

# MAINTENANCE OF HILLSIDE HOMESITES FOR SLOPE STABILITY AND EROSION CONTROL

During the wet season, homeowners such as yourself, living in houses constructed on fill (soil placed by man) or near fill or excavated (cut) slopes, become concerned about the condition of their building site. In general, modern design and construction practices minimize the likelihood of serious land sliding (slope failure). The grading codes of the local jurisdictions (city and county building departments) concerning filled land, excavation, terracing and slope construction are written to assure that proper grading procedures are followed. In addition, most hillside developments where Geotechnical Professionals have been involved have been constructed according to critical professional standards. Therefore, the concern of the homeowner should be directed toward maintaining slopes, drainage provisions, and facilities so they will perform as designed. The following general recommendations and simple precautions are presented to help you properly maintain your hillside homesite. Please refer to the attached diagram for illustration of terms.

The general public often regards the natural terrain as stable. This is an erroneous concept. Nature is always at work altering the landscape. Hills and mountains are worn down by mass wasting (erosion, land sliding, soil creep, etc.) and the valleys and lowlands of the terrain. Periodically (over millions of years) major land movements rebuild the mountains and hills, and these processes begin over again. In some areas, these processes occur at a relatively slow geologic rate and in others they occur at a relatively rapid rate. Development procedures are directed toward slowing the natural processes.

The development of hillside slopes for residential use is carried out, insofar as possible, to enhance the natural stability of the land and to minimize the probability of instability resulting from the grading necessary to provide homesites, streets, yards, etc. This has been done by the developer and designers based on geologic and geotechnical engineering studies. However, in order to be successful, the slope and drainage provision and facilities must be maintained by you, the homeowner.

As a homeowner, you are accustomed to maintaining your home: that is, you expect to paint your house periodically, clean out clogged plumbing, repair roofs, and so on. Maintenance of a hillside homesite must be considered on an even more serious basis, because neglect can result in serious consequences. In most cases, lot and site maintenance can be provided along with normal care of the grounds and landscaping. Any costs of maintenance are far cheaper than repair costs after neglect. Most hillside lot problems are associated with water. Uncontrolled water from a broken pipe or from wet weather conditions causes most damage. Wet water is the principle cause of slope problems in California, because the rainfall is quite variable and may be torrential or prolonged. Therefore, drainage and erosion control are important aspects of homesite stability and the provisions built into the developed lot must not be altered without competent professional advice. Maintenance of the provisions must be carried out to assure their continued operation. Therefore, we offer the following list of DO's and DON'Ts as a guide to you.

## **DO's**

1. DO check roof drains, gutter, and down spouts to be sure they are clear. Depending on your location, if you do not have roof gutters and down spouts, you may wish to install them, because roof and their large surface area can shed tremendous quantities of water. Without gutters or other adequate drainage provisions, water falling from the eaves may collect against the foundation and basement walls, which is undesirable.
2. DO clear drainage ditches and check them frequently during the rainy season. Ask your neighbors to do likewise.

3. DO check interceptor (brow) ditches at the top of slopes to be sure that they are clear and that water will not overflow the slope, causing erosion.
4. DO be sure that all drain outlets and weep-holes are open and clear of debris, vegetation, and other material, which could block them in a storm. If blockage is evident, have it cleared.
5. DO check for weather-loosened materials above and below your property if you live on a slope or terrace.
6. DO limit watering to the amount needed by vegetation and shut off irrigation devices during the rainy season when little irrigation is required. Over-saturation of the ground can cause major subsurface damage. Design landscaping to shed water away from the residence and to prevent ponding of water.
7. DO watch for water backup beneath the house at low points or sump drains, since this indicates drain blockage or improper landscape procedures uphill of the residence which are directing water to the crawl space areas.
8. DO watch for wet spots on your property. These may be seen caused by water following bedrock fractures or they may be indication of a broken water or sewer line. In, either case, obtain competent advice regarding the problem and its correction.
9. DO exercise ordinary precaution. Your house and building site were constructed to meet standards, which should protect against most natural occurrences, provided you do your part in maintaining them. Often, residential construction relies on gentle soil slopes constructed with compacted material around the residence, which direct surface drainage away from foundations. Landscaping can either enhance surface drainage or cause drainage problems. Loosening of the soil, blocking drainage, causes water to seep into the ground. Water will flow downhill along bedrock and within bedrock fractures.

