

CITY OF OREGON CITY

PUBLIC WORKS

WATER DISTRIBUTION SYSTEM

DESIGN STANDARDS

RESOLUTION NO. 19-xx

ADOPTED: May xx, 2019

PREPARED BY

Public Works Department

625 Center Street

Oregon City, Oregon 97045-0304

May xx, 2019

RESOLUTION NO. 19-XX

A RESOLUTION ADOPTING UPDATED CITY OF OREGON CITY PUBLIC WORKS WATER DISTRIBUTION SYSTEM DESIGN STANDARDS

WHEREAS, the City of Oregon City operates a water distribution system in order to provide water from the lower Clackamas River to the residents of the City; and

WHEREAS, the City's water system serves over 5,500 acres of developed p[roperty within the City limits and is comprised of over 140 miles of pipelines and other facilities including fire hydrants, valves, and service lines; and

WHEREAS; the City finds it is necessary to establish and implement uniform engineering design standards for all Public Works Water Distribution System projects in the interest of health, safety, and welfare of the residents of the City of Oregon City,

NOW, THEREFORE, OREGON CITY RESOLVES AS FOLLOWS:

- Section 1. That the Commission, by this Resolution, adopts the Public Works Water Distribution System Design Standards, attached to this resolution as Exhibit "A", for application to all publicly-owned Water Distribution System improvements within the City.
- Section 2. The effective date for the Public Works Water Distribution System Design Standards shall be the date this resolution is adopted, signed, and approved.
- Section 3. The Public Works Water Distribution System Design Standards adopted by this resolution shall supersede the Public Works Water Distribution System Design Standards, as adopted June 16, 1993.
- Section 4. That the Commission, by this Resolution, empowers the City Engineer to periodically update these Standards ~~for five years~~ as needed to maintain currency with standard engineering practices and standards.

Approved and adopted at a regular meeting of the City Commission held on the day of .

~~DAN HOLLADAY~~, Mayor

Attested to this day of : Approved as to legal sufficiency:

~~Katie Riggs~~, City Recorder

City Attorney

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Effective Date: _____
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WATER DISTRIBUTION SYSTEM DESIGN STANDARDS

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SECTION I - GENERAL

1.00 PURPOSE

The purpose of these Water Distribution System Design Standards is to provide a consistent policy under which certain physical aspects of the public water distribution design will be implemented. [Most of the elements contained in this document are Public Works oriented and most are related to public improvements and City contract projects; however, it is intended that they apply to both public and private work designated herein.](#)

These Standards cannot provide for all situations. They are intended to assist but not to substitute for competent work by design professionals. It is expected that [land surveyors, engineers, and architects](#) will bring to each project the best skills from their prospective disciplines.

The Standards are also not intended to unreasonably limit any innovative or creative effort that could result in better quality, cost savings, or both. Any proposed departure from the Standards will be judged on the likelihood that such variance will produce a compensating or comparable result, in every way adequate for the user and the City resident.

1.01 GOALS

Following from the above purpose, the Standards have the objective of developing a water distribution system, which will:

- A. Be consistent with the Oregon City Comprehensive Plan, [Oregon City Municipal Code](#), ~~and~~ the Oregon City Water [Distribution System Master Plan](#), [the Oregon State Health Division Administrative Rules \(Chapter 333\)](#), the State Plumbing Code, [Clackamas Fire District #1 Oregon Fire Code Applications Guide](#), [Oregon Fire Code – Appendix B](#), the most recent edition of the AWWA Standard Specifications, the most recent revision to the ODOT/APWA Standard Specifications for Construction, and City Code Chapter 13.04;
- B. Provide sufficient capacity to maintain minimum pressure during periods of maximum use and to provide sufficient volumes of water at adequate pressures to provide the expected average daily consumption plus fire flows at a minimum energy loss;
- C. ~~Be of material strong~~ [Have sufficient structural strength](#) ~~enough~~ to resist all expected loads, both internal and external, [which may be imposed](#); and able to preserve the potability of the water supply; ~~and~~
- D. Be economical and safe to build and maintain.
- E. [Be of materials resistant to both corrosion and erosion, and have a minimum design life of 75 years or the maximum industry standard, whichever is greater](#);

Alternative materials and methods will be considered for approval based on these objectives.

[Whenever any conflict exists between the references in 1.01.A. and these standards, the references in 1.01.A. take precedent.](#)

1.02 REVISIONS TO THESE STANDARDS

It is anticipated that revisions to these Standards will be made from time to time. The date appearing on the title page is the date of the latest revision. Users should apply the latest published issue to the work contemplated. [The Standard Drawings referenced in Section III may be revised from time to time as deemed necessary without revision to this overall document.](#)

1.03 SHORTENED DESIGNATION

[These City of Oregon City Water Distribution System Design Standards shall be cited routinely in the text as the "Standards".](#)

1.043 APPLICABILITY

These Standards shall govern all construction and upgrading of the facilities for public water distribution system in the City of Oregon City and/or applicable work within its service areas*.

Whenever possible, distribution pipelines shall be located on public property. Where pipelines are required to pass through private property, easements shall be obtained from the property owner.

The public distribution system shall include the distribution mains, fire hydrant assemblies, and the service lines including the water meters up to the public right of way or easement. The public distribution system is owned and maintained by the City of Oregon City unless otherwise noted.

The piping from the customer's property line, or the meter where provided, to the point of water use (the building supply line) is subject to the requirements of the Oregon Plumbing Specialty Code ~~State Plumbing Code~~. The piping beyond the water meter is considered privately owned and maintained.

Fire suppression water lines are considered privately owned beyond the property line.

Permanent water distribution ~~systems~~ ~~facilities~~ shall be provided to all property (legal lots of record created by partitioning or subdivision of land as per City of Oregon City Municipal Code within the City of Oregon City in accordance with these ~~s~~Standards).

Where applicable, developing property shall provide public water distribution extension along their frontage or through their site for extension to undeveloped property.

The design of the following are considered special problems and are not covered in detail in these Standards:

- A. Water Distribution Pump Stations
- B. Reservoirs
- C. Relining of Existing Water Mains
- D. Treatment Plants
- E. Pressure Regulating Devices
- F. Flow Measurement Devices

Review and approval of the above special problems by the City Engineer shall be required. When requested by the City, full design calculations shall be submitted for review prior to approval.

*Some areas of Oregon City may be served by Clackamas River Water (CRW) in the following cases :

a. When Oregon City water does not exist and the City has allowed for connection to CRW and CRW accepts the property into their service area.

[b. When the existing service is already maintained by CRW and no redevelopment is occurring requiring the transfer to City of Oregon City water.](#)

1.054 REFERENCES

The Standards are intended to be consistent with the most currently adopted provision of:

- A. Oregon City Municipal Code
- B. Oregon City Comprehensive Plan
- C. Oregon City Water [Distribution System](#) Master Plan
- D. Oregon ~~State~~ Plumbing Specialty Code, ~~Chapter 61~~
- E. Oregon Statewide Planning Goals and Guidelines
- F. Oregon Administrative Rules, Chapter 333
- G. Referenced National Trade Standards such as AWWA, ASTM, ANSI
- H. [Appendix B of the Oregon Fire Code](#)
- I. [Clackamas Fire District #1 Oregon Fire Code Applications Guide](#)
- J. [Local Trade Standards such as ODOT/APWA](#)

1.065 STANDARD SPECIFICATIONS

The workmanship and materials shall be in accordance with the current edition of the “Standard Specifications for Public Works Construction” except where the Standards provide other design detail. These standards are prepared by the Oregon Chapter of APWA, as modified by the City of Oregon City.

1.076 DEFINITIONS AND TERMS

Air Gap Separation - A physical vertical separation ([two times the diameter of the pipe](#)) between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressurized receiving vessel.

Approved Backflow Prevention Device - A device that has been investigated and approved by the regulatory agency having jurisdiction.

As-Built Plans/Record Drawing - Plans signed and dated by the ~~Consulting~~[Project](#) Engineer indicating that the plans have been reviewed and revised, if necessary, to accurately show all known as construction details of a particular public works project.

~~Assistant City Manager - Means the Assistant City Manager for the City of Oregon City or his/her authorized representative.~~

Backflow - Backflow is the flow of water or other liquids, mixtures, or substances into the distribution pipes of a potable water supply from any sources other than its intended source. (See Back-Siphonage)

Backflow Preventer - A backflow preventer is a device or means to prevent backflow into the potable water system.

Back-Siphonage - Back-Siphonage is the flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a water supply due to a negative pressure in such pipe.

Building Official - [The Building Official of the City of Oregon City or his/her authorized representative.](#)

Building Supply - The building supply is the pipe carrying potable water from the water meter or other source of water supply to a building or other point of use or distribution to the lot. Building supply shall also mean water service. (See Customer Line)

City - The City ~~of~~ Oregon City, [Oregon](#).

City Engineer - The City Engineer of the City of Oregon City or his/her authorized representative.

Consulting Engineer - [The engineer, licensed by the State of Oregon as a Civil Engineer, under whose direction construction plans, profiles, and details for the work are prepared and submitted to the City for review and approval.](#)

Cross Connection - A cross connection is any connection or arrangement, physical or otherwise, between a potable water supply system and any plumbing fixture or any tank, receptacle, equipment, or device, through which it may be possible for non-potable, used, unclean, polluted, and contaminated water, or other substances, to enter into any part of such potable water system under any circumstance.

Customer Line - That piping connecting the meter to the building plumbing system. (See Building Supply)

Cut Sheets - Sheets of tabulated data, indicating stationings, structures, fittings, [angle points, beginning of curve, points on curve, end of curves](#), stacking offset, various elevations, and offset cuts.

Definition of Words - Wherever, in these Standards, the words directed, required, permitted, ordered, designated, or words of like importance are used, they shall be understood to mean the direction, requirement, permission, order, or designation of the City Engineer. Similarly, the

words approved, acceptable, and satisfactory shall mean by, acceptable to, or satisfactory to the City Engineer.

Distribution System - Distribution main pipelines, plumbing stations, pressure reducing stations, valves, and ancillary equipment used to transmit water from the supply source to the service line.

Double Check Valve Assembly - An assembly composed of two single, independently acting, approved check valves, including tightly closing shut-off valves located at each end of the assembly and fitted with properly located test cocks.

Double Check - Detector Valve Assembly - A line-sized approved double check valve purpose of this assembly is to provide a telltale check of the fire system showing any system leakage or unauthorized use of water.

Dwelling Unit - [A habitable living unit that provides basic living requirements including permanent cooking, and toilet facilities.](#) ~~A facility designed for permanent or semi-permanent occupancy and provided with minimum kitchen, sleeping, and sanitary facilities for one family.~~

Easement - Easements are areas along the line of all public water mains that are outside of dedicated rights-of-way, and shall be prepared on approved forms granting rights along the water line to the City.

Fire Flow – [The flow rate of a water supply, measured at twenty \(20\) pounds per square inch \(psi\) residual pressure, that is available for firefighting.](#)

Fire Hydrant Assembly - The fire hydrant piping and attached auxiliary valve.

Fire Protection Service - A connection not metered to the public water main that is intended only to extinguish fires and the flushing necessary for its proper maintenance.

Fixture Unit Equivalents - The unit equivalent of plumbing fixtures as tabulated in the Uniform Plumbing Code.

Hydrant Lead - The line connecting the fire hydrant or fire hydrant assembly to the City main.

Irrigation Service - A metered connection intended for seasonal use and delivering water that is not discharged to the sanitary sewer.

Multiple Family Dwelling - A building or portion designed thereof for occupancy by two or more families, living independently of each other.

Manufacturer's Name - Any manufacturer's name, specification, catalog number, or type used herein as specified by make and order to establish the standard requirements of the City. Other equivalent makes will be considered for approval, providing they are comparable with this established standard.

Owner - Any individual, partnership, firm, or corporation by whom the [consulting project](#) engineer has been retained or who, as a property owner, is making arrangements with the City.

Person - Individual firm, corporation, association, agency, or other entity.

