Division 4

Sanitary Sewer

DIVISION 4
SANITARY SEWER

4.1 PURPOSE

a. In addition to the purposes outlined under Division 1 of these PWDS, the intent and purpose of these Standards is to ensure the development of a sanitary sewer system which will:

1) be of adequate design to carry the expected flow, within the design life, and at sufficient depth to serve all adjacent properties;

2) have sufficient grade to maintain a minimum velocity of two (2) feet per second when flowing full;

3) have sufficient structural strength to withstand all external loads which may be imposed;

4) be of materials resistant to both corrosion and erosion with a minimum design life of 75 years;

5) be economical and safe to build and maintain;

6) prevent infiltration and inflow of ground and surface waters.

7) meet all design requirements of the Oregon Department of Environmental Quality (DEQ).

Alternate materials and methods will be considered for approval on the basis of these objectives.

b. These Standards cannot provide for all situations. They are intended to assist but not to substitute for competent work by professional design engineers.

4.2 APPLICABILITY

a. These Standards shall govern all construction and upgrading of all public sanitary sewer and associated facilities in the City of Jefferson and applicable work within the City's service areas.

b. Permanent sanitary sewer facilities shall be provided to serve all properties within the City of Jefferson in accordance with these Standards. This shall generally be interpreted to mean that permanent sanitary sewer collection facilities shall be provided for existing legal lots of record at the time development occurs, and for new legal lots of record *(created by partitioning or subdivision of land)* at the time of partitioning or subdivision.

c. These design requirements may be used for private systems when plumbing code

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requirements cannot be met, provided the system is designed and appropriately certified by a professional civil engineer licensed in the State of Oregon, and provided design of private improvements to these public standards is not prohibited by the plumbing code or building official.

4.3 SPECIAL ITEMS

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

1) Sewerage Pump Stations *(public or private)*
2) Sewer Force Mains *(public or private)*
3) Siphons
4) Relining or Insitu Reconstruction of Existing Sewers
5) Internal Sealing of Existing Sewers
6) Wastewater Treatment Plants
7) Pretreatment Facilities
8) Energy Dissipators
9) Regulating Devices
10) Flow Measurement Devices
11) Mitigation of Hydrogen Sulfide and/or Hazardous Gases
12) Common Private Sanitary Sewers *(where approved by City)*

b. Review and approval of the above special items by the Public Works Director shall be required. When requested by the City, full design calculations shall be submitted for review prior to approval.

4.4 APPROVAL OF ALTERNATE MATERIALS AND METHODS

a. Any alternate material or method not explicitly approved herein will be considered for approval on the basis of the objectives set forth in Paragraph 4.1, Purpose. Persons seeking such approval shall make application in writing to the Public Works Director. Approval of any major deviation from these Standards shall be in written form. Approval of minor matters will be made in writing, if requested. Any and all such requests shall be submitted in writing to the Public Works Director prior to City approval of the design drawings.

b. Any alternate must meet or exceed the minimum requirements set forth in these PWDS *(also see "equal" & "substitute" definitions under PWDS 1.4)*.

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

d. Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the Public Works Director. When requested by the City, full design

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calculations shall be submitted for review with the request for approval.

4.5 CONSTRUCTION DRAWINGS

a. Construction drawings shall conform to the requirements of Division 1 of these PWDS.

b. Detail drawings shall be included on the construction drawings for all sanitary sewer appurtenances including but not limited to manholes, cleanouts, metering manholes, sewer service lateral connections, etc.

4.6 CITY STANDARD DETAILS

a. City standard details included in the appendix are supplemental to the text of these PWDS and show the City's minimum requirements for the construction of certain standard system components.

b. In the case of conflicts between the text of these PWDS and the City standard details, the more stringent as determined by the Public Works Director shall apply.

c. As required by Division 1 of these standards, all applicable City standard details shall be included on the construction drawings. Details shall be placed in numerical order on the detail sheets *(oriented from top left of each sheet to bottom right)*, for ease of reference during construction.

4.7 DEFINITIONS AND TERMS

a. In addition to the definitions contained in Division 1 of these Standards, the following definitions may apply particularly to sanitary sewer systems. Unless otherwise defined in these PWDS, the following definitions and abbreviations shall apply whenever used. Other definitions as outlined in the Oregon Plumbing Specialty Code (OPSC) shall also apply.

1) Abbreviations: Acceptable abbreviations for showing types of new and existing pipe materials on the plans are as follows:

   a) AC - Asbestos Cement
   b) CI - Cast Iron
   c) CP - Non-reinforced Concrete Pipe
   d) DI - Ductile Iron
   e) HDPE - High Density Polyethylene
   f) PVC - Polyvinyl Chloride
   g) RCP - Reinforced Concrete Pipe

2) Building Drain: The building drain is that part of the lowest piping of the drainage system which receives the discharge from waste and other drainage pipes inside the walls of the building and conveys it to the building sewer, which begins five feet outside the building wall *(building foundation)*.

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3) Building Sewer: That part of the horizontal piping of the drainage system which extends from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sanitary sewer system, private sanitary sewer system, individual sewage disposal system, or other approved point of disposal.

4) Collection Sewer: Mainline sanitary sewers.

5) Collection System: Facilities maintained by the City for the collecting, conveying, pumping and controlling of wastewater.

6) Contact Cooling Water: Water which is used as a medium for carrying away excess heat from apparatus, appliance, mechanism or device in which, in the course of cooling process, comes in direct contact with the product, is mixed or co-mingled with any other substance or used as a means of carrying off any other substance, in suspension or in solution. Contact cooling water is considered to be a process wastewater and may require pretreatment prior to discharge into the City's sewer system.

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

8) Drainage Waste: Stormwater, groundwater, surface drainage, subsurface drainage, spring water, well overflow, roof drainage, or other like drainage other than sewage or industrial waste.

9) Fixture Unit Equivalents: The unit equivalent of plumbing fixtures as tabulated of the Oregon Plumbing Specialty Code (OPSC).

10) Flow: The wastewater flow from an industry, institution or house connection *(daily average)*.

11) Industrial Waste: A water borne waste and wastewater from an industrial user.

12) Mainline Sewer: Any public sanitary sewer which receives flow from one or more upstream sewer mainlines or sewer service laterals.

13) Noncontact Cooling Water: Water other than sewage or industrial waste which is used as a medium for carrying away excess heat from apparatus, appliance, mechanism or devise in which, in the course of cooling process, is not mixed or co-mingled with any other substance or used as a means of carrying off any other substance, in suspension or in solution, thereby exiting such cooling process in substantially the same condition, save for temperature, as when it entered.

14) Plumbing System: All plumbing fixtures and traps, or soil, waste, special

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waste and vent pipes within a building and to a point five feet outside the building foundation thereof.

15) Private Sanitary Sewer Collection System: A privately owned and maintained sanitary sewer system installed to serve multi-unit structures or multiple structures on single ownership properties, which cannot legally be further divided, such as apartments, mobile home parks and schools or installed in multiple structure commercial or industrial developments.

16) Property Line Cleanout: A cleanout *(to City standards)* is installed on a sanitary sewer service lateral and which is located at or near the point where the sewer service lateral leaves the public right-of-way (*at or near the point where it leaves the public sewer easement for sewer mainlines not constructed in public right-of-ways*). This general term applies even if said cleanouts are not installed directly on the property line or easement boundary. Other cleanouts between the Property Line Cleanout and the building (*whether or not installed on other property lines crossed*) are private cleanouts which must conform with the Oregon Plumbing Specialty Code (OPSC) standards.

17) Public Sewer: Any sanitary sewer in the public right-of-way or easement operated and maintained by the City.

18) Sewer Service Lateral: That portion of the building sewer from the right-of-way line *(or easement boundary)* to a public sanitary sewer, private sanitary sewer, individual sanitary sewage disposal system, or other point of disposal.

A sewer service lateral shall not be allowed to serve more than one legal lot of record *(per City standards and per Oregon DEQ standards)*. This includes cases where multiple legal lots of record are under common ownership and/or are listed as a single tax lot *(an exception may be granted for cases where a single building was allowed to be constructed across multiple legal lots of record.)*.

Sewer service lateral maintenance responsibility. The entire portion of the sanitary sewer lateral and building sewer from the building to the public mainline shall be the sole responsibility of the property owner for maintenance and/or repair, whether or not a property line cleanout exists. The required property line cleanout for new services or rehabilitated existing services is required to allow the sewer service lateral to be located, as well as to facilitate cleaning and maintenance of the portion of the sewer service lateral under City streets, and decrease the likelihood of having to cut or excavate City streets.

19) Sewage: The wastewater derived from human habitation and use of buildings for residential, institutional or commercial purposes, excluding storm waters and industrial waste.

20) Structures: Those structures designated on the plans as manholes, siphons,

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junctions or diversion facilities, etc. Detailed drawings of structures or devices commonly used in City work and mentioned in these Standards are included in the standard construction specifications.

21) Trunk Sewer: A public sanitary sewer ten inches or larger which has been or is being constructed to receive the flow of more than one mainline sewer.

4.8 MATERIALS

a. General

1) Unless otherwise approved by the City Engineer, materials shall conform to the minimum requirements outlined herein and as shown on the City standard details.

2) In the case of conflicts between the provisions of these PWDS and the PWCS, the more stringent as determined by the Public Works Director shall apply. Acceptable materials shall be as outlined in these PWDS.

3) It is not intended that materials listed herein are to be considered acceptable for all applications. The design engineer shall determine the materials suitable for the project to the satisfaction of the City Engineer.

4) Material/Equipment Submittals from Contractor Required. Per Section G-1300, construction submittals shall be provided by the Contractor for review by the City, for all material & equipment which will incorporated into work covered under the PWDS.

5) Granular backfill shall be ¾"-0 conforming to OSSC (ODOT/APWA) 02630.10 (Dense Graded Base Aggregate), with no more than 10% passing the #40 sieve and no more than 5% passing the #200 sieve.

b. Non-Pressure PVC Sewer Pipe

1) Pipe and fittings fifteen (15)-inches in diameter or less shall conform to ASTM D-3034, SDR 35.

2) Pipe and fittings eighteen (18) through twenty-seven (27)-inches in diameter shall conform to ASTM F-679.

3) Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM classification.

4) The joints shall conform to ASTM D-3212, Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

5) Shallow PVC pipe *(see cover depths under PWDS 4.13)* shall be C900 PVC as specified under Pressure PVC Pipe below.

