

		West Virginia Department of Health and Human Resources			
		MANUAL OF ENVIRONMENTAL HEALTH PROCEDURES			
Section	Waste Water	Date	June 1, 2008	Procedure #	WW-6
Subject	Inspection of a Standard Septic Tank System Installation			Page	1 of 6

Proper final inspection of a septic tank system is necessary in order to assure the following:

- 1) The system has been installed in the originally approved, and permitted, area.
- 2) The system is not encroaching on the minimum separation distance to any water wells, either on the subject property, or on adjacent properties.
- 3) The system is properly constructed, installed as designed, and permitted.
- 4) Approved methods and materials are used in construction.
- 5) The system can be expected to function satisfactorily, and its operation will not be expected to result in a public health hazard.

New septic tank systems and modifications to existing septic tank systems must be permitted prior to installation, pursuant to Sections 4.1 and 4.3 of the WV Legislative Rule [64 CSR 9, Sewer Systems, Sewage Treatment Systems, and Sewage Tank Cleaners](#) (hereinafter referred to as *the Sewer Systems Rule*). Permits can only be issued upon review and approval of proper application, plans, and specifications which have been submitted for the proposed system, Section 4.2.

The following citations from the Sewer Systems Rule outline the regulatory authority for inspection after installation:

- “No sewer system shall be used or placed into operation until the system installation has been approved in writing by the director.” - Section 6.3
- “No part of any sewer system utilizing soil absorption disposal of effluent shall be covered until the system has been approved in writing by the director. Any part of the system that is covered prior to approval shall be uncovered upon oral or written order of the director.” - Section 6.4
- “The director may make as many inspections as are necessary during the construction, installation, modification, or operation of sewer systems to determine compliance with the applicable provisions of this rule.” - Section 6.1

NOTE: A permit is required for any modification of an existing system. A few minor repairs can be made to a septic system that would not require a permit. The removal of tree roots from solid-wall pipe, or the repair of a collapsed pipe in areas outside of the drainfield, are examples of work that may be performed without first obtaining a permit. Any work within the drainfield area will generally require a permit. Repairs using “absorption pits” (stone filled excavations greater than three feet deep) are illegal.

Minimum equipment required for a proper system inspection include:

- 1) Clipboard and form [SS-177, On-Site Sewage Disposal System Inspection Report](#).
- 2) Copy of system permit and application.
- 3) Measuring tape (one hundred foot minimum, two hundred foot recommended).
- 4) Level (carpenter’s level, two to four foot length; four foot is preferable).
- 5) Locke level: (hand-held sight level; laser builder’s level recommended).

Wet season conditions, heavy rains, snow fall, or frozen conditions are detrimental to a system installation. Adverse weather conditions prior to inspection should be noted on the inspection form. Section 6.5.h.4 of the WV Legislative Rule [64 CSR 47, Sewage Treatment and Collection System Design Standards](#) (hereinafter referred to as *the Design Standards*), prohibits installations during rain or inclement weather, or when the soil would fail the “wire” test, when rolled between the hands. Indications of system damage due to rainfall (silt infilling of individual drainlines, erosion of lower trench sidewall, a floated tank, etc.), should be evaluated for, and corrections required, if necessary. Note whether a diversion drain, ditch, or curtain drain has been installed above the drainfield installation site and whether one should be required, per section 5.2. of the Sewer Systems Rule, to protect the system from ground or surface water. Observed ponding of water in the absorption trenches should also be noted on the inspection sheet.

The septic tank, while not a complex component of the system, must be properly designed, constructed, and installed in order for the system to function satisfactorily. Tanks must be watertight, and baffled appropriately to retain solids, in order to perform their intended purpose. If the manufacturer and size of the tank is listed on the PHSD’s website, it might be assumed to be of proper construction. However, specifications of concrete tanks have been found to change and should be “spot checked” on occasion. Top and sidewall thickness should be observed, overall dimensions measured for total volume, as well as heights of inlets and outlets, and air space (clearance above outlet pipe invert) at top of tank. Note the manufacturer, and the size of the tank.

An often overlooked item with regard to the septic tank is proper orientation of the inlet and outlet. The outlet will be at least two inches lower than the inlet in a properly designed tank. If the tank is found to be “set backwards” (outlet end oriented toward the dwelling), this must be corrected even if it requires re-excavation and a return trip by the delivery truck to lift and turn the tank. Depending upon the orientation of the building sewer and the distance to the building, it may sometimes be possible to re-route the inlet and outlet piping to correct for a backwards tank; however, attention must be paid to limiting angles of bend on the building sewer, as well as maintaining minimum slopes. Providing for proper bedding of inlet and outlet piping may also be difficult when re-plumbing a backwards tank.

