

STANWOOD PUBLIC WORKS STANDARDS

CHAPTER 5

5.000 SANITARY SEWER

5A GENERAL CONSIDERATIONS

5A.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. Pretreatment shall follow all the requirements as set forth by DOE.

Any extension of Stanwood's sanitary sewer system must be approved by the Department of Public Works and must conform to the City of Stanwood Comprehensive Sanitary Sewer Plan, City of Stanwood Wastewater Facilities Plan, Department of Ecology (DOE), and Snohomish County Health District requirements.

Within the corporate city limits where a public sewer is available, it must be used. Where public sewer is not available within the city limits, connection is not required provided that the sewage from the structure originates 200 feet or more from the public sewer. In the case of private residential or commercial developments where the developed property abuts a right-of-way in which a public sewer is located or where a service connection is otherwise provided, connection of all structures generating sewage shall be required to connect to the public sewer regardless of distance from the public sewer.

Anyone who wishes to extend or connect to the City's sewer system should contact the Public Works Department for a sewer extension/connection fee estimate of the costs due the City for a sewer extension or connection.

Prior to the release of any water meters, or occupancy, all Public Works improvements must be completed and approved, and all applicable fees must be paid in full.

5A.020 Marking Side Sewers

The side sewer will be marked with a PVC flexible marker connected to pipe and extended above ground four feet.

5A.030 Sanitary Sewer/Water Main Crossings.

See Water Chapter.

5A.040 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The State of Washington shall license the engineer or surveyor directing such work as a professional engineer or professional land surveyor.

Stanwood Public Works Standards

A preconstruction meeting shall be held with the City prior to commencing staking. The City shall inspect all construction staking prior to construction.

The minimum staking of sewer lines shall be as directed by the City Engineer or as follows:

- A. Stake location of mainline pipe and laterals every 50 feet with cut or fill to invert of pipe.
- B. Stake location of all manholes for alignment and grade with cut or fill to rim and invert of pipes.

5A.050 Trench Excavation.

See Water Chapter, except for the reference to the 36-inches of cover.

5A.060 Backfilling

See Transportation Chapter and sewer details for requirements regarding trench backfill.

Where native soils are excavated from trenches and replaced with bedding that is more pervious (e.g. clay replaced with granular bedding), CDF or clay trench dams shall be provided every 300 feet along the sewer alignment to prevent the transport of groundwater.

5A.070 Street Patching and Restoration

See Transportation Chapter for requirements regarding street patching and trench restoration.

5A.080 Testing

Prior to acceptance and approval of construction, the following tests shall apply to each type of construction:

A. Gravity Sewer

1. Air Test

Prior to acceptance of the project, the gravity sewer pipe shall be subject to a low-pressure air test per WSDOT/APWA Standards. The contractor shall furnish all equipment and personnel for conducting the test under the observation of the City inspector. The testing equipment shall be subject to the approval of the City. The construction plans shall reflect the air test parameters and requirements.

The contractor shall make an air test for his own purposes prior to notifying the City to witness the test. The acceptance air test shall be made after trench is backfilled and compacted and the roadway section is completed to subgrade.

All wyes, tees and end of side sewer stubs shall be plugged with flexible joint caps, or acceptable alternates, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and their removal

Stanwood Public Works Standards

shall provide a socket suitable for making a flexible jointed lateral connection or extension.

Immediately following the pipe cleaning, the pipe installation shall be tested with low-pressure air. Tests shall be conducted per WSDOT Standards.

2. Television Inspection

Testing of the sewer main shall include a television inspection by the contractor. Television inspection shall be done after the air test has passed and before the roadway is paved. Immediately prior to a television inspection, enough water shall be run down the line so it comes out the lower manhole. A copy of the videotape and written report shall be submitted to the City. Acceptance of the line will be made after the tape has been reviewed and approved by the inspector. Any tap to an existing system needs to be televised as well.

3. Water Test or Vacuum Test

A water test of all manholes is also required. The water test shall be made by the contractor first by filling the manhole up with water and letting it sit for 24 hours to allow the water to saturate the concrete. After 24 hours the manhole shall be filled to the top of the cone. The water cannot drop more than 0.05 gallons in 15 minutes per foot of head above invert to pass. Upon completion of the water test, the water shall be pumped out of the manhole and not allowed to be released to the system. Vacuum testing, in accordance with ASTM C-1244-93, may be used in lieu of water testing.

4. Deflection Test

A deflection test in accordance with the Standard Specifications shall be required on all sewers except laterals.

