



# **DESIGN AND CONSTRUCTION STANDARDS**



## **DESIGN AND CONSTRUCTION STANDARDS**

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## DESIGN AND CONSTRUCTION STANDARDS

This document is intended to be updated annually. If errors are found, please cite them and submit them to Oak Lodge Water Services Engineering Department:

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# SECTION 1—GENERAL DESIGN AND APPLICATION SUBMITTAL REQUIREMENTS

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## **1.0000 General**

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### **1.0010 Authority and Purpose and Alternative Design Proposals**

The District's Design and Construction Standards establish and provide specific, technical direction for the design and construction of public sanitary sewer, public water and public and private watershed protection projects. Through the adoption of these standards, the District endorses a comprehensive set of design and construction practices that are designed to deliver high quality improvements to the District's customers.

Infrastructure improvements are conditioned through development permits including the Clackamas County development review, and/or building permit, and/or plumbing permit, and/or District-specific permit process, these standards, and other District policies adopted by the District. No relevant utility or infrastructure construction shall commence prior to the District approval of the construction plans. The District may require documents to be stamped by a Registered Professional Engineer licensed to practice by the State of Oregon.

The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public facility design are constructed. Most of the elements contained in these standards are Infrastructure-oriented and it is intended that they apply to both public improvements under District contract and public improvements under private contract designated herein.

These Design 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 engineers will bring to each project the best of skills from their respective disciplines.

The Design Standards are also not intended to unreasonably limit any innovative or creative effort, which could result in better quality, better cost savings, and/or better life cycles. Any proposed departure from the Design Standards will be judged, however, on the likelihood that such departure will produce a compensating or comparable result in every way adequate for the user and District's customer. Alternate materials, methods or design will be considered for approval by the District's Engineer as the need arises and conditions warrant modification. This consideration will be on a case-by-case basis and require sufficient justification prior to approval. The justification shall be submitted in writing and shall state the standard being changed and the rationale. If the proposed alternative cannot be agreed to, the owner shall submit a variance as described in the District's Rules and Regulations.

The purpose of this Chapter is to describe the permit types, common scenarios activating those permits, common permit review procedures and responsibilities. These are provided as examples and any application may vary depending on relative conditions.

### **1.0020 Engineering Policy**

It shall be the policy of the District to require compliance with all state and federal standards for professional engineers.

All engineering plans, reports, or documents shall be prepared by a registered professional engineer, or by a subordinate employee under the engineer's direction, and shall be signed by the engineer and stamped with the engineer's seal to indicate the engineer's responsibility for them. This engineer is designated by these Standards to be the Design Engineer. Through the permit review process, it shall be the Design Engineer's responsibility to review any proposed public facility extension, modification, or other change with the District prior to engineering or proposed design work to determine any special requirements (conditions) or whether the proposal is permissible.

A "Not Approved For Construction" and/or a "Plans Approved for Construction" stamp of the District on the plans, etc., for any job, does not in any way relieve the Design Engineer of responsibility to meet all requirements of the District or obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the full requirements of the District have not been met.

## 1.0030 Applicability and Permit Types

These Design Standards shall govern all construction and upgrading of all public and privately financed public facilities in the District and applicable work within its service areas.

### 1.0031 Permit Types

**Site Development Permits** are required for line extensions, subdivisions/partitions and / or site development or redevelopment (partial or wholesale). A line extension includes any proposal to install, lengthen, enlarge, amend, repair, replace, upgrade or alter any exiting sanitary sewer or water main line or other portion of the public system other than a side sewer lateral or water service. Line extensions also include vertical alignment changes. Any alteration to a public main line is considered a “line extension” The County equivalent permit numbers are typically “Z....xxx” and/or “SC.....xxx” and include subdivisions, partitions, design review, site clearing and similar applications. Site Development permits are to be garnered for any relevant activity within the District Boundary and / or Service Area. Line Extension Permits are processed as a “Site Development” permit.

**Utility Permits** are required to install new, or lengthen, enlarge, amend, repair, replace, upgrade or alter any existing sanitary sewer lateral or water service or other portion of the public system other than a main line or other portion of the public system not a line extension. The County equivalent permits can be “Z....xxx” and/or “SC.....xxx” and/or “B.....xxx” and include, tenant improvements, building and occupancy permits and similar applications. Examples include single family residences, ADUs, sewer taps, water service installations, meter size changes, lateral or service repair in the public right of way. Utility Connection Permits are to be garnered for any relevant activity within the District Boundary and / or Service Area.

Disconnection: A utility permit is garnered for any service discontinuance or abandonment. A disconnection requires a utility permit when any property(ies), existing service(s) either physical or virtual to be disconnected from the sanitary sewer or water system. Disconnection permits shall be required when a structure(s) is demolished wholly or may be required at the District’s discretion if the structure(s) is partially demolished.

Virtual Connection: Utility service connection permits are required for virtual connections to evaluate the effluent volume and strength (see definition “virtual connection”). Virtual connections do not typically install, lengthen, enlarge, amend, repair, replace, upgrade or alter any existing sanitary sewer or water main line or other portion of the public system and may not have any sanitary sewer work outside the building envelope at all. The County equivalent permits are “Z....xxx and / or B...xxxx” and include design review, tenant improvements, building and occupancy permits, process changes and similar applications. Examples include tenant improvement occupancy changes, production process intensification or reduction, or increased wastewater strength or volume. Utility Connection Permits are to be garnered for any relevant activity within the District Boundary and / or Service Area. Virtual Connection Permits are processed as a “Utility Permit”.

**Erosion Control Permit:** The District issues Erosion Control/Surface water Management Permits within its jurisdictional area. All construction activities affecting areas 500 square feet up to five (5) acres within the District shall obtain an Erosion Control/Surface Water Management Permit. Construction activities affecting areas 250 square feet or greater within the undisturbed buffer, sensitive areas, or riparian areas must also obtain an Erosion Control/ Surface Water Management Permit. An Erosion Control/Surface Water Management Permit is also required to discharge to the surface water system.

## **1.0040 Conflicting Codes, Regulations, Rules, Standards**

Where these Design Standards conflict with other applicable codes, Regulation or Rule or Standard, the more restrictive code shall prevail.

## **1.0050 Standard Specifications**

All construction design detail, workmanship, and materials shall be in accordance with the current edition of the District Standards.

## **1.0060 Approval of Alternate Materials Or Methods**

Any substitution, material or alternate method not explicitly approved herein will be considered for approval as set forth in Subsection 1.0010 (Authority and Purpose and Rules and Regulations Section 11.02 Variances and Exemptions). Persons seeking such approvals shall make an application in writing. Approval of any major deviation from these Design Standards will be in written form. Approval of minor matters will be made in writing if requested.

Any alternative must meet or exceed the minimum requirements set in these Design Standards.

The request must meet the requirements of Rules and Regulations Section 11.02 Variances and Exemptions, and the written application shall 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-case basis and approved by the District Engineer. When requested by the District, full design calculations shall be submitted for review with the request for approval.

## **1.0070 Special Design Problems**

Special applications not covered in these Design Standards require review and approval by the District Engineer. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.

Such applications which may require special review and approval are among, but not limited to, the following.

Sewer Force Mains	Water Distribution Pump Stations
Relining of Existing Sewers	Relining of Existing Water Mains
Internal Sealing of Existing Sewers	Water Pressure Regulating Devices
Sewer Regulatory Devices	Energy Dissipaters
Sewage Pump Stations	Water Reservoirs
Sewer Siphons	Water Treatment Plants
Sewage Treatment Plants	Water Flow Measurement/Monitoring/Telemetry Devices
Sewer Flow Measurement/Monitoring Devices	Storm Sewer

## **1.0080 Revisions to Design Standards**

It is anticipated that revisions to these Design 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.

Parenthetical notations at the end of sections indicate the most recent change to those sections. All sections without notations are from the original Design Standards as adopted. Some sections may be changed more than once and it shall be the user's responsibility to maintain their copy of these Design Standards with the latest changes.

## **1.0090 Definitions and Abbreviations**

### **AASHTO**

American Association of State Highway and Transportation Officials.

### **Approved backflow prevention device**

A backflow prevention device that has been investigated and approved by the Oregon State Health Division.

### **As-built plans**

Plans signed and dated by the Design Engineer indicating that the plans have been reviewed and revised, if necessary, to accurately show all as-built construction details.

### **Back Siphonage**

Backflow that results from negative pressure (partial vacuum) in the supply piping system.

### **Backflow**

The reverse of flow from its normal or intended direction of flow. Backflow can be caused by back pressure or back siphonage.

### **Backflow preventer**

An approved device or means to prevent backflow into the potable water system.

### **Building service lateral / sewer lateral**

See Rules and Regulations definitions “sewer lateral”

### **Building sewer**

See Rules and Regulations definitions “building sewer”

### **Building supply**

See Rules and Regulations definitions “service line”.

### **CBE**

Crushed based equivalent (CBE) is the number that directly relates the traffic coefficient to the number of inches of rock.

### **Collection systems**

Facilities maintained by the District for the purposes of collecting, pumping, conveying, and controlling of wastewater.

### **Core**

To cut and remove a portion of pipe with a circular hollow drill.

### **Cross-connection**

Any actual or potential physical connection between a potable waterline and any pipe or vessel containing a nonpotable or potable (e.g., well) fluid (suspended solid or gas) so that it is possible to introduce the nonpotable fluid into the potable fluid by backflow.

### **Curb**

The concrete structure indicating the edge of the vehicular roadway within the overall right-of-way.

### **Cut sheets**

Sheets of tabulated data, indicating stationings, structures, fittings, angle points, beginning of curve, points on curve, end of curves, storm drain slope, staking offset, various elevations, offset cuts, and storm drain depths for streets, waterlines, sanitary sewers, and storm drains.

### **Datum**

The vertical elevation control.

### **Dedication**

The legal conveyance of land, typically from a private property owner to the District.



**Definition of words**

That, whenever, 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, or order of designation of the District Engineer. Similarly, the words "approved", "acceptable", or "satisfactory", shall mean approved by, acceptable to, or satisfactory to the District Engineer.

**Design Engineer**

The engineer, licensed by the State of Oregon as a Professional Engineer under whose direction plans, profiles, and details for the work are prepared and submitted to the District for review and approval, or who is in charge of and responsible for construction of the improvement.

**Detention**

The holding of runoff for a designed period of time and then releasing it to the natural water course.

**Development**

See Rules and Regulations definitions "development"

**Domestic sewage**

The liquid and water-borne waste derived from ordinary living processes, free from industrial wastes, and of such character to permit satisfactory disposal without special treatment into the public sewer or by means of a private sewage disposal system.

**Double check detector check valve assembly**

A line-sized, approved, double check valve assembly with a parallel meter and meter-sized, approved, double check valve assembly. The purpose of this assembly is to provide backflow protection for the distribution system and, at the same time, provide a metering of the fire system showing any system leakage or unauthorized use of water.

**Double check valve assembly**

An assembly composed of two single, independently acting, approved check valves, including tightly closing shutoff valves located at each end of the assembly and fitted with properly located test cocks.

**Drainage facilities**

Pipes, ditches, detention basins, creeks, culvert bridges, etc., used singularly or in combination with each other for the purpose of conveying or storing storm water runoff.

**Easement**

Areas located outside of dedicated rights-of-way, which are granted to the District for special uses.

**(Private) Easement**

An area on a parcel that benefits other parcel(s) by granting special uses.

**Erosion control, post construction**

The re-establishment of groundcover or landscaping prior to the removal of temporary erosion control measures.

**Erosion prevention and sediment control**

Measures that are required for construction sites where the ground surface will be disturbed with clearing, grading, fills, excavations, and other construction activities, in order to prevent and/or control eroded material and sediment from leaving the construction site and entering the public storm system and/or a water quality resource area.

**Erosion, visible or measurable**

Includes, but is not limited to: deposits of mud, dirt, sediment, or similar material, exceeding ½ cubic-foot in volume on public or private streets, adjacent property, or into the storm and surface water system, either by direct deposit, dropping discharge, or as a result of the action of erosion.

**Fire hydrant assembly**

The fire hydrant and attached auxiliary valve from a water main to a hydrant.

**Fire protection service**

A metered connection to the public water main intended only for the extinguishment of fires and the flushing necessary for its proper maintenance.

**Flood or flooding**

A general and temporary condition of partial or complete inundation or normally dry land areas from the overflow of inland or tidal waters, and/or the unusual and rapid accumulation of runoff of surface waters from any source.

**Grade**

The degree of inclination of a road or hillside.

**Impervious areas**

Those hard surface areas located upon real property which either prevent or retard saturation of water into the land surface and cause water to run off the land surface in greater quantities or at an increased rate of flow from that present under natural conditions preexistent to development.

**Industrial waste**

Solid, liquid, or gaseous waste resulting from any industrial, manufacturing, trade, or business process due to development, recovery, or processing of natural resources.

**Interceptor sewer**

The primary public sanitary sewer which conveys wastewater directly into the wastewater treatment plant.

**Irrigation service**

A metered connection intended for seasonal use and delivering water, which is not discharged to the sanitary sewer.

**Lateral sewer**

See Rules and Regulations definitions "sewer lateral".

**Longitudinal joint**

A joint which follows a course approximately parallel to the centerline of the roadway.

**Manager**

See Rules and Regulations definitions "administrator".

**Natural drainageway**

A natural depression which collects drainage of surface water. It may be permanently or temporarily inundated.

**Natural grade**

The grade of the land in an undisturbed state.

**Natural resource**

A functioning natural system such as a wetland or stream.

**Natural resource area**

The land containing the natural resources to be protected.

**On-site detention**

The storage of excess runoff on a development site prior to its entry into a public storm drain system. Stored runoff is gradually released after the peak of the runoff has passed.

**Owner**

The owner of record of real property as shown on the latest tax rolls or deed records of the county or a person who furnishes evidence that they are purchasing a parcel of property under a written recorded land sale contract.

**Peak runoff**

The maximum water runoff rate (cfs) determined for the design storm.

**Person**

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

**Plans**

Construction plans, including system plans, sewer plans, and profiles, cross sections, detailed drawings, etc., or reproductions thereof, approved or to be approved by the District Engineer, which show the location, character, dimensions, and details for the work to be done, and which constitute a supplement to these standards.

**Potable water**

Water which is satisfactory for drinking, culinary, and domestic purposes and meets the requirements of the health authority having jurisdiction.

**Private collection system**

A privately owned and maintained lateral sewer system installed to serve multi-unit structures on single ownership properties which cannot legally be further divided.

**Private storm drain**

A storm drain located on private property serving one or more structures or inlets and is not owned or maintained by the District.

**Public sanitary sewer**

Sanitary main in public right-of-way or easement operated and maintained by the District for carrying sewage and industrial wastes.

**Public storm drain**

Any storm sewer in public right-of-way or easement operated and maintained by the District.

**Release rate**

The controlled rate of release of drainage, storm, and runoff water from property, storage pond, runoff detention pond, or other facility during and following a storm event.

**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 public for sidewalk, utility, and/or roadway purposes.

**Road Bed**

Any earthen material below the asphalt or concrete lifts.

**Roadway**

All of that portion of the right-of-way used or to be used for vehicle movement which exists between the curbs, proposed curb lines, or edges of pavement.

**Sedimentation**

Deposition of debris and soil.

**Sewage**

Water-carried wastes from residences, business buildings, institutions, and industrial establishments, except industrial wastes.

**Sewer Main**

The portion of the public sewerage system which is primarily installed to receive wastewater directly from individual residences and other individual public or private structures.

**Silt**

Fine textured soil particles, including clay and sand, as differentiated from coarse particles of sand and gravel.

**Siltation**

Deposition of (silt) fine textured waterborne sedimentation.

**Standard drawings**

The drawings of structures or devices commonly used on public improvements and referred to on construction plans contained in the OLWSD Design and Construction Standards.

**Structures**

Those structures designated on the standard plans such as catch basins, manholes, etc.

**Transverse joint**

A joint, which follows a course approximately perpendicular to the centerline of the roadway.

**Trunk sewer**

(Interceptor) A sanitary sewer which is primarily intended to receive wastewater from a collector sewer, another trunk sewer, an existing major discharge of raw or inadequately treated wastewater, or water pollution control facility.

**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".

**Wastewater**

The total fluid flow in the sanitary sewerage system which includes industrial waste, sewage, or any other waste (including that which may be combined with any ground water, surface water, or storm water) that may be discharged into the sanitary sewerage system.

**Water distribution system**

Water pipelines, pumping stations, reservoirs, valves, and ancillary equipment used to transmit water from a supply source through a service meter.

**Water main**

A water supply pipe for public use.

**Water service line**

The pipe connection from the District water main to the users' water meter, hydrant, backflow prevention device, or fire sprinkler double check valve.

**Virtual Connection**

A change in "service class" or occupancy or operational change which results in an increase in wastewater volume, strength or load using the existing sewer lateral or service line. Typically, these are tenant improvements or accessory dwelling units, but could also be commercial/industrial process changes.

## **1.1000 CONSTRUCTION PLANS**

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### **1.1010 General Information**

Prior to any construction work and plan approval, complete construction plans, specifications and all other necessary submittals shall be submitted to the District Engineer for review. Submittal requirements consist of design plans (where required), drainage calculations, and other information as necessary. Conditions of approval from the Development Plan Review process, or as specified by the District, the Clackamas County Planning Commission, Hearings Officer or the Planning Director shall all be shown on the design plans.

### **1.1020 Plan Preparation**

Construction plans and specifications shall be prepared by a professional engineer licensed by the State of Oregon, as specified in Subsections 1.1020 (Plan Preparation) and 1.1030 (Required Sheets).

Typical permit submittal items include:

- Complete OLWSD Plan Review Application Form (online submittal)
- Preliminary Site Plan: A site plan containing proposed sanitary sewer and / or surfacewater facilities
- Details
- Profile plans
- Fees and charges
- Drainage Fixture schedule
- Statement of occupancy(ies) for any and all relevant structures with sanitary sewer connection.
- Note, all submitted Site plans, grading plans, storm drainage plans, and associated calculations must be stamped and signed by a professional engineer licensed by the State of Oregon and meet the standards of the District.
- Engineer's statement (calculation) of disturbed area.
- Engineer cost estimate of sanitary sewer / surfacewater facilities including installation
- Downstream analysis.
- Preliminary and final plat
- Utility maintenance agreement(s)
- Geotechnical Report / Soil Report / Infiltration Analysis (from a professional geotechnical engineer or geologist).
- Storm Report
- Erosion Prevention / Sediment Control plan and details and narrative
- Performance bond
- Warranty bond
- DEQ Approval letter
- As-builts for any site work.

### **1.1021 Sheet Size**

All construction plans shall be clearly and legibly drawn in ink "D"- size sheets. Sheets shall have a 1½-inch clear margin on the left edge and a ½-inch margin on all other edges.

### **1.1022 Scale of Plans**

The following are applicable to engineering drawings for plan review and as-builts.

When plans are prepared for developer financed projects, the scale of drawings shall be as follows. Horizontal scales shall be 1" = 40', or 50', vertical scales shall be 1" = 2', 4', 5', or 10'. For subdivision

plans it is preferred that all plan views and profile views of the plan set are drawn at a common scale, if more than one scale is necessary, the difference should be large enough to be noticeable (e.g. 1" = 20' & 1" = 50'). When a scale is used which is smaller than 1" = 20' (e.g. 1" = 40') intersection details showing fittings and valves shall be provided at a larger scale. Architectural scales (e.g., 1/4" = 1'0") are not permitted unless approved. Letter size shall not be smaller than 0.10 inches.

Sheets shall contain a maximum of one plan view and one profile per sheet. The stations must align on the plan view and profile view and of a corresponding scale. The sheet coverage ratio should be no less than 60% plan view and 40% profile.

### **1.1030 Required Sheets**

Construction plan submittals shall contain the following minimum sheets: title sheet (unless not required by the District Engineer) plan and profile sheet(s), and detail sheet(s). A title block shall appear on each sheet of the plan set and shall be placed on the lower right-hand corner of the sheet, across the bottom edge of the sheet or across the right-hand edge of the sheet. The title block shall include the names of the project, the engineering firm, the owner, the sheet title, page, and revision number and dates.

The seal and signature of the Design Engineer responsible for preparation of the plans shall appear on each sheet as well as the Design Engineer's phone number. The description and date of all revisions to the plans shall be shown on each sheet affected and shall be approved and dated by the Design Engineer as evidenced by signature or initial.

### **1.1031 Title Sheet**

All subdivision projects and multiple sheet improvement projects shall have a title sheet as the first page of the construction plans. This sheet shall contain the following minimum information.

1. Site plan of entire project with street right-of-way and/or subdivision layout at a 1" = 100' scale. A 1" = 200' scale may be used if project size is too large. The site plan shall also be a composite utility plan showing all properties served by proposed sewer, water, and storm facilities, in addition to the proposed facility.
2. Vicinity map at a 1" = 1000' scale or greater. Map shall show the location of the project in respect to the nearest major street intersection.
3. Index of sheets.
4. Complete legend of symbols used.
5. General and construction notes pertinent to project, space permitting. If space does not permit a separate note page shall be used.
6. Temporary and/or permanent benchmarks used along with their descriptions, elevations of benchmark, and datum.
7. Design Engineer's name, address, phone number, and seal.
8. Developer's/owner's name, address, and phone number for public improvements with private financing.
9. Statement referencing District Infrastructure Design and Construction Specifications.
10. Provide contact phone number for all affected utility companies.
11. Show tax lot numbers or lot and block designations.
12. Conditions of approval.

## 1.1032 Plan Sheet

The plan view of each sheet shall be drawn at the appropriate scale showing the following minimum information.

1. Adjacent street curbs, property lines, right-of-way lines, utility easements referenced to property lines, street centerlines, and intersections. Show property corner and curb elevations to determine water service level, serviceability of lot/property for sanitary sewer, points of disposal for building storm drains, and how new curbs will join to existing curbs.
2. Location of all underground utilities within 100 feet of project (if they are affected by the project), existing power/telephone poles and guy anchors, valves, manholes, catch basins, fire hydrants, meter boxes and vaults, signs, etc.
3. Location of all water courses, railroad crossings, culverts, bridges, large water transmission pipes and gravity sewers, and/or storm drains within 200 feet of proposed gravity sewer and storm drain extensions if they affect the design of the project. All water courses shall show the 100-year flood plain as indicated on the U.S. Army Corps of Engineers and Federal Emergency Management Agency (FEMA) maps.
4. On sewer and storm drain plans, each manhole, catch basin, and cleanout shall be numbered and stationed. Station numbering shall tie to existing street monuments, property corners, or manholes. Each separate line shall be separately designated (e.g., sewer line 'A', storm line 'A', etc.).
5. On street plans, horizontal stationing shall show points of tangency and curvature for centerline; curve data shall show tangent length, radius distance, centerline curve length, and delta angle. Centerline intersection stationing, in both directions, shall be shown.
6. Where streets are being widened, edge of pavement elevations shall be shown to determine pavement cross-slope to new curb or pavement edge.
7. On water plans, show all fittings and valves and identify by type (e.g., MJ x MJ, FLG x MJ, etc.); fire hydrants; intersection details for valves and fittings
8. On all plans, show stub-outs and block-outs for future developments.
9. On composite utility plans, if individual sheets are not provided, all utilities and associated lines, appurtenances and fittings, and associated callouts and notes must be colored to their utility locate color. For example, sanitary sewer = green, potable water = blue, and pink for stormsewer and surfacewater.
10. All infiltrator locations and facilities or structures shall be shown on plans.
11. All corrections to plan review comments must be identifiable by being "clouded" or otherwise "called out" on the plans with the associated revision number.
12. All revisions must be labeled with the revision number and associated drawing date.

## 1.1033 Profile Sheet

Profiles for construction plans shall be the same horizontal scale as the plan sheet. Where profiles are drawn on the same sheet as the plan view, the profile shall be immediately below the plan view. The following minimum information shall be shown.

1. For sewers and storm drains, show locations of manholes, catch basins, and cleanouts, with each numbered and stationed as indicated in Subsection 1.1032 (Plan Sheet) item 4.

2. Existing profile at centerline of proposed utility or street. Profiles at the right-of-way lines will be required if grade differences are significant.
3. Proposed profile grade, as appropriate, for all sewers, storm drains, and waterlines, giving pipe size, length between structures or fittings, slope, backfill and pipe material, sewer inverts, rim elevations, etc. Extension of the profile of streets for future extensions (stub streets) will be extended at least 200 feet for local streets or as required by the District Engineer.
4. Existing underground utilities that cross the alignment of the proposed facility.
5. Beginning of all vertical curves, points of vertical intersection, end of vertical curve, low point of sag curve, and length of vertical curve. Profiles of existing centerline grade shall extend a minimum of 250 feet beyond the end of the improvement.
6. Clearly show all potential conflicts with existing public and private utilities (i.e., pipes, conduits, vaults, cathodic protection systems, etc.) that impact proposed design.
7. Profiles for ditch and creek flowlines shall extend a minimum of 200 feet beyond the project, both upstream and downstream. Typical cross sections at 50-foot intervals shall also be submitted.

**SPECIAL NOTE:** District As-builts are only to be used as an aid to the engineer. When a potential conflict may occur, the Design Engineer shall field locate, or cause to be located, and verify the alignment, depth, and inverts of all existing facilities shown on the plans that will be crossed by the proposed facility.

### **1.1034 Detail Sheets**

Detailed drawings shall be included with all construction plans where District standard drawings do not exist. If a standard drawing, such as sewer manholes, must be modified to fit existing or unique conditions, the modified drawing shall be shown on the plans. When appropriate, due to required detail complexity, a separate detail sheet shall be drawn. When District standard drawing appurtenances or construction installations are to be used, a reference to the specific standard drawing number shall be made on the title sheet.

### **1.1040 Supporting Information**

The Design Engineer shall submit sufficient supporting information to justify the proposed design. Such information shall include, but not be limited to, the following:

1. Design calculations.
2. Hydrology and hydraulic calculations with basin maps.
3. Alternate materials specifications including manufacturer's design application recommendation.
4. Grading plan support information to include as appropriate.
  - a. Soils classification report
  - b. Hydrology report
  - c. Geotechnical engineer's report

### **1.1041 Facility Plan**

When designing sanitary or storm sewer facilities, a facility plan shall be submitted with the construction plans when required by the District Engineer. This plan shall be used to identify and analyze the proposed extension of facilities. The topographic plan shall show all upstream and tributary areas within no less than 200 feet of the proposed development.

The plan shall include existing contours at 2-foot intervals, or as approved by the District, including location of existing structures and public and private utilities.



## **1.1042 Erosion Control Plan**

The erosion control plan shall address the measures as required by the Erosion Prevention and Sediment Control Plans, Technical Guidance Handbook (ECTGH) (Clackamas County Department of Utilities, 2001)<sup>1</sup>. Construction projects beginning prior to May 1 or those projects anticipating construction activity between November 1 and April 30 will be required to submit a plan addressing "wet weather" measures as outlined in the ECTGH. Construction activity is assumed as "active" until all permanent vegetation and/or erosion protection is established.

The plan shall include existing contours at 2-foot intervals, or as approved by the District, including location of erosion control facilities (i.e., silt fence, straw mulch, sediment ponds, etc.); outlet structures (i.e., catch basins, culverts, creeks, etc.); and existing public and private utilities.

## **1.1043 Information Required on Erosion Control Drawings**

The following items must be depicted on ESCP drawings, as applicable:

- a. Total property boundary including surface area of the development.
- b. Areas of soil disturbance (including, but not limited to, showing cut and fill areas and pre-and post-development elevation contours);
- c. Drainage patterns before and after finish grading;
- d. Discharge points;
- e. Areas used for the storage of soils or wastes;
- f. Areas where vegetative practices are to be implemented;
- g. All erosion and sediment control measures or structures;
- h. Identify the type of seed mix (percentages of the various seeds of annuals, perennials and clover) and other plantings.
- i. Critical riparian areas, sensitive preserved vegetative areas, including trees and their root zones.
- j. Runoff controls to minimize erosion and scour. BMPs such as, diversion, slope drains, diversion dikes, check dams and drainage swales.
- k. Stabilized site entrances and access roads including, but not limited to construction entrances, roadways and equipment parking areas (for example, using geotextile fabric underlay).
- l. Perimeter sediment control, including storm drain inlet protection as well as all sediment basins, traps, and barriers.
- m. Stockpile management, including dust control and location.
- n. Concrete truck and other concrete equipment washout areas.
- o. Impervious structures after construction is completed (including buildings, roads, parking lots and outdoor storage areas);
- p. Springs, wetlands and other surface waters on site or adjacent to the site;
- q. Temporary and permanent stormwater conveyance systems;
- r. Onsite water disposal locations (for example, for dewatering);

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<sup>1</sup> Or current edition.

- s. Storm drain catch basins depicting inlet protection, and a description of the type of catch basins used (for example, field inlet, curb inlet, grated drain and combination);
- t. Septic drain fields;
- u. Existing or proposed drywells or other UICs;
- v. Drinking water wells on site or adjacent to the site;
- w. Planters;
- x. Sediment and erosion controls including installation techniques;
- y. Natural buffer zones and any associated BMPs for all areas within 50 feet of a waters of the state; and
- z. Detention ponds, storm drain piping, inflow and outflow details.

**Narrative Site Description:** Describe the nature of the construction activity and the final use of the site, that is what will the site be used for at the completion of the construction. The narrative shall also contain the following:

**Water Quality Requirements for TMDL and 303(d) Listed Waterbodies.** If there is a potential for discharge of stormwater to directly discharge or discharge through a conveyance system to a portion of a waterbody that is listed for turbidity or sedimentation or that has an established Total Maximum Daily Load (TMDL) for sedimentation or turbidity from the construction site, then one or more of the BMPs listed below must be implemented. Identify the selected BMP(s) in the ESCP as one that addresses this condition of the permit, and provide the rationale for choosing the selected BMP(s). The 303(d) list can be found at: the Oregon DEQ website. Search under Category 5 (303(d)) and Category 4a (TMDL approved). If none, state “no water quality requirements” on the narrative.

**Inspector Qualification Information:** Provide the following information on the Erosion and Sediment Control Inspector. This is a person that works for the applicant and not a government employee. The consultant, general contractor, project manager, or person who prepared the ESCP may be designated with their agreement as the initial or final ESC Inspector. Upon designating an inspector(s), submit to OLWSD their name(s), and contact information including the following:

- Any Erosion Control Certification Information (E.g. CESCL, CPESC or equivalent)
- Application Date;
- Project Name;
- Plan Prepared By;
- Company Name;
- E-mail Address; and
- Emergency Phone Number.

### **Natural Buffer Zone**

If a “waters of the state” is within the project site or within 50 feet of the project boundary, and a natural buffer exists within 50 feet of the water of the state, the ESCP must delineate and protect this area with orange fencing or flagging and maintain existing buffer until completion of project. All discharge must be filtered prior to entering the natural buffer to avoid sediment build up. If scour is an issue, an energy dissipater may need to be installed.

Natural Buffer means, for the purposes of this permit, an area of undisturbed natural cover surrounding surface waters within which construction activities are restricted. Natural cover includes the natural vegetation, exposed rock, and barren ground that existed prior to commencement of earth-disturbing activities.

If project will reduce natural buffer zone under 50 feet of waters of the state, the ESCP must include one or more of the following BMPs to control and treat sediment and turbidity:

- Compost berms, compost blankets, or compost socks;
- Erosion control mats;
- Tackifiers used in combination with perimeter sediment control BMPs;
- Water treatment by electro-coagulation, flocculation, filtration; or
- Other substantially equivalent sediment or turbidity BMP approved by DEQ or Agent

If no natural buffer zone(s) will be affected by the project, on the narrative state the following: “no natural buffer zone impacts will be realized by the proposal.”

**Additional Information:** The District may also require the applicant to provide additional information as indicated in these Standards or the Rules and Regulations.

### **1.1050 Plan Submittal and Review Procedures**

For all utility or erosion control permit reviews, the property owner shall make a relevant application to the District. This submittal is separate from the Clackamas County or other Agency or District submittal. Other agencies such as Clackamas County do not provide application materials to OLWSD. The applicant or property owner must submit to OLWSD separately.

Construction plans for all privately financed Infrastructure facility improvements shall be submitted to the District Engineer. The District Engineer will coordinate the plan review and approval of all construction plans which will include review for compliance with all District Infrastructure Standard Construction Specifications, rules, and the project conditions of approval.

All plan submittals shall include information required in Subsection 1.1040 (Supporting Information) along with all other information requested by the District Engineer. This information is to include, but not be limited to, construction cost estimates, easement documents, right-of-way dedications, executed agreements, and a plan check and inspection fee. All submittals will be reviewed for completeness and the Design Engineer notified if required information is missing. Submittals should be made in a timely manner as lack of information to the District may impede the review process.

Plans and documents shall be submitted electronically through the District’s permitting software system. A complete construction cost estimate will be submitted for review and determining review fees. Once the plans are deemed complete, a detailed review will begin on a “first-in, first-out” basis. If the submittal is not complete, notification will be given by the District to the Design Engineer specifying information needed.

Upon completion of the detailed review, the District will notify the Design Engineer, any revisions or “Red-line comments” the District may have. The Design Engineer will revise the plans, addressing all items in the District’s letter, and return one electronic approved construction plan set to the District for approval.

### **1.1060 As-Built Plan Requirements**

For all Infrastructure facility improvements, the Design Engineer shall submit certified As-built drawings for all plans, which were approved for construction and a copy of the recorded plat. One set of As-built drawings shall be submitted for preliminary review. If the first submittal is not acceptable, the District Engineer will notify the Design Engineer of information needed for resubmittal.

As-built drawings and plat drawings shall meet the requirements of Subsections 1.1020 (Plan Preparation), 1.1030 (Required Streets), and 1.1060 (As-Built Plan Requirements) and shall be of archival quality. At a minimum, one (1) hard copy shall be submitted and one (1) electronic copy shall be submitted in PDF file format and one (1) copy of drafting software such as .DWG shall be submitted.. As-built drawings shall include all field changes and be approved by the District. As-built drawings shall be created with a surveyed space of NAD83 projection.

The Design Engineer shall submit, along with the As-built drawings, a statement certifying that all work for which plans were approved has been completed in accordance with the OLWSD Design and Construction Standard Specifications.

The words "as-built drawing" shall appear as the last entry in the revision block along with the month, day, and year the as-built drawing was prepared.

**NOTE:** Actual location and depth from finish grade of any other utilities encountered during construction shall be shown and noted on both plan and profile of the as-built plans.

### **1.1061 Storm Drains**

The following minimum information shall be noted on storm drain as-built drawings.

- Station of wye or tee into main line. Tie end of branch line to nearest property corner at right-of-way line and distance back from the face of curb.
- 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 manhole.
- Other change altering the approved plans.
- Other items as determined by the District.

### **1.1062 Sanitary Sewer**

The following minimum information shall be noted on sanitary sewer as-built drawings.

1. Station of wye or tee into main line. Stationing shall be based on existing Oak Lodge numerical system. Tie end of service lateral to nearest property corner at right-of-way line and distance back from the face of curb.
2. Depth at the end of service lateral measured from existing ground to invert of pipe. When required by the District Engineer, invert elevations shall be noted.
3. Length of service lateral measured from centerline of sewer main to end of pipe.
4. 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 manhole.
5. Other changes altering the approved plans.
6. Provide complete test results to the District Engineer.
7. Type of pipe, backfill material and location.
8. All rim and invert elevations on manholes, catch basins, and clean outs.
9. Other items as determined by the District.

### **1.1063 Water Main**

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

1. Station and/or property line/corner to valves (not at standard location), all fittings, blow-offs, and dead-ended lines.
2. 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.
3. 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 valve.

4. Identify types of fittings (i.e., MJ x MJ, FLG x MJ, etc.); provide information in the form of an inventory list on construction drawings.
5. Other change altering the approved plans.
6. Provide design calculations and complete test results to the District Engineer.
7. Actual location and depth, from finish grade of street, of any other utilities encountered during construction.
8. Other items as determined by the District.

### **1.1064 Plan Quality and Miscellaneous Requirements**

All submitted items shall be in both hard copy as described in this Section and as electronic documents in PDF format. Plan sheets shall be collated into one single file. Multiple individual sheets will not be accepted. OLWSD and other relevant details, notes and conditions shall be contained on the plan(s). Digital plans shall be vector-based, produced directly from drafting software such as AutoCAD. Scanned documents will be accepted only with prior approval and shall be at 360dpi minimum resolution.

If plans contain excessive linework, layers, have callouts that interfere with interpretation or are otherwise difficult to read, OLWSD shall at its discretion, reject the plans. Any incomplete or rejected submittal shall count as a submittal for inclusion in the review fee order.

Each submittal shall contain responses to the relevant previous comments and/or conditions of approval as satisfied by the plans or submittal as a narrative in a “findings” format. The initial submittal narrative shall contain the land use decision conditions of approval with OLWSD-related items responded to and successive submittals shall contain response(s) to the relevant comments from previous review(s).

Redlines are to be performed by the applicant or owner and shall be performed on all plan copies and shall be incorporated onto the final approved drawing set.

The applicant or owner coordinates with Clackamas County to establish a pre-construction meeting. The applicant shall coordinate with OLWSD to attend this meeting. If OLWSD is unable to do so, OLWSD shall require an individual pre-construction meeting on-site or at the OLWSD office.

Engineering review fees include one engineering review, one revision and plat review and as-built review for a partition or subdivision. Engineering review fees for design reviews with no plat include one review and one revision and one as-built review. Additional reviews are paid for with additional fees. Additional reviews are, for fee purposes, considered as new submittals and full review fees are charged.

### **1.1065 Permit and Approval Vesting and Amendments**

All OLWSD permits are valid for one year. Following expiration, a new permit shall be garnered by the owner and be subject to all relevant fees and/or regulations. Upon the date the District deems the application to the District to be complete, the application shall be vested with those current rules, regulations standards and other requirements being current at the date deemed complete. Other agency or jurisdictional approvals do not apply. The following are the vesting time ranges per OLWSD permit. In the following the shortest time period applies if there are multiple permits referenced. Permit vesting shall consider section 1.1067 Permit Amendments in this Chapter.

### **1.1066 Permit Amendments**

Should conditions or plans change from the original or approved conditions, the owner shall immediately apply for and obtain from the District an amendment to the permit prior to conducting any further work other than or different from that approved in the original permit. This includes submittal of updated permit application materials, and payment of amendment charges prior to the start of construction activities or other as determined by the General Manager. Permit amendments would not extend the vesting timeline.

### **1.1067 Permit Required**

A permit is required prior to work commencement. Failure to acquire permit(s) equates to a violation of the Rules and Regulations and Standards. An individual service connection permit and lateral shall be required for each individual house, dwelling, building or other structure or connection (physical or virtual) requiring sanitary sewage disposal. No installer shall install a sewer connection(s) in public right-of-way or public easements not covered by the District's issued permit. The issuance of a permit by the District will not relieve the permit holder from the responsibility of obtaining such other permits or licenses as may be required by other governmental agencies. Wastewater connections from multiple structures or dwellings within private property are regulated by the Clackamas County Building Division.

### **1.1068 Disconnections**

#### Sanitary Sewer

Property owners may voluntarily disconnect from the sanitary sewer system in the event that the building being served is being demolished<sup>2</sup>. Property owners may also voluntarily relocate (1.1069) where along the sanitary sewer mainline the building being served. Disconnections shall be capped at the property line or edge of a public easement with a compression plug (Cherne) at the main and inspected by OLWSD. Main lines may be required to be capped (plugged) at the District's discretion.

#### Drinking Water

Disconnections from the water system shall require the service to be severed on the meter side of the corporation stop with the corporation stop turned off and inspected by OLWSD.

