

OLYMPIC VIEW WATER & SEWER DISTRICT SEWER DESIGN CRITERIA

1. INTRODUCTION

Design criteria is established to determine the adequacy of the existing system and the requirements of future facilities. Unless otherwise specified herein or in other District documents, the design criteria is based on "Criteria for Sewage Works Design" published by the State of Washington Department of Ecology and other accepted standards for sewer system design and construction.

2. DEVELOPER STANDARDS AND DESIGN CRITERIA

The District has a Developer Extension (DE) Manual that was adopted in 2012 by District Resolution 1003. The DE Manual, Standard Detail Drawings, and Approved Materials List establish the design guidelines, criteria and material specifications that are accepted by the District. These documents meet or exceed the minimum design standards set by DOE in the "Criteria for Sewage Works Design" when adopted.

The District currently has no plans for any large-scale service expansion or Utility Local Improvement Districts. The majority of new sewer mains are expected to come in the form of Developer Extensions.

3. ABBREVIATIONS AND DEFINITIONS

In this section, a number of common technical terms and expressions have been abbreviated. These terms and their abbreviations are presented below.

Acre(s)	ac
Cubic feet per second	cfs
Gallon(s)	gal
Gallons per acre per day	gpac
Gallons per capita per day	gpcd
Gallons per day	gpd
Gallons per minute	gpm
Million gallons per day	mgd
Parts per million	ppm

4. REFERENCE DATUM

Since hydraulic capacities of sewerage facilities are based on pipeline slopes, it is important that a common datum be used for design purposes. The original sewer system construction drawings do not indicate the datum used for the District. Some records indicate the datum was Mean Lower

Low Water (MLLW). However, all relevant structures shall be survey located and the survey location of the points shall be based on the Washington State Plane North coordinate system, NAD 83/91 horizontal datum and NAVD 88 vertical datum prior to any design or construction of sewer improvements.

5. PERIOD OF DESIGN

In planning sewerage facilities it is necessary to evaluate both present and future service needs, and to design a system compatible with variable demands over a given length of time. This time span is known as the Period of Design. A 20-year period of design shall be used for mechanical systems and 50 years for collection systems.

6. DESIGN LOADING FOR SEWERAGE FACILITIES

The flow in a sanitary sewer system is composed of commercial and industrial wastes, groundwater infiltration and surface water inflows in addition to residential wastes. All portions of the sewer system must be capable of carrying the peak rate and volume from these sources.

Table 1 lists the estimated quantities of the various components, which are included in the flow in sanitary sewers. These values have been taken from Table 8 of the *1987 Comprehensive Sewer Plan* and updated with 2007 standards.

**TABLE 1
DESIGN CRITERIA FOR SEWAGE FLOWS**

PARAMETER	CRITERIA
Quantity of Sanitary Sewage (Average) – Residential	100 gpcd
New System in Areas of Average Ground Water and Good Storm Drainage - infiltration - inflow	600 gpad <u>500 gpad</u> 1,100 gpad
Peaking Factors for Sewage Flows*:	
Population	100 300 1,000
Peak Factor:	4.2 4.0 3.8

*Values taken from Figure C1-1, Ratio of Peak hourly flow to design average flow, *1998 Criteria for Sewage Works Design*.

7. INDUSTRIAL WASTES

Present land-use planning designations show no industrial zoning within the study area. The agreement between the District and City of Edmonds does not allow discharge of industrial waste to the City's system.

8. INFILTRATION/INFLOW SOURCES

Illegal connections from roof, footing and area drains, as well as sump pumps, are not allowed.

The Department of Ecology's *Criteria for Sewage Design* standards identify sewage generation rates of 100 gpcd with a minimum of 3 people per residence. This design requirement includes normal infiltration. The 100 gpcd district design standard includes 85 gpcd plus 15 gpcd for infiltration and inflow.

9. DESIGN OF SEWER SYSTEM FACILITIES

The recommendations that follow are for preliminary design of interceptors, trunk sewers, force mains and pumping stations.

Trunk and Interceptor Sewers

Trunk sewers and interceptors shall be designed with sufficient capacity to carry the peak flows from the ultimate development of the tributary area.

