



Meadowcroft Rockshelter

An updated wood lean-to anchored into a rock face serves as a bastion for a historical U.S. landmark

HISTORY

Meadowcroft Rockshelter is a natural sandstone overhang above Cross Creek, near the town of Avella in southwestern Pennsylvania. It was used as a short-term hunting/gathering campsite beginning as early as 16,000 years ago. Professional excavation began in 1973 under Dr. James Adovasio of the University of Pittsburgh, with additional excavation since 1990 through the Archaeological Institute at Mercyhurst College. The area protected by the rock overhang measures approximately 700 sq. ft. and is located some 42 ft. above the modern floodplain of the creek.

ARCHAEOLOGICAL SIGNIFICANCE

The Pre-Clovis occupation of Meadowcroft Rockshelter represents the first real challenge to the Clovis-first view of the peopling of the New World. Prior to work at Meadowcroft, it was believed that the first migrants crossed the Bering Land Bridge into present-day Alaska and south into the United States, where they became the Clovis mammoth hunters around 12,500 years ago. The early remains from Meadowcroft demonstrate that people were present in the New World prior to Clovis and had to have arrived via some other method. The data from Meadowcroft makes the Rockshelter a site with international implications for determining migration patterns of the first Americans.

Excavations have yielded over two million artifacts (objects created by people) and ecofacts (naturally-derived objects, such as seeds or bones) from a series of eleven strata concealed in sixteen feet of sediment.



Above: Wood was chosen as the primary building material for many reasons; among them, its ability to be easily customized in the field to conform to rocky terrain.

PHOTO CREDITS: Ed Massery with Tom Underiner

Through its innovative design and sensitive construction, the 2,500-sq.ft. interpretive archeological enclosure, completed in December 2007, protects and interprets one of the most important sites excavated in the United States.



CONSTRUCTION – BEAM STRUCTURE AND DETAILS

DESIGN

The original enclosure of this National Historic Landmark was a simple lean-to constructed by the archaeologists in the 1970s. Over the years, this ‘temporary’ structure was regularly reinforced and repaired until a permanent solution could be identified and funded. Access to the site was limited to scaling a steep and difficult embankment. No public access could be accommodated due to the dangerous conditions and the limited space under the roof.

The goals for the new structure were simple: protect and preserve the site for future investigations; provide access for researchers and observation areas for visitors; interpret the story of the site’s millennia of occupants and the innovative archaeological techniques employed; use sustainable design

principles, particularly wood construction.

All of these goals had to be accomplished within severe physical constraints. Digital laser survey technologies were employed to model the site and understand the rock and sub-surface conditions. Wood was chosen as the primary building material based on its ability to span large distances, harmonize with the natural environment, provide a warmth and honesty to the structure, and be easily customized in the field to conform to the rocky terrain. The resulting design is an updated wood lean-to anchored at eight points into the rock face and three points around the excavation.

The most difficult challenge was construction of three footings to support the post-and-beam carrying structure of the roof. During excavation for the caisson-type foundations

it was determined that the hillside soils could not resist the lateral forces placed on them. The poetic solution was to brace the footings with struts anchored into remains of the original rockshelter roof forty feet downhill, which collapsed thousands of years ago.

The roof consists of twelve, double, thirty-inch deep, glue-laminated beams, made of southern yellow pine. It is decked in 2-in.-thick tongue-and-groove Douglas fir planks with a standing seam metal roof. This design provides a robust structural solution that resists average rock falls. The roof is canted to direct rainwater away from the site and to maintain indirect lighting.

To minimize ground intrusion, and because the site is so severe in geometry, the perimeter wall studs were hung from the roof beams, eliminating the need for wall foundations. Attached to the studs are horizontally oriented Douglas fir slats with a Lexan polycarbonate interlayer to keep out wind and allow filtered natural light. This slat system evokes the cribbing of vernacular corn and hay storage structures traditional to the region. Large door openings frame views to and from the observation platforms.

Under the large overhang of the roof is a primary viewing platform designed to accommodate approximately thirty visitors. A second smaller platform is located at the highest point in the shelter. From here, when the 25-ft. fabric and metal mesh doors are raised, one can experience the excavation in context with the creek below. The platforms contain seating and interpretive panels on the site's history and significance.

The underside of the roof supports rigging for future investigations, as well as theatrical-grade lighting and audiovisual systems to provide visitors with a visual guided tour.

SUSTAINABILITY AND TREATMENT OF THE ARCHAEOLOGICAL SITE

The design solution inherently combines sustainability and resource protection. Highlights include: selecting wood as the primary construction material, and employing it in numerous applications, including posts, beams, walls and roof; limiting the physical interaction between the main structural members of the enclosure and the ground to three points; implementing hand-digging techniques when constructing the footers to avoid vibrations, which might have jeopardized the site; hanging the wall system from the roof rather than supporting it upon typical foundations in the ground; retaining the 1970s-era roof in order to protect the dig until the new enclosure was completed; limiting tree removal at the site and using as little machinery as possible; orienting the enclosure to maximize natural light, while also controlling it; strictly following the archaeology standards of The Secretary of the Interior and of the Advisory Council on Historic Preservation; and constant cooperation between the owner, architect and Dr. James Adovasio on the concept and its implementation.




Above: The data collected from the Meadowcroft Rockshelter excavations has broad-reaching implications for determining migration patterns of the first Americans. **Opposite:** The large overhang roof is canted to direct rainwater away from the site and to maintain indirect lighting. The primary viewing platform underneath accommodates roughly 30 visitors.

PHOTO CREDITS: Ed Massery with Tom Underiner

WOOD DETAILS

Structural – Frame: Glulam timber, post-and-beam structural frame with steel fittings epoxy-anchored into rock face, **Roof System:** Twelve, double, thirty-inch deep, glulam beams of southern yellow pine, with a structural roof deck comprised of 2-in. thick tongue-and-groove Douglas fir planks, **Floor System:** Tongue-and-groove Ipe floor deck over 2 x 12 exterior grade wood joists, **Interior Partitioning:** 2 x 4 wood stud wall construction

Exterior – Siding: 2 x 4 Douglas fir slat wall over clear Lexan panels, **Roofing:** Standing-seam Galvalume metal roofing system, **Windows/doors:** Oversize custom rolling door with tubular aluminum frame and Douglas fir slat wall cladding; Roman shade retractable fabric and metal door, **Finishes [Paints/stains]:** Semi-transparent, exterior, pigmented stain on wood structure and slat wall; hot-dip galvanized steel handrail/guardrail system

Interior – Walls, ceilings, floors: Tongue-and-groove Ipe floor deck over 2 x 12 exterior grade wood joists, **Millwork:** Custom benches at observation deck constructed from solid dimensional Ipe 2 x 4 members, **Finishes:** Same as exterior for walls and exposed roof deck; tung oil on Ipe floor deck. 

Architect

Robert S. Pfaffmann, AIA, Principal
Pfaffmann + Associates PC, Pittsburgh, PA

Owner

The Historical Society of Western Pennsylvania, Avella, PA

General Contractor

FJ Busse Company, Pittsburgh, PA

Structural Engineer

Atlantic Engineering Services, Pittsburgh, PA

Geotechnical Engineer

Gannett Fleming, Pittsburgh, PA

3D Laser Modeling

Quantapoint, Pittsburgh, PA

Photography

Pfaffmann + Associates, Pittsburgh, PA
Ed Massery, Pittsburgh, PA