

ON-SITE SEWAGE CONSTRUCTION MANUAL FOR STANDARD GRAVITY SYSTEMS



Klickitat County

These are the minimum standards and expectations for the construction of standard gravity on-site wastewater treatment and dispersal system in Klickitat County.

The intent of this packet is to provide as much information for installers and homeowners regarding proper procedures for installing a gravity flow on-site sewage disposal system.

Washington State Administrative Code 246-272A requires a detailed design prior to issuance of a septic permit. Klickitat County allows the homeowner to both design and install a standard gravity system if the property is not adjacent to a marine shoreline.

WAC 246-272A requires all other treatment levels or distribution methods must be designed by a licensed on-site designer or a professional engineer; all other treatment types must also be installed by a licensed septic installer.

You are required to have the approved design and signed permit on hand during construction. It is important to keep an open line of communication between the Health Department, the installer, the designer, and the homeowner.

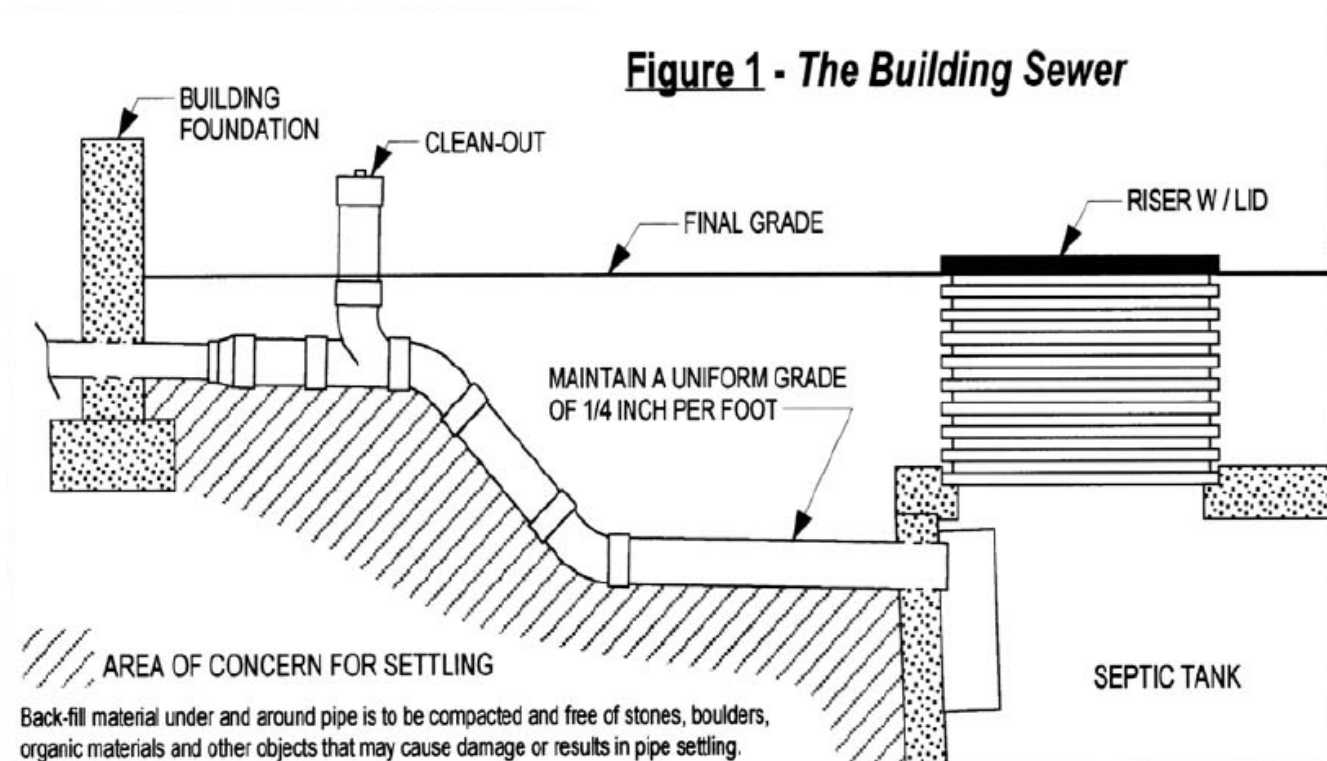
The installer must notify the designer and Health Department when the installation is ready for a final inspection. When conditions on the site are different than those noted on the design, the installer is obligated to inform both the Health Department and the designer, or if they plan to change or deviate from the original design.

