APPENDIX 9

DESIGNATED SOIL MPI RATES AND CORRESPONDING CONVENTIONAL DISPOSAL FIELD LINEAR FOOTAGE AND DISPOSAL FIELD AREA REQUIREMENTS

Table A9-1

Absorption/Percolation Rates (Minutes Per Inch)	Absorption Factor (AF) (Square Feet Per Gallon)	Required Amount of Trench Bottom Area (TBA) (Square Feet Per Bedroom)
30	1.8	270
45	2.1	315
60	2.4	360
75	2.7	405
80	3.0	450
85	3.3	495
90	3.6	540
95	3.9	585
100	4.2	630
105	4.5	675

NOTE: The absorption rates established in percolation test data shall always be rounded up to the next highest increment of five (5).

IMPORTANT NOTE: In any case where soil absorption data is obtained, and established, via the conducting of percolation tests, the minimum required amount of trench bottom area shall be 405 square feet.

A. Calculation Formulas

This Subsection outlines the formulas to be utilized in the calculation of the variables necessary to determine the disposal field trench linear footage requirements and total disposal field area requirements for conventional subsurface sewage disposal systems only.

IMPORTANT NOTE: The Department reserves the right to amend, adjust, modify or alter the design flow rates presented in this Appendix so as to establish an appropriate, case/site specific, projected daily wastewater flow figure where deemed necessary.

1. Required Linear Footage

(a) Single-family Dwellings

~~(1) No Over Sized Bathing Fixtures in Dwelling~~

There are two methods that may be used to calculate the required linear footage for a conventional subsurface sewage disposal system.

(i) For this method, the two main variables to be ascertained are the number of bedrooms (BDR) and square feet of trench bottom area (TBA). Information regarding the number of bedrooms is provided on the Construction Permit application information and the TBA is provided in Table A9-1 of this Appendix. The width conventional field line trench to be used is three (3) feet. Once the variables are determined, the following equation is used:

Required Linear Footage = ((BDR) x (TBA)) ÷ (width of conventional field line trench)

(ii) For this method, the two main variables to be ascertained is the projected daily wastewater flow (Q) and absorption factor (AF). Information regarding Q is calculated as shown in *Appendix 7, Subsection A, Part 1* (Residential Waste Flow - *Category One*) and the AF is provided in Table A9-1 of this Appendix. The width conventional field line trench to be used is three (3) feet. Once the variables are determined, the following equation is used:

Required Linear Footage = ((Q) x (AF)) ÷ (width of conventional field line trench)

~~(2) Over Sized Bathing Fixtures in Dwelling~~

~~(i) One Over Sized Bathing Fixture~~

~~For this method, the two main variables to be ascertained is the projected daily wastewater flow (Q) and absorption factor (AF). Information regarding Q is calculated as shown in *Appendix 7, Subsection A, Part 2, Example 1* (Residential Waste Flow - *Category Two*) and the AF is provided in Table A9-1 of this Appendix. The width conventional field line trench to be used is three (3) feet. Once the variables are determined, the following equation is used:~~

~~Required Linear Footage = ((Q) x (AF)) ÷ (width of conventional field line trench)~~

~~(ii) More Than One Over Sized Bathing Fixture~~

~~For this method, the two main variables to be ascertained is the projected daily wastewater flow (Q) and absorption factor (AF). Information regarding Q is calculated as shown in *Appendix 7, Subsection A, Part 2, Example 2* (Residential Waste Flow - *Category Two*) and the AF is provided in Table A9-1 of this Appendix. The width conventional field line trench to be used is three (3) feet. Once the variables are determined, the following equation is used:~~

~~Required Linear Footage = ((Q) x (AF)) ÷ (width of conventional field line trench)~~

(b) Structures Other Than Single-family Dwellings

The following equation is used to calculate the linear footage requirements for structures other than single-family dwellings. There are three important variables to be ascertained for this equation; they are the design flow rate (DFR), the design unit (DU) and the absorption factor (AF). The DU information will typically be obtained from the Construction Permit application information or applicant. The DFR is provided in Table A7-1 in *Appendix 7, Subsection B*. The AF is provided in Table A9-1 of this Appendix.

Required Linear Footage = ((DFR x DU) x (AF) ÷ (width of conventional field line trench)

2. Total Disposal Field Area Requirement

Once the disposal field linear footage requirement is determined, the amount of physical land area necessary to install the system and its required duplicate or secondary area must be determined. Since this calculation determines the *total disposal field area requirement*, the sum of this equation is divided by two to provide the square footage of land space necessary to install one disposal field.

The following equation is used to calculate the total disposal field area requirements (i.e. the primary installation area and the duplicate or secondary area):

Total Disposal Field Area Requirement = ((Required Linear Footage) x (installation factor*)) x 2

*The *installation factor* is defined as the amount of land surface area, in terms of square footage, associated with the installation of each linear foot of the disposal field trench. For each slope classification (i.e. 0-5% slopes, 5-15% slopes, 15-25% slopes), a minimum number of square feet is necessary to install said disposal field trench. The following numbers are to be utilized, however the Department shall have the authority to increase the amount of the installation factor for sites where the designated disposal field area is determined by the Department, to have such unusual land surface configuration characteristics (i.e. a highly variable topography), that a greater amount of land surface area would be necessary to install a prescribed amount of conventional disposal field trenches. The installation factors for the slope classifications are:

Table A9-2

0-5% slopes	10
5-15% slopes	13
15-25% slopes	16

B. Examples

The following examples illustrate the use of the figures in Table A9-2 for the calculation of the required amount of linear footage of disposal field trench in a conventional system only.