Sewer mains shall be designed to maintain a minimum velocity of 2 feet per second, which is generally considered to be the minimum which will keep pipe surfaces relatively free of deposited material. Table 2 presents the minimum allowable slope of various sizes of sewers to obtain a cleaning velocity under average flow conditions. Minimum slopes are not acceptable for all sewers. Sewers with low flow rates should have increased slopes or they may become maintenance problems due to deposition of solids.

TABLE 2
MINIMUM PIPE SLOPES

PIPE SIZE IN INCHES	SLOPE* (FEET/FOOT)
8-dead end**	0.0075
8	0.0050
10	0.0028
12	0.0022
15	0.0015

*Minimum slope for various sized sewer pipe necessary to maintain a cleansing velocity of 2 fps, at full pipe conditions.

**For a new sewer line that is going to a dead end, the minimum slope is increased.

A value of 0.013 is recommended for Mannings “n” value when calculating flow in a gravity sewer system.

Force Mains

Force mains shall be constructed of HDPE or PVC and shall be sized such that the pipe velocity at the design flow rate is not less than 2 feet per second and not more than 8 feet per second. Except for grinder pump systems, the minimum force main size shall be 4”.

Pipe Sizing

Main line pipe sizing shall be a minimum pipe diameter of 8 inches.

The sewer lateral tap at the main line sewer to the property line shall be a minimum pipe diameter of 6 inches with a 6 inch wye and clean out installed at the property line in a lamphole.

A 6 inch private side sewer may serve a maximum of six (6) single-family residences.

A 4 inch side sewer may serve one (1) single family residence.

Installation of piping and backfill materials shall be in accordance with the District’s Standard Drawings and/or the District’s Approved Materials List.

Taps

New Sewer Main - Utilize a 6 inch tee.

Existing Sewer Main - New taps to an existing sewer main shall cut in a new tee with mechanical couplings or use a saddle tap.

Pumping Stations

Pump stations shall be designed in accordance with these criteria and the Washington State Department of Ecology Criteria for Sewage Works Design.

Pump stations are allowed only when service to a general area is not feasible or practical. Said determination to be made by the District. In all other instances, gravity sewers shall be provided.

Pump stations shall be designed such that the peak design flow can be accommodated with the largest pump out of service.

Except in the case of small grinder systems, pumps shall be non-clog and capable of passing 3" solids.

All pump station designs shall incorporate an on-site backup generator capable of running all of the station demands.

Pump station wet wells shall be a minimum of 8 feet in diameter.

Grinder Pumps (Privately Owned)

At times, transmitting sewer from a private side sewer to the District's sewer main, via gravity, is unachievable. At these times, a private pump station (grinder pump) must be installed per District Standard Detail Drawings. The pump must be designed to be part of the building structure it serves. I.E. Inside a garage, basement, or exterior structure attached to the main facility. Installation of a grinder pump also requires premise isolation via installation of a reduced pressure principle backflow preventer installed in an insulated box after the potable water meter.

Sewer Materials

All materials used in the sewer collections system shall be in accordance with the District's Approved Materials List. Materials not listed on the District's Approved Materials List must be approved by the District prior to

use. All materials shall be installed in accordance with the installation procedures provided by the manufacturer.

Sewer Locations

In general, local trunk and interceptor sewers will be located in existing street rights-of-way or in proposed street areas. Certain sewers will have to be located on easements following natural drainage courses.

The location of the sewer lines in relation to other utilities must also be considered. There may be some conflict in final sewer locations due to interference with water mains, drains and electrical conduits. In most cases, however, sewer lines would pass beneath the other utilities. Sewer mains shall be at least 10 horizontal feet from any existing or proposed potable water facilities. At crossings, a minimum of 18 inches of vertical separation shall be maintained between the top of a sewer main and the bottom of a water line. Separation between water and sanitary sewer pipelines shall be in accordance with the State Department of Ecology's "Criteria for Sewage Works Design" (August 2008), also referred to as the "Orange Book." Final approval of methods to be used should minimum piping separations not be met, will be determined by the District.

Minimum cover over pipes shall be 36 inches from top of pipe to the finished grade.

Manholes

Manholes shall be installed at a maximum of every 400 feet of a straight run of pipe in accordance with the District Standard Detail Drawings and/or Approved Materials List.

Manholes shall be installed at any change in pipe direction.