A MONONGAHELA HOUSE RECONSTRUCTION ON CITY ISLAND

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ABSTRACT

An experimental house reconstruction based on archaeological information derived from the Protohistoric Throckmorton (36Gr160) and Foley Farm (36Gr52) Monongahela village excavations is described in detail. Houses of this culture and period (ca. 1590 - 1635 AD) suggest that many vertically walled dwellings had a parabolic frame system capped by a low pitched roof. Out-sloping walled (Johnson and Babich 1992, 2004) dwellings described for other Monongahela villages is not demonstrated for terminal stage architecture of Monongahela.

INTRODUCTION

During September - October 2002, Bureau for Historic Preservation (BHP) / The Commonwealth's Archaeology Program (CAP) staff and a complement of committed volunteers reconstructed a Monongahela house at the experimental archaeology site (36DA214) located at the west end of City Island in Harrisburg. The building project was undertaken as part of the Commission's annual public outreach program instituted during Pennsylvania Archaeology Month. The reconstruction was based on house patterns uncovered at the Foley Farm site (36GR52) located in western Greene County and excavated by the Pennsylvania Historical and Museum Commission (PHMC) in 1984 under the author's direction. Foley Farm is the type site for the Foley Farm phase, the last stage of Monongahela culture that dates ca. 1570/80 - 1615/35 AD (Herbstritt 1984, 2003a, 2003b). It is one of the largest village sites that has been archaeologically studied in Greene County, Pennsylvania.

With the exception of the site's central petal-structure that served a special function, houses at the Foley Farm site are similar to the protohistoric Throckmorton site (36Gr160) houses (Herbstritt 1983). The pattern used for the City Island reconstruction (house Bh-14 from the Beta house ring of the village) had a single appendage extending from its sidewall (Figure 1). Monongahela house appendages were likely used for storage and possibly as facilities for smoke-curing and storing perishable foods. The Foley Farm house and its appendage was rebuilt twice as is indicated by the overlapping wall postmolds and multiple postmold-lined depression scars remaining from earlier appendages.

THE PROBLEM - WIGWAM VS. NON-WIGWAM ARCHITECTURE

Archaeologists generally agree that Monongahela houses were tension domed structures (Mayer-Oakes 1955:Figure 2, 28; Dragoo 1955:85-141; Griffin 1978: 557) whereby the general form of the house is shaped like an Algonquian wigwam (Sturtevant 1975; Nabokov and Easton 1989: 56-62). In a general way, these structures are dome-shaped, a basic design that can be easily created by bending and joining the ends of wood saplings over which is placed a covering of skins, reed mats or more typically, bark (Ritchie 1969: Plate 96 for a contemporary period example). Using environmental, historical and archaeological evidence Richard George, Carnegie Museum archaeologist who has vast knowledge and experience on the archaeology of the Monongahela culture argued that the architecture of Middle through Late period Monongahela houses (after 1400 A.D.) continued in the wigwam style as recorded for the early phases of Monongahela (George 2002). This interpretation is in discordance with the pitched roof style of architecture as hypothesized by Johnson and Babich (1992) for Monongahela where the shape of the dwelling had a conical-shaped roof supported by outward-sloping side walls and interior roof-to-floor supports.

