

Chapter 6

Sanitary Sewer

City of Kelso
Engineering Design Manual
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CHAPTER 6 – SANITARY SEWER

6A GENERAL CONSIDERATIONS

6A.010 General

Sanitary sewerage refers to waste water derived from domestic, commercial, and industrial pretreated waste to which storm, surface, and ground water are not intentionally admitted. The standards established by this chapter are intended to represent the minimum standards for the design wastewater facilities. Except as otherwise stated herein, these standards apply to all sanitary sewer and facilities, regardless of whether final ownership is private or public.

Sanitary sewer design shall comply with the most current edition of the following, and as stated below:

- Kelso master plans;
- KEDM;
- Department of Ecology (ECY)'s Criteria for Sewage Works Design; and
- Washington State Department of Health (DOH) requirements.

Where there is a conflict between any of these documents, the most stringent standard will apply.

6B GRAVITY SEWER

6B.010 General

All sewers shall be designed as gravity sewers whenever physically feasible.

6B.020 Flow Criteria

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. Sewer mains shall be sized for the ultimate development of the tributary area. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet the requirements for future service. Sewer lift stations shall be designed and located to optimize the service area to provide regional service. Temporary or interim lift stations will not be permitted.

New gravity sewer systems shall be designed for capacity as specified in *ECY Criteria for Sewage Works Design (Orange Book)*. When an Exception from these flow rates is requested, the submittal shall include a description of the procedure used for the sewer design, in addition to the criteria described in Chapter 1, Design Exception Process.

6B.030 Minimum Size, Location and Slopes

A. Minimum size. The minimum size for gravity sewer mains shall be 8-inch nominal diameter. The minimum size for a side sewer within the street right-of-way shall be 6 inches.

B. Gravity sewer shall be designed with a minimum depth of 5 feet and to provide gravity service to adjoining parcels and future areas to be served, and vertical clearance between water and sewer lines. For sewer mains located where grading is anticipated for future development, the sewer shall be designed such that the minimum cover over the pipe is three (3) feet to

finished grade or existing grade, whichever is greater. Gravity sewer mains and associated manholes shall not exceed a maximum depth of 20 feet at any point along its length.

C. All sewers shall be designed to provide mean flow velocities of not less than 2.0 feet per second. However, sewer slopes shall not be less than the minimum slopes for gravity sewer main as set forth in the Washington State Department of Ecology's *Criteria for Sewage Works Design*, most current edition. Larger pipe size will not be allowed to achieve lesser slopes.

The last segment in a dead-end sewer main shall be designed at a minimum slope of 1%.

Sewers shall be designed with uniform slope between manholes.

D. Gravity sewers shall be designed with straight alignment between manholes. A new manhole is required where new mains connect to existing mains, if the connection is not made at an existing manhole.

E. The layout of sewer extensions shall provide for the future continuation of the existing system as determined by the City. In addition, main extensions shall be extended to and across the side of the affected property fronting the main.

F. Sanitary Sewer and Water Main spacing. See KEDM Chapter 5.

G. Sewers shall be located in the street along the center of a travel lane, outside of the wheel tracks, and within public right of way whenever possible. Sewers located within public utility tracts or easements shall be centered within the easement.

6B.040 Easements

When sewer or sewer facilities are proposed to be located outside of street rights-of-way, an easement shall be granted to the City for access and maintenance. The minimum widths of easements shall be as follows:

- A. Sewer mains of all diameters less than ten feet deep: twenty (20) feet, except additional width may be required for pipes larger than thirty-six (36) inches diameter.
- B. For pipes ten feet deep and greater, the width of easements shall be equal to or greater than the numerical value of twice the depth of the pipe invert measured from finish grade plus the outside bell diameter of the pipe, but not less than 20 feet.
- C. Easements for lift stations, vaults or other facilities shall be dimensioned as directed by the Director.
- D. A minimum 10' wide road with an all-weather surface shall be provided along the length of the easement.

The City Engineer may require increased easement widths when necessary to insure adequate area for equipment access and maintenance.

Gates to provide access by City maintenance vehicles shall be built into fences crossing easements. Gates shall be a minimum of 12' wide.

When possible, easements for sewers or sewer facilities serving apartment complexes or commercial/industrial developments shall be in parking lots, private drives, or similar areas that allow unobstructed vehicle access for maintenance.

6B.050 Manholes

A. Manholes shall be placed at:

- Intersections with other sewers;
- Angle points in the line;
- Changes in slope, and
- At the end of the line, except cleanouts may be used where the distance to the next downstream manhole is 150 feet or less.

B. Manholes shall be spaced no further than four-hundred (400) feet apart for pipes smaller than twenty-four (24) inches, and shall be located outside of wheel travel paths. A two tenths (2/10) foot drop from manhole inlet to outlet shall be provided. The crown of all upstream pipes shall not be lower than the crown of the downstream pipe.

C. Manholes in unimproved surfaces in easements shall be two (2) feet higher than surrounding grade.

D. Connections to manholes shall not be greater than two (2) feet above the outlet invert. Drop connections are not approved.

