

WATER STANDARDS AND SPECIFICATIONS



GRANTS PASS, OREGON
ADOPTED BY THE CITY COUNCIL
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INTRODUCTION

The need for standardization of water systems has long been a recognized requisite. In that there are numerous publications, governmental regulations and City ordinances that establish various and specific requirements for the design and construction of water systems, it is deemed

Water Standards
City of Grants Pass 1

imperative and to the best interest of the City to bring together into one manual these various requirements.

By compiling the pertinent and applicable requirements contained in the various publications into one document, we believe it will assist developers, design engineers and contractors performance in their field of expertise, thus providing for a better water system at a reduction in cost.

The City of Grants Pass is pleased to present this set of standards and specifications for future water improvements. The intent is to establish uniformity of designs and construction practices, reduce conflicts and provide ease in maintenance.

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Table of Contents

SECTION 100 – GENERAL REQUIREMENTS

**SECTION 200 – DESIGN OF PUBLIC WATER MAINS AND
INFRASTRUCTURE**

SECTION 300 – MATERIALS

SECTION 400 – CONSTRUCTION STANDARDS

SECTION 500 – WATERLINE TESTING AND STERILIZATION

SECTION 100 GENERAL REQUIREMENTS

101 Definitions and Abbreviations

- 101.1.0 Definitions**
- 101.2.0 Abbreviations**

102 General Provisions

- 102.1.0 Scope**
- 102.2.0 Standard Specifications, Codes, and Ordinances**
- 102.3.0 Safety**
- 102.4.0 Prequalification Requirements**
- 102.5.0 Improvement Bonds**
 - 102.5.1 Security Bonds**
 - 102.5.2 Maintenance Bonds**
 - 102.5.3 Alternate Securities**
- 102.6.0 Defective Work**
- 102.7.0 Utility Easements**
 - 102.7.1 Utility Easement Restrictions**
 - 102.7.2 Utility Easement Dedications**
- 102.8.0 Enforcement**

SECTION 200
DESIGN OF PUBLIC WATER MAINS AND INFRASTRUCTURE

201 Plan Check Procedure and Fees

- 201.1.0 Scope
- 201.2.0 Improvement Plan Checking Fee
- 201.3.0 Improvement Plan Submittal Requirement
- 201.4.0 Subsequent Reviews

202 Plan Criteria For Water Lines and Appurtenances

- 202.1.0 Plan Approval
- 202.2.0 Construction Plans (Typical)
- 202.3.0 Construction Plan Elements
 - 202.3.1 Key Map Sheet
 - 202.3.2 General Notes
 - 202.3.3 Utilities Sign-Off Block
- 202.4.0 Plan and Profile Sheet Elements
 - 202.4.1 Graphic Scale and North Arrow
 - 202.4.2 Plan of Water Main
 - 202.4.3 Underground Pipes and Utilities
 - 202.4.4 Profile of Water Main
 - 202.4.5 Map Legends
- 202.5.0 Drawings of Record

203 Waterline Design

- 203.1.00 Waterline Location and Alignment
 - 203.1.1 Water Main Location in Roads or Streets:
 - 203.1.2 Curved Water Main Requirements:
 - 203.1.3 Joint Deflections for Curved Water Main
 - 203.1.4 Water Main Location in Private Property
 - 203.1.5 Water Mains in Private Streets
 - 203.1.6 Waterline Separation from Other Utilities
 - 203.1.7 Water/Sanitary Sewer Separation
- 203.2.0 Structural Requirements
 - 203.2.1 Buried Facilities
 - 203.2.2 Other Utilities and Structures
 - 203.2.3 Flexible Joints
- 203.3.0 Water Service Assemblies Design
 - 203.3.1 Water Service Location
 - 203.3.2 Water Service Sizing
- 203.4.0 Valve Location and Spacing
- 203.5.0 Main Line Tapping Sleeves
- 203.6.0 Blow-Off Assemblies
- 203.7.0 Air And Vacuum Assemblies
- 203.8.0 Fire Hydrant Assemblies
- 203.9.0 Cross Connection Control Requirements
- 203.10.0 Pressure Regulators

- 203.11.0 Thrust Restraining**
 - 203.11.1 Mechanically Restrained Joints**
 - 203.11.2 Concrete Anchor Blocks**
- 203.12.0 Water Main Sizing**
 - 203.12.1 General Sizing**
 - 203.12.2 Minimum Water Main Size**
 - 203.12.3 Oversizing**
- 204 System Demands**
 - 204.0.0 Fire Flow Demands**
 - 204.1.0 Domestic Water Demands**
 - 204.2.0 Water Main Hydraulics**
 - 204.2.1 Pressure**
 - 204.2.2 Velocity**
 - 204.2.3 Head Loss**
 - 204.2.4 Hazen-Williams “C” Coefficient**
- 205 Design Criteria for Pump Stations**
 - 205.0.0 General Criteria**
 - 205.1.0 Firm Capacity**
 - 205.2.0 Storage Equalization vs. Continual Boosting**
 - 205.3.0 Pump Station Metering**
 - 205.4.0 Surge Protection**
 - 205.5.0 Pump Station Control**
 - 205.6.0 Telemetry**
 - 205.7.0 Hydropneumatic Tanks**
 - 205.8.0 Backup Power**
 - 205.9.0 Pump Station Site**
- 206 Design Criteria for Storage Facilities**
 - 206.0.0 General**

SECTION 300 MATERIALS

301 General Requirements

- 301.0.0 General Requirements**
- 301.1.0 AWWA References**
- 301.2.0 Quality Control of Materials**
- 301.3.0 Submittals**

302 Mainlines and Appurtenances

- 302.1.0 Water Mains**
- 302.2.0 Mechanical Joint Fittings**
 - 302.2.1 Mechanical Joint Restraint Glands**
- 302.3.0 Flanged Fittings**
- 302.4.0 Valves**
 - 302.4.1 Gate Valves**
 - 302.4.2 Butterfly Valves**
- 302.5.0 Valve Boxes**
- 302.6.0 Valve Accessories**
- 302.7.0 Fire Hydrants**
- 302.8.0 Tapping Sleeves and Valves**
- 302.9.0 Water Services**
- 302.10.0 Miscellaneous Pipe and Fittings**
 - 302.10.1 Steel Pipe and Fittings**
 - 302.10.2 Brass Pipe, Nipples, and Fittings**
 - 302.10.3 Copper Tubing and Fittings**
 - 302.10.4 Polyethylene Pipe and Fittings**
- 302.11.0 Mechanical Joint Restraint for Ductile Iron Pipe**

303 Trench Materials

- 303.1.0 Trench Materials**
 - 303.1.1 Class "B" Backfill**
 - 303.1.2 Class "A" Backfill**
 - 303.1.3 Controlled Low Strength Materials (CLSM)**
 - 303.1.4 Other Backfill Materials**
 - 303.1.5 Asphalt Patching**

304 Miscellaneous Materials

- 304.15.0 Concrete**
- 304.16.0 All -Thread Restraining Rods**
- 304.17.0 Eyebolts**
- 304.18.0 Paint**
 - 304.18.1 Brush-on Paint**
 - 304.18.2 Spray-on Paint**
- 304.19.0 Grease and Oil**

**SECTION 400
CONSTRUCTION STANDARDS**

401 General Requirements

- 401.0.0 Scope**
- 401.1.0 Standard Specifications**
- 401.2.0 Safety**
- 401.3.0 Workmanship**
- 401.4.0 Public Relations**
- 401.5.0 Existing Water Facilities**
 - 401.5.1 Large Main Taps**
 - 401.5.2 Fire Hydrant Extensions**
 - 401.5.3 Construction Water**
- 401.6.0 Inspection**
- 401.7.0 Delivery, Storage, and Handling of Materials**
- 401.8.0 Traffic Control**
- 401.9.0 Construction Staking**

402 Installation Requirements

- 402.1.0 Trenching and Excavation**
 - 402.1.1 Trench Width**
 - 402.1.2 Trench Depth**
 - 402.1.3 Open Trench**
 - 402.1.4 Trench Grade**
 - 402.1.5 Trench Foundation**
 - 402.1.6 Shoring, Sloping, and Benching**
 - 402.1.7 Trench Dewatering**
- 402.2.0 Mainline Pipe Installation**
 - 402.2.1 Placing of Pipe in Trench**
 - 402.2.2 Handling Material**
 - 402.2.3 Bell (Joint) Holes**
 - 402.2.4 Cleaning Pipe and Fittings**
 - 402.2.5 Push-on Joint Pipe**
 - 402.2.6 Permissible Joint Deflection**
 - 402.2.7 Joining Mechanical Joint Pipe and Fittings**
 - 402.2.8 Cutting Pipe**
- 402.3.0 Valves and Hydrants**
 - 402.3.1 Setting Valves and Fittings**
 - 402.3.2 Valve Boxes**
- 402.4.0 Water Service Assemblies**
 - 402.4.1 Water Service Assemblies (3 inches and larger)**
 - 402.4.2 Water Service Assemblies (2 inches and smaller)**
- 402.5.0 Fire Hydrant Assemblies**
- 402.6.0 Concrete Work**
 - 402.6.1 Thrust and Straddle Blocks**
- 402.7.0 Trench Backfilling**

402.7.1	Pipe Bedding
402.7.2	Pipe Zone
402.7.3	Backfilling
402.8.0	Trench Restoration
402.9.0	Painting

**SECTION 500
WATERLINE TESTING AND STERILIZATION**

501 Testing and Sterilization

501.0.0 General

501.1.0 Pigging

501.1.1 Installation of Poly Pigs

501.1.2 Materials

501.2.0 Pre-Testing Inspection

501.3.0 Hydrostatic Pressure Test

501.3.1 Line Filling

501.3.2 Pressure Testing Procedure

501.3.3 Testing Allowance

501.3.4 Hydrostatic Valve Testing

501.3.5 Failed Hydrostatic Tests

501.3.6 Testing Equipment

501.3.61 Pressure Gauges

501.3.62 Water Loss Measuring Equipment

501.4.0 Disinfecting Water Mains

501.4.1 Chlorination

501.4.2 De-chlorination

501.4.3 Bacteria Testing

501.4.4 Failed Bacteriological Tests

SECTION 100 GENERAL REQUIREMENTS

101 Definitions and Abbreviations

101.1.0 Definitions

Adequate - a domestic water supply source and distribution system, each sufficient to supply all peak daily demands and instantaneous demands during periods of maximum use without reduction in pressure below 20 pounds per square inch at any service connection, except during an emergency.

