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*Raven Hill Discovery Center, incorporated in 1991, is a 501(c)(3) tax-exempt corporation.*

**Mission:** Raven Hill provides a place that enhances hands-on and lifelong learning for all ages by connecting science, history & the arts.

To: Friends and Family everywhere  
From: Cheri and Raven Hill  
Date: March 13, 2021  
Re: Weekly Update

Greetings to our new & faithful readers!

Arches in brick architecture appeared in Mesopotamia over 3000 years ago, but the ancient Romans were the first to really apply the technology of arches. To cross a river or a valley, arches provided support for bridges and aqueducts, allowing for transport of people on roads and water in aqueducts over great distances.



For thousands of years, stone arch bridges have carried roads across rivers. Ours won't be a stone bridge, but the Conservation Resource Alliance is working to replace the culvert here at Deer Creek.

Raven Hill has its own Roman arch. It was added to our Ancient World exhibit in 2012, as part of a grant award from the Michigan Council for Arts & Cultural Affairs and generous local donors. Our arch has a most interesting installation story. Jim Garrison of Kalamazoo created the arch. (By the way, Jim was also the artist for the Crossopterigian fish and the dimetrodon in our Jurassic Park, as well as the obelisk in the Center's Ancient World.) Jim trailed the arch north to set it up. Installation of the "ancient" arch was done with state-of-the-art equipment, which made for some great pictures!



If you stand under the arch and make a sound, you will hear an echo, even though the arch is relatively narrow.



(Above & right) Installing a Roman arch the modern way saves a lot of time, sore muscles and pinched fingers. Just imagine a Roman road passing beneath.

Hellebuyck Masonry brought a fancy forklift over to help out. In record time, the forklift did the job of the chains and pulleys that would have been used in the 1800's. Forklifts were invented in 1923 and used during World War II by the US Armed Forces to move heavy materials to the front lines. It sure worked great for our little project!

Raven Hill's arch is a **round arch**, but the **catenary** curve is the strongest shape for an arch. It supports only its own shape. If you hold a piece of chain or rope by each end and let it hang, the chain naturally forms a catenary curve. (See drawing below.) Working with his father, Richard, Raven Hill co-founder, Tim Leach, built many catenary arch pottery kilns over the years.

The St. Louis Gateway Arch is a catenary arch. It opened in 1965 as a 630-foot-tall monument to Thomas Jefferson and America's westward expansion. The St. Louis Arch is just as wide as it is tall!

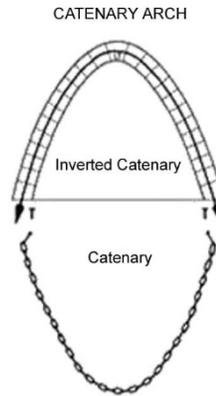


The arch's two legs were built separately, and if their measurements were off by as little as 1/64th of an inch, they would not have been able to join at the top.

Stefanie Waldek, Architectural Digest



In this unusual view of the St. Louis Arch, the windows at the top of the arch are barely visible in the upper right corner. Tim Leach Photo Collection



Speaking of arches!



(Above right) Just couldn't resist including this! **"Nothing is improved by anger, unless it be the arch of a cat's back."**

Charles Surgeon

Would you consider this cat's arch a round or catenary arch?!

If you know someone who might like to receive weekly updates, please send their email addresses to [info@miravenhill.org](mailto:info@miravenhill.org). I will add their names to our list. If you are interested in previous updates, you can find them all on our website—[www.MiRavenHill.org](http://www.MiRavenHill.org)



**"All experience is an arch to build upon."** Henry Adams, historian, journalist, novelist, educator and grandson of John Quincy Adams

If we can stay the course and remain cautious for a while longer, there may be light at the end of the tunnel. Or to adapt Alfred Lord Tennyson's words, **experience is an arch through which gleams that untraveled world beyond**. Either way, let's look to a better future and beat this pandemic. Continue to wash your hands, wear your mask, socially distance and stay away from crowds.

Take care and we'll see you soon! Remember to put Saturday, April 17<sup>th</sup> on your calendar. Raven Hill reopens with eyes-only indoors and hands-on outside.

Cheri

Has the pandemic acted as an arch, helping you reach new heights?