PRELIMARY REPORT
HULL CONSTRUCTION FEATURES OF THE BROWN'S FERRY VESSEL

by

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INTRODUCTION

During the summer of 1976, divers raised the remains of a small merchant vessel from the Black River in South Carolina (Fig. 1). Laden with 25 tons of bricks, its hull was nearly half intact. Artifacts were dated to about 1740, making this the oldest preserved vessel in this country.

In September, 1977, at the invitation of Alan B. Albright, Underwater Archeologist for the Institute of Archeology and Anthropology at the University of South Carolina and Director of the Brown's Ferry Project, I visited the hull's storage site to conduct a prelimary study. Although Mr. Albright has been kept informed of developments during the course of our work, this report will formally document the initial results of that study. It will also serve as a guide for future reconstruction work. The information must remain preliminary in form, since some parts of the hull were not accessible, others were better left undisturbed until some manner of conservation has been performed, while still other details can only be dealt with following a preliminary study.

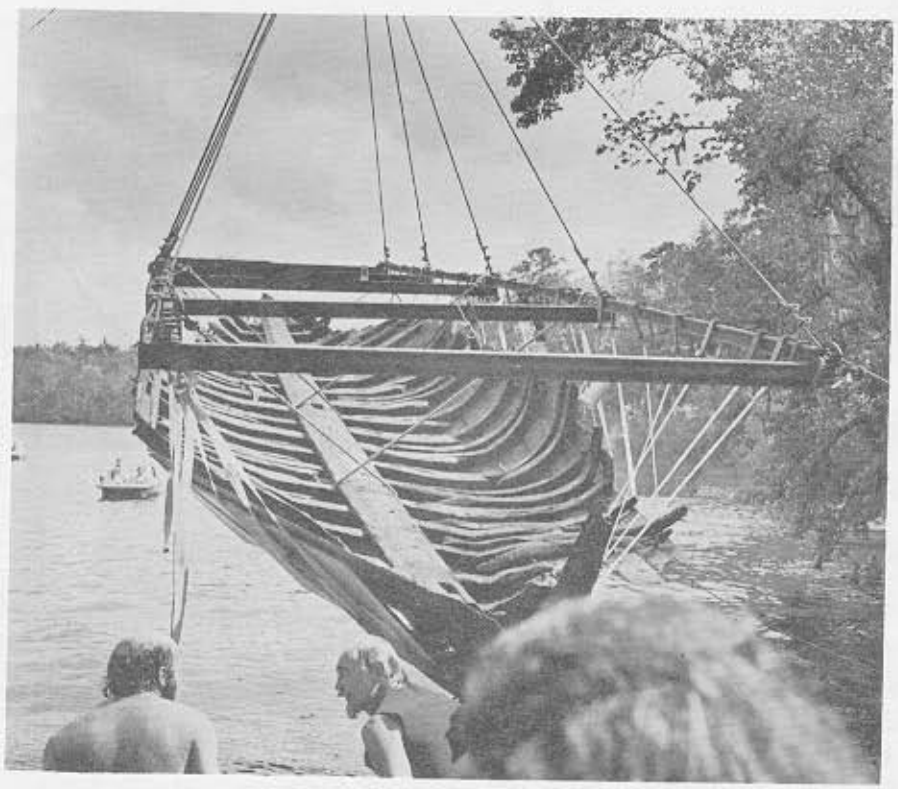

Figure 1: Raising the Brown's Ferry Vessel from the Black River (Photo by Gordon Brown).

THE STORAGE SITE

The wreck was stored along the perimeter of Fort Jackson, near Columbia, South Carolina, and was protected from human molestation. However, it was not protected from the elements, although continuous water sprays from perforated hoses and lawn sprinklers did seem to keep the timbers wet. This storage site was a temporary one as the hull has since been lowered into a storage pool to await conservation. The sprays made detailed inspection difficult and precise measurements virtually impossible. It was necessary to interrupt the water supply to perform certain duties, but such interruptions were limited to a few minutes each. Pools of water within the hull did not improve conditions.

Figure 2 illustrates the storage site. The hull was largely intact to the turn of the bilge. This section was still supported by the structure with which it was raised and transported, consisting of iron support beams, lifting cables, and cargo slings. The support structure and hull bottom rested on eight-inch sleepers. Detached hull members were stored nearby and were also under water sprays.