Air Gap Separation - a physical break between a supply pipe and a receiving vessel. The air gap shall be at least double the diameter of the supply pipe, measured vertically above the top rim of the vessel, but in no case less than one inch.

Approved - whenever in the specifications or upon the plans the words "approved equal" appear, it shall be understood that the item referred to may be substituted for by another item, if the other item is approved by the City Engineer in advance of installation for the particular use intended. Job specific (i.e. each new job requires a new approval.)

Backflow - the flow of water or other fluid into the domestic water system from any source other than the intended source of water supply.

Backflow Prevention Device - a device conforming to the requirements of AWWA C506, approved by the Oregon Department of Human Services Drinking Water Program and the City to stop flow as described under the backflow definition.

Check Valve - a valve which allows flow in only one direction.

City - the legally constituted municipal government of the City of Grants Pass, Oregon, its authorized agents or employees.

City Engineer - the City of Grants Pass Engineer or his designated representative.

County - Josephine County, State of Oregon.

Contractor - the person, firm or corporation entering into an agreement with the City or Developer for the performance of work and the construction of facilities to be accepted by the City, or the agent appointed to act for said party in the performance of the work.

Cross Connection - any actual or potential connection between a domestic water supply system and a pipe or piping system used or intended to be used for some other purpose.

Customer Service Line - the pipe, valves and appurtenances extending from the meter box into the customer's property.

Department of Community Development - the department established by the City to administer the design and construction of all development within the City's jurisdiction.

Developer - the person, firm or corporation proposing to subdivide or improve land within the City's jurisdiction.

Developer's Engineer - a professional, qualified engineer or a firm of professional engineers registered in the State of Oregon, retained by the Developer.

Director - the Utility Director of the City of Grants Pass.

Domestic Use - any water used for drinking, culinary or other household uses. Systems providing water for domestic use may also serve water for other uses.

Double Check Detector Backflow Prevention Assembly or Double Check Detector Assembly or DCDA – An assembly composed of a line-sized approved double check assembly with a bypass containing a specific water meter and an approved double check valve assembly. The meter shall register accurately in cubic feet for very low rates of flow.

Double Check Valve Backflow Prevention Assembly or Double Check Assembly or Double Check or DC - An assembly which consists of two, independently-operating check valves which are spring-loaded or weighted. The assembly comes complete with a shut-off valve on each side of the checks, as well as test cocks to test the checks for tightness.

Easement - a recorded document in which the land owner gives the City permanent rights to construct, maintain, and access water mains and other utilities across private property.

Engineer - a professional engineer or a firm of professional engineers registered in the State of Oregon, appointed and acting for the Department of Community Development.

Inspector - an employee or agent of the City engaged to observe and record field compliance with design criteria, plans and construction standards.

Pipe Bedding - That material which fills the zone between the trench bottom and the bottom of the pipe.

Pipe Zone - the full width of the trench from the top of the bedding to a point 12 inches above the top outside surface of the barrel of the pipe.

Plans - the official plans, prepared by an Engineer registered in the State of Oregon, showing profiles, typical cross-section, working drawings, detail drawings, and supplemental drawings, or exact reproductions thereof, approved by the City Engineer. Plans shall show the location, character, dimensions and details of the work to be done.

Potable Water - water that is free from biological contamination and is sufficiently free from chemical, physical or radiological impurities and which have such other physical properties so as to be palatable for human consumption.

Reduced Pressure Principle Backflow Prevention Assembly or Reduced Pressure Principle Assembly or RP Assembly or RP – An assembly containing two, independently-acting, approved check valves together with a hydraulically-operated, mechanically-independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The assembly shall include properly located test cocks and tightly closing shut-off valves at the inlet and outlet ends of the assembly.

Public Safety Director - the Public Safety Director or his designated representative.

Service Line - the pipe, valves, and appurtenances laid from the main to and including the meter, or to the curb stop or shut-off valve on an unmetered service connection.

Specifications - the direction, provisions, requirements and standard drawings pertaining to the method and manner of performing the work, and to the qualities of materials to be furnished for acceptance by the City.

Subcontractor - the person, firm, or corporation supplying labor, or labor and materials at the site of the work as a part of the contractor's obligation under an agreement.

Trench Backfill – That material which fills the zone between the top of the pipe zone and the bottom of the pavement base rock, ground surface, or surface material.

101.2.0	Abbreviations
ANSI	American National Standard Institutes
APWA	American Public Works Association
AWWA	American Water Works Association
NFPA	National Fire Protection Association
ORS	Oregon Revised Statutes
OOSHC	Oregon Occupational Safety and Health Code
UPC	Uniform Plumbing Code

102 General Provisions

102.1.0 Scope

The design, construction and testing of water mains, facilities and other appurtenances which are incorporated into the City of Grants Pass water system shall comply with these standard specifications and permit requirements of various governing bodies, except where specific modifications have been approved in writing by the Director. No work shall commence on water mains, facilities, or other appurtenances without a set of approved plans.

- a) All plans shall be engineered, stamped, and signed by a Civil Engineer registered in the State of Oregon.
- b) Only contractors who have been approved and prequalified by the City of Grants Pass may perform work on water facilities. Work performed by other than approved contractors will not be accepted.
- c) Prior to accepting bids and awarding a contract the developer or his engineer shall inform the City Engineer of all the contractor names intended for use to receive prior approval.

102.2.0 Standard Specifications, Codes, and Ordinances

Ordinances, requirements, and applicable standards of governmental agencies having jurisdiction within the area served by the City's Water System shall be observed in the design and construction of water mains and facilities. Such requirements include, but are not limited to, current revisions of the following:

- a) Oregon Standard Specifications for Construction latest edition, including all applicable supplements.
- b) American Water Works Association Standards (AWWA).
- c) Oregon Department of Human Services Drinking Water Program, (formerly known as the Oregon Health Division), Administrative Rules for Domestic Water Supply System, Chapter 333.
- d) Engineering report of the "Water Distribution System" by West Yost & Associates, Grants Pass, Oregon, dated January 2001.
- e) City's Ordinance Number 4352, "Utility Ordinance for the City of Grants Pass" relating to water service.
- f) City's Ordinance Number 4098, "City Fire Code" relating to fire flow requirements, for hydrant locations and coverage.

- g) The Oregon Plumbing Specialty Code relating to the customer's line.
- h) City Ordinance Number 4290, relating to improvements in subdivisions.
- i) Chapter 8.09 and 8.10 of the Grants Pass Municipal Code.
- j) City Ordinance Number 4880 relating to cross connections and backflow prevention.

102.3.0 Safety

Contractor and personnel engaged in construction work shall comply with the minimum safety and health requirements prescribed in the Oregon Occupational Safety and Health Code (OOSHC).

102.4.0 Prequalification Requirements

To work on projects involving the construction of public facilities, a Contractor must be prequalified per the Municipal Code Chapter 9.37.

102.5.0 Improvement Bonds

102.5.1 Security Bonds

For public contracts, the contractor shall provide performance and payment securities for 100%.

102.5.2 Maintenance Bonds

Prior to final acceptance, a maintenance bond in the amount set by the City Engineer based on the actual cost of the improvement will be required. The bond will remain in effect for a one-year period from the date of acceptance of the improvement by the City. The form of bonds will be as approved by the City Attorney. Maintenance bonds are set as follows:

Construction Cost	Percent Bonded
\$0.00 to \$25,000.00	100%
\$25,000.00 to \$50,000.00	50%
\$50,000.00 on up	25%

102.5.3 Alternate Securities

In lieu of a security bond or maintenance bond the City may accept a cash deposit or an equivalent security in the form of an irrevocable letter of credit, assignment of certificate of deposit, or assignment of loan proceeds from a financial institution licensed to do business in the State of Oregon.

102.6.0 Defective Work

Any defective materials or workmanship that becomes evident within one year after the City assumes responsibility for the completed work shall be replaced or repaired without cost to the City. In the case of “live” water system replacement or repairs, the City’s distribution division must do the work. The contractor and the developer will be notified if such a case arises.

102.7.0 Utility Easements

When permitted by the Director, the owner shall provide easements outside the Rights of Way. Easements shall be shown on construction plans and conform to section 203.1.4 of these standards. No permanent construction may occur in easement areas nor can large-scale landscaping such as trees or significant shrubs be planted. No fences will be allowed that restrict access or impede maintenance within the easement.

102.7.1 Utility Easement Restrictions

Deeds for easements shall provide for restrictions of permanent construction within the easement, provide all weather drivable surface allowing ingress and egress for maintenance and restrict grading. A recent title report will be required prior to acceptance of the easement.

102.7.2 Utility Easement Dedications

Dedication of easements shall be provided as follows:

For subdivision tracts - the owners of land included within the subdivision shall dedicate for public use, the utility easements so designated on the Final Map.

For other than subdivisions- dedication of utility easement(s) shall occur by means of deeds of conveyance to the City of Grants Pass and as approved by the Director.

102.8.0 Enforcement

The Director shall enforce adherence to these Design and Construction Standards.

SECTION 200
DESIGN OF PUBLIC WATER MAINS AND INFRASTRUCTURE

201 Plan Check Procedure and Fees

201.1.0 Scope

Pursuant to Ordinance No. 4290, which requires that the developer provide the City with plans, specifications and cost estimates for all public improvements, the following procedures and fees shall be applicable.

201.2.0 Improvement Plan Checking Fee

At time of receipt of the proposed improvement plan, a fee shall be paid in the amount as established by the City. The amount established shall be determined from Resolution No. 4045. Under no circumstances shall refund of the above fee be made unless approved by the Director.

201.3.0 Improvement Plan Submittal Requirement

The following submittals will be required for the initial plan check:

- a) In addition to the Community Development's required submittals, provide five sets of blue-line waterline improvement plans to the Engineering Division.
- b) One complete set of improvement plans if different than the waterline.
- c) One copy of the most current site plan submitted for Site Plan Review

City staff shall then analyze the plans and material as submitted and will prepare and send a copy of comments and a marked up set of plans to the developer's engineer for revisions. The in-house review period is estimated to be two weeks from the original submittal.

