Brad Meriwether

Building With the Land

A Homebuyer's Guide to Soils, Drainage, and Erosion Control in Marion County

Marion County Soil & Water Conservation Distrtict
6960 S. Gray Road, Suite C
Indianapolis, Indiana 46237
(317) 780-1765
www.marionswcd.org

Julie Farr
District Rep
317-431-2799

What is a Soil & Water Conservation District?

In the state of Indiana, every county has its own Soil & Water Conservation District (SWCD) office. Many of them have been in existence for over 60 years. Most SWCD offices were started to provide farmers with personal technical assistance to help them conserve their soil and protect water quality in their farming practices. When a county created a SWCD office the U.S. Department of Agriculture provided one or more employees to assist the SWCD in carrying out their conservation assistance. Over the years SWCD's have evolved to provide a myriad of programs and services to their counties.

The Marion County SWCD was formed in 1969. This district provides services to the county in a variety of ways. Landowners are provided assistance in solving drainage and erosion problems. Consultation is given on how best to use their land with its given soil characteristics. Information is provided on how to attract wildlife, plant and maintain woodlands, how and where to construct a pond and maintain it, and how to solve water related septic problems. The farmers in Marion County are provided technical assistance to make land use decisions which will benefit them as well as the environment.

The SWCD is used by engineers, builders, and developers to find soils and drainage information which helps them make decisions on how best to develop the land. The SWCD is involved in review of erosion control plans for land disturbance over 1 acre and makes site visits to ensure that sediment does not leave the construction site.

The District is involved in education. Employees work with schools who are interested in teaching their students about the environment. Many schools have developed outdoor classrooms with the help of the District which provide a wonderful learning environment on school grounds. Children are provided with resources from the District to help them with research papers or science fair projects related to the environment, especially on soil and water issues.

Adult education is also important to the District. Workshops on how the soil relates to drainage and erosion problems for property owners are provided to Realtors and other groups. The District has also been involved in training for Health Department and other city agency employees. The District creates and distributes educational brochures and booklets on soil and water related issues.

Each year the District strives to serve its residents with the information and assistance they need. As the county continues to grow in population we see our role becoming increasingly more vital. If we can be of assistance to you please call our office (317) 780-1765.

You may purchase a copy of the Marion County Soil Survey on CD from the SWCD office. You can also obtain soils information from the USDA website at www.nrcs.usda.gov .

Your New Home - Dream House or Nightmare?

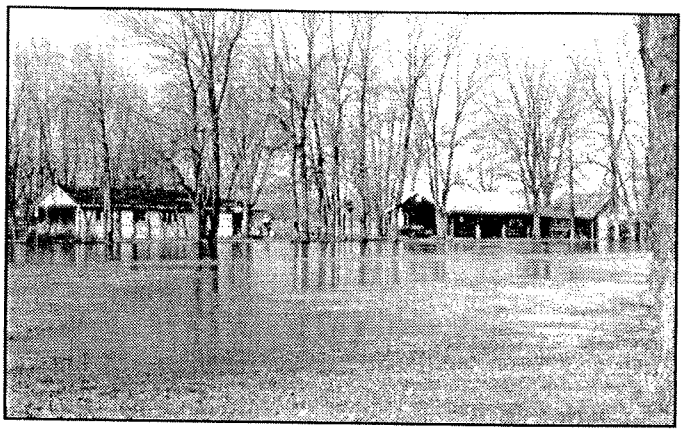
"##**## Tom!! You've got to do something about that miserable septic system! I'm tired of screaming at the kids - For Heaven's sake! Don't flush the pot or it will be all over the bathroom floor for the third time today!"

"Cathy, I'm going over to our neighbor's and give him a piece of my mind! I'll tell him if he doesn't keep his own water off my back yard I'm going to dam up the drainageway and float him right out his front door the next time we get a big rain!"

"Joe, let's move out of this swamp! We've spent a fortune the last two years re-doing the septic, pumping the basement, and hauling all the laundry to town. You go off to work every day, but I have to stay right here and live in this mess. If we're still here next spring I'll lose my mind! They're forecasting a drought this summer – let's wait 'til August, pray it doesn't rain, and sell this place to the next sucker!"

