

Eastgate Environmental Health Services

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Guidelines for Winter Water Table Review (WWTR)

Revised October 6, 2022

These guidelines are intended to provide a standardized process by which the design community and the Health Department (HD) can better determine site suitability for On-site Sewage System (OSS). This guideline establishes specific requirements and definitions to assure that more complete and meaningful data can be gathered, with the intent that proper assessment and evaluation will take place.

Categories of Lots Requiring WWTR:

1. Lots suspected of high winter water tables due to specific soil morphology or soil indicators, such as soil mottles, soil chroma, and depth to restrictive layer, wetland vegetation or history of the surrounding area.
2. Lots with previously identified high winter water tables, which need additional information to make a determination of suitability.
3. Lots where unacceptable soil depth has been demonstrated and some methods or methods has/have been incorporated to divert subsurface flows in an effort to lower the water table, such as an interceptor trench.

Reasons for WWTR:

1. To determine if a site meets the minimum standards for use of an OSS (18 inches or 12 inches for parcels equal to or greater than 5 acres per KCBOH 13.28.060)
2. To determine the type of OSS to be used based on soil depth to water table (typically the difference between using a PD system vs. a SF or Mound)
3. Drains installed for the purpose of affecting vertical separation (KCBOH 13.28.030)

Application Submittal Deadlines

Per code (KCBOH Title 13), December 1st is the last day WWTR applications may be submitted in order that a complete and adequate review can be made. It is recommended that WWTR applications be submitted to the HD no later than November 1st to record data in early wet season years. Should applications not be submitted in time to gather this data it may be lost for that wet season. It is therefore incumbent on the designer to inform the applicant of the possible consequences of missing this data-gathering period. Under no circumstances should a WWTR application be submitted after December 15th.

Application Submittal

Proper submittal of the WWTR Application is CRITICAL so we know which sites need to be visited during the wet season.

IF YOU DO NOT DO THIS – We will miss the wet weather review opportunity!

- ALL WWTR sites **MUST** have a WWTR Application submitted to this email address: EHWWTR@kingcounty.gov
- In the email, please include the name and phone number of the person to call for payment.
- If there is an associated OSS Site Design, the OSS Site Design should be submitted separately via the portal: [Online portal submissions](#)

IMPORTANT

USE THIS NAMING FORMAT for the **subject line of the EMAIL:**

WWTR_PN_Name of Applicant_Name of Designer

Example: WWTR_0522049014_BRITTENHAM_GOODMAN

USE THIS NAMING FORMAT for the **PDF of the Application:**

PN_APPX ADDRESS_WWTR_APPLICATION

Example: 0522049014_19521 8TH AVE S_WWTR_APPLICATION

Fee Amounts

- WWTR Application **WITHOUT** an associated OSS Site Design
 - **Full fee** per the [List of OSS service fees](#)
- WWTR Application **WITH** an associated OSS Site Design
 - **Two Hour fee** per the [List of OSS service fees](#)

Questionable OSS Site Design Review Process

- A site design application that is submitted without a request for WWTR on or after October 1, for which soil depth is determined to be questionable by the reviewing Sanitarian will be held for WWTR.
 - When an application is held for WWTR the designer of record will be notified in writing regarding the status of the application. Following designer notification, a copy of the notification will be sent to the property owner. Consultations with the reviewing Sanitarian can help determine if the designer/engineer should also monitor the site.
- Site design applications which are submitted or reviewed prior to October, and for which a WWTR is warranted, will be disapproved. This may necessitate resubmission for WWTR during the required WWT time period.