201.4.0 Subsequent Reviews

Subsequent reviews of submitted plans shall continue until the plans are satisfactory to the City. The in-house review period for subsequent reviews is estimated to be one week from the time of resubmitted plans for each subsequent review.

202 Plan Criteria for Water Lines and Appurtenances

202.1.0 Plan Approval

Approval by the City Engineer does not imply approval of the technical accuracy of the design. Responsibility for the design lies strictly with the developer and his engineer. Any changes to the drawings after approval by the City Engineer shall be shown as revisions and shall also be approved by the City Engineer.

202.2.0 Construction Plans (Typical)

a) Sheet Size: Overall dimensions 24" x 36"

b) Materials: Blue-Line copies of Originals

c) Margins: 2" on left, all others 1"

d) Typical Scales:

All construction drawings will be a standard scale. Standard engineering scales will be required except in cases of building designs, where architectural scales will be allowed. Scales shall be consistent throughout the drawings.

Typical horizontal scales range anywhere from 1" = 10' to 1" = 50' depending on the complexity of the design, whether multiple utilities are being designed or exist, or if there is street design involved. The City Engineer may require additional smaller scale details of large scale drawings.

Typical vertical scales range anywhere from 1" = 2' to 1" = 5'. Factors that determine this are the amount of elevation differential on the profiles and scalability. In some cases, the City may prefer a larger vertical scale over "breaking" the profiles.

The City Engineer has final authority of the scales to be used.

e) Drawing of Records/As Built: Ink on mylar and computerized drawings

202.3.0 Construction Plan Elements

The construction plans shall conform and contain the following standards:

202.3.1 Key Map Sheet

This sheet shall contain an overall plan at a minimum scale of 1" = 400 feet showing general layout, all utilities, named streets, lot boundaries, lot surrounding property identification, and numbers, map legends, general notes, north arrow, and a sheet index.

A vicinity map with a minimum scale of 1" = 1,000 feet showing tract boundary, streets, adjacent tracts, major streets outside tract boundaries and location of the bench mark.

At least two benchmarks used for the project shall be graphically shown on this sheet and the elevations, descriptions, locations, etcetera, spelled out as illustrated below:

Location _____
B.M. No. _____ Elev. _____ Type of Marker _____

All elevations used in preparation of standard plans shall be based on benchmarks and/or temporary benchmarks tied to NGVD 29 Source Data. (i.e.tied to known published monuments)

202.3.2 General Notes

Can be shown on the Key Map Sheet and need not be shown on other sheets. The General Notes shall include the following but not limited to:

- a) All contractors and subcontractors shall possess a valid City of Grants Pass business license and be “City” prequalified for the scope of work they are to perform prior to commencing work on this project.
- b) A pre-construction conference of all interested parties shall be held prior to any construction. (Interested parties shall include: developer, owner, all contractors, engineers, architects, surveyors, City Representatives, City Utility Department, etc.)
- c) All work on this project shall conform to standards adopted by the City of Grants Pass.
- d) All underground utilities and service laterals shall be installed prior to construction of curbs and gutters.
- e) Call “One Call” 1-800-332-2344 for utility locations, forty-eight hours before digging.
- f) City Engineering, phone number 474-6355, is to be notified forty-eight hours prior to commencing work and if work has stopped in excess of more than one working day.

202.3.3 Utilities Sign-Off Block

All construction plans shall have a Utility Sign-Off block on the Cover Sheet. This block also serves as the City Engineer’s final approval sign off for the construction plans. The sign off block shall appear as follows:

UTILITY	AGENCY	APPROVED BY	DATE
POWER			
TELEPHONE			
GAS			
CABLE TV			
U.S. POST OFFICE			
IRRIGATION			
DOMESTIC WATER			
SANITARY SEWER			
STORM DRAINAGE			
STREETS			
CONSTRUCTION AUTHORIZED TO PROCEED WITH APPROVED PLANS			

BY _____ TITLE _____ DATE _____

202.4.0 Plan and Profile Sheet Elements

202.4.1 Graphic Scale and North Arrow

All scales on the plans shall be illustrated graphically so that a true representation is produced when the plans are reduced in size. Every plan drawing shall include a North arrow. The north arrow should be directed to the top or to the left on the plan sheets.

202.4.2 Plan of Water Main

Plan drawings shall show the location of water mains. These drawings shall include waterline stationing (increase from left to right across sheet where possible); line bearings in easements only; curve data; angle points and their stations (show deflection and angles, right or left moving up station); show and station line valves, fire hydrants, blow-offs, sampling and chlorination points, air and vacuum valves and/or other miscellaneous appurtenances; water service lines; street or roadway center lines; curb lines, boundary lines, and names; lot boundary lines, numbers, and elevations. Show all water line easement boundaries and locate any prominent surface feature or structure.

202.4.3 **Underground Pipes and Utilities**

Show and label on the plans and profile the size and ownership of all existing underground utilities that cross or parallel the water main. Non-existing, but planned improvements for underground utilities shall also be shown. Any pipe line two (2") inches or more in diameter, which crosses the water main and especially water, sewer, storm drains, open channels, gas, irrigation, telephone, power, and cable lines, shall be shown and labeled on the profile with station and elevation.

202.4.4 **Profile of Water Main**

The profile portion of the waterline drawings shall show existing and proposed ground and/or street surface profiles with appropriate designations of actual surface elevations. For all water transmission mains, and other important water lines as designated by the Director, the profile shall contain the maximum and minimum Hydraulic Grade Lines (H.G.L.) for waterline shown. The profile shall show the waterline, its size, material makeup, pressure class, stationing, and grade. For waterlines 12-inches in diameter and smaller, the engineer may show top of pipe only. For waterlines 14-inches in diameter and larger, show both top of pipe and invert. On the profile show and locate all line valves, fire hydrants, blow-offs, air and vacuum valves, center lines of intersecting streets and other appurtenances with both station and elevation where applicable. At every change in pipe slope and in vertical curves, show elevations to top of pipe. The type of bedding and encasement required to carry loads on the pipe shall also be shown and specified. Show the elevations to nearest 0.01 foot of top of pipe.

202.4.5 **Map Legends**

Shall be shown on plans and as shown on City Standard Drawings #201 or equivalent.

202.5.0 **Drawings of Record**

For all water mains under streets, regardless of alignment or slope, the developer's engineer shall determine "record" elevations at the top of the pipe centerline at each change in pipe grade and shall provide a written record of such elevations to the inspector.

203 **Waterline Design**

203.1.00 **Waterline Location and Alignment**

203.1.1 **Water Main Location in Roads or Streets:**

The centerline of water mains shall be located in public streets parallel to and five feet east of the west curb line and five feet south of the north curb line wherever possible.

203.1.2 **Curved Water Main Requirements:**

In curved streets the water main shall not cross the centerline, but shall follow the street curvature by means of joint deflection and fabricated bends.

203.1.3 Joint Deflections for Curved Water Main

The maximum deflection of a curved water main shall not exceed that recommended by the pipe manufacturer. Appropriate bend fittings shall be placed at locations where joint deflection would exceed that recommended by the pipe manufacturer.

203.1.4 Water Main Location in Private Property

Easements shall be entitled "City Waterline Easement" and shall be a minimum of 20 feet in width, unless otherwise approved by the Director. City Utility Easements shall conform to the requirements set forth in City Ordinance No. 5197. Two or more utilities in a combined utility easement shall require additional width.

The water main shall be centered on the centerline of the easement except otherwise approved by the Director.

Where easements follow common lot lines, the full easement width shall be on one lot, in such a manner that walls, trees or other permanent improvements will not obstruct access to waterlines. Where this requirement cannot be met without interfering with existing buildings, easements may straddle lot lines, but the water main shall not be located on the lot lines. All easements must be accessible and be constructed with all weather drivable surfaces.

203.1.5 Water Mains in Private Streets

Water mains are not allowed in private streets unless they are to be used to supply flows to fire hydrants required by the Grants Pass Public Safety Dept. or to provide interconnectivity to waterlines in adjacent streets as required by the Director. Meters must be located within the right-of-way of a public street unless an alternative location is approved by the City Manager or his designee.

203.1.6 Waterline Separation from Other Utilities

The minimum horizontal separation from other utilities shall be 3 feet measured from edge to edge. The minimum vertical separation from other utilities shall be 6 inches. The minimum horizontal separation from city structures (i.e. manholes, catch basins, etc.) is 18 inches measured from edge to edge. The minimum horizontal separation from all other structures shall be 3 feet.

203.1.7 Water/Sanitary Sewer Separation

(See Oregon Administrative Rules, Chapter 333, of the Oregon Department of Human Services Drinking Water Program)

Water main lines shall be located at least ten (10') feet edge to edge horizontally from sanitary sewer main lines and laterals. Crossings of sewer and water main lines shall be made at approximately 90 degrees. Water main lines shall be designed so that water line has 18" of vertical clearance over the sewer line. If it is impractical to achieve 18 inches of vertical

clearance over the sewer line, the waterline shall be designed to go under the sewer line with 18 inches of vertical clearance AND:

The material for the sewer line shall be PVC pressure pipe (ASTM D-2241, SDR 32.5), ductile-iron Class 50 (AWWA C-51), or other acceptable pipe, with watertight joints. A full 18-foot length of this sewer pipe shall be centered over the waterline (no joints within 9 feet of the crossing). See GPDS #307 for details. This sewer pipe replacement requirement also applies to any waterline that will cross OVER a pressurized sanitary sewer.

In situations where there is an existing sanitary sewer and the installation of a new waterline crosses the sanitary sewer, the separation between the two shall be as follows:

(A) Where the water line crosses over the sewer line but with a clearance of less than 18", the sewer line shall be exposed to the sewer line joints on both sides of the crossing to permit examination of the sewer pipe. If the sewer pipe is in good condition and there is no evidence of leakage from the sewer line, the 18" separation may be reduced. However, in this situation, the contractor must center one length of the water line at the crossing. If conditions are not favorable or there is evidence of leakage from the sewer line or if the sewer is not a plumbing code sewer approved material, the sewer line shall be replaced with a full length of pipe centered at the crossing point of PVC pressure pipe (ASTM D-2241, SDR 32.5), ductile-iron Class 50 (AWWA C-51), or other acceptable pipe. The sewer couplers shall be City standard Romac SS1 per GPSD 307.

