4.12 Grey Water Sump

Revision: April 3, 2013
Installer registration permit: Property owner or standard and basic
Licensed professional engineer required: No

4.12.1 Description

A grey water sump is a receptacle designed to receive hand-carried grey water that is connected to a disposal trench in soil.

4.12.2 Approval Conditions

1. Limited to serve facilities such as recreation parks, camp sites, seasonal dwellings, or construction sites.
2. Grey water flow is limited to 10 GPD per unit.
3. Grey water may not be piped to the disposal system.
4. Soils at the disposal site must be approved by the permit-issuing agency before approval of the permit application.
5. Seepage chamber must be located a minimum of 100 feet from any surface water. Separation from limiting layers will be the same as for standard systems.

4.12.3 Construction

1. General details:

   Figure 4-17 shows a cross section of a grey water sump system.
2. A disposal trench may be substituted for a seepage chamber.
3. A sign must identify the disposal system at public places. Letters should be at least 3 inches high.

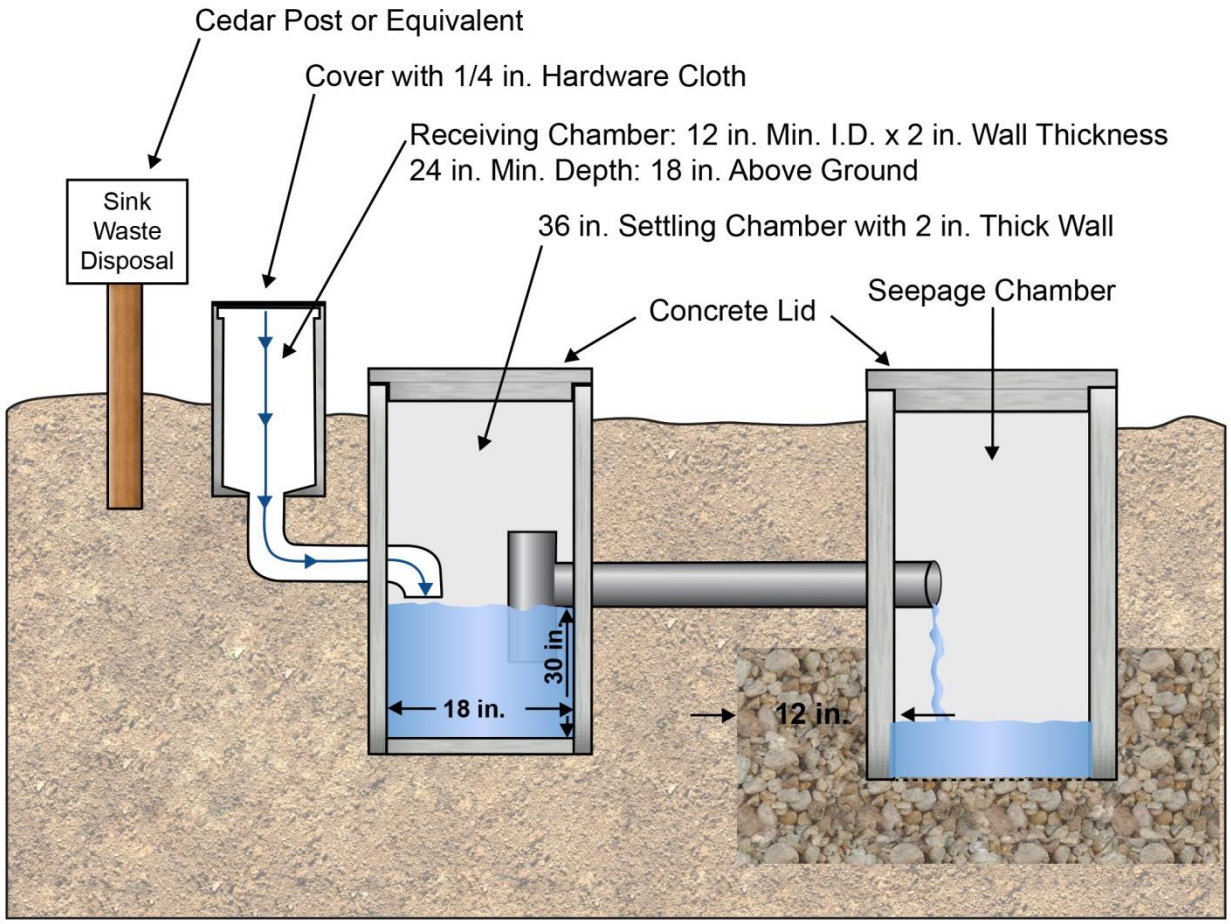

Figure 4-17. Cross section of grey water sump system.

4.13 Grey Water System

Revision: September 16, 2004
Installer registration permit: Property owner or standard and basic (complex if pressurized)
Licensed professional engineer required: No (yes if pressurized)

4.13.1 Description

Grey water is untreated household wastewater that has not come into contact with toilet waste. Grey water includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It shall not include wastewater from kitchen sinks, water softeners, dishwashers, or laundry water from soiled diapers. A grey water system consists of a separate plumbing system from the blackwaste and kitchen plumbing, a surge tank to temporarily hold large drain flows, a filter to remove particles that could clog the irrigation system, a pump to move the grey water from the surge tank to the irrigation field, and an irrigation system to distribute the grey water.

4.13.2 Approval Conditions

1. Grey water treatment and disposal systems must meet all the separation distance setback criteria and soil application rate criteria as found in the rules (IDAPA 58.01.03).