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c. **Pressure PVC Sewer Pipe**

1) Where approved by the Public Works Director, PVC pressure pipe shall conform to the requirements of AWWA C-900 *(design stress of 4000 psi)*, NSF approved, with cast iron pipe equivalent (CI) outside diameter dimensions. Pipe shall be PVC pipe with wall thickness equivalent to a standard dimension ratio (SDR) of 18.

2) Restrained joint PVC pipe shall be used in locations and configurations as required by the City Engineer *(Diamond Lok-21, Eagle Loc 900, TerraBrute CR, CertaLok C900 or approved equal, as approved by the City Engineer and Public Works Director for the specific application)*.

d. **Ductile Iron Pipe**

1) Ductile iron pipe shall be centrifugally cast in conformance to AWWA C-151.

2) Ductile iron sewer pipe shall be minimum Class 50 thickness for non-pressure applications, Class 52 for pressure applications.

3) All ductile iron pipe and fittings shall be cement-mortar lined and seal coated in accordance with AWWA C-104.

4) All ductile iron pipe and fittings buried underground shall be coated on the outside with a standard coating of black bituminous paint a minimum of 1 mil thick unless otherwise specified.

e. **Joints**

1) Joints for pipe shall be push-on joints using factory installed elastomeric ring gaskets. The gaskets shall be securely fixed into place by the manufacturer so that they cannot be dislodged during joint assembly.

2) The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.

f. **Sewer Pipe Fittings & Couplings**

1) Fittings shall be of the same material as the pipe, molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations as required.

2) Couplings for gravity PVC Pipe (D3034 or F679) to other PVC pipe.

a) Couplings shall be gasketed solid sleeve slip PVC couplings *(gasketed no stop coupling designed to be slid fully onto the pipe on one side of the connection, and then slid back over and centered on the joint)*.

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b) Flexible couplings shall not be used to connect pipe joints on new pipe systems, or to connect same diameter PVC pipe.

3) Flexible, Mechanical Couplings and Adapters *(gravity applications)*

a) Flexible, mechanical couplers and adapters shall be used for connecting plain ends of non-compatible types or sizes of pipe and for the installation of cut-in tee connections and other fittings into existing lines.

b) Couplers and adapters shall be supplied with stainless steel bands.

c) Flexible mechanical couplers and adapters shall be as manufactured by MaxAdaptor Coupling *(by Gripper Gasket LLC)* or approved equal, consisting of an EPDM rubber gasket, high impact polyamide (nylon) securing cage & stainless steel securing clamp assembly & hardware *(standard non-reinforced Fernco style rubber couplings are not allowed on mainline pipe joints or connections, or on sewer service laterals between the mainline and the back of the street frontage PUE).*

4) Pressure Pipe Couplings

a) Pressure couplings shall be limited in their application to connection of new pipe work to existing pressure sewer pipelines, temporary installations, and where specifically approved by the City Engineer.

b) Mechanical joint couplings shall have minimum pressure ratings that will accommodate maximum pressures which will be experienced during hydrostatic and leakage testing.

c) Couplings on pressure sewer force mains shall meet the requirements as for water mainline pipe, except as otherwise required or approved by the City Engineer on a case-by-case basis.

g. **Manholes**

1) General

a) Precast concrete pipe manhole sections, transition sections, eccentric cones, flat slab tops, and adjusting rings shall conform to the requirements of ASTM C-478 except as modified herein. Reinforcing in transition sections shall be equal to the requirements of that specified for wall sections of the larger diameter.

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b) Unless otherwise approved in writing on a case-by-case basis, the wall thickness of barrel riser sections shall conform with minimums under ASTM C-478 as follows.

(1) 5" wall for 48" diameter MH
(2) 6" wall for 60" diameter MH
(3) 7" wall for 72" diameter MH
(4) 8" wall for 84" diameter MH
(5) 9" wall for 96" diameter MH
(6) 11" wall for 120" diameter MH
(7) 12" wall for 144" diameter MH

c) Unless otherwise approved, all joints between manhole sections shall be keylock or O-ring type conforming to ASTM C-443.

d) Precast base sections shall be of monolithic construction and shall be manufactured such that the base riser section is integral with the base slab for 72" diameter and smaller.

e) Unless otherwise approved in writing on a case-by-case basis, the base slab thickness shall conform with minimums under ASTM C-478 as follows.

(1) 6" base for 48" diameter MH
(2) 8" base for 60" & 72" diameter MH
(3) 12" base for 84" through 144" diameter MH

f) Sanitary sewer manhole bases shall be provided with core-drilled openings and flexible manhole-to-pipe connectors for the connection of pipes & stubouts.

2) Core-Hole Separation from Manhole Barrel Joints.

a) The standard minimum separation between the edge of a core-hole and the nearest manhole barrel joint is 6 inches for manholes 48 to 72 inch in diameter, in order to maintain structural integrity and to prevent cracking or weakening of the manhole wall near the joint *(smaller separation requires written certification be provided during design by a manhole manufacturer based on the specific proposed design for the manhole)*.

For manholes greater than 72 inch diameter, the minimum separation shall increase to 8 inches.

3) Manhole Steps

a) Sanitary sewer manholes shall be equipped with permanent factory installed steps to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall not be required for manholes 4 feet or less in depth *(rim to invert)*.

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b) Manhole steps shall be of polypropylene plastic reinforced with a 1/2inch grade 60 reinforcing rod, with reflectors on the top outside edges.

c) There shall be no more than 30 inches from the manhole rim and the rung of the top step.

4) Manhole Grade Rings

a) The height of grade rings from the top of the cone or the top of the flattop section shall not exceed eighteen (18) inches in height.

5) Manhole Frame and Cover Assemblies

a) Castings shall be cast iron conforming to the requirements of ASTM A-48, Class 30, and shall match the dimensional requirements of the City standard details.

b) Standard frames and covers shall be used for all paved areas. Sanitary sewer manhole lids shall have 2 holes *(as opposed to storm manhole lids, which have 16 holes)*.

c) Where pressure tight manhole covers are called for, lid seals shall be a continuous round rubber gasket supplied by the manufacturer. Threaded inserts shall be cast in eccentric cones or flat slab tops and holes formed or cored in adjusting rings to match bolt size and spacing specified for the manhole casting.

6) Manhole Inflow Protector Lid Inserts

a) All sanitary sewer manholes *(or existing sewer manholes connected to)* in low areas which are subject to flooding or water ponding *(including all lawn, landscape or gravel areas, or low areas of parking lots, or manholes closer than 4 feet clear of parking lot curblines or existing/future street curbs, adjacent to ditches, etc.)* shall be provided with inflow protector lid inserts.

b) Manhole lid inserts shall be made of ABS or HDPE plastic, and shall include integral lifting lugs on each side of the insert allowing removal with a manhole hook *(lift straps are not an acceptable alternate to the integral lifting lugs)*.

The insert body shall be manufactured to match the dimensions and style of each specific manhole frame & cover.

Each insert shall be provided with a factory installed closed cell neoprene gasket bonded to the underside of the insert rim, designed for wet or dry conditions.

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Manhole lid inserts shall be ManPan Classic manhole inserts, or approved equal *(proposed alternatives must match all features to be considered an equal)*.

c) Where required by the Public Works Director for specific manholes, manhole inserts shall be provided with an integral clog free vent rubber check valve by Tideflex.

7) External Mastic Wrap on Manhole Joints & Pickholes.

a) External mastic wrap joint seal *(9-inch minimum width)* shall be installed on all manhole barrel joints and pickholes after assembly, prior to backfilling *(Bidco External Joint Wrap BW-9T by Trelleborg, or equal)*.

b) External mastic wrap joint seal *(9-inch minimum square)* shall be installed over all pickholes after grouting and prior to backfilling *(Bidco External Joint Wrap BW-9T by Trelleborg, or equal)*.

c) Clean MH Exterior Prior to Mastic Wrap Installation. The exterior of the manhole barrels adjacent to each joint shall be clean (*under the mastic wrap*) to ensure a good seal. A wire brush shall be used to clean the exterior surface under the mastic wrap as required to remove all dirt, loose particles or deleterious material.

d) Plastic Pallet Wrap for Use Over Joint Wrap Mastic. The mastic wrap over manhole joints shall be held in place with plastic stretch wrap *(ie. pallet wrap plastic)* to hold the mastic wrap in place during backfilling *(ie. to protect the external mastic wrap from displacement during backfill installation &/or compaction)*. Plastic wrap shall be installed immediately after the mastic wrap is placed *(a minimum of three layers of plastic wrap shall be used over each joint or pickhole covered)*.

h. **Mainline Cleanouts**

1) Mainline cleanouts shall consist of a lid and frame of heavy duty cast iron construction with closed lid design. A 3,300 psi concrete collar is required for cleanouts located outside of paved areas.

2) A 3,300 psi concrete collar is required for cleanouts located outside of paved areas.

3) The shaft or chimney of the cleanout shall be a minimum of 8-inches in diameter, except for 6-inch lines, which shall have a chimney diameter of 6-inches.

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i. **Underground Warning Tape**

1) Warning tape shall conform with the requirements noted on the City standard details and standard construction notes *(6-inch width, green color & "Caution: Buried Sewer Line Below" or approved equal printed continuously down the length of the tape).*

2) Underground warning tape shall be detectable or non-detectable acid and alkali resistant safety warning tape. The tape shall consist of a minimum 4.0 mil (0.004") thick, virgin low density polyethylene plastic film formulated for extended use underground. The tape shall be in accordance with the APWA national color code and shall be permanently imprinted in lead free black pigments suitable for direct burial.

j. **Toning / Tracer Wire**

1) A continuous insulated 12 gauge solid core copper toning wire shall be supplied with non-metallic pipe. Insulation shall be green in color for sewer piping.

All tracer wire splices shall be made with corrosion resistant waterproof wire nuts *(DBR direct bury splice kit by 3M Company, or equal).*

2) Wire shall penetrate into manholes within 18 inches of the rim elevation.

k. **Bore Casings and Accessories**

1) Carrier pipe installed inside steel bore casings shall be Ductile Iron or PVC as specified herein.

2) Bore casing and carrier pipe design and installation shall conform to the requirements outlined under Division 5, Water Distribution.

3) Installation of public sanitary sewer pipe inside of a casing pipe *(mainline pipe or laterals within a public right-of-way)* requires specific approval by the Public Works Director on a case-by-case basis.