(B) Where the water line crosses under the sewer line, the contractor shall expose the sewer line for examination as indicated in (A). If conditions are favorable and there is no evidence of leakage from the sewer line, the sewer line may be left in place but must be supported with a steel or reinforced concrete beam or other means of preventing settlement when it spans the water line trench, and special precautions must be taken to assure that the backfill material over the water line in the vicinity of the crossing is thoroughly tamped in order to prevent settlement which could result in the leakage of sewage. In this situation, the contractor must center one length of the water line at the crossing. If conditions are not favorable or evidence of leakage from the sewer line is found or if the sewer is not plumbing code sewer approved material, the contractor shall reconstruct the sewer line per provision (A).

(C) The Engineer is responsible for the decision matrix in (A) and (B). The contractor shall notify the Engineer in cases of (A) and (B). In no cases shall the contractor make this decision.

203.2.0 Structural Requirements

203.2.1 Buried Facilities

All structures, pipe, backfill, and trench restoration shall be of sufficient strength to support with an adequate factor of safety, an HS-20 truck loading with impact. Calculations showing factor of safety may be required by the City Engineer.

203.2.2 Other Utilities and Structures

Water Standards
City of Grants Pass

Water lines designed to cross under other pipes or structures shall be protected from damage and shall be constructed so as not to endanger the other pipe or structure. The Engineer shall clearly indicate acceptable methods for protection of other utilities and structures.

203.2.3 Flexible Joints

Flexible joints that allow for differential settlements or other movements of water pipe, facilities, adjacent pipe, and adjacent structures shall be provided where waterlines enter encasements or other structures. Flexible joints shall be within three feet of such structures or as otherwise designed by the Engineer. The flexible joint shall be constructed using an approved deflective joint assembly. A pipe bell and spigot is not considered a flexible joint.

203.3.0 Water Service Assemblies Design

203.3.1 Water Service Location

All service meters shall be located in the serviced property's improved adjacent Right of Way. Service meters will not be allowed in easements. Wherever possible, all service meters shall be installed in the sidewalk per GPSD # 203. No service shall be installed closer than 5 feet to a front property corner. Locations of meter boxes shall avoid driveways and roof drains. Water service lines shall be installed in a straight line perpendicular to the waterline from the service meter. Service line taps shall not have less than 2 feet of separation between each other. In no case shall a service tap be made in a main closer than 18" to a joint or fitting.

203.3.2 Water Service Sizing

Water service and meter size shall be determined by the owner or his engineer. The aforementioned determination is not required for single-family residential units, where a 5/8" x 3/4" meter per GPSD # 203 each unit shall be standard. Meters 3" and above are to be furnished and installed by the Developers' contractor. All meters smaller than 3" shall be furnished and installed by the City.

203.4.0 Valve Location and Spacing

In general, a tee-intersection shall be valved in two directions and a cross-intersection shall be valved in three directions. Hazardous or difficult to maintain crossings, such as creek, railroad and freeway crossings, shall be valved on each side.

Line size valves shall be installed on all dead end mainlines which may be extended in the future.

Whenever possible, distribution system valves shall be located at the intersection of the main. There shall be sufficient number of valves so located that not more than four (4) and preferable three (3) valves must be operated to affect any one particular shutdown. Spacing of valves shall be such that the length of any one shutdown in high value areas (areas consisting of high density commercial, industrial and residential) shall not exceed 800 feet or 1,200 feet in other areas.

203.5.0 Main Line Tapping Sleeves

Tapping sleeves shall be used on existing main lines where it is impractical to shut down the main to install a tee and valve(s). The determination of when a tapping sleeve or a tee shall be installed shall be sole responsibility of the City.

The type of tapping sleeve shall be determined by the following three factors:

- 1) Existing main material. Any material other than ductile iron shall be saddled with a ductile iron, mechanical joint tapping sleeve.
- 2) Run/Branch differential. If the branch diameter and the run diameter differ by less than 4 inches, the existing main shall be saddled with a ductile iron, mechanical joint tapping sleeve.
- 3) Existing main diameter. If the existing main is 10 inches or less in diameter, then the mainline shall be saddled with a ductile iron, mechanical joint tapping sleeve.
- 4) In cases that (1), (2), or (3) do not apply, a stainless steel tapping sleeve may be used.

The contractor shall install the sleeve, but shall not tap the existing main.

203.6.0 Blow-Off Assemblies

These assemblies shall be located at low points and dead ends, where sediment may collect. Fire hydrants may be substituted for blow-off assemblies with adequate drainage on dedicated fire lines or if approved by the City. Design class shall be compatible with the pipeline working pressure. Blow-off shall be of the type and installed as shown on City Standard Drawing No. 205, 205-A, and 205-B. Blow offs shall be 2" on 12" and smaller water lines. Blow offs shall be 4" on 16" and larger waterlines.

On dead-end lines, a 2½" gate valve for the blow-off is required in addition to the end of the line main line valve.

Blow offs shall be designed so that the outlet is free to discharge upon opening the blow off valve. The outlet shall discharge per GPSD 205 through the curb. If no curb is available, then the blow off shall discharge to a ditch, embankment, or other acceptable discharge point. The discharge point must be designed and protected from erosion resulting from the operation of the blow-off. Outlets for discharge points shall not be below grade or subject to flooding.

203.7.0 Air and Vacuum Assemblies

In general, these combination valves shall be located at high points of the system. Additionally, they may be required in locations where there is an abrupt change in upward slope and on either side of sudden change in grade (i.e. crossing under storm drain, etc.). The assemblies shall be of the type and for the specific project installed as shown on City Standard Drawing No. 206.

203.8.0 Fire Hydrant Assemblies

Fire hydrant assemblies shall be furnished and installed by the contractor at the locations shown on the plans and as approved by the Public Safety Department and the Director. The assemblies shall be installed as shown on City Standard Drawing No. 202.

Hydrants shall be located in accordance with the requirements of the City of Grants Pass Fire Code, Ordinance #4098, and as approved by the Public Safety Fire Prevention Officer. No public or personal property such as, but not limited to, mail boxes, shrubs, etcetera, shall be located within a distance of ten (10) feet along any street, driveway, or access way, in any direction from a hydrant. Fire hydrants shall be located so that no part of any commercial building is located more than three hundred feet (300') from a fire hydrant, and no closer than forty feet (40'). No single family residence building shall be located more than five hundred feet (500') from a fire hydrant, as measured along an accessible route. Additional hydrants may be required contingent on square footage or additional requirements per the Fire Code.

Fire Hydrant Leads over 50 feet in length must be 8" diameter per GPSD # 202-A with an 8" valve located at the main and a 6" valve located within 3 to 6 feet of the hydrant.

203.9.0 Cross Connection Control Requirements

A backflow prevention device conforming to the requirements USC Foundation for Cross-Connection Control and Hydraulic Research shall be installed at any cross connection or at any potential cross connection, or as established by the Director. Installation shall conform to City Ordinance No. 4880.

203.10.0 Pressure Regulators

Pressure regulators shall be installed on all water service assemblies, on the house side of the meter, where the maximum static pressure exceeds 80 psi.

203.11.0 Thrust Restraining

Thrust forces are created in a pipeline at changes in direction, tees, dead ends, or where changes in pipe size occur at reducers. Thrust forces may also occur at other locations as designated by the Engineer for a specific project. Acceptable restraint methods include concrete thrust blocks, straddle blocks, and tie rods. The details and dimensional data for concrete thrust blocks are given in GPSD 208 and 215.

203.11.1 Mechanically Restrained Joints

Restrained joint mechanisms will be allowed only as a supplemental restraining measure to concrete thrust blocks and tie rods and will not be allowed as the sole method of thrust restraint. *Exception: When a fire hydrant lead consists of only 1 length of pipe, the use of mega-lugs or approved equal joint restraint may be used.*

203.11.2 Concrete Anchor Blocks

Slopes in excess of 20% shall incorporate the use of anchor blocks as depicted on GPSD #210.

203.12.0 Water Main Sizing

203.12.1 General Sizing

Determination and approval of public waterline sizes is the sole responsibility of the City.
Exception: Private on-site fire line diameters shall be the responsibility of the Engineer. Sizing must comply with the City's adopted Water Distribution System Master Plan by West Yost and Associates dated January 2001, and its amendments by the City.

203.12.2 Minimum Water Main Size

Public water mains shall have an inside minimum diameter of 8-inches.

203.12.3 Oversizing

Oversizing is defined as any waterline that is installed that has a diameter over 8 inches and is required by the City to effectively enhance the system in its entirety. The City may participate in over sizing water main costs subject to budgetary limitations and prior approval. Developments that are required to oversize a pipe for the sole purpose of serving their own fire flow or demand requirements, and that oversizing does not benefit the distribution system as a whole, may not receive oversizing funding. Oversizing of local system improvements and water main extensions shall be consistent with adopted City policy pertaining to over sizing of water mains.

204 System Demands

204.0.0 Fire Flow Demands

Fire flow shall be determined in accordance with City Fire Code #4098. Fire flow required for overall system design must comply with the West Yost Associates report dated January 2001.

204.1.0 Domestic Water Demands

Water needs shall be determined from maximum potential population and land use of the area to be served. For design purposes, the design domestic flow shall equal the maximum daily demand plus fire flow. In order to determine the design domestic flow, the following criteria shall be used unless otherwise approved by the Director.

1. 2.42 persons per residential unit
2. Residential average daily demand 150 GPCD
3. Peaking factors

	% of Average <u>Daily Flow</u>
Maximum Day Demand	270 (=2.7 times ADF)
Peak Hour Demand	400 (= 4 times ADF)

For commercial, manufacturing and industrial demands, the Director shall be contacted for approval of values to be used.

204.2.0 Water Main Hydraulics

204.2.1 Pressure

Water mains shall be designed so that service pressures range between 35 and 100 psi, except under fire flow conditions where a residual pressure of 20 psi is allowable. In cases where the water main pressures are above 80 psi, individual pressure regulating valves are required on the customer side of the meter connection.