**ENSURE YOUR PROPERTY HAS COMPLETED A SITE AND SOIL EVALUATION BEFORE
SUBMITTING YOUR ON-SITE SEWAGE DESIGN.**

SECTION 1

BUILDING SEWER REQUIREMENTS

- The building sewer line out can be three or four inches in diameter and should meet ASTM D 3034 for poly-vinyl chloride (PVC) and SDR 35 piping. The type of pipe used should be labeled/shown on your design.
- The grade on all parts of the building sewer line must be $1/4$ inch **maximum** fall per foot with a **minimum** of $1/8$ inch fall per foot. All transport lines or sewer lines should be bedded to prevent sagging. Ensure to remove all stones, wood, organic debris, or objects that may cause damage.
- At least one sewer clean-out must be constructed prior to the septic tank and/or 2' from the foundation or skirting of the structure. Clean-outs must be installed at intervals of 50' on all transport lines from the structure to the tank.
- If elbows or bends are necessary, they cannot be greater than a 45° angle, unless it is a soft or long sweeping 90° bend.
- When a vertical drop and/or a change of direction of the building sewer is necessary, use a long sweeping 90° . Clean-outs are recommended at angles of 45° or greater.
- Any pipe crossing under a driveway, parking area, or vehicular encroachment area must be buried 36 inches in the ground or bedded in sand and encased in 5-inch or 6-inch schedule 40 PVC.
- All lines must be constructed to be watertight.
- The sewer out line from the building shall be bedded in a manner that assures it is;
 - Free from stones, boulders, or other objects that may cause damage
 - Free of organic material (wood, sod, etc.) that may decompose
 - **Evenly supported along its entire length; and**
 - **Unlikely to settle**
- Minimizing high and low spots while digging will reduce the potential for settling, sagging, or broken fittings.
- When connecting the sewer line to the tank ensure an adequate watertight seal is made and the pipe is bedded to relieve inevitable settling. Watertightness of the septic tank, lids, and pipe is critical to the entire operation of the septic system. Leaks, whether infiltrating or exfiltrating are a serious concern.



SECTION 2

SEPTIC TANK REQUIREMENTS

- All sewage tanks must be installed and bedded in a manner that assures they are;
 - Level
 - Free of stones or boulders
 - Free of organic material
 - Evenly supported throughout the entire area beneath the tank
 - Installed in accordance with manufacturers specification
 - Unlikely to settle
- Single family residences with 1 - 4 bedrooms are required to have a minimum of a 1,000-gallon septic tank. For each additional room, add 250 gallons (**WAC 246-272a-0232**).
- The septic tank must be set on undisturbed soil or by the manufacture's standards and have a minimum of 6 inches of cover.
- All pipes connecting to the tank must be water-tight with the proper slope.
- Access to the tank for inspection and maintenance at finished grade is required. **Risers must bring access to the tank to grade. All lids must be secure and water-tight.**
- **Installation of an effluent filter is strongly encouraged but not required.**
- All pipe entering and exiting the tank should be bedded and construction practices must prevent the pipes from "sagging" after cover.
- All septic tanks must be from the approved list provided by the Washington State Department of Health. That list can be found here; <https://doh.wa.gov/community-and-environment/wastewater-management/forms-publications>
- Tanks installed in areas with known high groundwater levels that may be affected by buoyancy must be secured from flotation. Anti-buoyancy methods should be discussed with the tank manufacturer. It is important to 'tamp' and grade the top soil around the tank to allow run-off to move away from the tank.

