4.8 Extended Treatment Package System

Revision: August 18, 2016
Installer registration permit: Complex
Licensed professional engineer required: No

4.8.1 Description

Manufactured and *packaged* mechanical treatment devices that provide additional biological treatment to septic tank effluent. Such units may use extended aeration, contact stabilization, rotating biological contact, trickling filters, or other approved methods to achieve enhanced treatment after primary clarification occurs in an appropriately sized septic tank. These systems provide secondary wastewater treatment capable of yielding high-quality effluent suitable for discharge in environmentally sensitive areas.

Property owners that install an ETPS unit must choose an O&M entity capable of meeting their OMM requirements. Verification of the chosen O&M entity shall be submitted with the subsurface sewage disposal permit application ensuring that the OMM (effluent quality testing) will occur (IDAPA 58.01.03.005.04.k). Property owners that do not want to meet the OMM requirements must meet the requirements of section 4.8.2(2) or choose another alternative system that will meet the conditions required for subsurface sewage disposal permit issuance.

4.8.2 Approval Conditions

1. A maintenance entity will be available to provide managed system OMM as described in section 1.9.1 and 1.9.2 (IDAPA 58.01.03.005.14). The OMM is to be performed by an approved O&M entity (IDAPA 58.01.303.009.03). Approval of the O&M entity will be made by the Director before permit issuance. Approvable entities may include, but are not limited to, the following:
   a. Municipal wastewater treatment departments
   b. Water or sewer districts
   c. Nonprofit corporations (section 1.6)

   An O&M entity membership agreement and an accompanying general access easement should be entered into between the property owner and the O&M entity, as a necessary condition for issuing an installation permit (IDAPA 58.01.03.005.04.k). This agreement and the easement will be recorded with the county as a condition for issuing an installation permit.
2. ETPSs may be used for properties without an approved O&M entity **only under <u>all</u> of the following conditions**:
   a. The site is acceptable for a standard system. All separation distances from ground water, surface water, and limiting layers shall be met.
   b. Enough land is available, and suitable, for two full-size drainfields. One complete full-size drainfield shall be installed.
3. Final effluent disposal through subsurface discharge will meet the following criteria:

a. If an 85% reduction or better in $CBOD_5$ and TSS can be achieved, the effluent may be discharged to a drainfield satisfying Section 4.21.5 "Drainfield Trenches" application rate criteria and vertical setback requirements.
    1) Otherwise, the effluent must be discharged to a standard drainfield, sized as directed in IDAPA 58.01.03.008 (section 7.1), and meet the required effective soil depth for standard drainfields as directed in IDAPA 58.01.03.008.02.
    2) Additional drainfield-sizing reduction granted for use of gravelless trench products is not allowed.
b. The 85% reduction will be accepted as being met if the effluent exhibits a quantitative value obtained from laboratory analysis not to exceed 40 mg/L (40 ppm) $CBOD_5$ and 45 mg/L (45 ppm) TSS.
c. TN reduction may be required for ETPS units located in an area of concern as determined through an NP evaluation. Permit-specific TN reduction levels will be determined through the NP evaluation. Results for TN are determined through the addition of TKN and nitrate-nitrite nitrogen (TN = TKN + [NO_3+NO_2-N]). TN reduction will be accepted as being met if the effluent exhibits a quantitative value obtained from laboratory analysis not to exceed the TN level stipulated on the subsurface sewage disposal permit.

4. Annual effluent monitoring and reporting is required for all ETPS units that discharge to a reduced size drainfield, to a drainfield with a reduced separation distance to limiting layers, and/or to a drainfield located in an environmentally sensitive area (area of concern). Monitoring shall meet the requirements of section 1.9.2. Reporting shall meet the requirements of section 1.9.3.
5. The ETPS will be preceded by an appropriately sized septic tank.
    a. The septic tank may be either a separate septic tank, a volume integral with the system's package, or a combination of internal clarifier volume coupled with an external tank.
    b. The septic tank shall provide the minimum tank capacity for residential facilities as specified in IDAPA 58.01.03.007.07.a, or for nonresidential facilities, a minimum of 2 days of hydraulic residence time (HRT) as stipulated in IDAPA 58.01.03.007.07.b.
    c. Timed dosing from the clarifier to the aerobic treatment unit is preferred and highly recommended to maintain a constant source of nutrients for the system's aerobic microbes.