204.2.2 Velocity

Water mains shall be designed to provide a mean velocity not more than five (5) feet per second under Maximum Daily Demand flow, or as approved by the City Engineer.

204.2.3 Head Loss

Water mains shall be designed to provide a mean head loss of not more than five (5) feet per thousand feet of pipe under Maximum Daily Demand flow.

204.2.4 Hazen-Williams "C" Coefficient

Pipe analysis shall be performed by assuming a value of 110 for the Hazen-Williams "C" coefficient.

205 Design Criteria for Pump Stations

205.0.0 General Criteria

Pump station design shall comply with recommendations contained in "Engineering Report of the Water Distribution System for the City of Grants Pass", dated February 11, 1979, and requires approval of the Director. In addition, design of pump stations shall take into consideration the guide lines and recommendations contained in "Water Distribution System Master Plan", dated January, 2001, and as compiled by West Yost & Associates, and as approved by the Director. Pump stations shall also comply with resolution No. 3964.

205.1.0 Firm Capacity

It is required that each pump station be redundant with at least two pumps. The pump station shall be able to deliver the flow required with the largest flowing pump out of operation.

205.2.0 Storage Equalization vs. Continual Boosting

Firm Capacity and pumping rates will vary depending on whether or not the pump station is pumping into a zone with adequate storage capacity.

If the zone is equipped, or will be at the time of the pump station construction, with adequate storage capacity the firm capacity pumping rate shall be capable of pumping the maximum daily flow plus that flow necessary to replace one full fire flow storage in a period of 16 hours.

If the zone is not equipped with adequate storage capacity, the firm capacity of the pump station shall be capable of pumping the peak hour demand for that service area plus the maximum expected fire flow rate expected in that zone.

205.3.0 Pump Station Metering

Water meters shall be installed in all pump stations.

205.4.0 Surge Protection

All pump stations shall be adequately protected against surge pressures. At no time will the pressure be allowed to rise above the working pressure of any part in the pump station.

205.5.0 Pump Station Control

Adequate controls and telemetry shall be provided to monitor and control the following operations of all pump stations from both the remote site and the water treatment plant:

- Pressures, both suction and discharge
- Flow rates
- Flow totalizing
- Pump alternation, equal alternation is mandatory
- Intrusion Alarm
- Smoke Alarm
- Power Interrupt

205.6.0 Telemetry

All pump stations shall be equipped with telemetry, both at the remote site and the water treatment plant, compatible with City system telemetry.

205.7.0 Hydropneumatic Tanks

All pump stations without storage shall be equipped with hydropneumatic tanks to help stabilize zone pressures and save pumping costs. All hydropneumatic tanks shall contain an internal bladder.

205.8.0 Backup Power

All pump stations shall be equipped with an emergency generator of sufficient capacity to operate the station at its rated capacity.

205.9.0 Pump Station Site

The pump station site shall be designed and constructed to all applicable ordinances. Adequate security measures shall be installed per the Homeland Security Vulnerability Assessment. All pump stations shall be constructed on lots that shall be deeded to the City of Grants Pass. All sites shall have adequate, security fencing, parking, drainage, and landscaping. All utilities shall be designed such as suction and discharge piping, power, gas, etc.

206 Design Criteria for Storage Facilities

206.0.0 General

Design of storage facilities shall take into consideration the guide lines and recommendations contained in "Water Distribution System Master Plan", dated January, 2001, and as compiled by West Yost & Associates, and as approved by the Director.

SECTION 300 MATERIALS

301 General Requirements

301.0.0 General Requirements

Unless otherwise specified on the plans or in the special provisions, all materials shall be new and in new unblemished condition.

301.1.0 AWWA References

1. C104 Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water
2. C110 Gray-Iron and Ductile-Iron Fittings, 3-inch through 48-inch for Water and Other Liquids
3. C111 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
4. C115 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges
5. C151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water and Other Liquids
6. C153 Ductile Iron Compact Fittings 4 inch through 12 inch for Water and Other Liquids
7. C504 Rubber Seated Butterfly Valves
8. C509 Resilient-Seated Gate Valves, 3 inch through 12", for Water and Sewage Systems
9. C600 Installation of Ductile-Iron Water Mains and their Appurtenances

301.2.0 Quality Control of Materials

The quality control of materials shall conform to the applicable sections of the Oregon Standard Specifications for Construction and the American Water Works Association (AWWA).

301.3.0 Submittals

At least two weeks prior to beginning construction, submit to the City two copies of manufacturer's standard drawings, catalog cuts, specifications, and data sheets for all materials and specific equipment for approval.

302 Mainlines and Appurtenances

302.1.0 Water Mains

Water lines shall be ductile iron pipe conforming to ANSI/AWWA C151/A21.51, ANSI Thickness Class. Under normal laying conditions, water mains shall be Class 52 for 4" up to 10" and Class 50 for 12" up to 16". Water mains 20" and larger pipe shall be as directed. All flanged pipe shall be Class 52. Severe conditions may require a heavier class. Ductile iron pipe shall be standard thickness cement lined forming to ANSI/AWWA C104/A21.4. Joints shall conform to AWWA C111/A21.11-00 for push-on rubber gasket joints and shall be Tyton® or approved equal. Unless otherwise noted in the Detail Specifications, the pressure rating shall be 350 p.s.i. minimum. Joint gaskets including gasket lubricant shall be furnished with the fittings.

302.2.0 Mechanical Joint Fittings

All fittings (i.e. bends, tees, crosses, reducers, couplers, plugs, caps, etc.) shall conform to ANSI/AWWA C153/A21.53. Joints shall conform to ANSI/AWWA C111/A21.11 . Joint accessories shall be alloy steel.

302.2.1 Mechanical Joint Restraint Glands

Joint restraint glands used for thrust anchorage shall be ductile iron Megalug, as manufactured by EBAA Iron, Ford 1400 Series, or approved equal.

302.3.0 Flanged Fittings

Flanged fitting bodies shall conform to ANSI/AWWA C110/A21.10. The flanges shall conform to ANSI/AWWA C111/A21.11.

302.4.0 Valves

302.4.1 Gate Valves

All valves 2” through 12” shall be the resilient seat type, open counter-clockwise, non-rising stem with "O" ring packing, conforming to ANSI/AWWA Standard C509. All internal ferrous surfaces shall be fully epoxy-lined.

302.4.2 Butterfly Valves

All valves 16” and larger shall be rubber seated butterfly valves conforming to ANSI/AWWA C504, Class 150B, short body with direct burial operators equipped with a 2" square nut and shall open by turning to the left (counter-clockwise). Butterfly valve class shall be in accordance with the pressure conditions for the particular installation and velocity conditions, which shall be the maximum velocity with a wide-open main break downstream from the valve.

302.5.0 Valve Boxes

Valve boxes to be used with direct burial gate and butterfly valves shall be three-piece sliding adjustable type consisting of a top section, cover and riser pipe. The cover and top section shall be cast or ductile iron non-flanged slip-type Olympic Foundry model 931 or Tyler 6850 Series with no substitutes. The cover and top section shall be 15" or longer and 6" inside diameter. The cover shall be labeled "Water", shall be stamped “931” if model 931, and shall have a 1-1/2” shoulder length. The riser pipe shall be 5” schedule 40 PVC.

302.6.0 Valve Accessories

When the valve operating nut is in excess of 24” below finish grade, an approved valve extension stem shall be provided to create an operator depth of 18" to 24”. Valve Extension Stems shall have one 2" socket to fit over the valve nut, a 1” cold rolled round bar stock shaft, a 4-1/2” diameter 1/8 inch steel plate collar at the top to keep the extension centered in the valve box, and a 2” nut that can be operated with a 2” valve wrench at the top. See GPDS # 217.

302.7.0 Fire Hydrants

All fire hydrants shall be: Clow Medallion, Mueller Centurion, Kennedy Guardian, or Watrous. All hydrants shall be installed per GPSD #202, # 202-A, and the following specifications:

- (a) Be of the compression type, opening against the pressure, conforming to AWWA Standard C-502-80, or latest revision thereof.
- (b) Have a main valve opening measuring at least 5-1/4", and shall be furnished with two 2-1/2" hose nozzle connections and one 4-1/2" pumper nozzle connection with left hand national standard threads (Counter clockwise) equipped with a 1/2" pentagon operating nut.
- (c) Be of the break-a-flange traffic design with a breakable coupling on the operating stem.
- (d) Drain way shall be bronze including seat ring and drain ring.
- (e) The inlet shoe or base shall be epoxy lined.
- (f) All internal bronze components shall contain a maximum zinc content of 16%.
- (g) Inlet size shall be 6".
- (h) Shall be factory painted school bus yellow.
- (i) Certificate of Compliance shall be furnished covering all the above specifications.
- (j) Any fire lead over 50 feet in length must be 8" diameter, installed with an 8" gate valve at the main and a 6" gate valve located within 3 to 6 feet of the hydrant.

302.8.0 Tapping Sleeves and Valves

Where specified on existing mains, tapping sleeves shall either be:

- A) Ductile Iron-Mechanical Joint; Mueller Co. model no. H-615; or equivalent.
- Or;
- B) Stainless Steel; Romac Industries model no. SST, SST-DB, and SST-III; or equivalent.

Tapping sleeve type shall be determined by Section 203.5.00. All tapping sleeves shall be factory equipped with a test plug.

Tapping valves shall be 250 psi working pressure, resilient seat, non-rising stem with square operating nut (turned counterclockwise to open), "O-ring" packing, with flanged by mechanical joint end (FLG x MJ); Mueller A-2370-6 or H-687; or equivalent.

A precast concrete block shall be provided for the tapping valve to sit on when using a stainless steel tapping sleeve.

302.9.0 Water Services

All materials for water services shall be as shown on GPSD's 203, 204 and 213.

302.10.0 Miscellaneous Pipe and Fittings

302.10.1 Steel Pipe and Fittings

Steel pipe and fittings shall be schedule 40 and shall comply with ASTM A-53, A-733, and ANSI B1.20.1 for threading, dimensions, and pipe specifications. Steel pipe shall be galvanized. Galvanization shall be by a hot dip process. All material shall comply with ASTM B6, A-90, and ANSI/NSF 61 section 8 for low lead content. Tensile strength minimum shall be 48,000 psi.