### **1.1069 Replacement Service Lateral Installations**

If new service lateral alignment is proposed, the existing lateral shall be removed at main, plugged with a Cherne Plug, and inspected by OLWSD prior to burial. The existing lateral shall be grouted at the downstream end.

If the existing lateral alignment is used, a new side sewer lateral shall be installed. The lateral shall conform to current District standards and requirements. Replacing laterals may be performed by pipe bursting or trenching. If HDPE material is used from the main to the structure, Oak Lodge waives the cleanout construction requirement.

### **1.1070 Building Sewer Repair**

OLWSD's purview is the public sanitary sewer system. Only the Clackamas County Building Official shall permit and / or inspect sewer plumbing on private property (notwithstanding public easements).

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<sup>2</sup> Pursuant to all relevant Oregon laws

### **1.1071 Connection to Cesspools And Septic Tanks**

Direct connection from all plumbing fixtures in the structure(s) to the sanitary sewer system is required. Any connections to a cesspool, septic tank shall be removed and proper connection directly made to the public sewer system. Cesspools and septic tanks shall be abandoned in accordance with Clackamas County and Oregon Department of Environmental Quality requirements.

### **1.1072 Sanitary Sewer Backflow**

The District reserves the right to require backwater valves to be installed on sanitary sewer laterals whenever conditions warrant at the District's discretion. Typically, conditions involve flood-related locations or high-water tables.

### **1.1073 Ownership and Acceptance And Bonding**

Performance and Warranty Bond: See Rules and Regulations 205.50.01. This bond is separate from any other agencies bond such as Clackamas County. The owner shall submit a separate bond document to OLWSD not combined with any other agencies.

Prior to commencement of construction, the owner shall submit a combined performance and warranty bond to the District. The bond or deposit shall be in the amount of 100% of all proposed sanitary, surface water (private) and public water work including installation costs. The performance bond shall automatically transform into a warranty bond upon completion of the improvement and the approval and acceptance thereof by the District. At that time, the applicant shall execute and deliver to the District a bill of sale or other document in form approved by the District transferring all right and title to the sewer main extension to the District, and a statement of value of the work completed. The warranty portion of the bond shall guarantee the associated infrastructure against any defects of labor and material for a period of one year from the date of acceptance by the District. Upon acceptance by the District of the infrastructure and the security for the one-year guarantee, the relevant infrastructure shall be incorporated in the District's system and be a part thereof and shall be maintained by the District, subject to the guarantee requirement for the first year.

### **1.1074 Inspections and Authority**

Site Development / Engineering Review / Line Extension: OLWSD inspects public main lines, side sewer laterals and all fittings, manholes, cleanouts and any other facility(ies) in the public right-of-way or easement. These utilities are installed by the owner. OLWSD inspects the pipe zone within six inches surrounding the main line and / or side sewer lateral or other facilities including backfill, bedding, concrete and associated installation. Clackamas County generally inspects all other backfill and compaction and road surfaces.

Engineering Review / Surfacewater facilities on private property (outside the public right-of-way): OLWSD inspects any water quality facility including swales, rain gardens or other pollution control device such as mechanical filter. OLWSD also inspects stormwater detention and/or retention facilities including swales, rain gardens or other pollution control device such as mechanical pipes.

Clackamas County inspects the following:

- all plumbing on private property for sanitary sewer and storm sewer and
- rain drains and storm water infrastructure in the public right-of-way.

Utility Connection Permits / Sanitary Sewer: OLWSD inspects public main lines, side sewer laterals and all fittings, manholes, cleanouts and any other facility(ies) in the public right-of-way or easement.

Utility Connection Permits / Water: OLWSD inspects public main lines, services and all appurtenances and any other facility(ies) in the public right-of-way or easement. For water services of two inches and less, Oak Lodge installs the tap and corporation stop. The owner's contractor installs the water service

pipe and appurtenances around the meter and Oak Lodge inspects this installation. Finally, Oak Lodge inspects and installs the meter. For water services greater than two inches, the owner installs the entire service.

Design Review and Utility Connection Permits and Other Applicable / Erosion Prevention / Sediment Control: OLWSD inspects all applicable sites and associated erosion prevention / sediment control and pollution control measures. These measures are installed by the owner.

### **1.1075 Inspection Request**

The District requires a twenty-four hour notice of inspection request which must be made online in each respective permit record. All relevant installations are to be inspected before their completion and while the installation and connections are still uncovered.

### **1.1076 Installation Without Inspection**

In the event an excavation is backfilled without an inspection first being completed by the District, then the owner shall cause the pipe to be exposed for the required inspection. All costs incurred in excavating a line for inspection shall be borne by the owner.

### **1.1078 Charges For Additional Inspections**

Excess Inspection Fee (see Fee Schedule) shall apply as follows:

Where the pipe is laid and back-filled and/or connection of the building and/or side sewer made to the sanitary sewer system of the District without prior inspection and approval thereof by an inspector of the District, or the District's delegee.

For each re-inspection and/or retesting of the pipe to be made because of the failure of the installer to comply with the ordinances, rules and regulations of the District and the Oregon State Plumbing Specialty Code and/or failure of the pipe to meet the minimum leakage requirements set by the District upon testing thereof.

Should the owner wish an inspection outside of the regular working hours (7:30 am to 3:30 pm Monday through Friday) of the District, the applicant must apply to the District twenty-four hours in advance and make a deposit of triple the Excess Inspection Fee.



### **1.1079 Construction Quality**

If any work done under a permit granted by the District is not in accordance with the provisions of this code, and if the installer doing the work shall refuse to construct properly and complete such work, notice of such failure or refusal shall be given to the installer stating the nature of the violation and providing a reasonable time for corrections thereof. The installer shall, within the period of time stated in such notice, correct and complete the work. In the event the work is not so corrected and completed within the stated time, the District may cause said work to be completed if, in its opinion, the failure constitutes a hazard to safety or health, and the cost of such work and any materials necessary therefore shall be charged to the installer and shall be payable by the installer immediately upon notice and demand thereof given to the installer.

### **1.1080 Construction Duration**

All work within the limits of any public right-of-way shall be completed with due diligence. If any excavation is left open beyond a time reasonably necessary to complete the same, the District may cause the excavation to be backfilled and the public right-of-way restored. Any costs of such work shall be charged to the property owner and shall be payable immediately to the District upon written notice and demand for the amount thereof given to the installer.

### **1.1081 Damage**

Should any installer or person damage any portion of the system during repair, installation or any other activity, the District reserves the right to charge the property owner for reimbursement of all time, materials and resources allocated to the associated correction, inspection and assessment and any other related work.

### **1.1082 DEQ Authority and Process**

The Oregon DEQ shall approve each sanitary sewer line extension in the District's service area. The Oregon DEQ reviews proposed sanitary sewer installation plans for every line extension and charges associated fees. For this review Clackamas County provides the land Use Compatibility Statement. The Oregon DEQ shall be contacted by the applicant to submit the application and shall assure that the Oregon DEQ has provided the District the Sanitary Sewer Extension Approval.

### **1.1083 Agency Coordination**

The District coordinates with CCDTD on land use development proposals within the County. The County has a policy to coordinate the review of development applications with the District, for proposals within the District's jurisdiction, to ensure that approval is not granted in the absence of adequate utilities or a mechanism to provide them concurrently with development.

END OF SECTION

# SECTION 2—STORM WATER AND EROSION CONTROL DESIGN STANDARDS

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## **2.0000 STORM WATER AND SURFACE WATER DESIGN**

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### **2.0001 Definitions**

The following are definitions of general applicability throughout the Oak Lodge Water Services Rules and Regulations and definitions specific to this Chapter. Additional definitions specific to other Chapters are provided within each specific Chapter.

#### **AWWA**

American Water Works Association

#### **Best Management Practices (BMP)**

Requirements, methods, measures, practices, or design and performance standards imposed on an owner or operator that facilitate compliance with this Code, applicable water quality standards or with requirements for dredged fill materials. BMPs may cover treatment requirements, operating and maintenance procedures, schedules of activities, prohibitions of activities, and other management practices to control plant site run-off, spillage, leaks, sludge or water disposal, or drainage from raw material storage.

#### **Board**

The Board of Directors of Oak Lodge Water Services District.

#### **Bioswale**

Landscaped elements designed to remove silt and pollution from surface runoff water. They consist of a drainage course with gently sloped sides (less than six percent) and filled with vegetation.

#### **Buffer**

Generally, the zone contiguous with a sensitive area that is required for water quality. The critical functions of a riparian buffer (those associated with an aquatic system) include shading, input of organic debris and coarse sediments, uptake of nutrients, stabilization of banks, interception of fine sediments, overflow during high water events, protection from disturbance by humans and domestic animals, maintenance of wildlife habitat, and room for variation of aquatic system boundaries over time due to hydrologic or climatic effects. The relevant regulatory agency's definition shall supersede this definition.

#### **Business Customer**

A person who resides or conducts business or other activities on a parcel zoned for business. Mere ownership and activities that are necessary to prevent or abate nuisance conditions or to avoid deterioration of a business parcel shall not constitute "residing" or "conducting business or other activities".

#### **Business Parcel**

A parcel of land, which is zoned for business use.

#### **Conservation Easements**

A voluntary agreement that allows a property owner to permanently limit the type and amount of development on their property while retaining private ownership.

#### **Construction Activity**

Ground disturbance activities including, but not limited to, clearing, grading, excavation, or filling, or activities subject to a building permit.

#### **Contractor**

A person duly licensed or approved by the State of Oregon to perform the type of work to be done under a permit or contract issued by the District.

#### **County**

Clackamas County, Oregon.

**Customer**

A residential, commercial business, industrial, or other customer.

**Customer Charge**

The periodic charges applied to all customers of the District's Surface Water Management system for the cost of planning, program development, public education, operation, maintenance, and replacement; including any other costs, such as but not limited to, debt service, capital improvements, administration, etc. This does not include charges from specific fees related to permits or one-time service fees.

**Detention**

The release of surface water runoff from a site at a slower rate than it is collected by the drainage system, the difference being held in temporary storage.

**Development**

Any human-induced change to improved or unimproved real estate, including but not limited to construction, installation, or expansion of a building or other structure; land division; drilling; and site alteration such as that due to land surface mining, dredging, clearing, grading, excavation, filling, construction of earthen berms, paving, or improvements for use as parking or storage.

**Discharge**

Any addition of water, storm water, wastewater, process water or any pollutant or combination of pollutants to waters of the State, directly or indirectly, by actions of dumping, spilling, disposing or physically connecting to the public storm system or natural drainage conveyance.

**District**

Oak Lodge Water Services District.

**Drainageway**

A channel such as an open ditch that carries surface water.

**Dwelling Unit**

As defined by Clackamas County.

**Easement**

An interest or right to use or occupy real property for construction and maintenance of facilities.

**Engineer**

A registered professional engineer licensed to practice in the State of Oregon.

**Equivalent Service Unit (ESU)**

A configuration of development resulting in impervious surfaces on a parcel, which contributes runoff to the Storm water system. One ESU is equal to 2,500 square feet of impervious surface area.

**Erosion**

Erosion is the movement of soil particles resulting from the flow or pressure from water, wind, or earth movement. Visible or measurable, construction-related erosion includes, but is not limited to:

1. Deposits of mud, dirt, sediment or similar material exceeding ½-cubic-foot in volume on public or private streets, adjacent property, or into the storm and surface water system, either by direct deposit, dropping, discharge, or as a result of the action of erosion during the construction period.
2. Evidence of concentrated flows of water over bare soils; turbid or sediment- laden flows; or evidence of onsite erosion such as rivulets or bare soil slopes, where the flow of water is not filtered or captured on the site.
3. Earth slides, mudflows, earth sloughing, or other earth movement, which results in material leaving the property.

**Erosion Control Plan**

A plan containing a list of best management practices (BMP) to be used during construction to control and limit soil erosion.

**Excavation**

The mechanical removal of earth material.

**Fences**

Structures that consist of concrete, brick, wood, plastic, or metal posts located in the ground, connected by wood, metal, or plastic, and capable of allowing passage of water.

**GIS**

Geographic Information System is a system of hardware and software used for storage, retrieval, mapping and analysis of geographic data.

**Groundwater**

Water found underground in the cracks and spaces of soil, sand and rock.

**Hazardous Materials**

Materials described as hazardous by the Department of Environmental Quality, including any toxic chemicals listed as toxic under Section 307(a) of the Clean Water Act or Section 313 of Title III of SARA.

**Hearings Officer**

Officer appointed by the General Manager or the Board of Directors, for hearings of appeals of administrative actions.

**Highly Erodible**

Soils with erosion (K) factors greater than 0.25, as listed in the Soil Survey of Clackamas County Area, Oregon, developed by the Soil Conservation Service.

**Impervious Surface**

That surface area, which either prevents, or retards the entry of water into the soil mantle and/or causes water to run off the surface in greater quantities or at an increased rate. Impervious surfaces may include, but are not limited to, rooftops, concrete or asphalt paving, walkways, patios, driveways, parking lots, oiled macadam, gravel, or other surfaces which similarly resist infiltration or absorption of moisture.

**Industrial Waste**

Any liquid, gaseous, radioactive or solid waste substance, or a combination thereof, resulting from any process of industry, manufacturing, trade or business, or from the development or recovery of any natural resources, or as defined by the Oregon State Department of Environmental Quality or the United States Environmental Protection Agency, exclusive of domestic sewage.

**Infiltration System**

A drainage facility designed to use the hydrologic process of surface and storm water runoff soaking into the ground, commonly referred to as recharge, to dispose of surface and Storm water runoff.

**In-Lieu Fee**

A fee paid to the District to cover onsite water quality or water quantity facilities from a site on which Storm water management is not practical.

**In-Line Detention**

Detention located in a stream channel, a drainageway, or in a regional or subregional piped system. In-line detention mixes flows to be detained with flows from other areas.

**Inspector**

A person authorized by the District to inspect construction sites and activities affecting surface water.

**Metro**

The Metropolitan Service District organized and operating under ORS Chapter 268 and its Charter in portions of Washington, Multnomah and Clackamas Counties to provide planning and other services.

**Municipal Separate Storm Sewer System (MS4)**

A conveyance or system of conveyances (including roads, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) owned or operated by a public body. The system is designed and used for collecting storm water and is not a combined sewer or part of a Publicly Owned Treatment Works (POTW).

**National Pollutant Discharge Elimination System (NPDES) Permit**

A permit issued pursuant to Chapter 402 of the Clean Water Act (40 CFR 122, 123, 124, and 504).

**Non-Single-Family Customer (or User)**

A person or property owner who resides or conducts business or other activities on a parcel that is other than a single-family parcel, including multi-family developments, commercial or industrial zoned parcels.

**Oak Lodge Sanitary District Plant List**

A document maintained by the District that lists native plant and tree species that are allowed and approved by the District in its plan reviews for replanting vegetation.

**Open Space**

1. Land within a development that has been dedicated in common to the ownership within the development or to the public specifically for the purpose of providing places for recreational uses or scenic purposes.
2. Land designated by local, state, or federal agencies for preservation.

**Owner**

The owner of record title or the purchasers under a recorded sale agreement and other persons having an interest of record in the described real property.

**Parcel of Land**

A lot, parcel, block or other tract of land that is occupied or may be occupied by a structure or structures or other use, and includes yards and other undeveloped areas required under the zoning, subdivision or other development ordinances.

**Perennial Stream**

A permanently flowing (non-intermittent) stream.

**Permit**

Any authorization required pursuant to this or any other regulation of the District.

**Permittee**

The person issued a building permit, development permit or any other permit described in this Code is issued.

**Person**

Any individual, firm, company, corporation, partnership association, entity, public corporation, political subdivision, governmental agency, municipality, industry, or any department or agency thereof.



**Pollutant**

Any of the following, but not restricted to: oil, grease, soil, mining waste, spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, heavy metals, asbestos, wrecked or discharged equipment, cellar dirt and untreated industrial, municipal and agricultural discharges into water.

**Post-developed**

Conditions at the site after development.

**Pre-developed**

Conditions at the site immediately before application for development. Man-made site alterations or activities made without an approved development permit will not be considered as pre-developed conditions.

**Pretreatment**

The reduction of the total suspended solids, including sediments and turbidity-causing materials and the removal of petroleum hydrocarbons, fats, oils, and grease through physical straining, settling processes or filtering of runoff.

**Private Storm System**

That portion of the storm system owned and/or maintained by any person or entity other than the District and is located outside the public right-of-way, except as otherwise approved by the District.

**Property (or the Site)**

The real property undergoing development.

**Public Storm water System**

Those portions of the Storm water system that are in the public ROW. Natural waterways are defined under State and Federal regulations.

**Public Right-of-Way**

Any public highway, road, street, avenue, alleyway, public place, public easement, or public right-of-way.

**Rational Method**

A formula for estimating maximum discharge of runoff at a point, using flow (Q), runoff coefficient (C), rainfall intensity (I) for selected recurrence interval, and area (A), in the formula:  $Q=CIA$ .

**Redevelopment**

A project that proposes to add, replace, and/or alter impervious surface (for purposes other than routine maintenance, such as resurfacing) on a site that is already developed. Requirements related to redevelopment shall be met when the project impacts greater than 500 square feet of impervious surface area.

**Retention**

The process of collecting and holding surface water runoff with no surface outflow.

**Sensitive Areas**

Existing or created wetlands, including all mitigated wetlands, Rivers, streams, sloughs, swamps, creeks and impoundments; limits defined by wetlands reports approved by the U.S. Army Corp of Engineers (USACE), Oregon Department of State Lands (DSL), and/or Clackamas County.

**Standard Methods**

The examination and analytical procedures set forth in the most recent edition of Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, AWWA, and Water Environment Federation.

**Stop Work Order**

An Order issued by the District for violation of the Rules and Regulations. All work contributing to the violation must cease when a Stop Work Order is issued, and the Stop Work Order will stay in place until such time as removed by the District in writing.

**Storm Drain Facility**

A constructed or natural feature that conveys surface water flows or runoff during rain events, including but not limited to pipes, streets, ditches, streams, pollution reduction manholes, and detention facilities.

**Storm Drainage/Storm Sewer**

A pipe, or any method of conveyance that carries Storm water, surface runoff, or drainage.

**Storm water**

Waters on the surface of the ground or underground resulting from precipitation.

**Storm water Management**

A program to provide surface water quality and quantity controls through nonstructural methods and capital improvement projects. Nonstructural controls include maintenance of surface water facilities, public education, water quality monitoring, implementation or intergovernmental agreements to provide for regional coordination, and preparation of water quality control ordinances and regulations. Storm water Management is also referred to as “surface water management”.

**Storm water Quality Treatment Facility**

Storm water Quality Treatment Facility refers to any structure or drainageway that is designed, constructed, and maintained to collect, filter, retain, or detain surface water runoff during and after a storm event for the purpose of water quality improvement. It may include, but is not limited to constructed wetlands, water quality swales, and ponds.

**Stream**

A drainageway that is determined to be jurisdictional by the USACE or DSL, also referred to as creek.

**Top-of-bank**

The point closest to the boundary of the active floodplain of a stream where a break in the slope of the land occurs such that the grade beyond the break is flatter than 3:1 at any point for a minimum distance of 25 feet measured perpendicularly from the break.

**Treatment**

The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in water to a less harmful state prior to discharging to Waters of the State.

**Undeveloped Land**

Land left in its natural state, free from any structures, roadways, placement of impervious materials or any other man created alteration.

**User**

Any person or entity in whose name service is rendered as evidenced by the signature on the application or contract for that service, or in the absence of a signed instrument, by the receipt and payment of utility bills regularly issued in his/her/its name. A user, under this system and structure of rates, is either single-family or non- single-family.

**User – Non-Single-family**

Any user whose impervious surface results from the development of land for purposes of operating a dwelling unit for occupancy by more than one single-family or for other business, industrial, commercial or institutional purposes and to whom utility services are provided at a distinct service location.

**Variance**

A discretionary decision to permit modification of the terms of any part of this Code based on a demonstration of unusual hardship or exceptional circumstance unique to a specific property.

**WES**

Clackamas County Water Environment Services is the wastewater and surface water management agency for Clackamas County.

**Water Quality Facility**

A facility specifically designed for pollutant removal.

**Water Quality Standards**

The Federal Clean Water Act, the Code of Federal Regulations, ORS Chapter 468 and OAR Chapter 340 Division 41.

**Water Treatment Bioswale/Water Quality Swale**

A vegetated natural depression, wide shallow ditch, or similar constructed facility used to filter runoff for the purpose of improving water quality.

**Waters of the State**

Those waters defined in ORS Chapter 468B.005, or as amended, which include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

**Wetland**

Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are those areas identified and delineated by a qualified wetlands specialist as set forth in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 1987, or by a DSL/COE 404 permit. Wetlands may also consist of:

1. **Constructed Wetlands.** As defined in Section 404 of the Clean Water Act, constructed wetlands are those areas developed as a water quality or quantity facility, subject to maintenance as such. These areas must be clearly separated from existing or created wetlands.
2. **Created Wetlands.** Created wetlands are those wetlands developed in an area previously identified as a non-wetland to replace or mitigate wetland destruction or displacement.
3. **Existing Wetlands.** Wetlands identified and delineated as set forth in the Federal Manual for Identifying the Delineating Jurisdictional Wetlands, January 1987, or as amended, by a qualified wetlands specialist.

**Work Area**

Areas of disturbance for activities defined under "Development". Work Area includes areas used for storage of equipment or materials that are used for these activities.

## **2.0002 Relationship to OLWSD Rules and Regulations**

The following standards, procedures and rules are adopted by reference in section 202.05 of OLWSD Rules and Regulations and have the full force and effect of the OLWSD Rules and Regulations.

## **2.0003 Ownership of Storm Water System**

The public storm sewer system is located on or within public and private property. Generally, Clackamas County owns the storm sewer and surfacewater facilities in the public right-of-way (ROW). OLWSD assists in maintaining some infrastructure in the public rights-of-way through various agreements but does not generally own or is responsible for the drainage function of that system.

Property owners generally own and maintain storm sewer and surfacewater facilities on private property regardless of the authority, ownership or responsibility of the water entering those privately-owned facilities.

## **2.0004 OLWSD Authority: Storm/Surface water System**

OLWSD's authority is derived from its compliance responsibilities with the District's MS4 permit. Compliance with this permit includes water quality monitoring, associated reporting, assuring new development and construction adheres to surface water standards for volume, rate and quality and erosion prevention / sediment control and to retrofit existing developed areas to improve water quality, perform watershed assessment. The District is a co-permittee with the Clackamas County MS4 Permit with authority allocated to each separate jurisdiction.

Clackamas County recognizes that the District has responsibility for operating, planning, and regulating surface water management systems in Comprehensive Plan Chapter Public Facilities and Services Policies 19-26<sup>1</sup> which requires all new developments to meet the development standards of the appropriate service provider.

## **2.0005 OLWSD Authority; Erosion Prevention / Sediment Control and 1200C**

OLWSD is responsible for "small lot" construction and development on tax lot(s) that are less than one acre (43,560sf). Construction, development and ground disturbing activities on lot(s) greater than one and less than five acres are required to obtain a 1200CN permit from the Oak Lodge Water Services District. Construction, development and ground disturbing activities on lot(s) greater than five acres are required to obtain a 1200C permit from the Oregon Department of Environmental Quality which performs permit application review and inspection.

## **2.0006 Connection to the Storm sewer System**

Any connection (either piped or release) to the Storm water / storm sewer / surface water system must be requested by the Property Owner, at owner's expense to the appropriate utility owner or regulatory authority, to connect directly with the proper public storm water in accordance with the provisions of these regulations. Such request shall be made through complete application to connect to the storm sewer system.

## **2.0007 Permit Applications (the Owner or Installer)**

The installer of work covered by these regulations shall make application for a permit on forms provided by the District. The Property Owner or representative must also sign the permit application as acknowledgement of the work proposed to be performed. The District accepts digital signatures on its form within the permit software system. The permit application shall be supplemented by any plans, specifications or other information considered necessary by the General Manager or designee.

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<sup>1</sup> <https://www.clackamas.us/planning/comprehensive.html> May 03, 2001

## 2.0008 Permit Required

An OLWSD-issued permit is required prior to any work commenced. Failure to acquire permit(s) equate to a violation of the Rules and Regulations. The issuance of a permit by the District will not relieve the permit holder from the responsibility of obtaining such other permits or licenses as may be required by other governmental agencies.

## 2.0009 Agency Coordination

The District coordinates with the Clackamas County Department of Transportation and Development and Oregon Department of Environmental Quality on land use and/or development proposals within the County. In the Clackamas County Comprehensive Plan Chapter 11 Policy 1 of City, Special District and Agency Coordination's Policy 1 authorizes the County to: *"Participate in interagency coordination efforts with federal, state, Metro, special purpose districts and cities. The County will maintain an updated list of federal, state and regional agencies, cities and special districts and will invite their participation in plan revisions, ordinance adoptions, and land use actions which affect their jurisdiction or policies."*<sup>2</sup> The County has a policy to coordinate the review of development applications with the District, for proposals within the District's jurisdiction, to ensure that approval is not granted in the absence of adequate surfacewater management facilities per Clackamas County Zoning and Development Ordinance.

### 2.009.1 Preliminary Statements of Feasibility: Surfacewater

The District signs preliminary statements of feasibility for Surfacewater management as the Surfacewater management authority subject to the following conditions: The property owner is responsible for substantiating Surfacewater compliance and performance. This is demonstrated through a preliminary storm water report and plan submitted for the preliminary statement of feasibility. OLWSD does not own the storm water conveyance system and cannot authorize connections to that system. The owner of the system reconciles existing capacity to proposed impacts. Some development proposals may require use of public easements which OLWSD cannot determine access rights. Other conditions may apply depending on the proposal.

## 2.0010 General Design Requirements

**Performance Standards:** Storm drainage design within a development area must include provisions to adequately control runoff from all public and private streets and the roof, footing, and area drains of residential, multi-family, commercial, and/or industrial buildings. The design must ensure future extension of the drainage system to the entire drainage basin in conformance with the adopted Storm Drainage Master Plans and Strategic Plans and these Design Standards. These provisions include:

1. Surface or subsurface drainage, caused or affected by the changing of the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a volume or location materially different from that which existed before development occurred, but shall be collected and conveyed in an approved manner to an approved point of disposal.
2. Surface water entering the subject property shall be received at the naturally occurring locations and surface water exiting the subject property shall be discharged at the natural locations with adequate energy dissipaters within the subject property to minimize downstream damage and with no diversion at any of these points.
3. The approved point of disposal for all storm water may be a storm drain or a detention or retention pond or other approved by Clackamas County or other relevant agency. Existing open channels, creeks or streams are approved points of disposal after the Storm water has been treated for water quality. Acceptance of proposed systems will depend upon the prevailing site

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<sup>2</sup> <https://dochub.clackamas.us/documents/drupal/def278a5-a8a3-4883-94ba-20443d3ba068> May 23, 2018

conditions, capacity of existing downstream facilities, and functional performance of the alternate design.

4. When private property must be crossed in order to reach an approved point of disposal, it shall be the owner's responsibility to acquire a recorded drainage easement. Temporary drainage ditch facilities, when approved, must be engineered to contain the storm water without causing erosion or other adverse effects to the private property.
5. The peak discharge from the subject property may not be increased from conditions existing prior to the proposed development, except where it can be satisfactorily demonstrated by the applicant that there is no adverse impact.
6. Retention/detention facilities will be required where necessary to maintain surface water discharge rates at or below the existing storm peak discharge, except where it can be demonstrated by the applicant that no adverse impact will result from not providing said facilities.
7. Permanent Storm water quality control facilities will be required for all new developments and redevelopments and construction projects including public road expansion projects.
8. Drainage from roofs, footings, and downspouts shall drain to a private Storm water management system. Systems other than residential drywells (or soakage trenches) shall be designed by an engineer and reviewed by OLWSD staff for approval.
9. Vegetation shall be established on areas disturbed by/or on areas of construction, as necessary, to minimize erosion in accordance with OLWSD or DEQ standards.

All storm drain system designs shall make adequate provisions for collecting all storm water runoff. The system shall accommodate all runoff from upstream tributary areas whether or not such areas are within the proposed development. The amount of runoff to be accommodated shall be based upon ultimate development of all upstream tributary areas.

Proposed storm drain systems shall not discharge flows into inadequate downstream systems unless approved by Clackamas County or relevant agency.

10. Applicant must obtain all necessary permits (Division of State Lands, Army Corps of Engineers, Oregon Department of Fish and Wildlife, etc.).

## **2.0011 Site Drainage Plans**

### **A. Existing Drainage Plan**

Provide a topographical contour map defining existing conditions to include the following minimum information.

1. 2' contour intervals; slopes over 10% may use 5' intervals; extend contours a minimum of 100 feet beyond property.
2. All structures, buildings, parking lots, and utilities on the property.
3. Locations of all existing drainage facilities and watercourses, including wetlands and floodplain areas and overland drainage, intercepted drainage or areas of high-water tables.
4. Locations of all subsurface water outlets (e.g., springs).
5. Arrows to indicate direction of flow for all drainage information.
6. All existing on-site storm and Surfacewater infrastructure.

### **B. Proposed Drainage Plan**

Show proposed site grading and drainage facilities on a topographical contour map. Unless the detail for proposed improvements will obscure the conditions shown on the existing drainage

plan, proposed site grading and drainage may be shown on the existing drainage plan. The following minimum information shall also be shown:

1. Finished contours of the property, after development, at 2' or 5' intervals as required.
2. Percent grade for graded slopes; elevations, dimensions and locations for all graded slopes.
3. Cut/fill areas; structural fill placement areas; erosion/sedimentation control methods; reseeding areas.
4. All proposed drainage facilities—including but not limited to public and private systems; paved areas, curbs, sidewalks; drainage ditches, culverts.
5. On-site basin plan showing drainage areas with respective treatment facilities. (For example, the drainage area for each proposed swale, and/or catch basin, and/or inlet, and/or mechanical filter, and/or outlet.)

#### **C. Drainage Calculations**

Furnish such supporting information as required per Subsection 305 of these Design Standards.

### **2.0012 Minimum Design Criteria**

#### **A. Storm Detention Facility**

See 2.1005.03.04 Additional Surface Water Management Standards in this chapter.

#### **B. Water Quality Facility**

All Water Quality Facilities shall meet the design requirements of the most current *City of Portland, Storm water Management Manual*, as amended and adopted by the District and the requirements of 2.1005. Proposed facilities shall be of this design or equivalent. If this design is not used, a variance application shall be submitted.

See 2.1005 in this Chapter for additional standards and guidance.

#### **C. Conveyance Piping**

##### **1. Time of Concentration**

Overland flow of runoff to the initial catchment point into the storm drain system shall be a minimum of 5 minutes.

##### **3. Velocity in Natural Channels**

Control of discharge from developed areas to natural channels shall be such that the average velocity resulting from all design storms less than or equal to the 10-year event remains below the erosive velocity of the channel.

##### **4. Manning's Equation**

When calculating minimum pipe slopes and velocities, the Design Engineer shall use the Manning pipe friction formula.

##### **6. Design Storm**

The minimum design storm is the 100-year event.

### **2.0020 Storm Water Detention and Retention**

#### **2.0021 Development Not Requiring Detention**

In general, all developments will be required to provide on-site detention, unless the developer can demonstrate by a hydraulic analysis that proposed development will not increase storm water

runoff volumes or peak discharge from an undeveloped condition. If the site is proposed for redevelopment or existing roadway or other constructed alterations, this does not mean existing developed conditions.

Notwithstanding any detention requirements, water quality facilities may still be required.

### **2.0022 Floodplain Information**

Floodplain information, delineating the 100-year floodplain limits, shall be shown where it occurs within the development. Floodplain limits shall be based on maps prepared by the U.S. Army Corps of Engineers and the Federal Emergency Management Agency (FEMA). Where better information is available, it shall be used by the Design Engineer.

### **2.0023 Emergency Overflow**

The Design Engineer shall assess the impacts of system failure for on-site detention. Overflow may occur due to rainfall intensity which exceeds the design storm, debris blockage of storm drain system, or some other reason.

The storm drain system shall be designed such that overflows do not cause inundation of neighboring properties. Potential overflow routes shall be adequately protected from erosion.

If surface detention (e.g., pond) is used, an overflow system shall be included to provide controlled discharge of design storm event for developed conditions as required by OLWSD, without overtopping any part of the pond embankment or exceeding the capacity of the emergency spillway. The overflow design shall assume failure of the normal outlet control structure. An emergency spillway shall be able to safely pass all flows over the pond embankment without overtopping the embankment. Sufficient armoring will be required to the toe on each face of the embankment to prevent failure of the embankment from erosion.

### **2.0024 Detention Facilities**

Detention volume storage methods, in order of preference, are the following:

1. Surface storage—pond;
2. Combination pond and water quality treatment;
3. Roadside swales overflowing to a Storm water system;
4. Underground storage by tank or vault will be approved by the District Engineer only when a pond is impracticable.

### **2.0025 Infiltration Facilities [Underground Injection Control (UIC)]**

Infiltration facilities, also known as Underground Injection Control or UIC facilities (UICs) are governed by the Oregon Department of Environmental Quality (DEQ) pursuant to OAR 340-106-0001 and OAR 340-044-0005 (or equivalent). Storm water UICs include drywells, storm sumps, french drains, infiltration trenches and galleries, and other devices designed or intended to dispose of Storm water directly below the soil without the benefit of surface infiltration.

Any person seeking to install a UIC within the District must first obtain a permit from DEQ. The OLWSD does not authorize, permit or review UICs. All other UICs, including those that accept Storm water from any residential driveway, commercial parking lot, street, etc., must be registered and permitted or rule authorized by DEQ.



## **2.0030 Water Quality Facilities**

### **2.0031 Criteria for Requiring Construction of a Water Quality Facility**

A water quality facility shall be constructed unless, in the judgment of the District Engineer, any of the following conditions exists. The applicant or owner may use the below to substantiate a variance request to water quality facility installation:

1. The site topography or soils makes it impractical, or ineffective to construct an on-site facility.
2. The site is small compared to the development plan, and the loss of area for the on-site facility would preclude the effective development.
3. There is a more efficient and effective regional site within the sub-basin that was designed to incorporate the development.
4. The development is for the construction of 1-or 2-family (duplex) dwelling(s) on existing lot(s) of record and not part of a subdivision (major or minor), or any partition with water quality treatments required for the subject impervious area(s).

If construction of an on-site facility is not required, then the District Engineer may require that development to construct an off-site treatment facility that will treat an equal or greater volume of Storm water elsewhere within the District. It is the development's responsibility to acquire the land necessary offsite to construct the proposed facility and to provide proof to the District Engineer that land has been acquired prior to the Land Use Application being deemed complete by the District. If the District is not furnished with adequate proof of ownership, then the application will not be deemed complete.

### **2.0032 Plan Requirements**

When construction of water quality facilities is required the following shall be contained on the plan(s):

1. The application shall include a set of construction plans prepared by the Design Engineer that certifies the proposed water quality facilities have been designed in accordance with the criteria required in these Standards.
2. A financial assurance, meeting the requirements of the community development code is provided for the construction of the water quality facility.
3. An operation and maintenance plan shall be prepared showing how the water quality facility is to be maintained.
4. A landscape plan shall be prepared for the proposed facility.
5. A list of recommendations by a Geotechnical Engineer may be required at the discretion of the District Engineer.

### **2.0033 Facility Design**

All Water Quality Facilities shall meet the design requirements of the most current *City of Portland, Storm water Management Manual*, as amended and adopted by OLWSD. See 2.1005 for additional information.

## **2.0040 Erosion Control**

All relevant construction activities shall provide erosion prevention measures and sediment control practices during all phases of construction to prevent and restrict the discharge of sediments in accordance with the District's Rules and Regulations and OAR 340-41-455(3)<sup>3</sup> (or equivalent). See 2.1005 of this section for Erosion Prevention and Sediment Control standards.

## **2.0050 Private Drainage Systems**

### **2.0051 Subdivisions**

When subdivision lots drain to the rear it may be necessary to provide a private drainage system in private easements. This system shall be for collection of roof drains, footing drains, and surface runoff. This system shall be designed to meet the Uniform Plumbing Code requirements.

### **2.0052 Subsurface Drainage**

Subsurface drains (underdrains) shall be provided at the following locations:

1. Where existing springs and field tile intercepted during construction activity for other facilities; i.e., sewer, water, mains, street excavations, foundations, etc. Subsurface drains are not needed if the tile is removed.
2. Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or underfloor flooding of buildings.

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<sup>3</sup> At time of composition.

## **2.1000 SURFACEWATER AND EROSION PERMIT PROCEDURES AND REQUIREMENTS**

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### **2.1001 General Notes**

The following notes shall be contained in any submitted surface water permit application:

1. Erosion Control must be inspected prior to construction commencement. The owner or applicant shall schedule an initial inspection of erosion control measure installation at least 24 hours in advance of needing inspection. No inspections will be scheduled after 1:30PM.
2. Additional erosion control measures, and/or permits and/or fees may be required if the project scope changes from the approved plans.
3. Utility Placement Permits (Road Opening) may be required by Clackamas County if work enters the public right-of-way or other applicable area.
4. All hazardous chemicals, which are delivered to or stored at the job site during construction, restoration, or maintenance activities shall be stored, covered, and protected from the weather. None of the materials shall be exposed during storage. Hazardous chemicals shall be disposed of in such a manner that pollution of soil, groundwater, surface water.
5. The use of hazardous chemicals including, but not limited to, pesticides (including insecticides, herbicides, defoliants, soil sterilants) and fertilizers, must strictly adhere to federal, state, and local regulations.

### **2.1002 Objectives**

The District provides surface water management through maintenance of surface water facilities, public education, water quality monitoring, implementation of intergovernmental agreements to provide for interjurisdictional coordination, and preparation of water quality and quantity control ordinances and regulations.

The objectives of this section are to:

1. Prevent or minimize the introduction of pollutants to surface waters;
2. Meet Federal National Pollutant Discharge Elimination System (NPDES) permit requirements;
3. Prevent future pollution and erosion through implementation of Best Management Practices (BMP);
4. Provide for the equitable distribution of the costs of the surface water management program; and
5. Better manage and control surface water within the District.

### **2.1003 Discharge Regulations**

#### **2.1003.01 Purpose**

This chapter provides for the regulation of discharge of Storm water, pretreatment facilities, and storm drainage facility connection.

#### **2.1003.02 Discharge Regulations**

An Erosion Control/Surface Water Management Permit is required to discharge to the District's sanitary sewer system, any public Storm water system, creeks, or other drainageways. Before discharging to any constructed or natural systems within the District, an Erosion Control/Surface

Water Management Permit authorizing such discharge shall first be secured in writing from the District and fees paid. No person shall discharge or cause to be discharged, directly or indirectly, any quantity of Storm water, pollutant substance, or wash water into the public Storm water system unless an Erosion Control/Surface Water Management Permit is obtained from the District

#### **2.1003.02.01 Discharge to Sanitary Sewer System**

Discharge or contribution to the discharge of any Storm water or other unpolluted water is not allowed into the District's sanitary sewer system without specific approval from the District.

#### **2.1003.02.02 Discharge to Public Storm water System**

All discharges to the public Storm water system shall have authorization from the utility's owner; Clackamas County. Prohibited Storm water discharge activities include, but are not limited to, the following:

1. Introduction of pollutants or waters to the public Storm water system containing pollutants or concentrations at levels equal to or in excess of those necessary to protect waters of the State.
2. Failure to abide by the terms of any Erosion Control/Surface Water Management Permit, MS4 permit, NPDES permit, statute, administrative rule, ordinance, stipulated and final order or decree, or other permit or contract.
3. Discharges of non-Storm water or spills or dumping of materials other than Storm water into public storm system unless pursuant to a conditional Erosion Control/Surface Water Management Permit approved by the District and in compliance therewith.
4. Illegal or unpermitted connection or methods of conveyance to the public Storm water system.
5. Any discharge that will violate federal, state, or local water quality standards.