Get the point? The Marion County Soil & Water Conservation District (SWCD) office has assisted many homeowners, farmers, developers and engineers in correcting drainage and erosion problems. We have seen or heard about almost every problem imaginable. Our expertise goes beyond book information and identifies specifics as related to Marion County. It does not matter whether you are a doctor, lawyer, professor, developer, broker or tycoon; these people make the same mistakes about drainage and erosion as the poorest people in society. The problems affect every income and education level. This manual should identify and answer most drainage and erosion questions with regard to building or buying a home or homesite. Additional services can be requested from our office at 6960 S. Gray Road, Suite C in Indianapolis, Indiana. Telephone number is (317)780-1765.

Note: This guide contains proven methods of residential drainage and water management. Local ordinances, building codes and other regulations may alter or limit their use.



My dream home is a nightmare!!

The single biggest investment the average person will make during their lifetime will be the purchase of a house. What looks like a lovely wooded homesite in the summer months or other times of dry weather may become a swamp in the springtime.

How to Use this Resource Guide

The purpose of this resource guide is to educate Marion County residents, builders and developers on the use and limitations of the soil in our county. This information is extremely important as much of the land left to be developed has severe limitations due to the soil. There are 15 different soil types in Marion County. Some soils are well drained. They are ideal sites for homes with basements and septic systems work well in them. Other soils are heavy clay, have high ground water tables and will cause septic system failures and flooding in homes with basements.

This guide will help you to control erosion on your building site. This is important in protecting the quality of our water and will help you establish a healthy lawn. There are monetary benefits to developers who control erosion on their construction sites.

Spend some time reviewing the information in this guide. You will find it extremely helpful as you look for a home or solve problems in your existing home. With this guide and a copy of the Soil Survey you will be on your way to making wise land use decisions.

Building with the Land

A home buyers guide to soils, drainage and erosion control in Marion County

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Soils

Soil is often referred to as "dirt." Dirt is the stuff that is swept off the kitchen floor. It should not be confused with SOIL, the valuable resource that supports our homes and roads, grows our food, flowers, trees, and grass, and filters our septic waste. Soil can severely affect our living conditions and should be thoroughly investigated before making a decision on where you are going to call home. The investigation should start by contacting the Marion County Soil & Water Conservation District for assistance and reviewing a copy of the *Soil Survey of Marion County*. The *Soil Survey* contains information on conditions and limiting factors of a soil type within Marion County.

The majority of Marion County soils are best suited for agricultural production. Table #1 shows the major limiting factors for urban uses. Soils are placed in 3 or more classes according to their limitations or suitability for certain uses. Soils are rated for the uses expected to be important or potentially important to users of soil survey information.

The purpose of the ratings is to help engineers, planners, and others understand how soil properties influence behavior when used for engineering purposes. Ratings are confirmed by those familiar with that soil and by the experience of users. Ratings for proposed uses are given in terms of limitations and restrictive features, suitability and restrictive features, or only restrictive features. Only the most restrictive features are listed. Other features may need to be treated to overcome soil limitations for a specific purpose.

Soils are rated in their "natural" state, that is no unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. In rating soils for engineering uses, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most degrees of limitations. Most of these practices, however, are costly. The owner may be willing to live with a few limitations, provided the use does not violate community codes or regulations. The final decision in selecting a site for a particular use is a personal one and generally involves weighing the costs for site preparation and maintenance.

Below are some definitions which will assist you in using Table 1:

Slight is the rating given soils that have properties favorable for the use. The degree of limitation is minor and can be overcome easily. Good performance and low maintenance can be expected.

Moderate is the rating given soils that have properties moderately favorable for the use. This degree of limitation can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance of the structure or other planned use is somewhat less desirable than for soils rated slight. Some soils rated moderate require treatment, such as artificial drainage, extended septic tank absorption fields, or some modification of certain features of the soil. For these soils, modification is needed for those construction plans generally used for soils of slight limitation. Modification may include specially designed foundations, extra reinforcement of structures, sump pumps, and the like.

Severe is the rating given soils that have one or more properties unfavorable for the rated use, such as steep slopes, bedrock near the surface, flooding, high shrink-swell potential, a seasonal high water table, or low strength. This degree of limitation generally requires major soil reclamation, special design, or intensive maintenance. Some of these soils, however, can be improved by reducing or removing the soil feature that limits use, but in most situations, it is difficult and costly to alter the soil or to design a structure so as to compensate for a severe degree of limitation.

*** **Note:** In the Marion County Soil Survey some soil units are listed under urban land (i.e. Brookston part Ub). These areas have been disturbed by development and may or may not have the same characteristics of the original soil. Limitations for these soils may be more severe due to compaction, filling or other conditions.