Plans - Construction plans, including system site plans, water system plans, ~~and (when required)~~ profiles, cross sections, detail drawings, etc., or reproductions thereof, approved or to be approved by the City Engineer. These plans shall show the location, character, dimensions, and details for the work to be done, in which constitutes a supplement to these standards.

Potable Water - Potable water is water that is satisfactory for drinking, culinary, and domestic purposes and meets the requirements of the health authority having jurisdiction.

Premise - Any lot, parcel, or tract of land owned by a single entity.

Private or Private Use - In the classification of plumbing fixtures, “private” or “private use” applies to plumbing fixtures in residences and apartments, to private bathrooms in hotels and hospitals, to restrooms in commercial establishments containing restricted use, single fixtures, and to similar installations where the fixtures are intended for the use of a family or an individual.

~~Project Engineer - The engineer, licensed by the State of Oregon as a Civil Engineer, under whose direction construction plans, profiles, and details for the work are prepared and submitted to the City for review and approval.~~

Public or Public Use - In the classification of plumbing fixtures, “public” or “public use” applies to plumbing fixtures in commercial or industrial establishments, restaurants, bars, public buildings, comfort stations, schools, gymnasiums, and railroad stations. This use applies to fixtures placed where the public is invited or which are frequented by the public without special permission or special invitation. This use also applies to fixtures in other installations (whether pay or free) where fixtures are installed so that their use is similarly unrestricted.

Residential User - The owner, lessee, or occupant of a single dwelling unit in one structure.

Right-of-way - All land or interest therein which by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public. Within this right-of-way, the City shall have the right to install or maintain waterlines and other public utilities.

Roadway - The right-of-way dedicated, granted, used, or to be used for [transportation purposes](#) ~~vehicle movement~~.

Service Line - The line or pipe connecting the City water main to the water meter.

Single Family Dwelling - Any residential building designed to house one family.

Standard Drawings - The drawings of structures or devices commonly used ~~for~~ City public works [infrastructure](#) and referred to on the [design](#) plans. These standard drawings are included in Section III ~~V, Standard Details~~.

Streets or Roads - Any public highway, road, street, avenue, alley, way, easement, or right-of-way used or to be used for a motor vehicle, [bicycle, or other legal mode of transportation](#).

Traveled Way - That portion of the roadway for the movement of [motor vehicles, bicycles, or other legal modes of transportation](#), exclusive of the shoulder and auxiliary lanes.

Uniform Plumbing Code - The Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, current edition as revised by the State of Oregon, called the “Oregon ~~State~~-Plumbing Specialty Code.”

Water Main - The water main (street main) is a water supply pipe for public or community use.

Water Supply System - For buildings or premises, consists of the building supply pipe, the water distribution pipes, and the necessary connecting pipes, fittings, control valves, and all appurtenances carrying or supplying potable water in or adjacent to the building premises.

1.087 ENGINEERING POLICY

The engineering policy of the City of Oregon City requires strict compliance with Oregon Revised Statute 672 for professional engineers.

All engineering plans, reports, or documents shall be prepared by a registered professional Civil Engineer licensed in the state of Oregon. These documents may also be prepared by a subordinate employee under his/her direction, and shall be signed by him/her and stamped with his/her seal to indicate his/her responsibility for them. It shall be the ~~consultingproject~~ engineer's responsibility to review any proposed system, extension, and/or existing system change with the City, before engineering or proposed design work, to determine any special requirements or whether the proposal is permissible. A City approval granted on the plans or other documents, for any job, does not in any way relieve the ~~consultingproject~~ engineer of his/her responsibility to meet all requirements of the City. A City approval also does not relieve the ~~consultingproject~~ engineer of his/her obligation to protect the life, health, and property of the public. The plan for any job shall be revised or supplemented at any time it is determined that the full requirements of the City have not [been](#) met.

The City will warn a ~~an~~ [consulting](#) engineer in writing of their conduct for submitting false or inaccurate information of a material nature. The City will also advise the Oregon State Board of Engineering Examiners.

1.098 APPROVAL OF ALTERNATIVE MATERIALS OR METHODS

Any alternate material or method not explicitly approved herein will be considered for approval based on the objectives set forth in Section 1.00 PURPOSE. Persons seeking such approvals shall make ~~the request~~[application](#) in writing. Approval of any major deviation from these Standards will be in written form. Approval of minor matters will be made in writing if requested.

Any alternate must meet or exceed the minimum requirements set in these standards.

The written ~~request~~~~application~~ is to include, but is not limited to, the manufacturer's specifications and testing results, design drawings, calculations, and other pertinent information.

Any deviations or special problems shall be reviewed on a case-~~by~~~~to~~-case basis and approved by the City Engineer. When requested by the City, full design calculations shall be submitted for review with the request for approval.

1.0109 ISSUANCE OF BUILDING PERMIT

~~Building permits shall only be issued upon completion of required water improvements and Fire Department access, and acceptance by the City, unless otherwise authorized by the City Engineer. Water improvements as well as all other public infrastructure improvements are required to be completed and be accepted by the City before any building permits for connection to new single family residential dwellings can be issued.~~

Building permits may be issued for commercial, industrial, and multi-family projects once city engineering approval has been provided for the plans.

Occupancy may not be granted to a Building until all improvements are complete to the satisfaction of the City Engineer and Building Official; however, temporary occupancy may be provided if certain conditions are met as determined by the Building Official.

1.110 TRANSFER OF ENGINEERING RESPONSIBILITY

Project water plans shall always have an engineer of record performing the function of ~~consulting~~~~project~~ engineer. If the ~~consulting~~~~project~~ engineer is changed during the course of the work, the ~~C~~city shall be notified in writing and the work shall be stopped until the replacement engineer has agreed to accept the responsibilities of the ~~consulting~~~~project~~ engineer. The new ~~consulting~~~~project~~ engineer shall provide written notice of accepting project responsibility to the ~~C~~city within seventy-two hours of accepting the position as ~~consulting~~~~project~~ engineer.

SECTION II - DESIGN

2.00 GENERAL DESIGN CONSIDERATIONS

Within the limits of economic feasibility, the designed water system shall have sufficient capacity to keep variations in pressure to a minimum and provide minimum pressure of 35 psi at the highest using fixture during periods of maximum use. The water system shall also provide sufficient volumes of water at adequate pressures to satisfy the expected daily consumption plus fire flows. Normal working pressure in the Distribution System should be approximately 60 psi with a range of 40 psi to 140 psi. The minimum pressure shall be 35 psi in the building at the highest distribution point (such as a showerhead).

In general, water distribution systems should be designed to provide for maximum development of the service area with recognition of possible urban renewal, industrial expansion, and so forth.

As a condition of water service, all developments will be required to provide public water mains of sufficient size for fire protection to adjacent parcels. This shall include the extension of water mains in easements across the property to adjoining properties and across the street frontage of the property to adjoining properties when the main is located in the street right-of-way.

Velocities in mains shall normally range from ~~two~~three feet (23') to ~~four~~six feet (46') per second for average demand to a maximum velocity of ten feet (10') per second for combined average demand plus fire flow. A 20-psi residual pressure under fire flow conditions shall be maintained in the distribution system where the existing static pressure is less than 40 psi.

All materials shall be new and undamaged. No rebuilt, reconditioned, or used material will be allowed unless approved by the City Engineer. The same manufacturer of each item shall be used throughout the project.

All work and materials shall conform to the most recent edition of the ODOT/APWA Oregon Standard Specifications for public works construction as adopted and modified by the City of Oregon City.

2.01 WATER SYSTEM CAPACITY

The Water Distribution System Master Plan has been in place for the City for several years as far back as the mid-1990s. Most recently a plan was readopted in 2004 and updated in 2012 and is currently undergoing a new update in 2019~~was updated in 1995 and adopted in 1997.~~ The plan~~It~~ is subject to periodic updates. A hydraulic analysis computer model was developed as part of the Water Master Plan effort to evaluate the performance of the existing distribution system and to aid in the development of future

improvements. Hydraulic mModeling ~~was performed~~ provides capital improvement plans, financing plans, and technical memorandums aiding the City in understanding the deficiencies with the existing system, potential deficiencies caused by development, and solutions to correct or prevent those deficiencies ~~using the WATER software, developed by CivilSoft for IBM-compatible personal computers.~~

On a case-by-to-case situation, the City may ~~require~~ require a water model to analyze the operation of the existing distribution system given the required fire flow for a proposed development at the expense of the applicant. The required fire flow shall be determined by the Fire Department.

The following design criteria shall be used to determine system adequacy and recommend improvement to provide required fire flow:

Residual Pressure - 20 psi

Average Demand Velocity - 3 fps to 6 fps

Average Demand plus Fire Flow Velocity - 10 fps

The minimum fire flow required:

~~Residential – 1,000 gpm~~

~~Commercial – 1,500 gpm~~

Residential – 1,500 gpm (for 2 hours)

Office/Commercial – 3,500 gpm (for 3 hours)

Mixed Use/Schools – 3,500 gpm (for 3 hours)

Industrial – 5,000 gpm (for 4 hours)

Actual required fire flow:

Case-by-case determined by the Fire Department

For fire flow requirements see Section VIII : ~~of the UNIFORM FIRE CODE,~~
~~APPENDIX III-A: Oregon Fire Code, Appendix B~~ and the Clackamas County Fire District #1 Oregon Fire Code Applications Guide.

2.02 MAIN CLASSIFICATION

A. Supply mains (Transmission Mains)

Mains that are used for transporting water from the source of supply and catchment reservoirs to the centralized point of distribution and distribution reservoirs.

B. Feeder Mains

Mains that transport water from centralized points of distribution and distribution reservoirs, to the various points of interconnection with the grid system of mains and centralized points of consumption.

1. Primary - Those feeder mains not supplying individual consumers, but their sole purpose being to transport water from centralized points of distribution to various points of interconnection with the grid system and centralized points of consumption.
2. Secondary - Those feeder mains which serve the same purpose as any other feeder mains except that individual consumers are served by this group due to either the fact that no other main is available or that the required supply to the consumer demands a large main.

C. Distribution Mains

Those mains that are used for supplying the individual consumer. As a rule, these are the small mains in the water supply system.

2.03 WATER SYSTEM CONSTRUCTION PLANS

A. General

Complete plans and specifications for all proposed water systems improvements, including any necessary dedications and easements, shall be submitted to the ~~Community Development~~Public Works Department. The City will review these documents for compliance with this Standard and issue approval when the documents meet City Standards. Plans must receive the required approval prior to construction permit issuance and beginning of construction. See Section 2.07 for required submittal information.

Improvements shall be constructed as shown on the plans and in accordance with these Standards and Standard Drawings. Equipment and materials shall be installed in compliance with the manufacturer's recommendations, except where a higher quality of workmanship is required by the Plan Specifications and these Standards.

All materials and work shall be in strict accordance with any applicable regulations and requirements of Federal, State, and local authorities. The Contractor may be required to arrange for inspection by these agencies and submit evidence of their approval, when required or requested by the Public Works Department.

Take care to prevent damage to pipe, fittings, and other materials (not including granular material) and equipment during transportation, unloading, and final placement for installation. Manufacturer recommended product handling shall be followed to protect coatings, linings, and structural integrity of materials used in

public water system construction. Under no circumstances shall materials be dropped or dumped into the trench.

All damaged materials and equipment during construction shall be replaced or repaired to the satisfaction of the Public Works Department.

The Contractor shall maintain safe working conditions for employees, City staff, and the general public in and around trench excavations. Precautions shall be taken to avoid damage to franchise utilities, adjacent properties, existing water infrastructure, and public or private landscapes/hardscapes. If any underground utilities are damaged, report damage to Public Works Department Operations.

B. Plan Preparation

Construction plans and specifications for public water main systems shall be prepared by a professional civil engineer licensed in the State of Oregon. Plans and specifications shall be prepared in accordance with the following requirements:

1. Dimensions - Construction plans shall be clearly and legibly drawn on a 24 inches by 36 inches format with a 1½ inch clear margin on the left side and one inch (1") margins on all other ~~side~~edges unless another format is approved by the City Engineer.
2. Scale - Horizontal scale shall be not smaller than 1" = 50'; vertical scale shall be not smaller than 1" = 5' or as approved by the City Engineer. 1" = 20' shall be required when more detail is needed.
3. Form - Title Sheet, Overall Utility Plan, Erosion/Sedimentation Control Plan, Grading Plan (if applicable), Plan and Profiles, and Details.

