

CHAPTER 7

SANITARY SEWER STANDARDS

7.1 GENERAL

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of sanitary sewer facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Washington State Department of Ecology's Design Standards shall also be employed by the City in its review and approval of system connections, extensions, and/or modifications.

"Off-site" improvements may be warranted based on (1) the existing condition and capacity of the existing sanitary infrastructure; and (2) impacts caused by the proposed development. These off-site improvements (in addition to "on-site" improvements as may be warranted) will be as determined by the City Engineer so as to reasonably mitigate impacts caused by development.

The following design and construction considerations shall apply:

7.2 DESIGN STANDARDS

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems shall conform to minimum City Standards set forth herein.

- A. Detailed plans shall conform with the requirements of the Plan Checklist presented in the appendices.
- B. Construction of new sewer systems or extensions of existing systems will be allowed only if the existing receiving system is capable of supporting the added hydraulic load. Sewers shall be extended to the far property line(s) to facilitate future extensions of same.
- C. Collection and interceptor sewers shall be designed and constructed for the ultimate development of the tributary areas.
- D. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow.

- E. Computations and other data used for design of the sewer system shall be submitted to the City for approval.
- F. All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of trench should be made. When standard-strength sewer pipe is not sufficient, extra-strength pipe shall be used.
- G. All pipe shall be laid in straight lines and at uniform rate of grade between manholes. Variance from established line and grade shall not be greater than 1/2 inch, provided that such variation does not result in a level of reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed 1/64 inch per inch of pipe diameter, or 1/2 inch maximum. Any corrections required in line and grade shall be reviewed with the City and/or the City Engineer and shall be made at the expense of the Developer and/or Contractor.
- H. Deflection tests shall be performed on all PVC sewer mains as discussed below.
- I. Prior to final inspection, all pipelines shall be tested, flushed and cleaned and all debris removed. A pipeline "cleaning ball" of the proper diameter for each size of pipe shall be flushed through all pipelines prior to final inspection.
- J. Before sewer lines are accepted, the Contractor/Developer shall perform a complete televised inspection of the sewer pipe and appurtenances and shall provide to the City an audio-visual tape recording of these inspections. All equipment and materials shall be compatible with existing City equipment. It shall be the Contractor/Developer's responsibility to confirm equipment compatibility with the City prior to inspection. The City's Manager and/or his designated representative shall be notified 48 hours prior to any televised inspection.

7.3 GENERAL REQUIREMENTS

- A. Work shall be performed only by licensed and bonded contractors with a demonstrated experience in laying public sewer mains of the type being proposed for construction.
- B. Prior to any work being performed, the Contractor shall contact the Manager or City Engineer to set forth his proposed schedule.

- C. Contractor shall obtain approval of materials to be used from the City prior to ordering or delivery of materials.
- D. Generally, the sewer main shall be laid only in dedicated street right-of-way or easements at least 15-feet wide shown on preliminary plats or which have been exclusively granted to the City. A street is normally not officially recognized until the plat, which created it has been filed (recorded) with the County Auditor.
- E. The sewer main shall run parallel to and 6 feet southerly or westerly of street centerline where possible. The sewer main shall maintain a minimum 10-foot horizontal and 18-inches vertical separation from proposed or existing water mains.
- F. The maximum distance between manholes shall be 400 feet unless specifically approved otherwise by the City Engineer.
- G. The allowable cover (finished grade) for the various types of pipe are:

PVC Pipe:	4' to 20'
D.I. Pipe (CL 52):	<4' (if allowed)
D.I. Pipe (CL 52) or PVC C900:	>20' or Slopes of 18 percent or greater

All pipe shall have a minimum of 36 inches of cover (18 inches in the case of a side sewer on private property).

- H. The minimum slope for 8-inch gravity mains shall be 0.5 percent (except the minimum slope for dead end runs shall be 1.0 percent for 8-inch gravity mains) and the minimum slope for 6-inch side sewer laterals shall be 2.0 percent.
- I. All side sewer laterals shall be of the same material as the main line.
- J. Each side sewer lateral shall be equipped with a 6" x 6" tee, with an approved water-tight cap, located adjacent to, but within, the public right-of-way, to be utilized as a clean-out. A watertight six-inch capped stub shall be installed which extends vertically from the 6" x 6" tee to the finished grade.
- K. Each side sewer lateral shall have an approved water-tight cap at the termination of the stub, it shall be adequately "blocked" to satisfactorily resist the air pressure testing.

