Chelan-Douglas Health District

On-Site Wastewater System

Construction Manual

Minimum Standards and Recommendations for the Construction of On-Site Wastewater Treatment & Disposal Systems in Chelan and Douglas Counties

Acknowledgements

Chelan-Douglas Health District, Environmental Health Division appreciates the contribution of the individuals involved in the development of this manual. The quality of this document is a result of the dedication, energy, and input from these persons, including:

Representative	Company Name
Representative Brian Dickey	Chelan-Douglas Health District Division of Environmental Health

Much of the contents of this manual, such as the outline, figures, and graphics, were used with permission from:

- *Thurston County On-site Wastewater System Construction Manual* (2002) Thurston County Public Health – Division of Environmental Health, Olympia, WA.
- CIDWT (2009) *Installation of Wastewater Treatment Systems.* Consortium of Institutes for Decentralized Wastewater Treatment. Iowa State University, Midwest Plan Service. Ames, IA. http://www.onsiteconsortium.org/home.html
- *Design and Construction Standards* (2007) Okanogan County Public Health, Okanogan, WA.

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INTRODUCTION

BE SURE YOU HAVE A COPY OF THE STAMPED "APPROVED" ON-SITE SEWAGE SYSTEM DESIGN BEFORE STARTING INSTALLATION.

The best installation of an on-site wastewater system occurs when good communication exists between all parties involved – the owner or applicant, the on-site system designer, the installer, and the Health District.

Designers and installers are responsible for communicating with each other throughout the installation phase of the wastewater system. The installer must notify the designer and Health District when the installation is ready for final inspection. The designer and installer are both responsible for notifying the Health District when they find site conditions different from those noted on the design, or when deviation from the approved design is necessary.

The installer is responsible for properly covering the installation. When homeowners install their own systems, they assume the responsibilities of the installer. Before beginning the installation, it is recommended the installer call the designer or Health District for a preconstruction conference. This step helps clarify design requirements and helps ensure a high quality installation, this is especially important on complex sites with complex designs.

This document contains basic and minimum construction standards as well as construction recommendations. While this guide provides details of the Health District's construction requirements, it is not intended to limit ingenuity or innovation.

SECTION 1 – General Criteria

The construction, and therefore the design, of on-site wastewater systems must conform to:

- The Washington State Department of Health's Recommended Standards and Guidelines (RS&G) for septic system technologies and products. The RS&G documents can be found here: http://www.doh.wa.gov/ehp/ts/WW/pubs-ww-topic.htm#RS&Gs
- WAC 246-272A.
- Chelan-Douglas Health District's onsite code Chapter 4.20
- Industry standards and guidelines including electrical codes.

General Notes:

1. Shoot elevations grades and stake drainfield location **prior to excavating** by using a laser level. Start from the drainfield towards the structure to determine the exact elevation to set tanks and stub-out for plumbing. If the stub-out is already in place, determine if the elevation will be appropriate for the design (gravity drainfield).
2. Roof and surface water runoff or discharge must be directed away from or down slope from the sewage disposal system by means of footing and/or foundation drains, or surface diversion ditches. Pools and hot tubs should also have their waste water diverted around system components.
3. Water line and sewer line crossings must conform to the Washington State Dept. of Ecology's "Criteria for Sewage Works Design" page C1-9. The document can be found here: http://www.ecy.wa.gov/pubs/9837.pdf
4. Any pipe crossing under a drive/parking or vehicular encroachment area must be buried 36" deep or bedded and encased in 6" PVC (ASTM D3033 or D3034) or equivalent. All piping under county and state maintained roads must have prior authorization (crossing permit) by the utility. They will have specific requirements for these crossings.

5. **DO NOT cover or back fill any portion of the system prior to final inspection by the Chelan-Douglas Health District or the system's designer.**

SECTION 2 – The Building Sewer

2.1 Connection Between the Building Drain and the Septic Tank. (Figure 1) The pipe and fittings used for construction of the building sewer from the building drain to the septic tank must be a minimum of ASTM 3034 and four inches in diameter.

Building sewer lines must be constructed with watertight joints, cleanly glued or gasketed, and be on the uniform grade of ¼ inch per foot, unless otherwise approved in writing by the health officer. The grade of the building sewer shall not be less than 1/8 inch per foot.

The building sewer line between the building drain/foundation and septic tank shall be bedded in a manner that assures it is:

- free from stones, boulders, or other objects that may cause damage, and
- free from organic material (sod, wood, etc.) that may decompose and result in the pipe sagging, and
- evenly supported along its entire length, and
- unlikely to settle, as much as possible.

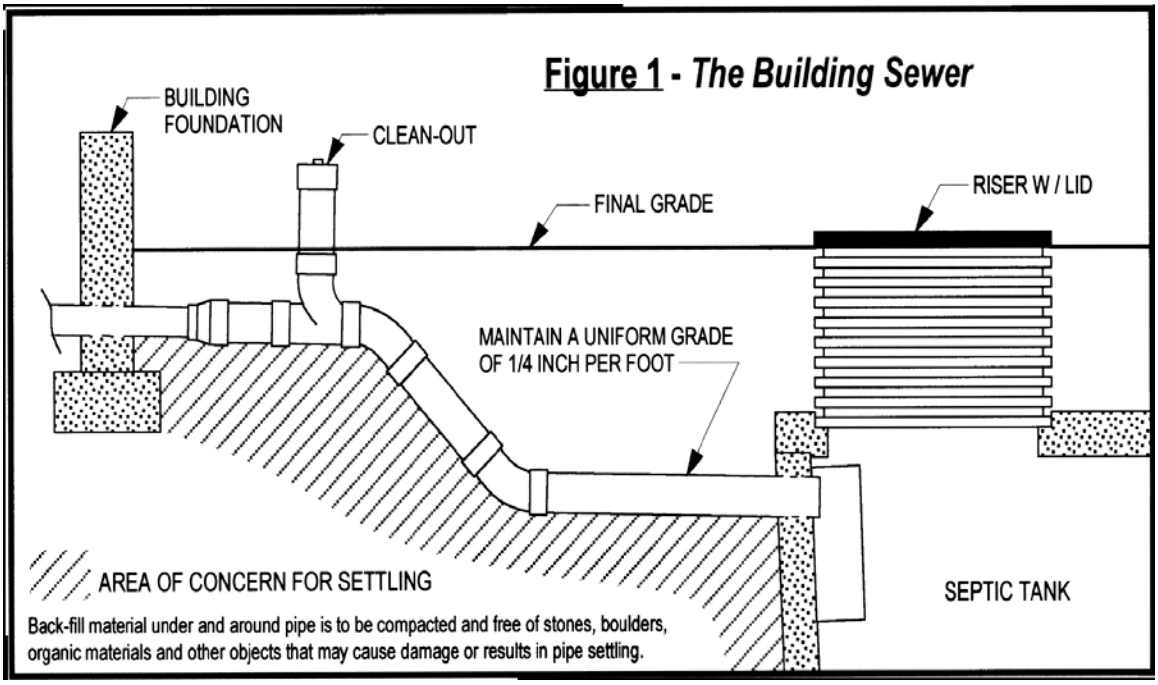
Suitable bedding and back-filling material for sewer lines may already be on the site. In other cases, it may be so rocky and stony that importing sand may be the best option. If any question arises as to the suitability of the material to be used for bedding or back filling, consult with the designer and/or Health District.