Example 1, Part A:

The soil absorption rate has been established at 80MPI from an approved set of percolation test data. A four (4) bedroom house~~, utilizing no oversized bathing fixtures,~~ is proposed to be constructed on the property. Using the information from Table A9-1, at an 80MPI rate, the table shows that 450 square feet of trench bottom area per bedroom is required.

The following equation is used:

Required Linear Footage = ((number of bedrooms) x (square feet of trench bottom area)) ÷ (width of conventional field line trench)

Thus: Required Linear Footage = (4 x 450) ÷ 3
= 1800 ÷ 3
= 600

Once the required amount of disposal field linear footage is determined, the amount of physical land area necessary to install the system and its required duplicate or secondary area must be determined.

The following equation is used to calculate the total disposal field area requirements (i.e. the primary installation area and the duplicate or secondary area):

Total Disposal Field Area Requirement = ((Required Linear Footage) x (installation factor)) x 2

For this example (i.e. Example 1, Part A), the disposal field area site has a slope of 11%.

Thus: Total Disposal Field Area Requirement = (600 x 13) x 2
= 7800 x 2
=15600
or 16000 Sq. Ft.

Example 1, Part B:

~~Should an oversized bathing fixture be proposed~~The second method of calculation for the dwelling in this example~~, the method of calculation differs~~uses the absorption factor (AF) from Table A9-1 instead of the trench bottom area (TBA). The first step in such cases is to determine the value of Q (or the projected daily wastewater flow rate) for the four (4) bedroom house~~ containing, for this example, a 65 gallon over sized bathing fixture~~. Then the next calculation will use the established variable of Q ~~-~~for the house~~ with the over sized bathing fixture~~ to allow for the determination of the Required Linear Footage for said house.

The following equation is used to calculate Q (i.e. the equation from *Appendix 7, Subsection A, ~~Part 2,~~ Example ~~1~~*) :

Thus: Q = ~~[(OSBFC - 30) x (BDR)] + (EDWF x~~ BDR~~)~~ x EDWF
Q = ~~[(65 - 30) x 4] + (150 x 4)~~(4 bdr) x (150 gpd/bdr)
~~Q = [(35) x (4)] + (600)~~
~~Q = 140 + 600~~
Q = ~~740~~600 gpd

To complete the calculation for the disposal field linear footage requirements for the four (4) bedroom house containing the over sized bathing fixture, use the following equation:

Required Linear Footage = (Q x AF) ÷ (width of conventional field line trench)

Thus: Required Linear Footage = (~~740~~600 x 3.0) ÷ 3
= ~~2220~~1800 ÷ 3
= ~~740~~600

The four (4) bedroom dwelling ~~with the 65 gallon oversized bathing fixture~~ having 80MPI soils requires the installation of ~~740~~600 linear feet of disposal field trench line.

The Total Disposal Field Area Requirement would then be calculated as shown in *Part A* of this Example.

Example 2:

The soil absorption rate has been established at 60MPI from an approved soil map prepared on a parcel of land. A small commercial office building~~, utilizing no oversized bathing fixtures,~~ is proposed to be constructed on the property. From information obtained from the developer, the business operation in the office building will have a maximum of 20 employees, with standard daily business hours (i.e. 9:00 a.m. to 5:30 p.m.).

From Table A7-1 in *Appendix 7*, two variables are established. Under the heading of *Type of Establishment*, find the appropriate or closest match to the propose type of establishment – thus, Office Buildings. The corresponding design unit number (DUN) and the design flow rate (DFR) are identified. The number of employees in the business becomes the DUN and the DFR is the rate to use to complete this calculation.

Thus, the variables are determined to be 20 gallons/person/day for the DFR and 20 employees for the DUN. From Table A9-1 in this appendix, at a 60MPI rate, the Absorption Factor (AF) is 2.4 (i.e. 2.4 square feet of trench bottom area is required to absorb one gallon of water per day). The width of conventional field line trench is 3 feet.

The following equation is used:

Required Linear Footage = ([DFR x DUN] x (AF)) ÷ (width of conventional field line trench)

Thus:	Required Linear Footage	= ([20 x 20] x (2.4)) ÷ 3
		= (400 x 2.4) ÷ 3
		= 960 ÷ 3
		= 320

The Total Disposal Field Area Requirement would then be calculated as shown in *Part A of Example 1* in this Subsection.

IMPORTANT NOTE: The methods and calculations presented shall be utilized for conventional subsurface sewage disposal systems only. Where the Department has determined, through the use of said calculations, that there is insufficient soil area to allow for the use of a conventional system, the use of alternative systems shall be required.