Tanks must be installed level. Measure the level of the tank with either a carpenter’s level or a building level. A laser level works well for this purpose also. Tanks that are badly out of level should be suspected of having floated. Even heavy concrete tanks will float when empty due to ground or surface water entering the tank excavation during wet periods or storm events. This can happen regardless of whether the hole has been backfilled or not. If the tank has floated it must be removed and re-set. The bottom of the tank excavation must be smooth and uniform to support the weight of a tank and its contents without potential of the tank cracking. This can only be assured if the tank is removed from the excavation, any water pumped out of the hole, and the bottom of the excavation re-leveled. A tank cannot be installed in an excavation that contains standing water. The water must be pumped out and the bottom of the excavation prepared to provide even support of the tank. NOTE: Tanks are often damaged if they float, or during the removal and re-set process, and must be replaced.

Plastic and fiberglass tanks require extra care during installation. The materials and construction of each tank are unique so the specific manufacturer's instructions must be followed during backfill. The installer should be questioned as to the backfill techniques employed to determine proper installation. The manufacturer's instructions should be provided with each tank at time of sale.

Many septic tanks have been found to leak, regardless of their construction material. This is a serious problem that should be evaluated at every opportunity. Leaking tanks will not seal themselves, as may have been suggested previously. It is recommended that all tanks be filled with water to normal operating depth (invert of the outlet pipe) as soon as possible after installation. If the tank is not filled prior to the time of inspection, a subsequent site visit should be made after the tank has been filled to observe if the tank is full to the outlet pipe invert. Note: This is not a requirement for a routine inspection; but it is strongly recommended to combat this serious problem. The tank leakage evaluation should be timed for periods when no water use has occurred in the dwelling or structure for at least several hours, preferably longer, to account for slow leaks. Confirm with owners, if possible, that water is not used during the interval before the evaluation. Once a non-leaking septic tank has been filled, it will remain full, so water should always remain at the level of the outlet pipe invert.

Piping into, and out of, the septic tank must be of schedule 40 construction and must extend at least two feet onto undisturbed soil outside of the septic tank excavation. If care is not taken when pipes are inserted into the tank the gaskets can be torn, particularly in cold weather. Note the integrity of both gaskets and require them to be re-sealed if there are problems. A quick tip for your installers: beveling the edge of the pipe prior to insertion can prevent tearing of seals.

Tanks using concrete baffles must be checked for proper inlet pipe placement inside the tank. If the pipe extends too far into the tank solids tend to clog at this point. There should be at least a four inch space between the end of the pipe and the concrete baffle.

Tanks using plastic (PVC) "T" baffles should be checked for proper length of baffles. The inlet baffle should extend at least six inches below the invert of the pipe, but no more than 20% of the liquid depth. The outlet baffle should extend between 35 and 40% of the liquid depth. Liquid depth is measured as the height of the interior of the tank below the invert of outlet pipe. Inlet and outlet "T" baffles are sometimes found improperly installed on opposite ends of the tank. Both baffles must be checked for being tightly secured and solvent welded. Physically grab each "T" and confirm its being glued in place. Each "T" must be oriented vertically. Occasionally the inlet or outlet pipe will be inadvertently rotated after the "T" is glued in the tank, resulting in the "T" being tilted from vertical. Check to see that each "T" is accessible through the access port. This is especially important at the outlet end so that an effluent filter can be inserted and removed for cleaning.

Check to see that tanks with concrete baffles, or multi-compartment tanks, can vent through the length of the tank. The casting of concrete tanks can leave a thin "web" of concrete that must be broken out of the top of the baffle to allow for proper venting.

If the tank is to be backfilled to a depth greater than twelve inches below grade, check that risers are installed to bring access to the surface, or to at least within twelve inches of the surface. If access is not provided to the surface at either manhole, a four inch inspection pipe must be provided to the surface. If an outlet filter is installed there must be a riser extended to the surface over the outlet end of the tank.

The building sewer must be at least four inches in diameter and be bedded solidly so that there is no sagging or low areas in the pipe due to settling. If original soil (or rock) has been over-dug, material should be compacted into any low areas to support the pipe. The pipe must have a slope of at least one-eighth of an inch per foot. No fittings of greater than forty-five degrees are permitted on the building sewer.

If the building sewer trench intersects with the gravel in the foundation drain of the building, a clay or earthen dam should be constructed in the building sewer trench to allow the foundation drain to function as designed and prevent water in the foundation drain from following the building sewer to the septic tank. If possible, note whether all interior drains are plumbed to the septic tank. Also note the routing of roof and foundation drains and ensure that they are directed away from the drainfield.