The WWTR Application shall include:

1. A name and phone number of the person to call for payment - [List of OSS service fees](#)
2. A cover letter detailing any history or special circumstances of which the HD needs to be advised
3. A completed application form ([Application for Winter Water Table Review \(WWTR\)](#))
4. A detailed vicinity map showing identifiable landmarks
5. The lot to be monitored is to be clearly flagged with identification of the designer and applicant at the access point of the lot
6. Soil Log data for the area being monitored
7. An overall dimensioned plot plan detailing the location and specific identification of each monitoring port or soil log hole to be monitored; For each application, no more than 6 monitoring stations/holes will be spot checked for data collection by the HD. These stations must be clearly identified on the plot plan as well as at the site. You may choose to install additional monitoring stations on the site, but the HD will not be committed to recording data from these stations. Identify the access route to the sample ports on the plot plan as well as at the site. Access to the sampling site and soil logs must be maintained. All relevant surface and known seasonal water features are to be delineated on the plot plan.
8. A Winter Water Table Monitoring Plan (WWTMP)

The WWTMP shall include the following:

- Identification of who will be doing the monitoring
- Length of time the monitoring period will cover
- Description of the method used for recording data for each type of monitoring station
- The frequency or level of monitoring
- Source of precipitation data to be used
 - Daily and or monthly rainfall summaries may be obtained via the internet (e.g. <https://www.ncdc.noaa.gov/cdo-web/search> and <http://www.seattleweatherblog.com/rain-stats/>) Weather forecasts from these sources can be of valuable in advanced scheduling of field data
- collection points/dates
- Identification of monitoring stations type(s) used (monitoring ports or soil log holes)

Water Table Monitoring Site Preparation

Soil Logs - Used for Measuring Water Tables

- **Are not acceptable** if they penetrate beyond a restrictive layer
- Must have a solid, level, horizontal 1x1 lumber that is buried at the top of the soil log, in the middle of the hole and will remain in place for the remainder of the study
- All sloping sites are to be measured from the downhill side
- Must provide adequate safety measures and flagging (See KCBOH 13.28.050)
- Must be constructed using sampling pits that conform to the criteria established in the [Guidelines for Test Pit Construction for On-site Sewage Systems \(PDF\)](#)

Monitoring Ports

- If monitoring ports are used, a hand dug soil log hole is to be placed **near** the sampling ports for calibration and clearly labeled as such.
- Must follow the standards outlined in diagram (Typical Water Table Monitoring Port) included on the last page of this document.
- Are expected to have crest gauges or some means of recording the peak water tables
- Shall be constructed of a light color pipe so that the water level can be determined (black piping is not acceptable).
- Must have port caps that are easily removable without disturbing the port
- Must conform to the criteria established in the *Memorandum dated December 30, 1996, titled, "Site Specific Monitoring of 1996-97 Winter Seasonal Ground Water Tables – Pilot Program"* (Note – Yes, this does need to be updated!)

If a low area exists within the site review area a monitor port or soil log is to be included at this spot. When including a drainfield design a monitoring port or soil log is to be placed in the area of the lowest proposed lateral.

Health Department Initial Evaluation

- Before a WWTR Application can be accepted for processing, it will be initially screened by the assigned inspector. Applications determined to be incomplete will be returned to the designer without HD field review.
- Within 14 working days of acceptance of a WWTR Application, the HD will make a site visit to determine if the application meets all requirements and standards for gathering water table data. If found unsatisfactory, the application will be rejected, and the designer/engineer will be notified. It is the designer's responsibility to ensure that all necessary application requirements are met.
- A corrected application must include a revised version of the application and a 1-hour fee (see [List of OSS service fees](#))
- The application can be resubmitted once corrections have been made

Factors in Determining High Winter Water Table Conditions

- From November through December sufficient water from rainfall must accumulate to establish a WWT and enough subsequent/background rainfall to maintain this condition. Extended periods of time without rain during the WWT season often means that substantial repeated rainfall is needed to bring back the WWT condition.
- Significant storm events (2-3 days in duration) following the initial development of a WWT may develop a High WWT condition. If storms don't follow in close frequency, after development of a WWT, a High WWT condition may not develop.
- Return probabilities/storm frequencies (i.e. 2, 4, 8, 10, 20, 30-year storms). Each higher level of storm raises the possibility that a High WWT event will occur. However, in some instances, storms of rare frequency triggering the largest rainfalls may also cause abnormally high WWT levels.