The water can be combined with the sanitary sewer plan if the water plans are part of a subdivision, commercial development, or City project where other public facilities are involved (sanitary sewer, storm, streets). However, the ~~Consulting~~Project Engineer must ensure the notes for the sanitary sewer and water are drafted to distinguish a definite difference between the water and sanitary. For example: Surround all water notes with a cloud symbol and all sewer notes with a box symbol.

Each utility will be required to be on its own page if required by the City.

2.04 TITLE SHEET

- A. Plan view (Site Plan) of the entire project, showing street right-of-way and/or subdivision layout to a scale of 1" = 100'. A smaller scale may be used on large projects upon approval of the City Engineer. A project is too large when a minimum dimension of two inches (2") cannot be maintained between the title, system site plan, and vicinity map. [A scale of 1" = 200' may be used in this case.](#)

The site plan shall be a composite plan showing all complete properties to be served by the water system improvements and properties adjacent to and within 250 feet of those served. The site plan shall also show existing and proposed water lines, tract names and numbers, [addresses](#), and lot numbers or property owner's names and street names.

- B. Index of sheets, including a graphical index if more than one [\(1\)](#) plan sheet.
- C. Complete legend of symbols used.
- D. Vicinity Map to a scale of not less 1" = 800' showing the project locations [unless another scale is approved by the City Engineer.](#)
- E. Engineer Title Block - located in lower right hand corner or right edge of paper with scale, north point, date, drawing number, the engineer's name, address and official stamp, and where applicable, the owner/developer's name and address [as determined by current standards maintained by the City Engineer.](#)
- F. Space for City Approval Stamp, 3" X 3", preferably in the lower right hand corner (to be provided on each sheet of the plan set) [as determined by current standards maintained by the City Engineer.](#)
- G. Temporary and permanent benchmarks including their descriptions, See comment under profiles.
- H. [Current](#) City Standard Construction Notes and other special notes relating to construction methods, or include the City Standard Construction Notes in the Contract Documents with a note on the drawings so indicated.
- I. City Planning File No. -or City Capital Improvement Project No.
- J. City G.P.S. Control (See Section 2.22 As-Built Drawings/Digital Mapping Requirements).

NOTE: If all the above items cannot be located on the title sheet, a different location within the plans may be used upon the approval by the City Engineer.

2.05 PLAN AND PROFILES

A. Plan

Plan view of water system shall be to a scale of not smaller than 1" = 50' (1" = 20' shall be required when more detail is needed) unless a different scale is approved by the City Engineer and shall contain the following information in addition to the above:

1. Adjacent street curbs and property lines, edge of pavement, right-of-way and utility easements referenced to property corners, property identification (Lot number or tax number), street intersection, or section lines. Adequate two foot (2') contour lines or property corner and curb elevations to help determine if existing basements or proposed daylight basements in new subdivisions can or should be served.
2. Location of water mains, service lines, meter boxes, fire hydrants, thrust block with bearing areas, and appurtenances with each fitting and branch line stationed to facilitate coordination in locating appurtenances. The stationing shall be tied to existing property corners or street monuments with the relationship of each valve and fitting shown to the property owners or street centerline. Each line with separate designation shall be stationed continuously from 0+00 at its point of connection to another line and each service line stationed.

~~If the water plans being prepared are part of a subdivision or public road project, water lines less than twelve inches (12") will not be required to be stationed; however, adequate dimensional control shall be required.~~

3. Size, length, type of material, and class of pipe between fittings.
4. Location of existing water courses, geologic hazards, stream and railroad crossings, gas mains, culverts, sanitary and storm drains, underground and overhead power and other utilities (including but not limited to gas, electric, telephone, cable, fiber), and hydrants within 100 feet of the proposed extension. All water course crossings must show the 100 year flood plains and floodways.
5. Location of other proposed public ~~improvements~~facilities (including but not limited to sanitary sewer, storm sewer, curbs, traffic signals, street lighting, street signage).
6. Location of existing private facilities (including but not limited to driveways, retaining walls, mailboxes, trees)
7. Location of other public utilities (non-City owned)
7. Match lines with sheet number references.

87. Location and description of all known existing surveying monuments, including, but not limited to, section corners, quarter corners, donation land claim corners, and City control survey monuments. Any monuments removed or destroyed by construction shall be replaced per ORS 209.150. If a boundary control survey or plat is prepared in conjunction with the construction plans a copy shall be submitted with the construction plans for review. See Section 2.22 As-Built Drawing/Digital Mapping Requirements.

98. Location of existing water valves that would be necessary to isolate project during construction if required.

B. Profiles

Profiles for the individual water lines shall be to the same horizontal scale and preferably on the same sheet, drawn immediately below the corresponding plan view reading from 0+00 left to right. However; if spatial and clarity needs are met better by having plan and profiles on separate sheets, they may be on separate sheets. Profiles shall be required in the following instances:

1. Railroad and culvert crossings, [geologic hazard areas](#), ditch or stream crossings with elevations of the ditch or streambed and the 100-year flood elevations profile and casing details. Horizontal scale 1" = 20', vertical scale 1" = 2'.
2. Utility crossings that conflict with the proposed water line installation. Same horizontal and vertical scale as (1) above.
3. Mains installed in easements across private property. Horizontal scale 1" = 50', vertical scale 1" = 5', or other standard scale.
4. Mains 12 inches in size or larger.

Profiles shall be based on one of the following bench mark systems:

- a. City of Oregon City,
- b. ODOT, or
- c. U.S. Geodetic Survey.

Show the location and elevation of the reference benchmark and any temporary benchmarks set on the title sheet.

Profiles shall show proposed waterline appurtenances, all utility crossings, existing and proposed finished grade, line sizes, slopes, elevations at grade brakes stationing, and required minimum clearances. For mains 12 inches and larger, include backfill classification.

SPECIAL NOTE: If practicable, the ~~consulting design~~ engineer shall field locate and verify the alignment, depth, and inverts of all existing facilities shown on the plans that will be crossed by proposed facilities. City as-built records are only to be used as an aid to the ~~consulting design~~ engineers when verifying the existing facilities in the field.

2.06 WATER SYSTEM APPURTENANCES/CONSTRUCTION NOTES

A. Appurtenances

Detailed drawings shall be included for all water system appurtenances including fire hydrants, thrust blocks, valve boxes, blow offs, service installations, etc.

~~Appropriate references to City of Oregon City Standard Drawings may be used instead of details actually shown on the plans.~~

B. Construction Notes

Standard City General Construction Notes and Water Notes shall be included on the plans, or in the Construction Documents with a note on the drawing so indicating. These notes may be added to or revised, upon City Engineer approval, in order to accommodate specific projects.

2.07 PLAN SUBMITTAL, APPROVALS, INSPECTION REQUIREMENTS

A. Construction plans shall be submitted ~~in duplicate~~ to the ~~Public Works Development Services~~ Department for checking to ensure compliance with these Standards, City of Oregon City Ordinances, and good engineering practice. Submitted plans shall include the following:

~~1. _____ Developer/Engineer Agreement,~~

~~2.1. _____~~ Engineer's Preliminary Cost Estimate (or Opinion of Probable Cost),

~~3.2. _____~~ Engineering Review Checklist checked by ~~consulting project~~ engineer, and

~~4.3.~~ A tie to the City horizontal control system. Survey ties to include monuments tied and closure results.

B. Submitted plans shall also include (if applicable) the following:

1. Supplemental specifications,
- ~~2.~~ Soils report and design recommendations,
- ~~3.~~ Geotechnical report and design recommendations,
- ~~2.4.~~ Natural Resource report and design recommendations,
- ~~3.5.~~ Easement and right-of-way descriptions and sketches,
- ~~4.6.~~ A tie to the City Bench Mark systems, including closure results,
- ~~5.7.~~ Boundary control survey,
- ~~6.8.~~ Final plat, and
- ~~7.9.~~ Other material as requested by the City Engineer

C. A 2½ % plan check fee, (or the currently established fee, fee is a percentage of an approved engineer's cost estimate) will be levied at the time plans are submitted to the Engineering Division. This fee is a percentage of an approved engineer's cost estimate for all site improvements. Plans will not be checked until fee is paid.

D. Once the plans are approved and construction permit issued, the Consulting~~Project~~ Engineer for private development projects shall be responsible for providing inspection and surveying services necessary to stake and construct the project. The Consulting~~Project~~ Engineer shall prepare the as-built drawings when the project is complete.

E. The Consulting~~Project~~ Engineer preparing the plans for a privately funded public improvement project shall execute a "City of Oregon City, Developer/Engineer Agreement for Public Works Improvements". This agreement provides for the following services from the Consulting~~Project~~ Engineer:

1. Perform surveying sufficient to prepare construction plans.
- ~~2.4.~~ Prepare construction plans and specifications, and obtain approvals.
- ~~3.5.~~ Attend a preconstruction meeting.
- ~~4.6.~~ Perform construction staking and inspection.
- ~~5.7. Complete project completion tasks as outlined in Section VI.~~

F. If the Consulting ~~Project~~ Engineer is not furnishing all of the above services, the specific arrangements, i.e., subcontracting, must be supplied to the City. The name, address and telephone number of Consulting ~~Project~~ Engineer, surveyor, and contact person shall be included.

G. Should the services of the Consulting ~~Project~~ Engineer be terminated or curtailed below the specific tasks, he/she shall correspond with the City so indicating.

H. The Consulting ~~Project~~ Engineer doing inspection for a privately funded public improvement project shall follow the City's "Minimum Guidelines for Inspection/Observation of Public Works Construction ~~Inspection~~" or similar current policy.

I. It shall be the policy of the City of Oregon City to provide spot check inspection services for non-public-funded public improvements. A 2½ % inspection fee, or currently established fee, (the fee is a percentage of an engineer's cost estimate), will be collected at the time the plans are approved. This inspection fee is in addition to the plan check fee. A permit is issued for construction when the following items are provided :

1. Approved Engineering Plan,
2. Engineer's Final Cost Estimate (or Opinion of Probable Cost),
3. Accepted Geotechnical Report (if required),
4. Accepted Natural Resource Pan (if required),
5. Performance Bond,
6. Developer/Engineer Agreement,
7. Erosion Control Permit (if required),
8. Permits from other jurisdiction if working in their right of way,
9. Approval from State of Oregon Health Division (if City does not continue its program to approve plans on behalf of the State),
10. Any other permits required from any other agencies having jurisdiction on the project

J. A project becomes accepted by the City when construction is complete and the following have been completed or obtained :

1. Maintenance Bond
2. Consulting Engineer's Certificate of Completion
3. Completed Punchlist

4. Recorded Subdivision or Easement Document (when required)

K. A water main becomes fully owned and maintained by the City once it has accepted the new improvement and released the performance bond. The City will provide all locates and supervise all new taps to that main once it has been connected to the public water distribution system. The contractor is responsible for a two year period following release of the performance bond for warranty to that new watermain and is required to make repairs if the line or appurtenances fail in any way as determined by the City. If repairs are not made, the City may use the maintenance bond for any repairs.

2.08 WATER MASTER PLAN REQUIREMENTS

The City uses the current adopted Water [Distribution System](#) Master Plan to recommend improvements to the existing and future distribution system. These recommendations shall be included in the design; however, they may be modified based on updating of the [Water Distribution System](#) Master Plan or updated computer model runs for specific fire flow requirements.

2.09 PIPE MATERIALS

Pipe materials shall conform to standards listed in this section.

All water mains and services shall be designed for a cold water working pressure of ~~2~~50 psi (refer to AWWA C 150 and DIPRA Technical Bulletin “Designing for Ductile Iron Pipe”). Fittings and valves shall be specified to have a working pressure of 250 psi unless an alternative is approved by the City Engineer.