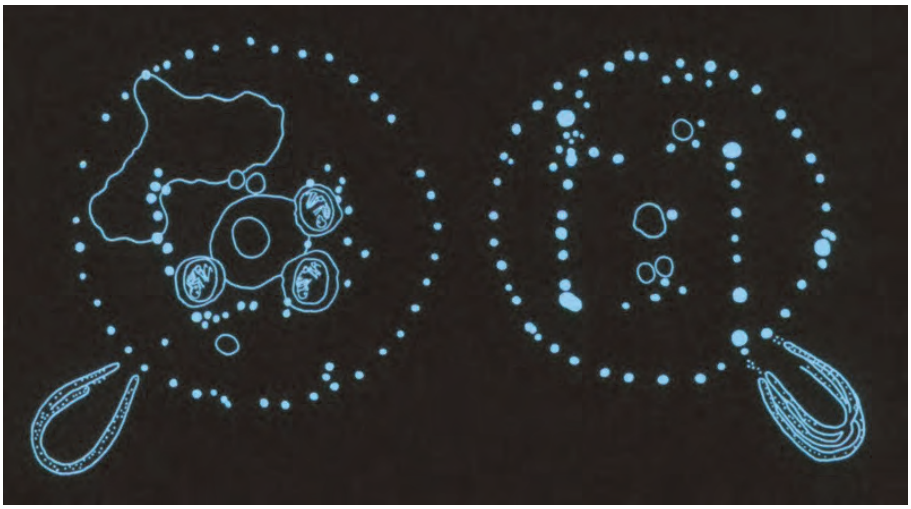

Figure 1. Archaeological plan view of two Foley Farm house patterns.

Indeed, there is a growing body of archaeological evidence that suggests post and beam pitched roofs came into use by the Monongahelans around the beginning of the fifteenth century. By the sixteenth to seventeenth century house wall posts were even larger than wall posts of earlier Drew and Johnston phase Monongahela houses. The Foley Farm site house wall postmolds (Herbstritt 2003a, 2003b) typically ranged from 12 - 15 cm (4 ¾ - 5 7/8 in) in diameter compared to the much smaller wall post-mold diameters of 4 - 8 cm (1 ½ - 3 ¼ inches) at the Bonnie Brook site, a Johnston phase Monongahela site of the early fifteenth century located in the Connoquenessing drainage of west-central Pennsylvania (Herbstritt 1981). Based on the small sized postmolds at Bonnie Brook, the houses were architecturally characterized as wigwams. To be certain, bending saplings into the arched framework for a Bonnie Brook house would not have critically altered the shape of the post holes. The same, however, cannot be said, for larger wall posts (greater than 12 cm diameter) of later periods in that the forced tension created by bending wooden poles into a similarly shaped framework takes considerably more effort. In fact, the posts themselves would be stressed by the greater tension exerted at the base of the building which tended to compress the soil on the interior side of the post facing toward the center of the house. An absolute consequence of bending large size saplings into an arched configuration tends to transform the cavity of a circular-shaped postmold into an elongate-shaped one - to my knowledge, no such phenomena have been observed by archaeologists who have uncovered Monongahela house patterns.

Moving beyond Pennsylvania and the greater Northeast/Middle Atlantic area, the principle house shape where large tightly lashed saplings can be inserted into the ground, bent and joined at the ends are the Caddoan grass houses of the southern Plains (Nabokov and Easton 1989:144-149). Caddo houses are, however, very large multi-leveled and entirely bullet-shaped in architecture thereby resembling nothing like the tension dome-shaped wigwams of the many archaeologically excavated Woodland sites in Eastern North America.

TESTING THE PITCHED ROOF HOUSE HYPOTHESIS

I decided to enter the debate by building a full scale circular-shaped house with a pitched roof. The principle goals of the project beside actually building the house were

1. To gain some knowledge of primitive construction/engineering problems that native peoples of the Eastern Woodlands normally would have encountered when building houses (through a "learning by doing" process and
2. To test the feasibility of undertaking such a project using only volunteer assistance.

The project was undertaken as an integral part of Pennsylvania Archaeology Month's Archaeology on City Island program administered through the Pennsylvania Historical and Museum Commission's Bureau for Historic Preservation. Since 1997 the Bureau has conducted primitive technology/archaeology experiments at the Experimental Archaeology site (36DA214) located on the west end of City Island. Flint knapping and pottery making have been incorporated in this annual public outreach program along with reconstructions of dugout canoes, a smoke house and vaulted dwelling of the early Clemson Island Late Woodland period.