## **DON'Ts**

1. DON'T alter lot grading without competent advice. The man-made soil surfaces on your lot were designed to carry water runoff to a place where it can be safely distributed.
2. DON'T block or alter ditches, which have been graded around your house or the lot pad without proper landscape measures to replace them. These shallow ditches have been put there for the purpose of quickly removing water toward the driveway, street, or other positive outlets.
3. DON'T block ditches or drains. If several homes rely on the same facilities, it is a good idea to check with your neighbors. Water backed up on their property may eventually reach you. Water backed up in surface drains will overflow and infiltrate slopes, which leads to instability. Maintain the ground surface up-slope of lined ditches to ensure the surface water is collected in the ditch and is not permitted to collect behind or flow under the lining. (See detail sketch on the attached diagram.)
4. DON'T permit water to collect or pond anywhere on your lot. Such water will either seep into ground, causing unwanted saturation, or will overflow onto slopes and begin erosion. Once erosion is started, it is difficult to control and severe damage may result rather quickly.
5. DON'T direct water over slopes, even when this may seem a good way to prevent ponding. This tends to cause erosion and slope instability. Dry wells, or leach lines are sometimes used to get rid of excess

water when other means of disposing of water is not readily available. However, such facilities should be planned and located by qualified engineer.

6. DON't let water pond against foundations, retaining walls, and basement walls. These walls are built to withstand the ordinary moisture in the ground and, where necessary, are accompanied by sub drains to carry off excess subsurface water. However, excess water must be directed away from these structures.
7. DON'T connect roof drains, gutters, or down spouts to existing, subsurface drains, which are not designed for that purpose. Instead, either collect the water in lined ditches, or tight-walled pipes and conduct it to a storm drain, paved road or suitable area of natural ground. Where such channel flow is directed onto natural ground, it must be converted to sheet flow, unless a suitable natural channel exists.
8. DON'T place loose soil or debris over the side of slopes. Loose soil soaks up water more readily than compacted fill. It is not compacted to the same strength as the slope itself, and will tend to slide when laden with water, and may even affect the soil beneath it. The sliding may clog terrace drains below may cause additional damage in weakening the slope. If you live below a slope, be sure that loose fill is not dumped above your property.
9. DON'T over-irrigate slopes or leave a hose or sprinkler running unattended nor near a slope. Ground cover and other vegetation will require moisture during the hot summer months, but only the amount that can be utilized by the plants. During the wet season, irrigation can cause subsurface flow and can cause ground cover to pull loose, which not only destroys the cover, but also starts serious erosion.
10. DON'T try to compact earth in trenches by flooding with water. Not only is flooding the least efficient way of compacting fine grained soil, but this could saturate and reduce the strength of supporting soils.
11. DON'T change surface grading behind retaining walls or against building walls. Increasing fill depths behind retaining walls increases the lateral loading on the walls, which could result in damage to such walls.

In conclusion, your neighbor's slope, above or below your property, is as important to you as the slope that is within your property lines. For this reason, it is desirable to develop a cooperative attitude regarding hillside maintenance, and we recommend developing a "good neighbor" policy. Should conditions develop off your property, which are undesirable from indications given above, necessary action should be taken by you to insure that prompt remedial measures are taken. Landscaping of your property is important to enhance slope and foundation stability and to prevent erosion of the near surface soils. In addition, landscape improvements should provide for efficient drainage to a controlled discharge location downhill of residential improvements and soil slopes.

Additionally, recommendations contained in the Geotechnical Engineering Study report apply to all future residential site improvements, and we advise that you include consultation with a qualified professional in planning, design, and construction of any improvements. Such improvements include patios, swimming pools, decks, etc., as well as building structures and all changes in the site configuration requiring earth cut or fill construction.