TRANSPORT LINES

- The transport line from septic tank to d-box must have a minimum grade of 1' of fall per 100' (1%) and be water tight.
- Absorption areas significantly lower in elevation are required to have a splash box to reduce excessive effluent flows to the d-box. You may also install a 90° sweep pointing in the 6 o'clock position to reduce velocity and splash into the d-box.
- Crossing domestic or irrigation water lines is to be avoided. If this is not possible, contact the Health Department concerning standard practices.

DISTRIBUTION BOX (D-BOX)

- All unused outlets in a d-box must be sealed and water tight.
- A method must be utilized to ensure the inlet flow is divided equally to all outlets. This can be done by using "flow meters or speed levelers," or installing a 90° sweep faced down toward the bottom of the d-box.
- The d-box should be laid level on a sound footing and 5' minimum from the beginning of the lateral trenches or bed. **If freezing or "frost heaving" is a concern, a frost-proof footing should be installed.**

SECTION 3

INITIAL AND REPLACEMENT ABSORPTION AREA REQUIREMENTS

- The laterals must be located near the test pits previously evaluated by Environmental Health staff.
- A minimum of 36" of undisturbed, native soil, is required between the bottom of the trench and the restrictive layer. On sloped sites, vertical separation and the trench depth is measured from the bottom/toe of the slope.
- Rigid, four-inch perforated pipe meeting ASTM D2729 (PVC), ASTM D4673 (ABS), or ASTM F405 (corrugated PE) may be used. Each lateral must be laid level with a cap glued to the end. The perforations should be in the 5 and 7 o'clock position.
- Gravel absorption beds must be covered with a non-woven geotextile filter fabric before covering. A minimum of 6 inches of drainrock is required under the perforated pipe.
- **The system replacement area will accommodate 100% of the required square footage with no reductions.**
- Absorption areas shall not be subject to vehicular traffic, shall not be encroached upon by buildings or structures, or be covered by impervious surfaces; including but not limited to asphalt, concrete, and swimming pools.
- Absorption areas shall not be located or constructed on slopes in excess of 45% or 24° (**WAC 246-272a-0210 (5)(a)**).
- Absorption areas shall not be located in areas where storm-water, drainage, or surface water accumulates. Storm-water drainage shall be directed away from the dispersal area.
- Absorption trenches must run perpendicular to the slope of the land and may need to curve around complicated areas with multiple slopes.
- Gravelless product must meet manufacturer's installation requirements. Gravelless-dome products are required to install 20-gauge, galvanized mesh screen below the product. The screen must cover 100% of the square footage used in the laterals or bed, and must also be 1/2 inch to 1 inch in size with hexagonal or square shape.
- The final absorption trench must be covered with a minimum of 6" of top soil and maximum of 24". The bottom of absorption trenches should be level, plus or minus half an inch.
- The length of an individual trench for gravity flow must not exceed 100 feet.
- The standard trench absorption width is 36". If a width of 12" or 24" is proposed, the required square footage for dispersal area must be shown on the design.
- Inspection ports are required at the end of each constructed lateral.
- **Equal distribution to each lateral is required for all systems.** Serial distribution requires sign-off by Klickitat County Health Department.

SITE PROTECTION AND PREPARATION

- Construction of the dispersal area should be staked, or flagged, or roped off before any construction begins. Homeowners and contractors should protect the area from traffic, materials stockpiling, or large equipment parking.
- Before site preparation occurs ensure the soils are dry. The soil moisture should be evaluated for the "plastic" limit. In nongranular soils (clay or silt), compaction will occur inf the soil is near it's plastic limit. This can be tested be removing a sample of soil and rolling between the palms of your hands. If the soil fails to form a "rope" it is sufficiently dry.
- Clearing the site should be limited to mowing and raking to minimally disturb the top soil and installation area. If trees must be removed, cut at the base of the trunk and remove the trunk by grinding. Mechanically raking the stump with heavy machinery should be avoided.

