



Arches, Bridges and Tunnels

Nature's Great Construction Projects

by Joe Gillman photographs by Scott Myers



Images of the yellow-red sandstones of the American West with their majestic spans likely come to mind when many Missourians think of a natural bridge or rock arch. Yet, Missouri has more than 85 documented natural arches, bridges and tunnels. While most do not adorn postcards or serve as the backdrop for movies, they do represent some very striking geology.

The state has a diverse and complex geologic makeup and the karst geology that dominates the Ozarks region is well known. Karst areas are underlain by weathered, soluble rocks such as limestone, dolomite and sandstone. While not all natural bridges form in the Ozarks, these karst conditions are the perfect environment for natural bridges to take shape in the state's abundant bedrock that consists of these materials. Natural arches, bridges and

tunnels have been created as a result of stream piracy, collapsed caves or rock slices.

Like a Thief in the Night – Stream Piracy

Missouri’s natural arches, bridges and tunnels come in many sizes, shapes, heights and widths. No two are alike. Some are large. Some are small. Some stand as sentinels of the landscape while others are neatly tucked into the contours of the ground and may go unnoticed. Often, these features are formed by complex geologic processes. These processes include stream capture by an adjoining drainage system. Each can result in the formation of a natural arch, tunnel or bridge. Further erosion and weathering can then sculpt these features into impressive monuments of the geologic record.

“Stream piracy is a geologic process where a surface stream is captured or ‘pirated’ by another, adjacent drainage feature,” said Carey Bridges, director of the department’s Geological Survey Program. “This capture essentially is a case of one stream taking a shortcut into another stream through a small cave or fracture in the rock. Through time, this natural opening is enlarged and the entire stream is rerouted through the cave, leaving behind a natural bridge,” Bridges added.

An outstanding example is Clifty Hollow Natural Bridge in Maries County. This natural bridge, first described by the Missouri Geological Survey in 1857, is located within the Missouri Department of Conservation’s Clifty Creek Natural Area. The

bridge is developing where a small tributary to Clifty Creek penetrates a narrow rock ridge, composed of Gasconade dolomite – a rock unit from the Ordovician time period between 500 and 444 million years ago – and flows into Clifty Creek. The tributary once traversed the length of the ridge and now runs along its base. Today, it flows directly through a large opening beneath the ridge, thereby creating the natural bridge. The arch spans approximately 40 feet and is 13 feet high with a picturesque, serene setting.

That Sinking Feeling – Collapsed Caves

Missouri is world-renowned for its many spectacular caves. These caves exhibit distinctive subsurface environments and often add a variety of other interesting geologic features. Collapsed cave systems sometimes aid in the formation of Missouri’s natural stone bridges.

“This process involves a mature cave system that becomes partly destroyed by erosion and weathering. The natural bridge or natural tunnel forms when adjacent parts of the cave collapse and leave behind what is known as a cave remnant,” Bridges said. “This preserved remnant then becomes the natural tunnel or natural bridge.”

Grand Gulf State Park in Oregon County has a textbook example of this geologic wonder within what is quite possibly Missouri’s most impressive karst complex and collapsed cave system. Geologists determined the location and orientation of the



(Above) Clifty Hollow Natural Bridge, in Maries County, is 40 feet high and 25 to 30 feet wide. The arch has a span of 40 feet, and is 13 feet high.

(Opposite page, top) Kaintuck Hollow Natural Tunnel, in Phelps County near Rolla, lies within Mark Twain National Forest. A small spring on the upstream end of the tunnel keeps the tunnel floor wet in a few places. When the tunnel was named, “Kaintuck” was local dialect for “Kentucky.”

(Opposite page, bottom) The 175-foot-long Kaintuck Hollow Natural Tunnel was formed when a cave system collapsed, leaving part of the cave roof intact.



original cave formed along a faulted zone in the Jefferson City dolomite. Like the Gasconade dolomite, this is a rock unit from the Ordovician time period.

Part of the former cave roof is still intact and forms Grand Gulf Natural Bridge. This extraordinary geologic feature provides a

rare glimpse into the inner workings of a subterranean world.