#### **2.1003.02.03 Discharge to Creeks or Drainageway**

New storm drains and roof drains are not allowed to drain directly into creeks or drainageways or encroach into the buffer unless an Erosion Control/Surface Water Management Permit is obtained from the District. Encroachment into buffer areas must be approved by the District and will require mitigation. Existing and replacement storm drains shall be constructed according to current state and federal regulations. Non-single family development shall provide an approved water quality facility prior to any discharge from the site to a storm drain system, a creek or drainageway, as approved by the District.

#### **2.1003.02.04 State Discharge Limitations**

State requirements and limitations on discharges shall apply in any case where they are more stringent than Federal requirements and limitations or those provided in this chapter.

#### **2.1003.02.05 Local Discharge Limitations**

The District retains the right to establish by ordinance more stringent limitations or requirements on discharges if such limitations or requirements are deemed necessary to comply with this chapter.

### **2.1003.03 Pretreatment Facilities**

The District may require that pretreatment facilities are necessary to comply with water quality standards. Before constructing or operating any pretreatment facilities within the District, an Erosion Control/Surface Water Management Permit authorizing such connection shall first be secured in writing from the District and fees paid.

#### **2.1003.03.01 Plans, Specifications, and Construction**

1. The District may require plans, specifications, and other information relating to the construction or installation of pretreatment facilities.
2. Pretreatment facility construction and installation shall not commence until written approval of plans and specifications by the District is obtained.
3. Every facility for the pretreatment and handling of surface water discharged from non-single family residential development sites shall be constructed in accordance with approved plans and specifications.
4. The applicant shall notify the District when the facility is ready for final construction inspection. The inspector shall then inspect the facility construction. If such construction meets the previous permit requirements, a pretreatment facility approval shall be issued.

#### **2.1003.03.02 Facility Operations and Maintenance Agreement**

The District may require an Operations and Maintenance Agreement for pretreatment facilities. This agreement may set forth operations and maintenance, sampling, access, and other requirements. This agreement will provide for District access to inspect the facility. This agreement will be recorded in the County records against the affected property.

Every facility for the pretreatment and handling of surface water discharged shall be installed, maintained, and repaired at the expense of the facility owner discharging the surface water. The owner shall be responsible for maintaining and repairing pretreatment facilities using BMPs, as determined by the District or authorized representative.

#### **2.1003.03.03 Sampling and Monitoring Facility**

A person constructing a pretreatment facility, as required by the District, shall also install and maintain, at the expense of the facility owner, a suitable sampling access point for checking and investigating the discharge from the pretreatment facility to the public storm system. The sampling point shall be in accordance with specifications approved by the District.

#### **2.1003.03.04 Sampling**

Samples discharged into the public surface water system shall be representative of the use and shall be taken after treatment, if any, and before dilution by other water. The sampling method shall be one approved by the District and in accordance with best engineering practices. All sample analysis shall be performed in accordance with the procedures set forth in 40 CFR Part 136<sup>4</sup>, as amended.

#### **2.1003.03.05 Reporting Requirements**

The District may require the permit holder to submit a compliance report indicating the quantity and quality of surface water discharge, the need for pretreatment to comply with applicable standards, and the operation and maintenance schedule of the pretreatment facility.

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<sup>4</sup> Or equivalent

### **2.1003.03.06 Inspection and Right-of-Entry**

The District or authorized representatives may inspect the monitoring facilities of any permittee to determine the compliance with the requirements of this Code. The discharger shall allow the District or authorized representatives to enter upon the premises at any reasonable hour for the purpose of inspection, sampling, or records examination. The District shall also have the right to install on the user's property such devices as are necessary to conduct sampling, inspection, compliance, monitoring, and/or metering operations. The right of entry includes but is not limited to access to those portions of the premises that contain facilities for sampling, measuring, treating, transporting, or otherwise handling surface water and storing records, reports, or other related documents.

### **2.1003.04 Discharge to a Storm Facility**

An Erosion Control/Surface Water Management Permit is required to discharge or drain to any storm drain facility, including but not limited to pipes, streets, ditches, streams, pollution reduction manholes, and detention facilities, whether constructed or natural. Before discharging or draining to any storm drain facilities within the District, an Erosion Control/Surface Water Management Permit authorizing such discharge shall first be secured in writing from the District and fees paid.

#### **2.1003.04.01 Plans, Specifications, and Construction**

The District may require plans, specifications, and other information relating to the construction or installation of storm drain facility connections:

1. Storm drain facility connections construction and installation shall not commence until a written permit and approval of plans and specifications by the District is obtained.
2. Every storm drain facility connection shall be constructed in accordance with approved plans and specifications and shall be installed, maintained, and repaired at the expense of the facility owner connecting to a storm drainage facility.
3. The applicant shall notify the District when the connection is ready for inspection. The inspector shall then inspect the connection construction therein, and if such construction meets the previous requirement as approved in the permit, a connection approval shall be issued.

## **2.1004 Erosion Control and Environmental Protection**

### **2.1004.01 Purpose**

This Article provides for the regulation of erosion and pollution control to maintain and protect water quality and natural resources in accordance with federal, state, and local water quality standards.

#### **2.1004.01.01 General Policy**

1. To comply with water quality standards set forth in OAR 340-041<sup>5</sup>, it is the District's policy to prevent erosion and eliminate or reduce the amount of sediment and other pollutants reaching the public storm and surface water system.
2. The provisions of this Chapter apply during construction activities and until permanent erosion and pollution control measures are in place, or the site is stabilized and/or the District closes the associated permit(s) as described herein, unless otherwise noted.
3. This chapter is intended to regulate construction activities and other activities that accelerate erosion. It is the District's policy to require temporary and permanent measures for all construction projects to lessen the adverse effects of site alteration on the environment.
4. Nothing in this section shall relieve any person from obligation to comply with the regulations or permits of any federal, state, or local authority.

### **2.1004.02 Erosion Control**

#### **2.1004.02.01 Erosion Control Requirements**

1. Where the District determines that erosion control facilities are necessary to comply with water quality standards, an Erosion Control/Surface Water Management Permit is required for construction and operation of such facilities. Before constructing any erosion control facilities within the District, an Erosion Control/Surface Water Management Permit authorizing such facilities shall first be secured in writing from the District and fees paid. Erosion control facilities and measures shall meet requirements of the current "*Clackamas County Water Environment Services Erosion Prevention Planning and Design Control Manual*."
2. The permittee or owner is responsible for the cost of installation, maintenance, and repair of all erosion control facilities required by an Erosion Control/Surface Water Management Permit, including both temporary and permanent facilities, as applicable.
3. The permittee or owner shall use BMPs, as determined by the District or Authorized designee.
4. No visible or measurable erosion shall leave the property during any construction or other erosion accelerating activity. The permittee/owner, along with any person who causes such visible or measurable erosion, shall be responsible for cleanup, damages, and fines. Cleanup responsibilities may involve, but are not limited to public facilities, resources, and areas impacted by a project including, but not limited

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<sup>5</sup> Or equivalent

to, creeks, drainageways, wetlands, catch basins, storm drains, and sensitive areas.

#### **2.1004.02.02 Plans, Specifications, and Construction**

In addition to the requirements of these Standards and Rules and Regulations, the District may require plans, specifications, and other information relating to the construction or installation of erosion control facilities or restoration plans. Erosion control facility construction and installation shall not commence until the permittee receives the District's written approval of erosion control plans and specifications. All erosion control facilities shall be constructed in accordance with approved plans and specifications.

#### **2.1004.02.03 Inspection**

The erosion control facilities and measures necessary to meet the requirements of this subsection shall be installed by the owner and shall be inspected by the District prior to the start of any construction activity. The owner shall notify the District when the erosion control facility is ready for final construction inspection. The District's inspector shall then inspect the facility construction prior to final approval.

#### **2.1004.02.04 Maintenance**

1. Maintenance of existing facilities shall be the responsibility of the property owner or applicant.
2. The permittee or owner shall maintain the erosion control facilities and BMPs in conformance with the approved erosion control plan.
3. If adequate maintenance is not performed, the maintenance standards and schedule shall be reviewed and enforced by the District and the owner or permittee shall be responsible to the District for costs incurred.
4. Where an erosion control plan is not effective or sufficient as determined by the District through a site inspection, the District may issue a stop work order and the permittee or owner shall be required to submit a revised plan to the District. Upon approval of the revised plan by the District, the permittee or owner shall immediately implement the additional facilities and techniques of the revised plan.
5. In cases where erosion is occurring in violation of this Code, the District may require the owner/permittee to install interim control measures prior to submittal of the revised erosion control plan.

#### **2.1004.02.05 Deposit of Sediment**

No person shall drag, drop, track, or otherwise place or deposit, or permit to be deposited, mud, dirt, rock or other such debris on a public street or into any part of the public storm and surface water system, or any part of a private storm and surface water system, which drains or connects to the public Storm water and surface water system. Any such deposit or material shall be immediately removed using hand labor or mechanical means. No material shall be washed or flushed into any part of the storm and surface water system without erosion control measures installed to the satisfaction of the District, and any such action shall be a violation.

#### **2.1004.02.06 NPDES Permit**

Any construction activity disturbing one (1) or more acres of land shall obtain an NPDES Storm water Discharge Permit issued by DEQ and submit a copy of the permit application, plans and associated reports and issued permit to OLWSD.



## **2.1004.03 Air Pollution**

### **2.1004.03.01 Dust Control**

Dust and other particulate matters containing pollutants that settle on property or are carried to surface waters through rainfall or other means shall be minimized to the maximum extent practicable, utilizing all measures necessary, including but not limited to:

1. Sprinkling with water, haul and access roads and other exposed dust producing areas;
2. Establishing temporary vegetative cover;
3. Placing wood chips or other effective mulches on vehicle and pedestrian use areas;
4. Maintaining the proper moisture condition on all fill surfaces;
5. Pre-wetting cut and borrow area surfaces; and
6. Using of covered haul equipment.

## **2.1003.04 Water Quality Maintenance**

### **2.1004.04.01 Construction of New Facilities**

Construction of new water quality facilities between stream banks shall be pursuant to permits issued by jurisdictional state and federal agencies (i.e., United States Army Corps of Engineers and the Department of State Lands) and applicable regulations.

### **2.1004.04.02 Pollutants**

Pollutants in the DEQ current toxics standards identified in OAR 340-041<sup>6</sup>, such as, but not limited to, fuels, lubricants, asphalt, concrete, bitumens, raw sewage, other harmful materials, and trash or debris, shall not be discharged into rivers, streams, impoundments, wetlands, sensitive areas, undisturbed buffers, or any storm drainage system, or at such proximity that the pollutants flow to these watercourses.

### **2.1004.04.03 Alterations**

The withdrawal of water from a stream, impoundment, wetland, or sensitive area, shall not result in altering or further degradation of the temperature or water quality of the waterbody in violation of OAR-340-041<sup>7</sup>.

### **2.1004.04.04 Construction Activities**

All sediment-laden water from construction activities shall be routed through sedimentation basins, filtered, or otherwise treated to remove the sediment load before the water is discharged into the surface water system.

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<sup>6</sup> Or equivalent

<sup>7</sup> Or equivalent

## **2.1003.05 2.1004.05 Natural Resource Protection**

### **2.1004.05.01 Fish and Wildlife Habitat**

Construction activities shall be done in a manner that minimizes adverse effects on wildlife and fishery resources pursuant to the requirements of local, state, and federal agencies charged with wildlife and fish protection.

### **2.1004.05.02 Sensitive Areas**

An Erosion Control/Surface Water Management Permit is required for activities disturbing sensitive areas that would affect water quality by altering or affecting sensitive areas and associated buffers. These activities include, but are not limited to:

1. landscaping;
2. construction activities;
3. tree cutting;
4. vegetation removal; and
5. streambank restoration.

Before conducting construction activities in sensitive areas within the District, an Erosion Control/Surface Water Management Permit authorizing such activities shall first be secured in writing from the District and fees paid (see Fee Schedule).

Sensitive Areas applicable to the District include:

1. Existing or created wetlands, including all mitigated wetlands; limits defined by wetlands reports approved by the USACE, DSL, and/or Clackamas County;
2. Rivers, streams, springs, sloughs, swamps, creeks; Impoundments (lakes and ponds).

Sensitive areas, for the purposes of this chapter, do not include water quality facilities, such as constructed wetlands or the undisturbed buffers adjacent to sensitive areas.

### **2.1004.05.03 Study Requirements**

An approved study may be required by the District identifying areas on the parcel which are, or may be, sensitive areas when, in the opinion of the District:

1. An area or areas on a parcel may be classified as a sensitive area; or
2. Designed as a natural resource or equivalent by Clackamas County.

### **2.1004.05.04 Tree Replacement within Buffer**

Existing trees within the sensitive area buffer or riparian area are encouraged to remain in place. If a tree is removed from the buffer area the following conditions apply:

1. Any trees removed a diameter at breast height (DBH) of at least 3 inches shall be replaced at a ratio of 4:1 (four trees planted for every one removed) within a time

frame, location(s), and species identified in the approved site restoration plan.

2. An Erosion Control/Surface Water Management Permit shall first be secured from the District if the tree removal activity causes ground disturbance greater than 250 square feet.
3. Trees removed by or requiring removal as a result of natural causes (e.g. wind storm, disease (requires report from Certified Arborist to validate and document disease), wildlife activities) do not have to be replaced.
4. Types of trees allowed for replacement are those identified in the *Oak Lodge Sanitary District Plant List*, except as allowed in a plan approved by the District.

#### **2.1004.05.05 Sensitive Area Buffer**

The District may require that the buffer be fenced, signed, delineated, or otherwise physically set apart from parcels that will be developed. In any new development or redevelopment, the buffer shall be contained in a tract, and shall not be a part of any parcel to be used for the construction. The District reserves the right to require separate tracts for buffers; however, conservation easements will be considered and allowed if the developer can demonstrate that restrictions for activities on the parcel will protect the resource associated with the buffer. Restrictions may include permanent signage, fencing, documentation with the title of the property, or other methods approved by the District.

#### **2.1004.05.06 Plans, Specifications, and Construction**

In addition to requirements in these Standards, the District may require additional plans, specifications, and other information relating to construction within, variances from, and restoration of buffers. Construction and restoration shall not commence until written approval of plans and specifications by the District is obtained and shall occur in accordance with approved plans and specifications.

The applicant shall notify the District when the facility is ready for final construction inspection. The inspector shall then inspect the facility construction therein.

#### **2.1004.05.07 Hazardous Chemicals, Pesticides, Fertilizers**

The use of hazardous chemicals including, but not limited to, pesticides (including insecticides, herbicides, defoliants, soil sterilants) and fertilizers, must strictly adhere to federal, state, and local regulations.

All hazardous chemicals, which are delivered to or stored at the job site during construction, restoration, or maintenance activities shall be stored, covered, and protected from the weather. None of the materials shall be exposed during storage. Hazardous chemicals shall be disposed of in such a manner that pollution of soil, groundwater, surface water, or air does not occur. In no case shall hazardous materials be disposed of in drainageways.

### **2.1005 Additional Surface Water Management Standards**

#### **2.1005.01 Purpose**

This Article provides for additional treatment design, water quality, quantity, and natural resource protection standards.

## 2.1005.02 General Standards

### 2.1005.02.01 Requirements

1. All development shall be planned, designed, constructed, and maintained to:
  - (a) Protect and preserve existing streams, creeks, natural drainage channels and wetlands, and to meet state and federal requirements;
  - (b) Protect property from flood hazards identified by the District;
  - (c) Provide records or show on District Storm water studies a system by which storm/surface water within the development will be controlled without causing damage or harm to the natural environment, or to property or persons.
2. All stream crossings and obstructions must be approved by USACE, DSL, Clackamas County, and other authorized federal, state, and local agencies.
3. In the event a development or any part thereof is traversed by any water course, channel, stream or creek, gulch or other natural drainage channel, adequate easements for purposes of surface water drainage maintenance shall be provided to the District. This does not imply a maintenance obligation by the District.
4. Facilities developed on site, including flow discharge from site, shall be constructed in a manner consistent with "*OLSD Surface Water Master Plan*".
5. All storm conveyance pipes, vaults, detention facilities, or other water quality or quantity facilities shall be built to specifications of the District.
6. All surface water facilities shall be constructed per specifications of the District.
7. Inspection of surface water facilities and approval of shop drawings shall be provided by the developer's engineer.
8. Following completion of construction, the engineer shall submit a document, stamped by a professional engineer, indicating all surface water systems have been inspected and installed per approved plans and approved changes.
9. Maintenance is required for all onsite surface water facilities. The maintenance program must be approved by the District. The District may require a recorded Operations and Maintenance Agreement for onsite facilities.
10. As-built plans of facilities, easements for all facilities, and approved maintenance plans shall be provided to the District upon completion of construction. Record drawings may be substituted for as-built plans when determined appropriate by the District or authorized representative.
11. Each surface water system shall have adequate easements and access for construction, operation, and maintenance. A commercial or industrial user having ownership or control of onsite detention facilities shall maintain such facilities in compliance with this Code and provide documentation of annual maintenance.
12. All surface water facilities shall be maintained as needed and as approved by the District. Proof of maintenance shall be annually submitted in accordance with a schedule approved by the District. If the facility is not maintained, the District may perform the inspection, maintenance, and documentation, and charge the owner of

the facility.

13. Site plans, grading plans, storm drainage plans, and associated calculations must be stamped and signed by a professional engineer licensed by the State of Oregon and meet the standards of the District.
14. Permittees or owners shall provide a performance bond or other surety acceptable to the District prior to recording of the plat for residential developments or the issuance of building permits for commercial or industrial developments. The amount of the performance bond shall be in the amount of 100 percent of the engineer's cost estimate for all approved but uncompleted surface water and buffer improvements.
15. A maintenance bond shall be provided to the District prior to release of the performance bond. The maintenance bond shall be in favor of the District, in the amount of 100 percent of the actual construction cost, for a period of one year from the date of final District inspection and acceptance of all completed buffer mitigation and public surface water facilities. During construction and the guarantee period, the District may perform work if the owner fails to do so and charge the Bond. At the end of the one-year guarantee period, the residual bond amount shall be released and remitted to the owner. Nothing herein shall limit the owner's responsibility for repair and maintenance to the amount of the bond.
16. The permittee or owner is responsible for complying with federal, state and local regulations.
17. All developments and redevelopments shall provide water quantity, water quality, and infiltration systems to meet requirements of subsection 2.1005.03 and 2.1005.04.
18. Development projects shall not be phased or segmented in such a manner to avoid the requirements of the Code.
19. Water quality facilities shall incorporate the following as a curb or hardscape stamp: "Storm water quality infiltration facility. Dump No Waste. Maintained by property owner".

## **2.1005.03 Water Quality Standards**

### **2.1005.03.01 Conveyance Standards**

1. Surface water collection systems shall be sized for post-developed conditions in accordance with the following criteria:
  - (a) Storm sewers and outfall pipes draining less than 640 acres: 25-yr, 24-hr design storm;
  - (b) Sewers and outfall pipes draining greater than 640 acres: 50-year, 24-hour design storm;
  - (c) Creek or stream channels draining less than 250 acres: 25-year, 24-hour design storm;
  - (d) Creek or stream channels draining greater than 250 acres: 50-year, 24-hour design storm;

- (e) Creek or stream channels draining greater than 640 acres: 100-year, 24-hour design storm.
- 2. Drainage areas may use alternate calculation methods such as the Santa Barbara Unit Hydrograph (SBUH), HEC-1, Hydrological Simulation Program - Fortran (HSPF), or Storm Water Management Model (SWMM), or others as approved by the District.
- 3. Drainage areas smaller than 1 acre shall use the Rational Method for determining conveyance flows.
- 4. Exceptions must be documented and approved by the District.
- 5. Instream or in-line detention can only be used in locations approved by the USACE, DSL, any other authorized federal, state, or local agency, and approval from the District.
- 6. District may require facilities to bring drainage including off-site drainage from private property to a public facility identified in the District's *Surface Water Master Plan*.
- 7. Public drainage facilities shall comply with Clackamas County standards, unless amended by the District.

#### **2.1005.03.02 Off-site Flows, Springs, and Groundwater**

The property owner shall be responsible to provide a drainage system for all water onsite and for water entering the property from offsite.

- 1. Surface water, springs, and groundwater shall be incorporated into the drainage design.
- 2. The owner is also responsible for springs and groundwater that surface during construction and within the warranty period of the drainage system.
- 3. During development or redevelopment of a property, the District may require the owner to install a drainage system with adequate capacity to convey offsite drainage to meet the needs identified in the adopted capital improvement plan of the *Surface Water Master Plan*.
  - (a) The drainage system shall be designed and installed consistent with standards described in subsections 2.1005.03.04 and 2.1005.03.05.
  - (b) In such case, the District may contribute a portion of the funding for the conveyance facility when funding is available.

#### **2.1005.03.03 Curb Drains**

Where a drainage system of catch basins and pipes is available, all drains that extend to the curb must be connected to the storm system.

#### **2.1005.03.04 Onsite Detention Design Criteria**

The District may require that the applicant design and construct a detention and drainage system which will ensure that offsite impacts caused by that development can be mitigated.

1. Onsite storm quantity detention facilities shall be designed to capture and detain runoff as follows:
  - (a) 2-year, 24-hour post-developed runoff rate to a ½ of the 2-year, 24-hour pre- developed discharge rate;
  - (b) In areas with limited downstream capacity, or critical areas identified in the District’s Hydromodification Analysis or other adopted documents detention shall be designed to reduce the 25-year, 24-hour, post-developed runoff rate to a 2-year, 24-hour pre- developed discharge rate, and, from the 2-year, 24-hour, post developed rate, to ½ of the 2-year, 24-hour pre-developed discharge rate.
3. Downstream analysis shall demonstrate adequate conveyance capacity to the distance where the project site contributes less than 15 percent of the upstream drainage area OR 1500 feet downstream of the project, whichever is greater. If the downstream analysis crosses the jurisdictional boundary of another surface water management agency, that agency must be notified by the developer or owner and given the opportunity to review and comment on the analysis.
4. Downstream Analysis Exemption: an exemption to the downstream analysis shall be proposed as an exemption request per OLWSD Rules and Regulations and shall address the following criteria. The exemption is discretionarily approved by the District as described in the Rules and Regulations:
  - a. Prior to Land Use Application, the owner/applicant shall provide infiltration tests results certified by a professional engineer (Oregon) or registered geologist/geotechnical engineer or equivalent. The test locations shall be conducted in areas anticipated for impervious areas and/or infiltration facilities.
  - b. The proposed development or redevelopment shall infiltrate up to the 25-year design storm event. If the 25-year storm event infiltration rate cannot be achieved, the 10-year event shall be infiltrated. If that cannot be achieved, the proposal shall match pre-developed peak flow for the 100-year storm event and meet the flow control standard documented in OLWSD Engineering Design and Construction Standards (OLWSD D&C) Section 2.1005.03.034. Flow control should be provided via mechanical means prior to entering the public system or receiving water.
  - c. To determine pre-developed runoff, the site should be analyzed using the Water Environment Services BMP sizing tool<sup>8</sup>.
  - d. All proposed roof areas and impervious surfaces should be managed consistent with other Storm water generated onsite.
  - e. The proposal does not have any other related exemptions, waivers or variances to OLWSD surface water standards.
  - f. The proposal does not disturb, by development activity or flow, or directly flow into any riparian areas or other water resource.

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<sup>8</sup> Section 2.4.8 and Portland City Code 17.38 at the time of this code adoption (<https://www.portlandoregon.gov/bes/article/582086>)

5. Detention is required for residential subdivisions and partitions of parcels with the potential to create more than two additional lots as currently zoned, and for non-residential developments and redevelopments as defined by the District. Detention is also required in the instance that two additional dwelling units are proposed on an existing lot of record and surface water drains to the public system including streets, pipes or stream. Two lot (creating one additional lot) partitions that cannot be further partitioned under current zoning, detention is not required if there are no downstream impacts. All subdivisions and partitions must include a drainage plan for each proposed lot. Infiltration facilities are required where soil conditions permit.
6. Open detention facilities shall be planted with vegetation as per the *Oak Lodge Sanitary District Plant List*, available from the District. Planting schedule and maintenance of vegetation shall be approved by the District.
7. Flow Control Exemption.

Onsite detention is not required for all development that discharges to surface waters because flow control is not always needed to protect stream morphology from hydromodification impacts.

Based on the flow control exemption criteria and conditions outlined in the *Discharge of Storm water to High Order Streams; Determining Exempt Reaches* (Herrera Environmental Consultants and Northwest Hydraulic Consultants, April 13, 2004), onsite detention is not needed for direct discharges to the Willamette River.

An exemption to the onsite detention requirement of subsection 2.1005.03.04 will be granted when all of the following conditions apply:

1. The entire development site discharges directly to the Willamette River; and
2. The project site is drained by a conveyance system that is comprised entirely of man-made conveyance elements (e.g., pipes, culverts, outfall protection, etc.) and extends to the ordinary high-water line of the Willamette River; and
3. The flow path distance from the project site to the 100-year floodplain of the Willamette River is less than one-half mile; and
4. The conveyance system between the project site and the exempt receiving water shall have sufficient hydraulic capacity to convey discharge from future buildout conditions (under current zoning) of the site, and the existing development condition from the remaining drainage area contributing to the conveyance system, based on the conveyance standards outlined in Section 2.1005.03.01; and
5. Any erodible elements of the man-made conveyance system must be adequately stabilized to prevent erosion under the conditions noted above.

#### **2.1005.03.05 Detention Design Method**

1. The procedure for determining the detention quantities is set forth in *City of Portland's latest Storm water Management Manual*. Local rainfall data and information shall apply. The design criteria shall be as noted in the Code. Engineers desiring to utilize a procedure other than as set forth in the Code shall obtain the approval of the District prior to submitting calculations utilizing the proposed procedure.
2. The sizing of Storm water quantity detention facilities shall be based on the impervious area to be created by the development, including structures and all roads and impervious areas. In circumstances of any road improvements, all roadway (public or private) that is altered to



the road bed and all areas that drain or flow to the (re)development site shall also be included in the proposal's treatment detention and treatment.

3. For single family and duplex residential subdivisions or partitions, Storm water quantity detention facilities shall be sized for the impervious areas to be created by the subdivision or partitions, including all residences on individual lots at a rate of one Equivalent Service Unit (ESU) of impervious surface area per dwelling unit, plus all roads. If actual impervious area is to be greater than one ESU per dwelling unit, then the actual impervious numbers shall be used. Such facilities shall be constructed as a part of the subdivision or partition.
4. Redevelopment of sites shall require detention for the areas impacted by construction.
5. Regional detention and water quality facilities are encouraged. Where topography allows, detention and water quality facilities may be sized and constructed to provide detention and treatment for more than one development. Maintenance must be provided for the facility. Easements and access must also be provided.
6. Each development shall address drainage for groundwater and springs. Existing problems shall be addressed in plans submitted for review and approval. Groundwater and springs that are encountered during development shall be the responsibility of the developer to address. Plans for drainage of these waters shall be submitted to the District for review and approval prior to construction.
7. Fees in-lieu of detention and treatment for water quality may be applied under the following conditions:
  - (a) Regional detention and treatment downstream is available and has been identified.
  - (b) Downstream detention and treatment is constructed or an agreement has been approved by the District on implementation of downstream detention and treatment.
    - (b) Fees in lieu of detention and treatment will be applied as a percentage of facility costs, including engineering, maintenance, and administration. Percentage of costs will be based on percentage of use of facility(s).
- 8) Treated area exchange: This provision is typically applied to redevelopment or capital improvement or public improvement projects. With this provision, an equal area of existing impervious area may be treated for proposed impervious area provided that the surface type is of similar polluting potential. For example, existing roof area could not be treated for proposed vehicle maneuvering area:
  - a) The exchanged area should be in the same watershed and preferably on the same site if a private development; and
  - b) The exchange should be performed within a proximate time range such as the same fiscal or calendar year.

#### **2.1005.03.06 Infiltration/Retention Systems**

Infiltration systems are encouraged for all new developments and redevelopments to infiltrate runoff from storm events up to one-half-inch of rainfall in 24 hours:

1. Treatment shall occur prior to or concurrent with infiltration systems in accordance with OLWSD Rules, Regulations and Standards.

2. Infiltration system capacity may be incorporated into the detention system design, in order to reduce the required detention volume. Infiltration facilities shall be sized to infiltrate the design runoff volume within a maximum of 96 hours.
3. Infiltration requirements may be waived, or reduced, if it can be demonstrated by a registered professional engineer that infiltration will destabilize the soil, cause adverse structural or environmental impacts, or due to site constraints such as high groundwater, springs, or impermeable soils.
4. Infiltration will be allowed in the District with consideration of soil and subsurface drainage capacity. Infiltration systems will be designed for 3 inches of rain within a 24-hour period.
5. Use of infiltration systems will require an engineering report documenting the year- round infiltration capacity of the soil/ground as well as a percolation test. DEQ approval is required for use of infiltration.

#### **2.1005.04 Water Quality Standards**

All new developments and re-developments shall provide on-site water quality facilities, as required by the District. In circumstances of any road improvements, newly created impervious surfaces shall be considered in the proposal's detention and treatment proposal. Water quality facilities shall be designed to capture and treat the first 1 inch of Storm water runoff from a 24-hour storm event.

Accepted types of vegetated treatment facilities include vegetated swales, filter strips, constructed wetlands, wet ponds and extended dry detention ponds. Alternative systems may be used with approval by the District and shall be designed to provide equivalent treatment as described in <sup>9</sup> the *City of Portland's latest Storm water Management Manual*.

### **END OF SECTION**

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<sup>9</sup> Section 2.4.8 and Portland City Code 17.38 at the time of this code adoption  
(<https://www.portlandoregon.gov/bes/article/582086>)

**SECTION 3—WASTEWATER  
DESIGN STANDARDS  
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## **3.0000 SANITARY SEWERS**

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### **3.0010 General Design Requirements**

**Performance Standards:** Sanitary sewer system design shall meet the policies and guidelines of the adopted OLWSD Rules, Regulations and Design and Construction Standards and its updates.

Sanitary sewer systems shall be designed to provide gravity service to all areas of development unless approved by District Engineer as stated below.

Sanitary sewer system capacity shall be designed for ultimate development density of the tributary area. The system shall allow for future system extension and for future development.

Sanitary sewers shall be designed to remove the domestic sewage from residential, commercial, or industrial buildings, and all public and private establishments.

Storm water, including street, roof, or footing drainage, shall not be discharged into the sanitary sewer system but shall be removed by a system of storm drains or by some other method separate from the sanitary sewer system.

Unpolluted or noncontact cooling waters shall not be discharged into sanitary sewers. The overflow drains and filter backwash lines of swimming pools and hot tubs shall drain into a sanitary sewer.

In general, sewer systems shall be designed to allow for future loads and for ultimate development of the specific drainage area or basin concerned.

As a condition of sewer service, all developments will be required to provide public sewers to adjacent upstream parcels in order to provide for an orderly development of the drainage area. This shall include street frontage of the property to adjoining properties when the main is located in the street right-of-way. This shall include trunk sewers that are oversized to provide capacity for upstream development.

All sewer mainlines shall be located within the public right-of-way or public easement as directed by the District Engineer. These lines are placed in the public streets and right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to provide required replacement and/or repair.

Design shall comply with Oregon Department of Environmental Quality sewer design guidelines<sup>1</sup>, and the requirements of OLWSD.

District Engineer approval will be required for any sanitary lift or pump stations.

### **3.0011 Pipe Materials and Size**

All public sanitary sewers including mains and laterals shall be constructed with PVC SDR 35 pipe as specified in the District's Design and Construction Standards Division 3 (Sanitary Sewer Construction Standards). The District Engineer shall have discretion for requiring alternative pipe materials. Class 50 ductile-iron pipe, C900 PVC pipe, or HDPE SDR 11 (new) or SDR 17 (bursting) pipe may be required with authorization from the District Engineer. Circumstances include but are not limited to areas of unstable soils, high groundwater, shallow rock, being located outside public roadways, and railroad crossings or creek crossings.

Private sanitary sewers shall meet the appropriate sections of the Oregon Plumbing Specialty Code.

All sanitary sewer main lines shall be a minimum diameter of 8 inches. A 6-inch diameter sewer will be allowed only with the District Engineer's approval and shall be submitted as a variance request.

New and reconstructed light rail and freight rail construction may require improvements to the sanitary sewer system at utility crossing locations. All existing pipes or pipes on the second half of useful life within

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<sup>1</sup> OAR 340, and Division 52 at time of adoption

the rail zones shall be replaced to current standards. Metallic or conductive pipe materials are not approved pipe materials at rail crossings. Pipes are to be centered under rail tracks to avoid joints underneath rail lines. All new pipe installations must identify practical future replacement options for the sewer pipe under rails in case of future failure of utility. All pipes shall be sized for full build-out and future flows. This sizing includes allowance for trenchless technologies. Where lining is anticipated, pipe size shall account for future lining thickness.

**3.0012 Minimum Design Criteria**

In general, sewer systems should be designed to care for future loads which may reasonably be expected within a period of 30 to 50 years, and for ultimate development of the specific drainage area concerned.

**A. Velocity**

All sanitary sewers shall be designed on a grade which produces a mean velocity, when flowing half-full or full, of no less than 2.5 feet per second. Where velocities greater than 15 fps are attained, special provisions shall be made to protect against displacement by erosion and shock. The minimum grades for the various sizes of pipe are as follows.

Inside Pipe Diameter (inches)	Grade (feet per 100 feet)
6	0.77
8	0.53
10	0.39
12	0.31
15	0.23
18	0.18
21	0.15
24	0.13
27	0.11
30	0.09
36	0.07

In general, slopes greater than those shown above are desirable and are particularly recommended on sewers which dead end and will not be extended so they have adequate slope to self-clean. Dead-end mains shall have a minimum of 2% slope for all diameter sewers.

**B. Manning Equation**

When calculating minimum pipe slopes and velocities, the Design Engineer shall use the Manning pipe friction formula.

**C. Pipe Coefficient**

The minimum pipe roughness coefficient for sanitary sewers shall be 0.013.

**3.0020 Alignment and Cover**

**3.0021 Right-of-Way Location**

Sanitary sewer lines shall be located in the street right-of-way, 5 feet north and west of centerline whenever possible. All changes in direction of pipe shall be made at a manhole.

Sewers shall be located in the street right-of-way. If streets have curved alignments, the center of the manhole shall not be less than 6 feet from the curb face on the outside of the curve, nor the sewer centerline less than 6 feet from the curb face on the inside of the curve.

Curved alignments will not be permitted.

### **3.0022 Minimum Cover**

All sanitary sewers shall be laid at a depth sufficient to drain building sewers, to protect against damage by frost or traffic, and to drain basement sewers, where practical. Sufficient depth shall mean the minimum cover from the top of the pipe to finish grade at the sewer alignment. In new residential hillside subdivisions, mainline and lateral sewers shall be placed in the street at a depth sufficient to drain building sewers on the low side of the street.

Sanitary sewers shall be constructed with 5 feet minimum cover in all parts of the public right-of-way or easement.

Where the topography is relatively flat and existing sewers are shallow (5 feet or less) the minimum cover shall be 3 feet. Where required for additional strength when cover is minimal, ductile-iron pipe or C900 PVC pipe and/or CDF backfill may be required by the District Engineer.

Deviation from the above standards will be considered on a case-by-case basis when one of the following circumstances exists.

1. Underlying rock strata—required: A request in writing to the District Engineer, together with submittal of a soils report, with a plan and profile certifying that bed rock exists 3 feet below the undisturbed ground surface at all investigated alignments.
2. A ditch or stream must be crossed—required: A plan and profile; horizontal scale 1 inches = 20 feet, vertical scale 1 inches = 2 feet.
3. Other circumstances which the installer desires to vary the standards shall be submitted as a variance.

### **3.0023 Separation with Waterlines**

Water mains shall be installed a minimum clear distance of 5 feet horizontally from sanitary sewers and shall be installed to go over the top of such sewers with a minimum of 18 inches of clearance at intersections of these pipes (in accordance with the requirements of OAR <sup>2</sup> Public Water Systems or equivalent). Exceptions shall first be approved by the District Engineer. In all instances the distances shall be measured edge to edge. The minimum spacing between water mains and storm drains, gas lines, and other underground utilities, excepting sanitary sewers, shall be 3 feet 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 location shall be 12 inches below (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 utilities are required; the minimum vertical clearance shall be 6 inches.

### **3.0024 Easements**

Sewers placed in easements along a property line shall have the easement centered on the property line and the sewer shall be offset 18 inches from the property lines. For sewers placed in easements located other than along a property line, the sewer shall be placed in the center of the easement. 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 sewer main purposes. Under no circumstances shall a building, wall, fence, or permanent structure be placed over a sanitary sewer main or sewer easement without District approval. This shall include overhanging structures with footings located outside the easement.

Public easements for sewers shall have a minimum width of 20 feet. In some instances, larger width easements may be required, such as excessively deep pipes or location of a building near the easement.

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<sup>2</sup> Chapter 333, at time of adoption

Easement locations for public sewer mains serving a Planned Unit Development, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas which will permit an unobstructed vehicle access for maintenance by District personnel.

All easements must be furnished to the District Engineer for review and approval prior to recording. Easements shall state that the District will not in any way be responsible for replacing landscaping including any shrubs or trees, fencing, or other structures or improvements such as asphalt or curbs that may exist or have been placed in the easement.

To service underserved areas, OLWSD may require public utilities and/or associated easement(s) to extend to the farthest property line or the most proximate or logical property line to connect to existing, planned, or potential utility lines.

### **3.0025 Relation to Watercourses**

Generally, the top of all sanitary sewers entering, crossing or adjacent to streams shall be at a sufficient depth below the natural bottom of the streambed to protect the sewer line. 1 foot of cover is required where the sewer is in rock; 3 feet of cover is required in other materials. In paved channels, the top of the sewer line shall be placed at least 6 inches below rock grade of the bottom of the channel, except as provided above.

Sewers located along streams shall be located outside of the streambed and sufficiently removed therefrom to provide for future, possible stream channel widening. All manhole covers shall be watertight at or below the 100-year flood elevation.

Sewers crossing streams or drainage channels shall be designed to cross the stream as nearly perpendicular to the stream channel as possible and shall be free from change of grade. The minimum cover shall be 36 inches from the bottom of the streambed or drainage channel.

Pipe material shall be ductile iron with an 18 foot length of pipe centered on the stream or drainage channel centerline. The ductile-iron pipe shall extend to a point where a 1-to-1 slope begins at the top of the bank and slopes down from the bank away from the channel centerline and intersects the top of the pipe.

Concrete encasement will be required when the above cover requirements cannot be met. Each deviation from the above requirements will be reviewed on a case-by-case basis and submitted as a variance request.

## **3.0030 Structures**

### **3.0031 Manholes**

Manholes shall conform to ASTM C-478.

Manholes shall be located at all changes in slope, alignment, pipe size, and at all pipe junctions with present or future sanitary sewers.

Manhole spacing shall not be greater than 300 feet. Spacing may be increased in special circumstances with District Engineer approval and submitted as a variance.

Manholes outside of vehicle or pedestrian travel ways shall have a tamper proof lid.

Designs for manholes are shown in the OLWSD standard drawings. They are suitable for most conditions.

All sanitary manholes shall be of watertight construction. If ground water or surface drainage can be expected, watertight covers shall be used.

