

CHAPTER 5 SANITARY SEWER

Table of Contents

5A	General Considerations	4
5A.01	General.....	4
5A.02	Definitions.....	4
5A.02	Sanitary Sewer/Watermain Crossings	5
5A.03	Staking	5
5A.04	Construction	5
5B	GRAVITY SEWERS	6
5B.01	General Design Criteria.....	6
5B.02	Slope	6
5B.03	Connections	7
5B.04	Manholes.....	7
5B.05	High Velocity Protection	9
5B.06	Cleanouts	9
5B.07	Sewer Laterals	10
5B.08	Testing.....	10
5C	LIFT STATIONS	12
5C.01	General Design Criteria.....	12
5D	PRESSURE SEWER (FORCE MAIN)	15
5D.01	General Design Criteria	15
5D.02	Air/Vacuum Valves	15
5D.03	Drains.....	16
5D.04	Pigging Ports.....	16
5D.05	Testing.....	16
5E	GRINDER PUMP SYSTEMs	16
5E.01	General Design Criteria.....	16
5E.0302	Collection System.....	17
5E.03	Controls and Alarms.....	18

5F GREASE TRAP/GREASE INTERCEPTOR..... 19
5F.01 General..... 19
5F.02 Capacity 20

Table of Drawings

- 5-1 Typical Manhole
- 5-2a Shallow Manhole Less than 3.5'
- 5-2b Shallow Manhole 3.5' – 5.5'
- 5-3 Manhole Collar
- 5-4a Drop Connection A – Ductile Iron Encased
- 5-4b Drop Connection B – Concrete Encased
- 5-5 Cleanout
- 5-6 S.T.E.P. System Air Release Assembly
- 5-7 Option 1 – Sewer Details Lateral Service Connection
- 5-7a Option 2 – Sewer Details Lateral Service Connection
- 5-8 Side Sewer Cleanout
- 5-9 Sanitary Sewer Saddle Tap
- 5-10 Side Sewer Plug
- 5-11 Sewer Main Connection
- 5-12 Pig Port
- 5-13 Grinder Pump Detail
- 5-14 Grinder Pump Storage Pipe
- 5-15a Typical Pump Control Panel Installation
- 5-15b Typical Pump Control Panel Installation
- 5-16 PVC Pressure Cleanout Detail

SANITARY SEWER

5A GENERAL CONSIDERATIONS

5A.01 General

- A. Within the corporate City limits where public sewer is available, it must be used. Connection is not required provided that the property is more than 500-feet from the public sewer, except in the case of land development where the developed property abuts a right-of-way in which a public sewer is located or where a service connection is otherwise provided. In this case, connection of all structures generating sewage shall be required to connect to the public sewer regardless of distance.
- B. Anyone desiring to extend or connect to the City sewer system must contact the City for a Pre-construction Application form. After the completed application is returned to the City, along with any other information that may be required or requested, staff will determine the conditions of service for connection to the sewer system.
- C. All sewers shall be designed as a gravity sewer whenever physically and/or economically feasible or as outlined in the *City of Winlock General Sewer Plan*.
- D. Extension of or connection to sewer lines outside of the Winlock Urban Growth Area (UGA) may be limited under the provisions of the Lewis County Comprehensive Plan. The City will not allow service outside of the UGA without written permission from the County.
- E. Maintenance of the building sewers shall be the responsibility of the property owner while the remaining sewer lateral and main shall be the City's responsibility.

5A.02 Definitions

- A. **Building Sewer** – A building sewer refers to the extension from a building's discharge plumbing (two (2) feet outside of the building) to the edge of pavement or curb line and shall have no other common sewers discharging into it.
- B. **Interceptor** – A sewer pipe receiving flow from a number of main or trunk sewers, force mains, etc.
- C. **Lateral** – see "Sewer Lateral."
- D. **Private Sewer** – Any portion of the sewer conveyance system or lines connected thereto, located on private property where no easements are granted to the City. Maintenance of a private sewer shall be the responsibility of the property owner(s).