4.8.3 ETPS Unit Design

Procedures relating to design are required by IDAPA 53.01.03 (section 7.1) or may be required as permit conditions, as appropriate, to ensure protection of public health and the environment.

1. All materials will be durable, corrosion resistant, and designed for the intended use.
2. All electrical connections completed on site shall comply with the National Fire Protection Association (NFPA) Standard NFPA 70, National Electrical Code, as required by the Idaho Division of Building Safety, Electrical Division.
3. Design for each specific application should be provided by a PE licensed in Idaho.

4. Manufactured and *packaged* mechanical treatment devices will be required to prove that the specified equipment model meets the ETPS product approval policy outlined in section 1.4.2.2.

4.8.4 Construction

Procedures relating to construction are required by IDAPA 58.01.03 (section 7.1) or may be required as permit conditions, as appropriate, to ensure the protection of public health and the environment.

1. Installation
   a. A licensed complex system installer shall be required to install an ETPS unit and all other portions of the septic system connected to the ETPS unit or that the ETPS unit discharges to (IDAPA 58.01.03.006.01.b).
   b. A public works contractor may install an ETPS unit if they are under the direct supervision of a PE licensed in Idaho.
   c. Licensed plumbers and electricians will be required to install specific devices and components for proper system operation. If the device requires any on-site fabrication or component assembly, a public works contractor should be used.
   d. A sample port will be installed in the effluent line after the aerobic treatment unit. Figure 4-13 shows the placement of a sampling port after the ETPS unit, and Figure 4-14 shows the sample port and drainfield after the septic and treatment tank.

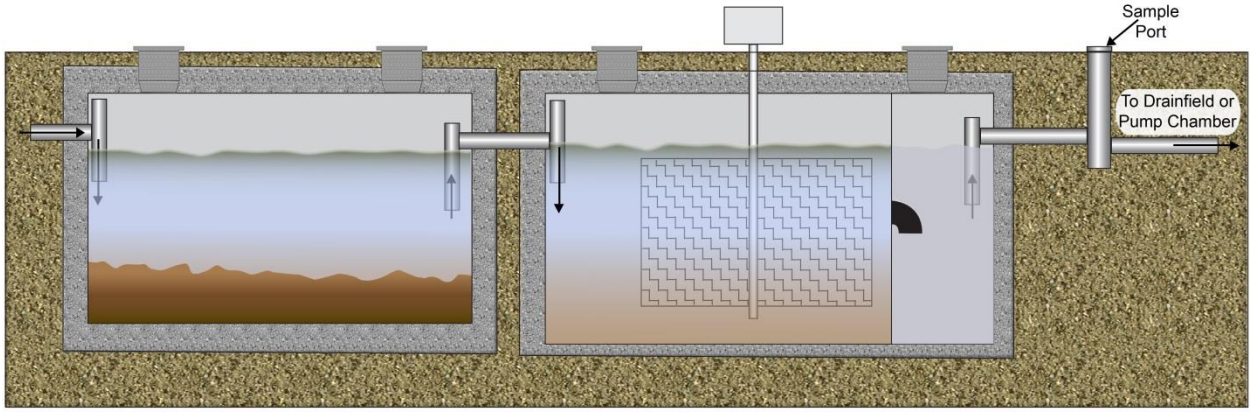

Figure 4-13. Sampling port example.