Soil Limitations

Soil Type	Homes without basements	Homes with basements	Septic Systems	Ponds	Streets	Comments
Brookston Br	Severe: Ponding, Drainage Needed	Severe: Ponding, basements not recommended	Severe: Ponding, perimeter drain needed	Moderate: Seepage	Severe: Low strength, ponding, frost action	Responds well to tile drainage
Crosby CrA	Severe: Wetness	Severe: Wetness	Severe: Wetness, perimeter drain needed	Slight	Severe: Low strength, frost action	
Crosby CsB2 Crosby part	Severe: Wetness	Severe: Wetness	Severe: Wetness, perimeter drain needed	Moderate: Slope	Severe: Low strength, frost action	
Crosby CsB2 Miami part	Moderate: Shrink-swell	Moderate: Shrink-swell	Severe: Percs slowly	Moderate: Seepage, Slope	Severe: Low strength	
Eel Ee	Severe: Floods	Severe: Floods	Severe: Flooding, wetness	Moderate: Seepage	Severe: Flooding, Frost action	
Fox FoA	Moderate: Shrink-swell	Slight	Severe: Poor filter	Severe: Seepage	Moderate: Frost Action, Shrink-Swell	Sand & gravel probable
Fox FoB2	Moderate: Shrink-swell	Moderate: Slope	Severe: Poor filter	Severe: Seepage	Moderate: Frost Action, Shrink-Swell	2 to 6 percent slopes, eroded
Fox FxC2	Moderate to Severe: Shrink-swell, slope	Moderate to Severe: Slope	Severe: Poor filter, slope	Severe: Seepage, Slope	Moderate: Frost action, Slope, Shrink-swell	6 to 15 percent slopes, eroded
Genesee Ge	Severe: Floods	Severe: Floods	Severe: Flooding	Moderate: Seepage	Severe: Flooding	
Hennepin HeF	Severe: Slope	Severe: Slope	Severe: Slope, percs slowly	Severe: Slope	Severe: Slope	25 to 50 percent slopes
Martinsville MgA	Moderate: Shrink-swell	Slight	Slight	Moderate: Seepage	Moderate: Frost action, shrink-swell	
Martinsville MgB2	Moderate: Shrink-swell	Slight	Moderate: Percs slowly	Severe: Seepage	Moderate: Frost action, shrink-swell	2 to 6 percent slopes, eroded
Miami MmA	Moderate: Shrink-swell	Moderate: Shrink-swell	Moderate: Percs slowly	Severe: Seepage	Severe: Low strength	0 to 2 percent slopes (gravelly substratum)

Soil Limitations

Soil Type	Homes without basements	Homes with basements	Septic Systems	Ponds	Streets	Comments
Miami MmB2	Moderate: Shrink-swell	Slight	Severe: Percs slowly	Moderate: Seepage, slope	Severe: Low strength	2 to 6 percent slopes
Miami MmC2	Moderate: Slope, Shrink-swell, low strength	Moderate: Slope, shrink-swell	Severe: Percs slowly	Severe: Slope	Severe: Low strength	6 to 12 percent slopes
Miami MxD2 MxE2	Severe: Slope (15%+)	Severe: Slope (15%+)	Severe: Slope, percs slowly	Severe: Slope	Severe: Slope, low strength	12 to 18 percent/ 18 to 24 percent slopes
Ockley OcA	Moderate: Shrink-swell	Moderate: Shrink-swell	Slight	Severe: Seepage	Moderate: Shrink-swell, low strength	
Ockley OcB2	Moderate: Shrink-swell	Moderate: Shrink-swell	Slight	Severe: Seepage	Moderate: Shrink-swell, low strength	
Rensselaer Re	Severe: Ponding	Severe: Ponding	Severe: Ponding	Moderate: Seepage	Severe: Low strength, ponding, frost action	
Shoals Sh	Severe: Flooding, wetness	Severe: Flooding, wetness	Severe: Flooding, wetness	Moderate: Seepage	Severe: Wetness, flooding, frost action	
Sleeth Sk	Severe: Wetness	Severe: Wetness	Severe: Wetness	Severe: Seepage	Severe: low strength, frost action	
Sloan Sn	Severe: Flooding, Wetness	Severe: Flooding, Wetness	Severe: Flooding, Wetness	Moderate: Seepage	Severe: Low strength, wetness, flooding	
Westland We	Severe: Ponding	Severe: Ponding	Severe: Ponding	Severe: Seepage	Severe: Ponding, frost action	
Whitaker Wh	Severe: Wetness	Severe: Wetness	Severe: Wetness	Moderate: Seepage	Severe: Frost action	