- L. Each parcel shall have its own side sewers. Multi-family buildings or mixed use buildings shall have a side sewer for each building.
- M. Each side sewer lateral shall have a 12-foot-long 2" x 4" wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to above finished grade. Above the ground surface, it shall be painted "white" with "S/S" and the depth, in feet, stenciled in black letters 2-inch high.
- N. Front lot corners shall be staked by a surveyor prior to construction for side sewer tee location(s).
- O. Side sewer connections if allowed directly into manholes shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.
- P. Manholes, where sewer extension may occur, shall be provided with knock-outs and channeled accordingly.
- Q. Manholes shall be provided with a 0.10 foot drop across the channel. Prechanneled manholes are not allowed.
- R. Manhole frame and cover shall be an Ergo hinged manhole assembly by East Jordan Ironworks. Unimproved areas require a concrete collar and a green carsonite "Sewer" marker, all manhole lids shall have the word "sewer" cast integrally onto its surface. See Standard Detail.
- S. A Concrete pad shall be placed around all frames per the Standard Detail for manholes located in non-paved areas.
- T. Pipe connections to manholes shall be as follows:
 - 1. **PVC Pipe:** Cast or grout a watertight manhole coupling (see detail) into manhole wall.
 - 2. **DI Pipe:** Bell and spigot joint or flexible coupling, either shall be 12-inch maximum distance from manhole wall.
 - 3. **PVC and DI Pipe, Optional:** Core the manhole and connect sewer pipe with a water-tight flexible rubber boot in manhole wall, Kor-N-Seal boot or equal.
- U. Provide the City's Engineer and City Inspector a copy of the cut sheets prior to construction.

- V. Pipe trenches shall not be backfilled until pipe and bedding installation have been inspected and approved by the City's Inspector.
- W. Final air testing shall not be accepted until all other underground utilities have been installed, and the lines have been flushed and cleaned and the first lift of asphalt is in place.
- X. Manhole rim and invert elevations shall be field verified after construction by the Developer's engineer(s) and the "record" drawings individually stamped by a Washington State licensed professional engineer or surveyor who shall attest to the fact that the information is correct. Acceptance of the project will not be complete until the record drawings have been submitted and approved by the City.
- Y. All commercial, industrial, or school food establishments shall be equipped with an approved grease interceptor. The grease interceptor shall be located to facilitate inspection and maintenance.

7.4 MATERIALS

A. Sewer Mains, Laterals and Force Mains

Gravity PVC pipe (15-inch diameter and smaller) shall be a minimum Class SDR 35 and be manufactured in accordance with ASTM D3034. The pipe and fittings shall be furnished with bells and spigots, which are integral with the pipe wall. Pipe joints shall use flexible elastomeric gaskets conforming to ASTM D3212. Nominal laying lengths shall be 20 feet and 13 feet.

The ductile iron pipe shall conform to ANSI/AWWA C151/A21.51-91 Standards, and current amendments thereto, except the ductile iron pipe shall be thickness Class 52 for gravity sewers and force mains. Grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16 inch, and the exterior shall be coated with an asphaltic coating. Each length shall be plainly marked with the manufacturer's identification, year case, thickness, class of pipe and weight. Note: Force mains shall be constructed of fused HDPE (SDR 11, minimum wall thickness). PVC or ductile force mains may be approved by the City in special circumstances and if the force main is between 4-feet and 8-feet deep.

The type of joint shall be mechanical joint or push-on type, employing a single gasket, such as "Tyton," except where otherwise calling for flanged ends. Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.

Restrained joint pipe, where required shall be push-on joint pipe with “Fast Tight” gaskets as furnished by U.S. Pipe or equal for 12-inch diameter and smaller pipe and “TR FLEX” as furnished by U.S. Pipe or equal for 16-inch and 24-inch-diameter pipes. Mechanical joint pipe with retainer glands (grip rings) as manufactured by “Romac” may also be required at the discretion of the City. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.

All pipe shall be jointed by the manufacturer’s standard coupling, be all of one manufacturer, be carefully installed in complete compliance with the manufacturer’s recommendations.

All fittings shall be short-bodied, ductile iron complying with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be cement lined and either mechanical joint or flanged, as indicated on the Plans.

Fittings in areas shown on the Plans for restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG, or ROMAC “Grip Ring”, as required and approved by the City Engineer.

All couplings shall be ductile iron mechanical joint sleeves.

The sewer pipe, unless otherwise approved by the City Engineer, shall be laid upgrade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with an approved temporary plug. Wherever movable shoring (steel box) is used in the ditch, pipe shall be restrained by use of a winch mounted in the downstream manhole and a line of sufficient strength threaded through the pipe and set tight before each move. Any indication that joints are not being held shall be sufficient reason for the City to require restraints, whether or not movable shoring is being used.

All pipe shall be laid in straight lines and at uniform rate of grade between manholes. Variance from established line and grade shall not be greater than 1/2 inch, provided that such variation does not result in a level of reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining

surface and pipe interior surfaces, does not exceed 1/64 inch per inch of pipe diameter, or 1/2 inch maximum. Any corrections required in line and grade shall be reviewed with the City's Manager and/or City Engineer and shall be made at the expense of the Developer.

