

Lone Hill Onyx Cave Gate Project

Missouri Department of Conservation 2011

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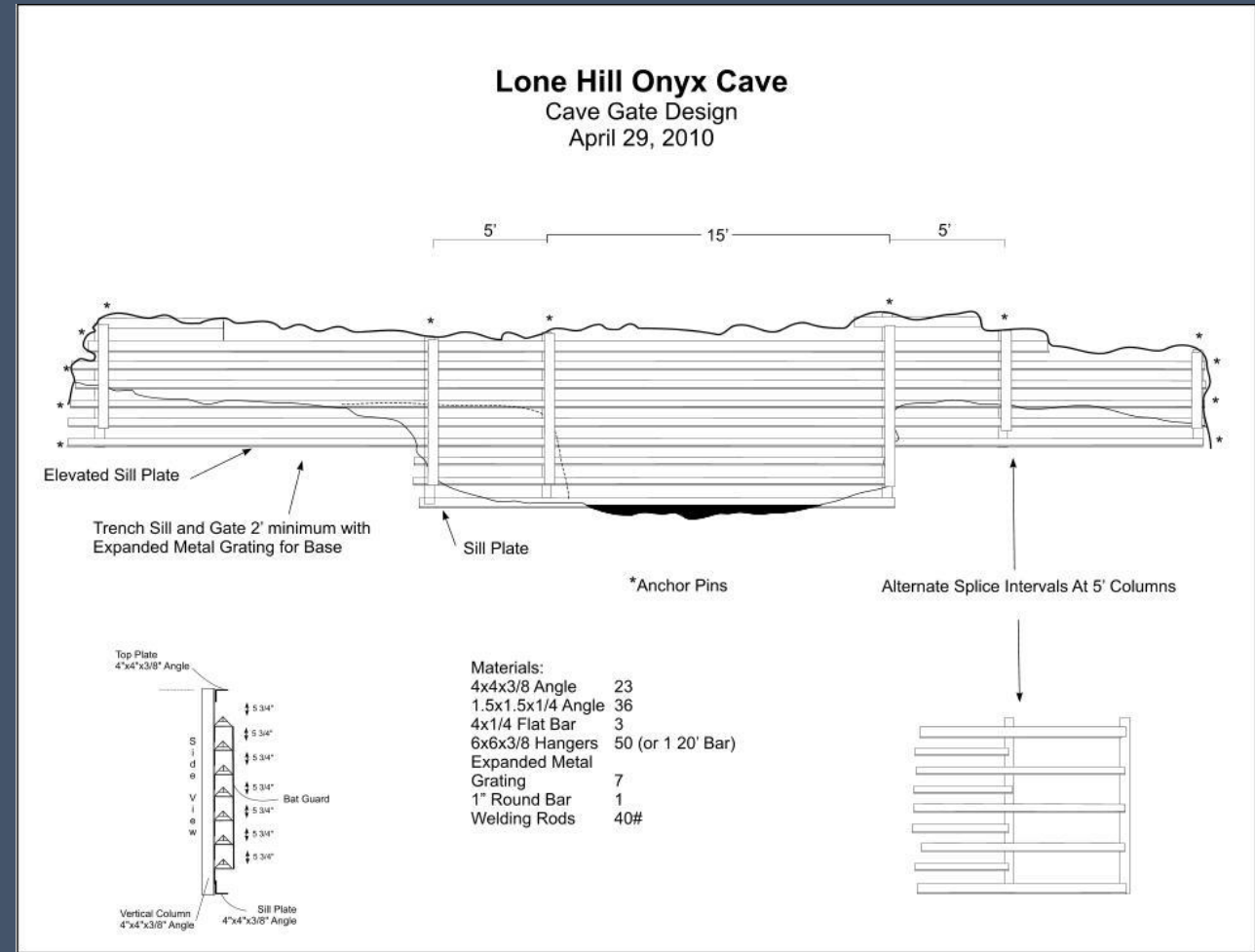


Lone Hill Onyx Cave

- Located at the Meramec Conservation Area in Franklin County MO
- Home of eight species of bats including Indiana Bat and Grey Bat
- Most popular recreational spelunking cave
- Accessible to special use permittees
- Has been gated unsuccessfully in the past
- Due to the threat of white nose syndrome and increased cave abuse the Department approved installation of a permanent cave gate.

Project Design Concept

- Design and construct permanent cave gate structure that allows air flow cave habitat movement while restricting unwanted access.
- Design based American Cave Conservation Association and Bat Conservation International Guidance.
- Engineering Best Practices and Fundamentals.



The Geometry of The Cave Dictates the Gate Type

- Full Basic Gate is most suitable for the Lone Hill Onyx Cave
- Low Entrance Ceiling
- Stream Channel
- Wide area inside of the cave near the entrance to accommodate gate and prevent air flow restrictions.



Lone Hill Onyx Cave 3/29/10

Basic Gate Design

- Expanded Metal EM3 Footing 2' below grade.
- 4"x4"x3/8" Steel Vertical Columns spaced 15' or less.
- 4"x4"x3/8 angle steel horizontal members with two 1 1/2" x 1 1/2" x 1/4" stiffeners
- Provide 5 3/4 " opening between horizontal members.
- 1" Diameter steel pins 8" minimum in rock at ceiling and wall connections.
- 1" Diameter by 3' steel bars driven in stream channel at 6" on center.
- Removable horizontal bar access.
- 4"x1/4" flat steel covering splices and hangers at vertical column connections.
- Gate Free of sharp edges, burs, spatter and slag.

Logistics of Construction

- Materials list, Prefabricate as many items as possible.
- Identify access route to cave and materials delivery.
- Establish staging area and fabrication area outside of the cave
- Provide adequate ventilation, lighting and sound mitigation measures.
- Provide adequate staffing for manual labor and delivery of materials.
- PPE



Construction Practices to Limit Disturbances

- Obtain necessary permits and clearances
- Time construction during the least impactful time of year.
- Prevent disturbances beyond the cave gate.
- Limit loud noises inside the cave.
- Provide ventilation moving air from inside the cave to outside.
- Keep cave free of trash debris.
- Keep fuel, oil, motorized equipment and chemicals outside of the cave.
- Restore site after construction.
- Fabricate as much of the gate as possible outside of the cave.



Gate Construction



Finished Gate

- Months to design and plan.
- Two days to stage materials and prep site.
- Four days to construct.



QUESTIONS?