Table 1

Chapter 2

Building Site Considerations

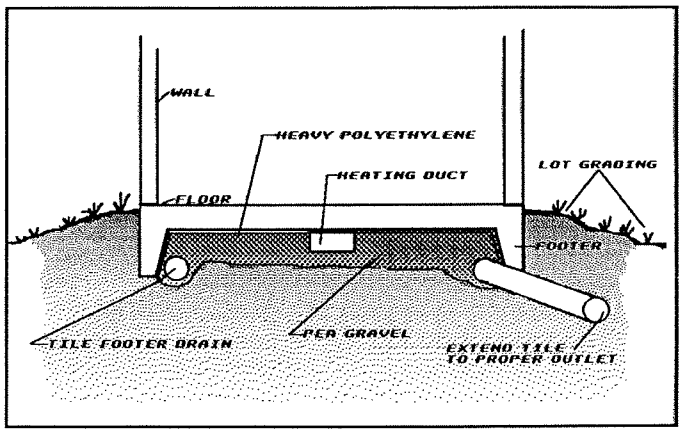
The type of building construction you plan should be influenced by soil conditions and has a bearing on the degree of drainage you will need to provide. For instance, building a basement on a depressional soil with a high water table may be asking for trouble even though corrective measures are applied. In the case of a dry site with sand and gravel underneath and no seasonal high water table, you are free to choose the type of construction best suited to your needs.

Types of Home Construction

Concrete slab, crawl space, shallow basement (bi-level or multi-level) and full basement are the common types of residential construction. Earth shelter homes need special drainage designs. The deeper the construction goes into the soil profile the more likely it will be for you to encounter drainage problems.

Concrete Slab

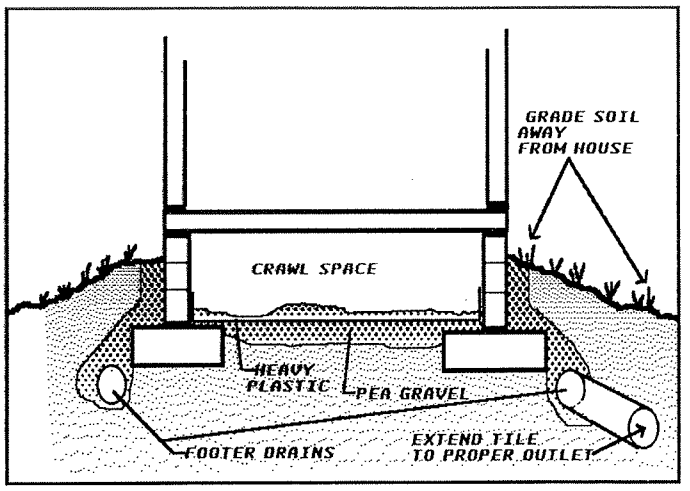
It is recommended to install subsurface drainage under slab construction. This prevents the water table from getting up near the slab and into the heat ducts. Under the slab there should be a minimum of 2 inches or more of pea gravel or sand to stop capillary water movement. This should be topped with a double sheet of 4 mil. Polyethylene plastic or other suitable moisture vapor barrier immediately under the slab.



Crawl Space

The majority of homes are built on a crawl space. A cavity is provided under the house for access to utilities. Although proper drainage of crawl spaces may be less essential than for a basement they can end up wet or dry depending on proper drainage planning.

Crawl spaces are usually partly above and below the original ground line. In most cases a majority of the crawl space is below ground line. Because the ground water table can be within a foot of the surface in poorly drained soils, it is easy to understand why crawl spaces can be wet. The diagram below shows the proper way to protect a crawl space from wetness. A tile should be placed outside and below the footing and backfilled with #8 stone or pea gravel. It is recommended that the inside surface of the crawl space be topped with a layer of pea gravel. To avoid dampness in the crawl space, add a heavy sheet of 4 mil. Polyethylene plastic on top of the finished crawl space all the way out to the foundation walls. Some builders prefer to add a protective layer of pea gravel on top of the plastic.