FOLEY FARM HOUSE - FLOOR PLAN

The Monongahela house at the Foley Farm site selected for the City Island reconstruction (house Bh-14) consisted of thirty-nine postmolds arranged in a pattern 6.24 m (20 ft 6 in) in diameter (Figure 1). It is reasonable to assume that not all of the wall posts were contemporaneous, rather the abundance of postmolds suggest that there was at least one rebuilding or replacement of the structure's entire shell as well as some of the interior roof and bench posts (Herbstritt 2003a, 2003b). The three superimposed drainage trenches in the floor of the 2.8 m (9 ft 2 ¼ in) long Foley Farm house appendage is indicative of multiple re-buildings. Every profiled Foley Farm house wall postmold 12 - 15 cm (4 ¾ - 5 7/8 in) diameter and the smaller postmolds of the appendage (2 - 3 cm diameter) exhibited a vertical or upright orientation thus straight sided walls are indicated for the house's architecture. Large, generally equally spaced postmolds (14 - 16 cm in diameter) inside the house pattern included a series of smaller 8 - 10 cm (3 ¼ - 4 in) diameter linearly arranged postmolds which I interpret as bed-rack and ceiling supports connecting the building's shell to the internal roof components. There is a break on one side of the postmold line that allowed access to various parts of the household and bunk area. A central fireplace was uncovered in the floor during the Bh14 house excavation along with several small circular-shaped rock lined pits that contained charred corn and other carbonized food residue. The appendage located on one side of the house had a downward sloping ramp leading into a wider end-way with its sides and end-way surrounded at floor level by a shallow 10 - 15 cm (4 - 5 ¾ inches) wide gutter trench. I believe that this semi-subterranean feature was used for the short-term storage of food, smoke curing of certain foods and, may have likely also been used in general storage for non-food household items.

CONSTRUCTION MATERIALS

Materials used in the City Island Monongahela house reconstruction consisted of wood, bark, cornstalks and twine. With the exception of the commercially made twine (they would have made their own), the materials were readily obtainable by Monongahelans living in the lower Upper Ohio Valley during the seventeenth century. For the City Island experimental house project we secured most of the raw materials from Michaux State Forest through the Department of Conservation and Natural Resources (DCNR), the state agency responsible for overseeing the Commonwealth's vast forest resources. Black birch *Betula nigra* saplings and bark from tulip poplar *Liriodendron tulipifera* trees were the primary materials used for the project. Five pickup truckloads of cornstalks used as sub-roof insulation material was generously donated by Melvin Nissley, owner and operator of MelMar Farms, a large family owned dairy business outside of Middletown, Pennsylvania. Common reed *Phragmites australis* harvested from central Lancaster County was bundle tied into mats for covering the seating/bed platforms of the house. Commercially manufactured binder twine was used to lash the building's shell, the internal framework, as well as tie/lash material for the sub-base cornstalk insulation and some of the bark covering. Wetted leather thongs would also serve the purpose, but were not used.

Time and material constraints (the entire project was completed during the annual City Island Archaeology program - a brief but intensive three week period) required the use of 16d nails to temporarily secure the shingled roof sections to the house. Time permitting CAP will return to the house site and replace the nails with twine lashings thereby permanently securing the bark to the reconstructed Monongahela house.

RECONSTRUCTING THE HOUSE

Building the Monongahela house at City Island involved a series of design and construction steps beginning with the layout of the base pattern. A circular shaped floor pattern was made with a straight sapling by protracting a circle measuring 6.0 m (19 3/4) ft) circle. Each of the 17 wall post locations was then marked with yellow pin flags and dug out with a bucket auger to a depth of 60 cm (23 5/8 in). The .5 - 1.25 m deep fill deposit consisting of concrete, cinder slag and rocks, overlaying much of the experimental site made digging extremely difficult and took one person approximately eight hours to complete the task of digging postholes

The outer shell of the building was constructed by vertically inserting a 2 m long by 10 - 12 cm (4 - 4¾ inches) diameter sapling post into each hand dug posthole. Cobbles gathered from the nearby river shore and some of the dug fill from the postholes was packed around each wooden post for stability.