Figure 2: The storage site, showing the intact hull in its cradle (Photo by Alan Albright).

METHOD OF RECORDING AND RECONSTRUCTING

Hull recording, although limited by factors mentioned previously, had to be complete enough to provide a basic set of drawings to supply information needed by the conservator and the reconstructor, and to establish a fundamental catalog should further wood deterioration occur. A table of offsets was made to describe the intact lower hull shape, although the offsets included the distortion caused by the suspender slings. Because the lower side of the hull bottom was totally inaccessible and the clutter above made lateral measurements impossible in some areas, standard methods of taking off hull lines could not be utilized. Instead, an arbitrary reference line was established about two feet above the centerline of the keelson. Inside hull curvature was determined by noting the distance and elevation of planking seams from selected points along the keelson at approximately two-foot intervals. The relationship between these points and the reference line was then determined for each offset. Since the vessel was obviously built to the English system of mensuration, all data were recorded in feet and inches.

A set of hull lines could not yet be drawn from the resulting offsets because of existing distortion and insufficient hull area was examined. Additional offsets were taken from the standing outer frame faces on the port side. Several detached starboard frames were temporarily mounted in their original locations and measured, while a dozen detached frames from both sides were drawn full size on paper. Planking widths were recorded at 2 foot intervals, frame spacing and sizes were noted, and existing hull distortion was determined where possible. Keelson, stem, fastenings, and auxiliary members were dimensioned and located. Tool marks, distinctive structural procedures, and repairs were all recorded. Selected detached planks and a wale were measured and tabulated.

Not all the hull was accessible for inspection, nor was it deemed advisable to handle all the detached hull members. In some cases the bottom of the hull was too close to the concrete slab for measurement or scrutiny; even mirrors proved unsuccessful because of the water dripping through the bottom seams. Only selected detached planking and frames, those deemed necessary to a complete hull analysis, were studied in any detail. While it was tempting to record all these pieces, time and funding did not permit us to perform a task which will be duplicated in even greater detail prior to conservation. In addition, these old timbers had already been subjected to more than their fair share of handling; to further risk them by additional shifting and exposure to the hot sun without water was unnecessary at this stage. It was decided to learn as much as possible from the existing information and to then perform any additional recording under controlled conditions and the supervision of a conservator.

Three days were spent at the storage site, tabulating and studying hull details. This information was then taken to Institute of Nautical Archaeology headquarters at Texas A&M Research Center, where research, drafting, and modelmaking facilities simplified the preliminary reconstruction. Offsets and other data were converted into lines drawings. Unfair lines and erroneous offsets were "averaged out" to produce a set of harmonious lines. The lines were then transferred to a mould loft from which the reconstruction model was built. Using the remaining recorded data in constructing the model (planking shapes, fastening angles, frame shapes, etc.), errors in the original lines draft were soon recognized and corrected. All reconstruction work was done in 1:10 scale.

HULL CONSTRUCTION

The Bottom Planks

The hull was flat-bottomed and lacked a keel; its bottom structure was formed by three large planks. Only the center plank extended the full length of the hull and was laid first in the manner of a keel. A plank of equal thickness was edge-joined on either side of it with treenails of approximately 3/4 inch diameter. Figure 3 shows a pair of these treenails joining the starboard and center planks near the stern. Several more were reported seen when the hull was hoisted from the Black River, although these were the only two discovered during our survey. After the hull can be drained of its pools of water and sand scraped from the seams, a fastening pattern should become apparent. No other type of fastening was discovered, nor was any necessary because the planks were well secured to each other after the floors were installed.

