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Sinkholes and Their Correction

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What Causes a Sinkhole

Sinkholes are openings in the soil that can occur when soluble rocks (usually limestone) dissolve below the soil surface over a period of hundreds or thousands of years, due to contact with slightly acidic groundwater. The cavity that results below the soil surface from the dissolution of the soluble rock(s) allows the soil to fall into the void, thus creating a sinkhole. The sinkhole size is proportional to the size of the dissolved underlying rock(s). The size of sinkholes has varied from those the size of a city block to those that are four inches in diameter. Most sinkholes are at least 20 feet deep (originating where the rock dissolved).

How to Correct a Sinkhole Problem

The main concern associated with the formation of a sinkhole is when it appears in close proximity to surface structures. If a sinkhole occurs close to a building foundation, the foundation and the building can become damaged. Any such sinkholes may require grouting or special support, such as underpinning. In such a case a reputable professional civil engineer should be contacted. Any sinkholes that appear in the landscape that do not threaten the integrity of a structure can be considered a nuisance.

Nuisance sinkholes can be filled in to improve the esthetics of the landscape. The procedure is to fill it with large rock, approximately six to 12 inches in diameter up to within three to four feet of the soil surface. Smaller rock, one to two inches in diameter, is then used to fill in the cavity to within 1.5 to 2 feet of the surface. Soil similar to that found in the landscape is then filled to the landscape soil line. If slight settling of the soil occurs where the sinkhole was filled in, it may be necessary to fill it in after four to six weeks with additional soil similar to the landscape. A typical soil cross section of a sinkhole repair is shown in Figure 1.

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Figure 1

Important Considerations of Sinkholes

Sinkholes often act as natural drainage patterns for surface water introduction to ground water within the underlying rock. This flow provides the continual removal of dissolved rock which causes the solution cavity to begin with. The primary difference between correcting a structural threatening sinkhole and a nuisance sinkhole involves whether to alter the drainage pattern. The drainage pattern may need to be altered to correct a structural threatening sinkhole. Changing drainage patterns can cause drainage problems. The method shown to correct nuisance sinkholes will not change the drainage pattern and can therefore correct the problem without causing drainage problems. The correction procedure is not 100% effective, however. If the large rocks do not wedge into the cavity, or if the cavity rapidly enlarges, the problem may persist. Rocks larger than 12 inches may be required.

Keep in mind that sinkholes serve as direct conduits to groundwater, therefore you must keep water contaminants away from a sinkhole. Contaminants such as animal wastes, pesticides, industrial chemicals, human wastes and waste water, and fertilizer must be kept away from a sinkhole and drainage water that moves into a sinkhole. This is true even for a sinkhole that has been repaired, as shown earlier in this article, since the drainage pattern will not be changed by the repair.