- E. **Public Sewer** – That portion of the sewer conveyance system located within the public right-of-way or easements that are owned, operated and maintained by the City.
- F. **Sewer Lateral, Lateral or Side Sewer** – The portion of the service line beginning at the end of the building sewer, typically the curb line or edge of pavement, (see Building Sewer) and extending to the sewer main. The sewer lateral is owned and maintained by the City.
- G. **Sewer Main or Trunk** – A sewer pipe that receives flow from one or more sewer mains and/or building sewers.
- H. **Side Sewer** – see "Sewer Lateral."
- I. **Side Sewer Permit** – A permit issued by the City for the purposes of monitoring and controlling work on sanitary side sewers and delineating specific and general criteria and requirements for side sewer work. (see "Building Sewer").

5A.02 Sanitary Sewer/Watermain Crossings

- A. See *Chapter 4* for requirements regarding sewer and water separation.

5A.03 Staking

- A. All surveying and staking shall be performed by a surveying firm licensed by the State of Washington and possessing the appropriate business license(s) to perform such work.

The minimum staking of sewer lines shall be as follows:

1. Centerline alignment must be staked with cuts and/or fills to flow at twenty-five (25) feet and fifty (50) feet from each manhole or structure and every fifty (50) feet thereafter, unless more frequent staking is required for construction at the discretion of a City representative.
2. Manholes must be staked with hubs to include invert elevations of all pipes and top of rim elevations to finished grade.
3. Location of valves, fixtures and septic tank shall be staked for force mains and grinder pump systems.

5A.04 Construction

- A. All sewer construction shall be in accordance with the Standard Specifications, Standard Plans, and as supplemented herein. See *Chapter 2* of these Guidelines for requirements regarding street patching and trench restoration.

5B GRAVITY SEWERS

5B.01 General Design Criteria

- A. The design of any sewer extension/connection will conform to these Design Criteria, *Department of Ecology's "Criteria of Sewage Works Design,"* (Orange Book) and any applicable criteria as set forth herein. The Orange Book can be referenced on-line at [<http://www.ecy.wa.gov/pubs/9837/start.pdf>]
- B. 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. See the following *Orange Book Table G2-2 Design Basis for New Sewage Works*. This figure is assumed to cover normal infiltration, but an additional allowance shall be made where conditions are unfavorable. Generally, laterals and sub-main 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 City for review and approval.
- C. The minimum size for mains shall be eight (8) inch inside diameter. Sewer mains shall be sized for the ultimate development of the tributary area. Nothing will 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.
- D. Sewer mains shall be constructed using materials conforming to the following:
1. PVC pipe six (6) to fifteen (15) inches diameter must meet either ASTM D 3034, SDR 35 solid wall pipe, or ASTM F 794 for solid seamless profile pipe; or
 2. PVC pipe 18 to 27 inches diameter shall conform to ASTM F679 Type 1 only.
 3. All joints for the PVC pipe shall conform to ASTM D 3212 with rubber gaskets conforming to ASTM F 477.
- E. Gravity sewer shall have a minimum depth of five (5) feet, unless otherwise approved. Actual depth shall be determined by slope, flow, velocity and elevation of existing system.

5B.02 Slope

- A. 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 *Manning's Formula* using an "n" value of 0.013. Use of other practical "n" values may be permitted by the City, if deemed justifiable on the basis of research or field data submitted. Provide minimum slope as designated in Orange Book, however, slopes greater than these are desirable.

- B. Under special conditions, slopes slightly less than is required for the 2.0 feet per second velocity, may be permitted by the City. Such decreased slopes will only be considered where the depth of flow shall be thirty (30) percent of the diameter or greater for design average flow. Whenever such decreased slopes are proposed, the design engineer shall furnish the City with the plans and computations of the depths of flow at minimum, average, and daily or hourly rates of flow. Larger pipe will not be allowed to achieve lesser slopes.
- C. Gravity sewers shall be designed with a straight alignment and constant slope between manholes.