4.9 GENERAL DESIGN CONSIDERATIONS (Sanitary Sewer)

a. **General Requirements**

1) Sanitary sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow.

2) Sewers shall be designed to convey the peak instantaneous wet weather flows anticipated over the design period without surcharging, including compliance with the latest sewer master plan.

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3) Gravity Flow: Where possible, all sanitary sewers shall be designed to flow by gravity to an existing or new sewer without sewage lift stations. The property owner or developer is responsible for constructing offsite improvements and/or obtaining any easements required to accomplish this.

4) Self-Cleaning. All gravity sewer system components shall be designed to be self-cleaning to the extent possible.

5) Public sewers within easements will be permitted only upon a showing that services cannot be provided from a line within a right-of-way. Minimum easement widths shall be as outlined herein, but in no cases shall easements narrower than 15 feet be considered.

6) Prohibited Discharges to Sewer System:

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

b) Unpolluted *(noncontact)* cooling waters shall not be discharged into sanitary sewers.

c) State and Federal laws and regulations and the sewer use ordinance restrict the disposal of certain chemicals and/or constituents into the sewer system and/or a Publicly Owned Treatment Works (POTW).

d) Only water or waste that will have no harmful effects on the sewage collection system or treatment system, and that will not endanger persons exposed to the wastes will be considered for discharge into the sewerage system. Prohibited discharges are not listed in their entirety herein *(see sewer use ordinance and/or DEQ regulations for more complete list)*, but generally include rainwater, stormwater or groundwater of any type, waters or wastes with a pH lower than 5.5 or higher than 9.5, radioactive isotopes, high concentrations of suspended solids or BOD, fats/oils/greases, septic tank or sewer holding tank effluent, other potentially corrosive or explosive liquid, etc.

b. **Providing for Future Development (Sewer)**

1) To & Through. As a condition of sewer service, all developments will be required to provide *(ie. designed & constructed by developer)* public sewers to serve adjacent upstream parcels in order to provide for the orderly development of the drainage area, as well as connection *(to the new system)* of existing sewer lines or sewer service laterals crossed or intercepted by the new sewer lines, at locations as required by the City Engineer and Public Works Director *(see also PWDS 1.6.e)*.

2) This shall include the extension of sewer mains in easements across the property to adjoining properties and across the street frontage of the property

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to adjoining properties when the main is located in the street right-of-way.

This shall also include extension to the far side of streets fronting or adjacent to the development as required to avoid work within or under these streets in the future.

3) This shall include trunk sewers which are oversized to provide capacity for upstream development, or as required to meet the minimum sizes shown in the applicable sewer master plan *(see also PWDS 1.6.h)*.

c. **Sewer Design Factors**

1) The following factors as a minimum shall be addressed in the design of sanitary sewers and determination of design flows.

a) Drainage basin to be served.
b) Topography of the area
c) Depth of excavation
d) Service lateral elevations
e) Soils conditions
f) Land use within the area to be served.
g) Projected population within the area to be served at build-out.
h) Per capita sewage flow.
i) Flows from commercial, industrial or institutional users.
j) Infiltration and Inflow
   (1) Infiltration allowance for new facilities.
   (2) Infiltration and inflow from existing facilities.
k) Maximum hourly and peak instantaneous flows
l) Condition and size of existing sewers
m) Location of WWTP
n) Pumping requirements *(including planned future elimination of pump stations as may be applicable)*
o) Maintenance, including accessibility for cleaning and inspection personnel and equipment.

d. **Work On or Connection To Existing Sanitary Sewer Mainlines**.

1) As a condition of connecting to and/or extending sanitary sewer mainlines, the design shall comply with all requirements under PWDS 4.17.

4.10 SEWER DESIGN PERIOD

a. Mainline Sewers

1) Mainline sewers shall be designed for the ultimate development of the tributary area. Consideration shall be given to the maximum anticipated capacity of institutions, industrial parks, commercial establishments, etc.

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b. Trunk Sewers

1) Selection of the design period for trunk sewers shall be based on evaluation of functional and other considerations. Some of the factors that should be addressed in the design of trunk sewers are:

a) Solids deposition, odor, and pipe corrosion at initial flows.

b) Effect of sewer sizing on land use and development.

c) Population and economic growth projections and the anticipated accuracy of these projections, coupled with the comparative costs of staged construction and the anticipated manner in which the future improvements will be funded.

4.11 SEWER DESIGN BASIS & CAPACITY

a. Design Basis

1) Generally, sewers shall be designed to carry the peak domestic, commercial and industrial contributions, plus infiltration/inflow from the individual gravity sewer service laterals, sewer mains and manholes. Where more detailed information is not available, new sewer systems within the City may be designed on the basis of the following flows.

a) Residential domestic flows: 100 gal/capita/day (gpcd)

b) Schools, non-residential students & staff: 25 gpcd

c) Commercial, non-residential customers
(1) Restaurant/Cafe: 40 gal/day/seat
(2) Tavern/Bar: 50 gal/day/seat

d) Laundries, self-service: 500 gal/day/machine

e) Infiltration/Inflow
(1) New facilities: 1,600 gal/acre/day
(2) Existing facilities: As measured.

2) Assumed flows from types of establishments not listed above shall be as approved by the City Engineer *(including documentation regarding the total number of Drainage Fixture Units [DFU] discharging to the City sewer. Conversion from DFUs to gpm base sanitary flows shall not be less than specified under OPSC 702.3, with peaking factors as specified by the City Engineer based on the specific type of development proposed and discharge location).*

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b. **Sewer Capacity**: Generally, sewers should be designed to carry, when flowing full but not surcharged, not less than the following plus existing or planned flows from upstream properties:

1) Mainline Sewers:

a) For new installations serving new areas, minimum peak design flow shall not be less than 4 times the design base sanitary flow plus I/I allowance.

b) For new installations serving existing sewered areas, minimum peak design flow shall not be less than 4 times the design base sanitary flow plus an additional I/I allowance based on existing conditions.

2) Trunk Sewers:

a) For new installations serving new areas, minimum peak design flow shall not be less than 3 times the design base sanitary flow plus I/I allowance.

b) For new installations serving existing sewered areas, minimum peak design flow shall not be less than 4 times the design base sanitary flow plus an additional I/I allowance based on existing conditions.

3) Roughness Coefficient:

a) A minimum "n" value of 0.013 shall be used in Manning's formula for the design of all sewer facilities regardless of pipe material. The use of higher "n" values for existing pipe may be required by the City Engineer.

b) In theory, new PVC sewers have manufacturer's "n" value of 0.009. However, sand and grit as well as slime build up on the pipe walls over time tend to render a true "n" value of 0.013. Hence, an "n" value of less than 0.013 will not be considered for approval.

4) It is recommended that design calculations include estimates of average, maximum and minimum daily flows. The submission of design calculations will not ordinarily be required, but engineers should be prepared to substantiate pipe sizes, layout, population estimates, land uses or other design assumptions as may be requested.

4.12 SEWER MINIMUM SIZE

a. Public mainline sewers shall not be less than eight (8) inches in diameter, or as required to meet the minimum sizes shown in the applicable sewer master plan *(see also PWDS 1.6.h),* unless approved in writing by DEQ and the City Engineer.

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4.13 SEWER MINIMUM DEPTH

a. 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.

b. Under normal conditions *(where it can be demonstrated that the required 18" vertical clearance can be maintained between sewer service laterals and water mainlines)*, sanitary sewers in residential areas shall be placed in the street with the following minimum cover *(ie. cover over the pipe)*:

1) Mainline Sewers - Seven (7) Feet

2) Trunk Sewers:

a) In the roadway - Seven (7) feet

b) In easements - Eight (8) feet

3) Where the topography is relatively flat and existing sewers are shallow *(five feet or less)* and cannot practically be lowered, the minimum cover may be reduced to four (4) feet. Cover depths less than four (4) feet will require the approval of the City Engineer and Public Works Director, and will require the installation of C900 PVC pipe, DR 18 for cover depths of 2 feet or greater, or Class 50 ductile iron pipe with corrosion resistant lining *(Protecto 401 Ceramic Epoxy lining or equal)* otherwise.

c. Mainline sewers shall be placed in the street at a depth sufficient to drain building sewers on the low side of the street, including for new residential subdivisions.

d. Deviation from these sewer depth standards will be considered on a case-by-case basis when the circumstances listed below exist and the required documentation is submitted.

1) Underlying rock strata: A request in writing must be submitted to the Public Works Director together with a soils report including a plan and profile showing & certifying that shallow bedrock exists below the undisturbed ground surface along all feasible alignment options.

4.14 SEWER MINIMUM SLOPE & ROUGHNESS COEFFICIENT

a. All sanitary sewers shall be laid on a slope which will produce a mean velocity when flowing full of at least two (2) feet per second based on Manning's formula using minimum roughness coefficient of 0.013 or the pipe manufacturer's recommendations, whichever is greater.

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b. The minimum acceptable slopes for various pipe sizes are listed below:

MINIMUM MAINLINE PIPE SLOPES	
Inside Pipe Diameter (inches)	% Slope (feet per 100 feet)
(private sewers only) 6	0.60
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24 & larger	Case-by-Case

c. In general, gradients greater than those shown above are desirable and are particularly recommended on the upper ends of mainline sewers.

d. Sewers shall be laid with uniform slope and alignment between manholes.

e. Oversizing Soley to Reduce Sanitary Sewer Slope Not Allowed. Engineers are cautioned not to specify sewers of sizes which are obviously larger than necessary for satisfactory carrying capacity but which are specified in order to meet grade requirements *(ie. a 10-inch pipe for an 8-inch pipe to acquire a decrease in slope)*.

1) In cases where using a larger pipe is the only option available to serve a development *(as demonstrated by the design engineer to the satisfaction of the Public Works Director and the City Engineer)*, the larger pipe size so installed shall not be considered as a justification for the developer to be eligible for oversizing or SDC reimbursement.

f. Grades *(slopes)* shall be determined to the pipe invert at the edge of the manhole and lengths to the center of the manhole.

g. The difference between the inlet pipe slope (Si) and outlet pipe slope (So) at any manhole shall not exceed 25 percent.

h. Sewers on slopes of 20 percent or more shall be anchored with concrete anchor walls or other restraining methods approved or specified by the City.

i. Where velocities greater than fifteen (15) feet per second are attained, the pipe

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material shall be ductile iron and special provision shall be made to protect manholes against erosion and displacement by shock. This may be accomplished by installing one additional manhole to decrease the slope or to split a 90° horizontal direction change into two 45° incremental changes.

