

# Area Fill and Wisconsin Mound Study Guide



*A passing score of 70% will be required for Area Fill Mound Certification*

*A passing score of 80% will be required for Level I Inspector Certification*

In preparation for the exam, it is recommended that individuals refer to the study guides on the Department's website at [www.dph.ga.gov](http://www.dph.ga.gov) and review the Rules of the Department of Public Health, 511-3-1, as well as the Georgia Manual for Onsite Sewage Management Systems.

Installation contractors must earn a passing score on the Residential Contractors Exam before sitting for the Area Fill and Wisconsin Mound Exam.

Please contact the State Office at 404.657.6534 to make an appointment to sit for the exam.

This study guide is not intended to be a comprehensive resource for Area Fill and Wisconsin Mound on-site sewage system installations. Please refer to the Manual for On-site Sewage Management Systems for more detailed information.

## Introduction

This study guide was written to supplement the information contained in the Georgia Manual for On-Site Sewage Systems concerning Wisconsin mounds and area fill systems. This document is not intended to replace the manual. It is therefore necessary to study the information in the manual in order to do well on the certification test. [page B-1 paragraph 4A, pages F-13 through F-32, page H-1, pages H-7 through H-10 and Appendix O-II page 1-7]. The certification test will not cover how to design the piping layout for a pressure dosed system. However, you should read this section in order to get a general idea of how pressure dosing works.

There are two basic types of systems that use fill materials; the Wisconsin Mound Soil Absorption System [mound system] and the area fill system. Both are similar in design and installation; however, the main differences are noted below.

Parameter	Wisconsin Mound	Area Fill Mound
<i>Sizing Criteria</i>	Requires both a basal and linear loading rate	Requires a percolation rate only
<i>Absorption Field Configurations</i>	Must use a bed configuration only	May use any currently approved configuration
<i>Soil Permeability Limitations</i>	Permeability of upper 10 inches of soil profile must be no slower than moderately low	Upper 12 inches of soil profile must have a percolation rate of 30 minutes per inch or faster
<i>Depth to Seasonal High Water Table</i>	Must be 10 inches from the surface or deeper	Must be 12 inches from the surface or deeper
<i>Maximum Slope of Site</i>	25%	12%
<i>Dosing</i>	Must be designed with a low-pressure piping system	Trenches may be gravity or surge dosed, beds must be designed with a low-pressure piping system
<i>Mound Slope</i>	3 to 1	5 to 1
<i>Absorption Field to Shoulder Setback</i>	No setback required	5 feet

## Sizing Criteria

Sizing for Wisconsin mound systems require that an approved soil classifier provide the designer with a basal loading rate as well as a linear loading rate. The basal loading rate is used to calculate the total area of the absorption bed contained in the mound and is estimated from the soil conditions of the surface horizon. It is expressed in gallons per day per square foot (see table FT-

5). The linear loading rate is used to calculate the amount of effluent that may be applied to the calculated absorption area per linear foot. It is expressed in gallons per day per linear foot (see figure FF-13). The linear loading rate determines the bed dimensions (i.e. more square vs. more rectangular and “stretched out”). Wisconsin mound systems cannot be sized using a percolation rate, however, measured rates may be used by the soil classifier to verify observed soil morphology. Typically, a special study will be required to obtain a basal and linear loading rate.

Sizing for area fill and area fill mound systems shall be based on the most restrictive texture encountered within 12 inches of the original soil surface or the most restrictive soil condition within 12 inches of the proposed trench bottom, whichever is greater. This information is typically expressed as a percolation rate, although a loading rate may also be used. If a loading rate is used, the approved soil classifier must specify the configuration (example: trench, bed, drip emitter, etc.). In the special case when unsuitable fill is removed and replaced below the existing ground surface, the percolation rate or loading rate for the upper 12 inches of the underlying in-situ soil should be used to size the system.

### **Absorption Field Configurations**

Wisconsin mound absorption areas are always dimensioned as beds “inside of” the mound.

Area fill absorption fields may be designed in any approved configuration as defined in the Manual (example: trenches, beds, drip emitters, etc.) with the exception of serial trenches which are not allowed.

### **Soil Permeability Limitations**

The upper 10 inches of soils used for Wisconsin mound installations must have a permeability no slower than “moderately low”. Typically, the slower the permeability, the smaller the basal loading rate will be (which will cause the overall absorption area to increase in size). Also, the slower the permeability, the smaller the linear loading rate will be (which will cause the mound to be longer and more narrow).

For area fill mound systems, the percolation rate of the upper 12 inches of the soil at the surface of the ground may be no slower than 30 minutes per inch.

### **Depth to Seasonal High Water Table**

Wisconsin mounds may only be designed on sites where the seasonal high water table (shwt) is 10 inches or deeper from the soil surface.

Area fill mounds require that the shwt is 12 inches or deeper from the soil surface.

In either case, a two-foot separation from the proposed trench bottom and the shwt or restrictive layer must be maintained unless an advanced treatment system is used.

### **Maximum Slope of Site**

Wisconsin mounds may be installed on sites with up to 25% slope because pressure distribution is utilized and a linear loading rate may be factored into the design.