- To put readings into perspective the HD needs sufficient data points (i.e. the highest level of monitoring), especially to put rarer occurring levels/events into perspective. If the lot in question is marginal, a higher level of monitoring is automatically indicated. **If the lot in question demonstrates a water table spike event (see below) the higher level of monitoring should be used to put this event into perspective.**
- Spikes - Following the heaviest rains of a storm, the water table may spike to abnormally high levels. A true spiking event would be expected to return to a high WWT condition within 24-48 hours following the storm event. **Therefore, it is important to make a 24-hour follow-up field visit to record the water table level.** Spikes to 16-17 inches of the surface on a 30-year storm VS spikes to 6-10 inches following a 3, 5, or 10-year storm can be interpreted differently in regard to the suitability of a site. We advise that designers/engineers study the definition and concept of “storm return period.”. This information is contained in a number of sources including the information handout entitled, “*Water Table and Hydrology Evaluation for On-Site Sewage System Design*”, November 1996.

NOTE: Field data recording points should be taken when high winter water tables are present. Data recording points taken when no water tables are present in the surrounding area are of little value in determining site suitability.

Monitoring Duration

Continued Monitoring Throughout the WWT season, when:

- Sites are marginal and continue to receive marginal WWT readings
- Sites utilizing mitigation measures to lower water tables
- Spike event occurs which needs to be put into perspective.
- Enough monitoring data is to be recorded to establish that the one spike reading is truly a rare event. It is the Designers responsibility to provide this information to the HD.

Monitoring can be terminated when:

- An observation is made that clearly indicates a site is not suitable (i.e. water to the surface) at any time.
- Clear indication that a site is acceptable for the proposed system type (when a design has been included) following at least two High WWT conditions (18 inches or more clearly indicated).

Designer Data Submittal Requirements

- At the appropriate time determined by the HD, the designer will be requested to supply his/her data report. All winter water table related data is to be submitted to the HD within 14 working days of the specified notification date. Data not provided within the prescribed time frame cannot be used in determining the suitability of the lot under review.
- Indicate on the above plotted graph, the date water table data was gathered
- Daily rainfall data is to be plotted on a graph through each month monitored

The designer is expected to substantiate the value of all data gathered and be accountable for its accuracy. In addition, the designer is responsible for compiling all data and other information and submitting it to the HD in a clear and concise manner.

Data Analysis and Evaluation

- During the final phase the HD will verify observed vertical separation limits and appropriate levels of treatment expected upon submission of a complete design

In lieu of an approval or disapproval, the HD will issue an analysis letter indicating whether or not the site is considered acceptable for submission of an OSS design and if acceptable, the minimum level of treatment necessary.

Subsurface Drip System Clarifications: The September 12, 2005 memo entitled: *Internal Office Waiver for Drip Irrigation Designs* has generated a number of questions.

Here are the department's responses to the most common questions raised:

- A site's primary and reserve areas do not have to meet the conventional trench installation application sizing per Title 13. One of the principle advantages of drip is the compact nature of its footprint.
- An AdvanTex system can be used in conjunction with drip to improve the quality of the effluent but will not count toward meeting either treatment standards 1 or 2.



City of Seattle
Norman B. Rice, Mayor



King County
Gary Locke, Executive

Seattle-King County Department of Public Health

Alonzo L. Plough, Ph.D., MPH, Director

MEMORANDUM

December 30, 1996

TO: King County Certified Designers

FM: Jim Henriksen, Wastewater Program Supervisor

RE: Site Specific Monitoring of 1996-97 Winter Seasonal Ground Water Tables - Pilot Program

Background:

Seasonal water table information is critical to properly assess site suitability and ultimately select the most appropriate type of on-site sewage system (OSS) for a particular parcel. Installation of OSS without accurate knowledge of seasonal water tables can result in decreased vertical separation caused by elevated water tables with the consequences of inadequate wastewater treatment, early system failure and resultant public health hazards.