Back fill under and around the pipe, firmly packing the bedding material so the building sewer line is evenly supported. A key step in reducing the potential for settling, sagging, and broken fittings is to dig the trench so that high and low spots are minimized, providing a smooth, undisturbed surface on which to lay the pipe. Some over-excavation, especially where the pipe enters and exits the tank, is unavoidable. Pay extra attention to ensure the pipes are evenly supported in these areas.

When a vertical drop and/or change of direction of the building sewer is necessary, medium to long sweep ninety's are acceptable. There are other methods as well. The principle is to make the turn or vertical drop as smooth as possible, reducing the potential for clogging. Medium and long sweep ninety's are preferable to multiple 45^0 bends.

Building sewer lines must have a clean out immediately adjacent to the foundation and one every 100 feet. Clean-outs are required for each aggregate change of direction in the building sewer that equals or exceeds 135^0. Clean-outs are recommended at angles of 45^0 or greater.

The maximum distance the building sewer line should extend into any septic tank baffle is one inch. The exact measurement of one inch is not the key element. The point is to extend the pipe far enough into the baffle to ensure an adequate seal and to allow for some (inevitable) settling.



SECTION 3 – Sewage Tanks - Septic tanks, Pump & Siphon Chambers

3.1 Tank Installation. (Figure 2 A &B) All sewage tanks shall be installed and bedded in a manner that assures they are:

- level.
- free from stones, rocks, boulders, or other objects that may cause damage (especially on the bottom).
- free from organic material (such as sod, wood, etc.) that may decompose and result in settling.
- evenly supported throughout the entire area beneath the tank.
- installed in accordance with the manufacturers specifications.
- unlikely to settle, as much as possible.

NOTE: It is important to minimize over excavation of the hole for the sewage tanks. It is recommended that the soil at the bottom of the excavations for the tanks be tamped to firm the soil and minimize settling. Use a plate compactor.

Suitable bedding and back-filling material for sewage tanks may already be on the site. In other cases, it may be so rocky and stony that importing sand may be the best option. If any question arises as to the suitability of the material to be used for bedding or back filling, consult with the designer and/or Health District.

3.2 Flow Line Installation. (Figure 2 A &B) The flow lines of all sewage tanks must be installed above the highest known seasonal water table. Soil mottling, winter water studies, and other available resources are used to determine the highest seasonal water table. Contact the designer and Heath District immediately (prior to installation) when conditions beyond the installers' control (such as building drain depth) preclude installation of the tanks as stated. Installations contrary to this requirement will be considered on a case-by-case basis.

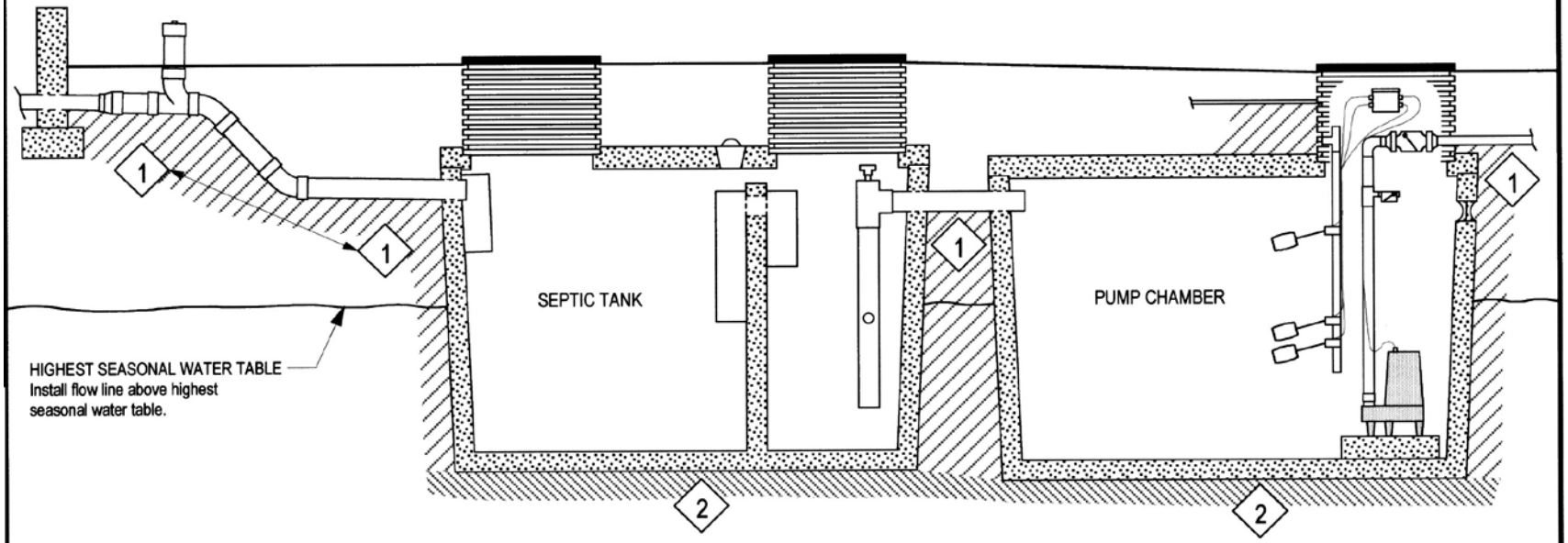
Tanks installed in areas with known ground water levels that may effect the tanks must be secured from flotation. This may be accomplished by utilizing anti-flotation rings from the manufacturer or by filling the tank with water as you backfill.