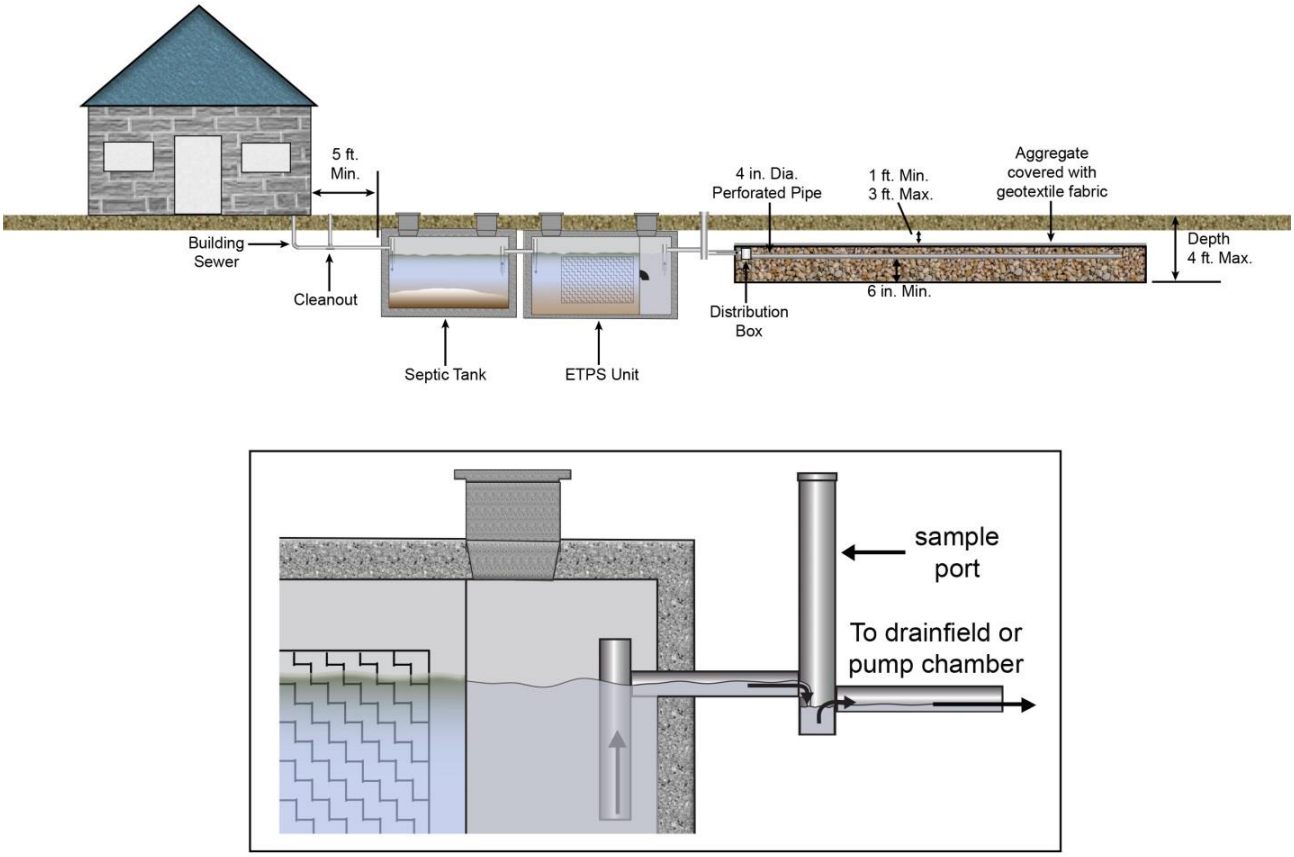

Figure 4-14. Sampling port and drainfield.

2. Within 30 days of completing the installation, the property owner shall provide certification to the regulatory authority, from their O&M entity, that the system has been installed and is operating in accordance with the manufacturer's recommendations (IDAPA 58.01.03.005.15).
   a. A statement requiring the submission of the installation verification form described above shall be written on the face of the subsurface sewage disposal permit.
   b. The regulatory authority shall not finalize the subsurface sewage disposal permit until the certification of proper installation and operation is received and includes information on the manufacturer, product, model number, and serial number of the ETPS unit installed.

4.9 Extra Drainrock Trench

Revision: December 10, 2014
Installer registration permit: Property owner or standard and basic
Licensed professional engineer required: No

4.9.1 Description

An extra drainrock trench is an aggregate-filled trench (1 to 6 feet wide) with more than 6 inches of aggregate under the perforated pipe. Figure 4-15 shows a typical cross section of a standard trench using extra drainrock. Figure 4-16 shows a typical cross section of an above-grade capping fill trench using extra drainrock. When more than 6 inches of aggregate is installed under the perforated pipe in a drainfield, the required drainfield length may be reduced. This section explains the conditions and calculations involved.

4.9.2 Approval Conditions

1. The site must meet the requirements for site suitability (IDAPA 58.01.03.008.02, section 7.1) except that
   a. The site may have a slope between 21% and 46% if the system is constructed according to the steep slope system requirements (section 4.26), and more than 12 inches of aggregate is installed under the perforated pipe in the drainfield, 12 inches of which is not used in determining the multiplication factor.
   b. The site slope may not exceed 20% if the top of the drainfield is less than 24 inches below the ground surface and 12% if the drainfield aggregate extends above the ground surface. The drainfield must be constructed according to the capping fill system requirements (section 4.3) except that the drainfield may not exceed 6 feet in width.
2. The bottom of the drainfield may be no deeper than 48 inches below the ground surface.
3. Multiplying factors cannot be used in addition to alternative soil application rates allowed by ETPSs, recirculating gravel filters, or intermittent sand filters.
4. Extra drainrock trenches may not be used to reduce trench length in sand mounds.
5. Multiplication factors less than 0.50 are not allowed.
6. Gravelless drainfield components may not be substituted for aggregate.