The building's superstructure consists of four main interior support posts - each approximately 12-12.5 cm (4¾ - 4 7/8 in) diameter and, fifteen smaller saplings (approximately 5 - 5.5 cm (2 - 2 3/8 in) diameter added along the back and sidewalls thus forming a C-shaped pattern. The saplings were inserted and chinked with rocks to a depth of 50 cm (approximately 19¾ in) for the corner posts and 20 cm (7 7/8 inches) for the others. The completed superstructure was 215 cm (7 ft 1 in) in height. Additional structural support was necessary to create the postulated pitched roof architecture of the Foley Farm house. We accomplished this by devising a series of four parabolic-shaped braces secured to the top of the C-shaped superstructure which was then fastened to a ring-shaped brace encircling the superstructure (Figures 2, 3). Two straight cross-members consisting of 8 - 10 cm (3¼ - 3 7/8 inches) diameter saplings were incorporated onto the top of the framework for added support. This converted the simple cube-shaped geometry into a structurally sound design thereby extending the superstructure's height and width to accommodate a conical-shaped pitched roof.

Figure 2. Exterior view of conical roof frame with its parabolic support system.

Before assembling the roof we found it necessary to install two ring braces, made from small saplings 4 - 6 cm (1 5/16 - 2 3/8 inches) in diameter. These we placed around the outer wall of the building to stabilize the framework and to provide side support for the beds/sitting platforms and the rafter ends. The task was accomplished by notching the top and mid-section of each wall post then securing to the braces with lashings.

Figure 3. Interior view of parabolic support system and bracings.

As shown by the archaeological footprint, the furnishings used by the Foley Farm residents for sleeping, sitting and perhaps as places to dry-store household goods were simple affairs placed in one or more areas of the house. Access was gained through open spaces around the hearth. For the City Island house reconstruction (Figure 4) these furnishings included two platforms (Figure 5) which we constructed from long relatively straight birch saplings - a smaller vacant space on the side remained that allowed access to the semi-subterranean post-lined appendage (Figure 6).

Figure 4. Interior bed platform.

Figure 5. Side view of semi-subterranean appendage superstructure.

Figure 6. Exterior view of conical roof covering of cornstalk liner and bark shingles.

The roof was built by installing thirty-five saplings measuring 3.8 m (12 ft 6 in) in length and 7.5 - 8.0 cm (3 - 3 1/4 in) diameter on top of the sidewalls and the C-shaped superstructure. Each rafter was saddle-notched approximately 33 cm (13 in) from the base to accept the horizontal bracings at the top of the outer sidewalls. The rafters were then lashed to the set braces and secured at the smoke-hole by an 80 cm (31 ½ in) diameter hoop fashioned by lashing small 2.5 cm diameter (1 inch) paper birch *Betula papyrifera* saplings harvested from the riverside west of the experimental site. Three additional rings also made of paper birch were horizontally lashed to the top, mid-point and lower section of each rafter to support the sub-roof covering of cornstalks. Although the completed roof frame has but a twenty-six degree pitch, the strength of the building's superstructure seems to be sufficiently strong enough to support the buildup of snow from a heavy winter blizzard.

A 2.8 m (9 ft 2¼ in) long semi-subterranean appendage was built onto the southwest side of the Monongahela house. For this, we dug an elongated pit 50 cm (19 1/2 inches) deep into the ground with the deepest and widest part farthest away from the house wall. The floor ramp's slope was designed to incorporate the general pitch of the roof (Figures 7, 8). One rafter was extended over the entire length of the elongated pit to function as the appendage's main roof support beam. A simple lattice work consisting of nineteen 2.5 – 3.0 cm (1 - 1 3/8 in) diameter paper birch saplings 183 – 244 cm (6 - 8 ft) long was fabricated onto the pre-constructed frame by inserting the widest ends into pre-dug postholes and cross-joining the standing ends with twine. Same size saplings were used to brace the top and sidewalls of the semi-subterranean frame for additional strength.

Figure 7. Side view of semi-subterranean appendage with bark cover.

Figure 8. Structure completed.