4.15 SANITARY SEWER ALIGNMENT AND LOCATION

a. General

1) Sewer mainlines shall be laid on a straight alignment and uniform slope between consecutive manholes.

2) Horizontal and vertical curves or bends in sanitary sewer mainlines are not permitted.

3) Retaining walls shall be offset a minimum of 10 feet from any parallel public sanitary sewer mainline.

b. Sanitary Sewer Location in Relation to Water Lines and Other Utilities

1) Horizontal Separation. Sanitary sewer pipelines *(including sanitary sewer laterals within the ROW or City easements)* shall be separated from all other public, private or franchise utilities by a minimum of 5 feet clear for normal depth pipelines. Greater separation may be required for deeper pipelines as directed by the Public Works Director.

   See PWDS 1.5.c for reference to reduced separation outside of public ROW or City easements.

2) General Vertical Separation. See PWDS 1.5.c for general vertical separation requirements at crossing. See below for separation requirement from waterlines.

3) Water/Sewer Horizontal Separation. Sanitary sewer pipelines *(including sewer service lines)* shall generally be separated from water mainlines and water service lines by a minimum of 10 feet unless otherwise approved in writing by the Public Works Director and the City Engineer. In no case shall the separation be less than 5 feet or as required by OAR 333 based on vertical separation.

4) Water Main & Water Service Crossings

   a) Where new sanitary sewer lines cross above or within 18-inches vertical separation below a waterline, such sewer mains and/or sewer service laterals shall have one full length of approved PVC *(or approved equal)* sewer pipe centered at the point of crossing per OAR 333-061-0050(9).

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c. **Sewer Location in Street Right-of-Ways**

1) Unless otherwise approved or required by the Public Works Director, sanitary sewers shall generally be located in the street right-of-way five (5) feet from the street centerline on the low side of the street *(sewer mainlines shall typically be installed on the uphill / high side of centerline in areas where the area below the sewer alignment consists of steep slopes or other areas with stability concerns, as determined by the City Engineer or Public Works Director).*

Public sewer mainlines shall be offset a minimum of 6 feet from any adjacent property line or right-of-way line.

a) Unless otherwise approved by the Public Works Director, horizontal alignment of new sewer mainlines shall be parallel with the centerline of the right-of-way.

b) In general, manholes or cleanouts shall be located outside of gutter areas or other locations where surface water inflow is likely to occur during storm events.

2) Where sewer alignments cross the street centerline, the design shall demonstrate that the requirements of ORS 92.044(7) are satisfied with relation to street centerline monuments *(ie. utility infrastructure is not to be placed within 1 foot of a survey monument location shown on a plat).*

3) If streets have curved alignments, the minimum distance between manholes or sewer lines and the curb face shall be as listed below. For streets improved to less than full width, the location shall be measured from the future curb location. The intent is to prevent a conflict with new storm drain lines while still providing for the least number of manholes required to transverse the curve.

a) Center of manhole to curb face: 6-feet minimum.

b) Sewer centerline to curb face: 6-feet minimum.

d. **Sewer Location in Easements, Easement Widths, Maintenance Access Requirements**

1) Sewers in easements will be allowed only after all reasonable attempts to place the mains in a right-of-way have been exhausted. All easement installations must be approved in writing by the Public Works Director on a case-by-case basis.

2) Easement locations for public sewer mains serving a PUD, 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

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maintenance by City forces.

3) **Sewer Mainline & Manhole Maintenance Access Requirements**. All sewer mainlines shall be located within the developed portion of street right-of-ways *(ie. paved or hard surfaced areas)*, or installed along all-weather access lanes along alignments approved by the Public Works Director.

a) Except where precluded by steep slopes *(and approved in writing by the City on a case-by-case basis)*, all-weather maintenance access lanes *(AC, concrete or similarly durable surfaces other than gravel, minimum 12' width, minimum section as defined below, subject to subgrade, baserock & pavement testing matching City standards for streets & fire lanes)* shall extend along the entire length of off-street sewers unless otherwise specifically authorized in writing by the Public Works Director.

Vehicular access gates meeting City standards shall be provided in any fences which cross the easement.

Collapsible bollards with locks keyed to City pattern shall be installed on maintenance access lanes to which vehicular access is restricted and for which locked gates are not provided.

If a public sewer main in an easement is approved without the required maintenance vehicle access, wider easements may be required at the discretion of the Public Works Director.

b) Maintenance Access to Manholes, Service Connections, etc. Where there are steep slopes or other conditions along the sewer alignments which preclude all-weather access along the entire sewer alignment *(as determined by the City)*, the maintenance access lanes shall extend to encompass all manholes or sewer service lateral connections located outside of the improved portion of the right-of-way, in order to provide for vactor truck and maintenance access.

c) Easement Width along Maintenance Access Roads. If installation of a sewer main along alignments without a maintenance access road is approved by the City Engineer and Public Works Director, the minimum easement width may be increased as determined by the Public Works Director at his/her sole discretion *(typically by 5 feet wider minimum in flatter areas, and by 10 feet wider minimum for steep hillside areas)*.

d) Maintenance Agreement for Access Lane. Where all-weather access lanes are located outside of parking lots, private streets, fire lanes or private driveways, the easement along the access lane alignment shall include provisions that maintenance of the all-weather access lanes shall be the responsibility of the owner of the property on which the access lane is located.

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e) Maintenance Vehicle Access Lane Section, Radius & Slope. Show all maintenance vehicle access lanes on the drawings, including dimensions and standard details for rock, AC and/or other durable surface sections.

Maintenance vehicle access lane section shall be minimum 3" AC *(Class C)* over 10" compacted baserock typical *(1.5% design cross slope typical)*, unless alternate surfacing *(other than gravel surfaces)* is approved by the Public Works Director.

Maintenance access lanes which also serve as sidewalks or multi-use paths shall be concrete as required under PWDS 2.21, unless otherwise approved by the City.

Where vactor truck access is required, edge of pavement radius *(inside corners along the maintenance vehicle access lane)* shall be 28 foot minimum *(same as fire lane radius)*, unless a smaller radius is approved in writing by the Public Works Director on a case-by-case basis, and shall also meet the same slope and grade change requirements as for fire lanes *(at both the approach and along the maintenance access lane)*.

Where vactor truck access is not required, edge of pavement radius shall be 15 foot minimum.

f) Pavement Compaction *(public & private roads & maintenance access routes)*. AC Pavement shall be compacted to a minimum of 91% of maximum density *(at all locations)* as determined by the Rice standard method, based on nuclear density testing.

4) Gate Requirements, Prohibited Uses in Easements. City standards require that easements granted to the City shall not be used for any purpose which would interfere with the unrestricted use for sewer main purposes. Under no circumstances shall a building or structure or tree be placed over a sanitary sewer main or sewer easement, nor shall any parallel fences or parallel utilities be constructed within the easement (***vehicular access gates*** *acceptable to the City shall be installed in fences which the City allows to be constructed across City easements, and* ***locks on gates*** *so approved shall comply with the requirements of PWDS 1.12.c*).

Prohibited structures shall include decks, as well as footings or overhanging portions of structures located outside the easement.

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5) Minimum Easement Widths: Unless otherwise specified or authorized by the City, minimum easements widths for sanitary sewers shall be as follows:

MINIMUM SANITARY SEWER EASEMENT WIDTHS		
Sewer Diameter	Depth to Invert *(deepest depth along easement alignment, see notes below)*	
	≤ 6 feet	> 6 feet
8 - 10 inches	15 feet	15 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
12 - 15 inches	20 feet	20 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
> 15 inches	25 feet	25 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.

Notes:
--Easements shall be a constant width between manholes or other in-line structures *(see 4.15.d.7 for required offsets)*.
--Easement width shall be based on the deepest portion of the line between mainline structures *(MHs, COs, etc.)*.
--Extend easement half the required width beyond manholes or mainline cleanouts *(rounded up to the nearest foot)*.
--**Easements along a required maintenance access lane** shall be a minimum of 4 feet wider than the access lane width.
--When sewers in easements are parallel with storm drainage channels, the minimum easement width and minimum required offset shall be measured from the top of the drainage channel bank.

6) Easement widths shall vary from the minimum by even foot increments. Sewers with a nominal inside diameter of 24 inches or larger will require wider easements than outlined above.

7) Sanitary Sewer Main Offset within Easements: When sewers in easements are approved by the City, the sewer line shall be offset a minimum of 6 feet from any property line, survey monument or easement boundary, or 1/3 the required easement width *(rounded up to the nearest foot)*, whichever is greater *(see easement table footnotes for offset from drainage channels)*.

8) Common Easements, Wider Width. Common placement in the easement of a sanitary sewer and storm drain line may be allowed under certain conditions subject to approval by the Public Works Director. Easements wider than the minimum may be required.

   a) Common easements will be reviewed on a case-by-case basis. Separation of utilities must meet City, Oregon State Department of Environmental Quality (DEQ) and OHA-DWS requirements.

   b) Franchise Utility Limitations in City Easements. Franchise utilities shall not be placed in City utility easements unless approved in writing by the Public Works Director, subject to separation requirements in excess of minimums as dictated by Public Works.

9) Public Works Review/Approval Required prior to Recording. All easements

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must be furnished to the City Public Works and City Engineer for review and approval prior to recording. All recording costs shall be borne by the Developer.

e. **Sewer Location in Relation to Streams or Drainage Channels**

1) Generally, the top of all sanitary sewers entering or crossing streams or drainage channels shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line, and to allow restoration of the stream bottom.

In general, as much cover as possible shall be provided. If less than 3 foot of cover is provided, the sewer shall be protected by a reinforced concrete slab centered over the sewer main *(set 6" minimum above the pipe, 6" minimum thickness w/#4 rebar at 12" O.C each way, and extending a minimum of 3 feet beyond the width of the pipeline trench each way, and stubbed 2 feet minimum into the bank).*

2) Perpendicular Crossings. 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 at the crossing.

3) Sewers located along streams or drainage channels shall be located outside of the stream or channel bed & banks, and sufficiently separated from the stream or channel to allow for future possible channel widening *(separation required is at the discretion of the Public Works Director).*

4) Manholes within drainage channels require case-by-case approval by the Public Works Director, and require that the channel be filled at the manhole location as necessary to raise the manhole rim above drainage and high water levels, and to provide a flat working surface around the manhole lid and to allow for the required vactor truck access to the manhole structure *(with channel deflection, storm pipes or culverts being provided as necessary to convey the channel flow past the manhole).*

5) All manhole covers below the 100 year flood elevation OR less than 2 feet above the 100 year flood elevation shall be provided with leakproof manhole inflow protector lid inserts as specified *(ManPan or equal).*

6) Pipe material at crossings shall be Class 50 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 1H:1V slope from the top of the bank and sloping away from the channel centerline intersects the top of the pipe.