B. Force Main

1. Prior to acceptance of the project, the pressure line and service lines shall be subjected to a hydrostatic pressure test of 150 pounds for four hours and any leaks or imperfections developing under said pressure shall be remedied by the contractor WSDOT/APWA Standards. No air will be allowed in the line. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. The pressure test shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests.

Tests shall be made after all connections have been made. This is to include any and all connections as shown on the plan. The contractor shall perform all tests to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

2. A water test for all wet wells in accordance with the manhole water test for gravity sewer shall be required.

Stanwood Public Works Standards

3. Pump operation, alarms and electrical inspection of all lift stations is required.
4. The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made. The contractor shall perform all tests to assure that the equipment to be used for the test is adequate and in good operating condition.

5B GRAVITY SEWER

5B.010 General

All sewers shall be designed as a gravity sewer whenever physically feasible or as approved by the Public Works Director.

5B.020 Design Standards

The design of any sewer extension/connection shall conform to City Standards, Department of Ecology's "Criteria of Sewage Works Design", and any applicable standards as set forth herein.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City.

New gravity sewer systems shall be designed on the basis of an average daily per capita flow of sewage of not less than 100 gallons per day. Generally, laterals and submain sewers should be designed to carry, when running full, not less than 400 gallons daily per capita contributions of sewage. When deviations from the foregoing per capita rates are used, a description of the procedure used for sewer design shall be submitted to the Department of Public Works for review and approval.

The General Notes that follow shall be included on any plans dealing with sanitary sewer design.

5B.030 Sanitary Sewer Construction General Notes

1. All workmanship and materials shall be in accordance with City of Stanwood standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).
2. The contractor, prior to the start of construction, shall obtain all approvals and permits required by the City of Stanwood.
3. If construction is to take place in the County right-of-way, the contractor shall notify the County and obtain all the required approvals and permits.
4. A preconstruction meeting shall be held prior to the start of construction.
5. The Stanwood Public Works Department shall be notified a minimum of 72 hours in advance of a tap connection to an existing main. The City shall be present at the time of the tap.

Stanwood Public Works Standards

6. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation.
7. Gravity sewer main shall be PVC, ASTM D 3034 SDR 35.
8. Precast manholes shall meet the requirements of ASTM C 478. Manholes shall be Type 1-48" manhole unless otherwise specified on the plans. Joints shall be rubber gasketed conforming to ASTM C 443 and shall be routed from the inside. Lift holes shall be grouted from the outside and inside of the manhole.
9. Side sewer services shall be PVC, ASTM D 3034 SDR 35 with flexible gasketed joints. Side sewer connections shall be made by a tap to an existing main or a wye branch from a new main connected above the springline of the pipe.
10. All sewer mains shall be field staked for grades and alignment by a licensed engineering or surveying firm qualified to perform such work.
11. All plastic pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the proposed finished subgrade. The marker shall be plastic non-biodegradable, metal core or backing marked "sewer" which can be detected by a standard metal detector. In addition, force mains and curvilinear sewers shall be installed with 14 gauge coated copper wire wrapped around all plastic pipe, brought up and tied off at valve body. On a curvilinear sewer, the wire shall be brought up, bared and wrapped three times around the manhole ring. Tape shall be per WSDOT/APWA Standards. The contractor shall furnish the tape and wire.
12. All buried power for pump systems shall be installed with continuous tracer tape installed 12" above the buried power. The marker shall be plastic non-biodegradable, metal core backing marked "power". Contractor shall furnish tape per WSDOT/APWA Standards.
13. Bedding of the sewer main and compaction of the backfill material shall be required in accordance with WSDOT/APWA Standards.
14. A three-foot square x four-inch thick concrete pad shall be installed around all cleanouts that are not in a pavement area.
15. Temporary street patching shall be allowed for as approved by the City Engineer. Temporary street patching shall be provided by placement and compaction on one-inch maximum asphalt concrete cold mix. Contractor shall be responsible for maintenance as required.
16. Erosion control measures shall be taken by the contractor during construction to prevent infiltration of existing and proposed storm drainage facilities and roadways.
17. Provide traffic control plan(s) in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) as required.

