

## **DRAINAGE TIPS**

Hillside lots that have been damaged by fire or are located in a fire-damaged watershed can be susceptible to erosion drainage and runoff/erosion problems. Torrential or prolonged rains cause the most damage.

To treat surface drainage problems, you will first need to identify the sources of surface water (runoff) flowing onto or over your property. First, walk outside and around your home. As you walk, observe the "lay" of your lot and the surrounding properties. Also, observe your roof and driveway. Is your home on top of a hill where all surface waters drain away from your home? If so, you will be concerned with holding topsoil on your property. Few homeowners live on top of a hill. So, it is more likely that water will flow onto your property from an adjacent hillside. Where will the water concentrate and how can you control the sediment that is carried with the water?

### **Gutters and downspouts direct roof runoff**

Be sure that your roof is properly fitted with gutters and downspouts (1), that will release water onto a non-erodible surface such as a paved driveway (2). Or you can connect downspouts firmly to solid plastic pipe (3) that will carry water downslope away from your home to a place where it will be released safely such as a paved roadside or storm drain ditch (4). Because twigs, pine needles and leaves can clog gutters and downspouts, the use of gutter guards of 1/4 to 1/2-inch hardware cloth screen is highly recommended. Clear your gutters regularly and inspect them to insure your roof runoff system is working properly. Most homes in New Mexico have foundations situated on sand or silt soils that can settle irregularly when they become saturated and lead

to cracking or jamming of windows or doors. It is therefore usually very important to keep runoff from gutter down spouts well away from your house foundation.

### **Curbs and berms protect sensitive slopes**

An asphalt curb, a compacted earth berm, K-Rails, concrete blocks, or other similar structure on the outside edge of a driveway or building pad (5) can direct runoff away from sensitive slopes to an area where it can be released safely. The recommended height of the berm is a minimum of 12-18 inches. (A sandbag berm may be used as a temporary measure.)\* A pipe drop (6) may be used to carry runoff downslope to a place where it can be released safely, such as a lined roadside ditch or storm drain.

### **Lined ditches handle road and driveway runoff**

Roads and driveways can be graded toward a lined ditch or streetside gutter designed to handle sheet flow water from paved surfaces and uphill slopes (7 & 8). As shown in the diagram, water from the driveway ditch is released safely into the drainage ditch or storm drain of the main road. At specific intervals along the main road, water may be transported under the road through a culvert (9a) and released safely onto a non-erodible surface. An energy dissipator (9b), such as a rocklined outlet, can serve this purpose where slope is minimal. In steeper areas or where large volumes of water may accumulate, other precautions may be needed to prevent washouts or localized flooding.

### **Proper grading promotes good drainage**

Proper grading of your land helps prevent water from pooling around foundations, flooding basements or below grade structural components, and concentrating water into destructive volumes. In general, grade surfaces flow away from foundations at a minimum grade of 1-2 feet for every 100 feet (10). Grade and compact surfaces evenly since water can collect in depressions or channelize into destructive flows.

### **Drainage for retaining walls**

Good drainage must be provided for solid construction retaining walls (11). Properly placed weepholes and perforated pipe with a gravel backfill behind the wall work well. The small openings between wood boards or non-grouted brick, stone or concrete block retaining walls serve this purpose. Many walls are not designed for saturated soils or ponded water behind them and can break, tipover or slide if this is not prevented with good drainage behind them.

### **Diversion ditches**

A diversion ditch may be needed to handle surface runoff flowing onto your property from upslope. For slopes steeper than 5%, or where large amounts of water are expected, line the ditch with concrete or hand-placed rock underlain with filter fabric or other appropriate measures. Direct water to a safe, non-erodible surface -- never directly onto the downstream slope itself. Always consult a qualified engineer to design water diversion measures.

### **Maintenance**

- Regular maintenance of drainage systems will keep your drainage problems to a minimum. Never direct water onto adjoining property without consulting the owners. Observe your system during the rain when you can watch runoff patterns that affect your property or affect downslope properties.
- Check gutters, downspouts and pipes during and after storms and remove debris that might cause clogging.
- Regularly inspect, clean, and repair berms and ditches as necessary. Signs of over-topping may mean that redesign is necessary or that modifications should be made to handle larger quantities of water. Check for and repair any damage caused by burrowing animals.
- Seed and mulch or otherwise vegetate all bare areas, especially on slopes.
- Regular maintenance saves time and money in the long run.

### **Safety measures**

- Do not start any work until you are assured that both above-ground and underground utility lines will not be affected by your work. Information on the location of underground utility lines can be obtained by calling 1-800-321-ALERT.
- Do not release runoff onto septic leach fields or at the base of structural foundations.

*\* A fact sheet on constructing temporary sandbag berms is available from the USDA-NRCS office in your area.*

**July 2002 Arizona**