Section 13.28.060.C of Title 13 specifies: "Where there is evidence of high winter water table or shallow restrictive layer, the health officer may require additional testing or monitoring to verify that a high water table does not exist. Such testing must be submitted no later than February 1 to allow adequate time to monitor and evaluate the seasonal water table."

In addition, WAC 246-272-11001 (Effective January 1995) require that the designer/engineer performing the soil and site evaluation record the ground water conditions, the date of the observation and the probable maximum height of ground water development.

Historically, site specific seasonal water table monitoring within King County has primarily consisted of the Health Department receiving site design applications for winter water table review just prior to or on February 1, followed by subsequent (as often as possible) periodic observations by the health officer of water table levels in open soil log test pit excavations. Typically, little or no designer/engineer generated seasonal water table data accompanies these applications.

Shortcomings of this process include:



- A reliance upon availability of the health officer to review and monitor numerous sites within a fairly short timeframe and in response to precipitation events.
- A lack of site or geographic specific rainfall data upon which to correlate groundwater observation data.
- The use of open test pit excavations for making water table observations. Open pits can be a safety hazard, do not provide for consistent measurements, and are prone to influences of surface water flow and collapsing.
- A lack of designer's/engineer's water table monitoring data to support/confirm vertical separation specified by a design.
- The respective roles and responsibilities of the health officer and designer/engineer in monitoring seasonal water table development and evaluating vertical separation is not clearly delineated.

The Pilot Program

As a preliminary step in developing more uniform methods and procedures for monitoring and evaluating site specific winter season ground water table development the following pilot program is being established for the 1996-97 Winter review season. The results of this pilot will be reviewed on an ongoing basis for further development and refinement throughout this wet weather season.

Goals of the project include:

- The development of standardized methods for monitoring and measuring seasonal high water table levels.
- Identify and utilize additional sources of rainfall data which are more specific than is Sea-Tac data to the various geographical regions within King County.
- Encourage the use and evaluate the performance of water table monitoring ports and crest gauges in lieu of open soil log excavations.
- Clarify respective roles and responsibilities of the system designer/engineer and the health officer in monitoring, documenting, and evaluating site specific seasonal water table development.
- Increase the active involvement of the system designer/engineer in site monitoring, developing and submitting to the health officer accurate water table data to establish and confirm vertical separation.

Procedure:

1. Applications for winter season ground water evaluation are to be submitted as early in the wet season as possible. Ideally, seasonal ground water monitoring should be conducted during the months of January, February, March and April. Lots which are now known to require wet season evaluation should be submitted for review by late December to early January.
2. The site application form may be used to initiate a winter water table review request by clearly marking the top of the application "Winter Water Table Review." Fees will be charged at the basic site application rate of \$145. A system design is not necessary provided that seasonal water table is the only aspect submitted for evaluation. However, if a detailed system design for the subject parcel is

completed and submitted for review subsequent to the seasonal water table monitoring (within 6 months), applicable site design review fees will be collected at that time. In addition, a complete site application with system design may also continue to be submitted up front for a combined water table and design review as it has been in the past with review fees based upon system type.

3. The winter water table review application is to include:
 - If the submittal is not a complete site application/system design, but only for seasonal water table review, basic site and soil information specified in 13.28.020 (A,B,E,F) and 13.28.050 including a completely dimensioned plot plan, soil log descriptions and locations, vicinity map, etc. is to be submitted.
 - Locations of water table monitoring ports.
A plan of the water table monitoring the designer/engineer will be conducting to include; frequency and interval of measurements, source of precipitation data (on-site rain gauge and/or weather station) and design of the monitoring port installation.
4. Health Department staff will not be the primary data gathering entity. Health Department staff will make an initial site inspection to evaluate the soil log holes and monitoring port installation and if requested, meet with the designer/engineer. Health Department staff will then occasionally spot check the site during the review period to observe site conditions and water table elevations.
5. The designer/engineer is to perform site monitoring on a frequent enough schedule to demonstrate minimum required vertical separation over a typical wet weather season. We request that monitoring data gathered be sent to the appropriate field sanitarian on a monthly basis and include (please use attached data collection sheet):
 - Monitoring port or soil log number.
 - Date of observation and measurements obtained.
 - Rainfall data pertinent to the site.
 - General weather conditions on observation day (i.e., sunny and clear, light rain, cloudy, etc.).
6. Monitoring ports be constructed and installed at least in accordance with the example attached. In addition, please use crest gauges to record peak elevations which may occur between observations.