Stanwood Public Works Standards

18. It shall be the responsibility of the contractor to have a copy of these approved plans on construction site at all times.
19. Any changes to the design shall first be reviewed and approved by the project engineer and the City of Stanwood.
20. All lines shall be high velocity cleaned and pressure tested prior to paving in conformance with WSDOT/APWA Standards. Hydrant flushing of lines is not an acceptable cleaning method. Testing of the sanitary sewer main shall include TVing of the main by the contractor. Immediately prior to TVing, enough water shall be run down the line so it comes out the lower manhole. A copy of the videotape shall be submitted to the City of Stanwood. Acceptance of the line will be made after the tape has been reviewed and approved by the inspector. A water or vacuum test of all manholes in accordance with Stanwood standards is also required. Testing shall take place after all underground utilities are installed and compaction of the roadway subgrade is completed.
21. All pressure mains shall be hydrostatically tested in conformance with the WSDOT/APWA Standards. In addition, all pressure mains shall be pigged or flushed in the presence of the City Inspector prior to placing pressure main in service.
22. Prior to backfill all mains and appurtenances shall be inspected and approved by the City of Stanwood Construction Inspector. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor's responsibility to notify the City of Stanwood for the required inspections.

5B.040 Main Line Gravity

- A. Size. 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.

The minimum size for submains and mains shall be 8-inch inside diameter. The minimum size for a lateral shall be 4 inches.

A 6-inch diameter minimum lateral is required for all commercial or general business applications or for multifamily connections.

The design is subject to all other design requirements as noted in this Chapter.

- B. Material. Sewer main shall be PVC, ASTM D 3034, SDR 35 with joints and rubber gaskets conforming to ASTM D 3212 and ASTM F 477.
- C. Depth. Gravity sewer will typically have a minimum depth of 5 feet to provide gravity service to adjoining parcels, adequate head room within manholes for maintenance personnel and vertical clearance between water and sewer lines. Actual depth will be determined by slope, flow, velocity and elevation of existing system.

Stanwood Public Works Standards

- D. All building sewer connections to the main shall be made with a wye connection. All new mains connecting to existing mains shall require the installation of a new manhole if not made at an existing manhole.

5B.050 Connection to Existing System

- A. At connection to existing system, all new sewer connections shall be physically plugged until all tests have been completed and the City approves the removal of the plug.
- B. Connection of new pipelines to existing manholes shall be accomplished by using provided knockouts. Where knockouts are not available, the manhole shall be core drilled for connection. The transition of connecting channels shall be constructed so as not to interrupt existing flow patterns.
- C. Connection of a pipeline to a system where a manhole is not available shall be accomplished by pouring a concrete base and setting manhole sections. The existing pipe shall not be cut into until approval is received from the City.
- D. Connections where an existing stub out is not available or where a new building sewer is the same size as the existing main shall be accomplished by the installation of a new manhole.
- E. Taps shall not be allowed to protrude into the existing main. The Public Works Department shall be notified 48 hours prior to any tap of a City sewer. A City representative shall be present to witness the tap.

5B.060 Manholes

Precast manholes shall meet the requirements of ASTM C 478 with either a precast base or a cast-in-place base made from minimum 3000-psi structural concrete. Manholes shall be Type 1, 48-inch diameter minimum. The minimum clear opening in the manhole frame shall be 24 inches. Joints shall be rubber gasketed conforming to ASTM C 443 and shall be grouted from the inside. Lift holes shall be grouted from the outside and inside of the manhole. Eccentric manhole cone shall be offset so as not to be located in the tire track of a traveled lane.

Manhole frames and covers shall be cast iron casting marked "Sewer" conforming to the requirements of ASTM A-30, Class 25, and shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability. Repairs of defects by welding or by the use of smooth-on or similar material will not be permitted. Manhole rings and covers shall be machine finished or ground-on seating surfaces so as to assure non-rocking fit in any position and interchangeability. Manholes located in areas subject to inflow shall be equipped with a sewer guard watertight manhole insert.

Where lock-type castings are called for, the casting device shall be such that the cover may be readily released from the ring and all movable parts shall be made of non-corrosive materials and otherwise arranged to avoid possible binding.

All castings will be coated with a bituminous coating prior to delivery to the job site.

Safety steps shall be fabricated of polypropylene conforming to an ASTM D-4101 specification, injection molded around a 1/2 inch ASTM A-615 grade 60 steel reinforcing bar with anti-slip tread. Steps shall project uniformly from the inside wall of the manhole. Steps

Stanwood Public Works Standards

shall be installed to form a continuous vertical ladder with rungs equally spaced on 12-inch centers.

Generally, gravity sewers shall be designed with straight alignment between manholes.