Waterlines less than 30 inches shall be ductile iron pipes cement-mortar lined and seal coated and shall conform to ASTM [A536](#), [ANSI/AWWA C151/A21.5](#), [ANSI/AWWA C104/A21.4](#), and [ANSI/AWWA C111/A21.11](#). Waterlines shall be thickness Class 52 with push-on joints. ~~Joints shall be rubber gaskets.~~ Joint and/or mechanical joint type conforming to [ANSI A21.11 \(AWWA C11\)](#). All joints shall be restrained unless approved by the City Engineer. Higher thickness class may be required where analysis indicates abnormal loading condition (see [AWWA H-3](#)).

All tees, bends, valves, and blow-off locations shall, unless otherwise noted, and approved by the City Engineer be restrained with a Mega-Lug follower, or approved equal.

Straddle blocks shall be provided on any dead end water mains.

Waterlines that are thirty inches (30") and larger, or meet other Special Conditions shall be of acceptable alternate materials that include reinforced concrete water pipe, steel

cylinder type, pre-tensioned conforming to **AWWA C303** [as approved by the City Engineer](#).

Acceptable abbreviations for showing existing types of pipe on the plans are as follows:

AC	-	Asbestos Cement
CI	-	Cast Iron
DI	-	Ductile Iron
CC	-	Concrete Steel Cylinder
PE	-	Polyethylene
PVC	-	Poly-Vinyl Chloride

A. General

Furnish the size, strength and thickness classification, the type of joints and type of materials as specified. Furnish catalog data for all materials and shop drawings for all fabricated items for approval prior to ordering or fabricating.

B. [US Made Products](#)

[All materials shall be made in the United States of America unless approved by the City Engineer. Exceptions to US Made may only be approved by the City Engineer if the product is not available in the USA or if the City Engineer determines that the lead time required will negatively affect the general public.](#)

~~C~~B. Ductile Iron Pipe

Ductile iron pipe material shall conform to ASTM [A536](#). Pipe shall be centrifugally cast, conforming to ANSI A 21.51 (AWWA C151), and shall be cement mortar lined and seal coated, conforming to ANSI A 21.4 (AWWA C 104). Pipe joints shall be mechanical, flanged, or push-on types. [All joints shall be restrained](#). Furnish gaskets and joint lubricant conforming to ANSI A 21.11 (AWWA C 111), suitable for designated pipe joint, size and pressure rating.

~~D~~G. Concrete Cylinder Pipe

Concrete cylinder pipe shall conform to **AWWA C 300**. Steel cylinder thickness, reinforcing wire diameter and spacing, and cement mortar lining and coating shall be as specified. Design shall furnish flanged, welded, or Carnegie-type push-on joints as required.

~~E~~D. Pipe Fittings and Specials

Pipe fittings and specials used with cast and ductile iron pipe shall conform to ANSI A 21.10 (AWWA C 110). Fittings shall be mortar lined, **Class 250**, and shall be mechanical, ~~restrained~~~~push-on joint~~, or flanged as required. The manufacturer's fittings and specials for concrete cylinder pipe shall be in accordance with **AWWA C**

300. Fittings may be furnished with plain ends for welding, flanged joints or ~~restrained~~~~push-on~~ joints, as specified.

Unless otherwise stated, manufacture fittings for steel pipe in accordance with **AWWA C 200 and AWWA C 208**. Furnish fittings for steel pipes that have plain ends, ~~restrained~~~~push-on~~ joints as specified or flanged ends. Protect steel pipe fittings and accessories by applying coal-tar enamel as specified in **AWWA C 203** or as otherwise specified.

All fittings shall be ductile iron conforming to ASTM A536, ANSI/AWWA C110/A21.10, ANSI/AWWA C104/A21.4, and ANSI/AWWA C153/A21.53. Fittings shall have cast upon them the manufacturer's identification, pressure rating, nominal diameters or openings, and the number of degrees or fractions of a circle for all bends. Fittings shall be coated inside with cement mortar with an asphaltic seal-coat. When specified, fittings shall be ductile iron mechanical joint (MJ) or flange joint (FLG) conforming to AWWA C153 and C110.

The maximum allowable joint deflection shall not exceed twelve (12) inches per eighteen (18) feet of laying length.

FE. Flanges and Gaskets

Provide flanges and gaskets conforming to the requirements of **AWWA C 207, Class D** unless otherwise specified, rated at 150 to 174 psi. Provide bolts and gaskets conforming to **AWWA C 207**.

GF. Mechanical Couplings

Provide ~~cast iron~~ mechanical couplings where connecting pipes are made of cast or ductile iron. Provide steel mechanical couplings where connecting pipes are made of steel or concrete cylinder pipe. Couplings shall be capable of withstanding the designated internal hydrostatic test pressure without leakage or over stressing. Coupling diameter shall be compatible with the outside diameter of the pipe on which the coupling is installed. Steel couplings shall receive corrosion protection as specified in sub paragraph **501.3.06**. Mechanical couplings shall have a minimum metal ring dimension as shown. Bolts shall be stainless steel or ductile iron compatible with the coupling used.

HG. Restrained Joint

Restrained joints and gaskets shall be used on all projects involving City of Oregon City public water in place of other joints and thrust blocks unless approved by the City Engineer. Achieve joint restraint using flanges, welded joint, joint harnesses, or other means as shown. Field welding of steel joints shall conform to **AWWA C 206**. Where joint harnesses are used, they shall consist of steel tie bolts extending across the pipe joints with lugs shop welded to the pipe barrel as shown. Joint harness assemblies shall conform to **AWWA Manual M 11**. Sized as required to withstand

the hydrostatic test pressure on the pipe. Components of joint harness shall be hot-dip galvanized after fabrication.

IH. Material for Thrust Blocks

Furnish and place thrust blocks sized as shown using Portland Cement concrete conforming to **ASTM C 94**, developing a 28-day compressive strength of at least ~~4,000~~**2,500** psi, placed as shown on the Plans per the standard detail.

J. Material for Straddle Blocks

Where straddle blocks are required, they shall use Portland Cement concrete with a minimum 28 day compressive strength of 4,000 psi per standard detail.

530.3.2. Pipe Joining

Cleaning

Before joining, all pipe contact surfaces are to be thoroughly cleaned, wire brushed if necessary, and kept clean until joining is completed. Remove all lumps, blisters, and excess coal tar coating from the bell and spigot ends of each pipe and fitting.

Mechanical Joints

All mechanical joints shall be installed with joint restraints except on cast iron pipe.

Installation of mechanical joints shall be as recommended by the manufacturer and in accordance with ANSI/AWWA C111/A21.11 Appendix A. If effective sealing is not obtained, the joint shall be disassembled, thoroughly cleaned, and reassembled.

Bolts shall be uniformly tightened to the torque values listed below or according to manufacturer's instructions, whichever is greater.

Joint Size (in.)	Bolt Size (in.)	Range of Torque (ft-lbs)
3	5/8	45-60
4-24	¾	75-90
30-36	1	100-120
42-48	1¼	120-150

The above torque loads may be applied with torque measuring or indicating wrenches.

If effective sealing is not attained by the maximum torque indicated above, disassemble the joint and reassemble after thorough cleaning. Overstressing of bolts to compensate for poor installation is not permitted.

Push-on Joints

All push-on joints shall be restrained.

Installation of push-on joints shall be according to manufacturer's recommendations and AWWA C600.

All joint surfaces shall be lubricated immediately before joining of pipe with an NSF approved joint lubricant, as recommended by the gasket manufacturer.

The Contractor shall take precaution not to damage the pipe, gasket, or fittings when pushing pipe together. Pipe spigot is to be squared with pipe bell prior to the joining process. If deflection is needed at a push-on joint, deflection shall take place after pipe is shoved home in the bell.

Deflection

Pipe deflection shall not exceed the values listed in the table below, or the manufacture's maximum allowable pipe joint deflection, whichever is less.

(18-foot pipe length)		
Pipe Diameter (inches)	Push-On Joint Maximum Deflection	
	Angle (degrees)	Offset per 18-foot pipe length (in.)
4	5	18
6	5	18
8	5	18
12	5	18
18	3	15
24	2.5	9.5

Flange Joints

Installation of flange joints shall be according to manufacturer's recommendations and ANSI/AWWA C111/A21.11 Appendix C.

Flange faces shall be flat and perpendicular to the pipe center line. Flange faces must be cleaned with a wire wheel prior to installation of the valve. Flange bolts shall be tightened in a progressively crisscross pattern, such as by first tightening the bottom bolt; then the top bolt; next the bolts on either side; finally, the remaining bolts. This process should be repeated until all bolts are sufficiently tightened. Bolts for flange fittings shall be long enough to tighten through the nut and have three threads exposed beyond the nut.

Thrust and Straddle Blocks

The Water Department will only accept concrete thrust blocking where shown on Standard Drawings or for applications where joint restraints are not feasible. Cost is not a determining factor in feasibility.

When permitted, install thrust blocking according to the Standard Drawings. Concrete shall have a slump of 2 to 4 inches and shall comply with ODOT Standard Specifications Section 2001.29 (Class 3000 – ¾-inch) “Commercial Grade Concrete”. Any field mixing of concrete must be approved by the City staff.

Concrete blocking shall extend from the fitting to solid undisturbed earth and installed so that all joints are accessible for repair. Prior to using high-early concrete for thrust blocking, the Contractor shall submit a mix design from the supplying concrete plant for City approval.

Concrete thrust restraint for vertical bends shall include embedded steel rebar hooks as shown in the Standard Drawings.

All pipe and fittings in contact with concrete shall be completely wrapped in two (2) layers of 4- mil polyethylene sheets or one (1) layer of 8-mil polyethylene prior to the placement of the concrete.

Straddle blocks installed on existing waterlines 8-inch and smaller require U.G. clamps or mid span restraint glands. Straddle blocks on waterlines 10 inches and larger require designed rebar reinforcement stamped by a registered professional engineer and approved by the Water Department.

2.10 MAIN SIZE

A. Grid System

The distribution system mains shall be looped at all possible locations to provide circulation and water quality.

B. Size of Pipe

1. 2-inch - shall not be used as part of the distribution system.
2. 3-inch - shall not be used as part of the distribution system as well as service lines and fire lines.
3. ~~6~~4-inch - may only be used on dead-end streets not requiring a fire hydrant that is less than a center line distance of 200 feet in length. This 200 feet is measured from the center of the intersecting street to the radius point of the cul-de-sac of a dead-end street. This line may not serve more than 12 residences and shall be connected to a looped minimum six-inch (6") main.

4. 8-inch - the minimum size distribution water main in residential subdivisions for the grid (looped) system. Looping of the distribution grid shall be at least every 600 feet to 1,200-foot intervals, unless otherwise approved. Also the minimum size for permanently dead-ended mains supplying fire hydrants with a fire flow less than 1,500 gpm and for secondary feeder mains in residential subdivisions. [6-inch may be used and follow this guideline if approved by the City Engineer.](#)
5. 12-inch - and larger, as required, for primary feeder mains in industrial subdivisions.
- ~~5.6.~~ [Full pipe sections shall be eighteen \(18\) feet in length unless industry standards change between updates of these standards whereby the City Engineer can approve any changes.](#)
- ~~6.7.~~ [Submit](#) exceptions to this section [may be requested](#) with rationale to the City Engineer for decision.

2.11 MINIMUM DEPTH

The standard minimum cover over buried water mains within the street right-of-way shall be thirty-six inches (36") from finish grade [to top of pipe](#).

The minimum cover for mains in easements across private property shall be thirty-six inches (36") [from finish grade to top of pipe](#).

Where the main is located in the cut or fill side slope or where mains are located in easements, finish grade shall mean at the water main alignment. The intent is to provide a minimum cover over the pipe of ~~36~~ inches in the street right-of-way and 36 inches in easements.

Deviation from the above standards will be considered on a case-by-case basis when the following circumstance exists:

Underlying rock strata - required: a request in writing to the City Engineer together with submission of a soils report with a plan and profile certifying that bed rock exists less than three feet (3') below the undisturbed ground surface.

When deviating from the standard depth, a profile shall be required.

2.12 LOCATION

A. Water Mains Within Street Right-of-Way

The standard location for water mains within public streets and roads shall be four feet (4') from the face of curb for such streets and roads under the pavement section

and preferably on the south and east sides of the street. Exceptions to these requirements may be made, to avoid conflicts with other existing underground facilities, and to permit sanitary sewers to be installed on the low sides of streets.

