Water meter loops one and one-half (1½") inch and larger must have both inlet and outlet valves.
- Q.** Water meters one and one-half (1½") inch and larger may be required to have a bypass around the meter of sufficient size to supply the property while the meter is being serviced. This requirement shall be at the discretion and direction of the Superintendent. Contact the City of Fountain's Water Department prior to construction of meter loops of this size (see Standard Drawing No. 45). When a bypass is installed, a water meter is required.
- R.** Inside three-fourth (¾") inch and one (1") inch water meter installations shall provide for the installation, by the City of Fountain, of a remote meter reading device or radio read system. The Contractor, Plumber and/or the Owner shall provide all accommodations necessary to provide for the remote metering device or radio read system.
- S.** Under no circumstances will the pressure exceed one-hundred (100) PSI at the inlet side of the meter (see Standard Drawing No. 39 through 41).

7.6 Inspection of Services

- A.** Water service lines shall be inspected by the City of Fountain's Water Department and the inspection shall include an inspection of the water service line from the corporation to the curb stop and an inspection of the meter installation to include all of those items contained within these Specifications.

- B. The City of Fountain’s Water Department shall inspect the customer service line from the curb stop to the building when it passes beneath curbs, gutters, and sidewalks.

7.7 Repair and Replacement of Existing Service Lines

- A. The Owner is responsible for the repair and maintenance of the water service line from the curb stop to the house or other building.
- B. Leaks occurring on a water service line between the curb stop and the house or building shall be repaired as necessary to include backfilling and restoration of the property at the Owner's expense. However, the City of Fountain will, if requested to do so, shut off the water service line at the curb stop. To preclude unnecessary waste of water, if repairs are not initiated within a reasonable period of time, the City of Fountain may, at its discretion, shut off the water service until repairs have been affected.
- C. The Owner is responsible for all damages that may occur to other property, real or person, including property of the City of Fountain, that were caused by failure to repair and maintain the water service line, or from leaks occurring on a water service line or from bursting or other failure of the water line.
- D. Leaks occurring between the curb stop and the corporation will be repaired by the City of Fountain at no expense to the Owner.
- E. When a doubt exists concerning the responsibility for repairing a leak, the City of Fountain will determine the origin of the leak, and responsibility for repair. This will be done by turning off the service at the curb stop. When this action causes the leak to stop flowing, the Owner will be responsible for repair. When the leak continues to flow after turn off, the City of Fountain assumes responsibility and will affect repair at no expense to the Owner.

7.8 Cross Connection Control

- A. All commercial applications are required to have back flow protection, double check pressure vacuum, per the American Society of Sanitary Engineering (ASSE) specifications.