New designs or revisions should not be shown on the construction drawings unless the standard designs are not suitable. New or revised designs may be necessary if:

1. One or more of the sewers to be connected to the manhole is over 36 inches in diameter (smaller diameters may require a special design if the manhole is at an alignment change.)
2. More than two sewers will be connected to the manhole.
3. There is less than 90 degrees between the incoming and outgoing sewer.
4. The manhole will be subject to unusual structural loads.
5. Diversion or other flow control measures are required.

Where one or more of conditions a), b), or c) are encountered, a drawing of the manhole base should be made to determine if it is feasible to use designs shown in the standard drawings. It may be necessary to restrict the options to a specific standard drawing specified by a note on the construction drawings. If a special design is required for any reason, it will be necessary to show the details on the construction drawings and to provide structural calculations as needed.

Some alternate manhole features are shown in the standard drawings. Where these features are required, they must be specified by a note on the construction drawings. Some examples are:

1. Slab tops must be used in lieu of cones where there will be 4 feet or less between the manhole shelf and the top of the last barrel section.
2. Watertight manhole frames and covers are to be used if floodwaters are expected to cover the manhole top or if the manhole must be located in the street gutter. Such conditions should be avoided wherever feasible.
3. Tamperproof manhole frames (7 inches depth) and covers are required in all areas outside the paved public right-of-way or pedestrian travel ways. Rims shall be 1 foot above the finished grade if not in a paved way.

Standards for elevation differences at manholes have been established to compensate for normal energy losses and to prevent surcharging of a sewer by a larger sewer. For purposes of slope calculation and for establishing elevation differences, the elevations are given at the intersection of the sewer centerlines (usually the center of the manhole). The rules for elevation differences at manholes are:

1. The crowns of incoming sewers shall be at least as high as the crown of the outgoing sewer.
2. If the incoming and outgoing sewers are of equal size and are passing straight through the manhole, no added elevation change is required.
3. If sewers intersect or the alignment changes at the manhole, the invert elevation difference shall be at least 0.10 feet for 0°-45° of horizontal deflection angle, and 0.20 feet for over 45° of horizontal deflection angle.
4. The slope of a sewer within a manhole shall be no less than the slope of the same sewer outside of the manhole.
5. Drop connections are required when the vertical distance between flow lines exceeds 2 feet. The diameter of the drop connection must be specified on the construction drawings. The diameter of the drop connection shall be the same size as the diameter of the incoming sewer. Outside drop assemblies only, will be permitted, see the standard drawings.
6. All connections must enter the manhole through a channel in the base. This includes drop connections and connections to existing manholes.



Where conditions make compliance with these rules impractical, exceptions will be permitted. It will be necessary, however, for the Design Engineer to provide a complete analysis of the need for such designs.

### **3.0032 Cleanouts**

Cleanouts will not be approved as substitutes for manholes on public sewer lines.

### **3.0040 Laterals**

Laterals are those sewer lines which connect buildings to the sewer mains. They are comprised of the privately-owned part of the lateral located on private property, and the District-owned part of the lateral located in the road right-of-way or District easement.

Each individual taxlot shall be connected by a separate, lateral connected to the sewer main. Exceptions to this standard shall be applied for as a variance request and approved by the District Engineer or designee.

If a structure is replaced or reconstructed, a new sewer lateral and cleanout is required to be constructed. The replacement lateral shall adhere to current District standards.

When a new lateral pipe and cleanout is required to be installed. The District will evaluate the tap to determine whether it can be reused for the new lateral. If the existing lateral alignment is re-used, new materials shall be installed. If a different alignment or tap location is required, the exiting sewer in the public ROW or easement shall be abandoned and disconnected at the main. If there are multiple existing laterals (in use or existing) all unused laterals shall be disconnected at the main.

Where the invert of the lateral entering a manhole is less than two feet above the manhole invert, a formed channel will be constructed utilizing Portland Cement concrete. The sewage entering the manhole will follow a smooth concrete channel transitioning evenly from the invert of the inlet pipe into the main channel. Sewage will not be allowed to fall freely to the manhole base.

The minimum inside diameter of a District-owned lateral shall be 4 inches for single family residences and for multifamily complexes of three Equivalent Dwelling Units or less.

A 6-inch diameter District-owned lateral is required for any commercial properties. During any commercial redevelopment, the sewer lateral(s) shall be inspected by the District to determine if it/they meets current material, slope and condition standards, If so, the lateral could remain. A cleanout may be required to be retrofitted to the existing lateral.

A 6-inch diameter District-owned lateral is required for any residential properties or complexes of four Equivalent Dwelling Units or more.

An 8-inch diameter District-owned lateral is required for properties with an 8-inch-diameter privately-owned lateral and must have a manhole installed at the property owner's cost at the point of connection to the main line. Laterals shall be built to the same construction standards and of the same materials as the sewer mainline. Laterals shall be placed at 90° to the main sewer line to avoid excessive exposure to other utilities during excavation for construction or maintenance of the laterals. Other angles may be approved for atypical conditions on a case-by-case basis and submitted as an alternate request described in Section 1. Lateral connections may be made at manholes 90° to sewer mainline if such placement would not interfere with other present or future connections to the manhole. Laterals will run straight from the tap to the clean out, with no bends and no intentional flexing of the pipe. Manhole taps are allowed when no other alternative exists. All manhole taps are to be requested with a variance application.

The minimum slope of sewer service lines shall be 2% (1/4-inch-per-foot), except for unusual conditions, when a slope of 1% (1/8-inch-per-foot) may be approved. It will be necessary, however, for the Design Engineer to provide a complete analysis of the need for any sewer service lateral slope less than 2%. The maximum slope shall be 100% (45° or 1-foot-per-foot).

Laterals shall be installed with a clean out located at the edge of the road right-of-way or at the edge of a District easement. If a Public Utility Easement (PUE) is present, the clean out must still be located in the road right-of-way, not in or behind the PUE. A 4-inch lateral must have a 4-inch clean out and a 6-inch lateral must have a 6-inch clean out. The clean out riser shall extend to 6 inches below final grade, be easily accessible, have a threaded plug, and be contained within a traffic-rated protective box set to final grade. A watertight plug shall be installed in the end of the lateral and a 2x4 wood marker shall be placed at the lateral end from pipe invert to at least 36 inches above the finish grade. The marker top shall be painted green and marked with the depth of the lateral measured from ground to invert of pipe.

### **3.0050 Connection to Existing Sewer**

Connections to, and extensions of, existing sewers will occur to facilitate new development. Certain requirements will be placed on the Design Engineer as to permitted methods and/or locations.

Connections to existing manholes shall be made with the following guidelines:

1. Where the invert of the connecting pipe is more than 2 feet above the manhole shelf, the Contractor will be required to construct an outside drop with the inlet pipe invert being located at the manhole shelf. The sewage entering the manhole will follow a smooth concrete channel transition from the inlet pipe into the main channel.
2. Where the invert is required to enter below the shelf of the manhole, the inlet pipe will not enter below a point where the crown of the new inlet pipe is below the crown of the outlet pipe. The base of the manhole will be rebuilt if damaged in this process. The sewage will enter the main flow in a smooth channel transitioning from the inlet pipe to the main channel.
3. No pipe will enter an existing manhole where the angle between the incoming flow and the outgoing flow is greater than 90°.

New laterals shall be connected by core drilling a hole in the existing main line and installing an Inserta Tee (or equivalent) per the manufacturer's instructions.

In the case where the new lateral diameter is only 2 inches smaller than the existing main diameter (for example, 4-inch tap on a 6-inch main or a 6-inch tap on an 8-inch main), a section of main line shall be removed and a PVC tee shall be spliced in with Fernco Strongback (or equivalent) couplers. After this type of tap is bedded and trench compaction is completed, the main line will be TV inspected at the Contractor's expense to show that the new PVC tee is properly aligned with the existing main line.

If an 8-inch lateral is to be connected to an 8-inch existing main line, then a manhole shall be required at the point of connection.

New and reconstructed light rail and freight rail construction may require improvements to the existing sanitary sewer system at utility crossing locations. All existing asbestos-cement pipes or pipes on the second half of useful life within the rail zones must be replaced to current standards. Existing metallic or conductive pipe materials are not approved pipe materials at rail crossings and must be replaced to current standards.

## **3.1000 Sewage Pump Station Design Standards**

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### **3.1010 General**

The pump station shall be a submersible pump type facility.

Station shall include: submersible pumps, wet well, valve vault, associated piping and valves, electrical controls, instrumentation, telemetry, access road, fencing, landscaping, and potable water supply, and shall generally conform to the District rules, regulations and standards.

Pump station shall be designed to pump the peak wastewater flow from the service area. When the service area is not built out, staging of pump station capacity will be allowed.

Where the flow is substantial or where environmental damage may occur due to power failure, the District Engineer may require permanent standby power.

Wet well-mounted or wet well/dry well stations will not be allowed.

### **3.1020 Design**

Pump station shall be designed to meet the minimum requirements and guidelines standards of the Department of Environmental Quality (DEQ), <sup>3</sup> regulations.

Design shall be by registered engineer experienced in design of such facilities.

Service area, peak flow, and pump station calculations shall be submitted to the District Engineer.

Wet well shall be designed to provide 4 hours of storage above high water alarm.

### **3.1030 Materials**

#### **3.1031 Pumps**

A minimum of 2 pumps shall be supplied. Each pump shall be capable of pumping the peak wastewater flow. Where more than 2 pumps are used, the station shall be able to pump peak wastewater flow when the largest pump is out of service.

Pumps shall be submersible pumps manufactured by Hydronix (or equal), explosion-proof, suitable for hazardous location, and shall be UL or FM listed.

#### **3.1032 Piping and Valves**

Piping and fittings shall be ductile iron.

Valves shall be metal, suitable for wastewater use. Valves shall be designed for wastewater service.

Provide pressure gauges on pump discharge piping.

#### **3.1033 Electrical**

Electrical controls shall be located above ground mounted in a waterproof enclosure. Electrical panels shall be UL listed. The pump station wet well shall be considered a hazardous location.

#### **3.1034 Controls**

Controls may be mechanical relays or programmable logic controllers.

Pumps shall alternate lead-lag position with each pumping cycle.

Bubbler shall control pump start/stop.

Float activated alarm shall indicate high water level.

An auxiliary power connector and manual transfer switch shall be provided.

#### **3.1035 Alarms and Telemetry**

Alarms shall be telemetered to the OLWSD SCADA system.

Alarms include:

- Pump failure
- Power failure
- Telemetry failure

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<sup>3</sup> OAR Chapter 340, Division 52 at time of adoption

- High water level
- Bypass

### **3.1036 Landscaping and Fencing**

A 6-foot chain link fence with 3 strands of barbed wire and redwood slats shall surround the pump station. Access for easy maintenance shall be incorporated in the design.

### **3.1037 Additional Features**

Provide 1-inch hose bib at valve vault. Potable water shall be provided by reduced pressure backflow preventer.

Provide positive ventilation in valve vault.

Odor control as required.

### **3.1038 Force Main**

Force main shall be designed for a nominal flow velocity in the range of 3 to 5 feet per second.

## **3.1040 Construction**

### **3.1041 Design Codes**

Pump station and related facilities will be constructed to Electrical and Building Codes.

### **3.1042 Steel Fabrications**

Steel fabrications shall be hot dipped galvanized; painting required on valves, piping, and pipe fittings.

### **3.1043 Operating and Maintenance Data**

Compile product data and related information appropriate for District maintenance and operation of products furnished under the Contract.

Prepare operating and maintenance manual.

Instruct District personnel in the maintenance of products and in the operation of equipment and systems.

### **3.1044 Spare Parts**

Supply 2 sets each of all gaskets, bearings, and mechanical seals for rotating equipment.

**END OF SECTION**

# SECTION 4—WATER DESIGN STANDARDS

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## 4.0000 Water Mains

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### 4.0010 General Design Requirements

**Performance Standards:** Water distribution systems shall be designed to meet State Water Administrative Rules, AWWA Standards, and guidelines of these Design Standards.

Water system design shall provide adequate flow for fire protection and maximum water usage and consumption. Required water system demands shall be met by maintaining the minimum operating pressures required by the District. For single-family residential areas, the minimum static pressure shall be 35 PSI, and the minimum fire flow shall be 1,000 GPM. For all other developments, the required fire flow shall be as determined by the Fire Marshal.

Water system design shall meet distribution needs for maximum water usage and consumption within a given pressure zone. New water systems shall allow for future extensions beyond present development.

When water systems are designed where velocities are greater than 5 fps, special provisions shall be made to protect against displacement by erosion and shock.

All waterlines shall be located within the public right-of-way or as directed by the District Engineer. These lines are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to permit required replacement and/or repair. The District Engineer, under special conditions, may allow a public waterline to be located within a public water easement as referenced in Subsection 4.0024 (Easements).

#### 4.0011 Pipe Materials and Size

All public water distribution systems shall be constructed with ductile-iron pipe. All such pipe shall be cement mortar-lined pipe with push-on or mechanical type joints. When a corrosive potential condition is encountered, all ductile-iron pipe and fittings will be polyethylene encased with an 8 mil tubing meeting manufacturer and AWWA standards. Where an active cathodic protection system is encountered as a result of other utilities, a deviation from the normal pipe design/material/installation practice may be required by the District Engineer.

All pipe, valves and fittings shall be pressure rated for 250 or 350 PSI. All fittings shall be factory cement lined and coated.

Water distribution main sizes shall generally conform to the following:

All new water mains must be 8-inch or greater unless otherwise approved by District Engineer for special cases including dead-end mains beyond the hydrant where no expansion is anticipated or likely and generally less than 250 feet in length. Any main less than 8 inches shall terminate with a standard blowoff per standard drawing 413. Fire hydrants are not permitted on lines less than 8 inches.

**8-inch diameter pipe** is the minimum size for primary feeder mains in residential subdivisions and general system. The minimum size distribution water main for the grid (looped) system, not to exceed an unsupported length of 600 feet and shall not be permanently dead-ended. Looping of the distribution grid shall be at least every 600 feet.

**10 inches and Up:** As required for primary feeder lines in subdivisions, industrial and commercial areas.

Velocity in distribution mains shall be designed not to exceed 5 feet per second. Velocity in service lines, as defined in Subsection 4.0050 (Water Service Lines), shall not exceed 10' per second. Standard trench section (standard drawing 402) will be utilized for all water pipe installed.

New construction and reconstruction of light rail and freight rail may require improvements to the water system at utility crossing locations. Existing pipes in the second half of their useful life within the rail

zones must be replaced to current standards. Metallic or conductive pipe materials are not approved pipe materials at light rail crossings.

All waterlines are to be encased through rail line crossings. Each casing pipe segment is to be positioned under rail tracks to avoid joints underneath rail lines. Metallic or conductive pipe materials are not typically approved at rail crossings (including pipes used as encasement conduit). If steel casing is selected, it shall be cathodically protected, but HDPE is generally preferred.

All water mains, lines and services and associated appurtenances within a radius of ten feet of any electrical line shall be cathodically protected. HDPE pipe is generally preferred.

#### **4.0012 Grid System**

The distribution system mains shall be looped at all possible locations. All developments will be required to extend mains across existing or proposed streets for future extensions of other developments within the District. 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. The installation of permanent dead-end mains greater than 250 feet, upon which fire protection depends and the dependence of relatively large areas on single mains, will not be permitted. To create a grid for existing, proposed and any potential connection, OLWSD may require public utilities and/or associated easement(s) to extend to the farthest property line or the most proximate or logical property line to connect to existing, planned, or potential utility lines.

#### **4.0013 Dead-End Mains**

Dead-end mains which will be extended in the future shall be provided with a properly sized blowoff (see standard drawings 413).

Permanent dead-end mains shall terminate with a standard blowoff assembly (see standard drawing 413).

#### **4.0014 Restrained Joints**

All fittings such as bends, tees, crosses, solid sleeves, valves, hydrants, blow offs, etc must be restrained by Megalug or Romagrip joint restraint glands. Thrust blocking and / or “rodding” will not be accepted as an alternative.

Thrust blocking will be required only behind tap saddles for new main and service installations 4 inches and larger.

Thrust blocking may also be required when an existing unrestrained main is modified and the potential for movement is increased. A saddle block may be required to anchor the unrestrained main in place.

All bell & spigot joints must be restrained by Field LOK (or equivalent) gaskets.

### **4.0020 ALIGNMENT AND COVER**

#### **4.0021 Right-of-Way Location**

Water systems shall be located south and east from the right-of-way centerline or as directed by the Engineer. Generally, the waterline will be located 4 feet from curblin or edge of pavement. Except as provided in Subsection 4.0024 (Easements), all waterlines shall be in the public right-of-way.

Curved alignment for waterlines or mains is permitted and shall follow the street centerline when practical. The minimum allowed radius shall be based on allowable pipe deflection for the pipe diameter and the pipe laying length, but not to exceed 3-degree joint deflection.

#### **4.0022 Minimum Cover**

The standard minimum cover over buried water mains within the street right-of-way shall be 36 inches from finish grade.

The maximum cover over buried water mains within the street right-of-way shall be 48" from finish grade, unless circumstances require additional cover and is approved by the District Engineer. The minimum cover for mains in easements across private property shall be 48" from finish grade.

Finish grade shall normally mean the existing or proposed pavement elevation. Where the main is located in the cut or fill side slope or where mains are located in easements, finish grade shall mean final ground elevation at the water main alignment.

#### **4.0023 Separation with Sewer Lines**

Water mains shall be installed a minimum clear distance of 5 feet horizontally from sanitary sewers, and shall be installed to go over the top of such sewers with a minimum of 18 inches of clearance at intersections of these pipes. When physical conditions render this spacing impossible or impractical, then ductile-iron water pipe with watertight joints or concrete encasements is required for the sewer line. Wherever it is necessary for sewer and water lines to cross each other, the crossing should be at an angle of approximately 90 degrees and the sewer shall either be located 18 inches or more below the water line or be constructed of ductile-iron water pipe with watertight joints for a distance of 9 feet on both sides of the water line. Exceptions shall first be approved by the District Engineer. In all instances, the distances shall be measured edge to edge. The minimum spacing between water mains and storm drains, gas lines, and other underground utilities, excepting sanitary sewers, shall be 3 feet 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 12 inches below 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 utilities are required, the minimum vertical clearance shall be 6 inches.

#### **4.0024 Easements**

Mains placed in easements along a property line, shall have easements centered on the property line and shall be offset 18 inches from the property line. Mains placed in easements along a right-of-way line shall be offset a minimum 3 feet from the right-of-way line and within a minimum 10-foot-wide easement. For mains placed in easements located other than along a property or right-of-way line, the main shall be placed in the center of the easement. Easements, when required, shall be exclusive and a minimum of 20 feet in width. 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. 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.

Easement locations for public mains serving a Planned Unit Development, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas which will permit unobstructed vehicle access for maintenance by District personnel.

All easements must be furnished to the District General Manager for review and approval prior to recording.

#### **4.0030 Appurtenances**

##### **4.0031 Valves**

Valves shall be the same size as the mains in which they are installed. Valve types and materials shall conform to the Design and Construction Standards.



Distribution system valves shall be located at the tee or cross fitting. There shall be a sufficient number of valves so located that not more than 4, and preferably 3 valves, must be operated to affect any one particular shutdown. The spacing of valves shall be such that the length of any one particular shutdown shall not exceed 500 feet. -

Valves shall be installed at each cross, tee, or any tap 2 inches or greater in diameter connected to the main line. Intersections shall be valved in at least 2 branches and cross-intersections shall be valved at all branches. Transmission water mains shall have valves at not more than 1,000-foot spacings. Hazardous crossings such as creeks, railroad and freeway crossings, shall be valved on each side.

Distribution tees and crosses for future branch lines on transmission mains may be required at the direction of the District Engineer.

#### **4.0032 Fire Hydrants**

The water system shall be designed to provide adequate flow as required. The distribution system shall be designed in commercial/industrial areas to accommodate fire flows up to 1,500 GPM. Minimum fire flow in single-family residential areas shall be 1,000 GPM.

The distribution of hydrants shall be based upon the Oregon Fire Code Section 507.5.1 through 507.5.6. See Appendix C<sup>1</sup>

Residential hydrants shall be located as nearly as possible to the corner of street intersections and not more than 500 feet from any cul-de-sac radius point.

No fire hydrant shall be installed on a main of less than 6" inside diameter. The hydrant lead shall be a minimum 6" inside diameter.

All fire hydrants will be located behind the existing or proposed sidewalk or in the planter strip. Hydrants shall be placed as to not interfere with driveways and curb ramps. If any public hydrant encroaches on private property, an easement will be provided as directed by the District Engineer.

No hydrant shall be installed within 5' of any existing aboveground utility and there shall not be any utility facilities installed closer than 5' from an existing hydrant.

Hydrant installation shall conform to standard drawing 411. Full-depth hydrants will be required in all installations. Installation of hydrant extensions will not be allowed, unless approved by the District Engineer.

Hydrants shall not be located within 20' of any building and shall not be blocked by parking. The large hydrant port should face the road or travelway.

Guard posts shall adhere to Oregon Fire Code section 507<sup>2</sup>.

Use of posts other than at the 4 corners may be approved by the District Engineer.

#### **4.0033 Pressure-Reducing and Air Release Valves**

The District's water distribution system is divided into separate pressure zones. Where water systems cross these zone lines, a pressure-reducing valve station will be required. The specific design and location for such valves will be reviewed and approved by the District's Engineer.

When designated by the District Engineer, air release valves, per standard drawing 413, shall be installed. Such valves will be required on large diameter lines at all high points in grade.

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<sup>1</sup> Or equivalent

<sup>2</sup> Or equivalent

## 4.0040 Backflow Prevention

The type of backflow prevention assembly required is determined by the hazard level, and the potential for back siphonage, backpressure, or both.

Generally, all commercial accounts or any meter 1.5 inches and larger is required to install a backflow device at the property line.

4.0041 Typical Conditions Requiring Backflow Protection. An approved, customer owned and maintained backflow prevention assembly shall be installed on domestic, irrigation or fire service line(s) to premises when any of the following conditions exist:

- a. Premises with activities included in Table 42 of OAR 333-061-0070<sup>3</sup>.
- b. There is an auxiliary water supply, such as a well, cistern, or body of water on the property.
- c. There is intricate or inaccessible piping, which makes it impractical to ascertain whether or not a cross-connection exists.
- d. There is an elevation difference between the service connection at the public water main and the highest water outlet on the property that exceeds 30-feet.
- e. There is a risk of back siphonage or backpressure due to practices or equipment.
- f. There is an actual or potential cross-connection that presents a health hazard.
- g. There is an irrigation system.
- h. There is a water storage tank or bulk water filling station for vehicles and/or equipment.
- i. There is a temporary water supply provided for construction use.
- j. There is a fire line, fire sprinkler system, or private fire hydrant on the premises.
- k. There are materials or chemicals on site which present a potential hazard to the water supply.
- l. There is a boiler on the property

## 4.0050 Water Service Lines

The sizes of water service lines which may be used are  $\frac{3}{4}$ , 1, 2, 4, 6, 8, 10, and 12 inches. Water service lines will be reviewed for effects on the distribution system and shall not be greater in size than the distribution main.

A 2" water service line will be installed to serve a 1.5-inch meter.

A 4" water service line will be installed to serve a 3-inch meter.

For 3" and greater services, a design drawing must be submitted showing the vault and fitting requirements with the expected flow (normal and maximum day flow) requirements and proposed usage.

Domestic service lines  $\frac{3}{4}$ " through 2" shall normally extend from the main to behind the curb, with a District meter stop and meter box located at the termination of the service connection (standard drawings 420). Meter to be provided and installed by District. Meter boxes are to be provided by the developer. In general, individual service connections shall terminate in front of the property to be served and shall be located 18 inches each side of a common side property line.

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<sup>3</sup> At time of adoption.

When a corrosive potential condition is encountered and the copper service passes over or under an active cathodic protection system, the service will be installed in a Schedule 40 PVC conduit for a distance of 10 feet on each side of the active system. All conduit placements will be as-built.

Unless otherwise specified, any new tap must be located a minimum of 18 inches from other water service taps and main line joints, valves, and fittings.

Any service must leave the main at a 90 degree angle and run straight from the corp stop to the meter. The service must be centered in the trench.

The meter box and service must be located in front of the property served and a minimum of 18 inches away from a property corner.

The top of the District meter stop must be installed 7 inches to 9 inches below finished grade.

#### **4.0051 Fire Service**

There are 4 categories of private fire services: 1) hydrants, 2) fire sprinkler lines, 3) combination hydrant and fire sprinkler lines, and 4) combination plumbing and fire sprinkler heads.

The water fire service line shall normally extend from the main to the property line and end with a vault metering device and valves. An approved backflow prevention device will be required of the property being served.

Single family dwellings that are sprinkled shall construct a separate fire service of 1-inch minimum diameter.

“Flow-through” sprinklers may combine the domestic and fire services for single family dwellings.

Individual taps or connections should have a minimum separation of 1.5 feet as measured from the outside of the pipes.

#### **4.0052 Fire Vaults Below Ground**

A vault will be required when a development or redevelopment proposes fire sprinklers and/or a service equal to or greater than 1-inch diameter. The vault drawing will be included on construction drawings submitted to the District. The vault shall contain all valves, fittings, meters, and appurtenances required for fire service to the development. Oak Lodge reviews vaults and Double Detector Check Valve Assembly for detector meter clearance. Oak Lodge replaces and installs the factory meters at its expense.

- a. 1-inch fire services require a 13-inch x 24-inch valve box or larger.
- b. Oak Lodge requires public access to the meter for reading purposes. The vault shall be located one-half in the public ROW or adjacent to the public ROW in a public easement dedicated to Oak Lodge or the public. The easement shall be recorded on the property plat.
- c. Installation Location: Double Check Backflow Prevention Assemblies (DC) and Reduced Pressure Principle Backflow Prevention Assemblies (RP) of size 2.5-inch and smaller shall be installed at the water service connection on the customer side of the water meter per UPC and OAR 333-061-0070 and OAR 333-061-0071. Assemblies must not be immersed in water and must be protected from freezing during cold weather.
- d. DCs and RPs of size 3-inch and larger shall be installed in a vault or aboveground housing per Uniform Plumbing Code (UPC) and OAR 33-061-0070 and oar 336-061-0071<sup>4</sup> at the water service connection on the customer side of the water meter.

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<sup>4</sup> At time of adoption.

- e. Below-Grade Vault inlet and outlet pipe spools shall be ductile iron, flange by plain end. The assembly must be flanged.
- f. Clearance between the assembly and interior vault wall shall be a minimum of 12 inches.
- g. Clearance between the test cock side of the assembly and the interior vault wall shall be a minimum of 24 inches.
- h. Clearance from the bottom of the backflow assembly to the floor shall be a minimum of 12 inches and the device must be supported with stand-on pipe supports.
- i. When outside stem/screw and yoke (OS&Y) rising stem valves are used, clearance from a fully opened stem to the top of the vault lid shall be a minimum of three inches.
- j. The vault must have adequate drainage to prevent the assembly from becoming submerged in water.
- k. RPs and Reduced Pressure Detector Assemblies must have an approved bore-sighted drain to daylight with a rodent screen.
- l. If a bore-sighted drain to daylight is not feasible for a DC or Double Check Detector Assembly installation, then a sump pump will be required.
- m. Plugs shall be installed on test cocks of below-ground installations, with no dissimilar metals.

#### **4.0053 Fire Vaults Above Grade Installation**

- a. The assembly must have the District Engineer's approval.
- b. The inlet and outlet pipe spools shall be ductile iron, flange by plain end. The assembly must be flanged.
- c. Underground 90 degree bends shall be restrained with mechanical joint restraint. Above ground 90 degree bends shall be flanged.
- d. The backflow assembly must be installed horizontal and plumb, unless otherwise allowed by OAR 333-061-0071<sup>5</sup>.
- e. The enclosure shall be installed on a concrete slab with a minimum thickness of six inches and a minimum compressive strength of 3,000 psi. The slab shall be poured on a 4-inch leveling course of 3/4-inch crushed, compacted rock.
- f. Clearance between the assembly and interior vault wall shall be a minimum of 12 inches.
- g. Clearance between the test cock side of the assembly and the interior vault wall shall be a minimum of 24 inches.
- h. Clearance from the bottom of the backflow device to the floor shall be between 12 and 60 inches.
- i. The backflow assembly shall be supported by stand-on pipe supports.
- j. The enclosure shall include an adequate bore sighted drain hole.

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<sup>5</sup> At time of adoption.

- k. The enclosure shall be insulated or have a heat source to maintain enclosure at 40 degrees Fahrenheit. The assembly shall be easily accessible.
- l. All structures and wiring shall comply with local building codes.

#### **4.0054 Installation of Double Check Detector Assemblies and Reduced Pressure Detector Assemblies**

- a. Detector meters shall be installed with all Reduced Pressure Detector Assemblies, Double Check Detector Assemblies, and any other applicable assemblies.
- b. The detector meter will be supplied by the district.

**Air Gaps:** All air gaps must be approved by the District.

- c. The air gap shall provide a physical separation between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel.
- d. The air gap size shall be a minimum of twice the diameter of the supply pipe, as measured vertically above the overflow rim of the vessel, and in no case shall be less than one inch.
- e. The air gap shall be installed away from walls or other obstructions that may restrict the air flow into the outlet pipe and nullify the air gap effectiveness.

#### **4.0060 System Testing**

All new water systems (lines, valves, hydrants, and services) shall be individually pressure tested, chlorinated, and tested for bacteria. All testing shall be performed in accordance with Division 4 (Water Construction Standards) of the Standard Construction Specifications and in the presence of a District Inspector. Services and hydrant lines 20 feet or less in length and services 2 inches and less in diameter will not be disinfected to the same requirements as longer and larger services and lines.

#### **4.0070 Water Quality Sampling Stations**

Water sampling stations will be required as directed by the District.

#### **4.0080 Water Service/Permit Application Meters**

The owner of the premises to be served, or the owner's duly authorized agent, will apply for water service from the District. No service will be provided until the District approves the application and required payments are made.

The District will provide water service only from mains located within public roads, streets, alleys, or public easements, public right-of-way, and to property abutting such mains, and to dwellings, and other structures, and premises fronting such thoroughfares with sufficient frontages on the same to provide for appropriate service from such thoroughfares.

All applications will include the signature of the applicant, the location of the premises for which the service is requested, the address to which all bills be sent, and such additional data. Failure to supply such information and any additional needed by the District to make a determination, when requested shall be deemed sufficient cause to deny the application.

Applications for service will be considered merely as a request for service, and will not bind the District or Board, to provide such service. Charges made for the installation of water service will be paid in full before installation.

The District will not permit so-called “spider connections” which would provide service from one road or street, to premises abutting, or dwellings fronting, on another road or street. The District will provide each dwelling with a separate service connection, and no other occupant of such dwelling, will furnish water to any other dwelling, or premise.

Meters will be set per District specifications. The service pipe from the main to the meter, as well the meter and the meter box will be the property of the District and not the person owning the premises or paying for the installation.

The contractor is responsible for the proper placement of the District meter stop in relation to the curb, sidewalk, property line, and finished grade. If the District determines that the meter stop location or depth are not acceptable, the contractor must relocate the meter stop and other related parts at no expense to the District. Extending the service line by use of a union or shortening the service line by bending it to use up excess length is not acceptable.

Water service installations for ¾-inch service to 2-inch service shall adhere to the following procedures:

- A Utility Placement Permit must be obtained from Clackamas County prior to construction in the road right of way.
- The installer is to schedule a preconstruction meeting with the District inspector.
- The installer must request the tap installation and all inspections a minimum of 24 hours ahead of time through OLWSD's Accela Citizen Portal: <https://aca.accela.com/OLWSD/Default.aspx>. No inspections will be performed after 2 pm.
- The corporation stop on the main line will be supplied and installed by OLWSD. The contractor is responsible for all aspects of the excavation, traffic control, and adherence to safety regulations. The excavation for the tap must be a minimum of 3 feet wide by 6 feet long with 1 foot clear behind the main and 1 foot clear below the main. If OLWSD determines that the work site does not meet their access or safety standards they will not install the tap.

#### **4.0081 Water Service Connection**

Water services shall be installed as described in 403.07 Copper Service Installation of these Design and Construction Standards.

Unless otherwise requested and approved in writing, service connections will be ¾-inch and meters will be 5/8-inch-x-¾-inch with such fittings, connections, a meter box, meter stops, etc. as the District may require.

When in the judgement of the District personnel, unusual conditions exist which require greater attention, extra fittings, meter boxes, vaults, or other safeguards, to assure adequate volume and pressure of water to an individual service, and or to minimize repair and maintenance problems, inherent in the installation, the District may require the applicant to meet the cost of such additional fittings, meter vaults, or other safeguards.,

When meters are required to be installed in driveways or roadways or under other circumstances, that in the opinion of the District personnel may cause unusual installation or maintenance problems, the District will have the right to require concrete meter vaults, with traffic-rated lids or other devices to likewise be installed. The cost of such vaults or other protective devices will be borne by the owner of the property requesting the service installation.

Services larger than ¾-inch, may, at the discretion of the Board, be installed when requested in writing, provided the system can adequately serve such larger connections without interfering with the water service of others. The charges made for the installation of larger services will be sufficient to cover all costs thereof, and the minimum or "ready to serve/ charge" will be higher than for standard ¾-inch service connections.

The Board may require persons requesting large service connections for fire protection, to pay for an equitable portion of the cost of feeder mains needed to supply the required flow. Each such case will be considered separately on its merits and the circumstances applicable to the case. The Board may also enter into special service contracts, in which higher minimum charges are established sufficient to cover the cost of the service rendered.

Replacement services and/or connections are to be dismantled by the property owner and at the owner's expense and inspected by the District.

All District rules, and regulations rates and charges are subject to change or modification by the Board. All special contracts will be in writing, signed by the proper person, or customer and the District.

An OLWSD representative must see the entire installation before it is backfilled. Any portion of the installation that has been covered prior to inspection must be exposed for inspection.

The water service must have a minimum 30 inches of cover. 24 inches of cover is permissible under a storm drainage ditch. Maximum cover is 48 inches.

No crimps or dents in the copper are acceptable.

The service must have a minimum of 6 inches of ¾-inch-0-inch ("¾-minus") bedding underneath.

The meter stops on both sides of the meter must be positioned with the valve nut straight up to allow for proper operation.

The meter must be centered within the meter box.

The customer-side plumbing connecting to the downstream side of the meter must be either copper or PEX (no PVC pipe is acceptable inside the meter box).

The contractor is to supply all parts except for the corporation stop, the meter, and the customer-side meter stop.

## **END OF SECTION**

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# 101 Definitions and Abbreviations

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Unless otherwise defined in the contract documents the following definitions and abbreviations shall apply wherever used.

The words "directed, required, permitted, ordered, requested, instructed, designated, considered necessary, prescribed, approved, acceptable, satisfactory," or words of like import, refer to actions, expressions, and prerogatives of the District Engineer.

Command type sentences are used, but are not exclusive of other directives, throughout these Standard Specifications. In all cases the command expressed or implied is directed to the Contractor.

The specifications contained herein are divided into categories: (1) Division; (2) Section; and (3) Subsection, and are designated as in the following example:

**Division:           DIVISION 3—SANITARY SEWER CONSTRUCTION STANDARDS**

**Section:            302 MANHOLES AND CONCRETE STRUCTURES**

**Subsections: 302.03 CONSTRUCTION**

**302.03.01 General**

**A.       Excavation and Backfill**

**1.       (as needed)**

**a.       (as needed)**

## 101.01 Definitions

### **Acceptance of work**

All work required by the contract documents and/or conditions of approval will be considered accepted upon approval of the Certificate of Completion by District.

### **Advertisement**

The public announcement inviting bids for work to be performed or materials to be furnished.

### **Attorney**

The District's Legal Counsel.

### **Certificate of Completion**

Standard District form, which must be signed by the Contractor.

### **Certificate of Compliance**

Standard District form, which must be signed by the Contractor, stating compliance with the contract documents and/or conditions of approval.

### **Change Order**

A written order issued by the District Engineer to the Contractor directing changes in the work, subject to approval of District.

### **District**

Oak Lodge Water Services District.

### **District Engineer**

The District Engineer, or General Manager, of the District, acting either directly or through authorized representatives.

**Contract**

The document entitled "contract" or "agreement" which is executed by the Contractor and the District; authorizing ordinance; advertisement calling for bids; bid; instructions to bidder; plans; and all specifications, addenda, permits, performance bond, insurance certificates, and change order for any approved revisions made during the performance of the work to any of the above listed documents, collectively referenced as the "contract documents."

**Contract cost**

The aggregate amount of price promised to be paid by District to Contractor upon fulfillment of the Contract.

**Contract item**

A specific unit of work for which a price or basis of payment is provided in the Contract.

**Contractor**

Any individual, firm, co-partnership, corporation, or any combination thereof who has entered into a Contract with the District for a project. In the case of work being done under permit issued by the District, the permittee shall be construed to be the Contractor.

**Day**

Calendar day; i.e., any and every day shown on the calendar, Sundays and holidays included.

**Easement**

The right to use a defined area of property for specific purpose or purposes as set forth in the specifications.

**Improvement**

General term encompassing all phases of work to be performed under a Contract for a Local Improvement District and synonymous with the terms "project" or "work."

**Inspector**

The authorized representative of the District.

**Lump sum**

A method of payment providing for one all-inclusive payment for the work described to be done, complete and accepted without further measurement, as such work is covered under the applicable lump sum pay item.

**Notice**

A written communication delivered, by hand or by mail, to the authorized individual, member of the firm, or officer of the corporation for which it is intended. If delivered or sent by mail it shall be addressed to the last known business address of the individual, firm, or corporation. In the case of a Contract with two or more persons, firms, or corporations, notice to one shall be deemed notice to all.

**OSHD Standard Specification**

The latest edition of the Specification Document published by the State of Oregon entitled Standard Specifications for Highway Construction, Oregon State Highway Division. This document is available from the Oregon State Highway Division, Salem, Oregon.

**Plans**

The official Plans, profiles, cross sections, elevations, details and other working, supplementary and detail drawings, or reproductions thereof.

**Project**

General term encompassing all phases of the work to be performed under the Contract and is synonymous with the term improvement or work.

**Provide**

When related to an item of work, the word provide shall be understood to mean furnish and install the work complete in place.

**Reference specifications**

Bulletins, standards, rules, methods of analysis or test, codes and specifications of other agencies, engineering societies, or industrial associations referred to in the contract documents. All such references specified herein refer to the latest edition thereof, including any amendments thereto which are in effect and published at the time of advertising for bids or of issuing the permit for the project.

**Right-of-way**

See CCDTD Definition

**Roadway**

See CCDTD Definition

**Shop drawings and submittals**

Supplementary plans or data or other information which the Contract requires the Contractor to submit to the District Engineer.

**Special Specifications**

Requirements peculiar to the project and changes and modifications of the Standard Specifications.

**Specified**

As used herein, the word specified, or as specified, means as required by the Contract.

**Standard plans or drawings**

Details of structures, devices, or instructions adopted by District as a standard and referred to in the Contract.

**Standard Specifications**

The terms, directions, provisions and requirements set forth herein.

**Station**

A distance of 100 feet measured horizontally along the established centerline of a street, sewer, or other work, unless specified otherwise.

**Street**

See CCDTD Definition

**SubContractor**

An individual, partnership, firm, corporation, or any combination thereof, to whom the Contractor sublets part of the Contract.

**Substantial completion**

The work (or a specified part thereof) has progressed to the point where, in the opinion of the District Engineer, it is sufficiently complete in accordance with the contract documents and/or conditions of approval, so that the work (or specified part) can be utilized for the purposes for which it is intended.