The maximum slope for area fill mounds is only 12%.

In either case, the mound should be oriented as parallel to ground contour as possible.

### **Dosing**

Because Wisconsin mound absorption fields may be used on more restrictive soil conditions and because they are dimensioned as beds, time dosing and a low-pressure piping distribution networks must always be used.

Area fill mound systems, on the other hand, may use any dosing method found in the Manual or product approval that is approved for the selected configuration.

### **Mound Dimensions**

Wisconsin mounds must be designed with a 3:1 side slope from the crown of the mound to the ground surface. This ratio is “run to rise”. In other words, 3 feet of run (horizontal distance) is required for each 1 foot of rise (vertical distance). There is no distance requirement for the edge of the absorption field to the shoulder of the mound.

The distance requirement from the edge of the absorption field to the shoulder of the mound is 5 ft. Area fill mounds must be designed with a 5:1 side slope from the shoulder of the mound to the ground surface.

Crowns of both Wisconsin mound and area fill systems must have at least 1% of fall from the center to avoid any water ponding.

### **Setbacks**

Just like any other drainfield configuration, all setbacks to waterbodies, wells, property lines, etc. apply to both Wisconsin and area fill mound systems. The following applies to both Wisconsin mound and area fill mound systems: For sloping sites, setbacks should be taken from the edge of the absorption field from the upslope side and from the toe of the mound on the downslope side. For level sites, all setbacks should be taken from the toe of the mound.

### **Surface Preparation**

Site preparation for Wisconsin mounds involves removing any excessive organic matter, grass, shrubs, and trees from the entire surface area of the mound footprint. Shrubs and trees should be cut at ground level with the stumps left in the ground along with any boulders present at the

site. If these occupy a significant amount of the absorptive area, the system designer may increase the size of the mound. Tilling of the site should only occur when the soil is dry and should crumble and does not take on a wire form when rolled between the hands. Tilling can be accomplished with a mold board plow, chisel plow, or chisel teeth mounted on a backhoe bucket. Backhoe bucket teeth are not satisfactory. Rototillers destroy soil structure and should not be used. Also, wheeled tractors should not be used as they may rut up the site. All work at the site should be performed from the upslope side.

Area fill mound systems also require removal of vegetation, organic matter, and darkly colored topsoil from the entire mound footprint. Tilling and site preparation procedures are the same as listed for Wisconsin mounds. All removed topsoil must be replaced, inch for inch, with the same amount of approved fill before constructing the mound.

### **Fill Material**

The sand required for the construction of a Wisconsin mound system should be a coarse sand with not more than 5% fines. ASTM C-33 sand may also meet the sand quality criteria if it contains not more than 5% fines. More details on sand quality for Wisconsin Mounds may be found in Section F of the Manual.

The sand required for an area fill mound system may also be a coarse sand with not more than 5% fines. ASTM C-33 sand with not more than 5% fines is also acceptable. Other materials may be acceptable if they have a permeability between 0.0005 meters per second and 0.0003 meters per second. The "Simplified Falling Head Permeability Test" found in Section H of the Manual or other ASTM approved testing procedure may be used to confirm suitability.

### **Qualified Personnel**

Any approved soil classifier, engineer or geologist that has registered with the department to conduct soil investigations may certify fill material and submit a "Fill Site Certification Form". With board of health approval, any currently certified level II environmental health specialist trained in fill evaluation may also approve fill material and complete a "Fill Site Certification Form".

### **Additional Information**

A Wisconsin mound design worksheet is available in the Manual to aid in site permitting.

For area fill systems, a "Filled Site Certification Form" must be completed and submitted before final approval may be given.

The inspecting environmentalist should verify the construction of the mound and absorption field, even when a completed "Filled Site Certification Form" has been submitted.

Final cover and seeding and/or mulching is critical for both Wisconsin mound and area fill mound systems to prevent slope erosion.

### **Some Causes of Failure for Wisconsin and Area Fill Mound Systems**

- ✓ Overloading of the systems due to excessive water use or ground water infiltration.
- ✓ Overestimating the infiltration rate and hydraulic conductivity of the natural soil during design.
- ✓ The natural soil being compacted during construction or not being plowed properly.
- ✓ The use of fill sand that has excessive amounts of silt and clay.

The main similarities between the mound system and the area fill system are noted below:

- ✓ Both systems' fill material must meet ASTM C-33 specifications for fine aggregate with less than five percent passing a number two hundred sieve. This is coarse sand so no loams or clays can be used. Even using sandy fill material that has excessive amounts of silt and clay can cause failure of the systems.
- ✓ Fill materials other than ASTM C-33 sands may be acceptable provided they pass the falling head permeability test procedure found in the manual or other Department approved ASTM testing procedures.
- ✓ Care must be used to construct both the mound system and the area fill system. If the site is not properly plowed to prevent formation of a barrier between the fill and natural soil or the natural soil becomes compacted then either system could experience failure.
- ✓ Both systems must comply with all set backs from wells, bodies of water and other features as do conventional gravel septic systems.
- ✓ Both systems have similar restrictions on the use of absorption trenches. [see page H-1 Table HT-1]