Mains should not be installed in alleys. As nearly as practical, mains shall be installed in a particular street with the distance from the curb line of the street varied as little as possible. On curved streets the mains may be laid on a curve provided the following minimum radius are not exceed (minimum radius was calculated using one half manufacturer allowable deflection):

PIPE SIZE - MINIMUM RADIUS	
6 inches through 12 inches	500 feet
14 inches through 16 inches	600 feet
18 inches through 24 inches	800 feet

On curved streets where mains are to be laid in straight lines, they shall be laid along the tangent between selected angle points to avoid conflicts with other utilities. The angle point of tangent section shall not be less than four feet (4') from curb face or pavement edge.

All new water pipelines under construction shall be physically disconnected from the City's existing distribution system and may only be connected after passing hydrostatic and bacteriological testing.

B. Within Easements

Mains laid in easements along property lines, with the easements centered on property- line, shall have the main and easement centerline offset ~~forty two~~^{thirty} inches (~~42~~³⁰") from the property line. The installation of mains within easements across privately-owned property is to be done only when absolutely necessary, such as avoiding dead-end conditions. Such easements, when required, shall be a minimum of fifteen feet (15') in width except that the minimum width shall be twenty feet (20') or more for transmission water mains and the conditions of the easement shall be such that the easement shall not be used for any purpose which would interfere with the unrestricted use for water main purposes. Typically 15 feet is used for placement in private roadways or parking areas and 20 feet is used when vehicular access is not normally available. Under no circumstances shall a building or structure be placed over a water main or water main easement. This includes overhanging structures with footings located outside the easement. The intent is to provide an unobstructed area in which to operate or repair equipment. Concrete pads, patios, walkways, and landscaping may be installed but is subject to removal at the property owner's expense.

Easement locations for public mains serving a [planned unit development](#)~~PUD~~, apartment complex or commercial/industrial development shall be in parking lots, private driveways, or similar open areas which will permit an unobstructed vehicle access for maintenance by City forces, and shall be located at least twenty feet (20') from the edge of existing or proposed structures.

Easement widths shall vary from the fifteen foot (15') minimum in five foot (5') increments, i.e. 15,20 feet.

All easements must be furnished to the City for review and approval prior to acceptance ~~by the City Commission~~ and recording. Standard City utility easement document forms and guidelines for preparation of descriptions and sketches shall be used.

[The easement shall be exclusive for water main s and appurtenances and not shared with other utilities or structures \(unless approved by Public Works\).](#)

C. Relation to Sewer Lines and Other Utilities

Whenever possible, mains shall be installed a minimum clear distance of ten feet (10') horizontally from sanitary sewers and shall preferably go over the top of such sewers with eighteen inches (18") of clearance at intersections of these pipes. In all instances in this section and the following sections, the distances shall be measured edge to edge. If the recommended spacing cannot be achieved, then construction standards, as outlined per the Oregon Administrative Rule Chapter 333-61-050, shall be followed. The minimum spacing between water mains and storm drains, gas lines, and other underground utilities, excepting sanitary sewers, shall be three feet (3') horizontally when the standard utility location cannot be maintained.

Where water mains are being designed for installation parallel with other water mains, utility pipe or conduit lines, the vertical separation shall be twelve inches (12") or in such a manner which will permit future side connections of mains, hydrants, or services and avoid conflicts with parallel utilities without abrupt changes in vertical grade of the above-mentioned main, hydrant or service. Where crossing of [non-sanitary sewer](#) utilities are required, the minimum vertical clearance shall be six inches (6").

[Sanitary Sewers crossing a water main shall be made at approximately 90 degrees and have eighteen \(18\) inches of vertical clearance. Otherwise, the sanitary sewer shall be constructed of ductile iron water pipe with watertight joints for a distance of nine \(9\) feet from both sides of the water line.](#)

2.13 SURFACE WATER

Surface water crossings of mains shall be over or under water depending on the location and size of the pipe.

A. Above Water Crossings

The pipe shall be adequately supported and anchored, with care taken to protect from freezing and damage, yet be accessible for repair and maintenance. All above water crossings will require the approval of the City Engineer.

B. Underwater Crossings

1. Mains crossing stream or drainage channels shall be designed to cross as nearly perpendicular to the channel as possible.
2. Where the watercourse is more than 15 feet wide, the pipe shall be of special construction with flexible watertight joints, valves shall be provided on both sides of the crossing so the section can be isolated for testing or repair, and test cocks shall be provided at the valves. The valves shall be easily accessible and not subject to flooding.
3. The following water surface crossings will be treated on a case-by-case basis:
 - a) Stream or drainage channel crossing for pipes twelve inch (12") inside diameter or greater.
 - b) River or creek crossings requiring special approval from the Division of State Lands.
4. The minimum cover from the top of pipe shall be thirty-six inches (36") to the bottom of the stream bed or drainage channel.
5. A scour pad centered on the water line will be required for mains less than twelve inch (12") inside diameter when the cover from the top of the pipe to the bottom of the stream bed or drainage channel is thirty inches (30") or less. The scour pad shall be six inches (6") thick and six feet (6') wide reinforced with (#4) bars twelve inches (12") on center both ways and shall extend to a point where a one-to-one slope, that begins at the top of the bank and slopes down from the bank away from the channel center line intersects the top of the pipe.

2.14 VALVES

A. Description

1. General

This section covers furnishing and installing the valves listed herein. The type and location of other special valves not listed herein will be specified and shown in the Plans and Special Specifications, when required. Valves shall be the same size as the mains in which they are installed. Gate valves will be used for pipe

eight inches (8") or less. Butterfly valves will be used for ~~twelve~~ inch (12") and larger pipe ~~rated for 250 psi~~.

No City of Oregon City valves shall be operated without authorization from the Public Works Department.

2. Certification

Furnish certification properly executed by the manufacturer showing compliance with the required specifications and results of test performance.

B. Materials

1. Gate Valves

Gate valves shall be ductile iron body, bronze mounted, ~~double disk~~, non-rising stem valves with O-ring seals and shall be manufactured to open when the stem is rotated counterclockwise. Provide a two-inch (2") square operating nut. Valve ends and sizes shall be as shown. All gate valves shall have resilient seats and conform to the latest revision of AWWA C 509. All gate valves shall be UL listed and FM approved.

Joint materials for mechanical joints shall conform to AWWA C 111. Joint materials for flanged joints will consist of 1/8-inch thick, full face, one piece, cloth inserted, rubber gaskets conforming to Section 7 of AWWA C 207. Bolts and nuts shall conform to section 8 of AWWA C 207.

2. Butterfly Valves

Unless otherwise specified, butterfly valves shall have ductile iron body and conform in all respects to the physical and performance requirements of AWWA C 504, short body type having operators suitable for direct burial. Furnish Class ~~2~~150 B valves unless otherwise indicated. Valves shall have a two inch (2") square operating nut which shall rotate counterclockwise to open unless otherwise specified.

The valve stem for butterfly valves shall be located on the street centerline side of the waterline unless otherwise noted on the plans or directed in the field.

3. Valve Boxes

All valves shall have a valve box for access. The valve box shall be constructed per City of Oregon City Standard Drawing 410, sized as shown in the applicable Standard Drawings, having cast iron top section and cover. Valve box extensions shall be Schedule 40 or 3034 sewer pipe 6" diameter.

Valve lids located in roadways with high-volume traffic or speed limits 35 mph and greater shall have locking lids, to prevent lid from being dislodged.

All lids shall contain the Oregon City design logo.

C. Location

Distribution system valves shall be located at the “T” or cross fitting as near as possible. Whenever a conflict exists with curbs or other physical obstructions, the valve shall be located at the intersection of the main with a property line. There shall be a sufficient number of valves located so that not more than four (4) and preferably three (3) valves must be operated to effect any one particular shutdown. Three (3) valves shall be required on a “T” intersection. The spacing of the valves shall be such that the length of any one shutdown in high value areas shall not exceed 500 feet nor 800 feet in other areas. The maximum distance between main line valves shall be 800 feet.

Generally, valves shall be installed at water main intersections in groups of three (3) for tee applications and four (4) for cross applications.

Valves shall be installed in areas adequate to allow for a 3-foot clear zone maintained around all water system valve boxes. Fencing, trees, large bushes, retaining walls, and anything else that may interfere with the operation of a water valve is prohibited within the clear zone.

Valves shall not be located within a curb, gutter, driveway, sidewalk surfaced area or ADA ramp.

Transmission water mains shall have valves spaced at not more than 2,000-foot and preferably spaced at 1,300-foot. Hazardous crossings, such as creek, railroad, and freeway crossings, shall have valves on each side.

Distribution taps on transmission mains shall not be spaced less than 1,300 feet apart where practical and shall have valves and be plugged.

D. Phased Construction

Water mains installed by phased construction, which will be extended in the future, shall terminate with a valve and blow-off. Also, see Section 2.17 (B) Blow-offs.

All developments will be required to extend mains across existing or proposed streets for future extensions by the City or other developments. All terminations shall be planned and located such that new or existing pavement will not have to be cut in the future when the main is extended.

2.15 BACKFLOW PREVENTION

General

An approved backflow prevention assembly shall be required per the City's Standard Guidelines for the Installation, Testing, and Inspection of Backflow Prevention Devices. All plans should be routed to the water quality technician for review and comment regarding cross connection control requirements. Conditions as set forth in the City Cross Connection Control Ordinance (~~Appendix A~~) will prevail in all cases

The meter user or the owner of the property shall have the assembly tested by a certified tester at least once per year. The water user or the owner of the property is responsible for the operation and maintenance of all approved backflow prevention assemblies.

2.16 FIRE HYDRANTS

A. Coverage

1. Distribution of hydrants shall be based upon the required fire flow and the area served. The Fire Department shall determine the required fire hydrant distribution based on their judgment in applying adopted fire codes. See Section VII, Uniform Fire Code, Appendix III A & B, Fire Flow, Fire Hydrants.
2. Preferred coverage shall result in hydrant spacing of:
 - 500 feet (when measured along a route accessible to vehicles) in residential areas
 - 200 to 500 feet in high-value districts including industrial subdivisions, and
 - No further than 250 feet away from any dwelling, business, garage, or building.
 - When new water mains are extended along streets where hydrants are not required for the protection of surrounding structures or other fire concerns, fire hydrants shall be provided at a spacing not exceeding 1,000 feet, for transportation hazards. When streets are provided with median dividers which cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis up to a fire-flow requirement of 1,500 gallons per minute and 400 feet for higher fire-flow requirements.

B. Location

No fire hydrant shall be installed on a water main of less than eight-inch (8") inside diameter unless approved by the City Engineer and the ~~City~~ Fire Marshal. The hydrant run shall be a minimum six-inch (6") inside diameter. Long eight-inch (8") dead-end lines to fire hydrants shall be avoided whenever possible to prevent water quality problems (stagnant water). When unavoidable, a fire hydrant shall be installed at the end of the line. Long dead-end lines over ~~30XX~~ feet shall be approved by the City Engineer. Hydrants shall be located as close to the mainline as possible and in no case shall be over ~~320~~ feet away.

Hydrant supply lines shall not exceed 30 feet in length. Hydrants shall be located:

- As near as possible to the corner of street intersections (curb returns),
- Within at least 200 feet from any cul-de-sac radius point, and
- At property lines extended into the right-of-way to not interfere with driveways.
- When possible, hydrants shall be provided on the street side closest to the water main to avoid long supply lines.
- Hydrants shall be placed within the grass parkway area of the right of way except when curb tight sidewalk (or integral sidewalk and curb). Hydrants in the grass parkway shall be located 24 inches behind face of curb and hydrants with curb tight sidewalk shall be placed at the back of sidewalk within the right of way to allow proper ADA access along sidewalk.
- When placed at mid-block locations, fire hydrants are to be installed at a common property line.
- Hydrants shall not be installed closer than five feet (5') from an existing utility pole or guy wire nor shall a guy wire or utility pole be placed less than five feet (5') from an existing hydrant.
- Hydrants shall not be installed closer than five feet (5') from any proposed or existing trees, shrubs, signs, benches, structures, etc. that would prevent access to the Fire Department.
- Hydrants shall not be located adjacent to a parking space that would prevent access to the Fire Department.
- Hydrants are to be installed in accordance with AWWA C600, AWWA Manual M17 and the manufacturer's recommendations. Hydrants shall be located as shown on the approved plans or as directed by the fire code official.