**Surety**

The corporate body which is bound with and for the Contractor, for the acceptable performance of the Contract, and for their payment of all obligations arising out of the Contract.

**Unit price**

A contract item of work providing for payment based on specific unit of measurement; e.g., linear foot or cubic yard.

**Use of pronoun**

As used herein, the singular shall include the plural, and the plural the singular; and the term "person" includes natural person or persons, firm, co-partnership, corporation or association, or combination thereof.

**Utility**

Tracks, overhead or underground wires, pipelines, conduits, ducts, or structures, owned, operated or maintained in or across a public right-of-way or easement.

**Work**

All material, labor, tools, equipment, and all appliances, machinery, transportation, and appurtenances necessary to perform and complete the Contract, and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item described or indicated and as required by good practice to provide a complete and satisfactory system or structure.

**Working day**

Calendar day, any and every day shown on the calendar, excluding Saturdays, Sundays and legal holidays.

**101.02 Abbreviations**

AAN	American Association of Nurserymen
ACI	American Concrete Institute
AGA	American Gas Association
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
CCDTD	Clackamas County Department of Transportation and Development
CRSI	Concrete Reinforced Steel Institute
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
ITE	Institute of Traffic Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NLMA	National Lumber Manufacturer's Association
ODOT	Oregon Department of Transportation
OLWSD	Oak Lodge Water Services District
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Administration
OSHD	Oregon State Highway Division
PCA	Portland Cement Association
UBC	Uniform Building Code
UL	Underwriters' Laboratories, Inc.
USASI	United States of America Standards Institute
WWPA	Western Wood Products Association

**102 Instructions to Bidders**

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See Oak Lodge Water Services District Purchasing Rules.

## **103 Award and Execution of Contract**

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See Oak Lodge Water Services District Purchasing Rules.

## **104 Scope of Work**

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### **104.01 Plans and Specifications**

The contract documents and/or conditions of approval will govern the work to be done. Anything mentioned in the Specifications and not shown on the Plans and detailed drawings, or shown on the Plans and detailed drawings and not mentioned in the Specifications, shall be of like effect as though shown or mentioned in both. Specifications and Plans referred to in any of the contract documents and/or conditions of approval shall be considered as being included in the document in which such reference is made. When a particular standard plan or Specification is referred to, such reference shall be to the standard plan or Specification which is in force at the time of advertising for bids. The phrases, "Contractor shall", "Contractor will", etc. may not always be specifically stated in all paragraphs but is considered understood where not specifically stated otherwise.

### **104.02 Precedence of Contract Documents**

In case of conflict, the order of precedence of the following documents in controlling the work shall be:

1. Contract
2. Addenda
3. Bid
4. Permits from outside agencies required by law
5. Special Specifications (Provisions)
6. Plans
7. Standard plans and standard details
8. Standard/Technical Specifications

Change orders, supplemental agreements and approved revisions to Plans and Specifications will take precedence over contract documents listed above.

### **104.03 Shop Drawings and Other Submittals**

Plans furnished and included with Specifications indicate the work proposed and the intended results.

By approving and submitting shop drawings, product data and samples, the Contractor represents that they have determined and verified all materials, field measurements, and field construction criteria related thereto, and that they have checked and coordinated the information contained within such submittals with the requirements of the work and of the contract documents and/or conditions of approval and that they have checked and coordinated the information contained within such submittals with the requirements of the work and of the contract documents and/or conditions of approval.

All required shop drawings, product data and samples shall be furnished to the District Engineer for their review and any required testing before any of the work or related work is performed or products or material ordered prior to the District Engineer's review and completion of any testing will be at Contractor's risk.

The District Engineer will review all shop drawings, product data and samples and conduct such tests as are required by the contract documents and/or conditions of approval within a reasonable time but in no event will the District Engineer be required to complete such review or conduct such tests in less than 14 days after submission. The District Engineer will notice the applicant stating one of the following:

1. Make corrections/additions noted: make the necessary changes and resubmit for review.

2. Set is ready for approval: send one digital set stamped by the Designing Engineer for construction.

The review by the District Engineer of any shop drawings, product data, samples, construction methods and equipment or other submittals is only for conformance with the general design concept of the project and does not extend to consideration of structural integrity, safety, detailed compliance with contract requirements, or any other obligation of the Contractor. Any action shown is subject to the requirements of the plans and specifications. The Contractor is responsible for confirming and correlating all dimensions; fabricating and construction techniques; coordinating their entire work in strict accordance with the contract documents and/or conditions of approval. The review does not relieve Contractor from their obligation fully to perform all Contract requirements, nor shall such review give rise to any right of action or suit in favor of Contractor or third persons, against the District.

#### **104.04 Changes in Work**

Without invalidating the agreement and without notice to a surety, District may, at any time, order additions, deletions or revisions in the work: these will be authorized by a written amendment, a change order, or a work directive change.

Upon receipt of any such document, Contractor shall promptly proceed with the work involved that will be performed under the applicable conditions of the contract documents (except as otherwise specifically provided).

#### **104.05 Force Account Work**

The Contractor shall perform work on a force account basis upon written notice by the District Engineer. If the District Engineer determines that the work increases the amount due under the Contract, payment will be made pursuant as force account work.

The Contractor must:

Maintain records in such a manner as to provide a clear distinction between direct cost of work performed on force account basis and costs of all other operations performed in connection with the Contract.

Daily, furnish to the District Engineer signed reports itemizing materials used and setting forth the cost of labor and charges for equipment rental, delineating whether said equipment is Contractor or Subcontractor owned. Provide names, identifications, and classifications of workmen, the hourly rate of pay and hours worked, and the size, type, and identification number of equipment and hours of equipment operation.

Substantiate material charges by vendor's invoices, submit such invoices with the reports; or, if not available, submit with subsequent reports. In the event said vendor's invoices are not submitted within 30 days after completion of the force account work owner reserves the right to establish the cost of such materials.

The District Engineer will compare their records with the reports furnished by the Contractor, make any necessary adjustments, compile the costs of work paid for on a force account basis and issue a change order covering the work.

#### **104.06 Salvage**

When shown or specified, carefully salvage and stockpile within the construction area all castings, pipe and any discarded facilities, to be disposed of by owner.

## **105 Control of Work**

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### **105.01 Authority of the District Engineer**

The District Engineer will decide all questions which may arise as to quantity, quality, and acceptability of materials furnished and work performed, the rate of progress of the work; interpretation of the Plans and Specifications; the measurement of all quantities; and the acceptable fulfillment of the Contract on the part of the Contractor. The District Engineer's estimates, decisions and approval signify favorable opinion and qualified consent; it does not carry with it certification or assurance of completeness, quality or accuracy concerning details. Such approval does not relieve Contractor from responsibility for errors, improper fabrication, improper construction methods, nonconformance to requirements or for deficiencies within their control.

It is further understood that all work to be done under the Contract will not be considered completed until it has passed final inspection by the District Engineer and is accepted by the District. It is further understood that the authority of the District Engineer is such that the Contractor shall at all times carry out and fulfill the instructions and directions of the District Engineer insofar as they concern the work to be done under the Contract.

The District Engineer shall have the authority to order unacceptable work to be corrected, removed or replaced, and unauthorized work to be removed and, pending completion of such order, to deduct the estimated cost thereof from any monies due, or to become due the Contractor including retainage. This authority shall take precedence over any and all requirements of the specifications for payment set forth elsewhere in the specifications.

At the District Engineer's sole discretion, minor defects in the work may be accepted subject to a reasonable deduction from the Contract price or other credits to the owner. Such determination by the District Engineer shall be final.

The District Engineer is not authorized to waive any written notice required of the Contractor by the Contract.

### **105.02 Authority and Duty of Inspectors**

The District Engineer may appoint assistants to inspect all materials used and all work done. Such inspection may extend to any or all parts of the work and to the preparation or manufacture of materials to be used. Inspectors will not be authorized to revoke, alter, enlarge, or relax the provisions of the Contract. An Inspector is placed on the work to keep the District Engineer informed of progress of the work and the manner in which it is being done. In addition, the Inspector shall call to the attention of Contractor any deviation from the Plans, or Specifications.

An Inspector will not be authorized to approve or accept any portion of the work or to issue instructions contrary to the Plans and Specifications under this Contract. Furthermore, the Inspector is not authorized to waive any written notices required by the Contract. The Inspector will have authority to reject defective material and to suspend any work that is being improperly done, subject to final decision by the District Engineer.

### **105.03 Responsibility of Contractor**

Do all work and furnish all labor, materials, equipment, tools, and machines necessary for the performance and completion of the project in accordance with the Contract. Be obligated to determine and be responsible for the method of construction.

Contractor shall be solely liable for any accident, loss or damage happening to work referred to in the Contract prior to completion and acceptance thereof.



**105.04 Notification of Utilities And Agencies**

Obtain prior approval from Clackamas County for closing or partial closing of any street. When performing work in streets and easements, whether inside or outside District’s legal boundaries, notify all of the affected utilities and local agencies about the operations so as to properly coordinate and expedite the work in such a manner as to cause the least amount of conflict and interference between the operations and those of other agencies.

The Contractor and its SubContractors must comply with all provisions of ORS and including notification of all owners of underground facilities at least 48 business day hours but not more than 10 business days before beginning work. Notify the following utilities and agencies in writing at least 2 working days before commencing any work on the project.

- 1. District Technical Services Department
- 2. Northwest Natural Gas Co.
- 3. Oregon Department of Transportation
- 4. Portland General Electric Co.
- 5. Comcast
- 6. Century Link
- 7. Water Environment Services of Clackamas County

Other applicable municipalities, agencies or special districts or providers

The District shall relocate or cause to be relocated all privately or publicly owned utility conduits, lines, poles, mains, pipes, and such other facilities within the jurisdiction and control of the District where such relocation is necessary in order to conform said utility and other facilities with the plans and ultimate requirements of the project. If desirable for specific reasons, or for convenience of field operations, contact the above listed utilities.

**105.05 Utilities and Existing Improvements**

Information shown as to location of existing water courses, drains, sewer lines, or utility lines is provided for Contractor's information and convenience and is not, in any way, warranted to be accurate by the District. Contractor shall verify all such information and shall deal with varying conditions at its own expense.

Operation of water valves and hydrants by unauthorized personnel is strictly prohibited. Obtain written permission from and pay any fee required from the District prior to using hydrant water.

Provide for the flow of sewers, drains, or water courses interrupted during the progress of the work, and restore such drains or water courses as approved by the District Engineer, at no additional cost to the District.

Be responsible for all costs for the repair of any and all damage to any utility, whether previously known or disclosed during the work, as may be caused by the work. Maintain in place utilities not shown on the drawings to be relocated or altered by others. If Contractor requires temporary relocation, for their convenience or because of their method of construction or as a result of site conditions, Contractor shall bear all costs for said temporary relocation. Maintain utilities which have been relocated by others in their relocated positions in order to avoid interference with structures which cross the project work.

Make excavations and borings ahead of work, as necessary, to determine the exact location of interfering utilities or underground structures. When this is not feasible or practical or the need for such work was not foreseen, the utility owners or the District shall have the right to enter upon the right-of-way and upon any structure therein for the purpose of making new installations, changes or repairs. Conduct operations so as to provide the time needed for such work to be accomplished during the progress of the improvement, at no additional cost to the owner.

It is understood that there will be interfering utilities, service laterals, and other underground pipes, drains or structures encountered on underground projects that are not shown or are shown incorrectly on the plans and/or have not been previously discovered in the field. Contractor agrees this is a normal and usual occurrence in the construction of underground improvements. Furthermore, bidders understand and agree that work in some cases must be done in close proximity to said utilities and underground pipes, drains, and structures not shown or shown incorrectly on the plans which may require a change in operations and may cause sloughing of the trench, additional traffic control, additional pavement and backfill costs, and time; the Contractor agrees that a reasonable number of these occurrences are usual and ordinary on underground projects and are reflected in the bid and plan of operation.

The District Engineer will require a reasonable amount of time to perform design changes necessitated by directly conflicting utilities and/or the utility owners will require a reasonable amount of time to make necessary utility relocations.

The Bidders agree to provide for these conflicts and interferences and agree to provide for a reasonable amount of time for design changes and/or utility relocations due to said interference in the bid and understand that no additional compensation for interruption of schedule, extended overhead, delay or any other impact claim or ripple effect or any other costs whatsoever or additional time will be made for these conflicts or interferences.

## **105.06 Survey Service**

Give notice to the District Engineer not less than 3 working days in advance of when survey services will be required in connection with the laying out of any portion of the work.

The District Engineer will furnish appropriate offset lines and grades as they deem necessary for all projects involving trenching operations. Contractor will be responsible for the transfer of the offset lines or grades into the ditch, to batter boards, or any other point within the work. Work done without lines and grades having been established by the District Engineer or work done beyond the lines and grades will be considered as unauthorized and will not be paid for and may be ordered removed, replaced, or corrected at no expense to the District.

## **105.07 Protection of Survey Markers**

### **105.07.01 Permanent Survey Markers**

Notify the District Engineer not less than three working days prior to starting work in order that the District Engineer may take necessary measures to ensure the preservation of survey monuments, stakes, lot stakes, and benchmarks. Do not disturb permanent survey monuments, stakes, lot stakes, or benchmarks without the consent of the District Engineer and notify the District Engineer and bear the expense of replacing any that may be disturbed.

When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, preserve the monument, and adjust the monument cover to the new grade at no expense to District.

### **105.07.02 Construction and Survey Markers**

Preserve construction survey stakes and marks for the duration of their usefulness during construction. If any construction survey stakes are lost or disturbed through negligence of Contractor, and in the judgment of the District Engineer need to be replaced, such replacement shall be by the District Engineer at the expense of Contractor. The cost of replacement shall be charged against and shall be deducted from payments for Contract work.

## **105.08 Protection of Property**

Protect all public and private property, insofar as it may be endangered by operations and take every reasonable precaution to avoid damage to such property.

Restore and bear the cost of any public or private improvement, facility, structure, or land and landscaping within the right-of-way or easement which is damaged or injured directly or indirectly by or on account of an act, omission, or neglect in the execution of the work. Restore to a condition substantially equivalent to that existing before such damage or injury occurred, by repairing, rebuilding, or otherwise effecting restoration thereof, or if this is not feasible, make a suitable settlement with the District of the damaged property.

Give reasonable notice to occupants of buildings on property adjacent to the work to permit the occupants to remove vehicles, trailers and other possessions as well as salvage or relocate plants, trees, fences, sprinkler systems, or other improvements in the right-of-way which are designated for removal or which might be destroyed or damaged by work operations.

Protect all designated trees, lawns and planted areas within the right-of-way or easements. Restore all on-surface disturbed areas, by methods as set forth in the technical specifications. If conditions are such that the method specified cannot be done, provide erosion control surface covering of such quality and quantity as will prevent erosion from occurring, without adverse impacts to the environment, if required by conditions existing at the site, at no additional cost to the District.

Review with the District Engineer the location, limits and methods to be used prior to clearing work. Clearing and grubbing shall be performed in strict compliance with all local, State and federal laws and requirements pertaining to clearing and burning, and particularly in conformity with the provisions of ORS Chapter 477, and all subsequent amendments, which require, among other things, filing with the State Forester a general description of the right-of-way to be cleared before the start of clearing operations. Obtain the required permit from the State Forester and District and perform clearing work in conformance thereto.

#### **105.09 Use of Work During Construction**

The District shall have the right to take possession of and use any completed or partially completed portions of the work. Such use shall not be considered as final acceptance of the work or portions thereof.

Such action by the District will not relieve the Contractor of responsibility for injury or damage to said completed portions of the work resulting from use by public traffic, action of the elements, Contractor's operations, defective work, or negligence, or from any other cause, except for injury or damage resulting from District's negligence. Contractor will not be required to again clean up such portions of the work prior to final acceptance, excepting for such clean up as results from Contractor's operations or defective work. Use of any completed or partially completed portions of the work does not relieve Contractor from the warranty responsibility nor shall the warranty period commence to run until final completion and acceptance of the work.

#### **105.10 Furnishing Temporary Services and Facilities**

Install, furnish and maintain temporary light, power, water and any temporary services or facilities complete with connecting piping, wiring, lamps, and similar equipment during construction of the work, including testing and start up. Remove temporary facilities upon completion of work. Obtain all permits and bear all costs in connection with temporary services and facilities. Conform to applicable statutes, rules, codes, and other requirements in the use of these facilities.

#### **105.11 Verbal Agreements or Representations**

No verbal agreement or conversation by or with any officer, agent or employee of the District, either before or after execution of the Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract. Any such verbal agreement or conversation is in no way binding upon the District.

## **105.12 Water and Air Pollution Control**

During the term of the Contract, Contractor's operations shall conform to applicable laws and regulations of the Oregon DEQ, and other agencies of the State and Federal Government, District Erosion Control Plans, as well as other local ordinances and resolutions designed to prevent, control, and abate water and air pollution.

During all phases of the work, or when directed, protect work sites, storage and disposal areas from washout and erosion, and take precautions to control or abate dust nuisance and air pollution by cleaning up, sweeping, sprinkling, covering, enclosing, or sheltering work areas, and stockpiles, and by promptly removing from paved streets earth or other material which may become airborne or may be washed into waterways or drainage systems.

## **105.13 Noise**

Conform and comply with applicable noise regulations as established in the Clackamas County Code. Work hours are restricted to the hours of 7:00 a.m. to 7:00 p.m. during the weekdays and 8:00 a.m. to 5:00 p.m. on the Saturday.

## **105.14 Access to the Work**

Provide access to the work for representatives of the District, the State of Oregon, the Federal Government, and other entities having jurisdiction in the area.

Allow access to the District Engineer or their representatives to all parts of the work and to plants of manufacturers at all times.

## **105.15 Defective or Unauthorized Work**

All work which does not conform to the requirements of the Contract shall be considered as unacceptable.

Upon discovery immediately remove unacceptable and defective work and replace by work and materials which conform to the Contract. This provision shall have full effect regardless of the fact that the unacceptable work may have been done or the defective materials used with the full knowledge of the Inspector.

# **106 CONTROL OF MATERIALS**

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## **106.01 Preference for Use of Oregon Products**

Preference may be given to services, articles or materials produced or manufactured in Oregon, if price, fitness, availability and quality are otherwise equal. These provisions do not apply to Contracts on projects financed wholly or in part by federal funds.

## **106.02 Quality of Work**

Materials, parts, products and equipment which are to be incorporated into the work shall be new and shall conform to the contract documents.

## **106.03 Sampling and Testing**

Tests of the work may be made by the District at any time during construction of the work or during the production, fabrication, or preparation and use of materials, parts, products, and equipment.

District reserves the right to require samples and to test products for compliance with pertinent requirements irrespective of prior certification of the products by the manufacturer.

When such tests of the work are necessary, as determined by the District Engineer, such tests will be made by and at the expense of District unless otherwise specified. Provide such facilities and cooperate as required for collecting and forwarding samples and do not incorporate into the work until tests have been made and found acceptable. In all cases furnish the required samples without charge and in ample time to permit testing prior to use. Provide safety measures and devices to protect those who take the samples.

In the absence of any reference Specification, it shall be understood that materials shall meet the Specifications and requirements of ASTM, as directed by the District Engineer. When there is no pertinent coverage under ASTM, the material concerned shall meet Specifications and requirements of applicable commercial standards of the Commodity Standards Division of the U.S. Department of Commerce. Lacking such coverage, materials shall meet requirements established by reputable industry for a high-quality product of the kind involved.

All testing shall be performed by the testing laboratory, the District Engineer, or as directed by the District Engineer.

In the event the District Engineer requests tests and the work fails, the Contractor shall bear all costs for this test and all subsequent testing necessary to meet specified requirements.

#### **106.04 Certification**

The District Engineer may, at their sole discretion and in lieu of any other required sampling and testing, accept from Contractor two copies of the manufacturer's certification with respect to the product involved, under conditions set forth as follows:

1. Certification shall state that the named product conforms to District's requirements and that representative samples thereof have been sampled and tested as specified.
2. Certification shall either be accompanied by a certified copy of test results or certify that such test results are on file with the manufacturer and will be furnished to the District Engineer upon request.
3. Certification shall give the name and address of the manufacturer and the testing agency and the date of tests; and shall set forth the means of identification which will permit field determination of the product delivered to the project as being the product covered by the certification.
4. Contractor shall be responsible for any costs of certification or for any costs of the sampling and testing of products in connection therewith.

#### **106.05 Inspection by Others**

Inspection of work by persons other than representatives of the District will not constitute inspection by the District.

#### **106.06 Storage and Protection of Items of Work**

Store items to be incorporated into the work to assure the preservation of their quality and fitness for the work. Stored items, even though approved before storage, may be re-inspected and are subject to rejection prior to being incorporated into the work. Stored items shall be located so as to facilitate their prompt inspection.

#### **106.07 Trade Names, Equals, or Substitutions**

In order to establish a basis of quality, certain processes, types of machinery or equipment, or kinds of materials may be specified—either by description of process, by designating a manufacturer by name and referring to their brand or product designation, or by specifying a kind of material. It is not the intent of these specifications to exclude other processes, equipment, or materials of equal value, utility, or merit.

Whenever a process is designated; a manufacturer's name, brand, or item designation is given; or a process or material covered by patent is designated or described; it shall be understood that the words "or equal" follow such name, designation, or description, whether in fact they do so or not. This "or equal" clause is not a warranty, either expressed or implied, by the District that an equal exists.

The Contractor may offer to furnish materials or equipment of equal or better quality and performance than that specified as a substitute after the Contract is executed. If the offer necessitates changes to, or coordination with, any other portion of the work, the data submitted shall include drawings and details showing all such changes. Contractor agrees to perform these changes as part of the substitution of material or equipment. Acceptance by the District Engineer shall not relieve the Contractor from full responsibility for the efficiency, sufficiency, quality, and performance of the substituted material or equipment in the same manner and degree as the material and equipment specified by name. Any cost differential associated with a substitution shall be reflected in the Contract price and the Contract shall be appropriately modified by change order.

If the bid includes a list of equipment, materials, or articles for which Contractor must name the manufacturer at time of submission of the bid, no substitutions therefore will be permitted.

All materials or equipment of equal or better quality offered by the Contractor for substituting shall be approved by the District Engineer prior to incorporation into the project.

## **107 LEGAL RELATIONS AND RESPONSIBILITIES**

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### **107.01 Laws and Regulations**

Comply with all federal and State laws; all local laws, ordinances, and regulations; and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of work. Observe and comply with all such laws, ordinances, regulations, orders, and decrees. Protect and indemnify District and their representatives against any claim or liability arising from, or based on, the violation of any such law, ordinance, regulation, order, or decree—whether by Contractor, their Subcontractors, suppliers of materials or services, or others engaged by the Contractor or their employees.

In addition to those set forth herein, the District's Public Contracting rules and the Statutes of the State of Oregon for public works contracts, ORS Chapters 279A and 279C, are incorporated by reference into the Contract.

### **107.02 Subcontractors**

After Contract award and notice of Contractor/Subcontractor agreements have been submitted, work shall not be transferred or subcontracted without prior consent of the District.

Use of Subcontractors, material suppliers or equipment suppliers shall in no way release Contractor from any obligations of contract with the District.

Contractor will provide in all subcontract agreements that the Subcontractor, material supplier and equipment supplier will be bound by the terms and conditions of this Contract to the extent that they relate to the Subcontractor's work, material or equipment. All Subcontractor's agreements will also provide that they are assignable to the District at District's option, in the event this agreement is terminated for default of Contractor.

### **107.03 No Waiver of Legal Rights**

The District shall not be precluded by any measurement, estimate or certificate made either before or after completion and acceptance of work or payment therefore, from showing the true amount and character of work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate or certificate is untrue or incorrectly made, or that work or materials do not

conform in fact to the Contract. The District shall not be precluded, notwithstanding any such measurement, estimate or certificate, or payment in accordance therewith, from recovering from the Contractor and their sureties such damages as it may sustain by reason of their failure to comply with terms of the Contract, or from enforcing compliance with the Contract. Neither acceptance by the District, or by any representative or agent of the District, of the whole or any part of the work, nor any extension of time, nor any possession taken by the District, nor any payment for all or any part of the project, shall operate as a waiver of any portion of the Contract or of any power herein reserved, or any right to damages herein provided. A waiver of any breach of the Contract shall not be held to be a waiver of any other breach.

#### **107.04 Other Contracts**

The District reserves the right to award other contracts or issue permits for work that may require coordination with the work to be performed under this Contract.

When separate contracts or permits are awarded or issued for different portions of the Project, "the Contractor" in the contract documents in each case shall be the Contractor who signs each separate contract.

**Mutual Responsibility of Contractors:** The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate their work with theirs.

If any part of the Contractor's work depends for proper execution or results upon the work of any other separate Contractor, the Contractor shall inspect and promptly report to the District Engineer any apparent discrepancies or defects in such work that render it unsuitable for such proper execution and results. Failure of the Contractor to inspect and report shall constitute an acceptance of the other Contractor's work as fit proper to receive the work, except as to defects which may develop in the other separate Contractor's work after the execution of the Contractor's work.

Should the Contractor cause damage to the work or property of any separate Contractor which results in a claim against the District, and if the claim is not satisfied by Contractor and the separate Contractor sues the District or initiates an arbitration proceeding on account of any damage alleged to have been so sustained, the District shall notify the Contractor who shall defend if requested such proceedings at the Contractor's expense, and if any judgment or award against the District arises therefrom the Contractor shall pay or satisfy it and shall reimburse the District for all attorney's fees and court or arbitration costs which the District has incurred.

The Contractor shall be responsible for any cutting, fitting and patching that may be required to complete the work except as otherwise specifically provided in the Contract. The Contractor shall not endanger any work of any other Contractors by cutting, excavating or otherwise altering any work and shall not cut or alter the work of any other Contractor. Any costs caused by defective or ill-timed work shall be borne by the party responsible, therefore.

If a dispute arises between the separate Contractors as to their responsibility for cleaning up, the District may clean up and charge the cost thereof to the several Contractors as the District Engineer shall determine to be just.

#### **107.05 Liability and Indemnification**

The Contractor shall assume all responsibility for the work and shall bear all losses and damages directly or indirectly resulting to the Contractor, to the District, to the District Engineer, and to their officers, agents, and employees on account of (a) the character or performance of the work, (b) unforeseen difficulties, (c) accidents, or (d) any other cause whatsoever.

The Contractor shall defend, indemnify, and hold harmless the District, the Design Engineer, and their officers, agents and employees from all claims, loss, damage, and injury of every kind directly or indirectly arising out of this Contract. The Contractor shall assume this responsibility even if (a) fault is the basis of

the claim, and (b) any act, omission or conduct of the District connected with the Contract is a condition or contributory cause of the claim, loss, damage or injury.

The Contractor shall not be liable for, nor be required to defend, or indemnify the District or the Design Engineer relative to any claim, loss, damage, or injury resulting solely from acts or omissions by the District, the Design Engineer, or their officers, agents or employees. The Contractor shall not be liable for, nor be required to defend, or indemnify the District or the Design Engineer relating to any claim loss, damage, or injury arising from the use of any maps, drawings, reports, surveys, designs, or specifications furnished by the District, Design Engineer, or their officers, agents, or employees.

Any specific duty or liability imposed or assumed by the Contractor, as may be otherwise set forth in the contract documents, shall not be construed as a limitation or restriction of the general liability or duty imposed upon the Contractor by this section.

The Contractor shall assume all responsibility for the work.

## **107.06 Insurance**

### **107.06.01 General**

The Contractor shall provide and maintain during the life of this Contract the insurance coverage designated hereafter. All costs for such insurance shall be borne by the Contractor and shall be included in the Contract price.

Prior to execution by the District and before commencing work under this Contract, Contractor shall furnish the District Engineer with certificates of insurance specified herein showing the name of the insurance carrier, coverage, type, amount (or limits), policy numbers, effective and expiration dates, description of operations covered, and containing substantially the following cancellation provision:

"The insurance covered by this certificate will not be canceled or materially reduced, except after 30 days written notice has been received by the District."

In case of the breach of any provision of this Article, the District, at its option, may take out and maintain, at the expense of the Contractor, such insurance as the District may deem proper. The District may deduct the cost of such insurance from any monies which may be due or become due the Contractor under this Contract.

### **107.06.02 Review and Approval of Insurance**

The Contractor shall not commence work under this Contract nor allow any Subcontractor to commence work on a subcontract until the Contractor has obtained all the insurance required hereunder and such insurance has been approved by the Attorney. All policies or insurance and certificates of insurance shall be satisfactory to the District. Approval of the insurance shall not relieve or decrease the liability of the Contractor hereunder.

### **107.06.03 Workers' Compensation, the Federal Longshoremens' and Harborworkers' Act, and the Federal Jones Act**

The Contractor shall provide and shall require all Subcontractors to provide workers' compensation coverage for all persons employed under this Contract including the Contractors' partners and any individual regardless of relation to the Contractor's partners and any individual regardless of relation to the Contractor or to the partners who provide work under this Contract. The Contractor shall be required to assure that subject workers will receive the compensation for compensable injuries provided in ORS Chapter 656 either by:

1. a carrier-insured employer; or
2. a self-insured employer as provided by ORS 656.407.

In addition to the statutory benefits outlined above, the Contractor and all Subcontractors shall provide employers' liability insurance with limits of not less than:

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Oak Lodge Water Services District Design and Construction Standards Division 1—General Construction Requirements  
February 18, 2021 (Previous Revision: March 17, 2020)



1. \$2,000,000 each occurrence
2. \$2,000,000 disease each employee
3. \$2,000,000 disease—policy

Evidence of such coverage, including the guaranty or warrant period, shall be filed with the District and maintained for the duration of the Contract.

The Contractor shall defend, indemnify, and hold harmless, the District and the District's officers, agents, and employees against any liability that may be imposed upon them by reason of the Contractor's or SubContractor's failure to provide workers' compensation and employers liability coverage.

**107.06.04 General Liability and Automobile Liability**

The Contractor shall provide a general liability policy that provides coverage for bodily injury including personal injury and property damage liability insurance and automobile liability insurance. Such insurance must protect the Contractor, the District, and their officers and employees from all things or damage which may arise out of this Contract or in connection therewith, including all operations of Subcontractors. Such insurance shall provide coverage for not less than the amounts for which public bodies are responsible as set forth in ORS Chapter 30.260 - 30.300, Tort Actions against public bodies, but in no event less than the following limits of liability:

The policy shall contain an endorsement that the aggregate applies separately to this Contract.

**Commercial General Liability Insurance**

1. \$2,000,000 each occurrence limit
2. \$3,000,000 general aggregate
3. \$3,000,000 products/completed operations aggregate
4. \$3,000,000 personal and advertising injury
5. \$2,000,000 limited job site pollution occurrence sublimit

**Comprehensive Automobile Liability Insurance Including Coverage for all Owned, Hired, And Non-owned Vehicles.**

1. \$2,000,000 each occurrence combined single limit
2. \$3,000,000 aggregate bodily injury and property damage, or \$2,000,000 each person bodily injury
3. \$2,000,000 each occurrence bodily injury
4. \$2,000,000 each occurrence property damage
5. \$2,000,000 each occurrence pollution occurrence sublimit

The insurance shall be written on a comprehensive form which includes broad form property damage on an occurrence basis. Unless excluded by Special Specification, the general liability policy shall include, without deductible, coverage for premises operations, explosion and collapse hazard, underground hazard, products, completed operations, contractual insurance, and independent Contractors. Such insurance shall be maintained until the expiration of the guaranty period required by the Contract. Failure to maintain liability insurance as provided above shall, at District's option, because for immediate termination of the Contract.

The Contractor shall provide a letter from the insurance company which states that such insurance shall be without prejudice to coverage otherwise existing.

The District, its officers, agents, and employees, shall be named additional insureds in the Contractor's General Liability Insurance policy.

The policy shall also provide for a Cross Liability Endorsement or Separation of Insureds Endorsement.

The policy shall be endorsed to provide an Amendment - Aggregate Limits of Insurance (per project) specifying that a separate aggregate limit of liability applies to this Contract.

If there are insufficient insurance proceeds and assets of the Contractor to fully indemnify the District, its officers, employees, agents, and the District Engineer, then the District, its officers, employees, and agents would be indemnified first with any remaining insurance proceeds and assets to be used to indemnify the District Engineer.

If set forth in the Special Specifications, additional insureds may be the District Engineer, other governmental bodies with jurisdiction in the area involved in the project, and their officers and employees and such agents as may be specified.

#### **107.06.05 Claims on Project**

The Contractor, when notified of a claim by an affected party shall:

1. Refer claim to the Contractor's insurance carrier or claims administrator.
2. Contractor's insurer will copy the District on acknowledgment of claim.
3. Contractor's insurer will copy the District on notice to claimant of disposition of claim.

#### **107.06.06 Builders Risk Insurance**

During construction, Contractor shall obtain and maintain for the benefit of the parties to the Contract as their interest may appear, all-risk builder's risk insurance to the extent of 100% of the value of the project. Coverage shall also include: (1) formwork in place; (2) form lumber on site; (3) temporary structures; (4) equipment; and (5) supplies related to the work while at the site. Such insurance shall be endorsed to require 30 days' written notice to the District prior to cancellation or change of the policy. One (1) copy of the policy and 2 certificates of such insurance shall be delivered to the District before commencing work and shall be subject to review and approval by the District. The District may temporarily waive delivery of the copy of the policy. In the event Contractor fails to maintain such insurance, the District may arrange therefore; and any premium incurred shall be to the account of Contractor.

#### **107.06.07 Insurance for Work in Railroad Rights-of-Way**

During construction in railroad right-of-way, Contractor shall obtain and maintain insurance as required by the individual railroads.

#### **107.07 Royalties and Patents**

Contractor shall pay all royalties and license fees required to perform the work. Defend and indemnify District, from all loss or damage that may result from the Contractor's wrongful or unauthorized use of any patented article or process.

#### **107.08 Permits**

Contractor shall obtain all Municipal, County, State, federal, or other permits or licenses necessary or incident to performance of the work under this Contract. Work within the railroad right-of-way requires permit by the rail authority and railroad operators in addition to the above. Comply with all permit requirements pertaining to the project.

**107.09 Compliance with ORS Chapter 279a, B, And C (Public Contracting Code)**

Comply, and require all SubContractors to comply, with the District’s Public Contracting Rules, the requirements of the applicable State statutes, and be subject to the applicable liabilities provided in ORS Chapter 279A, B and C, such as, but not limited to, the statutes that are numbered and referenced, and incorporated herein by an abbreviated subject matter, and listed below and the statutes required to be set forth as conditions in public contracts, which follows.

- 1. ORS 279C.375 Award of contract; Bond; Waiver of bond in case of emergency.
- 2. ORS 279C.540 Maximum hours of labor on public contracts; holidays; exceptions.
- 3. ORS 279C.840 Workers on public works to be paid not less than prevailing rate of wage.
- 4. ORS 279C.845 Certification of rate of wage by Contractor or SubContractor.
- 5. ORS 279C.850 Inspection to determine whether prevailing rate of wage being paid; proceedings to require payment of prevailing rate of overtime.
- 6. ORS 279C.855 Liability of Violations.

**107.10 Labor**

Upon notification in writing from the District Engineer, remove immediately from the job for its duration any laborer, workman, mechanic, foreman, superintendent, or other person employed who is found to be incompetent, intemperate, troublesome, disorderly or otherwise objectionable, or who fails or refuses to perform their work properly or acceptably.

Comply with provisions of the District’s Equal Opportunity Policy and to ORS Chapter 659 relative to unlawful employment practices and discrimination by employers against any employee or applicant for employment because of race, religion, color, sex, or national origin. Particular reference is made to ORS 659.030, which states that it is unlawful employment practice for any employer, because of the race, religion, color, sex, or national origin of any individual, to refuse to hire or employ or to bar or discharge from employment such individual or to discriminate against such individual in compensation or in terms, conditions or privileges of employment.

**107.11 Overtime**

In addition to the requirements set forth in Specification 107.09, Contractor shall notify the District Engineer of any overtime operations as soon as possible. The Contractor must provide documentation to the District Engineer’s satisfaction justifying the overtime work (ORS 279C.520).

In the event that the Contractor wishes to proceed with an overtime operation, the Contractor must first notify and obtain approval from the District Engineer to do so, prior to commencing such work.

For overtime work requested by the Contractor, the Contractor shall pay the applicable wage rate for the District Engineer’s Inspector, engineering and operations personnel, and other staff required at the project during the overtime hours.

This section does not apply to labor performed in the manufacture or fabrication of any material ordered by the Contractor or manufactured or fabricated in any plant or place other than the place where the main Contract is to be performed.

**107.12 Safety**

**107.12.01 Employee Safety**

The Contractor shall at all times be responsible for the safety of their employees and their SubContractor’s employees. The Contractor shall maintain the job site and perform the work in a manner

which meets the District's responsibility under statutory and common law for the provision of a safe place to work and which complies with the District's written safety regulations, if any.

Conduct the project with proper regard for the safety and convenience of the public. When the project involves use of public ways, provide necessary flag persons and install and maintain means of reasonable access to all fire hydrants, service stations, warehouses, stores, houses, garages, and other property. Private residential driveways shall be closed only with approval of the District Engineer or specific permission of the property owner. Do not interfere with normal operation of public transit vehicles unless otherwise authorized. Do not obstruct or interfere with travel over any public street or sidewalk without approval. At all times provide open trenches and excavations with secured and adequate barricades or fences of an approved type which can be seen from a reasonable distance. Close up or plate all open excavations at the end of each working day in all street areas unless approved otherwise by the District Engineer and in all other areas when it is reasonably required for public safety or as directed by the District Engineer. At night, mark all open work and obstructions by lights. Install and maintain all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges, and facilities. Observe all safety instructions received from the District Engineer or governmental authorities, but following of such instructions shall not relieve Contractor from its responsibility or liability for accidents to workmen or damage or injury to person or property.

#### **107.12.02 Public Safety and Convenience**

The Contractor shall at all times conduct their work so as to ensure the least possible obstruction to traffic and convenience to the general public and residents in the vicinity of the work and to ensure the protection of persons and property. No road or street shall be closed to the public except with the permission of the District Engineer and proper governmental authority. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks, private and public driveways and proper functioning of all gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses. The Contractor will minimize inconvenience to others due to mud and dust.

#### **107.12.03 Safety Program**

The Contractor shall adopt a written safety program complying with the requirements of employee and public safety set forth hereinabove and as described in the Special Conditions. The safety program shall also comply with OAR Chapter 437, Division 3, regarding general safety and health provisions.

#### **107.13 Right-Of-Way, Easements and Premises**

Confine construction activities within property lines, right-of-way, limits of easements and limits of construction permits as shown or specified in the contract documents unless arrangements are made with owner(s) of adjacent private property. If additional space or property is needed to accommodate Contractor's method for construction of the work or for the convenience of the Contractor, Contractor shall bear all related costs and responsibilities. Prior to the use of any private property outside the specified boundaries, file with the District Engineer written permission from the property owner(s).

Do not unreasonably encumber the specified work areas with materials and equipment. Obtain and bear the costs of permits for special occupancy and use of the specified work areas from the proper agencies. Comply with all requirements regarding signs, advertisements, fires and smoking.

#### **107.14 12-Month Maintenance and Warranty**

In addition to and not in lieu of any other warranties required under the Contract make all necessary repairs and replacements to remedy, in a manner satisfactory to the District Engineer and at no cost to District, any and all defects, breaks, or failures of the work occurring within 12 months following the date of substantial completion due to faulty or inadequate materials or workmanship. Repair damage or disturbances to other improvements under, within, or adjacent to the work, whether or not caused by settling, washing, or slipping, when such damage or disturbance is caused, in whole or in part, from activities of the Contractor in performing their duties and obligations under this Contract when such

defects or damage occur within the warranty period. The 12-month maintenance period required shall, with relation to such required repair, be extended 1 year from the date of completion of such repair.