3.3 Tight Lines.(Figure 2 A&B) The areas under where tight lines enter and exit tanks need special attention. When back filling the connections between the building sewer and septic tank, between the septic tank and a pump/siphon chamber and between the pump/siphon chamber and treatment component, it is critical to support the tight line to prevent sagging and broken joints. Extra care to reduce settling of the tanks and proper support (packed bedding) where tight lines enter and exit tanks should result in long term, watertight connections.

3.4 Installations Under Traffic Areas. When installing sewage tanks, building sewers, and sewage transport lines under concrete, asphalt, or gravel coverings where traffic is expected, design and installation criteria shall include the following.

a) Information showing that the components used meets applicable load-bearing requirements.
b) Regardless of the depth to the top of the tank, access risers with securable lids are required to final grade over the manhole openings and baffle inspection ports.
c) Over the septic tanks and pump chambers, all risers and lids must be capable of supporting any expected vehicular traffic.

Figure 2 A. - *Sewage Tanks*



1 AREA OF CONCERN FOR SETTLING.

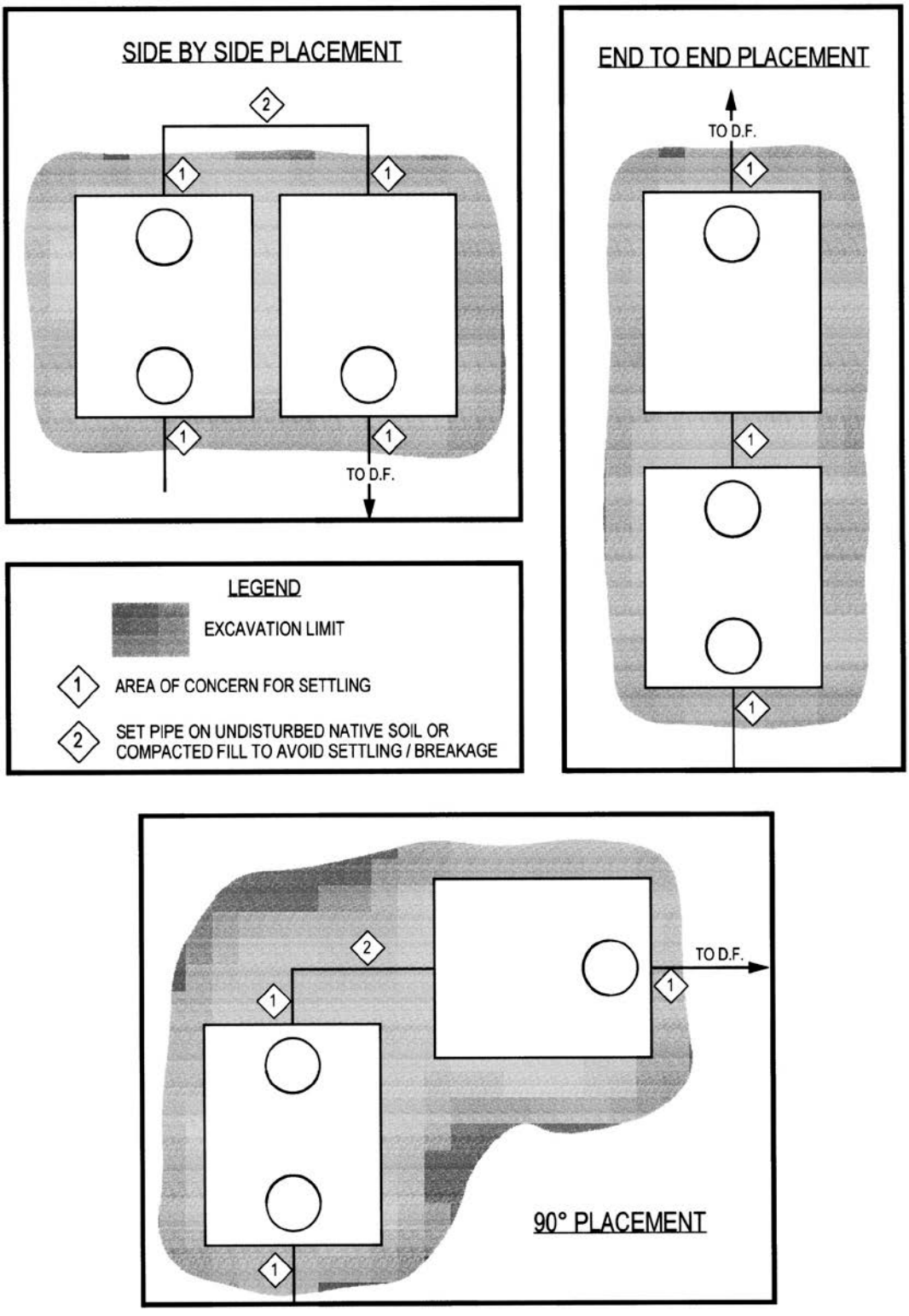
When back-filling the connections between the building sewer, tanks and the treatment component, it is critical to properly support the tight line by compacting the bedding material to prevent sagging and broken joints.

2 AREA OF CONCERN FOR SETTLING.

This area is to be level, evenly supported throughout and free of stones, organic materials and other objects that may cause damage to the tanks. It is important to minimize over-excavation. It is recommended that the soil at the bottom of the tank hole be compacted to minimize settling.

Suitable bedding and back-filling material for sewage tanks may already be on site. In other cases, it may be so rocky and stony that importing sand may be the best option. If any question arises as to the suitability of the material to be used for bedding or back-filling, cosult with the designer and / or Health Department.

