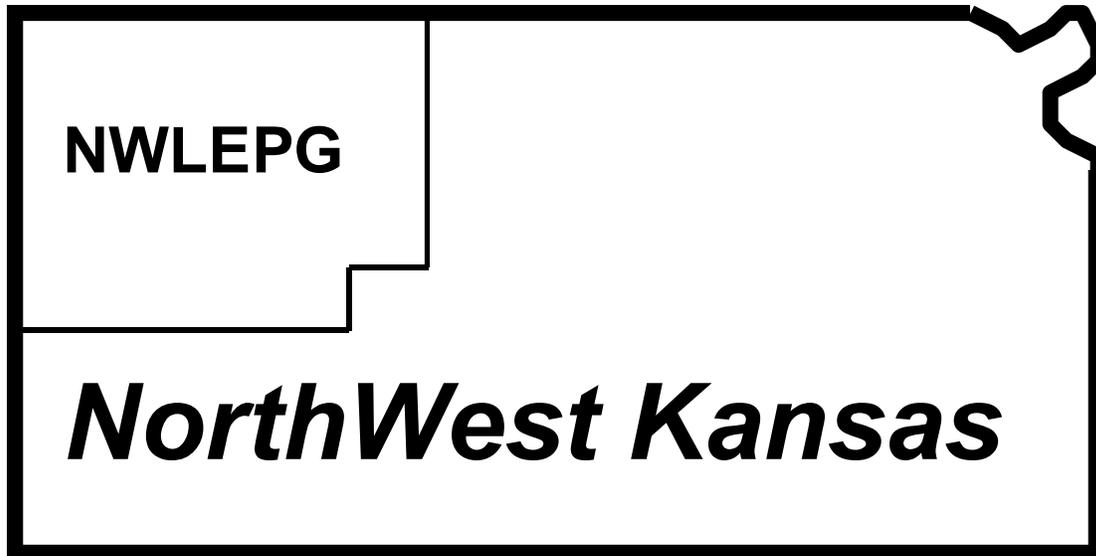


# CONSTRUCTION GUIDELINES for PRIVATE WASTEWATER SYSTEMS



## NORTHWEST LOCAL ENVIRONMENTAL PROTECTION GROUP

### Colby Office

350 S. Range, Colby, KS 67701

PH: 785-462-8636

Fax: 785-460-8637

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Serving: Cheyenne, Gove, Greeley, Lane, Logan, Rawlins,  
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# **CONSTRUCTION GUIDELINES FOR PRIVATE WASTEWATER SYSTEMS**

## **Introduction**

These guidelines provide the details on designing, sizing, planning and constructing a private wastewater system. It also contains forms, letters of intent, tables for designing, distance requirements and other tables. This information can be found under the various headings and subheadings in the following pages of this guideline.

## **REQUIREMENTS FOR SEPTIC TANKS**

### **Introduction**

Septic tanks are the first step in the treatment of wastewater in a private wastewater system. The importance of the septic tank is often underestimated by home owners and contractors alike. The following sections will give the users and contractors a better understanding of what, why, and how the septic tank performs its function. It also includes design sizing and operational requirements.

### **Functions of the Septic Tank**

Untreated liquid household wastes (sewage) will quickly clog all but the most porous gravel formations. The septic tank conditions the sewage so that it may be more readily absorbed into the subsoil. To do this, the septic tank must accomplish the following functions:

1. Remove the suspended solids: Clogging of the soil with tank effluent varies directly with the amount of suspended solids in the liquid. As sewage from a building enters a septic tank, its rate of flow is reduced so that larger suspended solids sink to the bottom or rise to the surface. The solids are retained in the tank and the clarified sewage is discharged to the absorption field.
2. Decompose the solids: The solids in the tank are subjected to continuous decomposition by bacteria and other living organisms normally present in sewage and natural processes. The bacteria thrive in the absence of free oxygen and the decomposition of the solids occur under anaerobic or septic conditions; hence the name of the tank.
3. Provide storage for sludge and scum: Sludge is the accumulation of the settled solids at the bottom of the tank. Sludge, and scum to a lesser degree, will be digested and reduced to a small residue of inert material. Space must be provided in the tank for accumulation of this residue during the interval between cleanings; otherwise, sludge and scum will eventually be carried out of the tank into the disposal field where it will clog the soil.