302.10.2 Brass Pipe, Nipples, and Fittings

Brass pipe shall comply with ASTM B43-96 mill tested schedule 40. Brass nipples shall comply with ASTM B43-96, B687 and ANSI/ASME B1.20.1 for threading dimensions and pipe specifications. Brass fittings shall comply with ASTM A-B1615.

302.10.3 Copper Tubing and Fittings

Copper tubing shall be in accordance with ANSI/ASTM B88. Tubing shall be type K, soft-drawn, seamless, and annealed. Fittings to be used with copper tubing shall be Flare-Type for 2-1/2" and larger and Compression-Type for 2" and smaller. Fittings shall comply with AWWA C800-01 Underground Service Line Valves and Fittings.

302.10.4 Polyethylene Pipe and Fittings

PE-3408 polyethylene pipe and/or tubing shall conform to AWWA C-901-Polyethylene (PE) Pressure Pipe and Tubing for 1" Water Services, SIDR shall be 7. Fittings shall be Mueller "Insta-Tite" connections on the PE side; or approved equal. Use of "Grip" type ring fittings are not allowed. All polyethylene pipes shall be wrapped at a maximum of three (3') foot intervals with blue #12 gauge solid copper wire. Use of polyethylene pipe will not be allowed through contaminated soils. Use of copper pipe through contaminated soils will be required.

302.11.0 Mechanical Joint Restraint for Ductile Iron Pipe

Mechanical Joint Restraints shall be EBAA Iron Megalug® Series 1100, or approved equal.

303 Trench Materials

303.1.0 Trench Materials

303.1.1 Class “B” Backfill

Class “B” Backfill shall be ¾” – 0 crushed rock per the Standard Specifications (Oregon Standard Specifications for Construction).

303.1.2 Class “A” Backfill

Class “A” Backfill shall be approved native material per the Standard Specifications (Oregon Standard Specifications for Construction). Class “A” backfill shall be considered only if optimum moisture and compaction can be achieved.

303.1.3 Controlled Low Strength Materials (CLSM)

CLSM, formerly known as Controlled Density Fill (CDF), shall be a highly flowable lean concrete mix per the Standard Specifications (Oregon Standard Specifications for Construction). Design mixes shall be supplied prior to construction.

303.1.4 Other Backfill Materials

Other backfill materials may be used only on a case-by-case basis and as approved by the City Engineer. The City will require that the contractor submit mix designs, test results, and any other pertinent information relating to the material to determine its suitability as a backfill. Any City pre-approved other backfill material may be used on a case-by-case basis only.

303.1.5 Asphalt Patching

Trench restoration shall be either ½” dense Level 2 PG 70-22 or PG 64-22 or ¾” dense Level 3 PG 70-22 or PG 64-22 (formerly known as “B” mix) Hot Mixed Asphalt Concrete (HMAC) per the Standard Specifications (Oregon Standard Specifications for Construction).

304 Miscellaneous Materials

304.15.0 Concrete

Concrete for thrust blocks and minor structures shall be Commercial Grade Concrete (CGC), class 3300 p.s.i., 1-1/2” max aggregate size, per the Standard Specifications (Oregon Standard Specifications for Construction). Absolutely no use of field-mixed concrete will be allowed.

304.16.0 All -Thread Restraining Rods

All thread restraining rods shall be ¾” high strength (ASTM A325) and be factory zinc-coated.

304.17.0 Eyebolts

Eyebolts shall be high strength alloy steel (A316 or better). Ductile iron lugs i.e. “ductlugs” are not allowed.

304.18.0 Paint

Unless otherwise specified, paint for touchup and repainting of water parts shall be lead-free.

304.18.1 Brush-on Paint

Brush-on paint shall be gloss industrial alkyd enamel designed specifically for industrial maintenance.

304.18.2 Spray-on Paint

Spray-on paint shall be two-coats of Rustoleum gloss enamel or approved equal.

304.19.0 Grease and Oil

Grease and oil used for lubricants such as, but not limited to, fire hydrant operators shall be Chevron Poly FM Food Grade Lubricant or approved equal.

SECTION 400 CONSTRUCTION STANDARDS

401 General Requirements

401.0.0 Scope

These standards are intended to describe the workmanship to be used in construction of a water system operated in the City and Urban Growth Boundary. It is presumed that the Engineer has prepared such general and special specifications as are necessary to define the nature and location of the work, contractual arrangements, payment for work, and any other matters concerning the owner and his contractor.

401.1.0 Standard Specifications

Unless otherwise noted on plans, specifications, or contained within these standards, the Oregon Standard Specifications for Construction and the American Water Works Association Standards (AWWA) shall set precedence for construction procedures and standards.

401.2.0 Safety

All construction work shall be done in conformance with the Occupational Health and Safety Administration (OSHA) regulations and standards.

401.3.0 Workmanship

All work will be done by persons experienced in the specific work required, and must be prequalified with the City of Grants Pass. All work shall be under competent supervision. All work must conform to these standards, including all referenced standards and manufacturer's recommendations, and in a first class manner. Unsatisfactory workmanship shall be immediately remedied to the Director's complete satisfaction.

401.4.0 Public Relations

The contractor shall conduct his affairs in such a manner that will cause the least disturbance to traffic and residents/businesses in the vicinity of the work. Contractor shall maintain the job site in a condition that shall bring no discredit to the City or its personnel. Contractor shall restore all affected private improvements to at least the original condition. The work areas shall be maintained in a reasonable clean state including all street areas. No tracking of rock, mud or other debris will be allowed.

401.5.0 Existing Water Facilities

Unless otherwise directed by the City, no work shall be performed on an existing facility by anyone other than the City's Water Division Personnel. Contractors at no time shall operate any valves on the existing waterline.

401.5.1 Large Main Taps

Taps 12” and larger shall be made by a prequalified, competent contractor. Approval for large main taps shall be on a case-by-case basis and only under the presence of a City inspector.

401.5.2 Fire Hydrant Extensions

When directed, the contractor may install an approved fire hydrant extension. The auxiliary valve to the hydrant shall remain open at all times.

401.5.3 Construction Water

Construction water may be obtained from the City. Contractor shall be responsible for all hookup and usage fees. Water is available from the City in two sources:

Fire hydrant connections- With prior approval from the Director, and a City-supplied hydrant meter and backflow device, the City will allow the contractor to use water from a fire hydrant.

Bulk Water Stations- Currently, the City has bulk water available at two stations.

401.6.0 Inspection

The contractor shall notify the City Engineering office forty-eight hours in advance of the start of construction, and not less than twenty-four hours in advance of each construction inspection stage. Advance noticing of construction areas needing traffic control, road closures, etc., require 4 or more working days.

1. Construction inspection stages shall include, but may not be limited to the following:
 - (a) All mainline installation. Inspection of mainlines shall be accomplished prior to placement of the pipe zone material.
 - (b) Service line installation. Inspection of service lines shall be accomplished prior to placement of the pipe zone material.
 - (c) Thrust blocking and pipe fittings shall be inspected before the placement of backfill material within the pipe zone.
 - (d) Air valve copper tubing installation for positive grade and location.
 - (e) Trench backfill construction. Trench backfill shall be inspected at the time of construction. Random testing shall be accomplished during construction on successive lifts.
 - (f) Paving construction. Final paving shall be inspected at the time of paving construction.

- (g) Pigging. A pig-flushing plan must be approved prior to construction. All pigs to be used shall be inspected by the Engineering Division Prior to placing the pig into the pipe. All pigs shall be in like-new condition. Pig flushing shall be witnessed by the City Engineering Department.
- (h) Pressure testing
- (i) Chlorinating
- (j) Flushing
- (k) Bacteriological testing
- (l) Final Completion. Prior to acceptance of the project, the Contractor shall request from the City Engineer a Final Inspection.

None of the applicable above items shall be backfilled prior to an inspection from the City. It is the Contractor's sole responsibility to notify and coordinate inspection with the City. If items are backfilled over prior to inspection, they will be required to be excavated and exposed for inspection by the City.

401.7.0 Delivery, Storage, and Handling of Materials

Contractor shall be responsible for inspecting materials delivered to site for damage. When applicable, materials shall be stored on site in enclosures or under protective coverings. Materials shall not be stored directly on ground. HDPE piping and rubber gaskets shall be stored under cover, out of direct sunlight. Pipe, fittings, valves, and other accessories shall be handled in such a manner as to ensure delivery to the job site in sound, undamaged condition. Special care shall be taken to avoid injury to coatings and linings on pipe and fittings. Damaged coatings and linings shall be repaired by the Contractor to the satisfaction of the City Engineer. Damaged materials shall be immediately removed from the jobsite or immediately and clearly marked as being "Unsuitable Material".

401.8.0 Traffic Control

Prior to construction, the contractor shall provide to the City a traffic control plan. The plan shall conform to the Manual on Uniform Traffic Control Devices (MUTCD), Chapter 6, Temporary Traffic Control. Road closures are allowed only on a case-by-case basis.

401.9.0 Construction Staking

All waterline construction shall be staked prior to construction. Construction stakes will be set parallel to the water main alignment at an offset distance and direction agreed upon with the contractor, but in no case shall construction be offset more than 10 feet. All stakes shall have information regarding the horizontal position of the waterline as well as information for grades.

Stakes will be set at no greater interval than 50 feet on straight alignments. For horizontally curved water mains the stake interval shall be 25 feet or less.

402 Installation Requirements

402.1.0 Trenching and Excavation

All utility trenches shall be constructed per GPSD 107 and 107-A.

402.1.1 Trench Width

The minimum trench width in the pipe zone must provide a clear nine inches outside the maximum outside diameter of the pipe. Extra width is required to permit the convenient placing of valves, fittings, and other accessories, and is subject to the approval of the Director. All trenches shall have a flat bottom.

402.1.2 Trench Depth

All main and service line pipe shall be laid to the depth so that the top of the pipe is a minimum of 36" below finished grade. It may be necessary to install the pipe at greater depths to avoid underground obstructions such as other utilities. Any part of the bottom of the trench excavated below the specified grade shall be filled with approved material and thoroughly compacted.