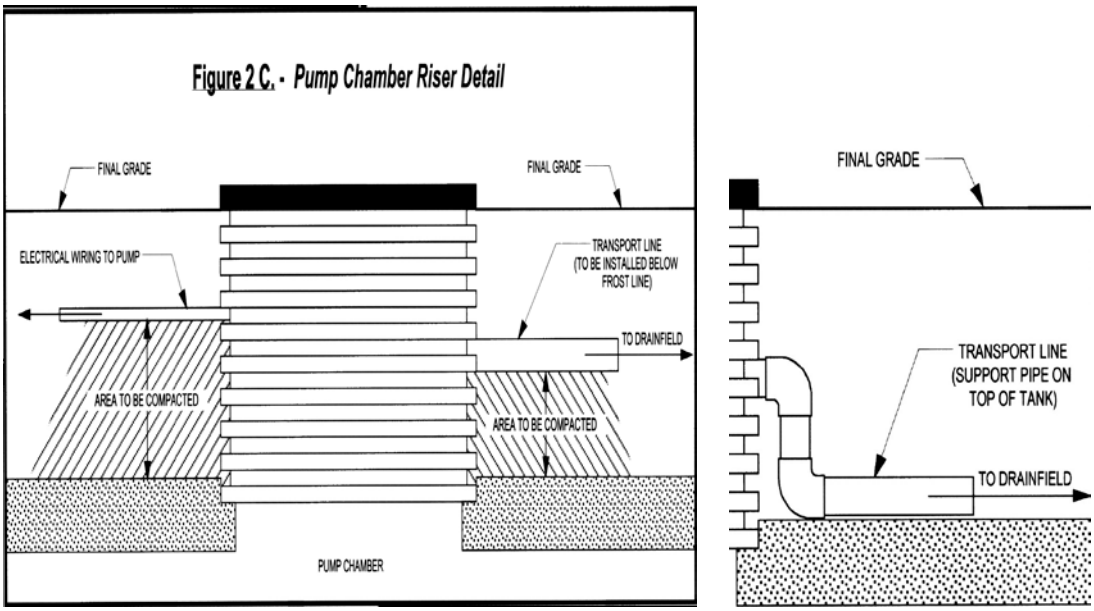
Figure 2 B. - ***Sewage Tank Placement***



3.5 Setbacks. When sewage tanks are relocated from their designed locations during installation, follow the setbacks described in WAC 246-272A-0210 Table IV. If there are any questions as to the suitability of relocating sewage tanks, the designer and Health District must be contacted.

3.6 Risers. (Figure 2 C) Risers are required per WAC 246-272A-0238 (1). Risers and access covers must be constructed of durable materials and be watertight. The seal between the riser and the tank must be watertight, and the joint between the access cover and riser must be sealed to prevent escape of gases or intrusion by vermin. One way to accomplish this is with a cast in riser on the sewage tanks however, epoxy, bentonite, black asphalt base mastic are also permissible. The use of expanding foam is not appropriate.

Access covers that extend to finished grade must be adequately secured to prevent unauthorized entry.



3.7 Cover. A minimum of six inches of cover is required over all sewage tanks.

3.8 Water-tightness Testing The WAC governing septic tanks (WAC 246-272C-0210) requires all tanks to be "…watertight and prevent surface drainage and ground water from entering into the tank or connected chambers. The department and local health officers are encouraged to require testing sewage tanks in the field at installation." To this end, the following should be required for all septic tanks and pump chambers that may pose a risk from leaking. Examples of higher risk from leaking tanks include situations of high seasonal water tables, waivers to place tanks <50 feet to well points and surface water, and tanks installed in Type 1 soils with well points in the area. A Best Management Practice and mark of an exceptional installer is to test each tank for water tightness:

Hydrostatic Testing Steps (accordance with ASTM C 1227 Section 9.1.2)

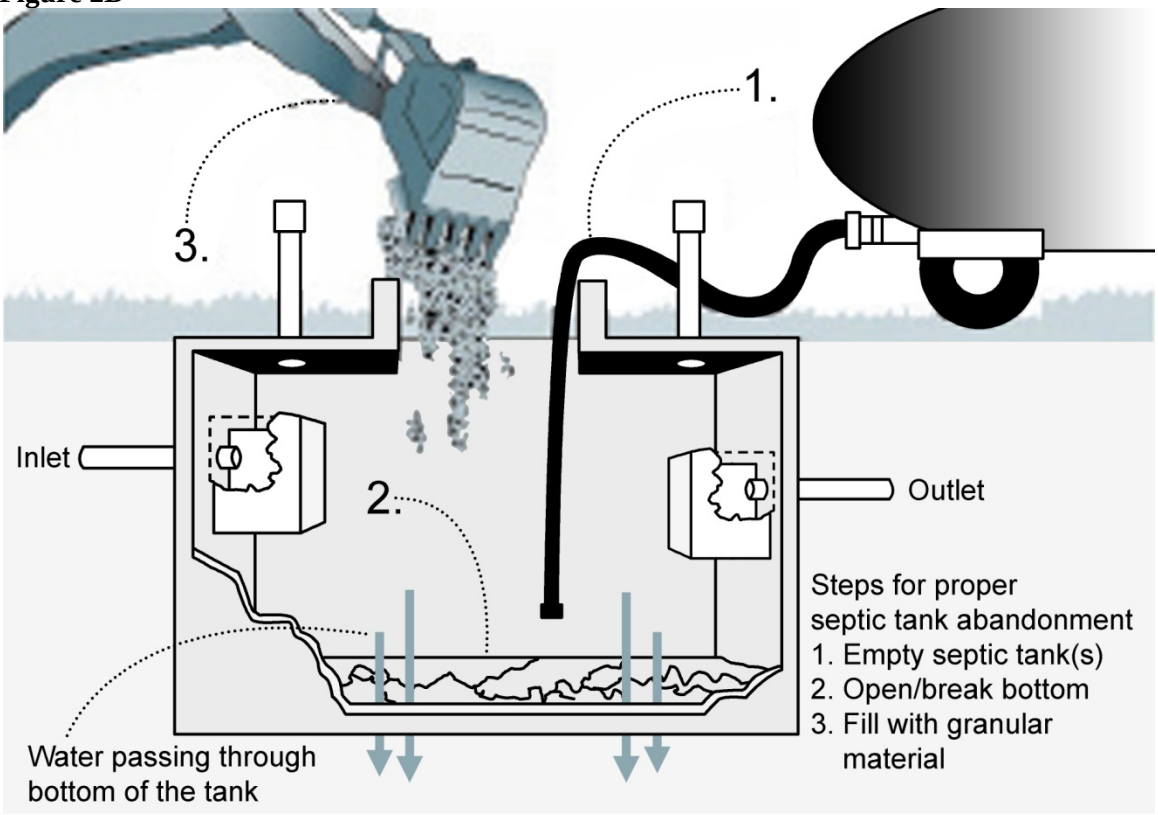
a. Leave the tank uncovered (sides and top) as soil/site conditions allow. This is to allow a visual inspection for, and easy access to, any leaks.
b. Seal the empty tank with Thoroseal or Tamoseal brand concrete sealer on the inside of the dry tank. Follow manufactures installation requirements.
c. Seal access openings, risers, and inlet and outlet pipes
d. Fill the empty tank with water to a point at least 2 inches above the point of riser connection to the top of the tank. Let the tank stand for 1 hour. If there is a

measurable drop the in the water surface elevation, refill the tank and let the tank stand for another hour. The tank passes the water tightness test one the water level is held for 1 hour without any measurable loss. Tanks shall not be rejected for damp spots on the exterior concrete surfaces.

e. When leakage occurs, if the tank is not rejected by the installer, designer, and/or Chelan-Douglas Health District, an additional water tightness test must be made to verify the repair is successful.

