

# Lakeport Plantation Restoration

Technical Report No. 6

## Guttering & Sheet Metal Work



When looking at the exterior of Lakeport Plantation house, your attention is immediately drawn to the bold cornice and dental molding as well as the straight lines of the fascia boards that make up the cap of the house. Hidden inside the ornate cornice molding is the box guttering, a part of the unique drainage system that not only directs water away from the house but, in earlier times, collected water for domestic use. Before restoration began on the house, it was discovered that the gutters and downspouts were part of a water collection system that carried the water underground by way of brick troughs, emptying the water into the two large cisterns at the back of the house. The purpose of the drainage system today is to collect rainwater and direct it away from the house, keeping the house and foundation dry.

There are two different types of gutters used on Lakeport Plantation house. The box gutters, or built-in gutters, are used on the two story section of the house. Built into the cornice of the house, they cannot be seen from the ground. The half-round gutters are used on the ell at the back of the house. These gutters are attached to the eave of the house and are easy to see.

There is little evidence of gutters being used in America earlier than the 18th century. The earliest wooden gutters were the V-shaped gutter, formed by fastening two long boards together, and the shaped



The photo at left shows the cornice molding that hides the box gutters on Lakeport Plantation house. Built-in gutters provide water drainage without interfering with the architectural details of the house.

At right is a photo of the original box gutter trough that was found beneath the corrugated tin roof on Lakeport Plantation house. Built of cypress, originally it would have been lined with tin or tene metal.



gutter, formed by hollowing out a hewn log. Wooden pins or wrought iron brackets were used to attach these gutters to the side of the building or the eave of the roof. Downspouts were also wooden and were built by fastening four boards together or hollowing out a log or block of wood.

As wood gutters progressed, they eventually became a part of the architectural detail of the house. Built-in gutters, shaped like a box or trough, were built into the roof overhang and became a part of the cornice design. The wooden troughs were lined with metal such as lead, copper or tin. Hidden from sight, built-in gutters provided a water drainage system without interfering with the exterior architectural design. Built-in gutters were first used on high-end houses and buildings during the 18th century. They became one of the most popular gutter systems between 1880 and 1925, and their popular design is still being used today.

The earliest metal gutter was the half-round gutter. Sheets of lead were hammered around wooden poles to form a U-shaped trough that hung from the eave of the roof by straps. Early metal downspouts were cylinder shaped and were also made of lead. Eventually, lead was replaced by tin and copper as materials used for making metal gutters. Tin requires painting to prevent rust but copper is considered



The photo at left shows the ceiling joists that extend past the tops of the walls of Lakeport Plantation house to become the exterior overhang as well as the frame that holds the wooden trough for the box gutters.



Most of the original box guttering was gone when restoration began and what remained was removed and replaced using new materials. This photo shows the new frame that was built along the west wall of Lakeport Plantation house to hold the new box gutters.

maintenance free and is extremely durable. The simple lines of the half-round gutter have made it popular for use with many different architectural styles. It is being used today for historic preservation projects, traditional renovations and on higher-end custom homes.

Aluminum and vinyl gutters are the most popular gutters used today. They are both lightweight and inexpensive. The aluminum gutters are made in many different shapes and colors and are coated with a baked on enamel that resists corrosion. The vinyl gutter is considered entirely maintenance free. However, because they are a relatively new product, it is uncertain how well they will hold up in the future.

When restoration began on Lakeport Plantation house, part of the original box gutters still remained on the north side of the house, above the ornamental iron porch. Evidence showed that they had been removed from the west side of the house in earlier years and were never replaced. Lack of maintenance had resulted in the deterioration of the rest of the gutters. The original box-shaped gutters were built of cypress and lined with sheet metal. The Lakeport ceiling joists, built to extend past the tops of the walls and become the exterior overhang, served as the frame to hold the box gutters. Because of the importance of the gutters in protecting the house, it would have been too risky to leave the original gutters. What remained of the original



The photo at right shows the new box gutters built into the cornice of Lakeport Plantation house. The new gutters are built of pressure treated pine material and will be lined with copper. The trough is built to slope to the nearest downspout to insure proper water drainage.