402.1.3 Open Trench

The length of the trench excavated shall not exceed 100 feet unless prior approval of the Director is obtained. Related trench construction, e.g. pavement, road gravel, concrete restoration, etcetera, shall also be completed within 800 feet of the open trench limit unless otherwise authorized. Trench that has been excavated shall be backfilled prior to the end of the day's work. All open trenches shall be kept clear of foreign debris (i.e. trench sloughing).

402.1.4 Trench Grade

The bottom of the trenches shall be graded to the specified line and grade with proper allowance for 4" of specified bedding. Grade shall not vary by more than one tenth of one foot from that shown on the plans. Any variations in grade shall be approved by the City Engineer.

402.1.5 Trench Foundation

The bottom of the trench shall be firm, stable, and capable of supporting the load of the pipe, backfill, and traffic loading. The bottom of the trench shall be compacted to 90% relative density of the native material. If the trench bottom is soft, spongy or unsuitable, trench stabilization shall be as required by the Engineer. Typically, this stabilization will be in the form of overexcavation and compaction of a free draining backfill. Dewatering of the trench may also be necessary.

402.1.6 Shoring, Sloping, and Benching

Unstable trenches or trenches in excess of 5 feet in depth shall be either shored, sloped, or benched per OSHA requirements.

402.1.7 Trench Dewatering

The contractor shall at all times provide proper means and equipment to remove and dispose of all water entering the trench excavation during pipe installation. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug or other means approved by the Engineer, and no trench water shall be permitted to enter the pipe. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

402.2.0 Mainline Pipe Installation

The construction and installation of water mains shall be in accordance with these specifications, as approved by the Engineer and as recommended by the pipe manufacturer.

402.2.1 Placing of Pipe in Trench

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe laying crew cannot put the pipe into the trench and in place without getting debris into it, the Engineer 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 the installation operations, no debris, tools, clothing, or other materials shall be placed in the pipe.

402.2.2 Handling Material

Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the contractor for the safe and convenient achievement of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench, with suitable equipment, in such a manner as to prevent damage to the pipe materials and protective coatings and linings. Under no circumstances shall pipeline materials be dropped or dumped into the trench.

402.2.3 Bell (Joint) Holes

These holes shall be dug at each joint in the bottom of the trench. These joint holes permit the entire length of the pipe to rest on the bedding material instead of just the pipe bells.

402.2.4 Cleaning Pipe and Fittings

All lumps, blisters and excess coating shall be removed from the bell and spigot ends of each pipe. The outside of the spigot and the inside of the bell shall be wiped clean and dry and free from dirt, grease and foreign matter before the pipe is installed.

402.2.5 Push-on Joint Pipe

Unless otherwise directed, pipe shall be laid with bell end facing in the direction of installation. For mains installed on appreciable slopes (20%+), bells shall (at the direction of the Engineer) face upgrade.

Ductile iron pipe with push-on type joints shall be laid and jointed in strict accordance with the manufacturer's recommendations as approved by the Engineer. There shall be no use of air power for connecting push-on joints. The contractor shall provide all special tools and devices such as special jacks, chokers, and similar items required for the installation. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer. No substitutes will be permitted under any circumstances.

402.2.6 Permissible Joint Deflection

Whenever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or plumb stems or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that approved by the Manufacturer or industry standard.

Typically the amount of deflections for full pipe lengths are as follows:

Size of Pipe	Maximum Joint Deflection In Degrees	Deflection in Inches 18 ft. Length	Approximate Radius in Feet of Curve Produced by Succession of Joints 18 ft. Length
4	5°	19	205
6	5°	19	205
8	5°	19	205
10	5°	19	205
12	5°	19	205
14	4°	15	260
16	4°	15	260
18	3°	11	345
20	3°	11	345
24	3°	11	345
30	3°	11	345
36	3°	11	345
42	3°	12*	382*
48	3°	12*	382*
54	3°	12*	382*

*20-foot length

402.2.7 Joining Mechanical Joint Pipe and Fittings

Mechanical joint ductile iron pipe and fittings shall be installed in accordance with the manufacturer’s recommendations as approved by the Engineer. The end of the pipe shall be cleaned of all dirt, mud and foreign matter by washing with water and scrubbing vigorously with a wire brush, after which the gland and gasket shall be slipped on the plain end. The ends of all rough cast iron and ductile iron pipes with rubber gaskets shall be lubricated with gasket lubricant of the type used for push-on joints.

The spigot shall be centrally located in the bell, the gasket placed in position, and the bolts inserted in the holes.

Torque ranges to be applied per the manufactures recommendations and are generally as follows:

Diameter of Bolt INCHES	Torque Range FT_LBS	Wrench Length INCHES
5/8	45 to 60	8
¾	75 to 90	10

When tightening bolts, the gland should be brought up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This shall be done by partially tightening the bottom bolt first, and then the top bolt, next the bolts at either side, and last, the remaining bolts. This cycle should be repeated until all bolts are within the required range of torque. If effective sealing is not attained at the maximum torque, the joint shall be disassembled and reassembled after thorough cleaning. Overstressing the bolts to compensate for poor installation practice shall be avoided.

402.2.8 Cutting Pipe

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workman like manner without damage to the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe. Acceptable methods of cutting ductile iron pipe are only those done by sawing, millings or using an abrasive pipe saw. The flame cutting of cast iron pipe or ductile iron pipe by means of an oxyacetylene torch shall not be allowed.

When mechanical joint or push-on pipe is cut in the field, it shall be cut as recommended by the pipe manufacturer, and the cut end shall be beveled and dressed so that it may be used for the next joint.

402.3.0 Valves and Hydrants

402.3.1 Setting Valves and Fittings

Valves, fittings, plugs and caps shall be set and jointed to pipe in the manner hereinbefore specified for cleaning, installing and jointing pipe. Valves shall be provided with compacted crushed stone or a precast concrete pad set on the undisturbed earth for support so that the pipe will not be required to support the weight of the valve. Following installation, the valve shall be operated from the fully open to fully closed position to assure that the valve does not bind during operation. The area around valves shall be backfilled in the same manner as specified for the adjoining pipe.

402.3.2 Valve Boxes

Valve boxes shall be provided for all valves. Valve Boxes, riser pipes, and covers shall be installed per GPSD 217. Each valve box and riser pipe shall be centered along the axis of the operating nut of the valve and shall be set so as not to transmit shock or stress to the valve body. The exposed end of the valve box shall remain accessible at all times. The contractor shall be responsible for keeping the valve box and riser pipe free of rocks and other debris for the duration of the project. The contractor at no additional cost to the City shall correct any misalignment or necessary readjustment of valve boxes.

The riser pipe length shall permit adjustment in the height of the cover and top section to finished grade. The PVC riser pipe shall be appropriately “notched” and fitted so that it will fit over the valve bonnet as to not allow silt and debris into the valve box assembly.

402.4.0 Water Service Assemblies

402.4.1 Water Service Assemblies (3 inches and larger)

Services larger than 3” are to be furnished and installed by the contractor complete including the meter. The installation of the service shall be installed in accordance with GPSD #213.

402.4.2 Water Service Assemblies (2 inches and smaller)

Water service assemblies shall be furnished and installed by the contractor on all “dry” mains at the locations shown on the plans or established in the field by the Director. The contractor shall furnish all labor, materials, tools and equipment necessary to furnish and install, complete and ready for operation, the assemblies as shown on the plans and herein specified. The contractor shall perform the installation of the lot service in accordance with GPSD #'s 203 and 204. The City will furnish and install the water meter only.

402.5.0 Fire Hydrant Assemblies

Fire hydrant assemblies shall be installed per GPSD 202 and 202-A. It shall be the contractor’s responsibility to assure that required horizontal clearances are satisfied regardless of approximate distances from the main as may be noted on the plans. The contractor shall make any necessary horizontal adjustment to improperly set hydrants at no additional cost to the City. Hydrants shall

be set so that the break-a-way flange is located a minimum of 2" and a maximum of 6" above finished sidewalk, top of curb, or as approved by the Director. In all cases, hydrants shall be set plumb.

Hydrants located where sidewalks or curb and gutters are non-existing shall be installed along with a fire hydrant access per GPSD 202-B. Hydrant flanges shall be constructed between 2" and 6" above the access grade.

Drainage shall be provided for the hydrant by placing washed 3/4" round rock from the bottom of the trench at the base of the hydrant at least six inches above the inlet pipe.

Hydrant Adjustment Notes: If it is found after chlorination that the hydrant was wrongfully set in a horizontal location or that the hydrant flange is set too high with the final grading, the City's utility crews will reset the hydrant at the Contractor's or Developer's expense. If the hydrant flange was set too low, the Contractor may, with the Director's approval, install an approved hydrant extension. Only Contractors that are pre-approved by the Director may work on an existing hydrant.

402.6.0 Concrete Work

Concrete work shall conform to the applicable sections of the Oregon Standard Specifications for Construction latest edition, including all applicable supplements.

402.6.1 Thrust and Straddle Blocks

A concrete reaction or thrust device shall be provided on all dead ends, tees, elbows, reducers, crosses, and at any bend which exceeds the allowable deflection recommended by the pipe manufacturer. Concrete thrust and anchor blocks shall be placed at all fittings between the undisturbed ground and the fittings to be anchored. Quantity of concrete and the area of bearing of the pipe and undisturbed soil shall be as shown on GPSD 208, plans, or as directed by the Engineer.

Thrust blocks shall be formed and the concrete shall be so placed, unless specifically shown otherwise, so that the pipe joints, fittings, and bolts will be accessible to repairs. In many cases, this involves constructing a form for the concrete. All concrete shall be allowed to cure for at least 72 hours prior to applying pressure to the respective section of pipeline.

402.7.0 Trench Backfilling

402.7.1 Pipe Bedding

Pipe bedding shall be Class "B" material. Pipe bedding construction shall be per Oregon Standard Specifications for Construction Sec. 00405.45

"Spread the bedding smoothly to the proper grade so that the pipe is uniformly supported along the barrel. Excavate bell holes at each joint to permit proper assembly and inspection of the joint. Bedding under the pipe shall provide a firm, unyielding support along the entire pipe length."

The installation of pipe bedding under the pipe while the pipe rests on blocks in the trench will not be allowed.