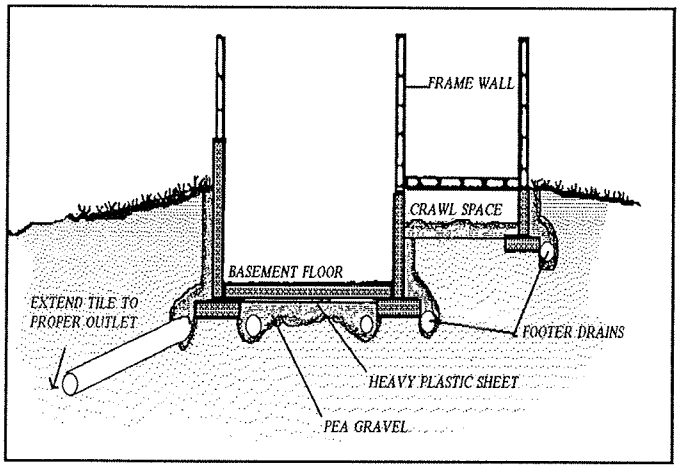


It has been our experience that many homes would have better surface drainage if the foundation was elevated one row of concrete block higher. This would reduce the excavation of the crawl space and provide more slope away from the house. If not stockpiled at the time of construction, topsoil often needs to be purchased for final grading around the house.

Shallow Basements

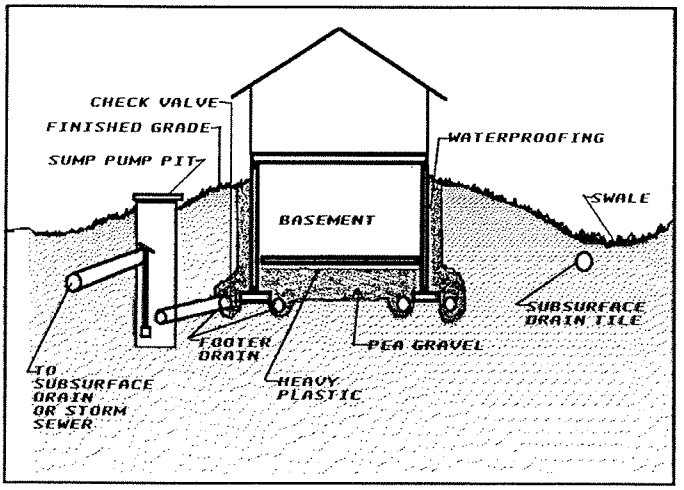
Bi-level and multiple-level homes can have the lowest floor level one-half below and one-half above ground. For planning of proper drainage, they may be considered shallow basements. They are usually located at lower elevations in the soil profile than crawl spaces. Consequently, drainage problems are more likely than with crawl spaces,

but usually not nearly as severe as for full basements. Tile drainage around the foundation footing is nearly always necessary. As shallow basements are not generally too deep in the soil, gravity flow tile outlets are often possible.



Full Basements

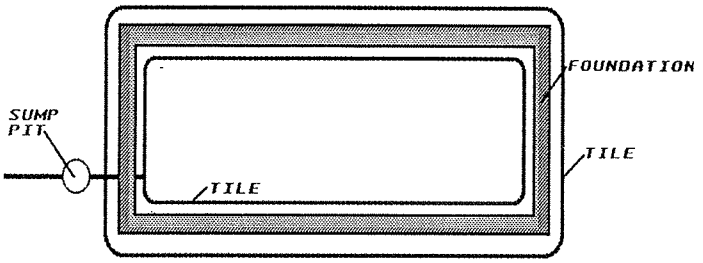
This type of construction requires the deepest excavation into the soil profile, perhaps 8 feet or more, and as would be expected, causes the most drainage problems. In poorly drained soils without drainage, the ground water table exerts great pressure on the deeper basement walls and floor. The ground water is trying to equalize the pressure by entering the basement. The result is a damp or wet basement.



Basement floors have been known to literally explode upward to relieve this pressure. Concrete block basement walls sometimes collapse, though this usually happens during or just after construction with settling of fresh soil backfilled against the outside basement walls or when proper structural supports were not used.

Tile Installation for Basements

There are some key elements when constructing shallow basements or full basements. Once the footing has been installed on the inside and outside of the footer. The footing drains then outlet either to a gravity drain or to a sump pump pit. Floor drains should not be connected to the footing drain. This prevents back-up water from entering the basement if there is a failure in the drainage system outlet.