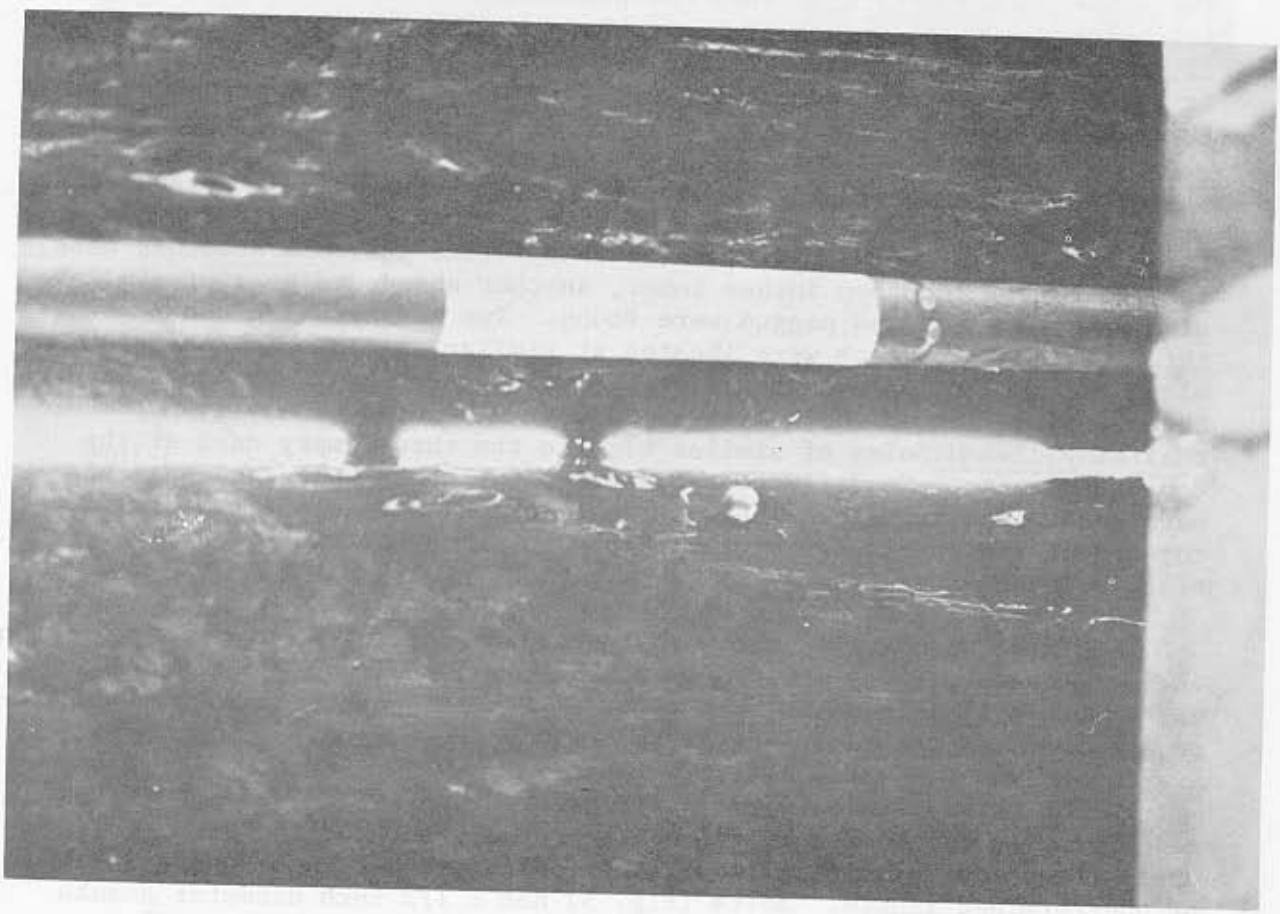

Figure 3: Two small treenails joining the edges of bottom planks (Photo by Alan Albright).

The three bottom planks were without butts and varied in thickness from 2 3/4 to 4 inches in thickness, with the greater dimension being more predominant amidships and the thinner cross-section occurring near the bow. Part of this variation in thickness may have been due to uneven trimming during construction, but the lower surfaces of these strakes appeared worn near the bow, as if from beaching.

The bottom planks were probably roughly shaped to their port and starboard curvatures at this time, although they could not have been finished until after the first side strakes were added.

The Stem

Perhaps the most interesting construction on the entire hull was that of the stem. It consisted essentially of three pieces: inner, main, and false posts. Figures 4 and 5 show the manner in which the three members were attached to the center bottom plank and each other. The main (outer) post contained the planking rabbet. Its maximum thickness was 4 1/4 inches at the rabbet, tapering to 2 1/2 inches where it joined the false post. Its maximum width was 23 1/2 inches where it joined the center plank; the center plank was only 2 1/2 inches thick here.