All extensions, additions and revisions to the sewer system, unless otherwise indicated, shall be made with sewer pipe jointed by means of a flexible gasket, which shall be fabricated and installed in accordance with the manufacturer's specifications.

All joints shall be made up in strict compliance with the manufacturer's recommendations and all sewer pipe manufacture and handling shall meet or exceed the ASTM and CPAW recommended specifications, current revisions.

Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position, or loading it with dirt or other foreign material. Any gaskets so disturbed shall be removed, cleaned, relubricated if required, and replaced before the rejoining is attempted.

Care shall be taken to properly align the pipe before joints are entirely forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Since most flexible gasketed joints tend to creep apart when the end pipe is deflected and straightened, such movement shall be held to a minimum once the joint is home.

Sufficient pressure shall be applied in making the joint to assure that it is home, as described in the installation instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure that joints once home are held so, until fill material under and alongside the pipe has been sufficiently compacted. At the end of the work day, the last pipe laid shall be blocked in an effective way to prevent creep during "down time."

For the joining of dissimilar pipes suitable adapter couplings shall be used which have been approved by the City Engineer.

All gravity sewer pipe shall be bedded from a depth of 4 inches below the pipe to 8 inches above the pipe and ductile iron gravity sewer pipe shall be bedded from a depth of 4 inches below the pipe to the springline of the pipe. The bedding material shall extend across the full width of the trench and shall be compacted under the haunches of the pipe.

Clay or Controlled Density Fill (CDF) dams shall be installed across the trench and to the full depth of the granular material in all areas of steep slopes, stream crossings and wetland to prevent migration of water along the pipeline.

All backfill shall be placed and compacted in accordance with City, County, or State requirements as may be applicable and copies of the compaction results shall be provided to the City Engineer.

B. Manholes

Manholes shall be of the offset type and shall be precast concrete sections with either a cast in place base, or a precast base made from a 3,000 psi structural concrete. Joints between precast wall sections shall be confined O-ring or as otherwise specified.

For connections to existing systems, a concrete coring machine, suitable for this type of work, shall be utilized in making the connection. The existing manhole shall be rechanneled as required. The new pipe connection shall be plugged (watertight) until the new pipe system has been installed and approved. The Contractor shall be responsible for any existing defects in the existing manhole unless these defects are witnessed by a representative of the City prior to any work being performed to make the connection. The Contractor shall be required to remove any and all deleterious material in the existing manhole and downstream reaches as a result of this work.

The minimum diameter manhole shall be 48 inches to a depth of 20 feet, and 54 inches for depths greater than 20 feet. The City may require an increased manhole diameter for future connections.

Terminal manholes at the end of the force mains may need protective coating for control of corrosion. Odor control may also be required. The City shall determine the need for either, or both, of these items.

1. Manhole Sections

Manhole sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the ladder steps. The completed manhole shall be rigid, true to dimension, and be watertight. Rough, uneven surfaces will not be permitted.

The mortar used between the joints in the precast sections and for laying manhole adjusting bricks shall be composed of an epoxy

non-shrink grout. All joints and pick holes shall be wetted and completely filled with grout, smoothed both inside and outside to ensure water tightness.

2. Manhole Steps

Manhole steps shall be polypropylene, Lane International Corp. No. P13938 or equal. Ladders (maximum 3-foot length) shall be polypropylene Lane International Corp. or equal, and shall be compatible with steps.

3. Grade Adjustment

Where work is located in public right of way, not less than 18 inches or more than 26 inches shall be provided between the top of the cone or slab and the top of the manhole frame.

4. Channels

Channels shall be field poured and made to conform accurately to the sewer grade and shall be brought together smoothly with well rounded junctions, satisfactory to the City Inspector. The channels shall be field poured after the inlet and outlet pipes have been laid and firmly grouted into place at the proper elevation. Allowances shall be made for a 0.1-inch drop in elevation across the manhole in the direction of flow. Channel sides shall be carried up vertically from the invert to three-quarters of the diameter of the various pipes. The concrete shelf shall be warped evenly and sloped 3/8 inch per foot to drain. Rough, uneven surfaces will not be permitted. Channels shall be constructed to allow the installation and use of a mechanical plug or flow meter of the appropriate size.

5. Drop Manholes

Drop manholes shall, in all respects, be constructed as a standard manhole with the exception of the drop connection as shown in the details. Inside drop manholes shall be a minimum of 54 inches in diameter.

6. Lift Holes and Steel Loops

All lift holes shall be completely filled with expanding mortar, smoothed both inside and outside, to insure water tightness. All steel loops shall be removed, flush with the manhole wall. The