5B.03 Connections

- A. Connections to existing sewers shall conform to the Standard Details.
- B. At connection to the 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.
- C. Connection of new sewer mains to existing manholes shall be accomplished by using core-drilled holes. The transition of connecting channels shall be constructed so as not to interrupt existing flow patterns. Manholes that contain knockouts shall not be permitted for use as part of the City sewer collection system. The City will collect all tapping cores from the Contractor, or shall be informed if the cores were washed into the sewer.
- D. Connection of a sewer main at a location without an existing manhole 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.
- E. 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.
- F. Contractor shall provide bypass pumping where directed by the City or otherwise required.

5B.04 Manholes

- A. Pre-cast manholes shall be Type 1, 48-inch diameter minimum and shall be in accordance with the Standard Details and Standard Specifications. The minimum clear opening in the manhole frame shall be twenty-four (24) inches. Eccentric manhole cone shall be offset so as not to be located in the tire track of a traveled lane.

- B. Manhole frames and covers shall be cast iron casting marked "SEWER" conforming to the requirements of 24-inch diameter ASTM A-30, Class 25, and shall be free of porosity, shrink cavities, cold shuts, 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 an approved watertight manhole insert.
- C. 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. The locking device shall be made of a non-corrosive material or properly coated to protect against corrosion. All casting shall be coated with a bituminous coating prior to delivery to the job site.
- D. Safety steps shall be fabricated of polypropylene conforming to an ASTM D-4101 specification, injection molded around a ½-inch ASTM A-615 grade 60 steel reinforcing bar with anti-slip tread. Steps shall project uniformly from the inside wall of the manhole.
- E. Manholes shall be placed at standard maximum 300-foot intervals, and at changes in direction, grade or pipe size. Slope through the manhole shall be 1/10th of one-foot from invert in to invert out unless otherwise approved by the City.
- F. Where a smaller sewer joint 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 80 percent depth point of both sewers at the same elevation or matching crowns. Pipe material shall be consistent between manholes.
- G. 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. Grade changes associated with "sweeps" will not be allowed. The angle between the line(s) entering a manhole and the line leaving shall be no less than 90 degrees.
- H. 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. Outside drop structures shall be constructed per Standard Details.
- I. All manholes that are to be owned and maintained by the City shall be accessible at all times to operations, maintenance equipment and vehicles. All-weather access

drives may be required to provide a sufficient driving surface for City vehicles, at the discretion of the City.

J. Manhole Sizing shall be determined by the following criteria:

1. 48" Manhole
 - a. Two (2) connecting pipes, 8- to 12-inch diameter
 - b. Three (3) connecting pipes, 8- to 10-inch diameter, perpendicular
 - c. Four (4) connecting pipes, 8-inch diameter, perpendicular
2. 54" Manhole
 - a. Two (2) connecting pipes, 8- to 12-inch diameter with greater than a 45 degree deflection
 - b. Three (3) connecting pipes, 10- to 12-inch diameter, perpendicular
 - c. Four (4) connecting pipes, 10- to 12-inch diameter, perpendicular
3. 72" Manhole
 - a. Two (2) connecting pipes, 15- to 18-inch diameter with less than a 45 degrees deflection
 - b. Three (3) connecting pipes, 15-inch diameter, perpendicular
 - c. Four (4) connecting pipes, 15-inch diameter, perpendicular
4. In the above criteria, "deflection" refers to the angle between any two (2) inlet pipe channels in the manhole. The intent of the noted configurations is to provide adequate shelves and room for maintenance and performing television inspections. For other pipe configurations, the size of the manhole shall be approved by the City.