Consider the following:

- Monitoring ports when properly installed can remove influences from surface sheet flows and siltation of soil log excavations.
- Soil log holes may be filled after confirmation from the Health Department when monitoring ports are used and thus reducing safety concerns of open soil log excavations.
- Install one post hole adjacent to one of the monitoring ports for a visual comparison/calibration. The post hole is to be flagged and covered with a piece of plywood or suitable covering for safety purposes.

7. Rainfall Information:

- For background information on measuring and evaluating rainfall see the enclosed excerpted Chapter 5 from Water Table and Hydrology Evaluation for Onsite System Design by Craig Cogger and Ed McCarthy.
- King County Surface Water Management (SWM) records rainfall at 36 measuring stations located throughout the county. A list of these stations and their locations titled King County SWM Recording Rain Gages is attached. The data gathered from these stations has a 5 to 6 week delay from collection to publishing. This data, as it becomes available as well as the existing historical rainfall data for each measuring station, will be available at the Aldersquare and Eastgate District offices for your review.

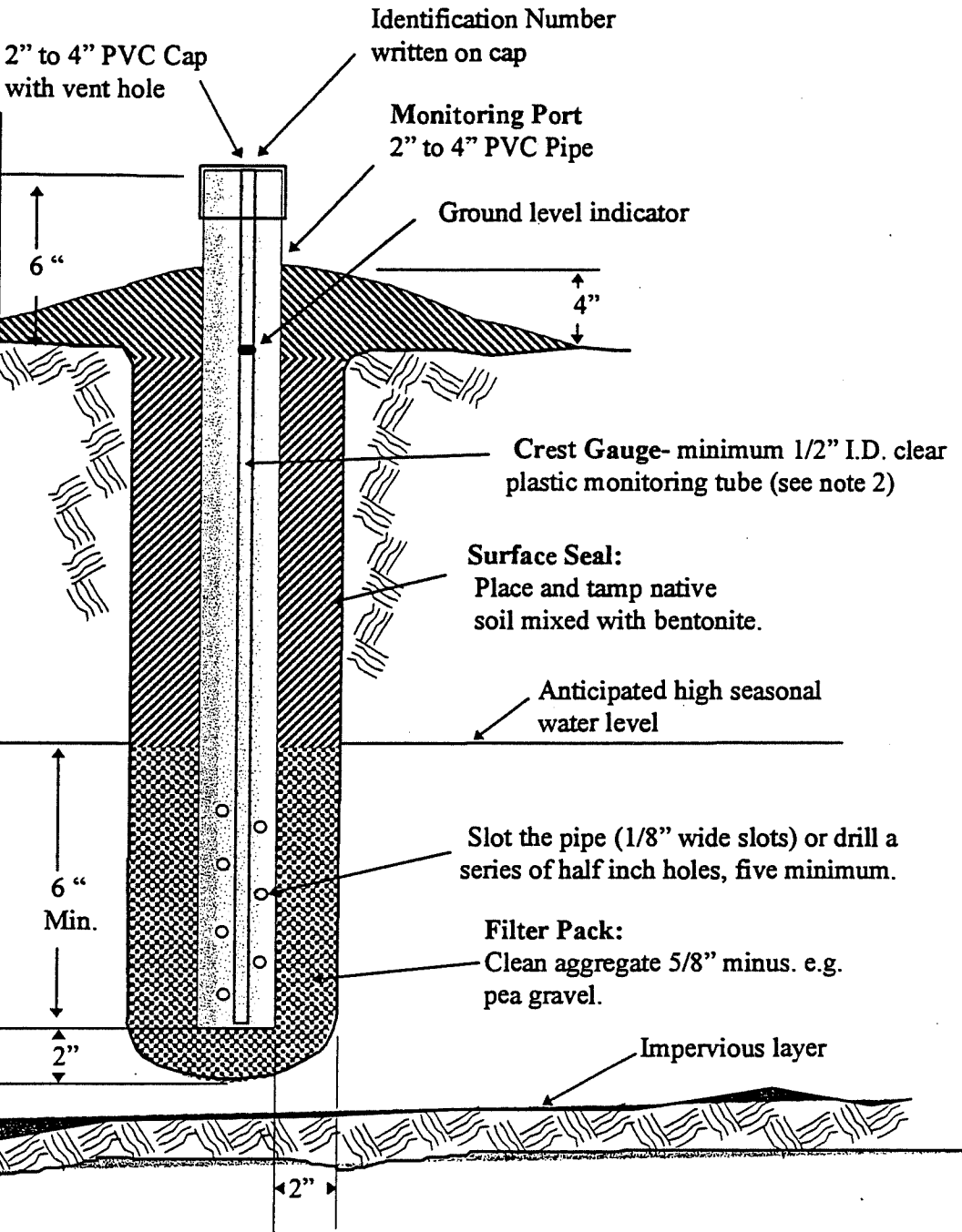
Be reminded that Northwest On-Site Wastewater Training Center at the WSU Puyallup Extension Campus offers a course in Water Table Evaluation, Measurement, and Instrumentation. For course details, contact Dave Lenning, Training Director at (360) 352-0618.