Manholes shall be provided at a maximum of 400 foot intervals for 8-inch to 15-inch sewers, 500 foot intervals for 18-inch to 30-inch sewers, at intersections, and at changes in direction, grade or pipe size. Greater spacing may be permitted in larger sewers.

Minimum slope through the manhole shall be 1/10th of a foot from invert in to invert out.

Manhole sizing shall be determined by the following criteria:

- A. 48" Manhole
 - 1. 2 connecting pipes, 8-inch to 12-inch diameter
 - 2. 3 connecting pipes, 8-inch to 10-inch diameter, perpendicular
 - 3. 4 connecting pipes, 8-inch diameter, perpendicular
- B. 54" Manhole
 - 1. 2 connecting pipes, 8-inch to 12-inch with more than 45° deflection
 - 2. 3 connecting pipes, 10-inch to 12-inch diameter, perpendicular
 - 3. 4 connecting pipes, 10-inch to 12-inch diameter, perpendicular
- C. 72" Manhole
 - 1. 2 connecting pipes, 15-inch to 18-inch diameter with less than 45° deflection
 - 2. 3 connecting pipes, 15-inch diameter, perpendicular
 - 3. 4 connecting pipes, 15-inch diameter, perpendicular

In the above criteria "deflection" refers to the angle between any 2 pipe channels in the manhole.

For other pipe configurations, the City shall approve the size of the manhole.

The above configurations will provide adequate shelves and room for maintenance and performing TV inspections.

5B.070 Slope

All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second based on Mannings formula using an "n" value of 0.013. The City may permit use of other practical "n" values if deemed justifiable on the basis of research or field data submitted. The following minimum slopes should be provided however slopes greater than these are desirable. Sewers shall be laid with uniform slope between manholes

Stanwood Public Works Standards

Sewer Size in Inches	Minimum % Slope % (Feet per 100')
6	1.00 (0.0100 Ft/Ft)
8	0.40 (0.0040 Ft/Ft)
10	0.28 (0.0028 Ft/Ft)
12	0.22 (0.0022 Ft/Ft)
14	0.17 (0.0017 Ft/Ft)
15	0.15 (0.0015 Ft/Ft)
16	0.14 (0.0014 Ft/Ft)
18	0.12 (0.0012 Ft/Ft)
21	0.10 (0.0010 Ft/Ft)
24	0.08 (0.0008 Ft/Ft)
27	0.07 (0.0007 Ft/Ft)
30	0.06 (0.0006 Ft/Ft)
36	0.05 (0.0005 Ft/Ft)

5B.080 Increasing Size

Manholes shall be provided where pipe size changes occur.

Where a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

5B.090 High Velocity Protection

Where velocities greater than 15 feet per second are expected, special provisions such as thrust blocking and piping materials shall be made to protect against displacement by erosion and shock.

5B.100 Drops

Straight grades between invert out of last manhole and connection to existing are preferred over drops whenever possible. Care must be taken when designing steep grades so as not to create a situation of excessive velocity or excavation.

An outside drop connection shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

The City will not allow an inside drop connection unless otherwise approved by the Public Works Director. If approved, a larger manhole will be required.

Stanwood Public Works Standards

5B.110 Cleanouts

Cleanouts are not an acceptable substitute for manholes; however, they may be used in lieu of manholes at the end of 6 or 8 inch diameter lines of not more than 150 feet in length. This does not include a 6-inch building sewer to serve one or two single-family dwellings. Location of cleanout for building sewers is governed by the Uniform Plumbing Code (UPC) as adopted by SMC.

All cleanouts in City right-of-way shall be extended to grade and a 3-foot square by 4-inch concrete pad shall be installed around all cleanouts that are not in pavement area.

5B.120 Building Sewer

Prior to a building being connected to public sewer, a connection permit must be obtained from the City. Materials and design criteria for a building sewer are covered by the UPC as adopted by the City of Stanwood. Inspection of the sewer is the responsibility of the Public Works Department.

5C LIFT STATIONS

5C.010 General

All lift stations will be designed to serve the appropriate basin as identified in the Stanwood Wastewater Facilities Plan.

5C.020 Design Standards

The design of any lift station shall conform to City standards, Department of Ecology's "Criteria of Sewage Works Design" and applicable standards as set forth herein. In addition, the plans shall include the following:

1. An overall site illustration of the lift station showing the location of all components including elevations.
2. Service size, voltage and enclosure type and location in relation to the pump station.
3. A list of specific materials used including quantity description and manufacturer name.
4. A schematic and line diagram of the service and motor control center and lift station.
5. The electrical shall be designed to meet state and local electrical code requirements.
6. The plans shall show all required telemetry installation with schematics.
7. An operation and maintenance manual from the lift station manufacturer shall be supplied.
8. A lift station emergency by-pass connection shall be provided per Standard Details.