~~Approved hydrant type is Mueller 5 1/4 - 3 way, or alternatives as approved by the Public Works Department. All hydrants in a particular project shall be the same manufacture and model.~~

See 2.22~~0~~ Mobile Home Parks and 2.23~~4~~ Planned Unit Developments for locations under special conditions.

C. Hydrant

Approved hydrant type is Centurion as produced by Mueller Co., with a 5 1/4 inch opening, - three (3) port nozzles, two (2) inch hose nozzles, and four (4) inch threaded pumper nozzle, or alternatives as approved by the Public Works Department. Allowed alternatives with written approval from the Public Works Department are Clow Valve Company, Medallion Model NO. F-2545. All hydrants in a particular project shall be the same manufacture and model.

All fire hydrants shall be painted per the standard detail.

D~~C~~. Auxiliary Valve

Each fire hydrant shall have an auxiliary valve and valve box which will permit repair of the hydrant without shutting down the main supplying the hydrant. Such auxiliary valves shall be gate valves conforming to Section 2.14 B~~2~~.1~~2~~ of this Design Standard. Refer to City Standard Details for illustration.

E~~D~~. Bollards

Bollards shall be provided in parking lots and drives when the hydrant is exposed to vehicular traffic. Bollards shall be located no closer than five feet (5') to the hydrant to provide adequate room to operate the hydrant.

F. Private Fire Hydrants

The City Engineer may approve private fire hydrants in consultation with the Fire Marshall and Public Works Water Department. The owner of the private fire hydrant shall furnish the City a signed operations and maintenance agreement acceptable to the City Attorney. The owner shall pay the County recording fees for this document upon signature by the responsible City official. Backflow prevention shall be provided.

2.17 AIR RELEASE VALVES/BLOW OFFS

A. Air Release/Combination Air and Vacuum Release Valve

An air release valve or combination air and vacuum release valve shall be permanently installed at high points on all water mains ~~twelve~~¹²-inch (12") inside diameter and greater where air can accumulate. The combination air and vacuum release valve shall be used where directed by the City Engineer. In general, the combination air and vacuum release valves are used in hilly terrain rather than gentle, rolling terrain. The air release valve or combination air and vacuum release valves shall be installed in a manhole off the street where flooding of the manhole or chamber will not occur.

Mains less than ~~twelve~~¹² inch (12") diameter may make use of a service line system for release of air during construction.

~~The open end of an air release pipe from automatic valves shall extend to the top of the manhole to at least six inches (6") above grade and provided with a screened, downward facing elbow. Grade shall mean the existing ground elevation adjoining the manhole.~~ air release shall be installed per the standard detail.

B. Blow-Offs

Mains that can conceivably be extended later shall have a blow-off assembly preceded by a two inch (2") valve. The blow off shall be located within the street unless approved by the City Engineer. ~~Where curbs exist, the blow off shall be located behind the curb at least two feet (2') from the curb face.~~ Also, see Section 2.14 (D), Valves, Phased Construction.

All low points shall be provided with adequate means for flushing, either by using a fire hydrant or blow-off hydrant.

Straddle Blocks are required at all blowoff locations.

C. Chamber Drainage

Chambers or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system shall provide for drainage.

2.18 SERVICE LINES

The term "service lines" is meant to be used only for the water line extending from the distribution main to the meter, hydrant, backflow prevention device, or fire sprinkler system double check valve.

The City of Oregon City Public Works Department is responsible for serving and maintaining water pipes from the water main to the customer's side of the water meter.

Maintaining the piping between the water meter and the property being served is the customer's responsibility.

A. Sizes

1. Public service lines :

The sizes of service lines that may be used are:

1 inch
~~1 1/2 inch~~
2 inch
4 inch
6 inch
8 inch
10 inch and
12 inch.

Service lines will be reviewed for effects on the distribution system and shall not be greater in size than the distribution main.

A service line may be reused on public property if it is in good condition as determined or approved by the Public Works Department.

2. Building service lines

The minimum size water service is based on fixture counts as outlined in the current edition of the Oregon Plumbing Specialty Code as determined by the Building Official.

A service line may be reused on private property if it is in good condition on private property as approved by the Building Official.

B. Location

1. Domestic

The service lines shall be extended from the main to a point where the curb stop, meter, and meter box will be located. In new residential developments, the meter shall be located behind the curb within a distance of two feet (2'). In general, service connections shall terminate in front of the property to be served. The domestic service may come off alongside fire service (i.e., one that crosses the street) upstream (City side) from the backflow prevention device. Each lot shall be served by a one-inch (1") line reduced at the curb stop by city forces. 3/4" service lines may be re-used if existing and in good condition as determined by the Public Works Department.

It is preferred to locate the meter within the grass parkway. If no grass parkway exists, the sidewalk may be used. If construction and orientation of the structure ultimately requires the meter be placed within the driveway, the meter should be placed in the sidewalk portion of the driveway. At last resort, the meter may be placed in the driveway itself within the right of way. At no time may a meter be located in the 'wing' of the driveway. Any meter boxes placed in driveways shall be traffic rated.

2. Private Fire Service

The service line shall normally extend from the main to the property line with a valve located at the property line.

A backflow prevention device shall be placed at the property line unless an agreement signed by the City Engineer permits otherwise. Plans for such service shall include a vicinity map, adjoining street name, width, curb and property line, location of existing water line referenced to property line, and the distance to property pins where the service crosses the property line.

SPECIAL NOTE:

A pump shall not be used on a service line to provide adequate pressure to a subdivision lot or property located above the pressure level of the supply main.

C. Materials

Pipe materials shall be described on the plans and conform to requirements of this section.

~~1. Bedding and Backfill~~

~~All backfilling under streets, parking lots, driveways, and sidewalks will be ¾ inch minus crushed aggregate material.~~

~~Backfill for all other areas may consist of native materials providing that no rocks larger than three inch (3") maximum dimension or clods of soil larger than six inch (6") maximum dimension are included. No sharp objects or any other material is acceptable.~~

~~Provide imported base material under all pipe where, in the opinion of the Engineer, material satisfactory for fine upgrading and bedding the pipe is not available at the trench. Imported base material will be used principally where ground water or rock conditions make it impractical to use a lesser quality base.~~

12. Service Water Pipe and Fittings

All one-inch service pipelines with a 5/8"x3/4" or 3/4" or 1" meter shall be seamless Type 'K' soft copper water tubing conforming to AWWA C 800 Type K and ASTM B88.

The piping for ~~1 1/4-~~ and 2-inch service lines shall be 2" rigid copper tubing type L.

Each individual residential water service connection shall be equipped with a one-inch lock-wing meter stop at the inlet to the meter. Mueller-B-24258N full ball style stop H-14255, Ford BA43444WQNL KV43-332 W-G or approved equivalent.

~~All one-inch, one-angle meter stops shall be bronze with plastic pipe or flared copper connector and outlet for meter coupling. Ford Pack Joint or equivalent fittings are not acceptable.~~

~~All one-inch corporation stops shall be made of bronze with full-way bore and with inlets for Mueller threads and outlets to adopt to P.E. 3406 pipe or Type K copper tubing.~~

All 1 1/2-inch and 2-inch meters shall be equipped with a Mueller H 1423-2-99000 meter/bypass setter or acceptable equivalent and other details as shown in the Standard Drawings.

All fittings, brass and cast iron type fittings, will be used with the aid of Teflon tape or Teflon paste.

If an active cathodic protection system is encountered, Schedule 40 PVC Shall be installed as shown in the Standard Drawings.

All meter boxes will be Hubbell Quartzite or Brooks meter boxes, ~~or approved equal~~, with reinforced concrete cover and cast iron reading lids. All meter boxes will be set to grade and in line. Refer to Section 2. 2119 for type of meter boxes and standard drawing.

All A.C., cast iron, plastic, and steel pipe shall be saddle tapped. All saddles will be iron pipe ~~Mueller~~ thread made of D.I. bodied with two (2) stainless steel straps, nuts and washers.

Meter installations ~~-- one and a half~~ three-inch (1.53") and above – shall have a fabricated bypass of adequate size and lockout capability. A design drawing must be submitted showing the vault and fitting requirements, with the expected flow requirements and proposed usage.

Corporation taps can be made on the following ~~cast iron and~~ ductile iron pipe sizes. All other sizes shall be saddle tapped. (Y=yes, N=no)

C.I. & D.I.	Class	1"	1 1/2"	2"
----------------------------	-------	----	--------	----

4"	52	Y	N	N
6"	52	Y	N	N
8"	52	Y	N	N
10"	52	Y	N	N
12"	52	Y	Y	Y
14"	52	Y	Y	Y
16"	52	Y	Y	Y
20"	52	Y	Y	Y

*All cast iron pipes shall be saddle tapped.

23. Valves and Special Valves

Resilient-seated gate valves with square operating nut and a minimum rated working pressure of 200 psi shall be used for ~~1½-inch and~~ 2-inch service. All valves shall be hydro tested to 300 psi or air tested to 100 psi under water by manufacturer.

Galvanized pipe is not an approved material for underground service.

2. Service Taps

Service taps shall be a minimum of 18-inches from water main joints and fittings and minimum 18 inches from another tap. Multiple direct taps shall be staggered if installed closer than 2 feet apart.

All service wet taps must be installed by an approved tapping contractor and under the direction of a Public Works Department representative. Contact the Public Works Department for a list of approved contractors.

Service taps on 4-inch and smaller water main pipe shall be tapped through a tapping saddle. Service taps on 6-inch and larger ductile water main pipe can be directly tapped for 1-inch copper tubing, and tapped with a tapping saddle or sleeve for 1½-inch and larger meter water services.

Special sleeved taps shall be used when tapping existing cast iron water main.

D. Existing Service

It is required to maintain continuous water service to existing water users at all times. The Contractor shall schedule construction work accordingly. When it becomes necessary to shut down service to make required inter-ties or repairs, the Contractor shall notify and get shut-off date approval from the Public Works Department so affected customers can be timely notified in advance.

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If a fire system is affected, the Contractor is required to contact the approved fire code official for alternate fire protection requirements.

Water main and service shut-offs are to be coordinated through a Public Works Department representative. Customers are required to be notified a minimum of 48-hours prior for residential properties and 72-hours for commercial or industrial properties. Weekends and holidays are not to be counted as part of notification time.

2.19 BEDDING AND BACKFILL

All backfilling under streets, parking lots, driveways, and sidewalks will be ¾-inch - minus crushed aggregate material.

Backfill for all other areas may consist of native materials providing that no rocks larger than three-inch (3") maximum dimension or clods of soil larger than six-inch (6") maximum dimension are included. No sharp objects or any other material is acceptable.

Provide imported base material under all pipe where, in the opinion of the Engineer, material satisfactory for fine upgrading and bedding the pipe is not available at the trench. Imported base material will be used principally where ground water or rock conditions make it impractical to use a lesser quality base.

All trench excavation shall be in conformance with Oregon City Standard Drawing for Pipe Bedding and Backfill, and shall be classified as either rock or common excavation.

Disposal of all excavated materials shall be at an approved permitted dumpsite meeting all State and local requirements.

Pipe bedding and trench backfill may be Class A on all water lines outside public streets or outside paved areas. Trench backfill shall be Class B in all public streets or paved areas in the project as outlined in Oregon City Standard Drawing for Pipe Bedding and Backfill. The Class B backfill shall extend a minimum of three feet (3') beyond the edge of street or hard surfaced areas. CDF backfill may be required instead of Class B as applicable per Oregon City Pavement Cut Standard or as shown on plans or as directed in the field.

CDF backfill is required on all existing Arterial and Collector Streets per ODOT Standards, Section 00442 for all trench transverse or perpendicular crossings of vehicle travel lanes as well as City standard detail.

