

# conservation in unconventional spaces – bat habitats

SHAKER TRACE NURSERY, GREAT PARKS OF HAMILTON COUNTY

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Historically, facilities occupied by bats have been designed and constructed with the intent of evicting the animals through a variety of exclusion methods, largely due to the human health concerns associated with bat exposure. However, steep global declines in bat populations and a better understanding of their ecological value have made it clear that these species require greater protection. There are alternatives to wholesale eviction, including the ability for bats and people to safely co-inhabit structures.

At Shaker Trace Nursery, Great Parks of Hamilton County envisioned the adaptive reuse through preservation of an over 100-year-old barn, transforming it into a new education and event programming space. For over two decades, the barn was utilized for seed drying and the general operations of their native seed nursery. Over time, the barn also became home to a colony of bats. With the vision for adaptive reuse, the project team was presented with a challenging opportunity to embody Great Park's conservation mission by reimagining the barn to support a bat habitat.

Close collaboration between the Great Parks' Conservation team, a Bat Ecologist with the University of Cincinnati, Pepper Construction, and emersion DESIGN resulted in a plan to renovate the barn into a co-inhabited facility.

While there is extensive research on ways to exclude bats, far fewer studies examine how to accommodate them while maintaining safe human occupancy. Shaker Trace now serves as that case study.



*Existing barn interior used for seed drying*



*Existing roosting areas in the roof rafters and metal roof*

### early due diligence

The existing barn is a central feature to the campus and project. Originally built in the 1880s by the Christian Moerlein Company for drying hops, Great Parks acquired the property in the early 1990's and used the barn for drying and storing native seeds.

The louvers in the north and south side of the building were open as originally intended. Bats used these openings, and probably other crevices, to enter and exit the barn. According to Great Parks staff, the bats have been inhabiting the barn for as long as they can recall during their ownership of the property.

During the project planning process, the team collaborated to research best practices. An environmental consultant, S&ME, was engaged to assess existing bat species through a series of auditory surveys (through EnviroScience, Inc.), and guano testing (through the Northern Arizona University's Bat Ecology & Genetics Lab). The findings determined that only *Eptesicus fuscus* - also known as Big Brown Bats - inhabited the barn, with a minor subset of other species likely foraging nearby. Although Big Brown Bats are not currently listed as threatened, endangered, nor on watch lists, Great Parks leaned into their mission as forward-looking leaders in conservation, and challenged the project team to explore design solutions that integrated bat habitat as part of the design.



*Biologist collecting fresh guano samples for lab analysis*



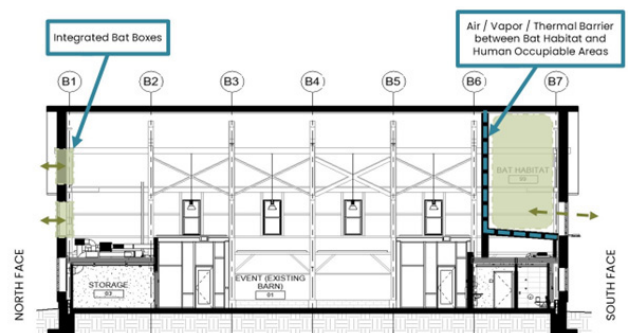
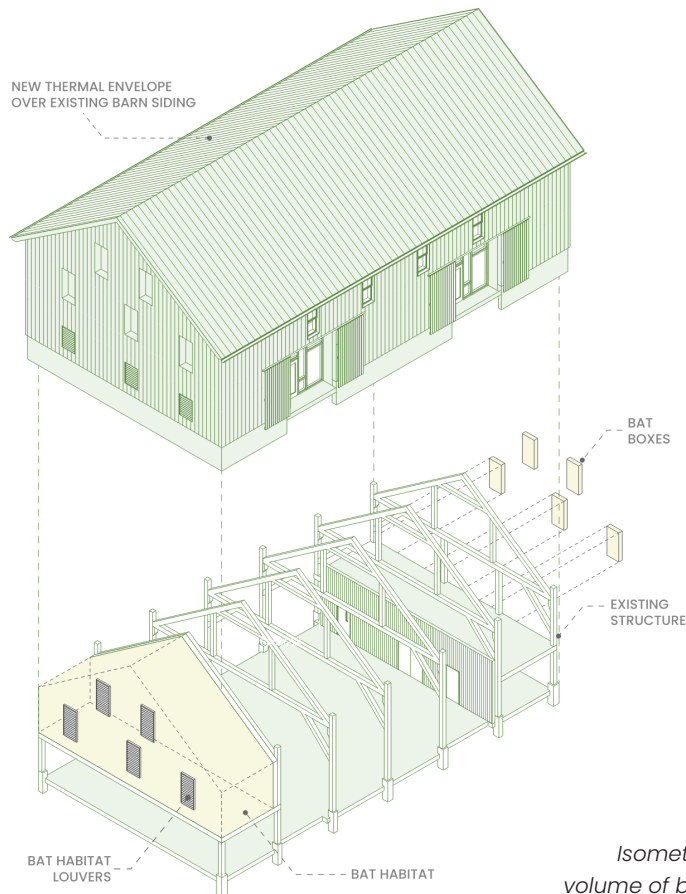
*Alternate view of acoustic site 2, mini bat & SM4, 8.30.22*

## design

emersion DESIGN analyzed the existing structure and proposed a completely new exterior building envelope to enclose, preserve, and seal the existing barn. This approach introduced a new, modern building envelope that creates an energy efficient shell, reducing the building's EUI (energy use intensity) and lowering overall mechanical and electrical demands. It also made it possible to retain the original wood plank barn cladding as the finished interior, preserving the character and history of the structure. The project also included a structural upgrade from agricultural to assembly occupancy.

Team collaboration determined that the best strategy for reimagining the bat habitat was to preserve the southern ceiling volume as the primary habitat, while integrating bat boxes along the northern elevation. This ensures the bats will have access to warmer and cooler spaces throughout their season.

To ensure healthy indoor air quality for humans, the emersion team designed a full environmental and air-barrier system separating human-occupied spaces from the bat habitat zone, creating complete mechanical and physical separation to isolate any harmful exposure to bat guano.



*Building section illustrating environmental separations between bat and human occupancies*

*Isometric illustrating the volume of bat habitats in the overall barn assembly*





*New exterior envelope over existing barn, louvers for bat habitat access and maintenance access for cleaning and monitoring*



*Interior of new event center*



## about the authors



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As the leader of emersion's cultural market, Brett unites his passion for people and learning with the design of spaces that enrich the community. Brett believes the best solutions always derive from teamwork and relationships. He works with clients to deliver projects that inspire and engage. Connect with Brett for your planning or design needs.

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Nikki is a talented and valued design architect at emersion. Her thoughtful and diligent approach to design advances clients as she works closely with them to sift through multiple design options to find the right solution.