

Lakeport Plantation Restoration

Technical Report No. 3

Foundations & Footers





The photo above shows the corbelled brick footer that was uncovered by the archeologists during excavation of the grounds around Lakeport Plantation house. This photo was taken from the Historic Structures Report for Lakeport Plantation.

As part of the restoration planning for the Lakeport Plantation project, archeologists with the Sponsored Research division of the Arkansas Archeological Survey excavated the grounds around the house. Excavation revealed brick foundation walls and footers also constructed of bricks. The footers are made up of four layers, or courses of bricks, laid in a series of stepped courses, moving outward at about a half brick per course. This method of bricklaying is called corbelling. This method allows the weight of the foundation to be spread over a larger surface area providing a solid foundation for the house. The foundation walls are three bricks thick and ten courses high and set on top of the footers. Foundation walls were built to support all interior as well as exterior walls of the house.

The footers and interior foundation walls did not need to be replaced. Because the footers set below ground level they had been protected over the years and were in good condition. The interior foundation walls were in good condition as well. They did, however, need to be repointed in several areas.

The exterior foundation walls were in poor condition. Settling had caused the majority of the foundation walls to be uneven and the north foundation wall was collapsing. Prolonged water exposure on the north side of the house had caused the mortar between the bricks to deteriorate and the foundation walls to collapse. The original plan was to disassemble the exterior foundation walls and reuse the salvaged bricks to rebuild the foundation walls. However, the hard portland cement that had been used to parge coat the exterior foundation walls in more recent years had a much stronger bond than the lime-based

The photo at right shows a view from underneath Lakeport Plantation house of the exterior foundation wall on the north side of the house. Years of water exposure had caused the mortar between the bricks to deteriorate and the foundation wall to crumble. This photo was taken from the Historic Structures Report for Lakeport Plantation.



mortar used for the original parge coating, making its removal impossible without causing serious damage to the soft, handmade bricks. The remaining bricks were spalling, or crumbling badly, due to prolonged water exposure. All of these factors combined resulted in the need to replace the exterior foundation walls.

The foundation walls and footers of Lakeport Plantation house, as well as the chimneys, dairy and original smokehouse were all constructed of low-fired, handmade bricks. They are orange in color, vary slightly in shape and size and are larger than modern bricks. Prior to the 1870's, most bricks were handmade in wooden molds. Molds were made in single, double, four or six brick forms. Clay is the primary material used in making bricks and sand was often added to reduce the plasticity of the clay. Until the steam shovel was invented in 1879, early brickmakers would dig for the clay on site with hand shovels. After the bricks were molded they would be laid out to dry and then fired in a brick oven or kiln. Reproduction "handmade" bricks were found to match the existing bricks, and purchased to rebuild the foundation walls of Lakeport Plantation house.

Ornamental cast iron foundation vents, seen in early photographs of the house, are believed to be original to the house. All of the foundation vents were carefully removed, sandblasted and then painted before being reinstalled in their original locations. There was no need for duplication of the vents as they were all in reusable condition and none were missing.



During the removal of the foundation walls, large sill beams measuring approximately seven and one-half inches by twelve inches were exposed. The sill beams are the beams that set on top of the foundation walls and support the floor joists and walls of the house. Deteriorated sill beams were removed

The photo at left shows one of the ornamental cast iron foundation vents after being sandblasted, painted and reinstalled in its original location. This photo was taken after the exterior foundation walls had been parge coated.



The photo at left shows a large sill beam that has been replaced, resting on top of the partially rebuilt foundation wall of Lakeport Plantation house. The sill beams support the floor joists and walls of the house.

and replaced with pressure treated southern pine materials. The sills and walls were held in place with hydraulic jacks and kicker boards to support the existing structure during the removal process.

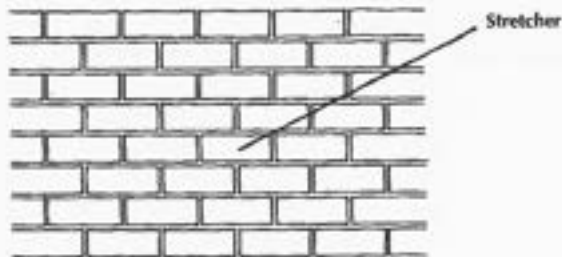
All of the exterior foundation walls were carefully disassembled in short sections and then reconstructed on the existing footers using the new bricks. When laying bricks, the mortar should act as a bedding for the bricks. The mortar is laid with a trowel first and the new brick is pressed into place so that the mortar is pushed against all of the surrounding bricks. The strength of the bricks depends upon the quality of the mortar and the bond. The bond consists of various brick coursing patterns. Typical brick coursing patterns are running bond, which consists of all stretchers, common bond consisting of five rows of stretchers and one row of headers and Flemish bond, which consists of alternating rows of stretchers and headers. Bricks laid with the longest side exposed are called stretchers and bricks laid with the end exposed are called headers. The new foundation walls were laid in a running bond pattern.

The most common mortar joint profiles are struck, flush and weathered. Because of mortar deterioration, it was difficult to determine the existing joint profile for the brickwork on Lakeport Plantation house. Because the exterior foundation walls were to be covered over with a parge coating, joint profiles would not be seen and were not an issue for the foundation walls. Mortar joints were raked flush to provide maximum bonding with the parge coating that was to be applied to the exterior foundation walls.



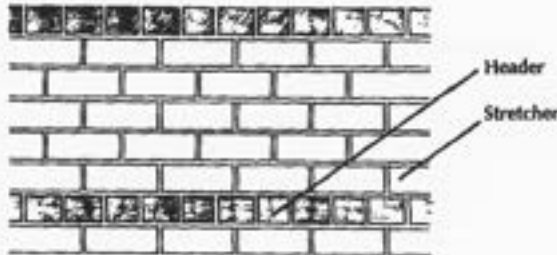
The photo at right shows the framing of Lakeport Plantation house being supported with hydraulic jacks and kicker boards during removal of the exterior foundation walls. The foundation walls were disassembled in short sections and rebuilt using reproduction "handmade" bricks.