7) Installation of sewers in a steel casing pipe may be required when the above cover requirements cannot be met, with PVC sewer pipe installed through the casing per City details. Each deviation from the above requirements will be reviewed on a case-by-case basis.

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4.16 MANHOLES AND MAINLINE CLEANOUTS

a. General

1) Lateral Connection to MHs Prohibited Without Variance. Sewer service laterals shall not be connected into manholes unless approved in writing by the City Engineer and the Public Works Director on a case-by-case basis. Where sewer service lateral connections to manholes are allowed, the crown of the sewer service lateral pipe shall be installed at or above the crown of the manhole outlet pipe, or as required to provide a minimum of 0.5' fall across a 48-inch manhole, whichever is greater.

2) Separation from MHs, etc. Sewer, storm or water service lines shall not cross directly under existing or new manholes or other junction structures, nor shall these sewer structures be designed or installed to be over the top of such service lines *(3' minimum horizontal separation typically required)*.

3) Replacement of Existing Manholes. Existing manholes *(to which new or replacement sewers connect at or near the existing base inverts)* shall be replaced if they have poured-in-place bases, are smaller than 48" diameter, or do not otherwise meet current City standards.

b. Mainline Sewer Cleanouts

1) Allowed Locations. Mainline sewer cleanouts will not be approved as substitutes for manholes.

Cleanouts shall only be allowed at the upper end of mainline sewers **(A)** which are less than 150 feet long, AND **(B)** which will be extended on the same grade and alignment during the next construction phase of a multiphase development *(ie. future phase of a multiphase project approved for development under the same land use approval as the phase with the proposed cleanout)*, AND **(C)** where the segment of mainline proposed to end with a cleanout does not include any sewer service laterals.

2) All mainline cleanouts meeting the criteria above will be considered on a case-by-case basis and approved by the City Engineer and the Public Works Director *(at their sole discretion)*.

3) In all cases, plan and profile showing the alignment and depth of the anticipated future extension from the proposed cleanout to the next manhole shall be submitted prior to approval of cleanouts.

c. Manhole Size

1) For pipe 21-inches in diameter and smaller, the minimum diameter of manholes shall be 48 inches.

2) For pipe larger than 21-inches to 27-inches in diameter, the minimum

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diameter of manholes shall be 60 inches.

3) For pipe larger than 27-inches in diameter, the minimum diameter of manholes shall be 72 inches unless otherwise approved by the City Engineer.

4) Larger manholes may be required for multiple pipe connections, multiple pipe connections or acute angle pipe connections *(as directed by the Public Works Director or the City Engineer)*.

5) Manholes sizes for drop structures or metering manholes will be reviewed on a case-by-case basis.

d. **Sewer Manhole Location & Spacing**:

1) Manholes shall be placed at the following locations:

a) Maximum MH Spacing. At intervals of 450 feet or less.

b) Upper end of all mainline sewers, except as provided above.

c) Every change in grade or alignment of a sewer.

d) Every change in size of a sewer.

e) Each intersection or junction of sewers, excluding sewer service laterals 6-inches or less in diameter.

f) Adjacent to the center radius point of a cul-de-sac.

g) In front of the last property or lot being served by terminal sewers *(which cannot be extended in the future)*, with the manhole to be located a minimum of 10 feet past the common lot line of the last adjoining parcel served *(ie. provided that future sewer mainline extension is not possible, since extension of sewer mains across the entire property frontage is otherwise required)*.

2) Manholes Required at Intersections. Where practical, manholes shall be located at street intersections.

3) Manholes Stubs. All manholes from which future sewer line extensions are anticipated, shall have a pipe stub designed and installed at the grade and direction of the anticipated sewer main extension.

Pipe stubs shall be a minimum of eight inches in size and shall protrude at least 2 feet outside the manhole base *(unless a longer length is required by the Public Works Director or the City Engineer to avoid cutting new streets when the line is extended in the future, or to extend past potentially conflicting existing utilities)*, and shall end with a watertight gasketed cap acceptable to Public Works *(except that a cleanout may be required for longer stubs)*.

4) Manholes in Drainage Flow Areas Prohibited. Manholes shall not be located in front of the curb or in the gutter flow area, or within the banks or bottoms of drainage channels *(unless provisions are made to raise the manhole rims to*

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bank grade or above per PWDS 4.15).

Placement of manholes behind the curbline shall be reviewed on a case-by-case basis for approval. Variances may be granted for those sewer or public utility lines which already exist behind the curb, subject to manhole rims being raised as required to avoid inflow conditions.

5) Manholes at Acute Angles. Two manholes shall be installed when the horizontal deflection angle between two inlet pipes is an acute angle less than or equal to 80°. The intent of this requirement is to prevent side sewer connections from discharging into manholes against the direction of flow through the manhole. Such manholes shall be spaced a minimum of 10 feet clear from each other.

e. **Sewer Manhole Rim Elevation**

1) The rims of all manholes located within paved or other hard surfaced areas *(or where paved pads are required around manholes per City standard details)* shall be set to finished grade. Manholes outside of these areas shall be set above finish grade as shown on the City standard details.

2) Concrete riser rings shall be used to bring casting to grade. The height from the top of the cone or flattop section to the rim shall not exceed 18-inches.

3) The rims of all manholes located outside of paved or other hard surfaced areas shall be set 6-inches above surrounding finish grade. Finish grade shall be defined as the final ground surface after grading and landscaping, as shown on the standard manhole rim adjustment details.

4) Manholes within easements shall have lockdown lids only where specifically required by Public Works.

f. **Drop Across Sewer Manhole Structure**

1) Generally, the minimum vertical drop across a 4-foot diameter manhole is required as shown below *(drop across larger diameter manholes shall be increased to provide the equivalent channel slope across the manhole).*

a) Straight through runs: 0.1' minimum drop

b) Bends greater than 45°: 0.2' minimum drop

c) For sewer service laterals connected to manholes, see PWDS 4.17 & 4.19 *(prior written approval required, 0.5' drop).*

2) Max Fall Across MH w/out Inside Drop Assembly. Maximum vertical drop across a 4-foot diameter manhole shall not exceed 18-inches with a beaver slide channel *(drops of more than 18-inches from inlet invert to outlet invert require an inside drop assembly).*

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3) Match Sewer Pipe Crowns. Where sewer pipes of different sizes enter the same manhole, the design shall generally provide that the crowns of the smaller incoming pipes be set at or above the same elevation as the outlet pipe crown *(as a minimum, DEQ standards requires that for intersecting unequal size sewers, the elevation at 80% of full depth of flow shall match)*. Deviation requires a written request & justification from the design engineer, and approval by the City Engineer.

4) Opposing Inlet Sewer Pipes with Significantly Differing Slopes. In cases where two pipes discharge into a manhole from opposite directions and one pipe has a slope more than 4% steeper than the pipe opposite, the invert of the pipe with the lower slope shall be set a minimum of 0.35 feet *(or ½ the pipe diameter, whichever is greater)* above invert of the steeper pipe.

g. **Sewer Manhole Flow Channels**

1) Channel Shape. Flow channels in manholes shall be of such shape *(semi-circular bottoms)* and slope to provide smooth transition between inlet and outlet sewer size/ invert to minimize turbulence and to ensure that the manhole channels are self-cleaning.

2) Flow channel height shall be to the crowns of the sewers. Benches beside flow channels shall be sloped from the manhole wall toward the channel to prevent accumulation of solids.

3) Beaver slide channels shall be shaped to allow the insertion of a 6-inch diameter by 3-foot long TV camera into the downstream sewer.

4) All concrete for manhole channeling shall conform to the requirements of OSSC (ODOT/APWA) 00440, Commercial Grade Concrete, 3300 psi min @ 28 days, max 5" slump, 4.5% air (±1.5%). Concrete mix design shall be submitted to Public Works and/or the City Engineer for review and approval prior to use.

5) If hand mixed sack-crete type concrete is proposed by the Contractor and approved by the Public Works Director on a case-by-case basis, it shall be a 4000 psi minimum mix *(approved by the City prior to use)*, mixed with the minimum amount of water necessary for workability *(5" slump or stiffer)*.

h. **Sewer Drop Manholes**

1) Prior Approval Required. Sanitary sewer drop manhole installations must be approved in writing by the Public Works Director and City Engineer on a case-by-case basis.

2) Drop manholes shall only be used in extreme cases of depth difference between existing and proposed sewer lines or when very special conditions exist such as a conflict with existing facilities which cannot be relocated.

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3) Drop Manholes Prohibited for Larger Sewers. Drop assemblies shall be provided for pipe lines 12 inches in diameter and smaller when entering a manhole with an invert more than 18 inches above the invert of the outlet line. The vertical displacement shall be measured at the inside manhole walls and not the manhole centerline.

Pipe lines larger than 12-inches shall be introduced into the manhole at the manhole invert, unless otherwise approved by the Public Works Director on a case-by-case basis.

4) Inside Drop Manhole Diameter. When allowed, inside drop manholes shall be a minimum of 60 inches in diameter. All inside drops shall be constructed with drop pipe per the City standard details, with stainless steel support brackets. Partitions inside of manholes will NOT be allowed.

i. **Sewer Manhole Taps**

1) All manhole taps shall conform with City standards or DEQ standards as summarized in the OSSC (ODOT/APWA) standards, whichever is more stringent *(as determined by the Public Works Director and City Engineer)*.

2) When an existing manhole is tapped to install a new sewer which will drain into the manhole, the crown of the new sewer shall generally match or be above the crown of the existing pipes.

3) When the size of the new pipe being tapped into the existing manhole is the same size as the existing pipe exiting the manhole, the invert of the new pipe should be a minimum of 0.35 feet above the invert of the existing pipe, or higher as required to be above the normal sewage flow level.

4) A detail drawing showing the steps, bench and proposed connection is required for connections to existing manholes.

5) The drawing shall include notes to the effect that openings for connections to existing manholes shall be made by core-drilling the existing manhole structure and installing a rubber boot. Small chipping hammers or similar light tools which will not damage or crack the manhole base may be used to shape channels. Use of large pneumatic jackhammers shall be prohibited.