2. Specialized plumbing designs will need to be approved by the Idaho Division of Building Safety, Plumbing Bureau.
3. Grey water surge tanks must be watertight and noncorrosive.
4. Operations and maintenance manuals must be provided to the property owner.
5. Grey water may not be used to irrigate vegetable gardens.
6. Capacity of the septic tank and size of the blackwaste drainfield and replacement area shall not be reduced by the existence or proposed installation of a grey water system servicing the dwelling.
7. Grey water shall not be applied on the land surface or be allowed to reach the land surface.

4.13.3 Design Requirements

1. Grey water flows are determined by calculating the maximum number of occupants in the dwelling, based on the first bedroom with two occupants and each bedroom thereafter with one occupant. Estimated daily grey water flows for each occupant are:
   a. Showers, bathtubs, and wash basins (total): 25 GPD per occupant
   b. Clothes washer: 15 GPD per occupant

   Multiply the number of occupants by the estimated grey water flow.

   For example: A three-bedroom house is designed for four people. The house has a washing machine connection, thus each occupant is assumed to produce 40 GPD of grey water, resulting in a total of 160 GPD.
2. The formula shown in Equation 4-11 is used to estimate the square footage of landscape to be irrigated:

$$LA = \frac{GW}{ETxPFx0.62}$$

Equation 4-11. Landscaped area needed for grey water produced.

where:

GW = estimated grey water produced (gallons per week)
LA = landscaped area (square feet)
ET = evapotranspiration (inches per week)
PF = plant factor, based on climate and type of plants either 0.3, 0.5, or 0.8
0.62 = conversion factor (from inches of ET to gallons per week)

For example: If ET = 2 inches per week, and lawn grasses are grown with a PF of 0.8 (high water using) then the landscaped area is equal to:

LA = (160 GPD x 7 days)/(2 x 0.8 x 0.62) = 1,129 ft² of lawn.

3. An alternative to using grey water for lawns is to irrigate landscape plants. A plant factor depends on the type of plants watered, an ET rate, and plant canopy. Table 4-10 is used to calculate square footage of landscape plants that can be irrigated with grey water.

Table 4-10. Grey water application rates for landscape plants.