- Excavation activities can cause significant reductions in soil porosity and permeability. Compaction and smearing of the soil infiltrative surfaces occur with equipment traffic vibration, scraping actions, and stockpiling materials on the infiltrative area.
- Front end loaders and blades should not be used for scraping actions. Lightweight backhoes are preferred. All equipment used for excavation should be kept off the infiltration field.
- Any area in the infiltrative area that is smeared should be “scarified” by manual raking.
- Placement of gravel or crushed rock into the trenches should be done with a backhoe bucket and not dumped in with a front-end loader or truck.
- Before leaving the site, the area around the site should be graded to divert surface runoff away from the infiltrative area. The backfill are should be slightly mounded to account for settling.
- It is also recommended to seed and mulch the area to promote a healthy vegetative cover.

SEPTIC TANK PUMPING

- Tanks should be pumped when sludge and scum accumulations exceed 30% of the tank volume or are encroaching on the inlet or outlet baffles.
- Periodic pumping or septic tanks is recommended to ensure proper system performance and reduce the risk of hydraulic failure in the infiltrative area.
- If systems are not on any routine inspection schedule, septic tanks should be pumped every 3-5 years. This is based on tank volume, building occupants, habits, appliances, and waste strength.
- Accumulated sludge and scum material may only be removed or pumped-out but a licensed septic pumper in Klickitat County.

Continue to the next page.

MINIMUM HORIZONTAL SETBACKS

Items Requiring Setback	From edge of soil dispersal component and reserve area	From sewage tank and distribution box	From building sewer and non-perforated distribution pipe
Well or suction line	100 ft.	50 ft.	50 ft.
Public drinking water well	100 ft.	100 ft.	100 ft.
Public drinking water spring measured from the ordinary high-water mark	200 ft.	200 ft.	100 ft.
Spring or surface water used as drinking water source measured from the ordinary high-water mark	100 ft.	50 ft.	50 ft.
Pressurized water supply line	10 ft.	10 ft.	10 ft.
Decommissioned well (decommissioned in accordance with chapter 173-160 WAC)	10 ft.	N/A	N/A
Surface water measured from the ordinary high- water mark	100 ft.	50 ft.	10 ft.
Building foundation/in-ground swimming pool	10 ft.	5 ft.	2 ft.
Property or easement line	5 ft.	5 ft.	N/A
Interceptor/curtain drains/foundation drains/drainage ditches			
Down-gradient*:	30 ft.	5 ft.	N/A
Up-gradient*:	10 ft.	N/A	N/A
Other site features that may allow effluent to surface			
Down-gradient*:	30 ft.	5 ft.	N/A
Up-gradient*:	10 ft.	N/A	N/A
Down-gradient cuts or banks with at least 5 ft. of original undisturbed soil above a restrictive layer due to a structural or textural change	25 ft.	N/A	N/A
Down-gradient cuts or banks with less than 5 ft. of original undisturbed soil above a restrictive layer due to a structural or textural change	50 ft.	N/A	N/A
Other adjacent soil dispersal components/subsurface storm water infiltration systems	10 ft.	N/A	N/A

*The item is down-gradient when the liquid will flow toward it upon encountering a water table or restrictive layer. The item is up-gradient when the liquid will flow away from it upon entering a water table or restrictive layer.

HOMEOWNER DESIGN APPLICATION

PLEASE READ

WAC 246-272A requires individuals to obtain an on-site sewage permit prior to construction. This includes any person proposing the installation, repair, modification, connection to, or expansion of an on-site sewage system. This permit is applicable to residential sources of sewage producing less than 3500 gallons per day. This chapter can also be applied to nonresidential sources of sewage if treatment, siting, design, installation, and operation and maintenance measures provide effluent dispersal required of residential sources. **In Klickitat County proof of adequate wastewater disposal is required prior to issuing a building permit.**