Documentation is critically important, especially when the system is to be located at a later date. On the inspection report, draw an accurate sketch of the entire system to include:

- 1) water supply well or public water line location,
- 2) dwelling,
- 3) septic tank, including measured distance to dwelling, and, measured distance to water supply
- 4) individual drainfield laterals, including the method of connection or distribution (e.g., distribution box, drop boxes, crossovers, and all connecting piping)
- 5) measured lengths of all drainfield laterals
- 6) width of lateral trenches
- 7) distances between laterals at both ends
- 8) measured distance at closest point between dwelling and upper (nearest) lateral
- 9) measurement at shortest distance between water supply and drainfield
- 10) measured distance at closest point of system to any nearby property line
- 11) two measurements to septic tank from fixed references for triangulating location
- 12) two measurements to distribution box (if used) for triangulation
- 13) locations of drainline inspection ports
- 14) note if effluent filter installed (requires riser to surface).

Check that the upper line of a drainfield using serial distribution is located at an elevation such that the invert of the septic tank outlet is at least two inches higher than the invert of the crossover pipe on the uppermost drainline. If a distribution box (D-box) is used check that the outlets of the box are at a higher elevation than the absorption media (gravel, gravelless pipe, chambers, etc) in the upper drainline. If chambers are used the outlets of the D-box should be at least as high as the elevation of the invert of the inlet pipe in the uppermost chamber lateral, or of the uppermost crossover, whichever is higher.

Distribution boxes should be placed on original, solid ground, as opposed to fill, to prevent settling of the box which results in uneven distribution. If the area under the box has been over-dug requiring backfill, a bed of gravel should be tamped into place at the proper elevation. Water must be provided in the D-box prior to inspection in order to check that all outlets are at the same elevation. The use of "speed levelers", "dial-a-flows", or other leveling devices in the D-box is highly recommended. Drainfield laterals must be of equal length, as a D-box cannot split flows proportionately to lines of different lengths.

Check that all crossover pipes rest on undisturbed earth in accordance with Sections 6.5.h.12.B and C of the Design Standards. This is critical to ensure the proper ponding of effluent in the upper lateral of the crossover connection. If the soil has been over-dug beneath the crossover, the crossover must be repaired. If suitable clay cannot be found onsite to rebuild the crossover, commercial bentonite clay, as used in water well grouting, should be mixed with soil and used for the repair.

Crossovers should be designed so that the effluent will pond in the upper trench to the height of the absorption media used (gravel, gravelless pipe, etc.) before flowing to the next lower line. This normally requires an "up and over" piping configuration where the crossover pipe exits the upper drainline. If chambers are used, however, the crossover pipe should be horizontal (level) as it exits the endplate of the upper trench, angling down to the lower line only after crossing over several feet of undisturbed earth. The crossover pipe on a chamber system shall not exit the upper line through the top of the chamber.

Pipe used in gravity distribution systems shall be four inches in diameter and conform to the ASTM standards for wastewater piping, pursuant to Sections 6.5.a. and 6.5.b. of the Design Standards. All plastic or PVC fittings and couplers should be glued, or solvent welded. Distribution piping must be bedded on original ground, or fill beneath the piping must be carefully tamped in place.

Check that drainlines are installed on-contour, and that the trench bottoms are level. A hand-held "locke" level is suitable for this job; however, use of a laser level allows one person to check elevations more quickly and accurately. If trenches are both level and on contour, the trenches will be dug to the same depth all along their length. Check that installation depth is no greater than allowed by the permit. Maximum trench depth is thirty-six inches in any case, except for minor irregularities in surface contour which require deeper installation for short spans, such as through a "high spot" or hump in surface contour.

Trench bottoms should be smooth and uniform with loose material removed. Trenches should be carefully dug to final depth, with care taken not to over-excavate, necessitating fill to level the bottom. This is especially important when using "chamber" drainfield products as the narrow "feet" of the chamber will settle into the fill. Chambers need to be evenly and solidly supported, so that the individual sections will fit tightly together. Once chambers are installed, loose material must be placed along the sides, and "walked in", as per manufacturer's recommendations. This is important to give proper support and strength to the chambers.

References

64 CSR 9, Sewer Systems, Sewage Treatment Systems, and Sewage Tank Cleaners

64 CSR 47, Sewage Treatment and Collection System Design Standards

ES-52, Individual and On-Site Sewage Systems – Excerpts from 64 CSR 47, Sewage Treatment and Collection System Design Standards

SS-177, On-Site Sewage Disposal System Inspection Report

SS-182, Application for a Permit to Construct, Modify or Abandon a Sewage Disposal System or Water Well

SS-183, On-Site Sewage Disposal System Permit

Environmental Engineering & Sanitation, pages 280-294, Joseph A. Salvato, Jr.; Wiley-Interscience, John Wiley & Sons, N.Y.

EPA Design Manual – Onsite Wastewater Treatment & Disposal Systems, U.S. EPA

History

Replaces WW-6 dated November 17, 1982

Attachments