402.7.2 Pipe Zone

Pipe zone shall be Class “B” material. Pipe bedding construction shall be per Oregon Standard Specifications for Construction Sec. 00405.46 (b).

“As required under the haunches of pipe and in areas not accessible to mechanical tamper or to testing, compact with hand methods to ensure intimate contact between the backfill material and the pipe or structure. Provide thorough compaction.”

402.7.3 Backfilling

Backfill with specified material. Backfill construction shall per Oregon Standard Specification for Construction Sec. 00405.46.

402.8.0 Trench Restoration

Trench restoration shall be in conformance with GPSD 107, GPSD107-A, and per Oregon Standard Specification for Construction Sec. 00495-Trench Resurfacing.

402.9.0 Painting

The contractor shall furnish all labor, materials, tools and equipment necessary to provide finished painted surfaces as indicated herein and on the plans and/or specifications.

Contractor shall be required to prepare surfaces to the paint manufacturer’s recommendations. If no recommendations are available, surfaces shall be cleaned free of dirt, grease, moisture, oil, mildew or any other contaminant that would cause paint not to adhere to the part being painted. Glossy surfaces shall be sanded to dull. An appropriate paint primer shall be applied prior to painting.

Color shall be as specified or shall match existing during touch-up work.

All other paint requirements shall be designated on the plans and/or specifications.

SECTION 500 WATERLINE TESTING AND STERILIZATION

501 Testing and Sterilization

501.0.0 General

The specifications constituting this section designate the requirements for the procedure, materials, and performance for testing and sterilization of water mains and appurtenances intended for the conveyance of potable water under pressure.

The contractor shall furnish all labor, materials, tools and equipment necessary to perform all the operations required to complete the testing and sterilization as herein specified.

The work shall include providing complete tests and sterilization, including all chemicals and equipment.

501.1.0 Pigging

All new water lines shall be pigged prior to pressure testing and chlorination.

501.1.1 Installation of Poly Pigs

“Poly Pigs” shall be supplied and installed by the contractor during installation of the pipeline. Number, sizes and locations shall be as determined and recorded by the Engineering Division. After meeting predetermined pipe restraint requirements and after all service and disinfection taps have been made, the “poly pigs” shall be moved through the pipeline system by the use of water pressure. Flushing operations will be performed by City of Grants Pass Water Distribution Division personnel. All “poly pigs” shall be removed from the pipeline system prior to hydrostatic pressure testing and sterilization. Reuse of “poly pigs” shall be determined by the project inspector.

When inline butterfly valves are specified, pig flushing shall be performed between each subsequent valve during construction. The contractor shall be responsible providing adequate thrust protection measures for these subsequent pigging operations.

501.1.2 Poly Pig Materials

“Poly Pigs” shall be constructed of flexible open cell polyurethane foam and with a center hole to allow water to precede pig, preventing the embedding of debris . They shall be able to pass through reductions of up to 60% of cross sectional area of nominal pipe. They shall have the ability to negotiate short radius bends, ells, tees, crosses, wyes, gate valves, ball valves, multi-dimensional piping and reduced port valves. “Poly pigs” shall be a municipal series, bare type, 5-7 lbs. per cubic foot density, and generally be for a light cleaning or gauging application.

501.1.3 Joint Restraint for Pig flushing

All concrete thrust blocks shall be required to cure for a minimum of 72 hours prior to pig flushing on any segment of water line.

Upon approval by the City, the Contractor may, under special circumstances, install mechanical joint restraints for the purpose of flushing the pig immediately after construction. Typical conditions that may apply are when pigging between butterfly valves or under heavy traffic conditions where safety may be an issue. All mechanical joint restraints shall be designed and diagramed by the project Engineer and approved by the City prior to installation.

501.2.0 Pre-Testing Inspection

Prior to hydrostatic pressure testing and sterilization, an inspection shall be performed on each individual water service, blow off, and ARV, to ensure compliance with these Water Standards and Standard Drawings and use of approved fittings and materials. All sampling site locations and their installations must be approved at this time. Any corrections needed shall be completed prior to proceeding with pressure testing and sterilization. Sample points shall be located at the beginning and end of mainlines, at the end of all branches of mainlines, and at approximately 500 foot intervals.

No water shall be admitted to the new line until all thrust blocks have cured for minimum of 72 hours.

501.3.0 Hydrostatic Pressure Test

After the pipe and all appurtenances have been installed and the backfill has been placed and compacted, the pigs have been flushed, and high velocity flushing has been performed, a hydrostatic pressure test shall be conducted by the contractor. The test pressure shall be 150 p.s.i. or 1.5 times the working pressure at the test point, whichever is greater. Test duration shall be two hours. The test shall be performed to AWWA specifications, standard C-600, section 5.2.

501.3.1 Line Filling

The line shall be filled with water prior to testing. Water shall be supplied only from the City's existing potable water supply mains by City of Grants Pass Water Distribution Division personnel. While filling and immediately prior to testing, all air shall be expelled from the pipeline. Where air valves or other suitable outlets are not available for introducing water or releasing air for test purposes, approved taps and fittings shall be installed and later securely plugged.

501.3.2 Pressure Testing Procedure

All internal valves shall be open prior to beginning this test. The pressure in the pipeline shall be pumped up to the specified test pressure. The test pressure shall be determined as 150 p.s.i. or 1.5 times the working pressure, whichever is greater. When the test pressure has been reached, the pumping shall be discontinued until the pressure in the line has dropped 5 psi, at which time the pressure shall again be pumped up to the specific test pressure. At no time shall the pressure

be allowed to drop below or rise above more than 5 psi. This procedure shall be repeated until two hours have elapsed from the time the specified test pressure was first applied. At the end of this period, the pressure shall be pumped up to the test pressure for the last time. The total quantity of water pumped to maintain pressure will be measured.

501.3.3 Testing Allowance

No pipe shall be accepted if the amount of makeup water is greater than that determined by the following formula as found in AWWA C-600 Sec. 5.2:

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where:

L = testing allowance of makeup water, in gallons per hour of test

S = length of pipe tested, in feet

D = nominal diameter of pipe, in inches

P = testing pressure, in p.s.i.

501.3.4 Hydrostatic Valve Testing

In addition to determining the total testing allowance loss, all valves will be hydrostatically tested, by the contractor, to ensure valve seal integrity. Each valve shall be closed and isolated so that the test pressure as described in 501.3.2 is applied to one side of the valve only. The valve test shall be for no less than 30 minutes. Testing allowance shall be in accordance to 501.3.3 for that section of mainline that is isolated by that valve.

501.3.5 Failed Hydrostatic Tests

If for any reason the hydrostatic test fails, the contractor shall determine the problem and notify the City. The contractor shall hydrostatically retest the entire system per Sec. 501.3.0 until the loss does not exceed the maximum testing allowance.

501.3.6 Testing Equipment

501.3.61 Pressure Gauges

Pressure gauges shall read in 1 psi increments.

501.3.62 Water Loss Measuring Equipment

The contractor shall provide the City with suitable means in which to measure the water loss. In some instances such as very low allowances or when the main is very close to losing its allowable leakage, the City may require the Contractor to install an approved gallon-read water meter to measure the leakage.

501.4.0 Disinfecting Water Mains

After pressure testing and prior to acceptance of work, the entire pipeline including all valves, fittings, hydrants, service laterals, and other accessories shall be sterilized, by the contractor, in accordance with AWWA Specification C-651, which provides detailed specifications for:

1. Limiting contaminated materials from entering the water mains during construction or repair.
2. Removing by flushing contaminating materials that may have entered the water main during construction or repair.
3. Disinfecting any residual contamination that may remain after cleaning.
4. Determining the bacteriologic quality of fresh water in the main after disinfecting the main.

501.4.1 Chlorination

Only after pigging, flushing, initial water line inspection, which includes approved sampling sites, and hydrostatic pressure testing are complete, will disinfection procedures begin. At this time the contractor shall super chlorinate the lines using a sodium hypochlorite solution to a concentration between 75-200 ppm, with an optimal range of 75-100 ppm. After 24 hours the new line will be tested to show a chlorine residual of no less than 50 ppm at all sample sites. The placing of chlorinating HTH capsules or powder in pipe sections during the laying process will not be considered adequate sterilization. The minimum sterilization period is 24 hours. The recommended maximum is 48 hours. During the sterilization process, all valves, hydrants, and other accessories shall be operated.

501.4.2 De-chlorination

When all sample sites show 50 ppm or more of residual chlorine or more after 24 hours, the chlorinated water shall be entirely flushed from the line using City-supplied potable water. De-chlorination shall continue until the water in the new line matches that of the public water system both chemically and bacteriologically. After this flushing, the water will remain isolated in the new line for 24 hours.

The discharging of chlorinated water into the environment (storm sewer, land application, etc.) is strictly prohibited. The contractor, upon approval from the City, may discharge chlorinated water into the sanitary sewer. If the chlorinated water is to be discharged anywhere but the sanitary sewer, then a neutralizing chemical shall be applied to the water to be wasted in order to thoroughly neutralize the residual chlorine. Chlorine residual concentrations may not exceed 0.02 mg/l at the discharge point.

501.4.3 Bacteria Testing

Twenty-four hours after de-chlorination is complete, water samples shall be taken at all designated sample sites. Samples will be taken by City engineering or water distribution personnel. Samples shall be processed by an approved laboratory using the membrane filter

method. (Standard Methods for the Examination of Drinking Water and Wastewater, 19th Edition, Membrane Filtration Test Method 922B). All samples taken must produce a negative reading for any type of bacteria. When negative sample results are verified by the laboratory, sample trees on services will be removed, and any dedicated sample sites will be dug up by the contractor within 48 hours. City water crews will then remove those dedicated sample points and plug them with a threaded brass plug. At this time the line will be put into service.

501.4.4 Failed Bacteriological Tests

If the initial disinfection fails to produce the desired negative bacteriological results, the new water line may be re-flushed. After 24 hours the water main shall be re-sampled at all sample points. If these samples also fail to produce acceptable results, the main shall be chlorinated (501.4.1), de-chlorinated (501.4.2) and sampled (501.4.3) as before. This procedure shall be followed until all bacteriological tests pass.