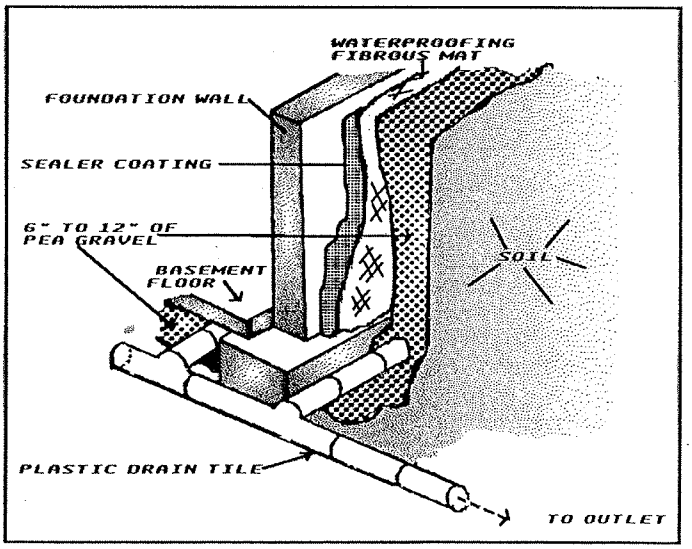


HOW TO AVOID A FLOODED BASEMENT: INSTALL THE SUMP PIT ON THE OUTSIDE OF THE BASEMENT WALL AND DO NOT INSTALL FLOOR DRAINS.

The tile on the inside of the footer should be backfilled to the level needed to support the concrete floor. Then install a double layer of 4 mil. Polyethylene plastic on top of the pea gravel to prevent dampness of the concrete floor. The floor is then poured on the plastic.

Water-proofing

On the outside of the foundation and wall, backfill over the footer drain with pea gravel. Then water proof the basement walls before backfilling against them with a core of pea gravel 6 to 12 inches wide to the surface of the soil. Installing more than 12 inches (width) of pea gravel could be harmful to the basement walls and/or plantings next to the home.



Damp-proofing vs. Water-proofing

Damp-proofing is merely applying a thin layer of liquid tar to the outside of the basement wall. This is sufficient for crawl spaces or where the soils are extremely well drained and dampness would not be a problem.

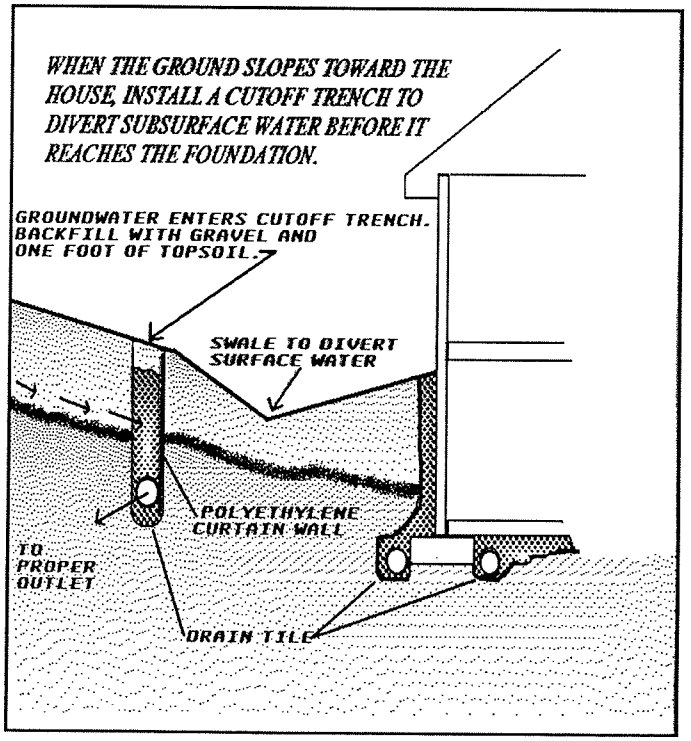
Water-proofing typically involves not only a layer of tar, but also some other layer(s) of fibrous materials. Check with your contractor about the current method for water proofing your concrete or block wall.

Earth Homes

This type of residential construction presents many of the same drainage problems as do full basements, sometimes more so. Earth homes should have an individual drainage design tailored to their own specific site and construction details. They should be built only where gravity type subsurface drainage is available. Drainage designs for this type of home should be much like those for full basements.

Hillside Seepage

The sketch below illustrates how to properly divert hillside seepage water away from a foundation. Seeps commonly occur on steep sloping soils.



Seeps and springs occur as groundwater travels along the glacial till. To intercept the seep the tile must be placed well into the till layer.

NOTES