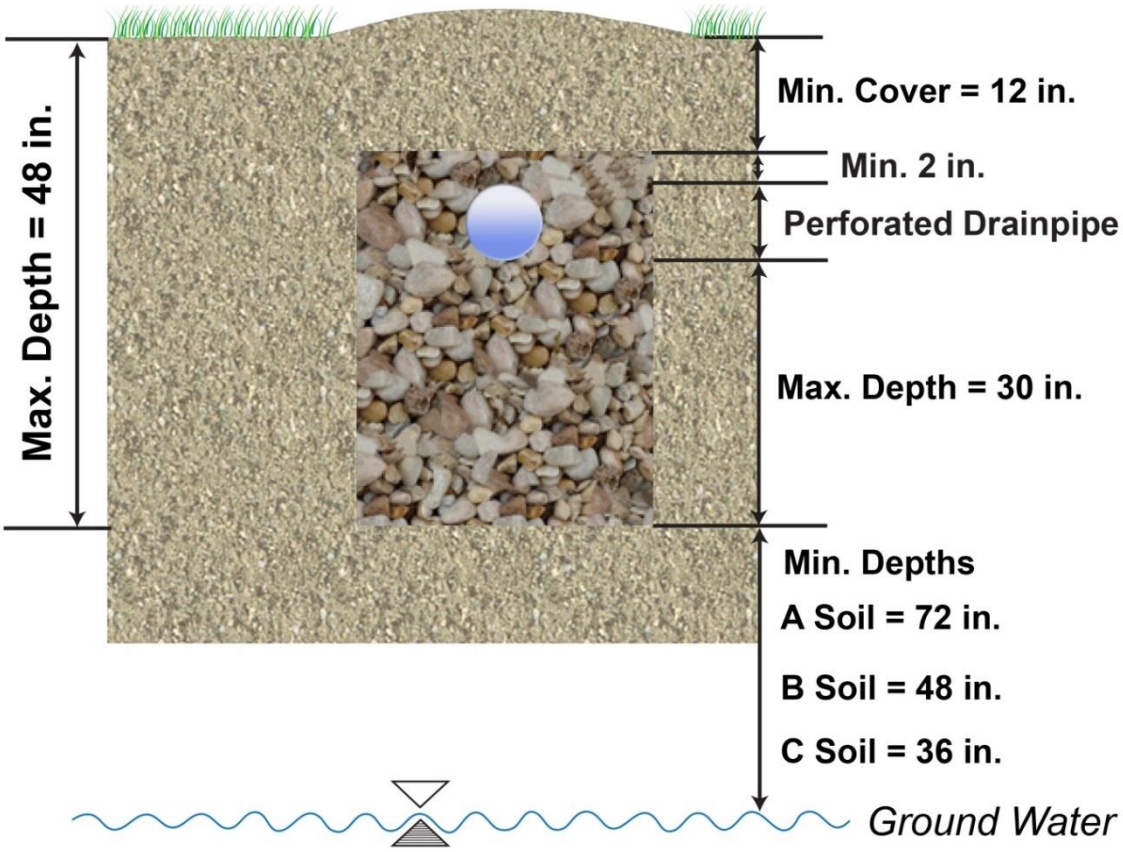

Figure 4-15. Cross section of standard trench with extra drainrock.