If adequately designed, constructed, and operated, septic tanks are very effective in accomplishing these functions.

## Size

A septic tank should be constructed to permit retention of incoming sewage for a minimum of 48 hours, the capacity shall be based upon the number of bedrooms according to the following table:

<b>Liquid Number of Bedrooms</b>	<b>Minimum Effective Tank Capacity (gallons)</b>
3 or less .....	1,000
4.....	1,250
5.....	1,500
Each Additional Bedroom (add).....	250

**Note:** For sizing systems other than residential dwellings, use Table 3 Quantities of Wastewater in the Construction Guidelines Appendix.

## Design Criteria

1. The tank shall be water tight and constructed of material not subject to excessive corrosion decay, such as fiberglass, polyethylene, concrete, vitrified clay, heavy weight concrete blocks, or hard-burned bricks. Properly cured pre-cast and cast-in-place reinforced concrete tanks are acceptable.
2. All tanks shall be water tight with special attention given to job-built tanks to insure water tightness.
3. Job-built tank geometry should provide sufficient surface area to reduce surge flows. The larger the surface area the smaller the discharge rate (velocity). Large surges will cause more solids to be discharged to the absorption field. Generally, tanks built with a 2:3 ratio of width to length are desirable. For example, a tank 4 ft. wide will be 6 ft. long.
4. Heavy-weight concrete blocks shall be laid on a solid foundation and the mortar joints shall be well filled. The interior of the tanks shall be surfaced with two 1/4 inch thick coats of cement sand plaster.
5. Precast and cast-in-place tanks shall have a minimum wall thickness of 2 1/2 inches and be adequately reinforced.
6. When precast slabs are used as covers, they shall have a thickness of at least 3 inches and be adequately reinforced.
7. The inlet pipe flow line shall be at least 3 inches higher than the outlet pipe flow line. The inlet invert shall be rounded to prevent dripping. Dripping causes oscillations which prevent good separation of solids.
8. All tanks shall provide adequate baffling which will disburse the flow as evenly as possible. This will slow the velocity of the liquids through the tank and produce a cleaner effluent.
9. A vented inlet tee or baffle shall extend at least 6 inches below the liquid level, but in no case should the penetration extend deeper than the outlet tee or baffle.
10. Outlet tee or baffle shall extend above the surface of the liquid to within 1 inch of the underside of the tank top and should extend at least 14 inches below the outlet flow line.
11. Liquid depth should be a minimum of 30 inches and a maximum not to exceed the tank length or 60 inches, whichever is less.
12. A single or multi-compartment tank may be used. A two-compartment tank will produce a cleaner effluent than a single compartment tank of equal size. No more than (4) compartments are allowed.
13. A septic tank having two or more compartments or if more than one tank is used in series the first compartment or tank should hold 1/2 to 2/3 of the required capacity.

14. The transfer of liquid from the first compartment to the second or successive compartment should be made at a liquid depth of at least 14 inches below the outlet invert but not in the sludge zone.
15. At least one access no less than 20 inches across shall be provided in each compartment or tank.
16. In multi-compartment tanks there must be at least a 1 inch air gap for venting between the underside of the top of the tank and the top of the dividing wall.
17. The plans and specifications shall be submitted and approved by the NWLEPG for any tank fabricated on site prior to construction.