Other notable natural bridges and tunnels that have formed as a result of this type of geologic phenomenon include Rock Bridge in Rock Bridge State Park in Boone County, Kaintuck Hollow Natural Tunnel in Phelps

Natural Bridge



Over time, a natural opening on the surface can be enlarged by flowing water, leaving a natural bridge that spans the valley of erosion.

Natural Tunnel



Cave systems that become partly destroyed by erosion and weathering can lead to the formation of natural tunnels with openings at both ends.

Formation of a Natural Arch



Erosion and weathering aid in the formation of natural arches.

DNR graphics by Mark Gordon

County, Hahatonka Natural Bridge in Camden County, and Bennett Spring Natural Tunnel in Laclede County.

A Slice in Time – Rock Slices

Rock slices are another way in which arches form and are commonly found immediately adjacent and parallel to a rock wall or bluff.

“These arches owe their formation to fractures that are oriented parallel to the bluff face,” Bridges said. “The fractures become enlarged through time and subsequently, part of the rock wall isolates itself from the main wall along this fracture. Through additional weathering and erosion, a slice-type arch can form.”

Many of these arches have the classic arched appearance and can be quite impressive in size and prominence. The Hootentown Natural Arch in Stone County contains four geologic formations from base to crest that include (listed oldest to youngest): the Northview shale, the Pierson limestone, the Reeds Spring limestone, and the Elsey limestone. These rock units are from the Mississippian time period between 345 and 320 million years ago. This arch is quite likely the largest natural arch in Missouri. It rises 80 feet from base to crest with a span of 80 feet. Paddy Creek Natural Arch in Texas County and the Devils Tables Natural Arches in Laclede County are examples of slice-type arches that formed adjacent to steep rock bluffs.

Missouri’s natural arches, bridges and tunnels also have a storied history. Natural Bridge Road in St. Louis was so named because the original road, which was planned in the 1840s, passed over a natural rock arch under which Rocky Branch Creek once flowed. The rock bridge, which has long succumbed to the pressures of urbanization, was reportedly located near the current intersection of 23rd and Palm streets, and stood a short distance from the man-made arch that now towers over the St. Louis skyline.

Natural arches also have been used as landmarks. Early travelers were well aware of the river landmark Roche Percee – French for “pierced rock” – Natural Arch located high atop a bluff near the Perche Creek and Missouri River confluence. This feature was first documented by Scottish explorers in the 1790s and later noted in Lewis and Clark’s journals documenting their voyage up the Missouri River. Visitors who journey along Katy Trail State Park in

this region can still behold this significant geologic feature. Not to be outdone by historical importance, local legend holds that Blackbeard’s Cache Natural Bridge, located in Jefferson County, is the site where Blackbeard the Pirate and crew buried treasure. Although it is highly unlikely that pirate loot is indeed buried there, it does serve as an interesting folktale and provides a unique name for this feature.

Many of these stone structures have been utilized for various purposes throughout history from human habitation by native cultures to modern-day recreation areas. Others have been the preferred locations for water mills, dance halls, breweries, livestock shelters, tourist destinations and other festive or practical purposes.

Remarkable examples of these geologic works of art can be seen in Missouri’s recreation areas and state parks. Why not visit Rock Bridge Memorial State Park, Bennett Spring State Park, Clifty Creek Natural Area or Kaintuck Hollow and see nature’s handiwork for yourself?

Most of Missouri’s natural arches, bridges and tunnels are located on private property. It is important to respect private property rights and request permission before attempting to observe geologic landmarks that do not have public access.

More information about these and other fascinating geologic features can be found in the popular book published by the Geological Survey, *Geologic Wonders and Curiosities of Missouri*, available at missourigeologistore.com. 🌞

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(Above) Hikers and bikers at Katy Trail State Park can find Roche Percee Natural Arch at mile marker 166.9, between McBaine and Easley, south of Columbia. Cut into the rock, high on a bluff, the arch is 25 feet high and 15 feet wide. **(Opposite page, top)** Rock Bridge Memorial State Park, near Columbia, is named for the massive 125-foot-long natural limestone tunnel with a stream flowing through it. A boardwalk leads from the tunnel to nearby Devil’s Icebox, a collapsed sinkhole with an entrance to a cave system.