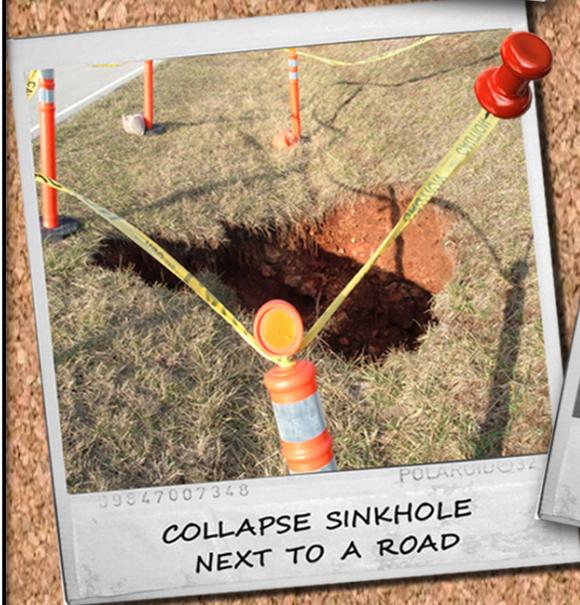
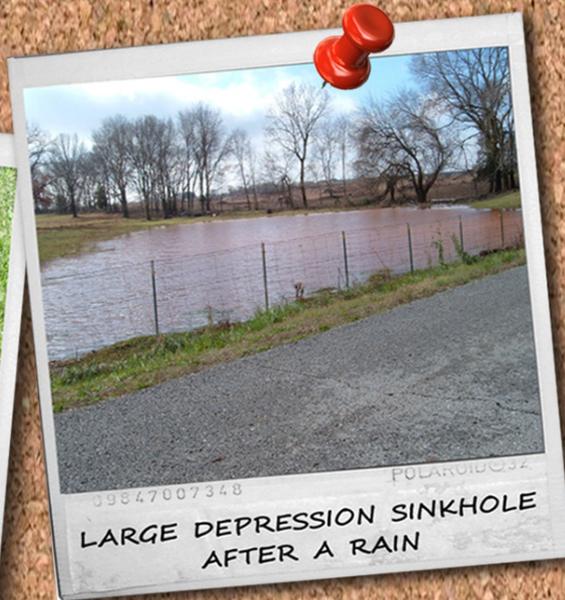
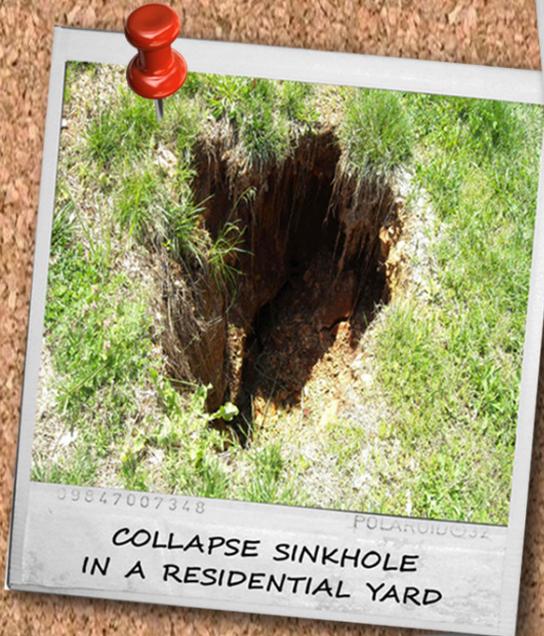


SINKHOLES IN THE OZARKS



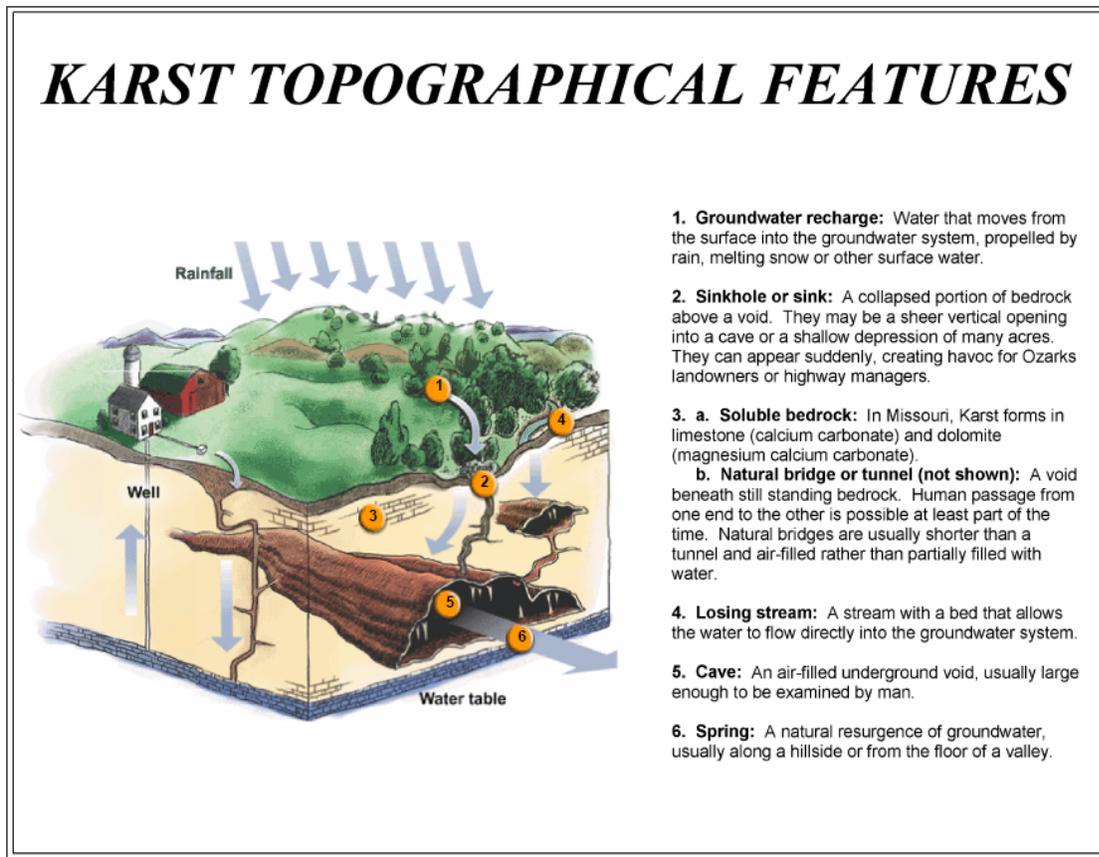
Sinkholes in the Ozarks

What is a sinkhole?

A sinkhole is a natural, geological feature that presents itself as a hole or depression in the ground surface. Sinkholes come in various shapes and sizes (from just a few feet to several acres) and can develop over many years or in just a few hours. Most sinkholes are a benevolent nuisance for property owners but on rare occasions a large collapse can occur; damaging property and contaminating ground water.

Where do sinkholes form?

Sinkholes form in karst dominant topographies. Karst is a term used to describe areas analogous to the Ozarks that have water soluble bedrock such as limestone, dolomite or gypsum which are highly susceptible to solutional weathering from slightly acidic groundwater. Evidence of solutional weathering can be found in the Ozarks numerous sinkholes, losing streams, springs, caves and other karst related features throughout the region.

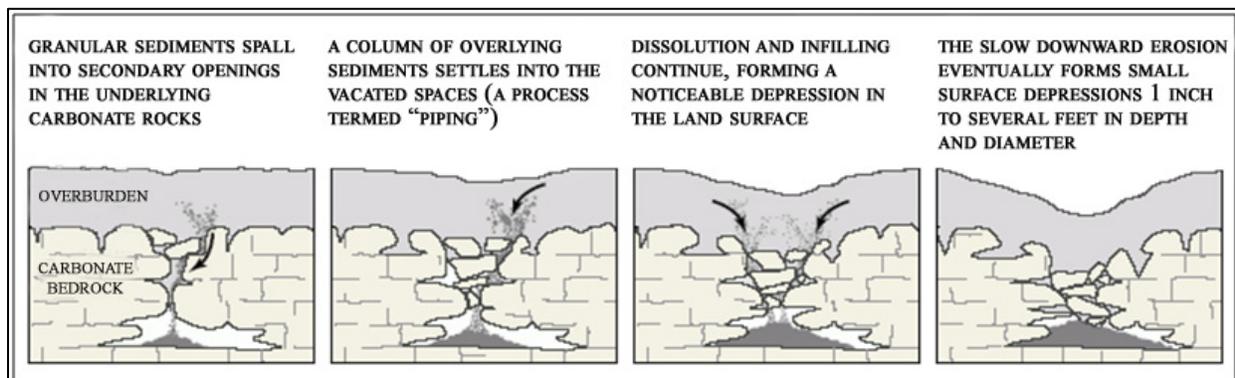


Sinkholes in the Ozarks

How do sinkholes form?

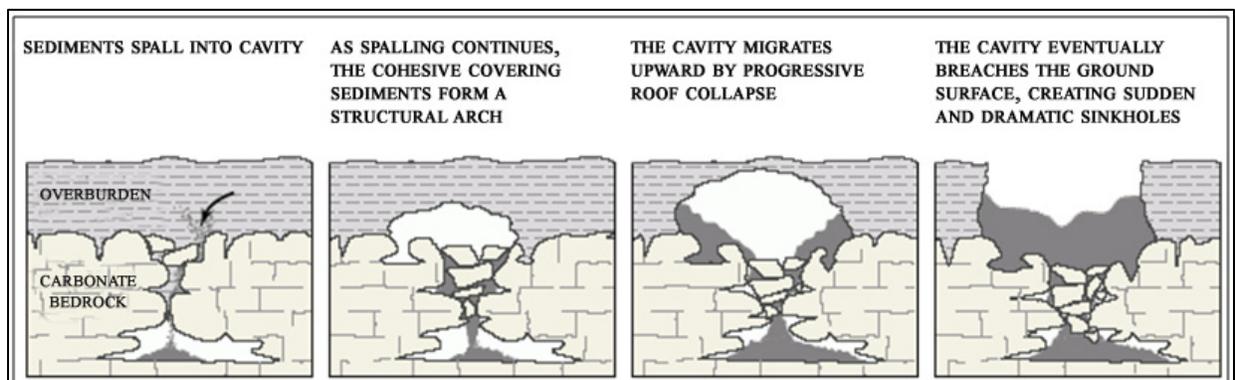
Sinkholes form when rainwater percolates down into the soil bed. As the water moves down through the soil, it becomes slightly acidic, dissolving the bedrock along horizontal and vertical fractures and joints in the rock. Over time these fractures continue to enlarge from additional chemical weathering; eventually the fractures in the bedrock will become large enough to move small soil particles, creating a void in the soil layer.

In some cases, the overlying surface begins to slump down forming a surface depression. The surface depression will continue to grow as it funnels additional water and soil particles through the existing subterranean fractures forming a bowl shaped sinkhole.



USGS

In other cases, this void in the soil layer becomes large enough that the soil above it collapses, resulting in a sinkhole collapse.



USGS

This process is self-perpetuating; as more water is introduced, more of the supporting soil particles are washed away. However, the sinkhole can plug up when large amounts of clay are present, forming a natural pond or sinkhole lake.

Sinkholes in the Ozarks

Types of sinkholes

Depression Sinkholes are bound by a defined drainage area and usually exhibit the standard circular or oval bowl-shaped surface depression. These types of sinkholes are shown on contour maps as a closed contour and will usually fill up with water during a heavy rain. Some depression sinkholes have an “eye” visible in the sinkhole floor that rapidly drains storm water into the underlying bedrock joints; like sand through an hour glass. There are well over 2000 of these large, established sinkholes throughout Greene County ranging in size from a few feet to several acres. Chances are good that you drive by several of them every day.



Depression Sinkhole

Collapse Sinkholes are karst-related features that are not bound by a defined drainage area. Collapse sinkholes form as a void in the soil layer migrates toward the surface. A sudden collapse occurs when the roof of the cavity can no longer support its own weight and caves-in, creating an abrupt and dramatic sinkhole. A collapse sinkhole will commonly develop in the floor of an existing depression sinkhole.



Collapse Sinkhole

Sinkhole collapses are very common in the Ozarks. On average, the City of Springfield responds to over 30 reported collapses every year. A sinkhole of this type can be dangerous if someone were to fall in and should therefore be repaired or fenced off as soon as possible.

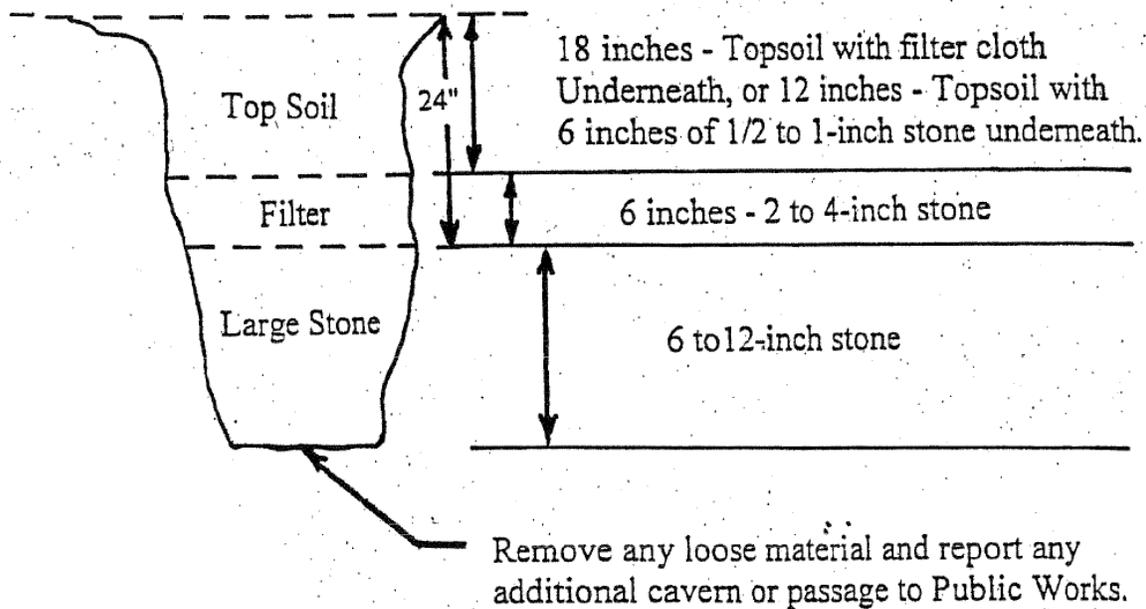
Sinkholes in the Ozarks

How to repair a small sinkhole collapse

As a general rule, sinkhole collapses in populated areas should be repaired, both to limit the growth of the sinkhole and as a safety precaution. ALWAYS use clean rock to repair a collapse. Never fill with yard waste or trash. If the collapse is close to a structure, it is recommended that you seek the advice of a qualified professional such as a geotechnical engineer. Follow the instructions below if remediation is required:

Collapse Sinkholes can be filled by individuals without a sinkhole permit but proper steps must be taken to avoid further collapse.

- 1) Remove all loose material from bottom of the hole. If no opening exists proceed to step 2. If an opening is uncovered stop and call Public Works at 864-1901.
- 2) Fill with large stone (6 to 12 inches in diameter) to within 24 inches of the surface.
- 3) Place a 6 inch rock layer using 2 to 4 inch stone to within 18 inches of the surface.
- 4) Cover with a filter cloth or a 6 inch layer of ½ to 1 inch stone to act as a filter.
- 5) Finish filling with topsoil and reseed (optional).



Sinkholes in the Ozarks

Sinkholes and protecting local water quality

Sinkholes are natural drainage points that have direct connections to our groundwater. 95% of Southwest Missouri's drinking water comes from groundwater, which is why it is extremely important to protect and prevent what goes into sinkholes. If you have a large depression sinkhole on or near your property, here are a few helpful tips:

Things to do:

- Create vegetative barriers around the "eye" of the sink. This helps keep sediment from clogging the eye and will help keep the sinkhole draining well. These barriers also remove pollutants which could contaminate groundwater.
- Fence out cattle and farm animals
- Clean out old sinkholes if previously used as a dump

Things to avoid:

- Clearing vegetation
- Dumping chemicals and trash

Frequently Asked Questions (FAQ)

What is not a sinkhole?

Collapses or depressions in your yard could also be attributed to:

- Subsurface clays that shrink or swell with changes in moisture
- Abandoned wells or cisterns
- Buried tree stumps or other debris
- Septic tank collapse

What do I do if a sinkhole collapse occurs on my property?

- Notify the appropriate agency:
 - City of Springfield Residents call Stormwater Engineering (417-864-1901)
 - County Residence call Green County Environmental (417- 868-4147)
- Fence or rope off the depression
- Protect the area from garbage, waste chemicals and polluted runoff
- If the collapse is near a structure, contact your homeowner's insurance and contact a qualified professional

When do I need to get a permit?

A permit from the Department of Public Works is required for the following actions within a depression sinkhole:

- Filling or grading
- Use of motorized equipment
- Building a structure
- Modifying the drainage

You do not need a permit to fill a small sinkhole collapse on your property.

See Article I, Division 2, Sec. 96-7 Permit Requirement of the Springfield Missouri Code of Ordinances for further details. www.springfieldmo.gov/government

Sinkholes in the Ozarks

Disclaimer: The information provided in this document is for information purposes only and is not a substitute for professional or legal advice. If you have any questions concerning a sinkhole, especially one that presents a potential hazard to life or property, please contact a competent professional.