



ON-PREMISES PRIVATE GRINDER PUMP SYSTEMS DISCHARGING TO PRESSURE SEWER SYSTEMS DESIGN AND CONSTRUCTION ISSUES TO CONSIDER

It is recommended that the property owner retain a design professional to prepare plans and specifications for a private grinder pump system, including, but not limited to, the gravity building sewer emptying into the wet well chamber and the private force main/discharge pipeline discharging from the wet well chamber, between the building plumbing/mechanical improvements on the property served and a point on Lakehaven's public pressure sewer system designated by Lakehaven. For specific requirements to design and install these systems, please reference Lakehaven's "Standards for Installation of Private Grinder Pump Systems, Pressure Side Sewers and Private Force Main/Discharge Pipelines from Grinder Pumps." Some issues to consider in the design and construction of these systems are as follows:

1. Sewer Flow Management in the Event of a Commercial Power Outage

There are three (3) acceptable methods to manage sewer flows from the building plumbing/mechanical improvements in the event of a commercial power outage that renders the pump station inoperable. They are: a) use of an existing and functional on-site sewage system; b) providing 24- to 48-hour holding capacity in the system (a separate holding tank or vault is an option); and c) use of a standby engine-driven emergency generator.

a. On-Site Sewage System/Septic Tank

[For specific requirements regarding on-site sewage systems, please reference the codes and regulations of the Seattle/King County Department of Public Health (KCDPH)]

- i. Both the septic tank and drainfield must remain a functional system.
- ii. The septic tank should be pumped out and made safe in accordance with KCDPH code.
- iii. The contents of the drainfield should not backflow into the empty tank.
- iv. If the on-site system is in a high groundwater table area, the tank should not be completely drained and emptied, but only pumped sufficiently to remove the sludge on the tank's floor to avoid floating the tank.
- v. A locator should be placed over the access/inspection cover for the septic tank, and its location noted/recorded, along with the drainfield (if known).
- vi. If the on-site sewage system is no longer functional, or if the owner desires to recover the land surface for other purposes, the on-site sewage system must be properly abandoned in accordance with the KCDPH regulations. In this case, one of the other acceptable methods to manage sewer flows in the event of a commercial power outage must be utilized.
- vii. The private grinder pump system must be designed to prevent entry of groundwater backflow from an operational on-site sewage system.

b. Holding Capacity in the System

- i. Sufficient storage must be provided to temporarily store a volume representing approximately 24 to 48 hours of sewer flow (100 to 200 gallons for a typical single family residence).
- ii. The use of an existing septic tank alone, without a functioning drainfield and intended to provide holding capacity for emergency flow management purposes, will not be allowed.
- iii. The temporary storage can be provided within the grinder pump's wet well chamber, or within a separate storage/holding tank or vault. The "normal working volume" of the

grinder pump's wet well chamber is measured between the "PUMP ON" level and the "PUMP OFF" level. The qualifying temporary storage shall be that available in excess of the "normal working volume" between the "PUMP OFF" level and the top of the wet well chamber.

c. Standby Engine-Driven Emergency Generator

- i. The standby engine-driven emergency generator can be equipped with a manual transfer switch that will isolate the grinder pump and its motor starter from the electrical system and the remainder of the structure served.
- ii. The transfer from commercial to emergency power can also be effected simply by a "pig tail" plug on the grinder pump's electrical control panel, so that when commercial power is lost, the grinder pump can be plugged into the emergency generator to provide the power needed to operate the grinder pump.

2. Commercial Power for Grinder Pumps

- a. An evaluation must be made to determine for the structure served that sufficient power is available for the grinder pump, specifically that 220 volts and adequate amperage is available at the circuit breaker panel to accommodate the grinder pump installation.
- b. Most modern homes have 220-volt, 3-phase power, and between 150 and 200 ampere services. Older homes can have as little as 110-volt, single phase power, and as low as 50 ampere services. It is recommended that a licensed electrician be contacted for the proper information, if the capacity is not labeled on the circuit breaker panel.
- c. Grinder pumps are available in various voltage ratings, and the recommended voltage is generally 220 to 230 volts. However, if there is sufficient amperage available at the circuit breaker panel for a 110 to 120 volt service, a **special order** for a 110 to 120 volt grinder pump may be made.