E. Sizing

1. Minimum manhole size is 54-inch diameter.
2. 54-inch and 60-inch Manholes
 - a. Two (2) connecting pipes, 8-inch to 12-inch with more than forty-five degree (45°) deflection, 15-inch to 18-inch diam. with forty-five degree (45°) or more deflection.
 - b. Three (3) connecting pipes, 10-inch to 12-inch diam., perpendicular.
 - c. Four (4) connecting pipes, 10-inch to 12-inch diam., perpendicular.
3. 72-inch Manhole
 - a. Two (2) connecting pipes, 15-inch to 18-inch diam. with less than forty-five degree (45°) deflection.
 - b. Three (3) connecting pipes, 15-inch diam., perpendicular.
 - c. Four (4) connecting pipes, 15-inch diam., perpendicular.
4. In the above criteria "deflection" refers to the angle between any two (2) pipe channels in the manhole. Channels shall be centered in manhole with ladder rungs placed on the side with the larger shelf. A minimum of one (1) foot separation is required between the outside walls of pipes penetrating the manhole wall.

For other pipe configurations, the size of the manhole shall be as approved by the

City.

F. Locking manhole covers shall be provided in areas outside of the public right-of-way.

6B.060 High-Velocity Protection

Where velocities will exceed 7 feet per second, special measures will be required as directed by the City Engineer.

6B.070 Side Sewer

A. A side sewer refers to the extension of a line from the sewer main to the right of way line or easement line to serve a property. A sewer service line refers to the line that runs from two (2) feet outside the foundation to where the side sewer ends at the right of way line.

B. Each building served by potable water shall be served by a separate side sewer. The following exceptions may apply—an application for design exception is required:

1. A single-family residence with an accessory dwelling unit (ADU) may share a side sewer if they are in the same building. If they are in separate buildings, a separate side sewer is required from each building to the cleanout at the right-of-way line.

2. A duplex may have a shared side sewer for both units of the building. Alternatively, at the applicant's option, the units may have either (a) separate side sewers from each unit to the cleanout at the right-of-way line or (b) separate side sewers with separate connection at the sewer main.

C. If an existing sewer main with stubout(s) is located along one or more of the frontages of a proposed building requiring sewer service, then the building must be connected to the sewer system at an existing stubout.

D. Where the Applicant proposes to connect new development to an existing side sewer, the City may require the Applicant to perform physical inspection, TV inspection and testing to determine the materials, configuration and condition of the existing side sewer. If, after reviewing the results of the inspection and testing, the Director determines the existing side sewer does not comply with the KEDM, the Applicant will be required to construct a new side sewer.

E. Side sewers shall be a minimum of six (6) inch diameter.

F. Side sewers slopes shall be designed to provide a minimum flow velocity of two (2) feet per second and as shown on the Standard Plan and in the *Criteria for Sewage Works Design*.

G. Side sewers shall be laid in straight horizontal alignments.

6B.080 Crossings of non-City Rights of way, Easements, and Railway Crossings

Where the sewer is proposed to be built across a roadway not within City of Kelso jurisdiction, across an easement, or across a rail line, the Applicant shall obtain design approval and permits from the Agency with jurisdiction for the roadway, or the rail line company, or the easement

owner, if applicable. Written documentation of design approval and permit issuance shall be provided to the City prior to the City granting construction approval.

6B.090 Sewer Crossings of Asbestos Cement (A.C.) Water Lines

Where a sewer main crosses under an A.C. water main the Contractor shall replace the existing A.C. water main with Ductile Iron Pipe Class 52 between points a minimum of three (3) feet beyond each side of the sewer trench walls. Not less than full lengths of the A.C. pipe shall be removed.

6B.100 Pipe in Fill Areas

Where pipe is proposed to be constructed in previously filled areas, the Director may require a review of the fill and the proposed sewer design by a licensed geotechnical engineer hired by the Applicant. Special mitigation measures recommended by the geotechnical engineer and as directed by the City for pipe materials, horizontal and vertical design and construction means and methods may be required at the discretion of the Director.

6B.110 Industrial Connections

Applicants desiring to make a new connection to the public sewer, or use an existing connection, for the purpose of discharging industrial waste may be required to pretreat the waste prior to discharge in conformance to the City's Discharge Pretreatment Policy. The Applicant shall prepare and file with the Director and the Three Rivers Wastewater Authority General Manager a report that includes the actual and/or predicted data relating to the quantities, and the physical, chemical and biological characteristics of the waste generated. Applicant shall also provide detailed information regarding the proposed pretreatment of the waste, and the predicted physical, chemical and biological characteristics of the treated waste proposed to be discharged, and such other information as the Director may require. No permit will be issued until the report is approved by the Director and the General Manager.

6C FORCE MAINS AND LIFT STATIONS

6C.010 General

This section provides design standards applicable to force mains. If the applicant proposes a lift station or force main, design requirements will be provided as a part of the developer agreement.

6D LATECOMER AGREEMENTS

Should the Applicant believe that the utility extension is an undue hardship that will benefit other property owners, the Applicant may request a latecomer agreement.

Appendix 1: Standard Plans

Standard Plan Index

Title	Standard Plan No.
Standard Sanitary Sewer Plans	
Sanitary Sewer General Notes	KSS-000-21
Manhole Adjustment	KSS-010-21
6” Sanitary Side Sewer	KSS-020-21
Manhole Type 1	WSDOT B-15.20-01
Supplemental to Standard Plan B-15.20-01	
Manhole Type 3	WSDOT B-15.60-02
Supplemental to Standard Plan B-15.60-02	
Circular Frame (Ring) and Cover	WSDOT B-30.70-04
Supplemental to Standard Plan B-30.70-04	
Miscellaneous Details For Drainage Structures	WSDOT B-30.90-02
Supplemental to Standard Plan WSDOT B-30.90-02	
Pipe Zone Bedding and Backfill	WSDOT B-55.20-02
Supplemental to Standard Plan B-55.20-02	
8 Inch Sewer Clean-out	WSDOT B-85.40-00
Supplemental to Standard Plan WSDOT B-85.40-00	