If Contractor, after written notice, fails within 10 days to proceed to comply with the terms of this section, District may have the defects corrected, and Contractor and Contractor's surety shall be liable for all expense incurred. In case of an emergency where, in the opinion of the District Engineer, delay would cause serious loss or damage, repairs may be made without notice being given to Contractor and Contractor or surety shall pay the cost of repairs. Failure of the District Engineer to act in case of an emergency shall not relieve Contractor or surety from liability and payment of all such costs.

In addition to the above provisions, District waterline facilities installed by the Contractor under this Contract that require repair or replacement during the 12-month maintenance period shall be repaired by the District or under the direction of the District and the Contractor and Contractor's surety shall be liable for all expenses incurred.

## **108 PROSECUTION AND PROGRESS OF WORK**

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### **108.01 Contractor's Construction Schedule**

Within 30 days of Contract award or 1 week in advance of starting work, whichever is earlier, submit for written approval a proposed construction schedule to the District Engineer. Contractor may not commence work until construction schedule is approved by the District Engineer.

If it is desirable to carry on operations in more than one location simultaneously, submit a schedule for each location at least 1 week in advance of beginning such operations. In the event that the Contractor's proposed construction schedule does not meet the necessary construction program schedule as determined by District, immediately resubmit a schedule that conforms as approved. Contractor shall not commence work until schedule is approved by the District Engineer.

The schedule shall show the proposed order of work and indicate the time required for completion of the major items of work. This working schedule shall take into account the passage and handling of traffic with the least practicable interference therewith and the orderly, timely and efficient prosecution of work. It will also be used as an indication of the sequence of the major construction operations and as a check on the progress of work.

### **108.02 Preconstruction Conference**

Attend a preconstruction conference, if requested, at a time, prior to start of work, designated by the District Engineer. Comply with information and instructions provided at the preconstruction conference as recorded in the minutes of the meeting.

### **108.03 Notice-to-Proceed**

Unless stated otherwise in the Special Specifications, written Notice to Proceed will be given by the District Engineer within 30 days after the performance and payment bond and all required insurances have been filed with and approved by the District and the Contract has been executed. Do not commence work under the Contract until such written notice has been given.

Notice to Proceed may be delayed up to an additional 30 days (for a total of sixty 60 days) from date of Contract by the District Engineer if, in the District Engineer's opinion, necessary easements or permits have not been obtained, or required utility relocation, construction, or reconstruction has not been completed or has not progressed to a degree that will allow initial contract work to commence.

Commence work within 10 working days after the date of the Notice to Proceed, or such other date as may be fixed by the Notice to Proceed, which date shall establish the date for commencement of the Contract time. Notify the District Engineer 48 hours in advance of the time and place work will be started.

### **108.04 Contract Time**

Time shall be considered the essence of the Contract.

Upon commencement of work, Contractor shall provide adequate labor, materials, and equipment, and work shall be performed vigorously and continuously in accordance with a schedule which will ensure completion within the specified time limit. Failure to diligently pursue the work may jeopardize additional contract time.

### **108.05 Suspension of Work**

If the work is suspended for convenience: Temporarily suspend work on the Project wholly or in part for convenience of the District as directed by the District Engineer. In the event of such suspension, the District Engineer shall, except in emergency, and except as hereinafter provided, give Contractor 3 days' notice. Work shall be resumed within 5 days after notice has been given by the District Engineer to Contractor to do so. The District Engineer shall allow Contractor an extension of time for completion

corresponding to the total period of temporary suspension, and shall reimburse Contractor for necessary rental of unused equipment, services of watch persons, and other unavoidable expenses accruing by reason of the suspension, as stipulated in Subsection 108.05 (E), Delays and Extensions of Time.

If work is suspended by the District Engineer: Immediately suspend work on the project, wholly or in part, as directed by the District Engineer, for reasonable periods of time as the District Engineer may deem necessary, when conditions are unsuitable for satisfactory performance of the work. The District shall allow the Contractor an extension of time for completion corresponding to the total period of suspension, but the Contractor shall not be entitled to reimbursement for any costs or damages arising under this clause.

If work is suspended for cause: Immediately suspend work on the Project wholly or in part as directed by the District Engineer for such periods as the District Engineer may deem necessary due to: (1) failure to correct unsafe conditions for working personnel, the general public, or District's employees, (2) failure to immediately correct defective and unacceptable work in accordance with Subsection 105.15, (3) failure to carry out provisions of the contract documents and/or conditions of approval, and (4) failure to carry out orders or directives.

Voluntary suspension by Contractor: There shall be no voluntary suspension or slowing of operations without the prior written approval of the District Engineer and such approval shall not relieve Contractor from the responsibility to complete the Contract work within the prescribed Contract time. Should operations be discontinued, Contractor shall notify, in writing, the District Engineer at least 24 hours in advance of resuming operations.

**Responsibilities of Contractor:**

1. At the commencement of and during any suspension of work, protect all work performed to prevent any damage or deterioration of the work. Provide temporary protection devices to warn, safeguard, protect, guide, and inform traffic during suspension, the same as though the work had been continuous and without interferences.
2. Bear all costs for providing suitable provisions for traffic control and for maintenance and protection of the work during suspension unless the suspension was for convenience.

In all cases of suspension, except voluntary suspension by Contractor, work will be resumed only upon written order of the District Engineer or District.

**108.06 Delays and Extensions of Time**

If the Contractor is significantly delayed due to court orders enjoining the prosecution of this Project, unavoidable strikes, acts of God, unusual and extraordinary action of the elements that are of such severity to stop all progress of the work, or act or neglect of the District not authorized by the Contract, the Contractor shall, within 48 hours of the start of the occurrence, give notice to the District Engineer of the cause of the potential delay and estimate the possible time extension involved. Within 10 days after the cause of the delay has been remedied the Contractor shall give notice to the District Engineer of any actual time extension requested as a result of the aforementioned occurrence.

No extension of time will be considered for weather conditions normal to the area and time of year in which the work is being performed. Delays in delivery of equipment or material purchased by the Contractor or their SubContractors (including District-selected equipment) shall not be considered as a just cause for delay, when timely ordering would have made the equipment available. The Contractor shall be fully responsible for the timely ordering, scheduling, expediting, delivery, and installation of all equipment and materials. Extensions of time will be considered for delayed delivery of the District specified equipment "without equal."

Within a reasonable period after the Contractor submits to the District Engineer a written request for an extension of time the District Engineer will make the decision on each request, for General Manager approval.

An adjustment of Contract time as herein provided shall be the Contractor's sole remedy for any delay in completion of the project arising from causes beyond the control of the Contractor, except for unreasonable delay caused by acts or omissions of the District or persons acting therefore. In no event shall the Contractor be entitled to collect or recover any damages, loss or expense incurred by reason of such delay, except for an unreasonable delay caused by acts or omissions of the District or persons acting therefor. However, if Contractor is delayed due solely to a breach by the District, Contractor will be entitled to recover damages limited to reimbursement for necessary rental of unused equipment, services of watch persons, documented direct overhead costs, documented direct unavoidable expenses accruing by reason of the suspension, plus 15% of the foregoing damages to cover normal Contractor profit. Contractor shall not be entitled to indirect costs or any other damages arising out of the delay, including but not limited to, interruption of schedules, or any other impact claim or ripple effect. If a delay is caused by the District and Contractor (joint delay), Contractor shall be entitled to a time extension only, by reason of such joint delay.

### **108.07 Liquidated Damages**

Time shall be considered the essence of the Contract. If Contractor fails to complete the project or to deliver the supplies or perform the services within the time specified in the Contract or any extension thereof by the District, the actual damage to District for the delay will be substantial but will be difficult or impractical to determine.

It is therefore agreed that Contractor will pay to District, not as a penalty but as liquidated damages, the per diem amount of 0.5% of the total contract or modification thereof for each and every calendar day elapsed in excess of the Contract time or the final adjusted Contract time applicable to the work required under the Contract.

Permitting Contractor to continue and finish the work or any part thereof after the Contract time or adjusted Contract time, as pertinent, has expired shall in no way operate as a waiver on the part of the District or any of its rights under the Contract.

Payment of liquidated damages shall not release Contractor from obligations in respect to the fulfillment of the entire Contract, nor shall the payment of such liquidated damages constitute a waiver of District's right to collect any additional damages which may be sustained by failure of Contractor to carry out the terms of the Contract, it being the intent of the parties that said liquidated damages be full and complete payment only for failure of Contractor to complete the work on time.

### **108.08 Contractor's Representative**

Designate, in writing before starting work, an authorized representative who shall have complete authority to represent and to act for Contractor, in all directions given by the District Engineer. Contractor, or its authorized representative shall supervise the work, and shall be present on site continually during its progress.

If Contractor or its authorized representative is not present, directions may be given by the District Engineer or their authorized representative to the workmen and such order shall be received and followed. Any direction will be confirmed in writing upon request from the Contractor.

Keep a complete copy of the Plans and Specifications on or near the site at all time.

### **108.09 Conflicts, Errors, Omissions, And Additional Drawings**

Check and compare all Plans and Specifications prior to construction and notify the District Engineer of any discrepancies or omissions in order to permit correction by the District Engineer. Coordination of Plans and Specifications is intended. Furnish labor and materials as required for the work. Should any work or materials be reasonably required or intended for carrying the project to completion which are omitted on the Plans and Specifications, furnish same as fully as if particularly delineated or described. The intent of the Plans and Specifications is to show and describe a complete project within the limits stated. Dimensions shown on Plans shall be followed, rather than scale measurements. Whenever it



appears that the Plans are not sufficiently detailed or explicit, the District Engineer may furnish additional detail drawings or written instructions and Contractor shall perform the work in accordance with the additional details or instructions.

### **108.10 District's Right to Do Work**

Failure or refusal to comply with any of the terms or conditions of the Contract will permit the District to supply or correct any deficiency or defect or take other appropriate action without prejudice to any other remedy. Such action by District shall be taken only after 7 days' notice by the District Engineer to Contractor and their surety, unless in the judgment of the District Engineer an emergency or danger to the work or to the public exists, in which event action of the District as set forth above may be taken without any notice whatsoever. The cost of such action by the District shall be deducted from the payment then or thereafter due Contractor. Pay the District any costs in excess of such payment due.

### **108.11 Termination for Default**

If the Contractor should be adjudged bankrupt, or if they should make a general assignment for the benefit of their creditors, or if a receiver should be appointed on account of insolvency, or if they should refuse to or fail to supply enough properly skilled workmen or proper materials for the efficient prosecution of the Project, disregard laws, ordinances or the instructions of the District Engineer, or otherwise be in violation of any provision of the Contract, the District may, without prejudice to any other right or remedy and after giving the Contractor and its surety 7 days' written notice, terminate the services of the Contractor and take possession of the premises and of all materials, tools and appliances thereon as well as all other materials whether on the premises or not, on which the Contractor has received partial payment and finish the work by whatever method it may deem expedient.

In the event action as above indicated is taken by the District, the Contractor, or its surety, shall provide the District Engineer with immediate and peaceful possession of all of the materials, tools and appliances located on the premises as well as all other materials whether on the premises or not, on which the Contractor has received any progress payment. Upon termination, in the event that the surety does not complete the Contract, at the election of the District, Contractor shall assign any and all SubContractors and material contracts to the District or District's designee. Further, the Contractor shall not be entitled to receive any further payment until the work is completed. On completion of the work, determination shall be made by the District Engineer of the total amount the Contractor would have been entitled to receive for the work, under the terms of the Contract, had Contractor completed the work. If the difference between said total amount and the sum of all amounts previously paid to the Contractor, which difference will hereinafter be called the "unpaid balance," exceeds the expense incurred by the District in completing the work, including expense for additional managerial and administrative services, such excess will be paid to the Contractor, with the consent of the surety. If, instead, the expense incurred by the District exceeds the unpaid balance, the amount of the excess shall be paid to the District by the Contractor or their surety. The expense incurred by the District as herein provided, and the damage incurred through the Contractor's default, shall be as determined and certified by the District Engineer.

In addition to and apart from the above-mentioned right of the District to terminate the employment of the Contractor, the Contract may be canceled at the election of the District for any willful failure or refusal on the part of the Contractor to faithfully perform the Contract according to all of its terms and conditions; provided, however, that in the event the District should cancel the Contract, neither the Contractor nor its surety shall be relieved from damages or losses suffered by the District on account of the Contractor's breach of Contract.

The District may, at its discretion, avail itself of any or all of the above rights or remedies and its invoking of any one of the above rights or remedies will not prejudice or preclude the District from subsequently invoking any other right or remedy set forth above or elsewhere in the Contract.

None of the foregoing provisions shall be construed to require District to complete the work, not to waive or in any way limit or modify the provisions of the Contract relating to the fixed and liquidated damages suffered by District on account of failure to complete the Project within the time prescribed.

## **108.12 Termination in the Public Interest**

It is hereby agreed that the District has the right to terminate the Contract in whole or in part when it is considered to be in the public interest.

In the event the Contract is terminated as being in the public interest the Contractor shall be entitled to a reasonable amount of compensation for preparatory work and for all costs and expenses arising out of the termination excluding lost profits.

The amount to be paid to the Contractor:

1. Shall be determined on the basis of the Contract price in the case of any fully completed separate item or portion of the work for which there is a separate or unit Contract price; and
2. In respect to any other work, the Contractor will be paid a percent of the Contract price equal to the percentage of the work completed.

**END OF DIVISION**

# Division 2 — STORMWATER CONSTRUCTION STANDARDS

**301 GENERAL..... 2**

## **301 GENERAL**

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The District's storm water construction standards apply to infrastructure on both private and public property. These generally include water quality and detention facilities. Generally, construction of storm water infrastructure is regulated by the Oregon Specialty Plumbing Code and permitted and inspected by the local Building Official which is the Clackamas County Building Department or by Clackamas County Department of Transportation and Development. When OLWSD's design standards of water quality and quantity facilities apply, reference OLWSD Chapter 2.

**END OF DIVISION**

# DIVISION 3 - WASTEWATER CONSTRUCTION STANDARDS

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## **301 PIPE AND FITTINGS**

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### **301.01 DESCRIPTION**

This section covers the following work: (1) gravity and pressure sewer mains, (2) fittings, and (3) laterals and cleanouts and manholes and pump stations.

### **301.02 MATERIALS**

#### **301.02.01 General**

Use all sewer pipe and fittings of the size, strength, material and joint type specified on the drawings and/or the proposal. Use jointing material as hereinafter specified for each pipe material. Each piece of pipe shall be clearly identified as to strength, class and date of manufacture. The manufacturer or fabricator shall furnish appropriate certification, based on manufacturers' routine quality control tests, that the materials in the pipe and fittings meet the requirements specified herein. Strength, permeability, hydrostatic tests, and pipe joints will be used as the basis of acceptance as described under proof tests herein.

It is not intended that materials listed herein are to be considered equal or generally interchangeable for all applications. The Design Engineer shall determine the materials suitable for the project and so specify.

#### **301.02.02 Ductile-Iron Pipe**

Ductile-iron pipe centrifugally cast of 60-42-10 iron shall conform to ANSI A21.51 Class 150 or AWWA C151, with Push-on Joint or Mechanical Joints as specified, conforming to ANSI Specification A21.11/AWWA C111. Ductile-iron pipe shall be lined with cement mortar and seal coated in accordance with ANSI Standard A21.4/AWWA C104.

When specified, tube type polyethylene encasement shall conform to ANSI A21.5/AWWA C105.

#### **301.02.03 PVC Nonpressure Pipe**

PVC sewer pipe shall conform to ASTM D 3034 SDR 35 or C900.

#### **301.02.04 HDPE Pipe**

HDPE pipe sizing shall conform with ASTM F714 or D3035. HDPE pipe material shall conform to ASTM D 3350. Pipe size and pipe dimension ratio shall be specified in the plans.

#### **301.02.05 Lateral Markers**

A 2-inch-x-4-inch stake painted green shall extend from the lateral end to a minimum of 3 feet above the ground.

#### **301.02.06 Jointing Materials**

Only lubricants for jointing materials approved by the manufacturer shall be used.

Furnish in duplicate a certified statement from the manufacturer of the gaskets, setting forth the basic polymer used in the gaskets and results of the tests of the physical properties of the compound. Gaskets shall be shipped in containers with identification of the batch from which the gaskets were fabricated.

##### **A. Ductile-Iron Pipe**

Rubber gaskets shall conform to ANSI A21.11/AWWA C111.



**B. PVC Pipe**

Rubber gaskets for PVC pipe shall conform to ASTM F 477. Solvent weld (glued) joints will not be allowed.

**C. HDPE Pipe**

HDPE pipe shall be joined via butt fusion welds in accordance with ASTM F 2620. The technician performing butt fusion welds shall be certified by the manufacturer or other certifying agency. Alternately, electrofusion polyethylene fittings may be used.

**301.02.07 Proof Tests**

The intent of this requirement is to prequalify a joint system, components of which meet the joint requirements, as to the water tightness capability of that joint system. This proof test shall be understood to apply to all sanitary sewers. Material and test equipment for proof testing shall be provided by the manufacturer. Joints shall meet the requirements of yard testing specified below. The pipe manufacturer shall submit results of the yard tests made, certified by a testing agency acceptable to the District Engineer. In general, each pipe material and joint assembly shall be subject to the following three proof tests at the discretion of the District Engineer.

**1. Pipe in Straight Alignment**

No more than 5 pipes selected from stock by the District Engineer or the testing agency shall be assembled according to the manufacturer’s installation instructions with the ends suitable plugged and restrained against internal pressure. The pipe shall be subjected to 13-PSI hydrostatic pressure for 10 minutes. Free movement of water through the pipe joint or pipe shall be grounds for rejection of the pipe.

**2. Pipe in Maximum Deflected Position**

A test section shall be deflected as described hereinafter for each pipe material. The pipe shall be subjected to 10-PSI hydrostatic pressure for 10 minutes. Free movement of water through the pipe joint or pipe wall shall be grounds for rejection of the pipe.

**3. Joints Under Differential Load**

The test section shall be supported on blocks or otherwise as described hereinafter for each pipe material. There shall be no visible leakage when the stressed joint is subjected to 10-PSI internal hydrostatic pressure for 10 minutes.

**A. Ductile-Iron Pipe**

For deflected position, create a position ½-inch wider than the fully compressed section on 1 side of the outside perimeter.

For differential load, support so that one of the pipes is suspended freely between an adjacent pipe, load bearing only on the joints. Apply a force per the following table along a longitudinal distance of 12 inches, immediately adjacent to 1 of the joints.

PIPE SIZE	FORCE - POUNDS	PIPE SIZE	FORCE - POUNDS
4 inches	1,000	15 inches	3,700
6 inches	1,500	18 inches	4,400
8 inches	2,000	21 inches	5,000
10 inches	2,500	24 inches	5,500
12 inches	3,000	and over	----

## **B. PVC Pipe**

PVC pipe joints shall be tested by and meet the requirement of ASTM C 3212 for gravity sewers and ASTM D 3139 for pressure sewers.

### **301.02.08 Fittings**

Provide tee fittings in the sewer main for lateral connections. Tees for laterals shall be 4 inches inside diameter, unless otherwise specified. All fittings shall be of sufficient strength to withstand all handling and load stresses encountered. All fittings shall be of the same materials as the pipe unless otherwise specified. Material joining the fittings to the pipe shall be free from cracks and shall adhere tightly to each joining surface. Use the same type of joints on all fittings that are used on the main sewer pipe. Tee fittings shall not be closer than 12 inches to any joint or bell of main line sewer which is 12 inches or less in diameter.

#### **A. Ductile-Iron Pipe**

Use mechanical joint cast-iron fittings conforming to ANSI A21.10/AWWA C110, and a class of at least equal to that of the adjacent pipe. Use push-on fittings of gray cast iron with body thickness and radii of curvature conforming to ANSI A21.10 and joints conforming to ANSI A21.11/AWWA C111.

#### **B. PVC Pipe**

PVC pipe shall be connected to sanitary manholes only thru formed or cored holes using an approved boot type adapter specifically manufactured for the intended service and approved by the District Engineer, such as Kor-N-Seal boots or equivalent. Sanded collars will be accepted only in poured-in-place manhole bases.

#### **C. HDPE Pipe**

Polyethylene fittings shall be manufactured in accordance with ASTM D 3261 for molded polyethylene fittings and ASTM F 1055 for electrofusion polyethylene fittings.

### **301.02.09 Pipe Coupling Adapters**

#### **A. PVC Pipe, and Ductile-Iron Pipe**

Use flexible mechanical compression joint coupling with stainless steel shear proof bands such as a Fernco Strongback or approved equal.

#### **B. HDPE Pipe**

Electrofusion couplers shall be used to join pipe between manholes. Electrofusion couplers shall conform to ASTM F 1055.

## **301.03 Construction**

### **301.03.01 Excavation and Backfill**

Conform to the requirements of Standard Detail 302 for pipe bedding and Section 1 for public easements (Excavation, Embankment, Bedding, and Backfill). All excavation shall be unclassified. Clackamas County public road standards supersede OLWSD standards outside of pipe zone. All mains, manholes, taps, laterals, and clean outs must be inspected by a District representative before burial. Any installations backfilled prior to inspection must be excavated for District inspection at the contractor's expense.

### **301.03.02 Line and Grade for Gravity and Pressure Sewers**

Do not deviate from line or grade, as established by the Design Engineer, more than ½ inch for line and ¼ inch for grade, provided that such variation does not result in a level or reverse sloping invert. Flat grade, negative slope, "bellies", or "sags" will not be accepted. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness. Establish line and grade for pipe by the use of lasers or by transferring the cut from the offset stakes to batter boards at maximum intervals of 25 feet.

#### **A. Line and Grade for Laterals**

The Design Engineer will establish line and grade to the tract of land to be serviced by the sewer system. At the preselected location of a lateral a stake will be driven into the ground showing the depth of excavation required at the property line.

The lateral must be laid perpendicular to the main whenever possible. Lay the pipe on a straight line and at a minimum of 2% grade between the tee and the clean out. The lateral shall be installed with the same accuracy as the main sewer and shall be a minimum of 5 feet of cover in all parts of the road right of way or easement.

### **301.03.03 Pipe Distribution and Handling**

Distribute material on the job no faster than it can be used to good advantage. Unload pipe only by means recommended by the pipe manufacturer. Do not unload pipe of any size by dropping to the ground. Do not distribute more than 1 week's supply of material in advance of laying, unless approved.

Pipe shall not be unloaded or stored in the public right-of-way or easement unless it has been certified and accepted by the Design Engineer. Inspect all pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are used. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

Use proper implements, tools, and facilities for the safe and proper protection of the work. Lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. Remove all damaged pipe from the job site. Do not drop or dump pipe into trenches.

### **301.03.04 Pipe Laying and Jointing of Pipe and Fittings**

#### **A. General**

Proceed with pipe laying upgrade with spigot ends pointing in direction of flow. Place pipe in such a manner as to ensure a continuous and uniform bearing and support for the full length of the pipe between joints. Take care to properly align the pipe before forced entirely home. Upon completion of pipe laying all pipe joints shall be in the "home" position, which is defined as the position where the least gap (if any) exists, when the pipe components that comprise the join are fitted together as tightly as the approved joint design will permit. Gaps at pipe joints shall not exceed that allowed by the manufacturer's recommendations.

Take special care to prevent movement of the pipe after installation when laid within a movable trench shield.

When laying operations are not in progress, protect the open end of the pipe from entry of foreign material and block the pipe to prevent movement or creep of gasketed joints.

Plug or close off pipes which are stubbed out for manhole construction or for connection by others.

When cutting and/or machining the pipe is necessary, use only tools and methods recommended by pipe manufacturer.

When shown or approved to deflect pipe from a straight line, either in the vertical or horizontal plane, or when long-radius curves are shown, the amount of deflection shall not exceed that specified or approved by the District Engineer. The pipe manufacturer's recommendation will serve as a guide, but the decision of the District Engineer shall be final.

The contractor shall at all times provide and maintain ample means and devices to remove and dispose of all water entering the trench excavation during the process of laying the pipe. Water and debris shall not enter into the District's sewer system. Water and debris shall be disposed of in an approved manner.

### **301.03.05 Installation of Tees and Laterals**

Provide pipe bedding material compacted to a minimum of 90% of maximum density as determined by ASTM D 1557/AASHTO T-180 under all tee fittings, extending to the springline of the fittings. Place pipe bedding material on undisturbed native material or compacted foundation stabilization material.

Use pipe and fittings for laterals of one type of material throughout; no interchanging of pipe and fittings will be allowed. Use 4-inch diameter pipe for residential laterals when not otherwise specified. Commercial and Industrial laterals must be a minimum of 6-inch diameter.

For 6-inch-x-8-inch connections, a "pipe snap cutter" shall be used to cut the main line and dress-in a factory tee.

Connect laterals to manholes only when directed. Connections to existing manholes shall be by way of a core drilled hole and use a Kor-N-Seal boot or equivalent.

Provide ends of all laterals with approved watertight plugs, or caps, suitably braced to prevent blow-off during internal air testing. Clean outs must be installed on the laterals prior to air testing.

Any new sanitary sewer tap location(s) must be a minimum distance of two (2) linear feet on either side of the main line from any other existing tap / lateral location.

All sanitary taps (both spliced-in taps and Inserta-Tee taps) will require a post-tap main line TV inspection. The inspection will be performed at the contractor's cost and after backfill and compaction is complete. Items under inspection will be excessive tap intrusion, leaks, alignment, and damage to the main line.

Permits for all sanitary installations (including single sanitary laterals for single lot development) must state that the installation is under warranty for a period of 12 months. At the end of 12 months OLWSD will TV the lateral to determine if the installation is accepted or if repairs are required.

### **301.03.06 Lateral Markers**

In new subdivisions, undeveloped areas, and where connections will not be made in the Contract, after the service line is installed, block the capped or plugged end and install 2-inch-x-4-inch marker. Extend markers at least 3 feet above the ground surface. Paint the top portion of the marker green. Write the depth of the lateral on the marker with permanent ink.

Take precautions during the backfilling operation to ensure the position and location of the marker. If the marker is broken or knocked out of vertical alignment during the backfilling operation, reopen the trench and replace the marker.

### **301.03.07 Testing**

#### **A. General**

All gravity sanitary sewers shall successfully pass an air test prior to acceptance and shall be free of leakage. Manholes shall be tested as specified in Section 3.0041 (Manholes and Concrete Structures).

All pressure sewer force mains shall be tested in accordance with applicable portions of Division and Section 4, when not otherwise specified.

Lines shall be cleaned prior to any television inspection.

A television inspection of the sanitary sewer pipe shall be performed. Any defects in material or workmanship shall be satisfactorily corrected prior to final acceptance of the work.

No private plumbing can be connected to a new sanitary system installation without District approval. The District will not approve or accept a sanitary system installation if any private plumbing has been connected to it.

#### **B. Cleaning Prior to Testing and Acceptance**

Prior to testing and television inspection of the sewer system hydro clean all parts of the system and remove all debris.

Upon the District Engineer's final manhole-to-manhole inspection of the sewer system, if any foreign matter is still present in the system, hydroclean the system a second time as required and remove the debris.

#### **C. Testing Procedure**

Perform the tests in a manner satisfactory to the District Engineer. Calibrate gauges for air testing with a standardized test gauge provided by the Contractor at the start of each testing day. The calibration shall be witnessed by the District Engineer; notify the District Engineer 24 hours prior to each test.

#### **D. Time of Test**

Make tests of sections of constructed sanitary sewer for acceptance only after all service connections, manholes, backfilling, and compaction are completed between the stations to be tested. The District may require testing of manhole-to-manhole sections as they are completed in order to expedite the acceptance of sections of sewer and allow connections prior to the whole system being completed.

#### **E. Repairs**

Repair or replace, in a manner satisfactory to the District Engineer, any section of pipe not meeting the air test requirements, or which has leakage.

Infiltration of ground water in an amount greater than herein specified, following a successful air test as specified, shall be considered as evidence that the original test was in error or that subsequent failure of the pipeline has occurred. Correct such failures occurring within the warranty period in a manner satisfactory to the District Engineer at the Contractor sole expense.

The Contractor, in contracting to do this work, agrees that the leakage allowances as indicated herein are fair and practical.

## **F. Air Testing**

### **1. General**

The District Engineer may, at any time, require a calibration check of the instrumentation used. Use a pressure gauge having minimum divisions of 0.10 PSI and an accuracy of 0.0625 PSI. (1 ounce per square inch.) All air used shall pass through a single control panel.

All plugs used to close the sewer for the air test must be capable of resisting the internal pressures and must be securely braced. Place all air testing equipment above ground and allow no one to enter a manhole or trench where a plugged sewer is under pressure. Release all pressure before the plugs are removed. The testing equipment used must include a pressure relief device designed to relieve pressure in the sewer under test at 10 PSI or less and must allow continuous monitoring of the test pressures in order to avoid excessive pressure. Use care to avoid the flooding of the air inlet by infiltrated ground water. (Inject the air at the upper plug if possible.) Use only qualified personnel to conduct the test.

Do not coat pipes for sewers internally or externally with any substance of any type in an attempt to improve its performance when air tested.

### **2. Ground Water**

The presence of ground water will affect the results of the test. Determine the average height of ground water over the sewer immediately before starting the test.

In every case, determine the height of the water table at the time of the test by exploratory holes or such other methods satisfactory to the District Engineer. The District Engineer will make the final decisions regarding test height for the water in the pipe section being tested.

### **3. Method**

Use the Time-Pressure Drop Method for all air testing. The test procedures are described as follows:

1. Clean the sewer to be tested and remove all debris where noted.
2. Wet the sewer prior to testing, if desirable.
3. Plug all sewer outlets with suitable test plugs. Brace each plug securely.
4. Check the average height of the ground water over the sewer. The test pressures required below shall be increased 0.433 PSI for each foot of average water depth over the sewer.
5. Add air slowly to the section of sewer being tested until the internal air pressure is raised to 4.0 PSIG greater than the average back pressure of any ground water that may submerge the pipe.
6. After the internal test pressure is reached, allow at least 2 minutes for the air temperature to stabilize, adding only the amount of air required to maintain pressure.
7. After the temperature stabilization period, disconnect the air supply.
8. Determine and record the time in seconds that is required for the internal air pressure to drop from 3.5 PSIG to 2.5 PSIG greater than the average back pressure of any ground water that may submerge the pipe.

### **4. Acceptance**

The sewer shall be considered acceptable when tested as described herein before if the section under test does not lose air at a rate greater than 0.0015 cfm per square foot of internal sewer surface.

For test sections containing over 625 square feet of surface area, the time measured by this method for 1.0 PSI pressure drop shall be calculated according to the following formula:

$$T = d^2L/42$$

T = test duration, seconds  
d = pipe diameter, inches  
L = section length, feet  
42 = conversion factor

For test sections containing less than 625 square feet of internal surface area, the time measured by this method for 1.0 PSI pressure drop shall be calculated according to the following formula:

$$T = 56d$$

The internal surface area of pipeline sections may be calculated using the formula:

$$A = \pi Ld/12$$

The surface areas of lateral lines of differing lengths and diameters may be accommodated in Equations 1 and 2 above by using the sums  $d_1^2L_1 + \dots + d_n^2L_n$  and  $d_1 + \dots + d_n$  in place of  $d^2L$  and  $d$ , respectively.

### **301.03.08 Deflection Test for PVC Pipe and HDPE Pipe**

In addition to air testing, perform a deflection test for all sanitary sewers constructed of PVC pipe or HDPE pipe after the trench backfill and compaction has been completed. The test shall be conducted by pulling an approved mandrel through the completed pipeline after compaction is completed. The diameter of the mandrel shall be 95% of the internal pipe diameter. Conduct testing on a manhole-to-manhole basis and only after the line has been completely flushed clean with water. Locate and repair any sections failing to pass the test and retest the section, at the Contractor's sole expense.

### **301.03.09 Subsequent Failure**

No infiltration of ground water in the system is allowed. No standing water is allowed.

### **301.03.10 Rail Lines Crossing Sanitary Sewer**

New and reconstructed light rail and freight rail construction may require improvements to the sanitary sewer system at all utility crossing locations. Each utility crossing area is to be minimized. All existing pipes on the second half of useful life within the rail zones shall be replaced to current standards. Metallic or conductive pipe materials are not approved pipe materials at rail crossings. Pipes are to be centered under rail tracks to avoid joints underneath rail lines. All new pipe installations must identify practical future replacement options for the sewer pipe under rails in case of future failure of utility.

### **301.03.11 Television Inspection of Sanitary Sewers**

Upon completion of all sewer construction, repairs, cleaning, and required tests, the Contractor shall notify the District Engineer 24 hours prior to when the television inspection will be performed.

Subsequent to being notified, the District Engineer shall commence examination of lines. Findings will be recorded.

When performing television inspections, water shall be added and a one inch measuring ball shall be utilized.

Upon correction of deficiencies revealed by television inspection, the Contractor shall notify the District Engineer; the same steps listed above may be repeated until all work is acceptable.

The District may, at its own option, perform a deflection test.

## **302 MANHOLES AND CONCRETE STRUCTURES**

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### **302.01 Description**

This section covers the work necessary for the construction of the following items: (1) manholes, (2) drop assemblies, and (3) concrete encasement.

### **302.02 Materials**

#### **302.02.01 Base Rock**

¾-inch minus base rock, conforming to the requirements for crushed aggregate material in Detail Drawing 302.

#### **302.02.02 Forms**

Forms for exposed surfaces shall be steel or plywood. Others shall be matched boards, plywood or other approved material. Form all vertical surfaces. Trench walls, large rock, or earth shall not be used as form material.

#### **302.02.03 Concrete and Reinforced Steel**

Concrete and reinforcing steel shall conform to Section 205 (Materials—Types and Use).

#### **302.02.04 Cement Mortar**

When specified for use, cement mortar shall conform to Detail Drawing 305 for concrete equivalencies. Mortar mixed for longer than 30 minutes shall not be used.

#### **302.02.05 Manholes**

##### **A. Standard Precast Manhole Sections**

Furnish sections as specified conforming to the details on the standard drawings and to ASTM C 478. Cones shall have same wall thickness and reinforcement as manhole section. Provide eccentric cones with precast grooves for all manholes over 6 feet in depth. Flat slab tops with precast grooves reinforced to withstand AASHTO H20 loading shall be provided for manholes 4 feet deep from crown of pipe and less. Top and bottom of all sections shall be parallel.

Prior to the delivery of any size of precast manhole section on the job site, yard permeability tests will be conducted at the point of manufacture. The precast sections to be tested will be selected at random from the stockpiled material that is to be supplied for the job. All test specimens will be mat tested, and shall meet the permeability test requirements of ASTM C 14 and ASTM C 497.

##### **B. Precast Concrete Bases**

Manholes shall be constructed using precast, reinforced concrete bases. Construction of precast bases shall conform to the requirements of ASTM C478. The base riser section shall be integral with the base slab.

##### **C. Poured in Place Manhole Bases**

The Contractor may use poured in place manhole bases only when pouring a new base over an existing main line. Concrete shall conform to Section 3.0030 (Manholes and Concrete Structures).

##### **D. Manhole Grade Rings**

Concrete grade rings for extensions shall be a maximum of 6 inches high.

##### **E. Jointing Materials**

Preformed plastic gaskets conforming to the requirements of AASHTO M-198 or joints using confined O-ring with rubber gaskets conforming to ASTM C443 shall be used.



### 302.02.06 Pipe and Fittings

Conform to requirements of Section 3.

### 302.02.07 Manhole Frames and Covers

#### A. General

1. All castings shall be true to size, weight and tolerances shown on the standard drawings. Delivered weight shall be +/- 5% of the specified weight. The bearing seat shall not rock when checked by the test jig. The foundry shall supply all test gauges and shall not subcontract any of the work other than testing procedure, patterns, and machining and cartage. The casting shall not be made by the open mold method and shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted. All castings shall be shot or sandblasted, and the application of paint or other coating will not be permitted. Standard manhole frames are required in state, county and public road right-of-way. Suburban manhole frames are acceptable in private roads, driveways, and easements. Only 2-hole lids will be accepted. In landscaped easements MH frames must be set slightly above final grade.

2. All manhole frames and covers located outside of the right-of-way shall be tamper-proof.

#### B. Materials

Conform to ASTM A 48, Class 30B with the following revisions:

Tensile Strength	30,000 PSI
Traverse Strength:	(1.2 inch diam. bar - 18 inch centers)
Load - Pounds	2,600 - 3,000
Deflection - Inches	0.22 - 0.34
Brinell Hardness (as cast)	173 - 200

The foundry shall certify as to the tensile and traverse properties and the Brinell Hardness. The District reserves the right to require a Rough Transverse bar (size of bar 1.2 inch diam. by 20 inch long) and/or a tensile bar as per ASTM A 48 for each 20 castings or heat when less than 20 castings are made.

#### C. Inspection

Notify the District at least 24 hours in advance of casting the units or bars. At least 24 hours notice shall also be given prior to final gauging and inspection. When directed, the following strength test shall be made on the manhole cover. The cover, while resting in its frame, shall sustain a concentrated load of 40,000 lbs. applied at its center through a 2½-inch plug. The District Engineer may, at any time, require up to 5% of the job and/or order to be tested in this manner. In case of failure during the test, additional covers shall be furnished until the tests prove satisfactory. Covers that do not pass this test shall not be used.

#### D. Cap Screws

Cap screws and washers for tamperproof and watertight manhole covers shall be stainless steel with 60,000 PSI minimum tensile strength conforming to ASTM A 453.

### 302.02.08 Steps for Precast Manholes

Steps for precast manholes shall be of ¾-inch diameter structural steel in conformance with the standard details or be of steel reinforced polypropylene plastic, M.A. Industries, Inc., No PS-2PFS, or Lane No. P-13850, or approved equal. All steps shall be in conformance with ASTM C-478 and shall be aligned vertically. All steps within a manhole shall be of the same design, type and size (mixing of unmatched steps within the same manhole is not permitted). Loose steps shall be cause for rejection of that manhole cone or section.

Steps of ¾-inch diameter structural steel shall conform to ASTM A 36 and galvanized in accordance to ASTM A 123. Steps shall be safety type 12-inch-x-8-inch-x-2-inch pattern as shown on the standard plans.

Steel reinforced polypropylene steps are to be driven into pre-formed holes in precast concrete manhole cones and sections by the manhole manufacturer prior to delivery to job site and shall be in conformance with the following specifications:

ASTM A-615 Grade 60, ½ inch deformed steel rod  
ASTM 2146-78 Type II, Polypropylene

### **302.02.09 Nonshrink Grout**

Nonshrink grout shall be Sika 212, Euco N-S, Five-Star, or equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C-827 and CRD-C-621. Grout shall not be amended with cement or sand, and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used.

Nonshrink grouts shall be placed or packed only with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout being used. Water as a substitute for commercial bonding agent for nonshrink grout will not be allowed in sanitary sewer construction.

## **302.03 Construction**

### **302.03.01 General**

#### **A. Excavation and Backfill**

Conform to applicable provisions in Section 204 (Excavation, Embankment, Bedding, and Backfill). Backfill around manholes shall be of the same quality as the trench backfill immediately adjacent. All excavation shall be unclassified. All mains, manholes, taps, laterals, and clean outs must be inspected by a District representative before burial. Any installations backfilled prior to inspection must be excavated for District inspection at the contractor's expense.