3.9 Tank and Drywell Abandonment All tanks which must be abandoned per design requirements will need to be properly abandoned to prevent future safety hazards due to unsecured tank openings or tank collapse.

Figure 2D

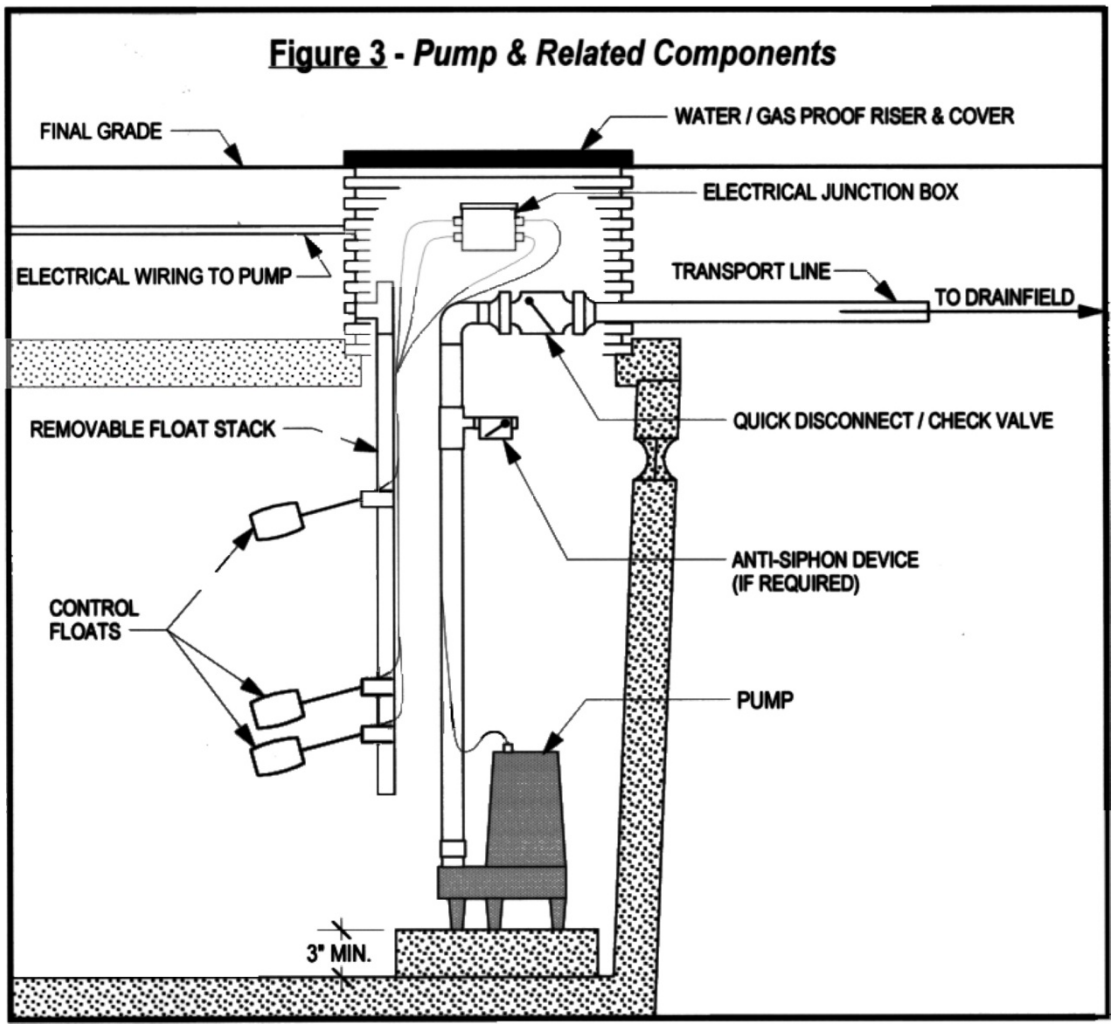


Consortium of Institutes for Decentralized Wastewater Treatment

SECTION 4 – Pumps and Siphons

4.1 Pumps.(Figure 3) Design and installation criteria for pumps include the following:

- All pumps and all mechanical components used in the pump chamber must be effluent rated.
- All electrical connections must be installed per Washington State Department of Labor and Industries requirements.
- Connect pumps to the sewage transport line with a quick disconnect coupling device so that transport lines do not have to be cut in order to remove the pump.
- All valves and quick-disconnect couplers must be installed in a manner so they are easily accessible from the surface.
- When siphons are used in lieu of pumps, follow all manufacturers' specifications.
- Install pumps on a block above the floor of the pump chamber, in a basket, or per the manufactures installation instructions.



4.2 Siphoning. (Figure 3) On all systems where siphoning is a concern, an antisiphon device must be installed in the sewage transport line. Siphoning can occur when the pump inlet is at a higher elevation than the highest drainfield lateral. The potential for siphoning may be determined by examining the elevations on the design. Siphoning may only become evident during the pressure test of the completed system. A hole drilled in the discharge pipe above the pump and in the chamber is unacceptable. A reversed check valve (as shown above) works well.

4.3 Pump Controls. (Figure 3) Requirements for pump controls include the following.

- Adjustable tether length float switches are generally utilized with a redundant "off." Switch configurations vary, so it is advisable to contact a local dealer.
- Install an audible/visible alarm switch, connected to a circuit separate from the pump circuit. This alarm is typically installed above the on/off switch. The alarm warns of problems within the pump chamber by signaling a high liquid level. (Called pump disconnects switch.)
- Install alarms and control panels so that the visual and audible alarm features are not rendered ineffective. In addition, control panels should be installed on a wall that is not immediately adjacent to the living area, as noises generated by the on/off cycles have been a source of complaints. Per Labor & Industries requirements, pump disconnect switches shall be located less than 50 feet from, and within site of, the access riser.
- Check-valves within the sewage transport line must be located within one foot of the pump chamber. Access is not required but must be shown on the Record Drawing. If multiple check valves are used, they must be shown on the Record Drawing.

4.4 Calculations The following is basic math and calculations related to pressurized septic systems used to properly set and program a control panel. It is the installer's responsibility to correctly measure the drawdown and set the control panel per the approved design parameters. Please contact the panel manufacture for more information on programming the panel. It is recommended that the installer write these numbers either on the card provided in the panel or on the underside of the pump chamber lid with a Sharpie pen. These numbers will prove invaluable to Service Providers and any future trouble shooting of the system.

a. **Pump Delivery Rate (PDR)**.