5B.05 High Velocity Protection

Where velocities greater than fifteen (15) feet per second are expected, special provisions such as thrust blocking and special piping materials shall be utilized to protect against displacement and hydrogen sulfide gas.

5B.06 Cleanouts

- A. Cleanouts may be used in lieu of manholes at the end of 8-inch diameter lines of not more than 150-feet in length if approved by the City and constructed in accordance with the Standard Details.
- B. Cleanouts for building sewers are governed by sewer ordinances as included in the *Winlock Municipal Code* and the *Uniform Plumbing Code* as adopted by the City.

5B.07 Sewer Laterals

- A. All sewer lateral connections to the main shall be made with a sanitary tee connection. A cleanout shall be provided at the edge of the right-of-way as shown in the *Standard Details*.
- B. Building sewers shall be a minimum diameter of four (4) inches for single residential service and six (6) inches for all other services. Maintenance of the building sewer is the responsibility of the property owner.
- C. Sewer laterals shall be a minimum diameter of six (6) inches. Maintenance of the sewer lateral is the responsibility of the City. Each property shall be served by an individual sewer lateral. In addition, each unit of a duplex shall be served by separate sewer laterals.
- D. Prior to connection or installation of building sewers or sewer laterals, a Side Sewer Permit must be obtained from the City. Materials and design criteria for a building sewer are covered by the applicable plumbing code as adopted by the City.
- E. In order to avoid the possibility of backup in the sewer lateral from head pressures in the sewer main, the City may require that a backwater valve be installed at the property owner's expense. Operation and maintenance of the backwater valve shall be the responsibility of the property owner under discretion of the City.

5B.08 Testing

- A. Gravity sewer lines shall be subject to a low pressure air test in accordance with the *Standard Specifications*. The Contractor shall furnish all equipment and personnel for conducting the test under the observation of a City representative. The testing equipment shall be subject to approval of the City.
- B. Prior to calling the City to witness the test, the Contractor shall have all equipment ready and have successfully performed the test. The air test for acceptance shall be made after trench is backfilled and compacted and the roadway section is completed to sub-grade.
- C. 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 shall provide an opening suitable for a lateral connection or extension.
- D. After completion of a successful air test, television inspection shall be completed by the Contractor in the presence of a City representative. Failure to have a City representative present will invalidate the test and the test shall be repeated at the Contractor's expense. Television inspections shall be completed after the manhole

has been channeled and before the roadway is paved. Immediately prior to the television inspection, enough water shall be run down the line to come out the lower manhole. A sediment trap shall be installed in the downstream manhole prior to flushing the line. The sediment trap and all the material it collects shall be removed before the line is placed into service. A copy of the video and a written report shall be submitted to the City. Acceptance of the sewer line shall be made after the tape has been reviewed and approved by the City.

- E. The City may televise the new sewer line during periods of high groundwater within the first year after acceptance of the line. Any conditions resulting in inflow and infiltration (I & I) shall be considered a system failure that shall be repaired by and at the expense of the Contractor.
- F. A mandrel test in accordance with Standard Specifications shall be performed, by and at, the expense of the Contractor on all sewers, except laterals, when televising reveals a possible defect or belly in the pipe.
- G. A vacuum test of all manholes is required prior to acceptance. The structure shall be tested in accordance with ASTM-C 1244-93 in the following manner:
 - 1. All lift holes and pipes entering into the manhole shall be plugged, taking care to securely brace each plug from being drawn into the structure.
 - 2. The test head shall be placed at the top portion of the structure in accordance with the manufacturer's recommendations.
 - 3. A vacuum of ten (10) inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop by one (1) to nine (9) inches. The manhole shall pass the vacuum test if the time is greater than the time shown in *TABLE-1* below.

Table 1 – Minimum Test Times for Various Manhole Diameters

Depth (in feet)	DIAMETER (in inches)				
	48	54	60	66	72
8	20	23	26	29	33
10	25	29	33	36	41
12	30	35	39	43	49
14	35	41	48	51	57
16	40	46	52	58	67
18	45	52	59	65	73
20	50	53	65	72	81
22	55	64	72	79	89
24	59	64	78	97	97
26	64	75	85	94	105
28	89	81	91	101	113
30	74	87	98	108	121

TABLE 1 gives allowable time in seconds, i.e., test section is acceptable if vacuum does not drop below nine (9) inches until after the times shown below have expired.

4. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The structure will then be re-tested until a satisfactory test is obtained.
5. If the manhole joint is displaced during the vacuum test, the manhole shall be disassembled, the seal replaced, the structure reassembled, and re-tested until compliance is obtained.
6. Testing can be done either *before* or *after* backfill operations around the structure; however, if during backfill operations it is found that the structure has been disturbed and it is suspected that the integrity of the joint has been compromised, re-testing shall be required.

H. Any time that testing reveals problems that lead to repairs by the Contractor, the City may require a complete re-testing of the entire system.

5C LIFT STATIONS

5C.01 General Design Criteria

- A. All lift stations shall be designed to serve the appropriate basin as identified in the most recent version of the *City of Winlock General Sewer Plan*.

- B. The design of lift stations shall conform to the Orange Book. The following requirements are minimum standards intended to supplement or clarify Orange Book requirements and are not all inclusive:
1. The proponent of the lift station is required to provide the City with a site located outside of the right-of-way. The land shall be deeded to the City and shall have sufficient area dimensions that allow for easy and safe access to the lift station.
 2. Each lift station shall be evaluated for buoyancy resistance using site-specific soil and groundwater information. Engineering calculations shall be provided on the determination of wetwell stability regarding flotation in the event the siting area could be subject to flooding.
 3. A concrete slab, six (6) inches in depth, shall surround the lift station well(s), with a minimum of two (2) feet of side exposure for all openings. The slab shall be installed at ground level.
 4. An access road, with easement, that shall support 20,000 lb axle loads throughout the year, shall be provided from the nearest public road to the station, to allow for maintenance of the station.
 5. Station entry access shall be keyed to match all other City lift stations. Entry lid to the station wet well shall be located as close as practical to the access drive. The lift stations shall be accessible at all times to operations and maintenance equipment and vehicles.
 6. Spare parts shall be provided as recommended by the manufacturer, with a minimum of one (1) impeller, one (1) complete set of seals, filters and one (1) set of volute gaskets. Four (4) complete sets of O&M manuals, and a list of the nearest dealers for spare parts and repair shall be provided. All replacement parts shall be readily available from a distributor in the U.S.A.
 7. The lift station shall include at least two (2) pumps, each one sized to handle all of the flow that the station will accept. Provide for a minimum of 45 seconds pump run time per pump cycle and a maximum of ten (10) pump starts per hour.
 8. The pumps, motor, and wet well shall be in compliance with current engineering practice. They shall be fully compatible as an assembly, and shall be engineered for the specific service area.
 9. All hardware and other basic mechanical parts (not including piping and valves) internal to the wet well shall be stainless steel, including float hangers, anchor bolts, cable systems, etc.
 10. The station shall be designed to include an isolation valve located in the discharge line between the station and a pumping bypass port.