The system owner is responsible for operating, monitoring, and maintaining the system to minimize the risk of failure. This includes securing the correct permits prior to construction or repairs and performing system evaluations. During the removal of solids, the homeowner should only employ approved pumpers within Klickitat County. **System owners are also responsible for protecting the tank, SSAS (drainfield), and the reserve area from; impervious materials, surface drainage, soil compaction, soil removal, and ensure the flow of sewage does not exceed capacity.**

HOMEOWNER DESIGN APPLICATION

APPLICANT INFORMATION

Name: _____

Mailing Address: _____

City: _____

State: _____

Zip: _____

Phone: _____

Email: _____

Site Address: _____

Parcel Number: _____

- | | |
|---|--|
| <input type="checkbox"/> Standard Gravity (\$400) | <input type="checkbox"/> SSAS Replacement w/o Soil Log (\$300) |
| <input type="checkbox"/> Alternative System (\$500) | <input type="checkbox"/> System Expansion w/ Soil Log (\$150) |
| <input type="checkbox"/> Systems \geq 1000 GPD (\$1250) | <input type="checkbox"/> System Expansion w/o Soil Log (\$300) |
| <input type="checkbox"/> Tank Replacement (\$50) | <input type="checkbox"/> Permit Renewal (\$110) |
| <input type="checkbox"/> SSAS Replacement w/ Soil Log (\$150) | <input type="checkbox"/> Connection to LOSS/Community System (\$100) |

Continue to the calculations and site plan pages.

System Calculations (note: you will need your site evaluation for this part)

Step 1. The system design flow is determined by the **number of bedrooms multiplied by 120 gallons.**
The minimum design flow for any on-site sewage system is 240 gpd.

of bedrooms _____ X 120 = _____ gallons per day (design flow)

Step 2. For a home serving 4 bedrooms or fewer, the minimum septic tank size is 1000 gallons. **For homes with more than 4 bedrooms, an additional 250 gallons per bedroom is required.**

of bedrooms _____ = _____ minimum tank size

Step 3. Refer to the site evaluation report to calculate the maximum trench depth. **For standard gravity systems there must be 36" of vertical separation from the restrictive layer.**

Depth of test pit or restrictive layer _____ - 36" = _____ **maximum** trench depth

Step 4. Refer to the site evaluation report to determine the square footage necessary to treat sewage. The application rate will be listed. **To determine the square footage, divide the design flow from step 1 by the application rate found on the site evaluation report.**

Design flow _____ / _____ application rate = _____ total square footage

Step 5. Typical trenches are 3 feet wide, divide the total square footage by 3 to get the total linear length of dispersal material. If your design requires 2 feet wide trenches, divide by 2.

Total square footage _____ / 3 = _____ total linear feet of **gravel** laterals

Step 6. If you plan to use gravelless product, like EZ Flo or Infiltrator domes, you will need to reduce the total square footage by a percent based on soil type. For soils types 3 through 6, there is a 40% reduction. In soil type 2, there is a 20% reduction. Soil type 1 has no reduction. **For example; if you receive a 40% reduction you multiply your total sq. footage from step 4 by .6 to get the remaining 60%.**

Total square footage _____ X _____ % after reduction = _____ new total square footage

New total square footage _____ / **3** = _____ total linear feet of **gravelless** drainfield