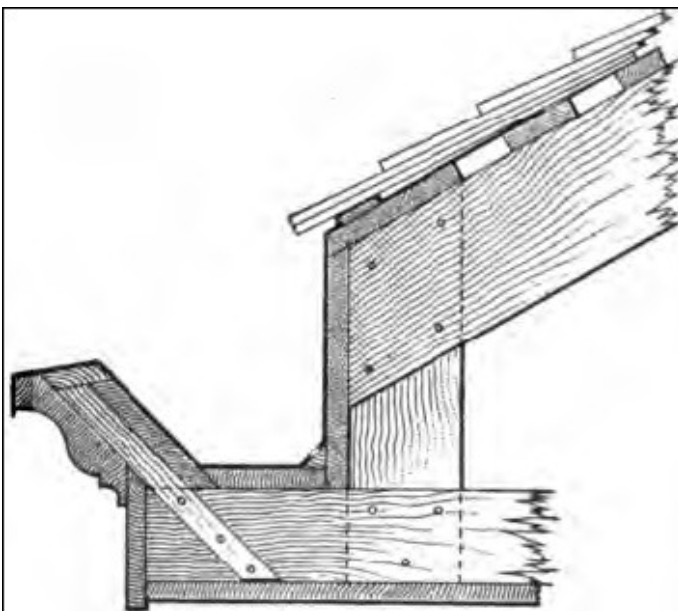
Before being allowed to begin work on Lakeport Plantation house, contractors were required to provide a mock-up of their work for approval. The photo at right shows a mock-up built for the box guttering and roofing systems as well as the cornice and dental molding and fascia boards that were to be restored.



gutters was removed and new box gutters were built using a pressure treated pine material. The purpose of the pressure treated pine is to protect the wood from insect invasion and fungal deterioration. The ends of the ceiling rafters that held the box gutters were also deteriorated and had to be rebuilt as well. Once the box gutters were complete, copper liners were fabricated to fit the gutters.

There was no clear evidence of original gutters on the ell part of the house. However, the unique water collection system indicates that gutters would have been used there. It is also important for the preservation of the house to have gutters on ell of the house. It is believed that a simpler, half-round gutter would have originally been used for this part of the house. Copper was used for the fabrication of the new half-round gutters as well.

The original downspouts can be seen in historic photos taken in the early 1900's, and pieces of the original were found above the kitchen in the ell of the house. The original downspouts were built from pieces of sheet metal measuring 9 3/4" in length, that were joined and soldered together repeatedly. All of the original sheet metal work would have been done by hand, requiring a great amount of time and labor.



The construction of the box gutter shown in the illustration at left is similar to the box gutters on Lakeport Plantation house. The ceiling joists extend past the tops of the walls to become the exterior overhang and provide a frame for the box gutters to set in. This illustration was taken from the Carpentry Section of the *International Library of Technology*, a series of textbooks published in 1909, to be used by people in the engineering professions and trades.

These photos show the fabrication of the copper liners that will line the wooden troughs of the box gutters for the two-story section of Lakeport Plantation house.



The photo above shows a restoration sheet metal worker using the sheet metal brake to bend and shape the copper liners. The photo at left shows a section of the liner ready for installation.



The photo above right shows the gas fire pot being used to heat the soldering irons. The photo at right shows an end piece, after being cut and shaped, being soldered to the end of a gutter liner.





The photo at left shows two sections of the copper liner for the box gutters being soldered together. Inside the small jar is a cleanser that is used to keep the end of the soldering iron clean. The photo below shows a close-up view of a joint being soldered together. It is important that the joint be as smooth and tight as possible to allow the liner to function properly.



Reproducing the copper liners, half-round gutters and downspouts required the work of experienced restoration sheet metal workers. The sheet metal trade is an early trade that can be traced back to the Greeks and Romans in ancient history. In colonial America, the first sheet metal workers repaired imported goods such as cooking pots, bowls, plates and spoons. With the move toward American independence, craftsmen began producing their own goods. These craftsmen, referred to as tinsmiths and tin metal workers at the time, made everything from household goods to metal roofs. With the invention of the first tin-working machines, in the early 1800's, the industrialization of sheet metal work had begun. The sheet metal trade has made great technological advancements in recent years. However, many of the hand tools used in years past are still being used by traditional sheet metal workers today. The Lakeport Plantation restoration project was fortunate to have a company with over forty years of experience in the traditional sheet metal trade, and that has won several major restoration awards, to fabricate all of the sheet metal work for Lakeport Plantation house.



The photo at right shows restoration sheet metal workers cutting and fitting the copper liner for a box gutter at the corner of the roof of Lakeport Plantation house. The hole that has been cut in the liner is to allow for water to flow through to the downspout that will be attached below the cornice.



These photos show the fabrication of the half-round copper gutters that were installed on the ell part of Lakeport Plantation house.

The photo at left shows sections of the half-round gutters being readied for installation. The photo below shows an end piece being soldered to a half-round gutter.



The photo above shows the half-round gutters being installed on the inside corner of the ell porch. The photo at right shows the beginning of a downspout that has been fabricated and attached to a half-round copper gutter.





