4.11 Extra Drainrock ~~Drainfield~~Trench

Revision: ~~June 24, 2011~~September 18, 2014

4.11.1 Description

An extra drainrock ~~drainfield~~ trench is an ~~standard~~ aggregate-filled ~~drainfield~~ trench (1 to 6 feet wide) with more than 6 inches of aggregate under the perforated pipe. Figure 4-13 shows a typical cross section of a ~~standard~~ 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.

~~4.11.2 Purpose~~

~~When more than 6 inches of aggregate under the perforated pipe is included in a standard drainfield, the required drainfield length may be reduced. This section explains the conditions and calculations involved.~~

4.11.~~3~~2 Approval Conditions

1. ~~Site~~ The site must meet the requirements for ~~a standard system~~site suitability (IDAPA 58.01.03.008.02, section 8.1), ~~as defined in IDAPA 58.01.03.003 (section 8.1).~~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 4.27) 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.
   ~~a.~~b. The site slope may not exceed 20% if the top of the drainfield is less than 24 inches below 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 4.5) except that the drainfield may not exceed 6 feet in width.
2. ~~Bottom~~ 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 extended treatment package systems, 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.
~~2.~~6. Gravelless drainfield components may not be substituted for aggregate.

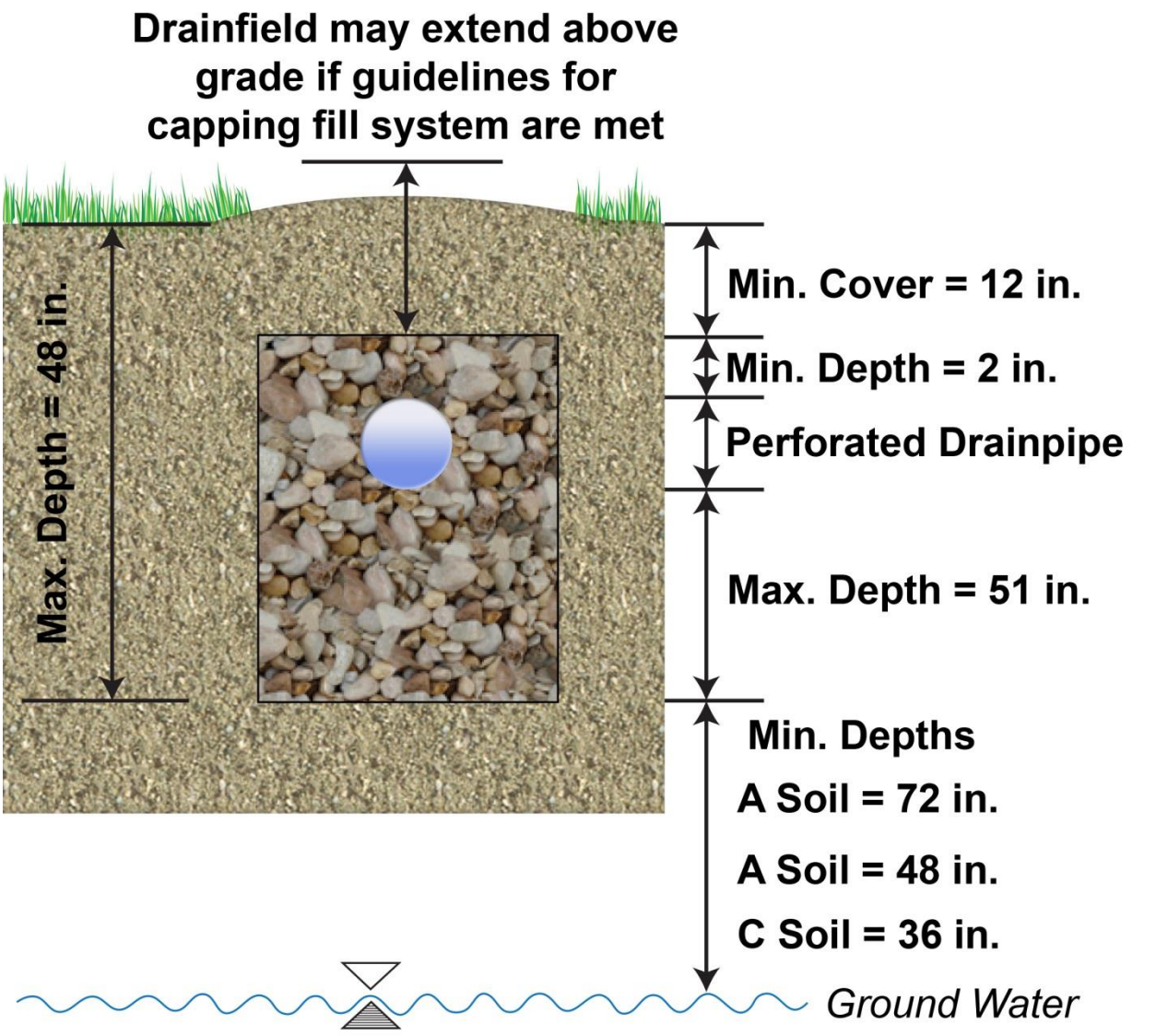

Figure 4-13. Cross section of standard trench with extra drainrock.

4.11.~~4~~3 Calculations

To determine required drainfield length when extra drainrock is ~~included~~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 ~~drainpipe~~perforated pipe in the drainfield. 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~~ 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	~~0.43~~*	~~0.47~~*	0.50	0.53	0.55	0.60	0.64	0.67
36	*	*	*	*	0.50	0.54	0.58	0.61
42	*	*	*	*	*	0.50	0.54	0.57
48	*	*	*	*	*	*	0.50	0.53

* - Multiplication factor is less than 0.50, use 0.50 if this depth and width are desired.

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

Equation 4-10. Multiplication factor.

where:

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

Example 1:

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

where:

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

Example 2:

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

where:

Trench width (W) = 72 inches or 6 feet.
Gravel depth (D) = ~~12~~ 42 inches or ~~1~~ 3.5 foot.

Example 3:

A three-bedroom home is proposed to be located on a ~~small lot. The effective soil is~~site with ~~a~~ uniform silt loam soil (soil design subgroup B-2; section 2.1.2, Table 2-4) ~~with~~ and normal high ground water at 7 feet. 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 4-7). 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 ~~a standard~~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 4-7, calculate the reduced trench length for a ~~standard trench~~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 ft. trench)(0.55) = 102 ft. total 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%. 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 1250 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, the reduced trench length for a drainfield 209 feet long, 72 inches wide with 33 inches of gravel under the drain pipe.

Trench Reduction = (Trench length)(Multiplying Factor) = (209 ft. trench)(0.64) = 134 ft. total trench length