JH:ma
Enclosures (4)

TYPICAL WATER TABLE MONITORING PORT (SECTION 4)

General Design Criteria for Monitoring Ports:

1. **Filter pack**- Clean pea gravel or other coarse material around the perforated or slotted pipe to prevent the filling of the pipe with fines.
2. **Surface seal**- Bentonite packed and mounded around the pipe to prevent surface water from puddling around the pipe. The top of pipe must terminate at least 2" above the surface seal.
3. **Pipe**- Perforated or slotted for at least 6 inches in the anticipated saturated soil zone.
4. **Port cap**- Protective secured vented cap placed on top of the pipe to prevent water and debris from entering the pipe.
5. **Placement**- The well should be placed in, but not extended through the soil horizon that is to be monitored. The depth should penetrate at least 6 inches below the depth needed to meet minimum design vertical separation requirements.



Notes:

1. Monitoring Port

1. Monitoring port depth to be at least 6 inches below the depth needed to meet minimum vertical separation requirements.
2. Backfill hole with 2 inches washed pea gravel and place pipe.
3. Place filter fabric or paper over pea gravel and fill remainder of hole with soil/bentonite.
4. Cut vertical slots in top of casing to allow easy removal of pipe cap.
5. Drill vent hole in pipe cap.

2. Crest Gauge

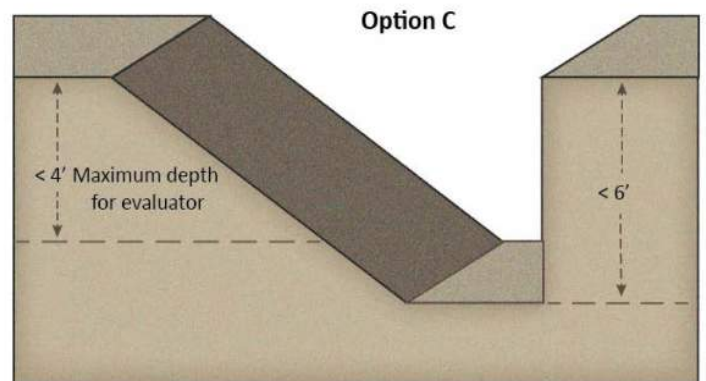
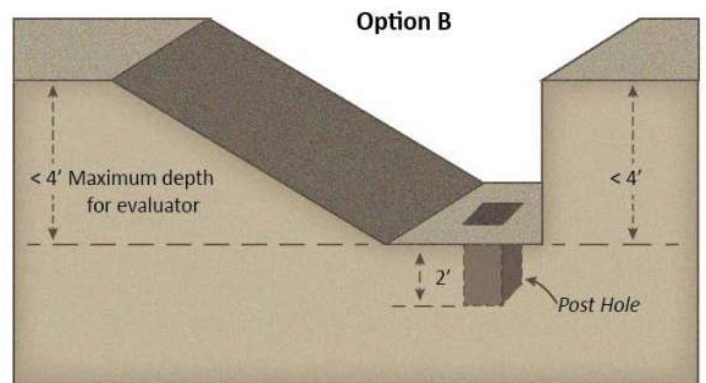
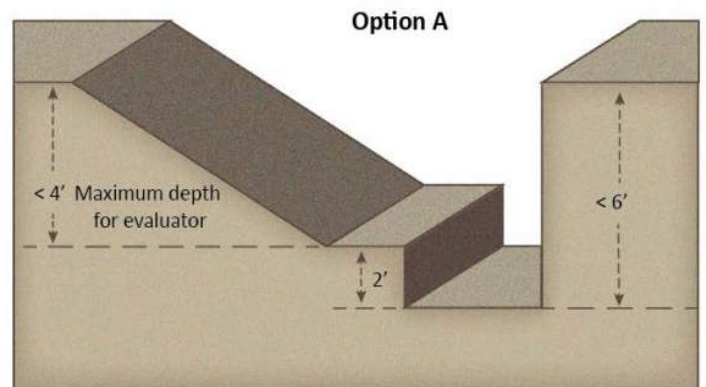
1. Size the tube to fit inside the observation port casing. The tube length is to extend from the bottom of the observation hole and be flush with the top of the casing.
2. Place several pieces of undersized Styrofoam in tube.
3. Glue small piece of screen across bottom of tube or thread across hatch of small wire through several holes drilled at bottom of tube to prevent Styrofoam from being washed out of tube.

Guidelines for Test Pit Construction for On-site Sewage Systems