6) Unless otherwise approved by the City Engineer, manhole steps shall be installed in any manhole which does not have existing steps, and which is connected to or otherwise altered in any way *(per the standard construction notes, sealing & vacuum testing of all such existing sanitary sewer manholes connected to or altered is also required, including manholes with rim adjustments or when paving around existing sanitary sewer manholes)*.

7) Replacement of Existing Manholes. See requirements above regarding conditions under which manholes being connected to must be replaced.

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j. **Monitoring/Metering Manhole**

1) A monitoring/metering manhole *(including provisions for sampling)* shall be installed on all systems meeting any of the following criteria *(as determined & reviewed by the Public Works Director)*:

a) Industry or business which discharges high strength wastewater *(concentration greater than 240 mg/L BOD or TSS)*, OR wastewater with characteristics not commonly found in domestic sewage.

b) A private sewer which contributes more than 5,000 gallons per day to the public sewer, unless waived by the Public Works Director on a case-by-case basis.

c) A private sewer which serves separate legal lots of record *(private collection system)*, unless waived by the Public Works Director on a case-by-case basis.

2) The minimum size sewer line downstream of the monitoring / sampling / metering manhole structure shall be six (6) inches *(to match commercial / industrial / public sewer service size requirements)*.

The size of the sewer line through the monitoring / sampling / metering manhole structure shall match the size of the inlet sewer pipe, but shall not be smaller than 4" diameter.

The metering & sampling manhole shall be configured to allow for straight laminar flow through the manhole and the primary flow measurement device inside the manhole *(see below)*.

3) Monitoring/metering manholes shall include the following as a minimum.

a) A permanent primary flow measurement device inside the manhole *(consisting of a flume or equivalent open channel flow measurement device which allows for and accurate measurement of the water level in a manner which allows the flow rate to be accurately determined using established and verified engineering formulas or data tables)*.

b) Provisions for a permanent secondary non-contact level sensing measurement device which provides real-time measurement of the level of the water flowing through the flume or primary measurement device.

c) Provisions for permanent continuous flow monitoring and recording, and provisions for continuous or flow paced composite refrigerated sampling of the flow through the metering manhole.

d) Power conduits to the metering & sampling enclosure from a power supply provided by the Developer, from an approved continuous and

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reliable power source.

e) Separate conduits shall be provided between the metering & sampling enclosure and the metering/sampling manhole so that the flow meter cable/wires and the sample tubing are not installed in the same conduit sleeve.

f) All bends in the conduit sleeves for the flow meter cable/wires and the sample tubing shall be long radius bends.

4) Unless waived in writing by the Public Works Director on a case-by-case basis *(due to extraordinary extenuating circumstances)*, sampling and flow monitoring equipment shall be provided with the metering & sampling manhole.

a) All machinery, equipment, conduit, power, supplies and labor required to carry out the sampling and flow monitoring program shall be provided by the Developer *(equipment shall be mounted inside lockable insulated heated FRP enclosures acceptable to the Public Works Director)*, and shall meet the City's prior approval.

b) Owner of the property being served shall be responsible for all permits & installation costs associated with providing, installing and connecting the conduit(s) and the power to the metering & sampling enclosures, and shall also be responsible for the ongoing power costs.

5) A recorded access easement & maintenance agreement will be required for each such monitoring/metering manhole.

4.17 WORK ON or CONNECTION TO EXISTING SEWER MAINLINES

a. General

1) Connections of new sewer service laterals to existing sewers shall be made watertight.

2) New Lateral Connection to Existing Mainline Tees. Connection of sewer service laterals shall be made *(where possible)* to existing tees or wyes previously installed and capped. In all cases, the integrity of the existing tee or wye shall be verified by Public Works prior to connection *(see also PWDS 4.18.d for requirements relating to reuse of existing sewer service laterals)*.

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3) New Lateral Connection without Existing Mainline Tees. Where tees or wyes for connection are absent or unusable, connection of sewer service laterals into existing sewer lines shall be made with approved connection couplings or service saddles as noted below.

Taps shall be installed without protrusion into or damage to the existing sewer, and shall result in a watertight connection.

a) Unless otherwise required or approved in writing by Public Works and the City Engineer, sewer service lateral connections to existing AC gravity pipe shall be with approved service saddles.

Unless otherwise approved in writing by the Public Works Director on a case-by-case basis, connections to all other types of existing gravity pipes shall use Insert-a-Tee type fittings *(Fatboy style)*.

A note shall be added to the drawings stating that the coring machine for Insert-a-Tee couplings shall be anchored in accordance with the manufacturer's recommendations.

4) Lateral Replacement in Conjunction With Sewer Mainline Replacement. When existing sewer mainlines are replaced or reconstructed as part of a project, the existing sewer service laterals shall be replaced from the new mainline to a new property line cleanout per City standards *(except where otherwise approved in writing by the Public Works Director and City Engineer on a case-by-case basis, subject to the existing lateral pipe meeting the condition criteria under PWDS 4.18.d)*.

a) In cases where the existing sewer lateral pipe is not perpendicular to the street *(ie. installed at an angle from the mainline to the property line)*, the new service lateral shall be installed and reconnected to the mainline along a perpendicular alignment acceptable to the City Engineer and Public Works Director.

b. Existing Sanitary Sewer Slope & Condition Verification, Correction of Adverse Conditions.

1) As a condition of connecting to and/or extending sewer mainlines, the design shall include verification that the existing downstream sewer is in adequate condition and with adequate capacity to handle the existing and new flows, and otherwise conforms with City standards.

2) This shall include verification of existing sewer slopes and alignments downstream of the connection point (*as part of the design topographic survey*), AND cleaning/TV inspection of existing mainlines which meet any of the following conditions: **(A)** existing or design slopes less than 1.0% or **(B)** have had a history of flow or maintenance problems, or **(C)** end with mainline cleanouts at or near the connection point, or **(D)** existing downstream

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mainlines are located in easements outside of public right-of-ways, or **(E)** are located in areas with maintenance access restrictions.

This requirement generally includes existing mainlines which will be replaced in their entirety as part of the project, unless it has previously been determined that there are no existing service connections along the alignment to be replaced, and the alignment can be otherwise definitively determined.

a) Costs for survey, title research, inspection, cleaning and TV inspection *(including locating and painting out the mainline alignment during TV inspections)* are the responsibility of the development team.

3) The TV inspection shall be conducted by an approved technical service, using a track or wheel propelled self-leveling auto-focus pan-head camera which **(A)** is equipped to make audio-visual recordings of the TV inspections on a USB storage device, and **(B)** is equipped with a sonde/locator system capable of allowing the alignment of mainlines being inspected to be located and painted out on the ground surface.

a) A standard 1-inch diameter ball shall be suspended in front of the camera during the inspection to determine the depth of any standing water *(with the ball in contact with the pipe invert)*. The pipe shall contain sufficient water to reveal low areas or reverse grades during the TV inspection.

b) The USB storage device and written report *(or download link and pdf report)* shall be delivered to the City Engineer and the Public Works Director.

c) The alignment of mainline shall be painted on the surface of the ground for any mainlines inspected which do not have a manhole at both ends, and which do not have a straight alignment between manholes.

4) Unless otherwise approved in writing by the City Engineer, this cleaning/TV inspection/locate painting and alignment verification/survey *(including verification that downstream sewer mainlines outside of public right-of-ways are located within easements in compliance with current City standards)* shall be done as part of the design process *(note: any approval by the City to defer this pre-design TV inspection work shall not relieve the Developer and/or the developer's contractor of the responsibility to correct problems subsequently discovered, at the developer's sole expense)*.

If the development team uses sewer TV inspections previously performed by the City or others, any discrepancies discovered during construction shall remain the developer's entire responsibility.

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5) Correction of Adverse Conditions. The sewer design shall include provisions to correct any adverse grade conditions, broken/obstructed pipe or other conditions found in the existing sewer which, *(in the opinion of the City Engineer or Public Works Director)* **(A)** may cause sewer backups or **(B)** may present maintenance concerns/issues upon extension of the mainline and/or connection of additional mainlines or sewer services, or **(C)** require upgrades along sewer alignments which are not located within public right-of-ways or within recorded easements in order to bring sewers into conformance with current City standards including all-weather maintenance access. Corrections of any such adverse conditions shall occur prior to connecting to or extending the mainline or setting new manholes.

c. Manholes over Existing Sanitary Sewers

1) In general, existing sewers shall be cut out to allow installation of new precast manholes *(with approved pipe coupling to existing pipe each way)*, unless otherwise approved by the Public Works Director and the City Engineer on a case-by-case basis.

2) For the rare cases *(based on extraordinary extenuating circumstances)* where cast-in-place manholes are explicitly approved *(in writing by both the Public Works Director and the City Engineer, on a case-by-case basis as a PWDS variance)* to be constructed over existing sanitary sewers, such manholes shall conform to the requirements of OSSC (ODOT/APWA) 490.41, Manholes Over Existing Sewers and the following *(with notes addressing these requirements added to the drawings on the sheet where the cast-in-place manhole is shown, as well as details showing and noting the location and proposed configuration of all components)*.

a) Two Waterstop Grouting Rings by Trelleborg *(or approved equal)* shall be installed on each pipe *(one centered on the manhole wall thickness, with the splice joint down, and the other outside of the first with the joint opposite & upward)* prior to concrete placement for the manhole base. Adequate concrete shall be placed on the outside of the manhole barrel doghouse notch to fully encapsulate the second grouting ring.

b) The top of the existing pipe shall not be cut out until after the completion of the manhole vacuum test and inspection of the new manhole by City staff to verify that there is not visible leakage.

c) Notes to this effect shall be placed on the construction drawings.

d. Maintaining Sanitary Sewer Flows. The construction of sewer improvements that impact existing sewers shall address the following, including notes on the drawings.

1) All existing sanitary sewer system components shall remain in service through the construction operations unless specific exceptions are approved in writing

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by Public Works and the City Engineer, and written approval from each affected property owner.

2) Sewer service from upstream and affected properties must be maintained unless such written approval is granted. The methods used to maintain sewer flows shall be the Contractor's design, subject to approval by the City. Required methods of conveying sewer flows may include, but are not limited to, bypass pumping, use of flow through plugs with periodic release of sewage flows, etc. The bypass system shall be capable of conveying flows when the sewers are flowing full. Normal unrestricted flows shall be restored at the end of each work day. Bypass systems left in place or operated outside normal working hours shall be monitored continuously by the Contractor personnel unless alternate arrangements proposed by the Contractor are acceptable to the City *(ie. high level & pump fail alarm callouts, etc.)*. The Contractor shall provide for City review all submittal information required to demonstrate *(to the satisfaction of the City)* compliance with these requirements.

