



# **Stephens Consulting Services, P.C.**

*ENGINEERING • PLANNING*

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## **FREQUENTLY ASKED QUESTIONS (FAQ)**

**About**

### **ONSITE WASTEWATER SYSTEMS**

#### **Why do I need a design prepared by an engineer or private consultant?**

When the site conditions (soil type, depth to saturated soil, available area, etc.) meet the restrictions of the county regulations, the staff of the county health department will normally be able to include the system design in the permit that they issue for construction of the system. When they do not feel comfortable doing so, they will refer the applicant to an engineer or other consultant in private practice. It then becomes the consultant's job to select the most appropriate technology and prepare the design that is in the property owner's best interests.

#### **Do I still need a permit from the county?**

Yes. While the designer has some liberty with the choice of the system components, the final design must still be approved and permitted by the county health department.

#### **When is an "engineered system" required?**

There are generally three circumstances that result in the need for designs prepared by private consultants. One or more of these conditions may result in the need for an improved means of treatment:

1. The soil found on the property is very slowly permeable --- usually with high clay content. Slowly permeable soil often results in premature failure of the soil absorption portion of an onsite system. The soil will not accept the wastewater fast enough and long periods of saturation create a biomat that seals the soil pores. With better treatment that can be provided by today's technology, the water reaching the native soil is better quality, and will more readily be absorbed.
2. The depth to seasonal soil saturation is inadequate due to poor soil drainage. A goal of an onsite septic tank and soil absorption system is to treat the wastewater in the tank and then in the soil. A well-drained soil profile is necessary for this to happen. When an adequate depth of dry soil is not naturally present, treatment must be supplemented in some form of added technology.
3. There may not be adequate area available on the property for the construction of a standard onsite system; or, the more suitable soil conditions may not be located in a convenient location on the property to permit the construction of a standard gravity-fed system. This is frequently a problem in the case of repairs necessary for existing homes.

#### **How much area will an engineered system take?**

This question depends entirely upon the technology used and the site circumstances. In some cases it may take more area than a typical standard system, but in many cases it could actually occupy less space. In general, when septic tank effluent is treated to a higher quality, less area is required for the soil absorption component of the onsite system than would be necessary with only septic tank treatment --- assuming comparable soil conditions.

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### **How much will an engineered system cost?**

As you might expect, systems that include the use of improved treatment technologies will cost more than a simple gravity septic tank and soil absorption system. Construction costs are more because of the additional components needed. Depending upon the design, system installation costs may vary from 2 to 4 times the cost of a standard septic tank and drainfield system. In addition, operation and maintenance costs are higher because the components require periodic inspection and maintenance. Many regulatory agencies now require periodic inspections and service of advanced systems by professional service providers. Most improved treatment systems also use power for pumps and/or aeration equipment.

### **Are there differences in the technologies used for advanced treatment systems?**

There are many choices in technology for onsite systems today. And, there are significant differences in both the installation costs and the costs of long-term operation and maintenance. Many times the less expensive systems to install will require a significantly higher level maintenance and will use more energy. These differences are worth discussing with the designer of your choice.

### **What are my choices in technology, and what are some of the pros and cons?**

The choices of design may vary from county to county in Michigan. Each county has a list of those technologies they will accept. However, listed below are those technologies that have been widely accepted in Michigan over the last 15 or 20 years. Some are more common than others, but all have been found to perform well when properly designed and maintained. These are listed in the general order of simplest to the more complex. Cost does not necessarily rank in the same order.

**Standard drainfield using pressure distribution** - This design concept is appropriate when you still may be able to use an in-ground soil absorption system. It requires the addition of a pump with controls and a network of small diameter pipe to provide equal distribution throughout the soil absorption area. One pump is required and energy use is small. A preventative maintenance service call by a professional maintenance company every year or two is normally adequate.

**Elevated bed or sand mound system** – This design concept incorporates the use of a pressure-distribution system as described above, but requires that the soil absorption system be elevated to overcome slowly permeable soil conditions or inadequate depth to saturated soil conditions. Treatment is provided in the sand fill through which the wastewater passes before it enters the natural soil. Preventative maintenance visits by a professional every year or two are adequate in this case also.

**Packed-bed filters** – The generic title of packed-bed filters can be applied to several types of media, and several similar design concepts. In general, they consist of the installation of an additional treatment component between the septic tank and the soil absorption components of an onsite system. The goal is to improve the quality of the wastewater effluent before it is applied to the soil. Packed-bed filters may contain sand, geotextile material, foam cubes, coconut fiber, peat, or numerous other choices of media. They may also be single-pass or recirculating in their design. Energy use is still minimal with one or two pumps operating only a small portion of the day, but a little higher in the recirculating variation. A preventative maintenance visit by a professional service provider on an annual basis is necessary. An advantage of packed-bed filters is that they generally take up less area than mound systems, and may be more aesthetically pleasing to the homeowner.

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**Aerobic Treatment Units (ATU)** – Even though all of the technologies listed use the concept of *aerobic treatment* in their process, this category has been traditionally named for its use of compressors or blowers to pump and disperse air into the liquid wastewater in various ways. Usually, ATU's require that the blower or compressor run 24 hours a day, 7 days a week, even if the family is away on vacation. They also require a start-up period to develop a suspended bio-culture that is responsible for treatment. This means that they are not usually considered appropriate for seasonal homes. ATU's may cost less to install than some of these other technologies, but they are the most energy-intensive, and may add \$15 to \$25 per month to the homeowner's electrical bill. Most experts agree that ATU's serving homes should have an inspection / preventative maintenance visit by a professional service company 2 to 4 times per year, resulting in a higher maintenance costs.

**Lagoons** – Lagoons are the simplest of alternative treatment, and are acceptable in a limited number of counties in Michigan under restricted circumstances. Most counties have requirements for a minimal parcel size of 15 or 20 acres so that they are isolated from neighbors. They are energy efficient, and make the most of naturally occurring processes to provide good treatment. They are not expensive to install or maintain, and most appropriate for use in soils with a very high clay content. Maintenance consists of upkeep of the grassy areas and perimeter fencing. An irrigation area must be included where the pond can be drawn down by irrigation equipment on an as-needed basis during the growing season. Approvals may or may not include a periodic inspection visit by a third-party maintenance company or the regulatory agency.

### **What should I consider in choosing a designer?**

There are many choices of the technologies described above (and some not mentioned) that can be used to meet the needs of most sites. It is the designer's responsibility to help the property owner select a technology to fit their particular circumstances and preferences. The independent designer's first obligation should be to represent the interests of their client. It is for that reason that we supply this information on the choices available.

You should know that onsite system designs are specifically designed to custom fit the technology to be used. And, you should know that some designers work with certain manufacturers of one of these technologies to "design-build" systems. In other words, they may have a tendency to design systems using the products they sell for the installation. In such cases, the property owner may have limited ability to truly get bids on the installation of the system.

**Stephens Consulting Services, P.C. is a truly independent design company without ties to any manufacturer or supplier of equipment. As such, we can honestly represent the interests of our clients in our advice and in our designs. Our clients receive a complete system design in the form of construction plans and specifications, and are free to get bids for the project from the contractors of their choosing.**

Any questions related to the content of this FAQ sheet or other onsite wastewater issues should be directed to:

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