Trench backfill compaction shall be 95% of AASHTO T-180 Modified Proctor from top of pipe zone up to road base. Contract shall determine type of equipment and method to use to achieve required compaction. 95% compaction, AASHTO T-180, is required in public streets and paved areas. 85% compaction, AASHTO T-99, is required in non-paved or unimproved areas (except when future pavement or hard surface is anticipated)

Open trenches shall be strictly limited to a maximum of 100 feet within active street rights of way unless limited to a lesser amount by permit. No trenches will be allowed to

remain open overnight. Use of steel plates overnight shall be kept to a minimum and can only be used in the following ways :

- a. For Local Streets, cold or hot asphalt mix may be used with pins to firmly secure plates.
- b. For Collector and Arterial Streets, plates must be level with the pavement with no ramping of asphalt and must be firmly secured.

Utility trenches 12 feet in depth and under, a minimum of one compaction and density test at approximately one half of the trench depth is required along with one test at or near the surface. For trenches over 12 feet in depth, tests shall be at approximately 4 feet above the pipe, at the surface, and one additional test halfway between the surface and the first test. Compaction density tests shall be performed at a minimum of every 100 feet.

2.20 CONNECTIONS AND TESTING

Connection to the City's existing distribution system shall be made after passing hydrostatic and bacteriological testing and acceptance by City of Oregon City Public Works Department. Hydrostatic testing shall be monitored by City staff. Bacteriological test shall be taken by City staff who are certified Distribution Operators by Oregon Department of Human Services, Drinking Water Program. Connection of new pipelines to the existing system shall be observed by City staff.

Facilities shall be provided for the proper dewatering and disposal of all water removed from water mains and excavations to avoid damage to adjacent property.

Special care shall be taken to prevent contamination while dewatering, cutting into, and making connections with existing water pipe. Trench water, mud, or other contaminating substances shall not be permitted to enter the water pipes. The interior of all pipe, fittings, and valves installed in water connections shall be thoroughly cleaned and then swabbed, sprayed, or dipped in a 1% hypochlorite solution prior to assembly.

A. Hydrostatic Tests

The test shall conform with AWWA C600, with the exception that the test duration shall be 60 minutes with zero loss in pressure allowed. The test pressure shall be 150 psi at the highest point of elevation in any section or one and a half times the working pressure, as determined by the City. The duration and pressure shall be monitored by City staff.

A. Disinfection

Pipelines shall be flushed and disinfected before placing into service. Disinfection shall conform with AWWA C651. Super-chlorinate the new pipeline for a minimum of 24 hours, no more than 36 hours. After 24 hours the chlorine concentration must be a

minimum of 10 ppm, at which time the pipeline is flushed until residual chlorine level is met (nominal 1 ppm). Pipeline shall remain in static condition with distribution water (nominal 1 ppm chlorine residual) a minimum of 16 hours, then take two (2) bacteriological samples 15 minutes apart while leaving the water running at the sample locations. Highly chlorinated water used for disinfection shall not be discharged into the City's municipal separate storm sewer system or surface waters. Compliance with all applicable federal, state and local regulations concerning discharge of chlorinated water shall be followed. Granulated chlorine is not allowed without approval from the Public Works Department.

No chlorine shall be introduced to a new water main until the hydrostatic pressure test has been passed and accepted by City staff.

B. Wet Tapping

Connection to existing water pipe may be made by means of a wet tap. The cutting in of tees will not be permitted unless approved and signed off by the Public Works Department.

All wet taps shall be installed by a contractor approved by the Public Works Department and installed under the direction of Public Works Department representative. Contact the Public Works Department for a list of approved tapping contractors.

Wet taps 12 inches and larger require a horizontally installed butterfly valve.

C. Connection to Existing Valves

Water improvements that include connection to the City water system by means of an older existing valve may require the replacement of said valve if the valve's condition is determined by the Public Works Department to be questionable in performing the necessary pressure testing and disinfection.

2.212.19 METERS

City Water Department personnel will furnish and install **all water meters** scheduled for services inside the City of Oregon City at the request and expense of the customer.

Meter size shall be equal to the service piping size, unless supporting calculations are supplied and approved.

For ~~four~~^{three}-inch (~~4~~³") and greater service, a design drawing must be submitted showing the vault and fitting requirements, with the expected flow requirements and proposed usage.

All water meters 2-inch and smaller must be installed by the Public Works Department; 3-inch and larger meters are the responsibility of the Contractor.

A. Meter Boxes

All meter boxes for residential service (5/8"x3/4" and 1") shall be Hubbell Quazite B03111812M with Hubbell Quazite Lid PG1118WAKM50. No other meter boxes are allowed as an approved equal unless this product is no longer manufactured and the City of Oregon City Water Division approves a different product.

Unless otherwise approved, all meter boxes must be as shown:

5/8-inch x 3/4-inch Brooks	Style No. 37
1-inch Brooks	Style No. 38 or 37
1 1/2-inch Brooks	Style No. 65
2-inch Brooks	Style No. 66
3-inch and above	Pre-cast Vault from utility vault company or built to City Standards

*Brooks Style NO. 37 may be allowed if approved by the Public Works Department in cases where Hubbell is not available.

B. Location

When a curb and sidewalk is provided by a development or in the existing condition, the meter shall be located in the planter strip between the curb and the sidewalk.

When the planter strip does not exist, the location shall be determined in the field by Public Works personnel.

The meter shall not be located in the same vault with a backflow prevention device unless the topography allows and is approved by the Public Works Department.

Meters shall be located at the termination of the City service line in the public right-of-way.

1. 5/8"x3/4"~~One-inch~~ through two-inch meters

Installed in the right-of-way, as described in Section 2.18 B.1~~seven inches from back of curb, in a location that allows for easy meter reading and maintenance.~~

2. Three-inch and larger

Near the curb or in the public right-of-way to allow for easy meter reading and maintenance without entering private property. It must be accessible with a crane truck to within ten feet (10') of the installation. It must have a ten-foot (10') vertical clearance.

The meter, vault, and piping are to be protected for freezing, vandals, and vehicles. The area around the vault must be sloped in such a manner to prevent storm water from ponding over the vault.

A minimum three-foot (3') clear space or more must be provided around the vault to provide ample working space for maintenance.

C. Hydrant Meters

Water may be available for the Contractor's use from approved fire hydrants upon deposit of a cash bond from the Public Works Department. Site specific hydrants for Bulk Water usage may be allowed on a case-by-case basis, at the sole discretion of the Public Works Department. The Contractor or developer shall pick up the hydrant meter and obtain request to use water at the Public Works Operations Center. All bulk water usage shall be metered and include an approved backflow assembly when required. All water usage shall be paid by the contractor or developer prior to returning the hydrant meter and receiving the cash bond back.

2.220 MOBILE HOME PARKS

General design considerations shall conform to requirements set forth by the State Department of Human Resources, Health Division, by the Oregon State Plumbing Specialty Code (Chapter 10 and Appendixes A and E), and these design standards.

Previously introduced requirements for public water distribution mains or service lines shall apply in the design for mobile home parks subject to approval by the State Health Division.

Fire Protection

Previously introduced requirements for fire hydrants shall apply for fire protection within mobile home parks subject to the following special requirements:

- A. Each mobile home must be within a 200-foot radius of a fire hydrant.
- B. Maximum area coverage per fire hydrant shall not exceed 160,000 square feet.
- C. Minimum fire flow from each hydrant shall be 1,000 gallons per minute at 20-psi residual pressure (see Section 2.00) and maximum velocity of ten feet (10') per second in the main.
- D. The minimum main size supplying fire hydrants shall be eight inches (8") per City standard.
- E. In mobile home developments requiring more than one fire hydrant, there shall be two (2) or more connections to the main distribution system for the mains supplying the fire hydrants.

2.23~~4~~ PLANNED UNIT DEVELOPMENT (PUD)

General design consideration shall conform to requirements set forth ~~in by the State Department of Human Resources, Health Division, by the Oregon State Plumbing Specialty Code (Chapter 10)~~ and these design standards.

Previously introduced requirements in the City's Design Standard for capacity, materials, grids, valves, fire protection, service lines, and meters shall also be applicable to design within PUD areas.

2.24 ABANDONING FACILITIES

The Contactor shall seal the open ends of all pipes, fittings, etc. that are to be abandoned with an end cap, coupling, or a concrete plug with a thickness equal to the diameter of the pipe. The Public Works Department requires that all abandoned piping be severed as close to active piping as practical.

All service lines are required to be severed at the main and for the corporation stops to be capped if not required to be removed. A 4" diameter by 4" long piece of PVC pipe is to be installed over all capped corporation stops that remain as part of abandonment. All other parts of the service lines and other appurtenances are to be cut off and removed at 24 inches minimum below finish grade.

Structures (vaults, meter boxes, etc.) shall be removed completely to eliminate conflict with any future utility improvements. Abandonment of structures shall be completed only after piped systems have been properly abandoned.

Abandoned valve boxes in pavement areas shall be cut off 24 inches below grade, removed, gravel filled, and plugged with compacted asphalt. Valve boxes outside of pavement areas shall be cut off 24 inches below grade, removed, and filled with native backfill.

The Public Works Department has first claim to any removed or abandoned water materials (valves, hydrants, fittings, etc.). The Contractor shall dispose of all unwanted materials in an approved manner.

2.252 AS-BUILT DRAWINGS/DIGITAL MAPPING REQUIREMENTS

A. As-built Drawings

For the purposes of this section, as-built drawings will also mean drawings of record, record drawings, or terms indicative of an attempt to record the as-constructed state of the improvement.

Following completion of construction, the ~~Consulting~~Project Engineer shall submit ~~two (2) complete sets of mylar~~ as-built drawings in the form requested by the City Engineer. ~~It is recommended that a blackline be submitted first for checking by the City staff before sending mylars.~~ As-built drawings shall be the same size and format as the construction plans. ~~They shall be a minimum of 3-mil thick and suitable for reproduction and archives.~~ As-built drawings shall describe all revisions to the previously approved construction plans. ~~The Project Engineer shall submit a certification letter with the as-built drawings certifying the as-built drawings have been reviewed and revised, if necessary, to accurately show all known as-constructed details.~~ The ~~Consulting~~Project Engineer shall also certify that the public improvements have been completed in accordance with the City of Oregon City Public Works Standards and Specifications to the best of his/her knowledge. (This is completed with a Certificate of Completion) The words “As-Built Drawing” or “Record Drawing” shall appear as the last entry in the revision block along with the month, day, and year the as-built drawing was prepared. Submission of as-built drawings shall be made within 90 days of acceptance by the City. The cost to produce these as-built drawings shall be included in the ~~Consulting~~Project Engineer’s cost estimate for establishing the surety amount for the performance surety. Failure to submit these as-built drawings shall be grounds for withholding final release of the surety amount.

The ~~Consulting~~Project Engineer shall provide design calculations and complete test results to the City Engineer.

All as-builts shall follow the most recent version of the City of Oregon City’s “As-Built Drawing and Post Construction Survey Requirements”

The following minimum information shall be noted on water main as-built drawings:

1. Generally, the location of cleanouts, vaults, fire hydrants, blowoff assemblies, water meters, and water valves shall be shown.
24. Station and/or property line/corner to valves (not a standard location), all fittings, blow-offs and dead-ended lines.

32. All changes from standard 36-inch depth cover. Limits shall be shown on plan with annotated reason for change. Actual pipe elevation (top of pipe) will be taken at every fitting.
43. Show alignment changes, grade changes, and changes in construction materials. If changed alignment results in station changes, a station equation shall be shown as appropriate at a value.
54. Identify types of fittings (i.e., MJ x MJ, FLG x MJ, etc.). Provide an inventory list on construction drawings for appurtenances including fire hydrants, thrust blocks, valves, blow-offs, service installations, tees, bends, tapping sleeves, air releases, and so forth.
65. Any other change altering the approved plans.
76. Actual location and depth from finish grade of street of any other utilities encountered during construction.

Provide photographs of all installed valves and fittings in place before backfill.

Photographs should be provided with daily inspection reports during the course of construction.