Safety and soil characterization are both important when constructing a test pit for an on-site sewage system soil review. The three test pit options in this guidance will meet the Washington State Labor and Industries (L&I) safety requirements in Chapter 296-155 WAC. The three options can be used for all soil types listed in On-Site Sewage Systems Chapter 246-272A WAC and Chapter 246-272B WAC except as noted below. Local Health Jurisdictions may have more specific guidance for their local area. The reviewing agency should be consulted before test pits are constructed.

Test Pit Construction

- Call 811 to locate underground utilities prior to digging.
- All test pits must be evaluated for stability by a competent person per WAC 296-155-657. Test pits shall not be entered if deemed unstable.
- Use the least stable soil for evaluating test pit stability when there is a layered soil profile.
- Regardless of soil type, a test pit that shows distress such as fissures or cracks is deemed unstable.
- Benching for test pit stability can only be done in unsaturated soils with greater than 15% fines (silt and clay). This means some DOH Type 1, Type 2, and Type 3 soils and soils seeping freely may not qualify for Test Pit Option A.
- The three test pit options do not allow an evaluator to enter the test pit to a depth greater than 4 feet. To enter to a depth greater than 4 feet, additional requirements in WAC 296-155-657 must be followed.
- Every test pit must have a ramp that provides for entry and exit into the test pit without the need of aid.
- All spoils must be placed at least 2 feet from the edge of the test pit.
- All equipment within 20 feet of the test pit should be shut down when a person is in the test pit.
- For Large On-site Sewage Systems (LOSS) an excavator must be on site.
- Test pits shall not be left open for an extended period unless properly barricaded per L&I regulation. An example of a properly barricaded test pit is orange construction fencing surrounding the entire test pit and secured by metal fence posts.



For more information contact Washington State Department of Labor and Industries, your local health jurisdiction, or the Washington State Department of Health.