The photo at left is taken from an early photo of Lakeport Plantation house. In the photo, to the far left, can be seen a piece of the original downspout attached to the corner of the house. Fabricated from short pieces of sheet metal, the downspout would have required many hours of labor to construct. This photo was taken from the Historic Structures Report for Lakeport Plantation.

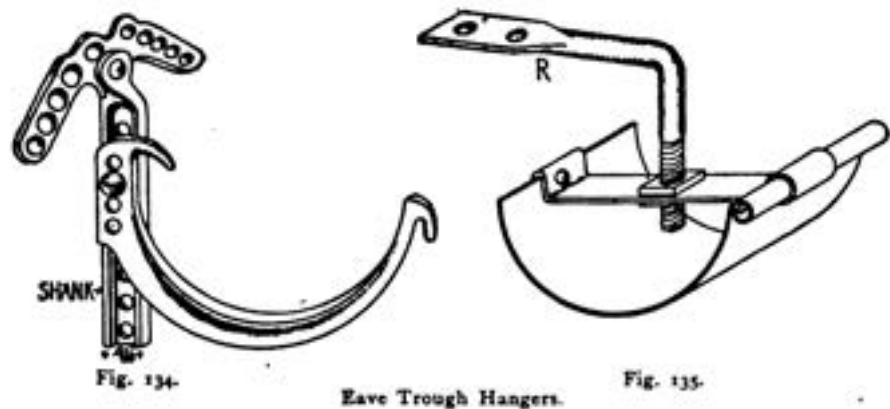
All of the sheet metal work was done on-site using traditional tools of the trade. A sheet metal brake, designed to bend and shape metal, was used to fabricate the long pieces for the gutters, downspouts and liners for the gutter boxes. Tin shears and hand bending tools were used to cut, bend and shape the ends for the gutters, deflectors and other small pieces and to cut the holes for the downspouts. Gas fire pots and soldering irons were used to solder the joints together, although coal heat would have been used originally. Copper was used for all of the sheet metal work because of its durability.

The half-round gutters were attached to the roof using copper gutter hangers and brackets. The brackets run underneath the shingles and are secured to the roof. The hangers are then attached to the brackets and hold the gutters. The brackets are designed to allow for gutter adjustments as well as allowing the gutters to move. Although copper is extremely durable, if not allowed to move, it will break apart. The



The photos above and at left show the newly fabricated downspouts for Lakeport Plantation house. The photo above shows a downspout as it extends from the cornice that holds the box gutters. The photo at right shows the bottom of a downspout where the water will flow into an underground drainage system. The curved neck and mouth of the downspouts were fabricated by skilled sheet metal workers.

In this illustration, the gutter hanger on the left (Fig. 134.) is the type used to attach the half-round gutters to Lakeport Plantation house. This illustration was taken from the 1898 book, *Building Construction and Superintendence, Part II: Carpenters' Work*, by F.E. Kidder, C.E., Ph.D.



liners for the gutter boxes were secured using copper tabs that were nailed to the roof underneath the shingles. The lip of the liner hung from these tabs, which allowed the liners to move. The downspouts were held in place with copper straps that were attached to the house at one end, wrapped around and were riveted to the downspout at the other end.

When working with metals, it is important that the metal types are compatible. Using two different types of metals together that are not compatible will cause the metals to corrode and fail prematurely. Even the nails that are used must be compatible. Because of its chemical composition, copper is not compatible with many other types of metals. Two metals that are compatible with copper are stainless steel and brass. The nails and rivets, hangers and brackets were all made of copper to avoid any possibility of corrosion.

Although exposed copper does not require painting, all of the gutters and downspouts were painted white for historical accuracy. The metal used to make the original gutters and downspouts was a tin orterne metal and would have required painting to keep them from rusting.

A good gutter system that is well maintained is very important to the preservation of a house. Gutters and downspouts should always be kept clean and free from debris. They should be checked regularly for any



The photo at left shows a deflector that sets above the gutters in the corner of the ell porch. Hand fabricated by a restoration sheet metal worker, the deflector is used to keep the water that runs down the valley of the roof from splashing over the gutters.

In the photo at right the copper gutters and downspouts at the back of Lakeport Plantation house have been painted white. Although it is not necessary for exposed copper to be painted, the new gutters and downspouts were painted for historical accuracy.



signs of damage and repairs should be made right away. Peeling paint and deterioration along the eaves of the house are the first signs that there may be a problem with the gutters. Others signs to look for are dark stains or mildew in the attic or on the ceilings and the walls. Water laying around the foundation of a house also indicates a serious drainage problem. If not controlled, water can damage the walls and foundation of a house and eventually threaten the entire structure of the house.

**Resources:**

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**Historic Preservation Websites:**

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

The Old House Web. <http://www.oldhouseweb.com>.

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