~~B. Digital Mapping Requirements~~

~~All subdivisions are required to:~~

- ~~1. Tie into the City's GPS (tie two points, show inverse, and compare measured vs. record);~~
- ~~2. Use the state plane coordinates as their basis of bearings, and~~
- ~~3. Show a state plane coordinate on the initial point for the subdivision.~~

~~Partitions are required to tie into the City's GPS on a case-by-case situation which is determined during staff review for the partition.~~

~~Developments with the construction cost exceeding \$250,000, other than single-family residential (such as multi-family, commercial, industrial, etc.), shall:~~

- ~~1. Tie into the City's GPS control;~~
- ~~2. Use state plane coordinates as their basis of bearings, and~~
- ~~3. Show a state plane coordinate on the project boundary.~~

~~Submit the following per instructions from City GIS Coordinator:~~

- ~~1. An AutoCAD compatible digital form (DXF Format) of the as-built drawing tied to City control network and translated to the City coordinate base.~~

~~2.— Basic layering scheme.~~

~~3.— Standard symbols for appurtenances.~~

**~~WATER DISTRIBUTION SYSTEM
DESIGN STANDARDS~~**

**~~SECTION III
ENGINEERING REVIEW CHECKLIST~~**

**CITY OF OREGON CITY
ENGINEERING REVIEW CHECKLIST
FOR PUBLIC WORKS CONSTRUCTION**

	PROJECT NO. _____
	PROJECT TITLE _____
	LOCATION _____
	REVIEW DESIGN PLANS _____
ENGINEER'S COST ESTIMATE _____	AS BUILTS _____
	RECEIVED ON _____
	RETURNED ON _____
	ENGINEER _____
PLAN CHECK FEE PAID _____	CONTACT PERSON _____
INSPECTION FEE PAID _____	REVIEWED BY _____

INCOMPLETE SUBMITTALS WILL BE RETURNED!

SUBMIT 2 BLACKLINES FOR INITIAL REVIEW (The City endorses environmental efforts to recycle paper so blue lines are discouraged)

Six copies will be required for approved sets. Distribution: _____ City Engineer
 _____ City Inspector
 _____ Public Works
 _____ Developer/Owner
 _____ Project Engineer
 _____ Contractor

LEGEND: X = O.K. O = INCOMPLETE NA = NOT APPLICABLE

- I. _____ SANITARY
- II. _____ WATER
- III. _____ STREET
- IV. _____ STORM
- V. _____ GRADING
- VI. _____ SEDIMENT & EROSION CONTROL

~~H. WATER (Section numbers refer to Design Standards)~~

~~2.00 GENERAL DESIGN CONSIDERATION~~

~~Adequate Fire Flow~~

~~Min/Max Working Pressure 40–100 psi, Normal, 60 psi~~

~~Provide for Adjacent Property and Maximum Development. (extend across street frontage and through easements, if required)~~

~~Maximum Velocity—10 fps for average demand plus fire flow~~

~~20 psi residual pressure under calculated fire flow conditions.~~

~~2.01 WATER SYSTEMS CAPACITY~~

~~Minimum Fire Flow in Residential Areas 1,000 gpm~~

~~Minimum Fire Flow in Industrial and Commercial Areas per Fire Department
(Case by case—Minimum 1,500 gpm) Required fire flow = _____~~

~~2.02 MAIN CLASSIFICATION (N.A.)~~

~~2.03 PLAN PREPARATION~~

~~Prepared by Professional Civil Engineer~~

~~Plan Sheet Size 24" x 36" with margins~~

~~Scale: Horizontal 1" = 50' , Typical; 1" = 20' When More Detail Needed~~

~~Sheet Order—Title Sheet, Overall Utility Plan, Erosion/Sedimentation~~

~~Control Plan, Grading Plan (if applicable), Plan and Profiles, Details~~

~~If combined with sewer, distinguish between notes~~

~~2.04 TITLE SHEET~~

~~Site Plan (1" = 100' , 1" = 200') Include adjacent property~~

~~Sheet Index—(Include graphical index when more than one plan sheet involved)~~

~~Legend of symbols used~~

~~Vicinity Map (not less than 1" = 800')~~

~~Title Block~~

~~North Arrow~~

~~Room for City Approval Stamp, 3" x 3" on each sheet preferably in the bottom right corner~~

~~Reference Bench Mark~~

~~T.B.M. including description~~

~~City GPS Control~~

~~General Notes (Std. City Notes)~~
~~Planning File No./Capital Improvement Project No.~~

~~2.05 — PLAN & PROFILES, GENERAL DRAFTING~~

~~Title Block/North Arrows/Scale~~
~~ROW, Property Lines, Easements, Survey Monuments~~
~~Existing Pavement/Curbs/Sidewalks~~
~~Existing Utilities and Water Courses~~
~~Existing Water Valves necessary to isolate system~~
~~Proposed Pavement/Curbs/Sidewalks~~
~~Proposed Utilities (Water, Sewer, Storm)~~
~~Street Names~~
~~Tax Lot No. or Subdivision, Lot, Block~~
~~Appurtenance Symbols & Installation Notes~~
~~Waterline Location/Dimensional Control, and Size~~
~~Stationing, Line Designation (A, B, etc.)~~
~~Required Profiles (Including Utility Crossings)~~
~~Profiles (Proposed waterline and appurtenances, existing and proposed finished grades, line sizes, slopes, elevation at grade brakes, stationing, required minimum clearances)~~
~~Profile for 12" and larger (Backfill Classification)~~
~~Match Lines (w/sheet) (no reference)~~

~~2.06 — WATER SYSTEM APPURTENANCES — (Details/Construction Notes)~~

~~Water System Notes (Standard City Notes)~~
~~Fire Hydrant Detail~~
~~Thrust Block Detail~~
~~Valve Box Detail~~
~~Blow-off Hydrant Detail~~
~~Service Installation Detail~~
~~Trench & Backfill Detail~~
~~Air & Vacuum Valve~~
~~Other~~

~~2.07 — PLAN SUBMITTAL~~

~~Duplicate (After initial reviews, submit 6 copies for approval)~~
~~Plan Check Fee — Half of fee based on Construction Cost (Due when plans are submitted)~~
~~Inspection Fee — Remaining fee totaling 5% (minus Plan Check Fee already paid) based on Construction Cost (Due when plans are approved)~~
~~Engineer's Cost Estimate~~
~~Developer/Engineer Agreement (Privately funded projects)~~

~~Engineering Review Checklist, checked by Project Engineer~~
~~Survey Control, Horizontal and Vertical, with closures~~
~~Soils Report, if applicable~~
~~Legal Description and Sketches, if applicable~~
~~Boundary Control Survey, if applicable~~
~~Final Plat, if applicable~~

~~2.08 — WATER MASTER PLAN REQUIREMENTS~~

~~Oversizing Per Master Plan Included~~

~~2.09 — PIPE MATERIALS~~

~~Call Out in System Notes~~

~~2.10 — MAIN SIZE~~

~~System Grid (looped)~~
~~Shown on Plan~~
~~4" Cul-de-sac/Dead End, less than 200-foot centerline distance to radius point of cul-de-sac or end of pavement on dead end; serving 12 homes max.~~
~~8" Residential, Distribution Grid, 600 ft. max. Unsupported~~
~~8" Residential Secondary Feeder, Dead-end line supplying F.H.~~
~~12" + Primary Feeder Mains, Industrial Subdivisions, or as Dictated by Required Fire Flow~~

~~2.11 — MINIMUM DEPTH~~

~~Other Than Standard Noted~~

~~2.12 — LOCATION~~

~~4' From Curb Under Street Section~~
~~Bends 4' From Face Curb~~
~~South/East Side of Street~~
~~Water/Sanitary Separation (10' Horizontal) (18" Vertical), OAR 333-61-050~~
~~Water/Other Utility Separation (10' Preferred, 3' Minimum)~~
~~Parallel Mains (12" Vertical Separation)~~
~~Utility Crossings (6" Vertical Clearance)~~
~~Minimum Radius:~~
~~8" through 12" — 500' minimum~~
~~14" through 16" — 600' minimum~~
~~18" through 24" — 800' minimum~~
~~Offset From Property Lines (30") — Parallel Lines~~

Easement Description/Sketch/Document/ (Refer to City Guidelines)
Easement (15' Distribution) (20' Transmission) (5' increments)
20 foot separation to proposed structures (Commercial)
Located in parking lots/drives for access (Apartments, Commercial)

~~2.13 SURFACE WATER CROSSING (Case by Case)~~

Valves
Minimum Cover
Scour Pad
Trench Groundwater Block/Dam

~~2.14 VALVES~~

Gates Valves 8" or Less
Butterfly Valves 10" or Larger
Combination Air & Vacuum Release Valves (See 2.17 Blowoff)
Spacing Maximum 500' 800' for Distribution
Spacing Maximum 1,300' 2,000' for Transmission
Tee Intersection, Valved on Three Branches
Located at Tee or Cross fitting as near as Possible
At Hazardous Crossing, Valved Each Side
At Terminus of Phased Construction (See 2.17 Blow-offs)

~~2.15 BACKFLOW PREVENTION~~

Provided, if required

~~2.16 FIRE HYDRANT~~

Spacing, Residential 500 feet (When Measured Along Road)
Spacing, High Value 200 500 feet (As Determined by Fire Department)
At Street Intersections/Property Line
Maximum 200 foot Centerline Distance to Cul-de-sac Radius Point
Main Size for Dead End Mains, 8" Minimum (Avoid long dead end leads, if possible) (Need City Engineer Approval) 30' Maximum for dead end lines
Minimum Main Size for Looped Mains, 8"
5 foot Separation with Utility Poles/Guys
Bollards

~~2.17 AIR RELEASE VALUES/BLOW-OFFS~~

Air Release Valves, Greater than, or Equal to 10" Main at High Points
Provide for Drainage

~~Blow-Off Hydrant, Dead End Lines, Low Points~~

~~2.18 SERVICE LINES~~

~~Service for Each Lot~~

~~Use 1" Single Service for Residential~~

~~Verify Service Size for Other Than Single Family~~

~~2.19 METERS~~

~~Install by City (In Construction Notes)~~

~~Located in Right-of-Way or Easement~~

~~Same Size as Service Line, Unless Supporting Calculations Supplied and Approved~~

~~3" and Larger, Special Location and Vault Requirements, Flow Calculations~~

~~2.20 MOBILE HOME PARKS (Check Design Standards)~~

~~2.21 PLANNED UNIT DEVELOPMENTS (Check Design Standards)~~

~~2.22 AS-BUILT DRAWINGS/DIGITAL MAPPING REQUIREMENTS~~

~~Two sets—3 mil mylar (submit blackline for checking)~~

~~Certification letter~~

~~Same size and format~~

~~Note all deviations from original approvals~~

~~Stamped "As-Built Drawing", or "Record Drawing"~~

~~Stationing~~

~~Changes from standard cover~~

~~Types of fitting (MJxMJ, FLGxMJ, etc.)~~

~~Appurtenances (inventory list)~~

~~Location and depth of existing utilities encountered during construction~~

~~Test results, inspection log, etc.~~

~~Digital Mapping Requirements (current list of City requirements for layers, etc.)~~

WATER DISTRIBUTION SYSTEM
DESIGN STANDARDS

SECTION III

STANDARD DRAWINGS

WATER DETAIL DRAWINGS

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City of Oregon City
Public Works Standard Drawings

[OC 313. Pipe Bedding and Trench Backfill – Storm & Sanitary & Water Pipe](#)
[OC 513. Typical Utility Placement Detail](#)

WATER DISTRIBUTION SYSTEM
DESIGN STANDARDS

SECTION **IV**

STANDARD CONSTRUCTION NOTES

WATER DISTRIBUTION SYSTEM
DESIGN STANDARDS

SECTION VI

MINIMUM GUIDELINES FOR INSPECTION,
~~DEVELOPER/ENGINEER AGREEMENT~~

WATER DISTRIBUTION SYSTEM
DESIGN STANDARDS

SECTION VII

UNIFORM FIRE CODE, APPENDIX III – A & B

SECTION VII

DEVELOPER/ENGINEER AGREEMENT