FINAL SYSTEM PARAMETERS

Design Flow: _____

Septic Tank Size: _____

Soil Type: _____

Application Rate: _____

Trench Width: _____

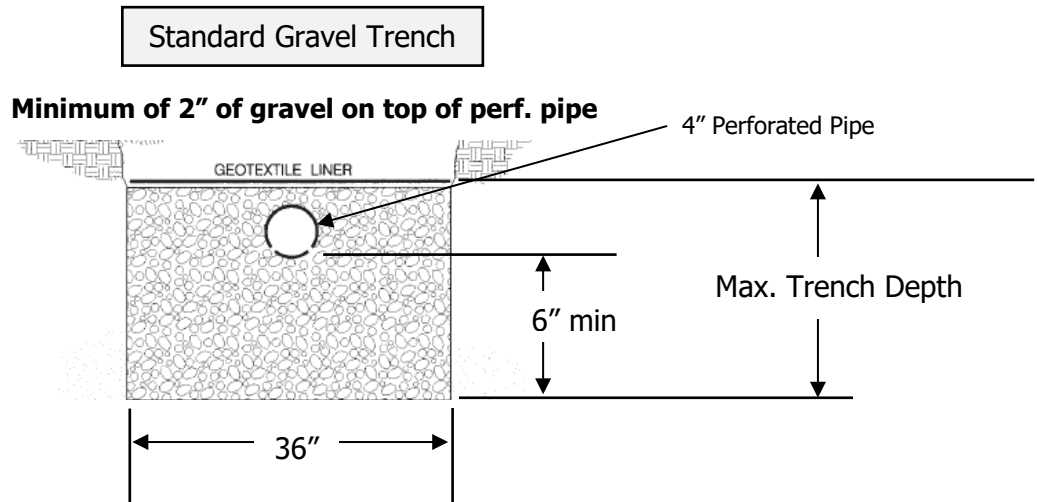
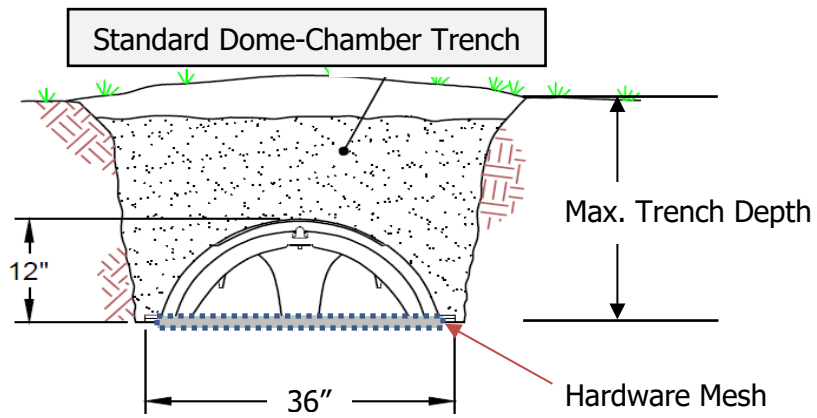
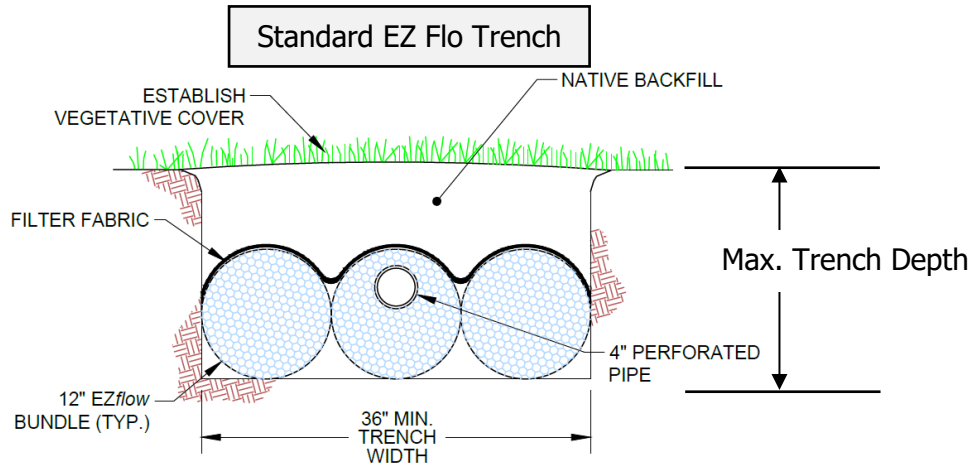
Total Linear Feet: _____

Max. Trench Depth: _____

Pump Tank Size: _____

Installer: _____

TYPICAL TRENCH CROSS SECTIONS EXAMPLES



EXAMPLE DESIGN