3) Contractor shall be responsible for all costs related to maintaining sewer flows, as well as all costs for cleanup, damages and fines resulting from any sewerage spill or overflow associated with any methods used to convey sewage flows during construction.

4.18 SEWER SERVICE LATERALS

a. General

1) Sewer service laterals are building sewers as defined above. Minimum size & slope shall be as summarized below and per the City standard details.

2) Easement Requirement. An easement shall be recorded for any sewer service lateral which encroaches on or crosses any legal lot other than one being served.

3) Sewer Service Lateral Connection Location.

a) Unless otherwise approved by the City Engineer and the Public Works Director on a case-by-case basis *(based on extraordinary extenuating circumstances)*, sewer service lateral connections and associated property line cleanouts shall be installed within or immediately adjacent to the public right-of-way.

Variances to this requirement shall typically require an all-weather maintenance access road be installed and extended to the sewer lateral connection location *(and to the associated property line/easement boundary cleanout location)*, see PWDS 4.15.d.4.

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b) Variance Required for Sewer Lateral Connection to Manholes. Sewer service laterals shall not tie into manholes unless approved by City Engineer and Public Works Director on a case-by-case basis.

(1) Where connection to manholes is allowed, sewer service lateral inverts shall provide a minimum of 0.5 feet fall across the manhole, or the sewer service lateral shall match crowns with the outlet pipe, whichever is higher.

4) As a minimum criterion, construction of the sewer service lateral shall be of the same quality and meet the same requirements as the public sewer with regard to materials, watertightness, and location. In addition, these sewers shall conform to the State and local plumbing codes and restrictions. No roof, surface, foundation, or stormwater drain lines shall be connected to the public sewers or sewer service laterals.

5) Separate Sewer Lateral to Each Legal Lot /Additional Sewer Service Laterals.

a) Sewer Service for Each Legal Lot. Each legal lot of record shall be provided with a separate sewer service lateral connected to an approved public. Combined sewer service laterals *(ie. serving multiple structures on a single legal lot of record)* will be permitted only when the property cannot legally be further divided. An example of this is a residential lot with a house and a detached garage, shop or ADU with plumbing fixtures *(see PWDS 4.19.a)*.

b) Duplexes. Separate sewer service laterals shall be installed to serve each side of duplex lots.

Condos. Separate sewer service laterals shall be installed to serve each unit of condominiums.

Detached Dwelling Units, etc. Separate sewer service laterals shall be installed to serve each unit of developments with separate detached dwelling units *(except where otherwise approved by the Public Works Director for a private sewer serving RV parks, MH parks, cottage clusters or similar developments with all units located on a single legal lot of record, or where otherwise approved by the Public Works Director for separate detached accessory dwelling units on single family lots which can connect to the primary structure sewer service, etc.)*.

c) Additional sanitary sewer laterals must be stubbed into the property lines sufficient to serve all residential parcels *(including those which can be further partitioned in the future)* where such service or future partition would require that new streets be cut to install such services, or where the service line must cross intervening property to provide such future service.

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6) Curb/Gutter Marking. Where sanitary sewer laterals connect to sewer mainlines in the street, the top of curb and the gutter pan shall be stamped at the point of the service crossing as required by the City standard details and standard notes.

7) Perpendicular Sewer Service Laterals. Unless otherwise approved in writing by the City Engineer and the Public Works Director on a case-by-case basis, sewer service laterals shall be installed from the mainline to the property line perpendicular to the street centerline.

   a) Permanent installation of sewer service laterals parallel with the right-of-way is generally prohibited, except where extenuating circumstances exist which meet the variance criteria.

8) Backwater Valve. For reference only, OPSC 710.1 requires that a private backwater check valve be installed *(on the private side of the property line cleanout)* when a drainage fixture is installed on a floor level that is lower than the top of the nearest upstream manhole or cleanout structure. In all cases, this backwater valve shall be installed on the private side of the property line cleanout *(backwater valve is typically installed between the cleanout just outside the building and the building wall)*.

   While this backwater valve is a private item covered under the OPSC *(ie. not under Public Works jurisdiction for inspection or maintenance)*, property owners and homebuilders may wish to consider using a backwater valve designed to allow inspection, cleaning and maintenance to be performed from the surface *(such as the Clean Check by Rectorseal)*. Failure to install a backwater valve per OPSC requirements will not result in any liability by the City *(for either cleanup or repairs)* in the event there is a sewage backup into a building which would have been prevented by an operable backwater valve installed as required by the OPSC. Any backwater valve shall be installed so that it remains accessible at all times for inspection, maintenance and replacement of valve parts.

b. Minimum Sewer Service Lateral Diameter and Slope

1) Residential Sewer Lateral Diameter. The minimum inside diameter of any residential sewer service lateral shall be four (4) inches, and shall be equal to or greater than the building plumbing stub *(building drain)* diameter.

2) Multifamily, Commercial, Industrial, Public Sewer Lateral Diameter. The minimum inside diameter of sewer service laterals to serve multifamily dwellings or serving commercial, industrial or public buildings or properties shall be six (6) inches *(in part to avoid the need to cut public streets in the future, if a more intense use is proposed for the property, which results in increased flows)*.

3) Where an Inserta-Tee connection to mainline pipe is used, the maximum lateral size shall be 2 nominal sizes smaller than the mainline pipe *(ie. 4" on*

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8" main, 6" on 10" main, etc.). Sewer laterals larger than this requirement *(in relation to the sewer main size)* shall be connected with cut-in tees per City details.

4) Where sewer service lateral sizing larger than the minimum is necessary, fixture unit equivalents shall be determined in accordance with the Oregon Plumbing Specialty Code (OPSC).

5) Uniform Slope from Mainline Connection to PL Cleanout. Sewer service lateral slope shall be uniform from the mainline connection to the property line *(or easement)* cleanout, and shall conform with the City standard details *(2% minimum)*.

6) Sewer service laterals for townhouses and similar cluster housing developments shall be installed on a uniform slope from the main line sewer connection to a point five (5) feet from the end of the building drain conforming to the above requirements.

c. Sewer Service Lateral Cleanouts

1) Property Line Cleanout & Lateral Extension Limits. A cleanout *(set in a cleanout box conforming with City standard details)* shall be installed at or near the right-of-way line or sewer easement boundary line for all sanitary sewer service laterals, at a location acceptable to Public Works.

The sanitary sewer service lateral shall extend beyond the property line/sewer easement boundary cleanout to the back of any PUE fronting the right-of-way or easement, or to the far side of easements for public utilities, whichever is further.

a) Where sewer service laterals are required or shown along flagstem or common use driveways *(or which cross property other than that being served)*, the pipe shall be extended to the end of the driveway or to the boundary of the lot being served *(whichever is farther)* in conjunction with the development infrastructure construction.

2) Sewer Laterals Crossing Other Property. For long sewer service laterals, a cleanout to City standards shall be installed on the upstream side of any intermediate property lines crossed *(including on the upstream side of the property line where the sewer service lateral crosses onto the property being served)*, as well as at maximum 100-foot intervals beyond the right-of-way or easement cleanout, and at bends as required by the Oregon Plumbing Specialty Code (OPSC).

3) Typical Sewer Lateral Cover Depth. Unless otherwise approved by the City Engineer, sewer service laterals shall have at least four (4) feet of cover from finish grade *(typically sidewalk grade)* at the right-of-way or easement line. Generally, the topography of the property will dictate how deep the service line must be. Sewer laterals depths greater than necessary to meet City

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minimums and to serve the lot in question are to be avoided.

d. Existing Sewer Service Laterals

1) The City is under mandate from the Oregon Department of Environmental Quality (DEQ) to reduce infiltration and inflow (I/I) of storm runoff and groundwater into the City's sanitary sewer system. A significant portion of the (I/I) problems in the City's sewage collection system are attributable to leaking sewer service laterals or drains connected to sewer service laterals. DEQ and City standards require that "No person shall discharge or cause to be discharged any storm water, surface water, groundwater, roof runoff, subsurface drainage to any sanitary sewer."

a) The City requires applicants to demonstrate compliance with this ordinance by testing existing sanitary sewer service laterals *(at the expense of the applicant)* which are proposed for continuing or expanded use. This applies to existing sewer service laterals which are proposed for use by **(A)** new structures, **(B)** replacement or additional structures on the property, **(C)** structures which are significantly remodeled or refurbished *(as determined by the Public Works Director)*, or **(D)** when the use of an existing structure is modified to the extent that the quantity and/or characteristics of the sewage from the structure will be significantly different from the previous use *(as determined by the Public Works Director)*.

2) Existing Sewer Lateral Testing Requirements. Unless waived in writing by Public Works *(for newer PVC sewer service laterals)*, all existing sewer service laterals *(proposed for use by new construction or with change in use on the property)* shall either be replaced or shall be air tested from the mainline to the building to verify that it is free of leaks or defects. The sewer service laterals shall be tested at 4 to 5 psi, and a loss of 0.5 psi in 15 seconds constitutes a test failure. The sewer service lateral shall be replaced if defective.

The cost for all sewer lateral testing work shall be the sole responsibility of the applicant *(including insertion of an inflatable packer into the mainline in order to plug the sewer lateral at the mainline connection, or similar methodology to allow testing of the entire sewer service lateral)*.

a) If the sewer service lateral passes the testing, cleanouts per PWDS *(& plumbing code)* requirements shall be installed on existing sanitary sewer service laterals which are approved for continuing use *(ie. those which do not already have cleanouts)*.

b) Sewer lateral testing for old laterals will be waived if the sewer service lateral is proposed for replacement *(by the applicant)* in lieu of the incurring the expense of the required testing.

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3) Cap/Plug Abandoned Sewer Laterals Watertight at Mainline Connection. If existing sewer service laterals are abandoned or not used *(or if the developer determines that it is not cost effective to perform the required testing)*, the sewer service lateral connection shall be sealed watertight at the mainline in a manner acceptable to Public Works *(if there is evidence of leakage at the existing tee connection at the mainline, the existing connection shall be sealed with a repair band or other approved method to seal the mainline tap watertight)*. The remaining portion of the disconnected lateral pipe shall either be removed entirely, or shall be capped or plugged at both ends *(as required by the City standard construction notes, Appendix B)* if it is abandoned in place.