#### **B. Base Rock**

Place crushed aggregate base rock and thoroughly compact with a mechanical vibrating or power tamper.

#### **C. Foundation Stabilization**

If material in bottom of excavation is unsuitable for supporting manholes and other sewer appurtenances, excavate below subgrade as directed and backfill to required grade with rock conforming to Foundation Stabilization in Detail Drawing 304.

### **302.03.02 Manholes**

All manholes, except as otherwise specified, shall be constructed using precast, reinforced concrete base sections, riser sections, and other precast appurtenances conforming to ASTM C478. Base riser sections shall be integral with the base slabs.

Preformed plastic gaskets shall be installed in strict accordance with the manufacturer's recommendation. Only pipe primer furnished by the gasket manufacturer will be approved. When using preformed plastic gaskets, manhole sections with chips or cracks in the joint surfaces shall not be used. Completed manholes shall be rigid and all manholes for sanitary sewers shall pass the vacuum test. Construct manhole inverts in conformance with the standard drawings with smooth transitions to ensure an unobstructed flow through manhole. Cover exposed edges of pipe completely with grout. Trowel all grouted surfaces smooth.

The inside of all manholes will be grouted smooth with all spaces between risers, rings, and cones filled with grout flush with the inside of the manhole.

Holes for installing pipe into precast manhole sections shall be cast in place or core drilled.

Channels shall conform accurately to sewer grade. Channel shall be formed to accept a 7-inch x 30-inch cylinder into the pipes. Construct cast in place channel and shelf, in field, in 1 operation. Finish concrete shelf between channels with a brush.

### **302.03.03 Drop Assemblies**

Construct drop assemblies at locations indicated and as shown on the standard drawings.

### **302.03.04 Pipe Stubouts and Manholes**

Install stubouts from manholes at locations as shown or directed. Pipe connections to the cone section of a manhole are strictly prohibited.

### **302.03.05 Manhole Grade Rings**

In general, manhole grade rings will be used on all manholes in streets or roads or other locations where a subsequent change in existing grade may take place. Extensions will be limited to a maximum height of 12 inches.

Install appropriate combination of grade rings to a height that will accommodate the finish manhole surface elevation as shown on the drawings. Lay grade rings in mortar with sides plumb and tops level. All mortared sanitary sewer manhole necks and all grade ring joints made with mortar shall be constructed using an approved commercial concrete bonding agent applied to all cured concrete surfaces being mortared. No joints, necks, frames, or grade rings on sanitary sewers shall be mortared without an approved bonding agent. Water as a substitute for commercial concrete bonding agent will not be approved. Grade ring extensions shall be watertight.

### **302.03.06 Adjustment of Manholes and Cleanouts to Grade**

The frame and cover will be adjusted to final grade after the first lift of AC has been placed and prior to the final lift. The void between the frame and the first lift of AC will be filled with Type B grout conforming to Section 205 (Materials—Types and Use). The manhole frame must be flush with the final grade of the roadway without the use of paving rings.

### 302.03.07 Vacuum Testing

Manholes shall be vacuum tested.

For manholes with poured bases constructed over existing main lines, the top of the existing main shall not be “cut out” until the manhole vacuum test has been witnessed and approved by an OLWSD inspector.

1. Each manhole may be tested immediately after assembly and prior to backfilling for Contractor information and ease of repair if necessary. Acceptance testing will be accomplished after backfilling and final paving is complete.
2. All lift holes shall be plugged with an approved nonshrink grout. Manhole frame to grade ring or cone connection shall use commercial concrete bonding agent and nonshrink grout.
3. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.
4. The test head shall be placed at the inside of the top of the manhole frame and the seal inflated in accordance with the manufacturer’s recommendations. The seal at grade rings and frame shall be subject to the test.
5. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the values indicated below.

DEPTH OF MANHOLE (FEET)	ALLOWABLE TIME (SECONDS)		
	48-INCH	60-INCH	72-INCH
8	20	23	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

6. If the manhole fails the initial test, necessary repairs shall be made with an approved nonshrink, quick-setting grout. Retesting shall proceed until a satisfactory test is obtained.

### 302.03.08 Placing Precast Units

If material in bottom of trench is unsuitable for supporting unit, excavate as directed and backfill to required grade with foundation stabilization material in conformance with Section 204 (Excavation, Embankment, Bedding, and Backfill). Set units to grade at locations shown or directed.

### 302.03.09 Cleaning

Upon completion, clean each structure of all silt, debris, and foreign matter.

## **303 WORK ON EXISTING SANITARY SEWERS**

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### **303.01 Description**

This section covers the work necessary to join new work to existing, the abandoning of sanitary sewer lines, and adjusting existing utility structures to finished grades.

### **303.02 Materials**

Conform to requirements of Section 205 (Materials—Types And Use) and to the requirements for related work referred to herein.

#### **303.02.01 Inside Drops (Oregon Drops)**

This type of connection will only be allowed with prior approval by the District Engineer and shall conform to the requirements of the standard drawing.

### **303.03 Construction**

#### **303.03.01 Excavation and Backfill**

Conform to requirements of Section 204 (Excavation, Embankment, Bedding, and Backfill). All excavation shall be unclassified. All mains, manholes, taps, laterals, and clean outs must be inspected by a District representative before burial. Any installations backfilled prior to inspection must be excavated for District inspection at the Contractor's expense.

#### **303.03.02 Manholes Over Existing Sewers**

The Contractor shall be totally responsible for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

Construct manholes over existing operating sewer lines at locations shown. Perform necessary excavation and construct new manholes in conformance with applicable requirements of Section 302 (Manholes and Concrete Structures).

Construct manholes as shown on the detail drawings or standard drawings. Densify the concrete base by vibrating or working as approved and screed to provide a level, uniform bearing for precast sections.

Place the first precast section of manhole in concrete base before concrete has set and deposit sufficient mortar on the base to assure a watertight seal between the base and the manhole wall. First section shall be properly located and plumb. Stacking additional precast manhole sections shall be prohibited until the concrete has cured a sufficient amount to support the additional weight in moist conditions.

Prevent broken material or debris from entering sewer flow. Maintain flow through approved sewer lines at all times. Protect new concrete and mortar for a period of 7 days after placing. All sanitary sewer manholes shall be vacuum tested in accordance with Subsection 302.03.07 (Vacuum Testing).

#### **303.03.03 Connection to Existing Main**

Connections of laterals to existing sewer mains shall be made watertight. Transition couplings between dissimilar pipe materials shall be made using approved commercial adapters with stainless steel bands such as Fernco Strongbacks or equal.

New taps made to existing main lines shall be made by installation of an Inserta Tee or equal unless the tap diameter is within 2 inches of the main diameter (such as a 4-inch on 6-inch tap or a 6-inch on 8-inch tap). In those cases, a section of main line must be cut out and a PVC tee fitting spliced into the main with Fernco Strongbacks or equivalent. The Contractor shall be totally responsible for maintaining adequate capacity for flow at all times and for containing all wastewater within the system at all times. A written plan for pump-around or containment of sewage must be approved by the District before work may begin. Special care must be taken to compact bedding material under the new tap to provide proper support of the main. The Contractor must TV inspect the new tap section of main after backfilling and

compaction is completed to confirm that the new Inserta Tee does not protrude into the main excessively or to confirm that the new tap section of the main is properly aligned with the existing main at both ends. This TV inspection is to take place with a District inspector present.

Taps shall be installed without protrusion into or damage to the existing sewer. No compromise of the sewer will be allowed, such as undermining and settlement of the sewer grade, debris in the sewer, or longitudinal or transverse cracking of the sewer pipe.

#### **303.03.04 Removal of Existing Pipes, Manholes, and Appurtenances**

Existing pipelines, manholes, and appurtenances which lie in the line of and are to be replaced by the new construction shall be removed from the site and disposed of as provided for in Section 203 (Clearing and Grubbing).

#### **303.03.05 Filling Abandoned Manholes**

Existing manholes shown to be abandoned shall be filled with granular material as specified in Section 204 (Excavation, Embankment, Bedding, and Backfill). Compact to at least 90% maximum density as determined by ASTM D1557. Remove manhole frame and cover and plug all pipes with permanent plugs as specified in Section 303.03.07 (Permanent Plugs). Break or perforate the bottom to prevent the entrapment of water.

#### **303.03.06 Existing Manhole Frames and Covers**

Manhole frames and covers removed by the Contractor which will not be reused on the project shall become the property of the District. Notify the District Engineer a minimum of 1 day prior to removal to arrange for picking up the removed frames and covers.

#### **303.03.07 Permanent Plugs**

Clean interior contact surfaces of all pipes to be cut off or abandoned. For pipe 12 inches or smaller in diameter, install a gripper-type mechanical plug into the main and grout over it. For pipe 21 inches and larger, the plugs may be constructed of common brick or concrete block. Plaster the exposed face of block or brick plugs with mortar. All plugs shall be watertight and capable of withstanding all internal and external pressures without leakage.

#### **303.03.08 Adjusting Existing Structures to Grade**

Existing manholes, and similar structures shall be brought to the specified finished grade by methods of construction, as required in Section 510 (Adjustment of Existing Structures to Grade).

#### **303.03.09 Reconstruct Manhole Base**

Conform to applicable requirements of Section 302 (Manholes and Concrete Structures). Exercise caution in chipping out existing concrete base so as to prevent cracking of manhole walls. Prevent all material from entering the sewer flow. Pour new base to a minimum of 6 inches below the lowest projection of the pipe. Construct new channels to the elevations shown. Conform to details for channel construction in the standard drawings. Repair any cracks which occur as a result of work operations with new grout to form a watertight seal.

#### **303.03.10 Manhole Required**

If a connection is to be an 8-inch tap on the same size receiving line, then a manhole shall be required to make the connection.

#### **303.03.11 Connection to Existing Manholes**

All sanitary sewer pipe connections, including those at invert level and penetrations for drop connectors, conduits, and pass-throughs, shall conform to the requirements of applicable portions of Sections 301(Pipe and Fittings [Sanitary Sewer]) and 302 (Manholes and Concrete Structures).

### **END OF DIVISION**

# DIVISION 4—WATER CONSTRUCTION STANDARDS

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## 401 GENERAL

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The following specifications, in conjunction with applicable requirements of other parts of the contract documents, the plans, and addenda, shall govern the character and quality of material, equipment and construction procedures for water work. All work done shall be in compliance with the requirements and restraints of OSHA, the State of Oregon Accident Prevention Division regulations and the Workers' Compensation Board. In addition, all work shall be completed in conformance with State of Oregon, Clackamas County, and/or City of Milwaukie and/or City of Gladstone street opening permits.

## 402 WATER WORKS MATERIALS

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### 402.01 DUCTILE-IRON FITTINGS

All fittings shall conform to ANSI/AWWA Specification C110/A21.10 or ANSI/AWWA Specification C153/A21.53. All ductile-iron fittings shall be Class 350. Fittings shall be furnished with flanged or mechanical joints as specified on the plans. Fittings shall be ductile-iron fittings conforming to AWWA C110 and for compact C153. Fusion bonded epoxy fittings shall be U.S. pipe Permafuse or equal. Fittings shall be factory lined with cement mortar or cement lined to factory standards. No field coating with cement will be approved, other than for minor repairs. Fittings shall be new and free of defects in coating, body, and lining. During installation, fittings shall be properly aligned and bolted securely to provide watertight joints.

Fittings must be manufactured to conform to ANSI/AWWA standards.

### 402.02 MECHANICAL JOINTS

Mechanical joints, including accessory glands, gaskets, and bolts, shall conform to the requirements of ANSI/AWWA C111/A21.11, except where specifically modified in AWWA C153 for compact ductile-iron fittings. As stated in AWWA C111, Tbolts shall be made of either high strength cast iron containing a minimum of 0.50% copper, or high strength, low alloy, steel. Bolts shall be marked to identify material and producer. Contractor shall provide the District with the bolt manufacturer's specifications, which shall give the following information: manufacturer's name, type of material, and identifying mark. Follower glands for mechanical joints shall be domestic made only.

Mechanical joint gaskets shall be made of vulcanized synthetic rubber and shall be no more than 3 years old.

The recommended installation procedures in AWWA specification C111, Appendix A, "Notes on Installation of Mechanical Joints," including bolt torque ranges, shall be followed.

#### 402.02.01 Megalug/RomaGrip Pipe Restraint

RomaGrip/Megalug glands shall be RomaGrip/Megalug brand, as manufactured by Romac/Ebaa Iron Sales, Inc., only<sup>1</sup>. RomaGrip/Megalug shall be used on ductile-iron pipe and fittings.

### 402.03 FLANGED JOINTS

Flanges shall conform to ANSI specification B16.1 for Class 125 flanges and shall conform in all other respects to ANSI/AWWA C110/A21.11. Bolts for assembly of flanged joints shall be of the size and quantity shown in Table 10.14 on Page 34 of AWWA C110. As stated in AWWA C110, bolts shall conform to ANSI B18.2.1, Square and Hex Bolts and Screws Inch Series, Including Hex Cap Screws and Lag Screws. Nuts shall conform to ANSI B18.2.2, Square and Hex Nuts. Threads shall conform to ANSI

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<sup>1</sup> or approved equal



B1.1, Standard for Unified Inch Screw Threads (UN and UNR Thread Form), Class 2A, external, and Class 2B, internal<sup>2</sup>.

Bolts and nuts shall be of low-carbon steel conforming to the requirements of ASTM A307, Standard Specifications for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength, Grade B.

Contractor shall provide the District with the manufacturer's specifications regarding the bolts to be used on the project.

Flange gaskets shall be full face, 0.125-inch thick, red rubber or approved equal.

#### **402.04 FLANGED PIPE OR SPOOLS**

Flanged pipe or spools shall conform to the latest edition of ANSI/ANWA C115/A21.15. Flanges shall conform to requirements as specified in Subsection 402.04 (Flanged Joints). Pipe used shall be Class 53 DI. Pipe shall be furnished with coatings as specified in "Ductile-Iron Pipe". Threads on the flanges and pipe barrel shall be taper pipe threads (NPT) in accordance with ANSI B1.20.1.

When ordering, the following minimum information shall be provided to the manufacturer: Pipe size and finished length (flg. to flg., flg. to p.e.).

Manufacturer shall provide the following information: Length and weight shown on each pipe, flange manufacturer marking, country where cast, and DI or CI stamped on flanges. If fabricator is other than flange manufacturer, fabricator's mark shall be stamped with metal die on each flange after assembly. Also, manufacturer shall provide statement that the flange pipe complies with the specified standards.

#### **402.05 DUCTILE-IRON PIPE**

Ductile-iron pipe shall be Class 52. Physical properties shall not be less than 604210 iron and pipe shall conform to the latest revision of ANSI/AWWA specification C151/A21.51. Ductile-iron pipe shall be factory lined with cement mortar and bituminous seal coat and coated outside with asphaltic seal coat. Pushon rubber gasketed joints shall be installed using field-lok or approved equal locking gaskets. Pushon and mechanical pipe joints shall conform to ANSI/AWWA Specification C111/A21.11 and flanged joints shall conform to ANSI/AWWA C115/A21.15.

#### **402.07 VALVES (GENERAL)**

All valves shall be designed to AWWA specifications and shall have standard 2-inch square operating nut unless otherwise shown on the plans. All pipe valves and fittings shall be pressure rated at 250 to 350 PSI and shall open counter clockwise. All fittings shall be factory cement lined and coated.

##### **402.07.01 Gate Valves**

2-inch gate valves shall be resilient wedge double disc, non-rising stem with "O" ring packing, complying with AWWA Class C specifications. Gate valves 4-inch through 10-inch shall be resilient wedge, non-rising stem with "O" ring packing, complying with AWWA Class C specifications. The valves shall be designed to withstand water working pressures of 150 PSI or more. All valves shall be furnished with a 2-inch-square operating nut and shall open counter-clockwise when viewing valve from above.

Operation of the valve shall permit full withdrawal of the disc from the waterway to provide a clear unrestricted passage when the valve is in the open position. The valve shall be furnished with mechanical joint ends unless otherwise specified. Where flanges are furnished on valves, they shall conform to ANSI Specification B16.1, Class 125.

Valves located within vaults must have both hand wheel and rising stems.

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<sup>2</sup> or approved equal

#### **402.07.02 Butterfly Valves**

All butterfly valves shall be rubberseat type and bubbletight at 250 PSI pressure with flow in either direction. They shall be designed for direct burial and be satisfactory for application involving valve operation after long periods of inactivity. Valves shall conform to AWWA specification C504. All valves shall be Mueller or approved equal. Operating nut for the valve shall be located on the side of the main shown on the plans.

#### **402.08 FIRE HYDRANT ASSEMBLY**

Fire hydrants shall conform to AWWA specification C502. The hydrants shall have a 5.25-inch minimum valve opening with a 6-inch mechanical joint inlet, a 6-inch mechanical joint by flanged resilient wedge auxiliary gate valve, two 2.5-inch hose nozzles, one 4.5-inch pumper nozzle, a 1.5-inch pentagon operating nut (opening counter clockwise), and a safety flange. The hydrant color shall be yellow { (Rust-oleum V7400 alkyl enamel, fire hydrant yellow<sup>3</sup>). The fire hydrant depth of bury shall be arranged to match the grade of the surrounding ground. See standard drawing no. 411 for additional requirements.

Fire hydrants shall be Mueller Centurion A-423, M&H 929 Reliant, or Clow Medallion F-2545<sup>4</sup>. No other manufacturer will be accepted by the District.

#### **402.09 CAST-IRON VALVE BOXES**

Valve boxes shall be manufactured using domestic cast iron only. Valve boxes shall be the cast iron "Vancouver" pattern (18-inch tall casting) with standard lid – commonly known as a "9-10 can". Valve riser pipe from the valve to the cast-iron top shall be 6-inch PVC sewer pipe or approved equal for the Vancouver box. See standard drawing no. 310410.

Valve box castings shall be smooth and uniform. Box lid shall not protrude above the rim and lids shall seat flat without rocking. Lid will be stamped with a W. Boxes of uneven thickness, pitted, or otherwise flawed in the casting will be rejected. PVC sewer pipe shall be cut off smooth with no sharp edges.

#### **402.12 2-INCH SERVICE SADDLES**

Generally, 2-inch water services shall be connected with a 2-inch resilient wedge iron-bodied gate valve with a standard 2-inch square operating nut at the main. The gate valve will have female iron pipe thread connections. Service saddles may be approved by the District Engineer. Where approved, service saddles shall be 2-inch female iron pipe threads, double strap, stainless steel. Body of saddle shall be ductile iron coated with nylon, and straps, bolts, washers, and nuts shall be stainless steel. The close brass nipple between the saddle and the gate valve will be designated "lead-free", containing no more than 0.25% lead by a weighted average when used with respect to the wetted surfaces of pipe, fittings, and fixtures.

#### **402.13 COPPER PIPE**

3/4-inch and 1-inch Service lines shall be soft temper, copper water tube Type K, meeting ASTM B88<sup>5</sup> specifications. 2-inch service lines shall be rigid copper water tube Type K, meeting ASTM B88<sup>6</sup> specifications. Type L tubing will not be accepted.

#### **402.14 BRASS FITTINGS**

All brass components shall be designated "lead-free", containing no more than 0.25% lead by a weighted average when used with respect to the wetted surfaces of pipe, fittings, and fixtures.

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<sup>3</sup> or approved equal

<sup>4</sup> or approved equal

<sup>5</sup> or approved equal

<sup>6</sup> or approved equal

## **402.15 CORPORATION STOPS**

Corporation stops shall be used for 3/4-inch and 1-inch taps only. They shall be full-port ball style valves and tap directly into the main line with iron pipe threads.

## **402.16 METER STOPS**

The District meter stops shall be full-port angle ball valves, with padlock wings (meets ANSI/AWWA C800 Standard). The customer meter stops shall be full-port angle valves (either ball or ground key type valves are acceptable, and padlock wings are not required). For 3/4-inch service, a Ford BA43-332WQ or Mueller B-24258N is required<sup>7</sup>. For a 1-inch service, a Ford BA43-444WQ or Mueller B-24258N is required<sup>8</sup>. Either of these may be substituted if prior approval is provided from OLWSD.

## **402.17 CUSTOMER SIDE PLUMBING**

Customer side plumbing within the meter box must be copper or PEX. PVC will not be accepted. The customer-side meter stop must be positioned with the valve nut straight up to allow for proper operation.

## **402.19 WATERLINE MATERIALS AT LIGHT RAIL CROSSINGS**

New and reconstructed light rail and freight rail construction may require improvements to the water system at all utility crossing locations. Each utility crossing area is to be minimized. All existing water pipes or pipes within the rail zones shall be replaced to current standards and encased. Metallic or conductive pipe materials are not approved pipe materials at rail crossings. Pipes are to be centered under rail tracks to avoid joints underneath rail lines. All accessible structures must be located a minimum of 15' from the gate arms outside of the rail crossings.

# **403 CONSTRUCTION**

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## **403.01 STORAGE OF EQUIPMENT AND MATERIALS**

Unless otherwise noted on the plans or in the special provisions, it shall be the responsibility of the Contractor to locate a storage site for all equipment and materials and gain approval from the District Engineer.

Prior approval shall be obtained from the governing agency for any storage of equipment or materials within the right of way (i.e., stringing of pipe).

### **401.011 INSPECTION**

All mains, services, valve, fittings, hydrants, and other appurtenances must be inspected by a District representative before burial. Any installations backfilled prior to inspection must be excavated for District inspection at the Contractor's expense.

## **403.02 PLACING PIPE AND FITTINGS**

The pipe shall be laid true to line, without objectionable breaks in grade and shall be firmly bedded for the entire length of the pipe.

All pipe shall be bedded and covered with 0.75-inch minus crushed aggregate to a depth of 6-inches on all sides.

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<sup>7</sup> or approved equal

<sup>8</sup> or approved equal

Where conflicts arise between the designed grade of the waterline and an existing underground structure, the depth of the trench may be increased to permit proper installation of the waterline. Payment for over excavation shall begin once the extra depth reaches 18-inch below the designed grade.

Care shall be taken to clean joints and to keep them free of water during construction. Whenever water is excluded from the interior of the pipe, adequate backfill shall be deposited on the pipe to prevent floating. In the event of any flotation occurring, the pipe so affected shall be removed from the trench, replaced and relaid at the Contractor's expense.

Each section of the pipe and each fitting shall be thoroughly cleaned before it is lowered into the trench. Cleaning of each pipe or fitting shall be accomplished by swabbing out, brushing out, blowing out with compressed air, washing to remove all foreign matter. The most efficient method of cleaning out pipe and fittings will be determined on the job by the District Engineer.

If clean pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, the District Engineer will require that a piece of tightly woven canvas be tied over the ends of the pipe or fitting until it has been lowered into position in the trench. After the pipe or fitting has been lowered into the trench, all foreign matter shall be completely brushed from the bell and spigot ends before assembly. At the end of each day, or during suspension of the work, the pipe ends shall be securely closed by means of a secure plug or approved equivalent. Water in the trench shall not be allowed to enter the pipe and fittings.

If it is necessary to cut the pipe to lay it on curves or to cause a change in direction, the Contractor shall cut the pipe as required for proper installation. Where the cut length of pipe is to be installed into the bell end of another pipe, the cut end shall be beveled to ensure a proper seal. To set valves and fittings properly, the pipe shall be cut to the exact length required to obtain the designated locations. The cost of cutting the pipe shall be included in the unit prices bid.

Dead end lines, where a standard 2-or-4-inch blow-off assembly is not required by the plans, shall be provided with a ¾-inch corporation stop 18 inches from the plugged end of the pipe. This will allow for air removal and release of line pressure during future waterline extension. No extra payment shall be made for this installation.

### **403.03 WET TAPPING EXISTING MAIN**

When specified, wet taps on existing water main are required to minimize interruption of service to customers. District personnel will install ¾-inch and 1-inch corporation stops and 2-inch gate valves on live mains. District approved contractors will install 4-inch and larger taps on live mains. Tapping sleeve and valve for 4-inch and larger taps shall conform to standard drawing no. 408.

Before attaching tapping sleeve, care shall be taken to clean water main of all debris and defects. Attach sleeve and valve to the main. Then attach proper tapping machine to valve. Pressure test this assembly before making tap. After making tap, remove the tapping machine and inspect fitting and valve for leaks. If any such leaks are found, Contractor shall be required to repair the defect. Attach branch main to valve and install pipe. New connections 4-inch and larger shall be securely thrust blocked using a poured block sized according to the system pressure and the size of the main or service installed. -Taps shall be made no closer than 18-inch from end of sleeve to nearest joint.

Excavation for tap shall be such as to fully expose main with a minimum depth below main of 12 inches. A minimum of 18-inch of main shall be exposed from the end of the tapping sleeve. Also, excavate enough area to accommodate tapping machine and workers. Backfilling shall be in accordance with OLWSD backfill standards.

### **403.04 POLYETHYLENE ENCASEMENT OF PIPE AND FITTINGS**

When specified, install polyethylene encasement, tube type, on all pipe and appurtenances. Polyethylene film shall conform to ASTM standard specification D124878, having a minimum thickness of 0.008-inch (8

mil). Install this encasement in accordance with AWWA C105, Method A, 1 length of polyethylene tube for each length of pipe. When required, polyethylene tubing used on mains shall be held in place with 2 inch-wide adhesive tape which is compatible with polyethylene, with plastic binder twine, with nylon tie straps, or other method approved by the District Engineer.

The use of polyethylene sheets will not be allowed on pipe segments, only fittings. Sand backfill shall be placed within the pipe zone and bedding area wherever polyethylene encasement is used.

Polyethylene sheets may be used to cover valves, fittings, and all mechanical joints and flanged connections. Valves shall be wrapped up to the bottom of the operating nut. Three layers of polyethylene shall be wrapped snugly around the pipe and held in place by using an adhesive tape compatible with polyethylene, plastic binder twine, or nylon tie straps. Backfill material shall not be allowed to get under the polyethylene, and pockets in the polyethylene which can trap backfill material shall be eliminated.

### **403.05 PLACING VALVE UNITS**

A valve unit shall consist of a valve, bolts, gaskets, followers, PVC riser pipe, and cast-iron valve box, complete with cover.

Valves shall be placed in a vertical position at locations shown on the plans. The Contractor shall check each valve to determine that the valve is properly adjusted to seat securely and open fully. Valves not meeting these requirements shall not be installed. Valve boxes and PVC riser pipe shall be placed in a vertical position over the valve operating nut and the backfill shall be carefully compacted around the box. Any valve boxes found off center from the valve operating nut shall be removed and replaced into the proper position. The top of the valve box shall be adjusted to meet finish grade. PVC riser pipe shall extend up inside the valve box 7 inches on the Vancouver box to allow future raising of the box. Notches shall be cut into the rim of the valve box on a line passing through the center of the box as detailed on standard drawing no. 313. Valve boxes shall be placed so that the notches line up parallel with the water main below. A collar of concrete with a depth of 4-inch, 24-inch x 24-inch square, shall be placed around the top of all valve boxes not in a paved area.

The Contractor shall not operate any valve touching potable water.

### **403.06 PLACING FIRE HYDRANT ASSEMBLIES**

The fire hydrant assembly shall consist of a mechanical joint hydrant, mechanical joint by flange auxiliary gate valve, cast-iron valve box, galvanized bolts, gaskets.

The fire hydrant shall be placed in a vertical position on a precast concrete block having a bearing surface of not less than 1 square foot. Hydrant drain holes shall not be blocked. Not less than 4 cubic feet of clean drain rock shall be placed around the base of the hydrant for drainage. The drain rock envelope must extend to 6-inch above the drain holes and must be fully wrapped in geotextile. See standard drawing no. 411 for other requirements. Fire hydrant extension kits may be installed with approval by the District Engineer. Where approved, fire hydrant extension kits may only be installed by District water crews. In no instance will more than one fire hydrant extension kit per hydrant be installed.

### **403.07 COPPER SERVICE INSTALLATION**

Where indicated on the drawings or as determined in the field, the Contractor will be required to install copper water services. This will require District personnel or an approved contractor to install live taps (see 403.03) as necessary. The Contractor will install the copper service pipe and District meter stop and meter box.

All new copper pipe and service fittings shall be kept clean and free of debris. Where new services are installed, new meter boxes shall be set with the top of the box at finish grade. Meter boxes shall be located as follows, in order of preference:

1. Within the planter strip, excluding water quality facilities – with the District Meter Stop located 18 inches behind the face of curb.

2. Behind the sidewalk in an approved area (either in the road right of way, a Public Utility Easement, or an OLWSD easement) - with the District Meter Stop located 12-inch behind the back of sidewalk
3. In the sidewalk – with the District Meter Stop located 18-inch behind the face of curb (or 12-inch behind the front of the sidewalk)
4. If there is no curb: 3/4-inch and 1-inch District Meter Stops are to be located 40-inch outside of the property line, and 2-inch District Meter Stops are to be located 50-inch outside of the property line
5. Depth: District Meter Stops shall be installed with the top of the stop 7 to 9-inches below final grade

In addition:

1. The meter box must be located in front of the property served and a minimum of 18-inches away from a property corner.
2. The meter box shall not be located in a driveway or other areas where vehicle tires might pass over it (when suitable locations exist outside trafficked areas). The meter box must not be located in driveway approach wings.
3. The contractor is responsible for the proper placement of the District meter stop in relation to the curb, sidewalk, or property line. If the District determines that the meter stop location or depth are not acceptable, the contractor must relocate the meter stop at no expense to the District. Extending the service line by use of a union or shortening the service line by bending it to use up excess length is not acceptable.

The meter box and cover required for a 3/4" meter shall be a DFW 11"X18"X12" gray "wide body" meter box part number DFW486WBC4-12-BODY; and a DFW 11"X18" gray solid meter box cover w/ magnet w/ ss pick hole pin part number DFW486C-4MP-LID.<sup>9</sup>

The Meter box and cover required for a 1" meter shall be a DFW 13"X24"X12" gray meter box part number DFW1324C4-12-BODY and a DFW 13"x24" gray solid meter box cover w/magnet w/ss pick hole pin part number DFW1324C-4MP-LID.<sup>10</sup>

All copper service pipe shall be bedded and covered with 0.75-inch minus crushed aggregate to a depth of 6 inches on all sides. If the service is located in a road right-of-way, all of the backfill will consist of 0.75-inch minus crushed aggregate.

Service lines shall be located in a direct line between the meter and a point on the main directly opposite the meter. Service lines shall have a minimum cover of 30 inches except where crossing road ditches where the cover may be reduced to 24 inches at said road ditch. The service line must be centered in the trench.

Where existing copper service is to be transferred to new main, and the existing main is to remain live, Contractor shall disconnect corporation stop from old main and install a lead-free brass plug. Contractor shall provide excavation down to old corporation stop, select backfill and compaction. Excavation and backfill shall be considered incidental to the project. Contractor shall perform surface restoration according to the bid item for that work.

All new services crossing existing metal gas lines shall have PVC sleeves as discussed on standard drawings no. 420.

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<sup>9</sup> or approved equal

<sup>10</sup> or approved equal

Corporation stops shall be set at a 45 degree angle up from horizontal. Taps shall be a minimum distance of 18 inches from the bell or spigot end of the main, or from another service tap, or from any fitting.

Where a new section of copper service is to be installed, it shall be Type K, seamless soft annealed copper pipe conforming to ASTM B88. There shall be no splicing of copper unless the service is longer than 100 feet or as approved by the District Engineer (unique conditions). When splicing is approved between 2 pieces of copper, it shall be done with a 3 piece copper to copper union. No more than 1 splice per service shall be made and splicing shall be made outside of the existing or proposed travel lane. Existing galvanized service lines encountered by the Contractor shall be replaced with copper service pipe up to and through the angle meter stop.

Where 2-inch services are to be installed, the main shall be tapped thru a 2-inch service saddle and a 2-inch resilient wedge iron-bodied gate valve, have 2-inch type K rigid copper tubing and utilize a 2-inch full-port ball type angle meter stop with locking wings.

#### **403.08 PLACING PERMANENT BLOW-OFF ASSEMBLIES**

A standard blow-off assembly shall consist of a main size x MJ cap tap , 2-inch x 1' brass nipple, 2-inch resilient wedge gate valve, 2-inch x 30-inch galvanized nipple, 2-inch galvanized 90° bend, 2-inch galvanized piping, 2 valve boxes, galvanized coupling and brass or PVC plug. The blow-off assembly shall be placed as shown in standard drawing no. 413.

#### **403.10 REMOVING EXISTING WATER WORKS MATERIALS**

When the Contractor removes existing pipe, gate valve units, fittings, fire hydrant units or other items to allow installation of the work specified herein, the Contractor shall haul the removed water works material away. Title to the removed materials shall transfer to the Contractor, except when otherwise specified.

The District reserves the right to designate other water works materials to be removed. The Contractor shall remove the designated water works materials and haul them to the District's designated storage yard.

#### **403.11 ABANDONING EXISTING MAINS AND VALVES**

Any existing water lines that are abandoned shall be severed and plugged as directed by the District Engineer. All abandoned valve boxes shall be removed, gravel filled, compacted, and asphalt plugged at no additional cost.

##### **403.111 ABANDONING EXISTING SERVICES**

3/4-inch and 1-inch services that are abandoned shall have the corp stop left in place and the copper service line severed within 2-inch of the corp stop.

1.5-inch and 2-inch services that are abandoned shall have the corp stop removed from the service saddle and the saddle plugged with a brass plug designated as "lead-free", containing no more than .25% lead by a weighted average when used with respect to the wetted surfaces of pipe, fittings, and fixtures.

3-inch and larger services that are abandoned shall have the tee removed from the main line and the main then repaired with a section of solid pipe and MJ sleeves.

Abandoned meters and meter boxes are to be removed and returned to the District.

#### **403.12 MAINTAINING SERVICE**

The Contractor shall schedule construction work specified herein to maintain a continuous water service to existing water users. Where it is necessary to shut down service to make required interties, the Contractor shall notify the District at least five working days prior to a planned water service shut down to allow the District to notify users of the impending loss of water service. Contractor may be required to

make necessary service shutdowns of affected businesses after regular business hours at no additional cost to the District.

### **403.13 FLUSHING**

The new pipeline shall be flushed, pressure tested, and disinfected before any connection to the existing water system is made. Temporary blow-offs and chlorination points shall be provided by Contractor at all dead ends and points of connection to the existing system. The new waterline shall be built as close as possible, as determined by the District Engineer, to the existing water system at points where connections are to be made.

All pipe, valves and fittings shall be thoroughly flushed prior to pressure testing and chlorination. Flushing shall be done through blow-off units, hydrants, individual services, and main at a minimum velocity of 2.5 F/S. All water used during flushing operations shall be measured through a Pitot Blade and stop watch. All results shall be reported to the District Engineer on a daily basis.

Prior to any flushing procedures taking place, the Contractor shall issue a flushing plan providing direction of flow, water damage control and a written schedule to the District Engineer for approval. A 48 hour notice shall be given to the District Engineer prior to any system shutdown or flushing procedures. Under no circumstance shall the Contractor operate any District valves without prior approval by the District Engineer.

The following chart shows minimum temporary blow-off/inlet sizes which shall be provided by the Contractor. Gate valves shall be provided on blow-off and inlet pipes to pressure test against, and to keep the pipe interior clean when backflow device is removed.



<b>REQUIRED OPENINGS TO FLUSH PIPELINES</b>		
<b>NOMINAL PIPE SIZE (INCHES)</b>	<b>FLOW REQUIRED TO PRODUCE 2.5 FPS VELODISTRICT(GPM)</b>	<b>MINIMUM INLET &amp; OUTLET PIPE SIZE REQUIRED (INCHES)</b>
4	110	2
6	240	2
8	430	4
10	660	4
12	950	4
14	1290	6
16	1690	6
18	2140	6
20	2640	6
24	3800	6

All flushing and testing water shall be delivered to the new waterline through Oregon State Health Division approved double check valve backflow prevention devices.

The Contractor shall provide or obtain a backflow prevention device. Certified backflow tester shall test device and furnish documentation to District Construction Inspector after device is installed on site.

After flushing, the new system shall be pressure tested and disinfected. Payment for this item shall be included in the price bid for pipeline installation work.

#### **403.14 TESTING AND CHLORINATION**

All of the pipe, fittings, services, and individual valves, except the last connection with the existing main, after being placed, must be pressure tested, conforming to AWWA C600 Section 4 specifications. If the Contractor elects to test the line in sections, the lengths of the sections and provisions for testing shall be subject to approval by the District Engineer.

Before testing the pipeline for leakage, the pipeline shall be thrust blocked. The interior of the pipeline shall be thoroughly cleaned to remove all foreign matter.

The Contractor shall furnish necessary thrust blocks, pumps, medium range pressure gauges, means of measuring water loss, and all other equipment, materials and labor required for making the tests.

All air vents shall be open during the filling of the pipeline with water. After a test section is completely filled, it shall be allowed to stand under slight pressure for at least 24 hours to allow the lining to absorb what water it will and to allow the escape of air from any small air pockets. During this period, the bulkheads, valves and exposed connections shall be examined for leaks. If any are found, they shall be stopped. The pressure shall then be raised slowly to the minimum hydrostatic pressure of 180 pounds per square inch, or 1.5 times the normal working pressure, whichever is higher, measured at the point of highest elevation and shall be maintained for a period of at least 1 hour, beginning at a time of day to be mutually agreed upon between the Contractor and the District Engineer.

Test pressure shall not exceed 150% of pipe pressure rating.

No leakage is acceptable. While the pipe is under pressure and stabilized, an inspection for leaks along the pipeline shall be made by the Contractor. The gauges should be graduated at 2 PSI increments. Any leaks found shall be recorded and shall be repaired by the Contractor. All such repairs shall be made subject to the approval of the District Engineer.

The Contractor, at their own expense, shall perform any excavation required to locate and repair leaks or other defects which may develop under the test. He shall remove backfill and paving already placed, shall replace such removed material, and shall make all repairs necessary to secure the required water tightness. All repairs and retests shall be made at the Contractor's sole expense.

All leakage tests shall be made in the presence of the District Engineer or District Inspector.

The pipeline shall be thoroughly chlorinated and flushed in accordance with the Oregon State Health Division's publication, "Public Water Systems", ORS Chapter 333. The Contractor shall employ the use of storage tanks, basins, or other means to transport or treat the chlorinated water for discharge to an approved point of disposal. Adequate quantities of chlorine in a water solution shall be added to the pipeline and shall be allowed to stand a sufficient length of time to sterilize the interior of the pipeline. The chlorinated water shall be flushed from the pipeline and a water sample shall be taken from the pipeline. The water sample shall be tested biologically and an acceptable certification that the water is safe for domestic water consumption shall be obtained before placing the pipeline into service. If the water is not safe, the Contractor shall chlorinate and flush the line and take new samples until an acceptable safe water certification is obtained.

Chlorine may be applied by the following methods: Liquid chlorine gas/water mixture, direct chlorine gas feed, or calcium hypochlorite and water mixture. The chlorination agent shall be applied at the beginning of the section adjacent to the feeder connection and shall be injected through a corporation cock, hydrant, or other connection ensuring treatment of the entire line. Water shall be fed slowly into new line with chlorine applied in amounts to produce a dosage greater than 50 ppm but not more than 200 ppm throughout the system. After 24 hours, a residual of not less than 25 ppm shall be produced in all parts of the line. If the check measurement taken after the 24-hour period indicates a free chlorine residual of less than 25 ppm, the system shall be flushed, rechlorinated, and rechecked until a final residual of 25 ppm or more is achieved and at no additional expense to the District.

During the chlorination process, all valves and accessories shall be operated. All parts of the line and services shall be chlorinated. After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. A minimum of 24 hours after dechlorination, the District shall take two consecutive sets of samples, taken at least 24 hours apart. At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line, and one set from each branch. Water samples will be taken for bacteriological tests by the District.