Evapotranspiration (inches per week)	Relative Water Need of Plant (plant factor)	Gallons per Week		
		200 ft² Canopy	100 ft² Canopy	50 ft² Canopy
1	Low water using 0.3	38	19	10
	Medium water using 0.5	62	31	16
	High water using 0.8	100	50	25
2	Low water using 0.3	76	38	19
	Medium water using 0.5	124	62	31
	High water using 0.8	200	100	50
3	Low water using 0.3	114	57	28
	Medium water using 0.5	186	93	47
	High water using 0.8	300	150	75

Note: square feet (ft^2)

Gallons per week (GPW) calculation for this chart was determined with Equation 4-12:

$$Grey\ water\ flow\ (GPW) = ET \times plant\ factor \times area \times 0.62\ (conversion\ factor)$$

Equation 4-12. Gallons per week needed for irrigated plants.

This formula does not account for irrigation efficiency. If the irrigation system does not distribute water evenly, extra water will need to be applied.

For example: A three-bedroom home with a washer will produce 1,120 GPW (7 days x 160 GPD). If ET = 2 inches per week, then with the 1,120 gallons of grey water a homeowner could irrigate the following :

a. Eight small fruit trees: 8 x 50 = 400 gallons (high water using, 50-foot canopy)
b. Eight medium shade trees: 8 x 62 = 496 gallons (medium water using, 100-foot canopy)
c. Seven large shrubs: 7 x 31 = 217 gallons (medium water using, 50-foot canopy)
d. Total water use per week: 1,113 GPW

4.13.4 Other Requirements

1. The Uniform Plumbing Code (UPC) Grey Water Standards require that all grey water piping be marked *Danger—Unsafe Water*.
2. Valves in the plumbing system must be readily accessible, and backwater valves must be installed on surge/holding tank drain connections to sanitary drains or sewer piping. Ball valves are recommended to be used in the system. Finally all piping must be downstream of water-seal type trap(s). If no such trap exists, an approved vented running trap shall be installed upstream of the connection to protect the building from possible waste or sewer gasses.
3. Surge tank must be vented and have a locking gasketed lid. If the surge tank is within the structure, then the venting must meet the requirements of the UPC. Outside surge tanks shall be vented with a 180° bend and screened. A minimum capacity of 50 gallons is required. The surge tank must be placed on a 3-inch concrete slab or on dry, level compacted soil and the lid labeled *Grey Water Irrigation System, Danger—Unsafe Water*. Surge tanks shall be constructed of solid durable materials, not subject to excessive corrosion or decay, and shall be watertight. The tank drain and overflow gravity drain must be permanently connected to the septic tank or sewer line. The drain and overflow drain shall not be less in size than the inlet pipe.
4. Filters with a minimum flow capacity of 25 GPM are required.
5. Pumps are usually required to lift the grey water from the surge tank to the irrigation system (section 4.19). Alternatively if all of the landscape plants are below the building drain lines, then the grey water irrigation system could use gravity to distribute the grey water.
6. Irrigation system can be either a mini-leachfield or a subsurface drip irrigation system. Mini-leachfield designs follow IDAPA 58.01.03.008, except for those deviations allowed by Table 4-11, and are required to use geotextile for the drainrock-soil barrier.

Notes:

1. The plants listed in Table 4-12 are tolerant of sodium and chloride ions or have been reported to do well under grey water irrigation.
2. Different types of media can be used in grey water filtration. These include nylon or cloth filters, sand filters, and rack or grate filters.
3. Table 4-11 lists criteria for the design of mini-leachfields.

Table 4-11. Grey water mini-leachfield design criteria.

Mini-leachfield Design Criteria	Minimum	Maximum
Number of drain lines per irrigation zone	1	—
Length of each perforated line	—	100 feet
Bottom width of trench	6 inches	18 inches
Total depth of trench	12 inches	18 inches
Spacing of line, center-to-center	3 feet	4 feet
Depth of earth cover over lines	6 inches	12 inches
Depth of aggregate over pipe	2 inches	—
Depth of aggregate beneath pipe	2 inches	—
Grade on perforated pipe	Level	1 inch/100 feet

Table 4-12. Sodium and chloride tolerant plants.