A design report shall be submitted with each lift station demonstrating its conformance with the standards as outlined above and shall address the following items:

Stanwood Public Works Standards

Pump Data

- size and type
- horsepower
- pump curves
- head capacity
- velocity

Motor

- size and type
- cycle length
- type of mount
- controls
- type

Telemetry

- alarm system (must be compatible with City system)

Housing

- size and type
- ventilation
- humidity control
- interior lighting
- access

Auxiliary Power

- provision for connection required of all lift stations. Auxiliary generator will be required as determined by the City Engineer.

Well Sizing

- type
- storage capacity

Maintenance

- warranty
- tools and equipment required

Electrical Service

- size and type
- source

Corrosion Protection

- type of materials

Stanwood Public Works Standards

- coatings
- linings
- maintenance

Site Layout

- location of lift station on property

Testing

- operational
- pressure

Pipes and Valves

- size and type
- bypass

5D PRESSURE SEWER (FORCE MAIN)

5D.010 General

Low pressure systems may be considered for situations where high ground water table or topography make gravity sewer impractical.

5D.020 Design Standards

The design of any sewer extension/connection shall conform to City standards, Department of Ecology's "Criteria of Sewage Works Design", and any applicable standards as set forth herein.

The layout of 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 through the side of the affected property fronting the main.

New sewer systems shall be designed by methods in conjunction with the basis of per capita flow rates. Methods shall include the use of peaking factors for the contributing area, allowances for future commercial and industrial areas, and modification of per capita flow rates based on specific data. Documentation of the alternative method used shall be provided along with plans.

5D.030 Force Main

- A. Material. Force mains for sizes up to 12 inches shall be ductile iron AWWA C151, Class 50 PVC C900 with ductile iron fittings and gasketed joints, or AWWA C906 HDPE. For 14 to 24 inch mains, pipe shall be ductile iron AWWA C151 Class 50 or PVC C905 with ductile iron fittings and gasketed joints. A more rigid pipe may be required where unlimited trench widths occur.
- B. Depth. Force mains shall have a minimum 36 inches of cover to top of pipe. See Water Chapter for sanitary sewer/water main crossing requirements.

Stanwood Public Works Standards

- C. Velocity. The minimum velocity allowed is 2 feet per second (fps) at average Dry Weather Flow. 2 fps is required to maintain solids in suspension although 3 fps is desired to scour settled solids. Maximum velocity allowed shall be 8 fps.

5D.040 Air/Vacuum Valves

Air release valves and air/vacuum valves shall be located at the high points of the line within a standard 48-inch manhole or a comparable sized approved vault. Air release valves shall be fitted with an activated carbon canister to absorb compounds with disagreeable odors prior to releasing the air to the surrounding area. Grades shall be designed to minimize the need for air/vacuum valves when practical. Vehicular access to valve is required for maintenance.

5D.050 Force Main Drain

Provisions to drain a force main to facilitate repairs or to temporarily remove force main from service shall be provided. This may be accomplished through the use of a valved tee connected to a drain line at the low point of the line. A manhole shall be set over the force main at the valved tee.

5D.060 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class 3000 poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

5D.070 Force Main Termination

Hydrogen sulfide odor (H₂S) and the buildup of sulfuric acid (H₂SO₄) occur in the operation of a force main. To mitigate these conditions some type of control method(s) shall be used. This may include chemical addition at the pump station and/or the reaeration of the wastewater at or near the terminus. Reaeration may include the following:

1. Construction of a vault housing and aspiration assembly.
2. The use of hydraulic fall (vertical siphon) within the terminal manhole.
3. High velocity discharge with smooth transition so as to not cause splashing of force main into the down stream gravity sewer.

These methods would all require an adequate source of fresh air at the vault or manhole. At a minimum, the manhole at the terminus and the first manhole downstream of the terminus shall be coated with Tnemec 120 vinyl ester, Quantum polymorphic resin or approved equal, which is resistant to sulfuric acid and hydrogen sulfide.

5D.080 Individual Pressure Sewer Services

Pump systems for individual pressure sewer systems shall be positive displacement pumps equal to Environment One. The pressure sewer systems shall be designed by a licensed engineer. The specifics shall be reviewed by the City.