11. City water shall be provided to the station for hose down. An approved backflow prevention device shall be provided on the water supply line outside the dry well to protect the public water system. The backflow device shall be in accordance with Chapter 4 of these guidelines.
12. A 100-amp minimum 480/277-volt 3-phase 4-wire main service shall be provided as per plans. The service shall be sized to accommodate the requirements of the lift station.
13. All electrical equipment shall be enclosed in a freestanding, vandal proof, all-weather enclosure NEMA 3R or better.
14. An emergency power hookup shall be provided as necessary to serve the lift station. The transfer switch shall be sized to accommodate the full lift station load (100-amp minimum).
15. Wiring shall be THHN stranded copper.
16. Lift station telemetry shall be compatible with the system in use by the City at the time of proposed construction. The system shall be installed entirely by the Contractor at the Applicant's cost. The City will have final approval authority over the telemetry system that shall be used.
17. Conduit shall be galvanized, or of a non-corrosive material as approved by the City, except conduit that penetrates a wet well or corrosive environment shall be coated rigid PVC.
18. Pump motors shall be 3-phase, 480 or 277 volt, and provided with elapsed time meters.
19. Pump control system shall be of the solid-state programmable logic controller (PLC) type, Allen-Bradley or approved equal. The system will possess a solid-state liquid level-sensing device of a 4-20ma analog design. The controller shall be readily accessible for ease of maintenance. The City will have final approval authority over the control system that will be used.
20. Lift stations shall be designed to accommodate a confined space entry davit, as utilized by the City. An appropriate bracket unit shall be included with the station at the wet well entry lid to accommodate the City's confined space entry equipment.
21. The lift station will include the following alarm and station status points, as applicable:

- a. Low Wet Well
 - b. High Wet Well
 - c. Pump Failure
 - d. Power Failure
 - e. Intrusion
- f. A water test for all wet wells in accordance with the manhole vacuum test for "Gravity Sewers" shall be required

5D PRESSURE SEWER (FORCE MAIN)

5D.01 General Design Criteria

- A. Force mains up to twelve (12) inches shall be ductile iron AWWA C151 Class 50 or PVC C900 with ductile iron fittings and gasket joints. For fourteen (14) to twenty-four (24) inch mains, pipe shall be ductile iron C151 Class 50 or PVC C905 with ductile iron fittings and gasket joints. A more rigid pipe may be required where unlimited trench widths occur. All ductile iron pipe and fittings shall be epoxy coated or PE lined and designed for use with corrosive materials.
- B. Force mains will have a minimum thirty-six (36) inches of cover to top of pipe. See *Chapter 4 Section 4.13 for Sanitary Sewer/Watermain Crossing* requirements.
- C. The minimum velocity allowed is two (2) feet per second (fps) at average dry weather flow. Two (2) fps is required to maintain solids in suspension although three (3) fps is desired to scour settled solids. Maximum velocity allowed shall be eight (8) fps.
- D. Force mains will include toning wire, cathodic protection and tracer tape installed in accordance with the Standard Specifications.
- E. Hydrogen sulfide (H₂S) odors and the buildup of sulfuric acid (H₂SO₄) occur in some force main applications. To mitigate these conditions, some type of odor control method(s) may be required. This may include chemical addition at the pump station and/or the re-aeration of the wastewater at or near the terminus. The specific requirements shall be determined by the City

5D.02 Air/Vacuum Valves

- A. Air release valves and air/vacuum valves shall be located at the high points of the line within a manhole or approved vault that provides eighteen (18) inches of clearance on all sides between the assembly of the wall(s). Air release valves shall be fitted with an activated carbon canister to prevent the release of disagreeable odors to the surrounding area. Grades shall be designed to minimize the need for air/vacuum valves when practical. Vehicular access to the valve is required for maintenance.

5D.03 Drains

- A. Provisions to drain a force main to facilitate repairs or to temporarily remove a force main from service shall be provided. This may be accomplished through the use of a valved tee connected to a drain line at its low point with isolation valves on both sides of the tee along the main. A manhole shall be set over the force main at the valved tee to provide a sump for the wastewater to be drained into.

5D.04 Pigging Ports

- A. Pigging ports shall be located outside of paved areas but within the right-of-way as shown in the Standard Details. Subject to review and approval by the City, pigging ports may be required at a change in pipeline size and/or; at the end of a dead-end line. The distance between pigging ports shall not exceed 3,000 feet without approval.

5D.05 Testing

- A. Prior to roadway paving and final acceptance of the project, force mains and service lines shall be subjected to a hydrostatic pressure test in accordance with the test requirements for water mains described in the Standard Specifications.
- B. The Contractor will provide all necessary equipment and will 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 will 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.

5E GRINDER PUMP SYSTEMS

5E.01 General Design Criteria

- A. Grinder pump systems, when allowed by the City, shall be in accordance with the general requirements described in the Orange Book, the Standard Details and these Criteria.
- B. Each development with grinder pump service will include an easement on the face of the plat for access to all lots. Individual lots with grinder pump service must provide separate easements prior to approval of service.
- C. Operation and maintenance of the public portion of the grinder pump system shall be the responsibility of the City only after the system has been inspected and approved and an easement is granted to the City and the warranty period of one year has expired. The public portion of the grinder pump system is defined as the grinder

- D. Power shall be provided and paid for by the grinder pump customer. The customer shall be responsible for contacting the City in a timely manner whenever an alarm is activated or maintenance and repairs become necessary. The customer shall be responsible to curtail water usage during times of grinder pump system malfunction until such problems are corrected. The City will not accept responsibility for damages resulting from plumbing backups or other problems associated with grinder pump system facilities or plumbing that the customer is responsible for.
- E. Systems installed on a site where an existing septic tank exists may not use the existing tank. The existing tank must be removed or abandoned per Department of Health and/or Lewis County requirements.
- F. Pump and pipeline sizing shall conform to City requirements based on the criteria as set forth in industry guidelines.

5E.02 Collection System

- A. The minimum pipe size used is 2-inch inside diameter. Pipe shall be Class 200, ASTM D2241, SDR 21 with rubber gasket joints. Gaskets will comply with ASTM D 1869. Grinder pump mains will have a minimum thirty-six (36) inches of cover to top of pipe.
- B. Service pipe shall be minimum 1-1/4 inch diameter, Schedule 40 PVC water pipe, solvent welded connection located at 90 degrees to the mainline, when possible. Solvent cements and primer for joining PVC pipe and fittings will comply with ASTM D 2564 and shall be used as recommended by the pipe and fitting manufacturers. Services will have a minimum twenty-four (24) inches of cover over the top of the pipe.
- C. All pipe shall be installed with continuous tracer tape set twelve (12) to eighteen (18) inches under the proposed finished grade. The marker tape shall be marked "SEWER" and shall be plastic, non-biodegradable, metal core, or backing that can be detected by a standard metal detector. In addition to tracer tape, twelve (12) gauge coated (green) copper wire shall be wrapped around the pipe, and then brought up and tied off at the valve boxes.
- D. All 1-1/4 inch valves shall be PVC ball valves with pre-loaded EPDM stem seals, micro-finished PVC ball and self-adjusting polyethylene ball seat to compensate for wear and prevent over-tightening. Valves shall be designed for use with corrosive fluids, for low torque manual operation, and for a working pressure of 150 psi.

- E. All 2-inch and larger valves shall be resilient wedge gate M&H style 820 or Waterous Series 500 plug valves with an epoxy coating to resist corrosion. Valves shall be located at every intersection and at a maximum of every 500 feet unless otherwise approved by the City. Valves may be installed in conjunction with required pigging ports.
- F. Air release and air/vacuum valves shall be located at the high points of the line. Profiles for each pipe run shall be submitted with the hydraulic gradeline for both static and dynamic flow conditions to show where the critical points are for air release valves. Vehicular access to air/vacuum valves is required for maintenance. Air Release Valves shall be A.R.I. D-025 Combination Air Valve for Sewage. Each vent shall be equipped with an odor control system such as activated carbon filters impregnated with sodium hydroxide.
- G. Pigging ports shall conform to the requirements for force mains.

5E.03 Controls and Alarms

- A. All grinder pump systems shall be wired to a dedicated 20-amp breaker that supplies power to the grinder pump system control box only. This is required to avoid damage or overload to the system and appliances. The customer is responsible for the operation and maintenance of the breaker feeder wires that serve the grinder pump system. All buried power shall be installed with continuous tracer tape set twelve (12) inches above the buried power. The marker tape shall be plastic non-biodegradable, metal core backing marked "Power".
- B. Grinder pump systems shall be supplied by a single source, complete, with pump, pump chamber, piping, valves, fittings, riser, lid, controls and control panel as shown on the Standard Details. Panel shall include an hour meter, audible alarm (minimum of 80db) and oil-tight visual alarm, red lens, with push-to-silence feature. Alarm circuit shall be wired separately from the pump so that if the internal pump overload switch is tripped, the alarm will still function.
- C. Panel shall include a 20-amp power disconnect assembly toggle switch to de-energize entire control panel, to permit servicing panel without access to the customer's breaker switches. The pump control panel shall be mounted on the side of the house nearest the tank and pump, preferably on a portion of the structure not intended for occupancy. The control panel shall be located within sight of the tank in all cases and of the street where practical. The panel shall be between four (4) and five (5) feet above finished grade.

5F GREASE TRAP/GREASE INTERCEPTOR

5F.01 General

- A. Grease traps or grease interceptors shall be required for all restaurants, commercial kitchens, industrial processing facilities or other facilities where fats, oils or grease (FOG) could be otherwise discharged to the sanitary sewer system. Such equipment shall be operated and/or maintained by the owner or operator of such facilities so as to eliminate the discharge of these substances to the sanitary sewer system. Grease traps and interceptors shall be designed in accordance with the applicable plumbing codes.
- B. The retained FOG shall be regularly cleaned and/or pumped out by the property owner. The maintenance frequency varies with each facility and shall be established by the property owner unless otherwise directed by the City in response to maintenance problems.
- C. The maximum liquid temperature through a grease trap shall be 90-degrees Fahrenheit. A dump valve may be required to ensure the liquid temperature standard is maintained, at the discretion of the City.
- D. A maintenance log shall be kept on-site for recording all maintenance activity. At a minimum, the log will contain date of maintenance and/or inspection, work performed, and name of individual who performed service.
- E. Interceptors shall be water tight and constructed of materials not subject to excessive corrosion. Appropriate tank materials include concrete, coated metal, and fiberglass. Plans for grease interceptors will include dimensions, structural reinforcing, structural calculations, and other pertinent data as determined by the City. Interceptors shall be designed by a professional engineer licensed in the State of Washington.
- F. Grease traps and interceptors shall be located in such a manner as to be easily accessible for cleaning, pumping, and sampling. In addition, they shall be as close as practical to the fixtures discharging into them. In general, an appropriate location is under a kitchen sink (for traps) or immediately outside the facility served (for interceptors).
- G. Flow control fittings shall be installed on the inlet side of smaller traps to protect against overloading and surges from the fixtures.
- H. Venting of outdoor interceptors is not required where siphoning, of the contents is prevented by providing appropriately sized outlets.

5F.02 Capacity

A. The size of a grease interceptor shall be determined by using the following formula:

$$\mathbf{MPH \times WR \times RT \times SF = Vol}$$

MPH = number of meals served per peak hour, or seating capacity (whichever is applicable)

WR = cumulative waste flow rate, based on the fixtures

-with dishwasher = 6 gallons

-without dishwasher = 5 gallons

-single service kitchen (i.e. no reusable dishes or flatware) = 2 gallons

-garbage disposal = 1 gallon

RT = retention times

-commercial kitchen = 2.5 hours

-single service kitchen = 1.5 hours

SF = storage factor

-8 hour operation = 1

-single service kitchen = 1.5

-16 hour operation = 2

-24 hour operation = 3

Vol = minimum interceptor liquid volume in gallons

B. The capacity of a grease trap shall be determined by using the following table:

Number of Fixtures	Required Flow Rate (gpm)	Grease Retention (lbs)
1	20	40
2	25	50
3	35	70
4	50	100