3. Surface Improvement Considerations

- a. The cost for the installation of the grinder pump and its force main/discharge pipeline will depend greatly upon the extent of surface improvements that will be encountered, such as landscaping (special grass, trees and shrubs, and their respective sizes), rockeries, irrigation systems (older systems may be galvanized steel pipelines that will be difficult to work around and to keep rust from traveling to the sprinkler heads and plugging them), swimming pools, tennis courts, etc., and paved driveways and other surfaces. Costs will generally be driven up if there is limited space to place the force main/discharge pipeline from the grinder pump to Lakehaven's public pressure sewer system, and/or limited space to wire the grinder pump to its electrical control panel and the circuit breaker panel.
- b. Costs can also increase if there are space restrictions preventing the use of a backhoe to dig the ditches. Each premise can present a unique set of challenges that must be overcome. Typically, the force main/discharge pipeline will be installed 18-inches to two feet below ground. The depth of Lakehaven's public pressure sewer main in the street right of way will typically be deeper, since most street agencies require the piping to be a minimum of 4 feet deep within the street rights of way.
- c. A new pipeline installation technique that has become available within the past 20 years is referred to as "directional boring." Directional boring can leave the ground surface undisturbed and resolve a number of the challenges noted above. However, directional boring is typically more expensive than standard open trench construction. Other techniques used to install the grinder pump, its force main/discharge pipeline, the underground electrical power cable, and the grinder pump's electrical control panel, is simply digging by hand, using a small trenching machine (such as a "Ditch Witch®"), or using a small backhoe.

- d. Whatever technique the owner selects, a location wire should also be installed so that the underground pipeline and power cable can be found in the future after the ground surface has been restored to normal condition. The cost of installing a location wire is minimal during initial installation and it can reduce and/or eliminate problems (including time and costs) associated with digging up the underground pipeline and power cable in the future if/when any future maintenance is required.

4. Alarm for High Water/Imminent Overflow

- a. The grinder pump system will be equipped with an audible and visible alarm system to notify the owner of high water in the grinder pump wet well chamber. The alarm is intended to alert the owner that the contents of the grinder pump wet well chamber has reached a critical stage where water use that eventually drains to the grinder pump should be curtailed as soon as the alarm activates. The alarm should be placed where it will be heard throughout the structure served. The alarm may also activate when flows discharging to the grinder pump wet well chamber may be greater than the pump can accommodate (i.e., a hot tub emptying into the plumbing drain system and discharging a large volume of water at one time). In this case, the alarm will activate since the grinder pump will need to “catch up” to the flow that is discharged to it.
- b. Alarms should not be tied into a burglar alarm system or a phone system, since they might cause problems with those systems.
- c. The alarm should also be located where the visible portion of it (typically a red light) can be seen by neighbors who may be able to alert the owner who is temporarily away.

5. Check Valves on the Grinder Pump’s Force Main/Discharge Pipeline

- a. Check valves are located at the grinder pump and on the grinder pump’s force main/discharge pipeline where it crosses the street right of way line before connecting to Lakehaven’s public pressure sewer system. These devices allow flow within a pipeline to go only one way.
- b. Check valves are installed to protect the pump and the owner’s property from having wastewater backflow into the owner’s pump from Lakehaven’s public pressure sewer system.
- c. Check valves are also installed to allow relatively quick maintenance to be performed at the pump.

6. Grinder Pumps for Specific Pressure Sewer Systems

- a. There are many grinder pumps on the market that can work effectively. However, each pressure sewer system that is part of Lakehaven’s overall sewer system is designed for specific types and capacities of grinder pumps.
- b. Typically the grinder pump should be capable to pump against approximately 180+/- feet of total dynamic head pressure and at a rate of flow of approximately 6 to 12 gallons per minute.
- c. The pump should be a positive displacement grinder pump to minimize the opportunity for problems to the customer.

7. Location, Installation, and Maintenance of Grinder Pump Systems

- a. Grinder pump systems should be located to optimize accessibility for preventive maintenance or repair purposes.
- b. The control panel for the grinder pump should be located in line-of-sight from the grinder pump itself.
- c. Grinder pumps should be installed within wet well chambers supplied as a packaged unit.
- d. Grinder pumps should NEVER be placed in a septic tank.
- e. Follow all requirements of the grinder pump manufacturer when installing and operating the grinder pump.