Typical Brick Coursing



Stretcher

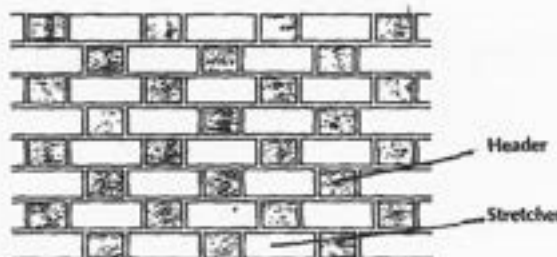
Running bond consisting of all stretchers.



Header

Stretcher

Common bond consisting of five rows of stretchers and one row of headers.



Header

Stretcher

Flemish bond consisting of alternating rows of stretchers and headers

Types of Mortar Joints



Struck



Weathered



Flush



Vee



Concave



Raked

The above illustration shows the typical brick coursing patterns and types of mortar joints used in bricklaying. This illustration was taken from *The District of Columbia Historic Preservation Guidelines: Walls and Foundations of Historic Buildings*.



The photo at left shows a brick mason laying the new exterior foundation wall. The foundation walls are three bricks thick and ten courses high and set on top of the footers. There are foundation walls to support all interior as well as exterior walls.



The photo at right shows a large section of the exterior foundation wall after being rebuilt. The brick piles are the original historic bricks that were disassembled and removed. The historic bricks were too deteriorated to be salvaged and reused.

When working with bricks and mortar, it is very important that they are compatible with one another. Mortar should always be softer than the bricks. Stresses to a brick wall caused by expansion and contraction or settlement should be relieved by the mortar rather than the bricks. Damage to the mortar will be much easier to repair than crumbling bricks. The mortar used to rebuild the exterior foundation walls was a modern portland cement, chosen for its compatibility with the new bricks.

For repointing the mortar joints of the interior foundation walls, where the historic brick remains, a traditional lime based mortar was used. Samples of the original mortar were taken from Lakeport Plantation house and sent to Wollenberg Building Conservation, LLC, in St. Louis, Missouri, to be analyzed. Results of the testing can be found in the Historic Structures Report for Lakeport Plantation. This report helped to determine the composition of the lime mortar that was used for repointing the interior foundation walls.

When repointing mortar joints, the old mortar should be removed to about two to two and one-half times

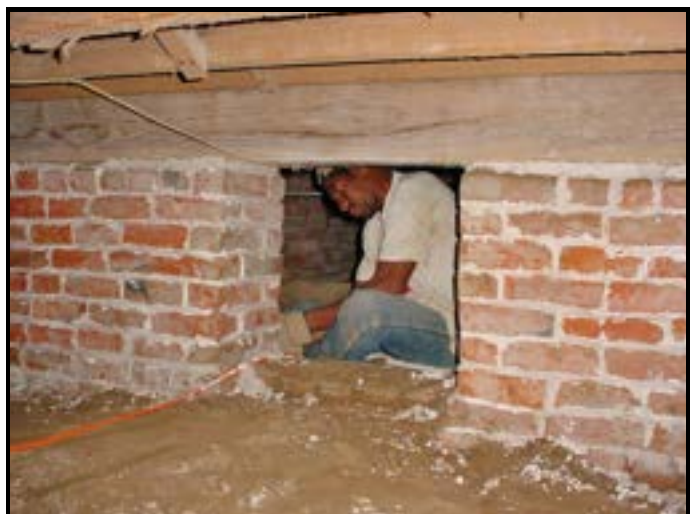
the width of the joint and deeper if necessary to ensure an adequate bond. It is best to remove the old mortar with hand tools. Power tools are often used to remove mortar from modern bricks but can cause serious damage to the soft historic bricks. Joints should be cleaned to remove any loose mortar and the bricks should be dampened prior to repointing. It is best to fill the mortar joints a layer at a time allowing each layer to dry before applying the next layer.

The foundation walls should be examined regularly as a maintenance procedure. Problems to look for are deteriorating mortar joints, cracks, spalling bricks, poor drainage or moisture penetration. The source of the problem should be found and corrected before any repairs are made. With proper care and maintenance, masonry construction is meant to last for many, many years.

With historic brick masonry, it is important to use experienced craftsmen who have the knowledge and skills necessary for the special requirements of historic brick. Modern brick construction of today differs greatly from the historic brick construction of the 1800's and applying modern principles to historic brick may cause further damage rather than the intended purpose of preserving a historic building.



The photos at left and below show the brick masons working underneath the house, repointing mortar joints of the interior foundation walls. The mortar had deteriorated over the years and had to be removed and the foundation walls repointed.



Resources:

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National Park Service, U. S. Department of the Interior. Technical Preservation Services. <http://www.cr.nps.gov/hps/tps/>.

The Secretary of the interior's Standards for the Treatment of Historic Buildings with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. <http://www.cr.nps.gov/hps/tps/standguide/index.htm>.

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Dobson, Edward. A Rudimentary Treatise on the Manufacture of Bricks and Tiles. This is a reprint of the London 1911 edition. Lindsay Publications, 2005.

Lynch, Gerard. Brickwork: History, Technology and Practice, Volume 1. Donhead Publishing, 1994.

Lakeport Plantation is an Arkansas State University Heritage Site located in Chicot County, Arkansas. The *Lakeport Plantation Restoration Technical Reports* were compiled by Ronnie and Sonya Walker to document the restoration of Lakeport Plantation.