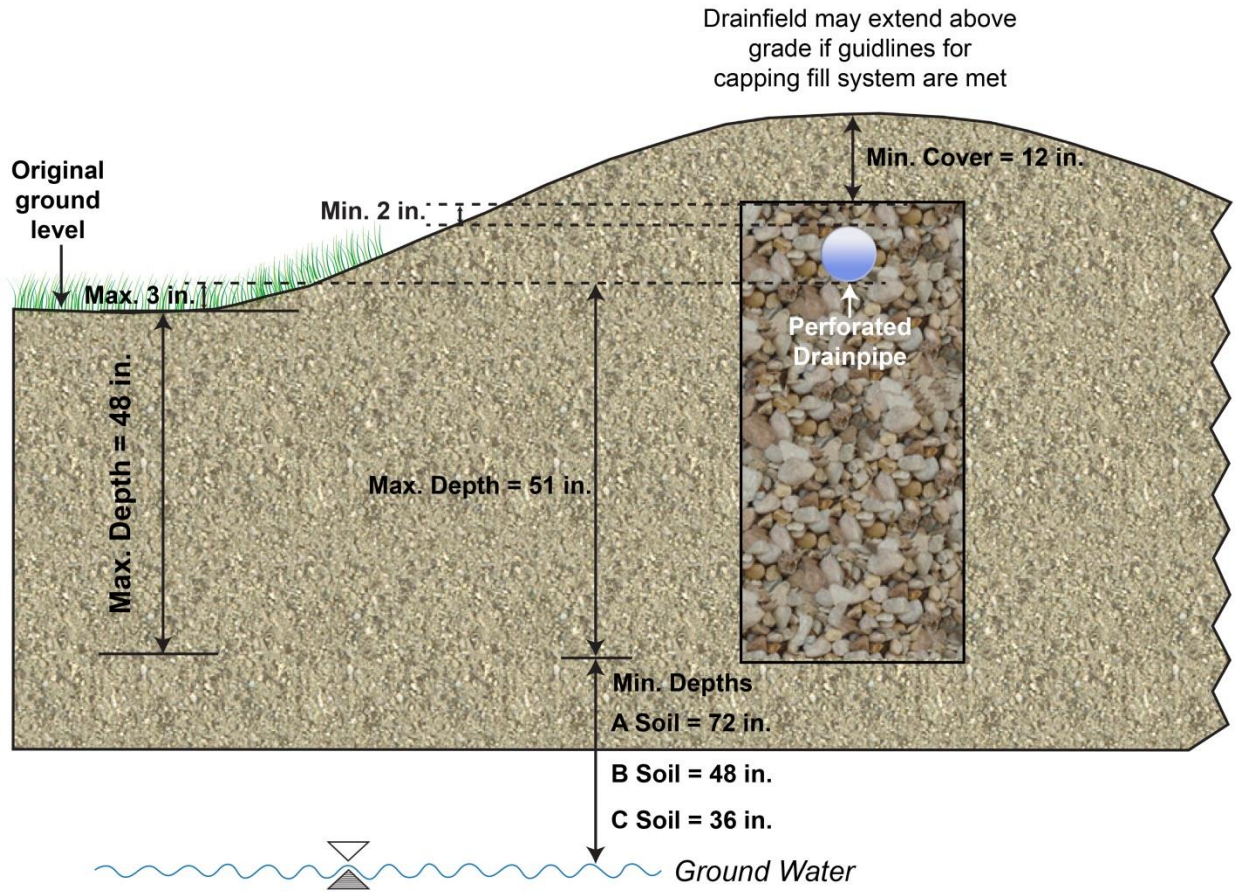

Figure 4-16. Cross section of an above-grade capping fill trench with extra drainrock.

4.9.3 Calculations

To determine required drainfield length when extra drainrock is installed, use the appropriate multiplication factor to adjust the standard trench length. Standard length is indicated in Table 3-2 (section 3.2.4).

The appropriate multiplication factor depends on the trench width and depth of gravel below the perforated pipe in the drainfield. Determine the appropriate multiplication factor as follows:

- Locate the factor in Table 4-9 for the particular combination of trench width and gravel depth below the drainpipe, or
- If the particular combination of trench width and gravel depth is not given in Table 4-9, use Equation 4-10.

Table 4-9. Multiplication factors to adjust drainfield length for extra drainrock.

Gravel Depth Below Perforated Pipe (inches)	Trench Width (inches)							
	12	18	24	30	36	48	60	72
12	0.75	0.78	0.80	0.82	0.83	0.86	0.87	0.89
18	0.60	0.64	0.66	0.69	0.71	0.75	0.78	0.80
24	0.50	0.54	0.57	0.60	0.62	0.66	0.70	0.73
30	a	a	0.50	0.53	0.55	0.60	0.64	0.67
36	a	a	a	a	0.50	0.54	0.58	0.61
42	a	a	a	a	a	0.50	0.54	0.57
48	a	a	a	a	a	a	0.50	0.53

a. Multiplication factor is less than 0.50; use 0.50 if this depth and width are desired.

$$Multiplying\ Factor = \frac{Trench\ Width + 2}{Trench\ Width + 1 + (2 \times Gravel\ Depth)} = \frac{W + 2}{W + 1 + (2 \times D)}$$

Equation 4-10. Multiplication factor.

where:

W = trench width in feet
D = gravel depth in feet

Example 1:

$$Multiplying\ Factor = \frac{W + 2}{W + 1 + (2 \times D)} = \frac{3 + 2}{3 + 1 + 2(1)} = \frac{5}{6} = 0.83$$

where:

Trench width (W) = 36 inches or 3 feet.
Gravel depth (D) = 12 inches or 1 foot.

Example 2:

$$\text{Multiplying Factor} = \frac{W + 2}{W + 1 + (2 \times D)} = \frac{6 + 2}{6 + 1 + 2(3.5)} = \frac{8}{14} = 0.57$$

where:

Trench width (W) = 72 inches or 6 feet.
Gravel depth (D) = 42 inches or 3.5 feet.

Example 3:

A three-bedroom home is proposed to be located on a site with uniform silt loam soil (soil design subgroup B-2; section 2.1.2, Table 2-4) and normal high ground water at 7 feet. In section 2.2.2, Table 2-5 shows the minimum distance from trench bottom to normal high ground water as 3 feet for this soil design subgroup. Maximum depth of the trench is 4 feet. The total absorption area required for the home is 556 ft^2 ([250 gallons/dwelling]/[0.45 GPD/ft^2/day]), equivalent to trench dimensions of 3 feet wide and 185.5 feet in length (no trench may exceed 100 feet in total length for gravity distribution). With 30 inches of aggregate under the perforated pipe in the drainfield and a trench width of 36 inches, the trench length would be reduced to 55% of the 185.5-foot standard length (0.55 = 55%) or 102 feet, according to the appropriate multiplication factor (Table 4-9). This was calculated as follows:

1. Calculate the drainfield area required for a three-bedroom home.

$$Trench\ Bottom = \frac{daily\ flow}{application\ rate} = \frac{250\ GPD}{0.45\ GPD/square\ foot} = 556\ square\ feet$$

2. Calculate the length of trench required for the drainfield.

$$\text{Trench Length} = \frac{\text{trench bottom}}{\text{trench width}} = \frac{556\ \text{square feet}}{3\ \text{feet}} = 185.5\ \text{foot trench}$$

3. Using the appropriate factor from Table 4-9, calculate the reduced trench length for a drainfield 185.5 feet long, 36 inches wide with 30 inches of gravel under the drain pipe

   Trench Reduction = (Trench length)(Multiplying Factor) = (185.5 foot trench)(0.55) = 102-feet total trench length. Two trenches will need to be constructed that in total provide 102 feet in trench length.

Example 4:

A three-bedroom home is proposed to be located on a site with uniform clay loam soil (soil design subgroup C-2; section 2.1.2, Table 2-4), normal high ground water at 5 feet, and a slope less than 6%. In section 2.2.2, Table 2-5 shows the minimum distance from trench bottom to normal high ground water as 2.5 feet for this soil design subgroup. Maximum depth of the trench is 2.5 feet. The total absorption area required for the home is 1,250 ft^2 ([250 gallons/ dwelling]/[0.2 GPD/ft^2/day]), equivalent to trench dimensions of 6 feet wide and 209 feet in length (no trench may exceed 100 feet in total length for gravity distribution). To maximize the multiplication factor, the system is chosen to be constructed as an extreme capping fill-extra drainrock trench. This allows 33 inches of aggregate under the perforated pipe in the drainfield. With a trench width of 72 inches, the trench length would be reduced to 64% of the 209-foot standard length (0.64 = 64%) or 134 feet, according to the appropriate multiplication factor (Equation 4-10). This was calculated as follows:

1. Calculate the drainfield area required for a three-bedroom home.

$$Trench\ Bottom = \frac{daily\ flow}{application\ rate} = \frac{250\ GPD}{0.2\ GPD/square\ foot} = 1{,}250\ square\ feet$$

2. Calculate the length of trench required for a standard drainfield.

$$\text{Trench Length} = \frac{\text{trench bottom}}{\text{trench width}} = \frac{1{,}250\ \text{square feet}}{6\ \text{feet}} = 209\ \text{foot trench}$$

3. Using the appropriate multiplication factor calculated through Equation 4-10, determine the reduced trench length for a drainfield 209 feet long, 72 inches wide, with 33 inches of gravel under the perforated drain pipe.

   Trench Reduction = (Trench Length)(Multiplying Factor) = (209 foot trench)(0.64) = 134-feet total trench length. Two trenches will need to be constructed that in total provide 134 feet of trench length.