It shall be the responsibility of the development team to determine the location of existing sewer service laterals during design, and show this information on the design drawings submitted for review by Public Works. The Contractor shall be responsible to verify the precise location *(by mainline TV inspection or similar)* of such lateral connections to be abandoned, prior to sawcutting or excavation.

a) All such abandoned & sealed sewer service lateral connections shall be inspected by Public Works prior to backfilling, and may be TV inspected during the winter following the end of the first year of service to verify that the plug, cap or repair remains watertight.

Any excavation, repairs or surface restoration required to correct abandoned and sealed sewer service lateral connections which are found to be leaking within the warranty period will be the responsibility of the party which had the original work performed.

b) Building Demolition. When existing building(s) are demolished or removed from a property, the applicant shall either **(A)** disconnect and plug the existing sewer lateral watertight at the mainline connection *(as summarized below)*, or **(B)** *(if the applicant proposes to leave the existing sewer lateral in place for future reuse)* demonstrate that the existing sewer lateral is leak free and complies with all requirements herein *(subject also to installation of a property line cleanout per City standards, if an approved cleanout does not already exist)*, and has a watertight gasketed cap behind the property line cleanout per City standards & Detail 416.

4.19 GREASE REMOVAL.

a. Provisions acceptable to Public Works shall be made for grease removal for any installations with commercial or similar kitchens, or other applications as required by Public Works.

b. Gravity Grease Interceptor Vault Required. Unless otherwise approved by Public Works *(based on extraordinary extenuating circumstances)*, a minimum two

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compartment exterior gravity grease interceptor vault *(1000 gallon typical minimum, complying with IAPMO / ANSI Z1001, as referenced by OPSC 1014.3.3 & OPSC Chapter 17)* shall be provided, particularly in any application where hot water or steam cleaning of commercial type kitchens is utilized *(while a variance regarding the type of grease interceptor may be considered by Public Works at the sole discretion of the Public Works Director, an approved grease interceptor must be provided in order to comply with City, DEQ and state OPSC standards).*

Larger sizes shall be provided as required by the current Oregon Plumbing Specialty Code (OPSC) table 1014.3.6 *(gravity grease interceptor sizing).*

While not required by the City, it is recommended that the developer consider grease interceptor vaults which are dual-certified to both hydromechanical performance standards *(ASME A112.14.3)* and gravity design and structural standards *(IAPMO/ANSI Z1001)* for larger installations or uses.

c. Sanitary Flows Shall Bypass the Grease Interceptor. Per OPSC 1014.3.2.1, piping configuration shall provide a sanitary sewer pipe connection downstream of the grease interceptor vault to ensure that sanitary sewer flows from toilets, urinals and similar fixtures do not flow through the grease interceptor.

d. Outlet Sampling on Grease Interceptors.

1) Provisions shall be included to allow for sampling of the grease interceptor vault effluent *(ie. details for outlet junction box, vertical drop cleanout or equivalent shall be included on the drawings).*

2) Unless otherwise approved by the City Engineer and Public Works Director, outlet sampling shall be provided with a Schier SV10 Sample Port or approved equal *(proposals to use of a standard property line cleanout as a sampling port are not allowed).*

e. Any proposal for a gravity grease interceptor vault smaller than 1,000 gallon capacity shall include documentation that the unit is sized per the requirements of the current OPSC table 1014.3.6 *(or current edition).*

f. A maintenance agreement (acceptable to the Public Works Director and City Attorney where applicable) shall be recorded against the property.

g. Property owner shall provide the City with a copy of a maintenance contract with a certified grease removal company. Property owners may select a certified grease removal contractor from the Oregon Regional Preferred Pumper list at https://www.preferredpumper.org/.

Copies of cleaning and/or maintenance work orders demonstrating compliance with the grease interceptor maintenance agreement provisions and City standards shall be submitted to Public Works on at least an annual basis.

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4.20 UNDERGROUND WARNING TAPE & TONING / TRACER WIRE

a. Detectable or non-detectable acid and alkali resistant safety warning tape shall be provided along the full length of all sewer service laterals and all mainlines.

b. Underground warning tape shall be placed a minimum of 12-inches and a maximum of 18-inches below the finish ground surface, and shall be continuous the entire length of the sewer service laterals installed from the mainline to the back of the PUE. The warning tape shall be continuous between manholes or cleanouts.

c. All sanitary piping *(both public lines and private lines within right-of-way or easements)* shall have an electrically conductive tracer wire, 12 gauge minimum size single strand insulated copper with green sheathing, installed in the trench for the purpose of locating the pipe in the future. The tracer wire shall run the full length of the installed pipe, with each end accessible from the surface through a manhole or cleanout.

4.21 PRIVATE SANITARY SEWER COLLECTION SYSTEMS

a. Sewer Service for Each Legal Lot. Each legal lot of record shall be provided with a separate sewer service lateral connected to the public sewer main, unless otherwise approved by the City on a case-by case basis.

   1) If a private common sewer is approved *(including a private sewer serving a MHP or other development with separate detached dwelling units on a common property)*, a Private Sewer Maintenance Agreement acceptable to the Public Works shall be recorded against the legal lot served by the private common sewer, and a copy of the recorded agreement returned to the City prior to finalization of the approval and commencement of construction.

b. Private sanitary sewer collection systems *(as defined under PWDS 4.7.a)* shall be designed in conformance with main line standards specified herein when plumbing code grade requirements of Oregon Plumbing Specialty Code (OPSC) Section 1106 cannot be met, AND shall include the following.

   1) A manhole is required at the connection to the City system of a private sanitary sewer system serving multiple buildings on a single legal lot.

   2) A monitoring/metering manhole shall be required at the property line upstream from the connection of a private sewer system to the City main *(see PWDS 4.16)*, unless waived by the Public Works Director on a case-by-case basis.

      A recorded access easement & maintenance agreement with the City will be required for each such monitoring/metering manhole.

c. These provisions of the PWDS do not, nor are they intended to supersede the Oregon Plumbing Specialty Code (OPSC), but are intended to allow the design engineer flexibility in the design of private sewer systems where the OPC minimum slope

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requirements cannot be satisfied.

d. PWDS 4.18, Sewer Service Laterals, must be used for sewer service lines in the system with the following exceptions:

1) The minimum size sewer line upstream of the monitoring manhole structure shall be six (6) inches.

e. Private Sanitary Sewer Manholes.

1) Private sanitary sewer manholes shall be constructed and tested in accordance with City standards and details.

2) Manhole Inflow Protector Lid Inserts on Private Manholes. Unless otherwise approved in writing by the Public Works Director on a case-by-case basis, ALL private sanitary sewer manholes shall be provided with inflow protector lid inserts meeting City standards *(ManPan Classic inserts)*, whether or not such inserts are specifically shown or noted on the drawings.

f. See requirements and criteria under PWDS 4.22 relating to private sewer pump stations.

4.22 PRIVATE SEWER PUMP STATIONS.

a. As noted under PWDS 4.9.a.3, gravity sewer service is required where possible. Installation of private sewer pump stations is not allowed except with express prior written approval by the Public Works Director and the City Engineer on a case-by-case basis, based on a determination *(at their sole discretion and judgment)* that extension of a gravity sewer main and sewer service is not possible based on City standards and master plans *(approval during land use process where applicable, and prior to submittal of project design drawings for review otherwise)*. The property owner or development team shall provide all information *(at their expense)* requested by the City to aid in this evaluation and determination.

b. Private Sewer Pump Station Shall Serve Only a Single Legal Lot. A private sewer pump station shall not be allowed to serve more than one legal lot of record *(per City standards and per Oregon DEQ standards)*. This includes cases where multiple legal lots of record are under common ownership and/or are listed as a single tax lot.

Lot Consolidation. If there are multiple legal lots of record *(or portions of multiple legal lots of record)* underlying a single tax lot for which a private sewer pump station is proposed, the underlying legal lots shall be consolidated into a single legal lot of record *(through a property line adjustment or similar process)* as a condition of approval for the private sewer pump station *(such consolidation shall be completed prior to activation of the private sewer pump station, and prior to issuance of a temporary or permanent occupancy permit)*.

c. Any private sewer pump stations approved by the City shall meet standards

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established by the Public Works Director and the City Engineer *(see PWDS 4.3 and samples in Appendix I)*, the Oregon Plumbing Specialty Code (OPSC) and other applicable codes or standards *(whichever is more stringent)*.

Updated versions of the private sewer pump station standards will be made available to engineers after written conceptual approval of the approach by the Public Works Director and the City Engineer.

d. When private sewer pump stations are approved for use, detailed design drawings shall be submitted for review by Public Works as part of the development drawings, illustrating the basis-of-design for the pump, tank & all accessories meeting City standards, including the following.

1) Details showing and callouts listing all applicable manufacturer information for the selected system, including make, model, size of pump and tank, cut sheets as applicable.

   Per OPSC 710.9, any sewage pump system serving any "public use" shall have duplex alternating pumps *(also for uses including but not limited to commercial, industrial, multifamily, or public access buildings)*.

2) Anchor block or ballast sizing & buoyancy calculations *(typically assuming groundwater to the surface)*.

3) Callouts and/or drawings specifying control panels & features proposed for installation, including an accessible visible and audible alarm activated in the event of pump failure *(overload, mechanical failure or high water condition)* as required under OPSC 710.9, etc.

4) Flow Measurement & Telemetry Requirement Condition.

   a) If a private sewer pump station is approved which will connect to the public sewer system *(or to the wastewater treatment plant/WWTP)* downstream of the location of the City's primary influent flow measurement device for the WWTP, the private pump station shall include an approved flow meter with totalizing capabilities, along with a telemetry link to the City SCADA system *(approved by the City Engineer and the Public Works Director)* which will allow the flowrate and volume discharged to the WWTP to be remotely monitored and recorded by the City *(per DEQ and NPDES permit requirements)*.

   b) Maintenance and upkeep of any such required flowmeter and telemetry link *(including any repairs and/or upgrades which may be required for compatibility with the City systems)* shall be an ongoing obligation of the property owner in perpetuity.

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e. Septic & Holding Tanks Prohibited. Pumping from septic tanks or other similar holding tanks is expressly prohibited.

f. Recorded Agreement Required. An operation & maintenance agreement acceptable to the City shall be recorded against the property.

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