If you know the gallons per inch (gpi) in a tank, the pump delivery rate to the field can be measured:

PDR = inches of liquid drop measured to the ¼" X gpi
minutes pumped (to the exact second)

Example: 4 ¾" drop in a 1000 gallon pump chamber in exactly 3 minutes. It is known that there is 22 gallons per inch in this tank from the manufacture.

PDR = (4.75" x 22 gpi) ÷ 3
(104.5) ÷ 3
34.8 gallons per minute is physically being delivered to that drainfield. Note that this may be significantly different from the designed PDR.

b. **Dosing Regime for a Timed Dosed Panel**:

Step 1: find the daily designed flow within the design, typically shown as "gallons per day" and the number of doses required per day. Calculate the dosing volume (DV) = daily design flow ÷ number of doses per day. Example for a three bedroom home: 360 gpd ÷ 4 doses per day = 90 gallons per dose is the dosing volume (DV).

Step 2: Calculate the pump run time (ON time programmed into the panel): **ON time** = DV ÷ PDR

Example using the three bedroom analogy and the above PDR example:

ON Time = 90 gallons per dose ÷ 34.8 gallons per minute
= 2.58 minutes Control panels are usually set in minutes and seconds (mm:ss) for the on time so the installer needs to convert 2.58 minutes into this: 2 minutes plus 35 seconds (the 35 seconds comes from taking 0.58 of a minute).

Step 3: Calculate the pump rest time (**OFF time** into the panel). It is not mission critical to ensure to the exact minute the pump is off. Approximation of the off time to the nearest whole number is fine. For the above example, an **OFF time** of six hours between doses is fine…the paper design will show an OFF time of 5 hours 58 minutes. But it is important to ensure the amount of doses per 24 hours are programmed in…this is accomplished by the **OFF time**.

Appendix B of the Consortium of Institutes for Decentralized Wastewater Treatment's (CIDWT) "Installation of Wastewater Treatment Systems" manual has a complete math overview. This would include calculating liquid volume or operating volume in a give sized tank, calculating the liquid volume of a giving length and diameter of a pipe, and calculating flow rates, detention times, and hydraulic loading rates.

SECTION 5 – Subsurface Soil Absorption Systems

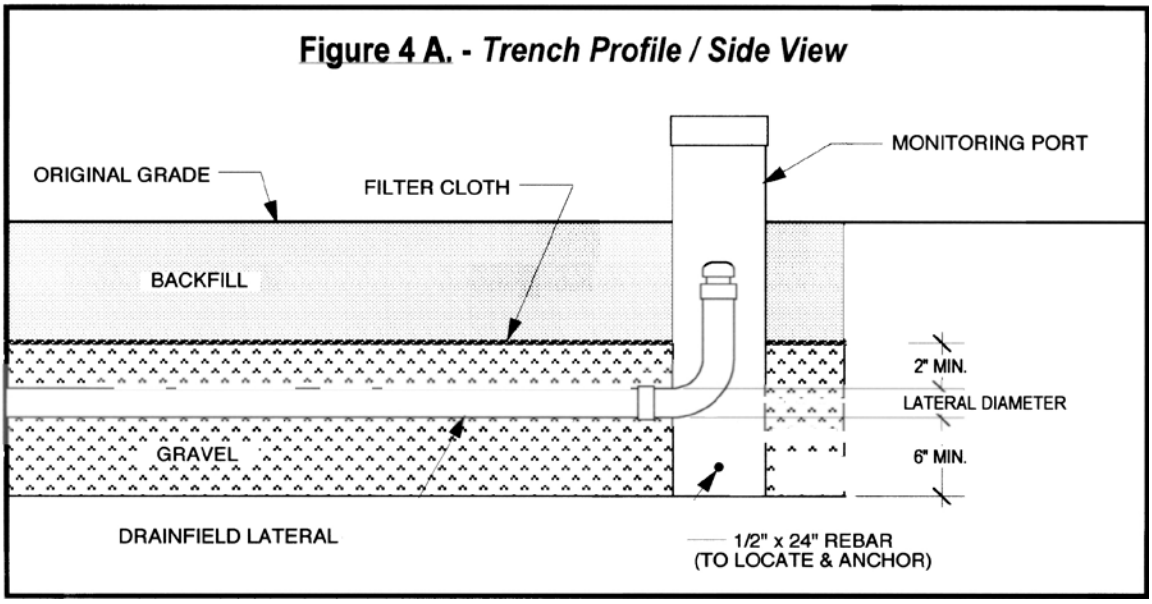
A major cause of septic system failure is installation of the system during periods when the soil is nearly saturated with water. Such conditions result in finer textured soils smearing and compacting during construction. Systems should only be installed when the soils are sufficiently dry. To judge soil moisture content, see the Washington State DoH TRC Guidelines, EPA Design Manual, etc. Contact the designer or Health District if you have any questions.

5.1 Gravity Drainfield System Requirements. (Figure 4A)

- A minimum of three feet of ASTM 3034 tight line is required between the septic tank, distribution box (D-box), and drainfield.
- Rigid, four-inch perforated pipe meeting the ASTM 2729 standard is required. Each lateral must be laid level with an end cap glued on the end. Rotate each section of pipe so the holes are at the 5:00 and 7:00 o'clock position.
- A minimum of six inches of drainrock is required under the perforated pipe, and a minimum of two inches of drainrock is required over the perforated pipe (see Figure 4). Drainrock is to be 2 to 22 inches in diameter, uniformly graded, clean, non-deteriorating gravel, with the percent by weight passing the U.S. No. 200 sieve no greater than 0.5%. Other types of drainrock may be accepted on a case-by-case basis using the WSDOT standard as a guide. The drainrock must be covered with an approved geotextile (filter fabric) prior to backfilling the system. The bottom of the trench/bed must be level +/- 1".
- When distribution boxes or inspection boxes are part of the system, the boxes must be secured in a manner to prevent shifting during back filling. This may be accomplished by pouring a concrete pad under the distribution box. The distribution box outlet pipes must be carefully leveled with respect to one another for proper operation.
- If a step down system is used, follow the designer's guidelines. There is to be only one step down per lateral and each step down must be at least 5' horizontally from the next step down to prevent short circuiting (bypassing) of the lateral.
- If the installer wishes to deviate from the amount and/or length of laterals, he must get permission from the designer; however, no lateral shall be longer than 100'.