Agapanthus	Cottonwood	Honeysuckle	Olive	Rosemary
Arizona cypress	Crape myrtle	Italian stone pine	Pfitzer bush	Strawberry clover
Bermuda grass	Deodar cedar	Juniper	Purple hopseed bush	Star jasmine
Bougainvillea	Evergreen shrubs	Oaks	Redwoods	Sweet clover
Carpet grass	Holly	Oleander	Rose	

Figure 4-18 shows a single-tank gravity grey water system, and Figure 4-19 shows a single-tank pumped grey water system.

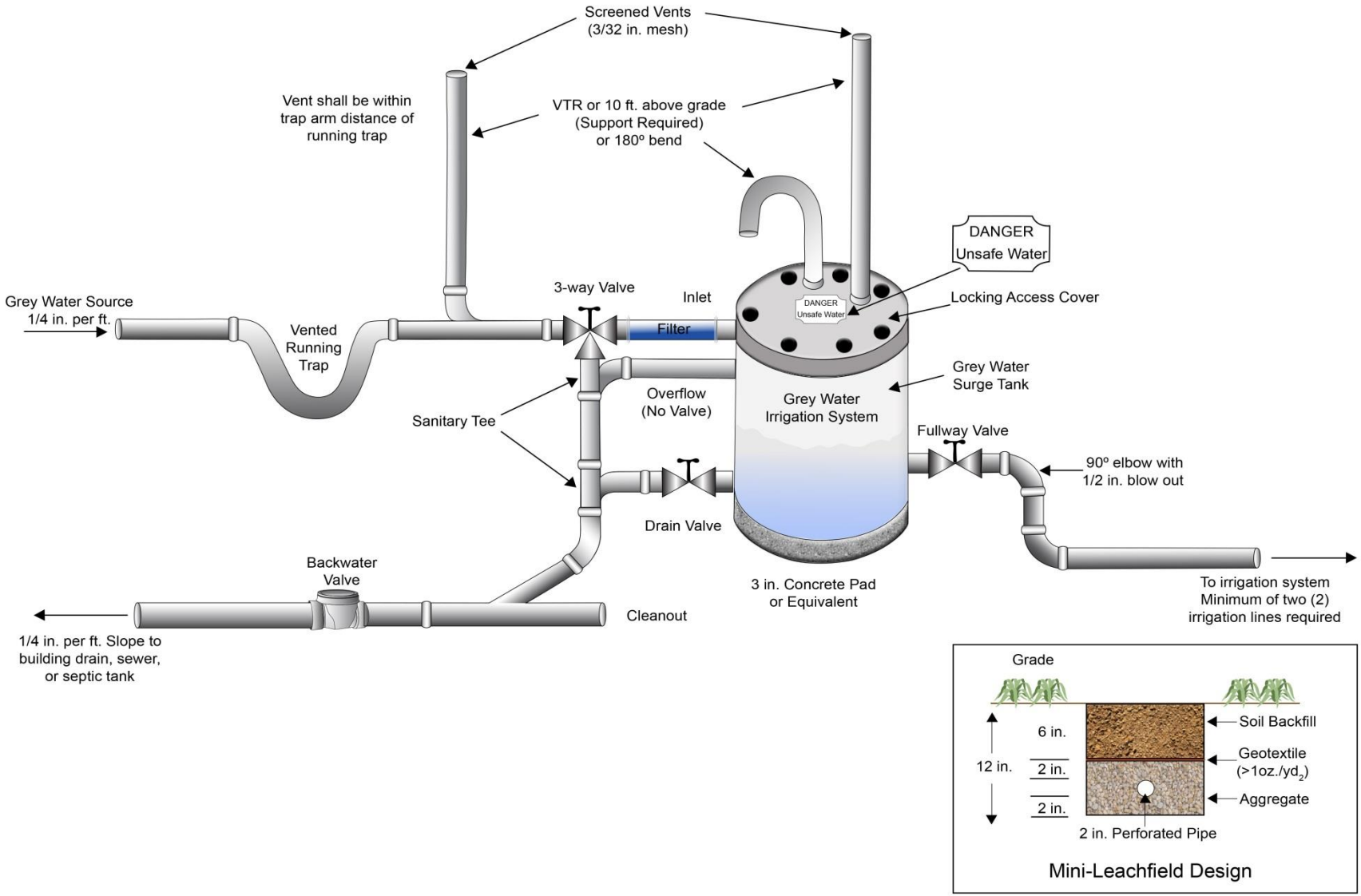

Figure 4-18. Grey water system (single-tank gravity).

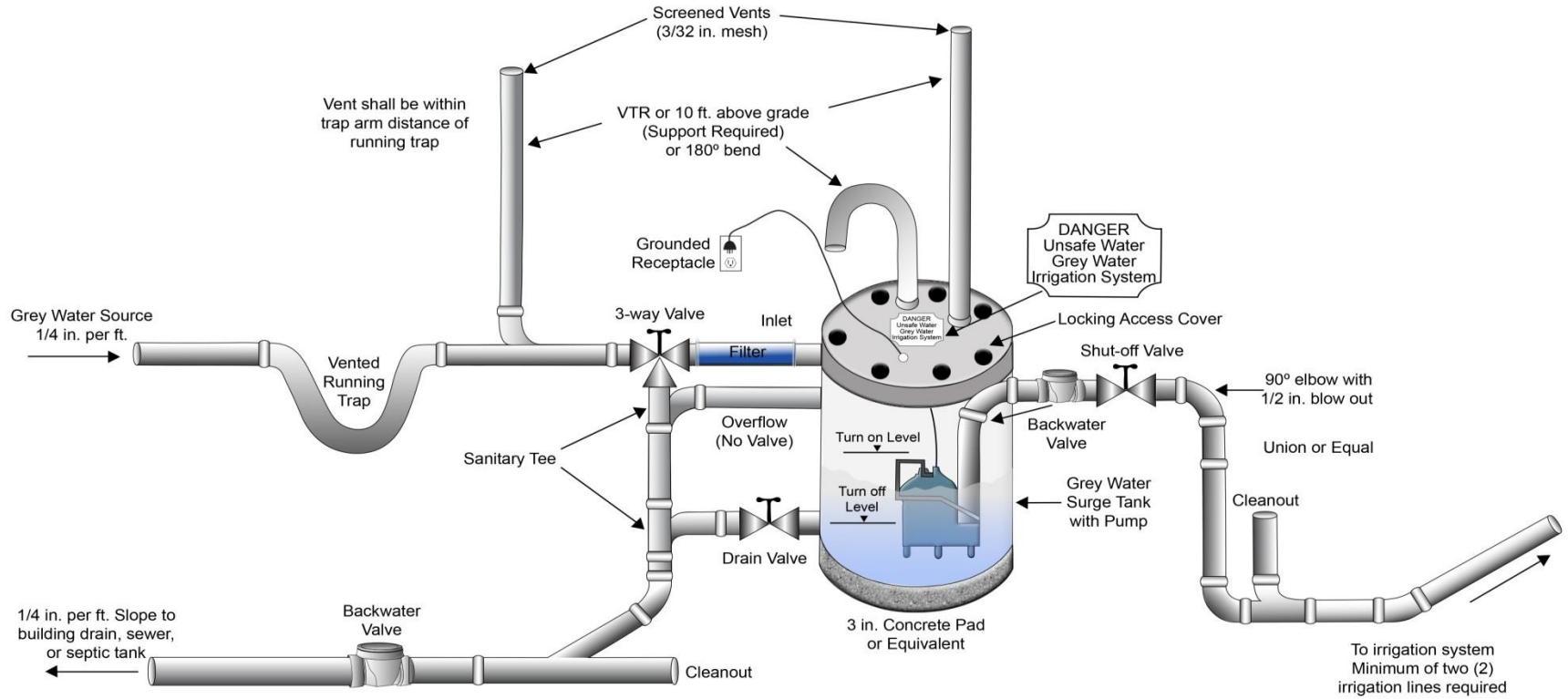

Figure 4-19. Grey water system (single-tank pumped).