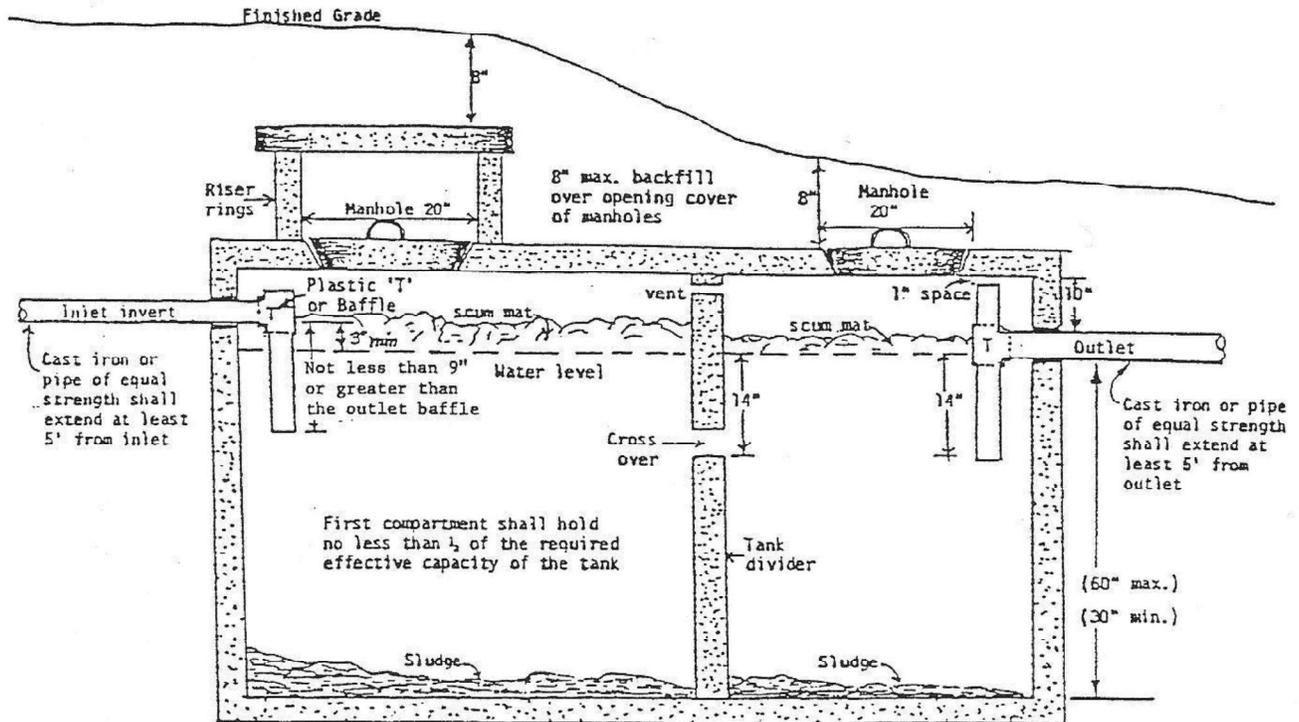
GENERAL: When designing job-built tanks, the contractor/builder should remember key factors affecting the tank design. Tank geometry, inlet and outlet arrangements, the number of compartments, and the operation and maintenance of the tank directly affect the ability of the tank to perform its function.

### **Installation**

1. Cast iron pipe or pipe meeting ASTM standard 3034, properly supported to prevent failure by settling, shall extend from the septic tank for a distance of at least 5 feet from the inlet and outlet ends. (PVC SDR 35 and Schedule 40 PVC Pipe both meet this standard.)
2. Septic tanks shall be installed level and on a solid base or undisturbed soil.
3. Roof drains, foundation drains, area drains, cistern overflows or any other storm drainage shall not enter the tank or any part of the treatment system.
4. The building sewer should be laid with a minimum fall of 1/8 inch per foot and should not exceed 1/4 inch per foot.
5. Bends in the building sewer should be limited to 45 degree ells or longsweep quarter bends to prevent plugging.
6. Cast iron pipe or its equivalent is required whenever the building sewer is located under a driveway.
7. The inlet and outlet pipes shall be grouted and sealed with a water proof material.
8. The opening cover of a septic tank manhole, inspection port, or sampling access port should be no deeper than 8 inches below the finished grade. Manhole extensions may be added to meet this recommendation.

# DIAGRAM 1

## TYPICAL SEPTIC TANK INSTALLATION



### Abandonment of Tank

Septic tanks are sometimes abandoned for a variety of reasons. Whenever a tank is abandoned for whatever reason, the tank **shall** be filled to prevent danger of collapse. If the tank contains liquids, the tank must be pumped prior to filling. The tank must be filled with some type of inert material such as gravel, sand, sandy loam, or clay in compliance with K.S.A. 19-2504.

### Proper Septage Disposal

Any licensed septic tank cleaner or individual disposing of septage shall dispose of the septage in a manner which does not pollute the waters of the state, endanger human health, or constitute a public nuisance.

Methods for disposal of septage has been developed by KDHE and the EPA. The proper methods of disposal are in the appendix Table 8.