5.2 Pressure Distribution Requirements. (Figure 4A) For conventional pressure distribution systems, Class 200 or better (thicker walled) pipe is required. Schedule 40 pipe is recommended for all piping in the system but follow what the design required. The minimum diameter pipe for sewage transport lines, manifolds, feeder pipes, and laterals is one inch. Minimum rock depth requirements are the same as for gravity drainfield systems.

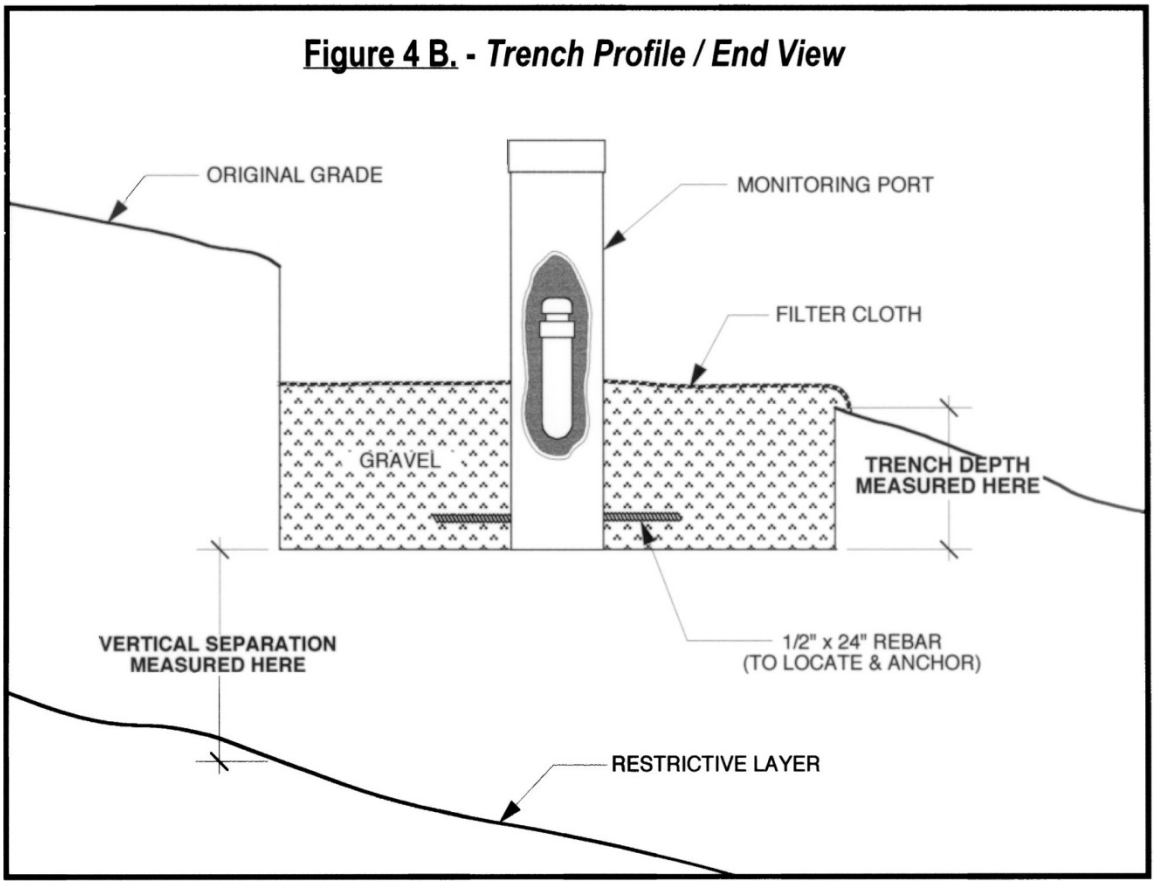
Figure 4 A. - *Trench Profile / Side View*



5.3 *Vertical Separation. (Figure 4B)* Vertical separation is the depth of unsaturated, original, undisturbed soil between the trench bottom and a restrictive layer. The restrictive layer may be the highest seasonal water table, an impervious layer, or a specific soil type. On level sites, vertical separation is measured from the center of the trench. Trench depth is measured on either side of the trench. On sloping sites, trench depth is measured from the downhill side of the trench; vertical separation is measured from the uphill side of the trench.

5.4 Trench Depth. (Figure 4B) The excavated trench bottom for gravity and pressure systems should not be deeper than shown on the approved design. Contact the designer and Heath District immediately (prior to installation) when conditions beyond the installer's control (such as building plumbing depth or inaccurate system layout) necessitate a trench deeper than designed.

Figure 4 B. - *Trench Profile / End View*



5.5 Bed Systems. Generally, bed systems are not required to be time-dosed. However, time dosing is recommended when using multiple bed configurations and for multiple family residences.

- When multiple beds are installed on the same downhill plane, the minimum distance between beds is 6 feet, or equal to the width of the bed. The health officer may reduce this separation if sufficient justification exists.

- Place a PVC high pressure gate valve in the transport pipe to adjust the total dynamic head for the bed system. Shallow pressure systems may use an irrigation box and deep installations may need to place the valve in a 6" PVC riser pipe. Do not use the ball valve located in the pump chamber (such as found with the Orenco Systems discharge assembly) to adjust TDH…this valve may open over time due to hydraulic action from the on/off of the pump.

5.6 Trench Separations. Standard trench separation is ≥ 6 ½ feet between trenches so that the reserve area can be shown/placed between the primary (installed) trenches. Do NOT install the drainfield if the reserve area is shown between primary trenches and this side-wall to side-wall distance cannot be met. The installation will not be approved. A 5 foot side-wall to side-wall distance is permissible if the reserve area is located elsewhere.

5.7 Gravelless (gravel substitute media) or Chamber systems

- Follow manufactures specifications, including end caps and adaptors/couplers, for installation.
- Use of screws to attach chambers together, inspection ports and inlet pipe are recommended.
- Install observation ports in the first and last chamber of each lateral or, in the case of a gravel substitute media such as EZ Flow, in the last 5' from the ends. The observation port should be capped and at grade. Cut pipe the depth of the cap with a hand saw in an "X" pattern (as viewed from above) to help prevent the cap from seizing onto the pipe. For the gravel substitute media, place a 1 to 2 foot section of rebar through the observation port just above the media to anchor the pipe.

Trench or bed depths installed greater than specified on the approved design: MAY NOT BE APPROVED. Installing the system too deep can and has resulted in expensive redesign and/or relocation of the subsurface soil absorption system. Make sure you understand how deep the system is to be installed before starting construction!