Two material components were incorporated in covering the house roof. First, three overlapping layers of cornstalks were tied onto the pre-constructed lattice work of small paper birch saplings followed by a final covering of five overlapping courses of tulip poplar bark. Each bark section measured approximately 91.5 cm (3 ft) in length by 51 cm.(20 in) wide. The smoke-hole at the very top of the pitched roof was not covered so that it would remain functional whenever the hearth was in use.

Construction of the sub-roof insulation involved tying bunches of cornstalks together (usually four or five at a time) into connected segments averaging five feet in length. These segments or "aprons" were then tied to the pre-constructed latticework on top of the rafters. Dangling husks and loose cornstalk stems extending below the rafters were trimmed before the final covering of bark was installed. As the final construction step, overlapping sections of bark were placed on top of the cornstalk sub-roofing beginning at the bottom of the roof working upward with second, third, fourth and fifth overlapping courses. As noted, because of project time constraints each bark shingle was temporarily nailed onto the roof rafters. Some shingles within the lower two courses were properly secured by first boring two holes centered at the top of each shingle and then lashed to the underlying cornstalk and rafter substructure elements.

To complete the reconstruction we covered the appendage with a single layer of overlapping tulip poplar bark (Figure 9). Again, the process involved overlapping the bark against the framework then subsequently capping with more bark along the top. Certain concerns regarding the City Island's public security and safety policy prevented us from bark-covering the entire house. As such, we shingled only it's southwest and west sidewalls which, again, was accomplished by overlapping long sheaths of bark onto the post and beam framework. The bark was secured by boring a pair of holes near the top of each sheet and attaching with twine lashings.

Figure 9. Completed house reconstruction facing west.

AFTERWARD

At the beginning of the 2002 City Island Archaeology project, Mayor Steven Reed visited the experimental archaeology site to view our progress on the Monongahela house reconstruction. We were informed by Mayor Reed that the City of Harrisburg would provide proper signage for our reconstructions of a sweat lodge, canoe and the "new" Monongahela house, all located at the experimental site. The BHP/CAP's principle purpose in creating the reconstructions at City Island is to

benefit public outreach and to provide the citizens of our Commonwealth with a glimpse at the past regarding the material culture of prehistoric Native Americans. To that end, we trust that the experimental archaeological site will receive the proper care and maintenance necessary to ensure its survival for years to come.

ACKNOWLEDGEMENTS

I would like to thank a number of individuals who in many different ways contributed to the success of the 2002 City Island Monongahela house reconstruction project. Harrisburg's former Mayor Steven Reed provided the "place to do experimental archaeology." Without his support none of this would have come to fruition. The DCNR's Michaux State Forest manager, Gary "Smoke" Zimmerman arranged for the harvesting of the wood products used for the reconstruction. Michaux State Forest Foreman, Bill Parr and his field staff, namely Mike Freeman, John Hammond, Dale Herring, Andy Martinek, Henry Rhinehart, and Tony Scott harvested and delivered on-site, the materials for the reconstruction. I thank former BHP Director Jean Cutler, and Kurt Carr, Senior Curator, and Doug McLearen, The Commonwealth's Archaeology Program (CAP) supervisor, for their encouragement to carry the project through to completion and for supporting my every decision regarding the experimental reconstruction process. CAP staff, Winter Roberts, Dave Burke and Gary Stinchcomb assisted in the field during the initial layout of the house floor plan, participated in some of the early construction activities and all of the "experimental site" mapping after the City Island project ended. I thank Barry Kent, who I considered a true mentor in many regards, provided sage advice about primitive house engineering and who volunteered his skills in the actual reconstruction. Bob Winters, our non-resident Native American consultant on all things "Indian" advised on certain aspects of primitive house building and, as well, manually assisted in the reconstruction. I should also like to thank our volunteer staff including Charlie and Marsha Gladfelter, Bill Laubscher, Bill Metz, Brad Miller, Robert Newmyer and Rich Petyk. A special thank you is in order for my construction assistants, Charlie Hannon and Emily Leopold, who voluntarily contributed "more than many" hours to the project from its inception to its completion. To all these people I am grateful.

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