The Contractor shall furnish and place all necessary fittings required for the testing, chlorinating and flushing of the pipeline. If a corporation stop is removed, the hole shall be filled with a lead-free brass plug.

Water used in testing and flushing the pipeline shall be purchased from the District.

#### **403.15 CUT-IN AND CONNECTION TO EXISTING MAINS**

After new waterline is flushed, pressure tested and disinfected, but prior to any cut-in and connects, Contractor shall hold an onsite pre-connection meeting. Those to attend shall include onsite foreman, District Inspector, District Operations Personnel, and District Engineer.

This meeting shall take place prior to each connection and no longer than 1 week prior to the connection. At this meeting, Contractor shall have all fittings, pipe, chlorine swabbing equipment, pumps and hoses, and all equipment needed to make the cut-in connect. Cut-in schedule and shutdown coordination shall be discussed.

Once the bacteria test has been passed, cut-ins and connections to the existing water system shall be made by the Contractor. All fittings necessary for the cut-in and pumps adequate to handle water in the trench shall be on hand and ready for service before connection is commenced. If the new waterline is opened to the air before Contractor and District personnel are ready to proceed with the connection, or if new waterline is contaminated by dirt or dirty water, the new waterline shall be disinfected again.

Fittings and pipe for cut-ins shall be swabbed out thoroughly with a 1% chlorine solution (½ pound of 64% calcium hypochlorite in 4 gallons of water). Swabbing equipment and solution shall be kept clean and fresh.

During each connection, work shall proceed without breaks until the connection is completed and water service is turned back on. Ground water shall not be allowed around any of the existing piping during the connection.

After the connection is completed and water service is turned back on, a visual leak inspection of all fittings shall be done by the Inspector prior to backfilling.

### **403.16 CLAY DAMS**

Where indicated on the plans, or as directed by the District Engineer, the Contractor shall place clay dams to prevent ground water movement along the trench. Dams shall be made of impervious backfill material composed of particles at least 50% of which pass a no. 200 sieve, and with a plasticity index not less than 20, unless otherwise indicated on the plans.

A dam shall fill the trench completely from side to side and top to bottom, except for the volume occupied by the pipeline and any materials required for surface restoration. Pipe in contact with clay dam will be wrapped with 2 layers of 8-mil polyethylene.

Flow shall be considered in design of water and storm drain system.

### **END OF DIVISION**

NOTES:

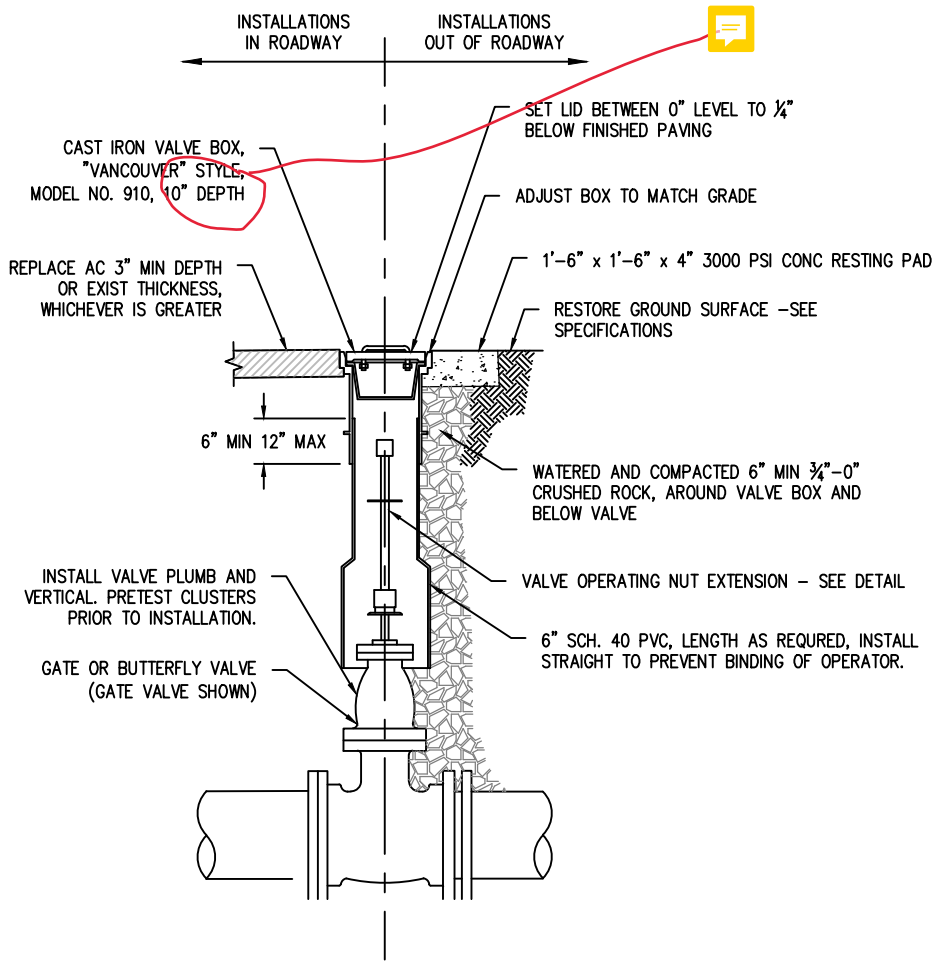
1. WHENEVER RAINFALL AND RUNOFF OCCUR, A KNOWLEDGEABLE AND EXPERIENCED PERSON IN THE PRINCIPLES, PRACTICES, INSTALLATION, AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS MUST PROVIDE DAILY INSPECTIONS OF BOTH THE CONTROLS AND PLACES WHERE WATER FLOWS OUT OF THE SITE. THIS PERSON SHALL WORKS FOR THE PERMITTEE.
2. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND DURING THE WET WEATHER PERIOD, BETWEEN OCTOBER 1 AND MAY 31. ALL EXPOSED SOILS MUST BE COVERED AT END OF BUSINESS DAY DURING THE WET WEATHER PERIOD.
3. DURING THE WET WEATHER PERIOD, TEMPORARY STABILIZATION OF THE SITE MUST OCCUR AT THE END OF EACH WORKDAY.
4. SEDIMENT CONTROLS MUST BE INSTALLED AND MAINTAINED ON ALL DOWNHILL SIDES OF THE CONSTRUCTION SITE AT ALL TIMES DURING CONSTRUCTION. THEY MUST REMAIN IN PLACE UNTIL PERMANENT VEGETATION OR OTHER PERMANENT COVERING OF EXPOSED SOIL IS ESTABLISHED.
5. ALL INLETS MUST HAVE SEDIMENT CONTROLS INSTALLED AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
6. SIGNIFICANT AMOUNTS OF SEDIMENT THAT LEAVES THE SITE MUST BE CLEANED UP WITHIN 24 HOURS AND EITHER PLACED BACK ON THE SITE AND STABILIZED OR DISPOSED OF PROPERLY. THE CAUSE OF THE SEDIMENT RELEASE MUST BE FOUND AND PREVENTED FROM CAUSING A RECURRENCE OF EROSION DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN UP OF SEDIMENT SHALL BE PREFORMED ACCORDING TO THE OREGON DEPARTMENT OF STATE LANDS REQUIRED TIME FRAME.
7. SEDIMENT MUST NOT BE INTENTIONALLY WASHED INTO STORM SEWERS, DRAINAGE WAYS, OR WATER BODIES.
8. SEDIMENT MUST BE REMOVED FROM BEHIND ALL SEDIMENT CONTROL MEASURES WHEN IT HAS REACHED A HEIGHT OF ONE THIRD THE BARRIER HEIGHT AND PRIOR TO THE CONTROL MEASURE'S REMOVAL.
9. ALL STRUCTURES WITH SUMPS MUST BE CLEANED WHEN THE SEDIMENT RETENTION CAPACITY HAS REACHED 50% AND ALSO AT COMPLETION OF THE PROJECT.
10. ANY USE OF TOXIC OR OTHER HAZARDOUS MATERIALS MUST INCLUDE PROPER STORAGE, APPLICATION, AND DISPOSAL.
11. THE PERMITTEE MUST PROPERLY MANAGE HAZARDOUS WASTES, OILS, CONTAMINATED SOILS, CONCRETE WASTE, SANITARY WASTE, LIQUID WASTE, AND OTHER TOXIC SUBSTANCES DISCOVERED OR GENERATED DURING CONSTRUCTION.
12. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS. NUTRIENT RELEASES FROM FERTILIZERS TO SURFACE WATERS MUST BE MINIMIZED. TIME RELEASE FERTILIZERS SHOULD BE USED AND CARE SHOULD BE MADE IN APPLICATION OF FERTILIZERS WITHIN THE RIPERIAN ZONE OF ANY WATERWAY.
13. OWNER OR DESIGNATED PERSON SHALL BE RESPONSIBLE FOR PROPER INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH CURRENT DISTRICT STANDARDS AND COUNTY, STATE, AND FEDERAL REGULATIONS.
14. PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE BOUNDARIES OF THE CLEARING LIMITS, VEGETATED BUFFERS, AND ANY SENSITIVE AREAS SHOWN ON THIS PLAN SHALL BE CLEARLY DELINEATED IN THE FIELD. UNLESS OTHERWISE APPROVED, NO DISTURBANCE IS PERMITTED BEYOND THE CLEARING LIMITS. THE OWNER/PERMITTEE MUST MAINTAIN THE DELINEATION FOR THE DURATION OF THE PROJECT. NOTE: VEGETATED CORRIDORS MUST BE DELINEATED WITH ORANGE CONSTRUCTION FENCE OR APPROVED EQUAL.
15. PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE MINIMUM CONTROL MEASURES THAT MUST BE INSTALLED ARE GRAVEL CONSTRUCTION ENTRANCE, PERIMETER SEDIMENT CONTROL, AND INLET PROTECTION WHERE INLETS ARE PRESENT. AS SOON AS LAND DISTURBING ACTIVITIES START, SOIL PILES MUST BE PROPERLY COVERED. ALL THESE MEASURES MUST BE MAINTAINED FOR THE DURATION OF THE PROJECT.
16. IF VEGETATIVE SEED MIXES ARE SPECIFIED, SEEDING MUST TAKE PLACE BEFORE SEPTEMBER 1.
17. WATERTIGHT TRUCKS MUST BE USED TO TRANSPORT SATURATED SOILS FROM THE CONSTRUCTION SITE. AN APPROVED EQUIVALENT IS TO DRAIN THE SOIL ON SITE AT A DESIGNATED LOCATION USING APPROPRIATE BMPS; SOIL MUST BE DRAINED SUFFICIENTLY FOR MINIMAL SPILLAGE.
18. ALL PUMPING OF SEDIMENT CONTROL BMP (SUCH AS P) AND THROUGH A SEDIMENT
19. THE EROSION AND SEDIMENT TO ENSURE THAT SEDIMENT MUST BE INSTALLED PROPERLY ER PROPERTIES.
20. WRITTEN EROSION AND SEDIMENT UPON REQUEST. LE TO DISTRICT INSPECTORS
21. THE EROSION AND SEDIMENT CONDITIONS. DURING THE REGULATIONS. S FOR ANTICIPATED SITE MAINTAIN COMPLIANCE WITH ALL
22. IN AREAS SUBJECT TO WIND SPRAYING, PLASTIC SHEET TION OF FINE WATER

#23. INSTALL A NOTIFICATION STATION WITH A 4-INCH X 4-INCH POST, MINIMUM HEIGHT 36-INCHES, WITH A "COMMERCIAL DocBox" ( <https://www.docbox.com/products/commercial-doc-box> ) ATTACHED NEAR THE TOP. THIS SHOULD BE INSTALLED AT THE FRONTAGE PROPERTY LINE FACING THE FRONT LOT LINE. EQUIVALENTS ARE PERMITTED WITH PRIOR APPROVAL.

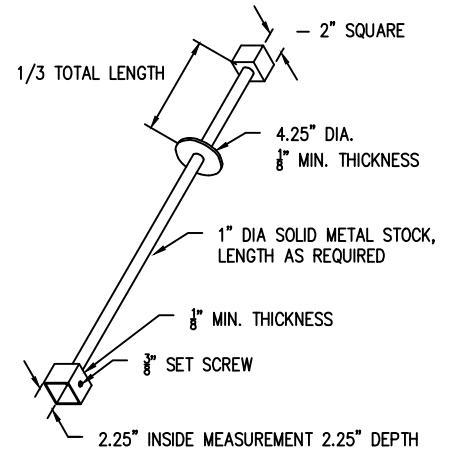
THE DOCBOX SHALL CONTAIN THE DISTRICT'S APPROVED PERMIT DOCUMENTS INCLUDING PLANS AND SUPPORTING DOCUMENTS, A 24-HOUR EMERGENCY CONTACT WITH MOBILE PHONE, NAME, TITLE AND EMAIL ADDRESS.



DRAWING NO.	
202	
DATE:	02/18/2020
SCALE:	NTS



ISOLATION VALVE DETAIL



OPERATING NUT EXTENSION

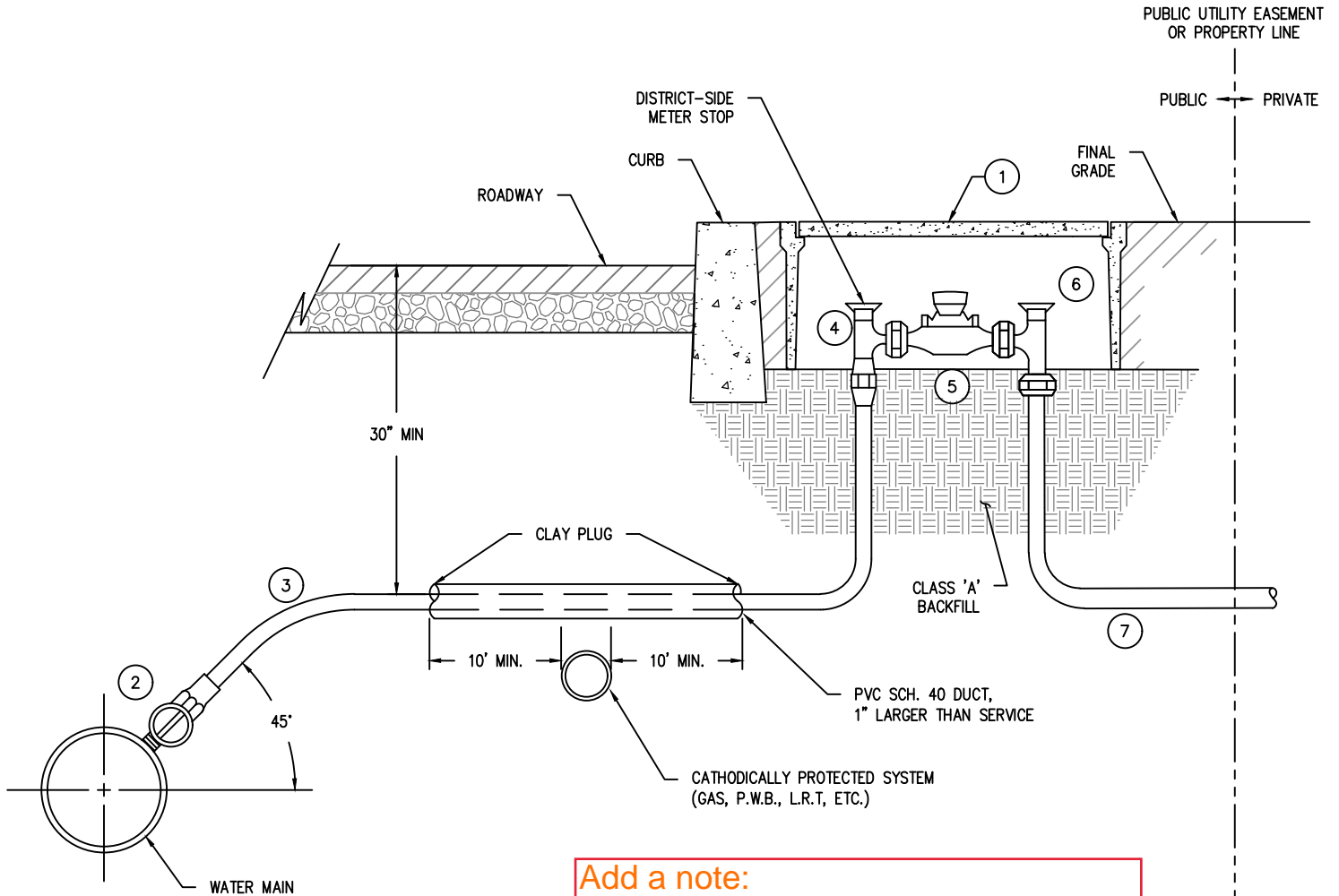
ISOLATION VALVE NOTES:

1. VALVES SHALL BE INSTALLED AT NO MORE THAN 500 FT SPACING WHEN 10" OR LARGER. VALVES SHALL BE INSTALLED AT NO MORE THAN 800 FT SPACING WHEN LESS THAN 10".
2. ISOLATION VALVES 2" AND LARGER ARE TO BE NRS RESILIENT SEAT GATE VALVES MEETING AWWA C509 OR C515. VALVES 14" AND LARGER SHALL BE BUTTERFLY VALVES MEETING AWWA C504.
3. BACKFILL AROUND VALVE BOXES SHALL BE COMPACTED USING A JUMPING JACK.
4. OLYMPIC FOUNDRY MODEL NUMBERS SHOWN. OWNER APPROVED EQUALS WILL BE ALLOWED.
5. ALL VALVES SHALL BE SUPPLIED WITH VALVE BOX AND LID. LID SHALL HAVE RECESSED HANDLE.
6. ALL VALVES THAT WILL BE PART OF A CUT-IN CONNECTION OR HOT TAP ON AN EXISTING MAIN SHALL BE PRE-PRESSURE TESTED ON BOTH SIDES OF THE SEAT PRIOR TO INSTALLATION.

OPERATING NUT EXTENSION NOTES:

1. EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS 5 FEET OR DEEPER BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF ONE (1) FOOT LONG, ONLY ONE EXTENSION PER VALVE. ALL EXTENSIONS ARE TO BE MADE OF STEEL SIZED AS NOTED, AND PAINTED WITH TWO COATS OF CARBON ELASTIC (ATCO NO. 2221) AS SPECIFIED BY PRESERVATIVE PAINT CO. OR APPROVED EQUAL.
2. FOR EXTENSIONS LONGER THAN 4 FEET AND/OR VALVES LARGER THAN 12" DIAMETER, BAR SHALL BE 1 1/4" DIAMETER.

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1	SPACING AND DEPTH REQ'D	02/18/2020	HSC	
2				
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**Add a note:**  
 Trench must be 3-foot wide x 6-foot deep minimum, with 1-foot clear behind the main and 1-foot clear under the main.

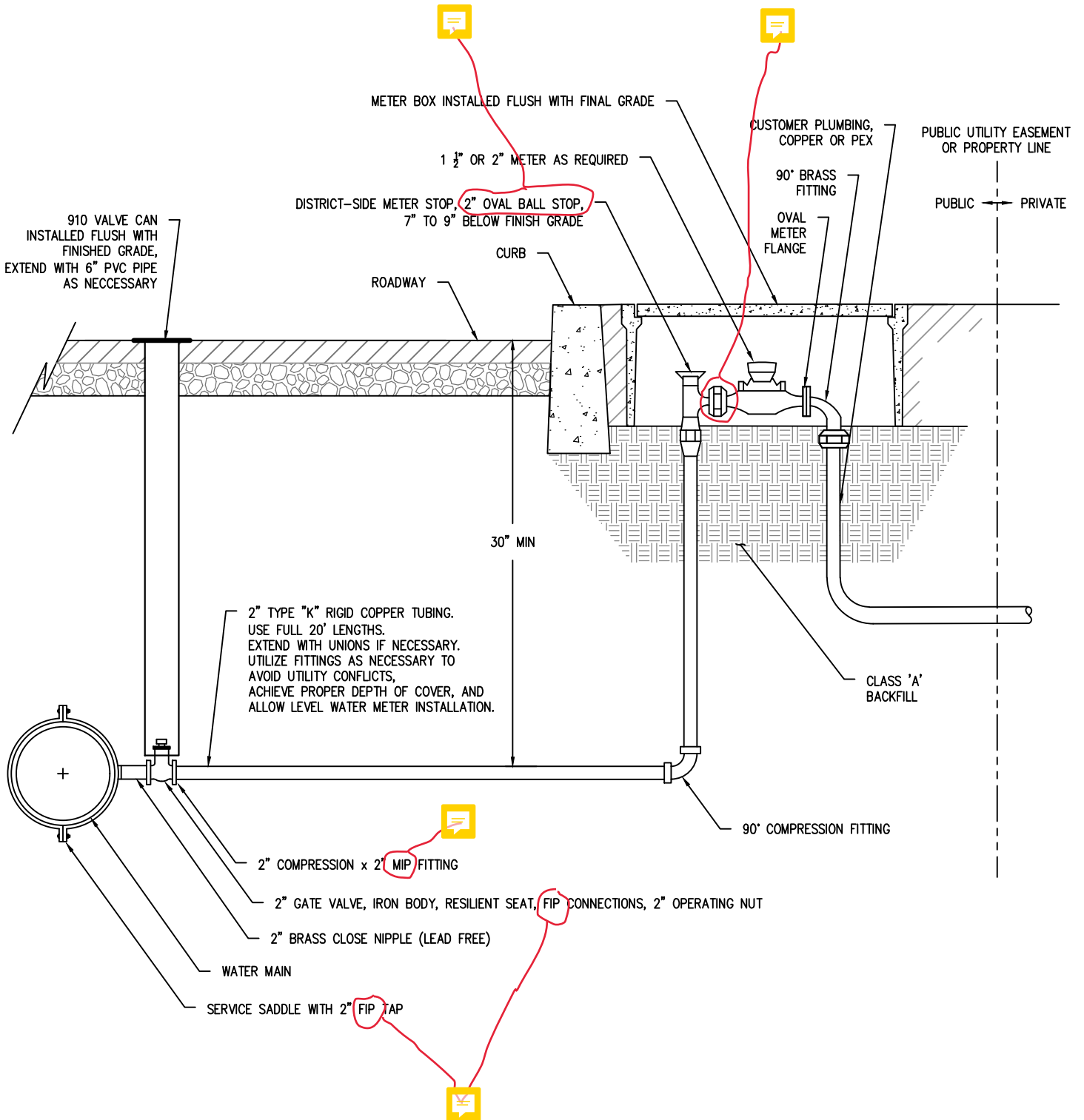
**NOTES:**

1. SUBSTITUTES FOR ANY MATERIALS SHOWN SHALL BE PRE-APPROVED BY THE DISTRICT.
2. ALL PIPE AND STRUCTURE ZONES SHALL BE BACKFILLED USING 3/4" MINUS CRUSHED AGGREGATE AND COMPACTED TO 95% MAX. DENS. AS DETERMINED BY AASHTO T-180. COPPER SERVICE SHALL BE BEDDED AND COVERED WITH BACKFILL 6" ALL AROUND SERVICE. IN ROADS, BACKFILL SHALL BE EXTENDED TO TOP OF EXCAVATION.
3. WHEN AN ACTIVE CATHODIC PROTECTED SYSTEM IS ENCOUNTERED, SCH. 40 PVC SHALL BE INSTALLED AS SHOWN ABOVE WITH CLAY PLUG.
4. THE COMPLETE WATER SERVICE MUST BE INSPECTED BY DISTRICT PRIOR TO BACKFILL OR BE RE-EXCAVATED WITHOUT COST TO THE DISTRICT.
5. FOR LOCATION OF DISTRICT-SIDE METER STOP RELATIVE TO PROPERTY LINE, EASEMENT LINE, CURB, OR SIDEWALK, SEE DRAWING 423.

**KEYNOTES:**

1. DISTRICT STANDARD METER BOX WITH TOP OF LID AT FINAL GRADE.
2. CORPORATION STOP VALVE. FULL-PORT BALL TYPE UNIT TAPPED DIRECTLY INTO WATER MAIN WITH MALE IRON PIPE THREADS. OPERATING NUT INSTALLED IN 3 O'CLOCK OR 9 O'CLOCK POSITION.
3. 3/4" OR 1" SOFT TEMPER, TYPE 'K' COPPER TUBING COMPLYING WITH ASTM B-88. ENTIRE SERVICE SHALL BE SINGLE PIECE OF NEW PIPE FROM CORP STOP TO DISTRICT-SIDE METER STOP. COPPER-TO-COPPER UNIONS ARE ONLY ACCEPTABLE WHEN WATER SERVICE IS LONGER THAN 60 FEET AND ONLY WITH PRIOR APPROVAL OF DISTRICT ENGINEER.
4. DISTRICT-SIDE METER STOP INSTALLED 7" TO 9" BELOW FINISH GRADE. FULL-PORT BALL TYPE ANGLED METER STOP WITH LOCKING WINGS.
5. WATER METER, TO BE SUPPLIED AND INSTALLED BY DISTRICT.
6. CUSTOMER-SIDE METER STOP SAME AS DISTRICT-SIDE, EXCEPT BOTH BALL-TYPE AND KEY-TYPE ARE ACCEPTABLE AND LOCKING WINGS ARE NOT REQUIRED.
7. CUSTOMER-SIDE PLUMBING WITHIN THE METER BOX SHALL BE PEX OR COPPER. PVC IS NOT ACCEPTABLE.

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1 1/2" AND 2" WATER SERVICE ASSEMBLY

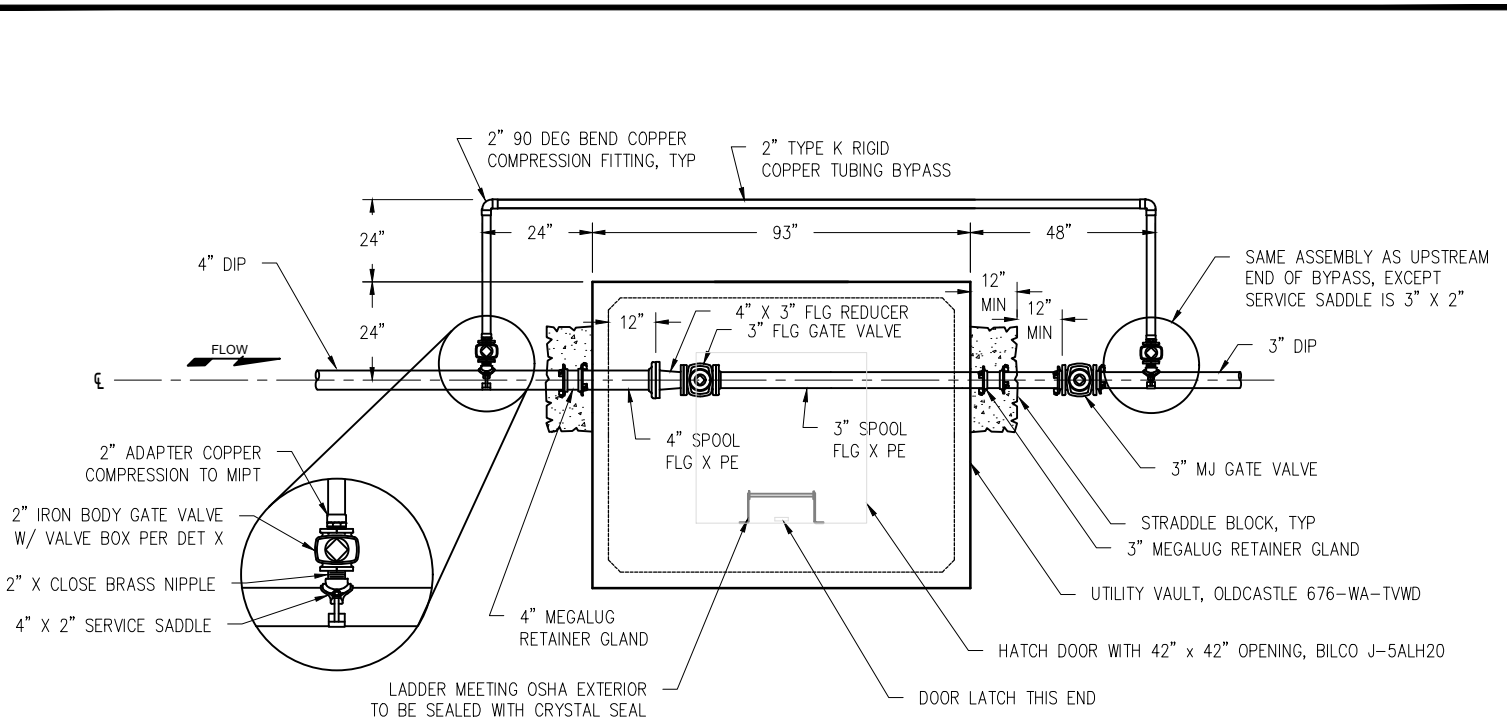
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DRAWING NO.

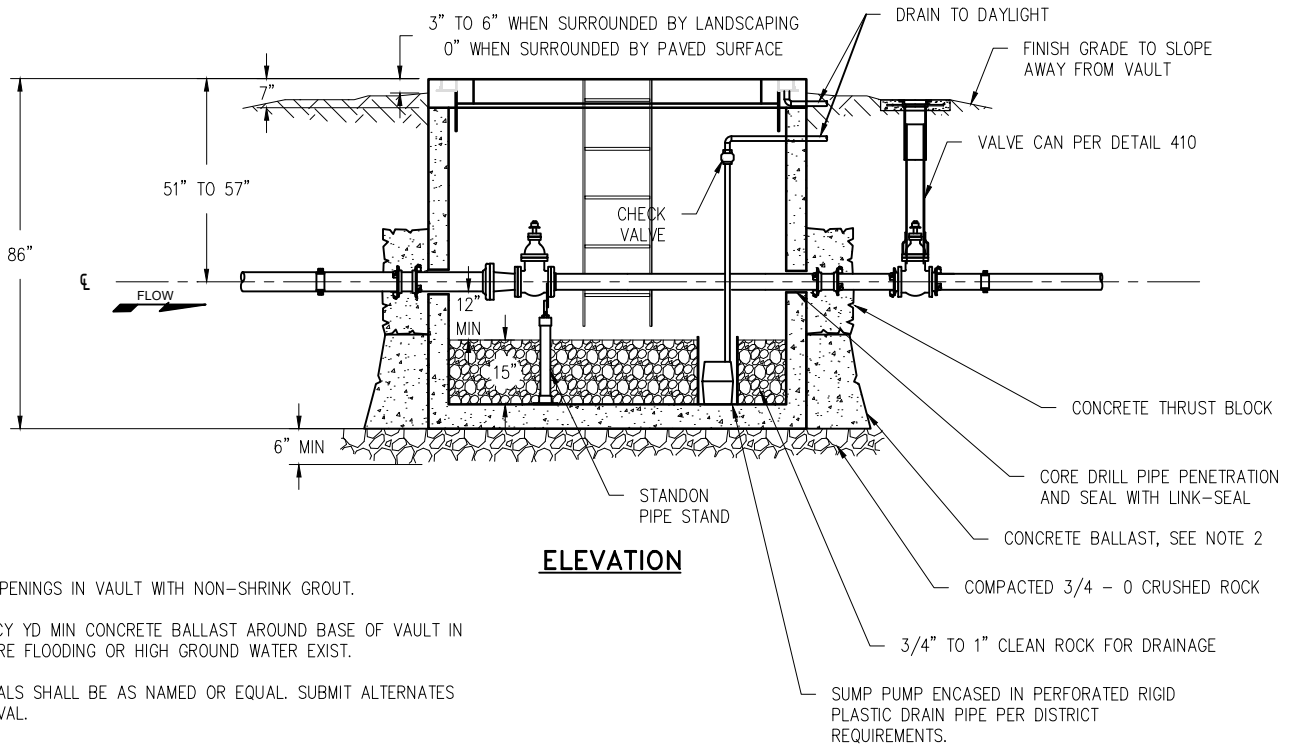
421

DATE: 02/18/2020

SCALE: NTS



**PLAN**



**ELEVATION**

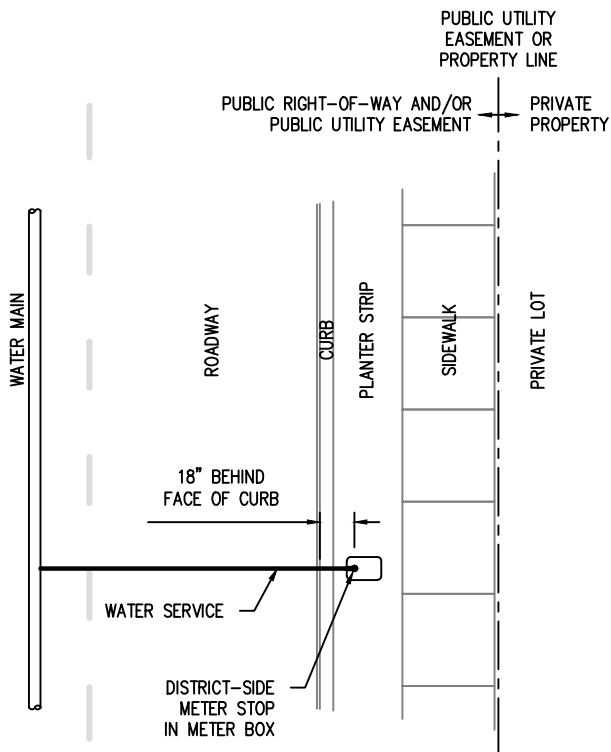
**NOTES:**

1. SEAL ALL OPENINGS IN VAULT WITH NON-SHRINK GROUT.
2. INSTALL 3 CY YD MIN CONCRETE BALLAST AROUND BASE OF VAULT IN AREAS WHERE FLOODING OR HIGH GROUND WATER EXIST.
3. ALL MATERIALS SHALL BE AS NAMED OR EQUAL. SUBMIT ALTERNATES FOR APPROVAL.
4. ORS 92.044(7) PROHIBITS LOCATING ANY UTILITY INFRASTRUCTURE WITHIN 12 INCHES OF A SURVEY MONUMENT. DEVELOPER SHALL PAY FOR ANY RELOCATION OF SERVICES AND/OR METER BOXES FOUND TO FALL WITHIN 12 INCHES OF A SURVEY MONUMENT LOCATION.

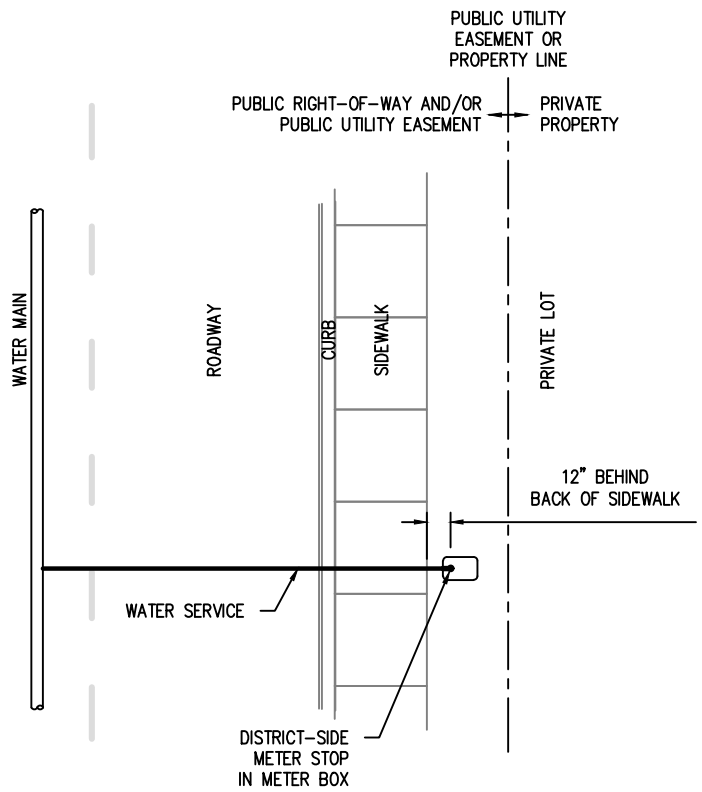
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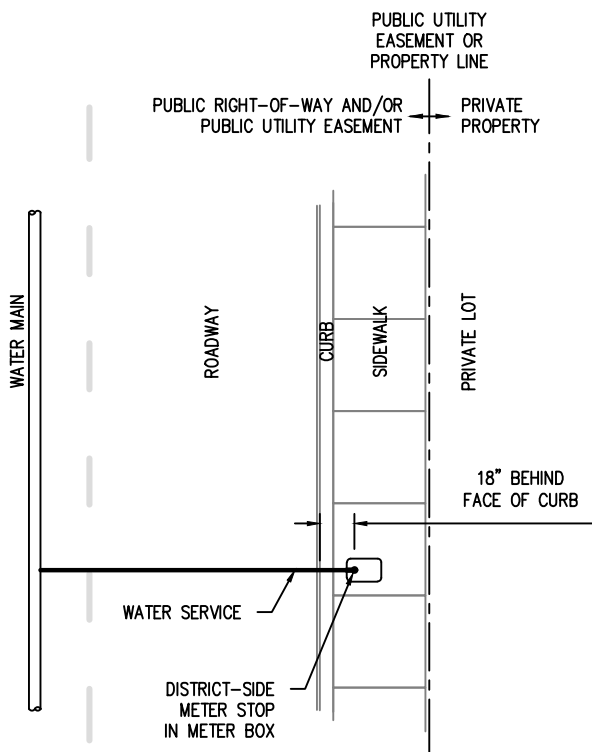
1st PREFERENCE – METER BOX LOCATED IN PLANTER STRIP



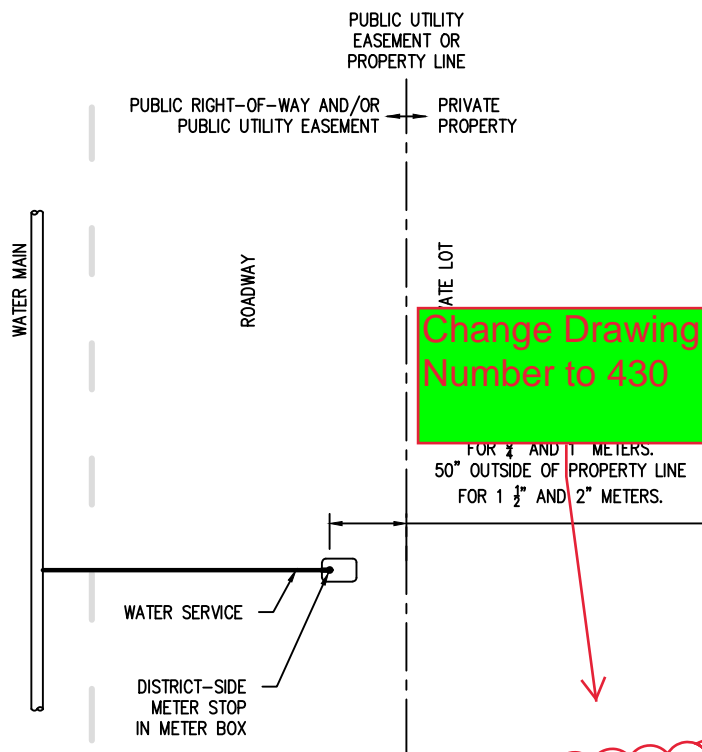
2nd PREFERENCE – METER BOX LOCATED BEHIND SIDEWALK



3rd PREFERENCE – METER BOX LOCATED IN SIDEWALK



4th PREFERENCE – NEITHER CURB NOR SIDEWALK PRESENT



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4				DISTRICT ENGINEER