5.7 Final Cover Inspections Prior to backfilling septic system components the installer is required to contact the Health District or the designer of the system for a cover inspection. This is to ensure the system was installed per the design and the system meets the requirements of WAC 246-272A.

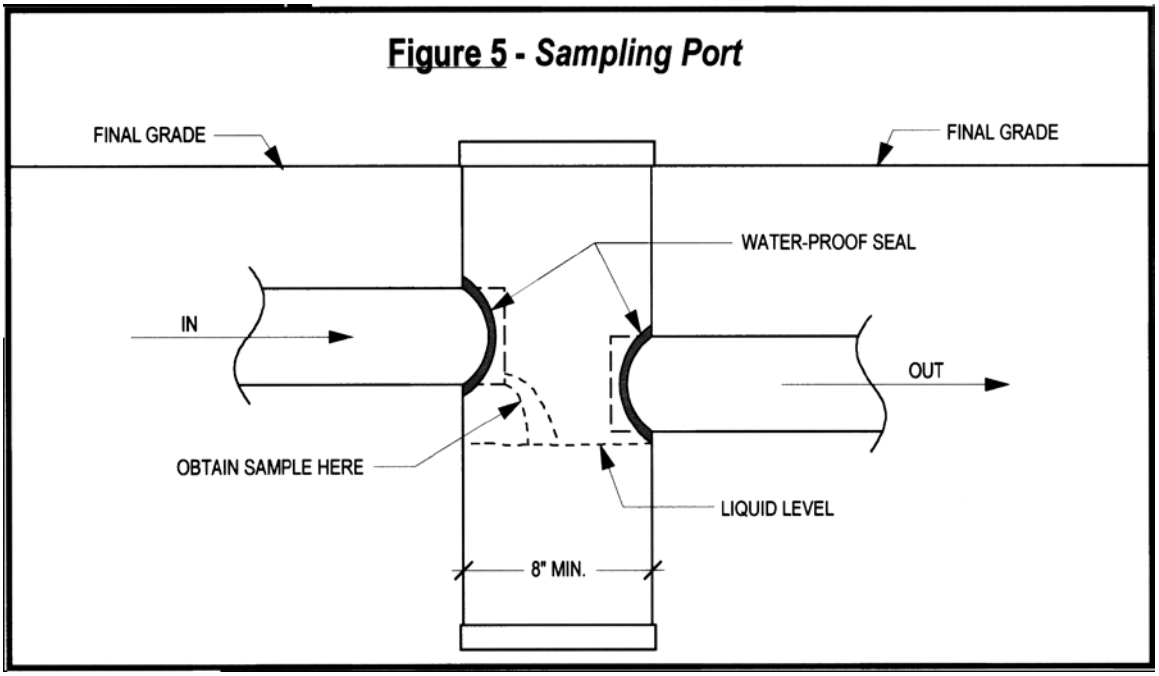
- For pressurized drainfields, mounds, and sand filters:
  - Timed drawdown to set control panel (see section 4.4). Ensure there is an adequate amount of water in the tank to conduct this test.
  - Alarm function test
  - Measured distance between orifices and orifice size.
  - Proper cover material available onsite
  - Measure total dynamic height (TDH) in the field. Two methods are acceptable but please check the design:
    1. Drainfield uncovered and the laterals are exposed. Lateral orifices are placed in the "up" position. Pump is energized and the "squirt height" is measured. The heights must be acceptable per the orifice size (1/8" orifices require 60" TDH and 3/16" orifices require a 24" TDH) and even +/- 15% across the bed/trench.
    2. Drainfield covered with prior permission from the Health District. Due to site constraints, some drainfields will need to be covered as the system is constructed. Secure the proper length PVC pipe (60" for 1/8" orifices and 24" for 3/16" orifices) to the ends of the clean-out sweeps at the ends of each lateral. Distance is measured from the upturn of the sweep. Energize pump and adjust TDH so water just flows out of the ends of the piping. Remove piping and place a cap on the sweep.
- Septic tanks and pump chambers:
  - Water tight testing
  - Backfill material
  - Proper securing of the risers
  - Effluent filter
  - Inlet and outlet baffles. Also check for proper center wall baffling if required.

SECTION 6 – Alternative Systems

The design and construction of alternative on-site wastewater disposal systems must conform to the Recommended Standards and Guidelines adopted by the Technical Review Committee, WAC 246-272A, and other industry standards and guidelines.

Key requirements for alternative systems include the following.

- Install Aerobic Treatment Units (ATU) according to the manufacturer's specifications.
- Install disinfecting units according to the manufacturer's specifications.
- Show sampling point locations for obtaining effluent samples after disinfecting units on the design. Construct sampling points in a manner that allows for collecting a "free fall" sample. Sampling points are not required when an ATU is used without disinfection. *(Figure 5)*



- Install monitoring ports in a manner that meets the equivalent methods shown in the guidelines. These specifics are usually shown on the design.
- Provide surface access to valve boxes for operation and maintenance (this is critical!).
- The sand must be from a commercial gravel pit and meet the applicable Washington State recommended standards and guidelines.
- Commercial gravel pits should perform their own sieve analyses. The method used must conform to ASTM C-136 Method for Sieve Analysis of Fine and Coarse Aggregates and ASTM E-11 Specs for Wire Cloth Sieves for Testing Purposes, Annual Book of ASTM Standards, Volume 04.02.

SECTION 7 – Record Drawing

The installer is responsible for the Record Drawing. This document is the "accurate graphic and written record of the location and features of the onsite septic system that are needed to properly monitor, operate, and maintain that system." The Chelan-Douglas Health District has an official form for the installer to submit. The drawing must be accurate to +/- one half foot per WAC 246-272A-0265 (1), however, it is more important to have a useful drawing to find those critical parts of the system. A drawing will not be rejected if the installer triangulates with a 100' or so tape

measure off of permanent objects such as well points, corner of buildings, PUD vaults, etc. The intent of the Record Drawing is to find the system components sometime in the future if all risers and inspection ports are buried or removed.

The following is required on each drawing:

- Drainfield and manifold orientation and layout
- Trench/bed dimensions and critical distances within the layout
- Septic tank/pump chamber placement in relation to the dwelling
- Location of buildings/property lines in relationship to the tanks and drainfield
- Observation ports and clean-out locations
- Location of all wells, roads, driveways
- Undisturbed native soil between trenches/beds
- North arrow
- 100% reserve area if new construction or replacement

An example of an excellent Record Drawing: