

### 4.11.4 Calculations

To determine required drainfield length when extra drainrock is included, use the appropriate multiplication factor to adjust the standard 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 drainpipe. Determine the appropriate multiplication factor by:

- Locating the factor in Table 4-7 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 4-7, use Equation 4-10.

**Table 4-7. Multiplication factors to adjust drainfield length for extra drainrock.**

Gravel Depth Below Drain 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	0.43	0.47	0.50	0.53	0.55	0.60	0.64	0.67

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

**Equation 4-10. Multiplication factor.**

where:

W = trench width in feet

D = gravel depth in feet

**Example 1:**

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

where:

Trench width (W) = 36 inches or 3 feet.

Gravel depth (D) = 12 inches or 1 foot.

**Example 2:**

$$\text{Multiplying Factor} = \frac{W + 2}{W + 1 + (2 \times D)} = \frac{6 + 2}{6 + 1 + 2(1)} = \frac{8}{9} = 0.89$$

where:

Trench width (W) = 72 inches or 6 feet.

Gravel depth (D) = 12 inches or 1 foot.

**Example 3:**

A three-bedroom home is proposed to be located on a small lot. The effective soil is a uniform silt loam (soil design subgroup B-2; section 2.1.2, Table 2-4) with normal high ground water at 7 feet. Section 2.2.1, Table 2-6 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<sup>2</sup> ([250 gallons/dwelling]/[0.45 GPD/ft<sup>2</sup>/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 pipe 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 4-7). This was calculated as follows:

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

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

2. Calculate the length of trench required for a standard 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 4-7, calculate the reduced trench length for a standard trench 185.5 feet long, 36 inches wide with 30 inches of gravel under the drain pipe

$$\text{Trench Reduction} = (\text{Trench length})(\text{Multiplying Factor}) = (185.5 \text{ ft. trench})(0.55) = 102 \text{ ft. trench}$$

## 4.12 Gravelless Trench System

Revision: January 30, 2013

### 4.12.1 Description

A gravelless trench system meets all the requirements of a standard trench system except that the drainrock is replaced by an approved gravelless trench component (section 5.6). Typical components include gravelless chambers, large diameter nylon fabric wrapped piping of varying dimensions, and drainrock substitution systems. Approved gravelless products are granted a reduction in disposal area square footage. Reduction is only allowed in trench designs up to 36 inches in width. No reduction is allowed for installation widths greater than 36 inches, or for installation in sand mound designs.

### 4.12.2 Approval Conditions

1. Unless otherwise noted, the system must be installed according to the gravelless trench component manufacturer's recommendations.
2. Reduction in square footage cannot be in addition to other allowable disposal area reductions (i.e., drainfield reductions due to increased application rates for treatment).
3. The measured width of the installed product should be at least 90% of the excavated trench width (section 5.6, Table 5-6).

### 4.12.3 Design

1. Length of gravelless trench product needed should be calculated on the following basis:
  - a. Disposal trench length is determined by the application rating for each product (section 5.6, Table 5-5, rating column)

Example (large diameter pipe):

- 1) Product selected has a rating (square feet of application area per linear foot) of 1.33 ft<sup>2</sup>/ft
- 2) 3 bedroom home (250 GPD) in soil design subgroup B-1 soils (application rate of 0.6 GPD/square foot [ft<sup>2</sup>])
- 3)  $([250 \text{ GPD}]/[0.6 \text{ GPD}/\text{ft}^2])/(1.33 \text{ ft}^2/\text{ft}) = 314$  linear feet of gravelless trench product

Example (gravelless chamber):

- 1) Product selected has a rating (square feet of application area per linear foot) of 4.0 ft<sup>2</sup>/ft
- 2) 3 bedroom home (250 GPD) in soil design subgroup B-1 soils (application rate of 0.6 GPD/ft<sup>2</sup>)
- 3)  $([250 \text{ GPD}]/[0.6 \text{ GPD}/\text{ft}^2])/(4.0 \text{ ft}^2/\text{ft}) = 105$  linear feet of gravelless trench product