Approximately 4 1/2 feet of the main post survived. Its upper end was quite eroded and the entire stem assembly was twisted to starboard. Three holes, 5/16 inch in diameter, transpierced the main stempost near its rot line. Eighteen inches lower, another abandoned hole of similar size and one which was pegged were found. Two additional clusters of three pegged holes each were located at similar spacings and orientations along the rabbet. Although the pegs closing seven of these holes have been worn smaller at their exposed ends from erosion, there is no doubt that they closed holes of similar size to the three empty ones at the top of the stem. No definite explanation for these holes and pegs has been determined to date. The fact that each cluster was situated just forward of the upper edge of the planks entering the rabbet may be a clue, however.

The false stem served the dual function of strengthening and protecting the main post. It was moulded 5 inches at the heel and sided 2 1/2 inches where it joined the main post. The false post diminished in thickness forward at the same rate as the main post.

Two bolts and at least two nails secured the false stempost to its neighbor. As in the model, the nails probably secured the false post until the bolts were installed. These nails had 3/8 inch square shanks of undetermined length. Bolts (Fig. 5) had 1 1/2 inch diameter shanks and heads 1 3/4 inches in diameter and 5/8 inch deep. Slots with a length of 1 inch and slightly less than 1/4 inch width were cut near the end of the shank. Keys were twice as long as the diameter of bolt, and were tapered to enter, but not pass through, the bolt slot. Washers, 2 inches in diameter and a 1/4 inch thick, cushioned the bolt head and

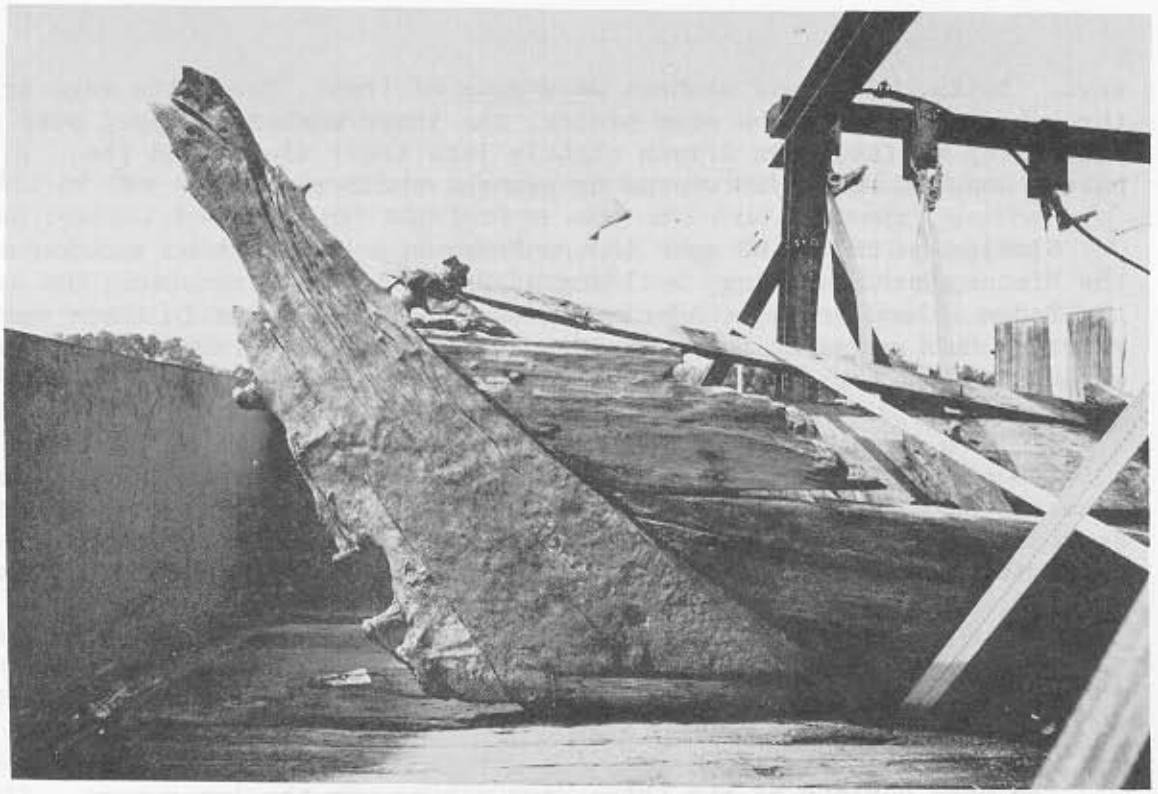

Figure 4: The surviving portion of the stem (Photo by Alan Albright).

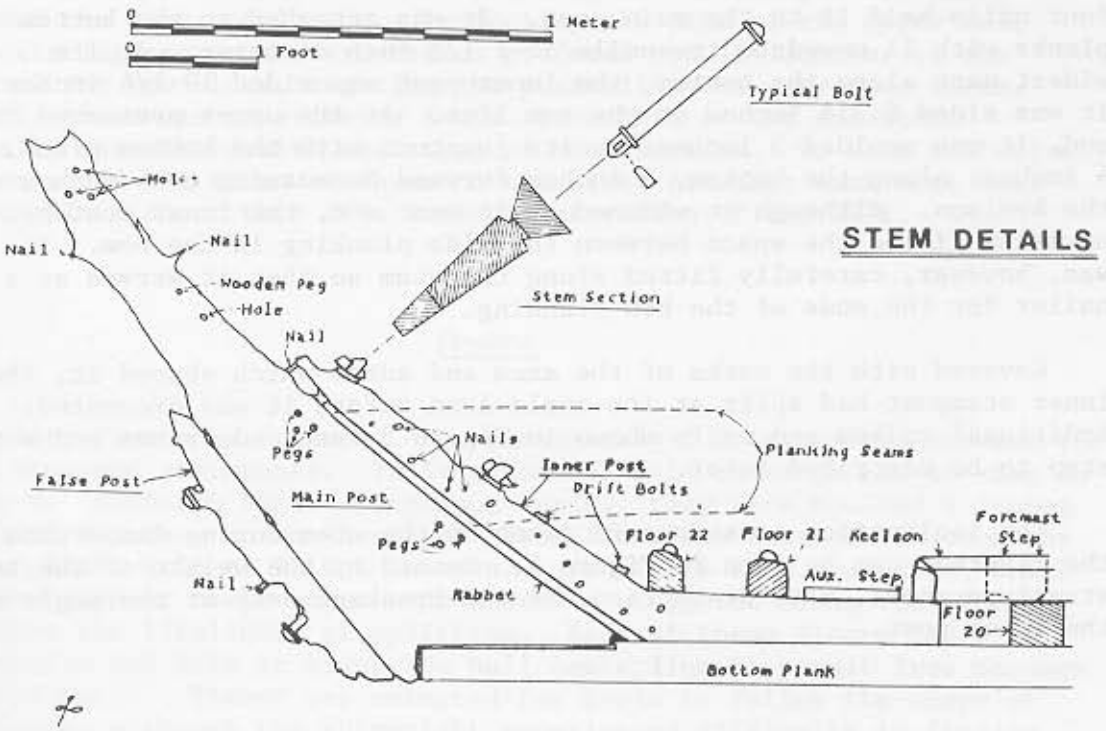

Figure 5: Stem details (Redrawn from an original by Darby Erd).

keys. Bolts, keys, and washers were made of iron. The bolts were driven through the holes of the stem pieces, the inner washers slipped over the protruding shafts, keys driven tightly into their slots, and the narrow ends of the keys twisted to prevent their removal.

Similar bolts can be seen in the Underwater Exploration section of the History and Technology Building at Smithsonian Institution; on the Padre Island wreck at Austin, Texas (Olds 1976); and in their earliest recorded hull usage at Bodrum Museum in Turkey, where rubber castings were made from the concretions of a 7th century Byzantine wreck (Bass 1971).

Two of these slotted bolts and two iron drift bolts held the three stem pieces together within the preserved area. Iron traces and a depression suggest the possibility of a third slotted bolt at the upper extremity of the main post.

Inner Stempost

The most curious of the three stem pieces was the inner post. (It can hardly be called a stem knee.) Its grain direction indicated it was selected from the juncture of a tree trunk and branch or root, although the grain did not perfectly parallel the bottom and stem directions. In addition to the four bolts previously noted, at least four nails held it to the main post. It was attached to the bottom planks with 11 unwedged treenails of 1 1/8 inch diameter. At its widest part along the bottom, the inner post was sided 19 1/4 inches; it was sided 6 3/4 inches at the rot line. At its upper preserved end, it was moulded 3 inches; at its juncture with the bottom plank, 4 inches; along the bottom, 5 inches forward decreasing to 4 inches at the keelson. Although it widened as it went aft, the inner post by no means filled the space between the side planking in the bow. It was, however, carefully fitted along the stem so that it served as a nailer for the ends of the bow planking.

Covered with the marks of the axes and adzes which shaped it, the inner stempost had split at its angle long before it was excavated. Additional spikes and nails shown in Figure 5 fastened frames and a step to be described later.

The inclination to starboard taken by the stem during dispersion on the riverbed can be seen in Figure 1. Caused by the weight of the heavy structure above, this distortion created breakage only at the angle of the inner post.

Sternpost

All of the upright portions of the sternpost and the aftermost end of the central bottom plank had broken away and disappeared. However, the surviving bottom part of the inner post, together with remaining frames and planking nearby, provided enough evidence to establish at least a partial understanding of the nature of the stern structure. It was similar to the lower end of the inner stempost, 5 inches thick at its broken (after) end and 3 1/2 inches thick at its forward edge. It was attached to the bottom with 7 unwedged treenails. As in the stem, this inner member did not fit against the side planking as it went forward, being only 13 3/4 inches across its widest part. The surviving length (34 1/3 inches) was the distance to the upright arm of this post, which broke away and permitted the surviving portion to erode slightly more.

Two iron bolts or spikes angling through the after extremity of the inner post fastened either a very short deadwood or the main post to this piece. Accessibility to the bottom of the hull may provide more information. It was the permeation of iron from these fasteners which saved the stern extremity.

Although the inner sternpost appeared similar to the inner stempost along its preserved length, it was sided 5 1/2 inches less at either end. Thus the lower part of the stern was narrower than the stem. Projecting the runs of lower side planking on the draught and model produced the same conclusion. Projecting the line of the upper hull from existing compound stern frames produced results similar to the shape of the bow sides, negating the possibility of a transom stern. In fact, there was no evidence for a stern knee or the deadwoods generally associated with that type of construction. We have tentatively reconstructed the stern as shown on the lines drawing; much more will be determined about this area during restoration of the hull.

Frames

Twenty floors were spaced on approximately 2 foot centers between the inner stem and sternposts. Their extent of hull coverage can be seen in Figure 6. Although their dimensions varied, they were moulded 4 inches and sided 5 inches on the average. Each floor was fastened through the bottom planks at 6 to 8 inch intervals with 1 1/8 inch treenails, which were unwedged at their upper ends and were staggered along the floors to reduce the likelihood of splitting. Each of these floors had a watercourse cut into it along the hull centerline to permit free passage of bilge water. Timber was selected for grain to follow the shape of the floors, although the shipwright experienced difficulty in finding such grain curvature among the u-shaped floors in the ends of the hull. No metallic fastenings were used to secure these floors, nor were there any fastenings present in the floor tops to suggest the installation of permanent ceiling.

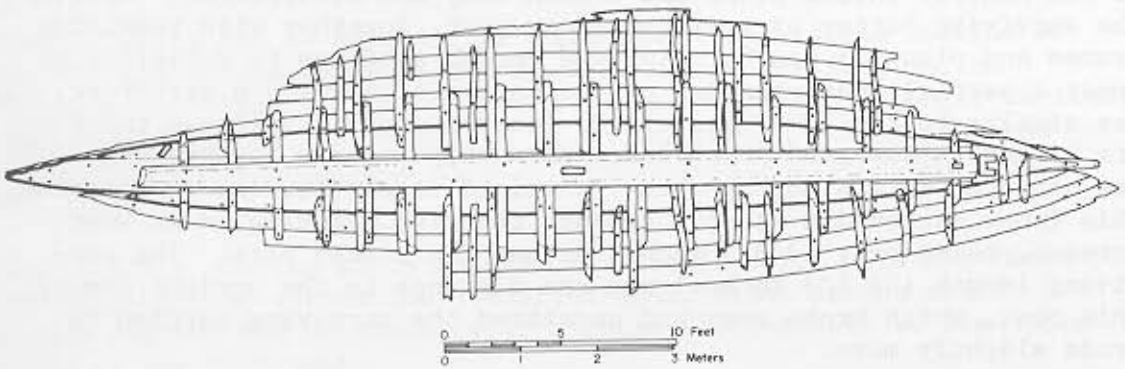

Figure 6: The intact portion of the hull (Drawing by Darby Erd).

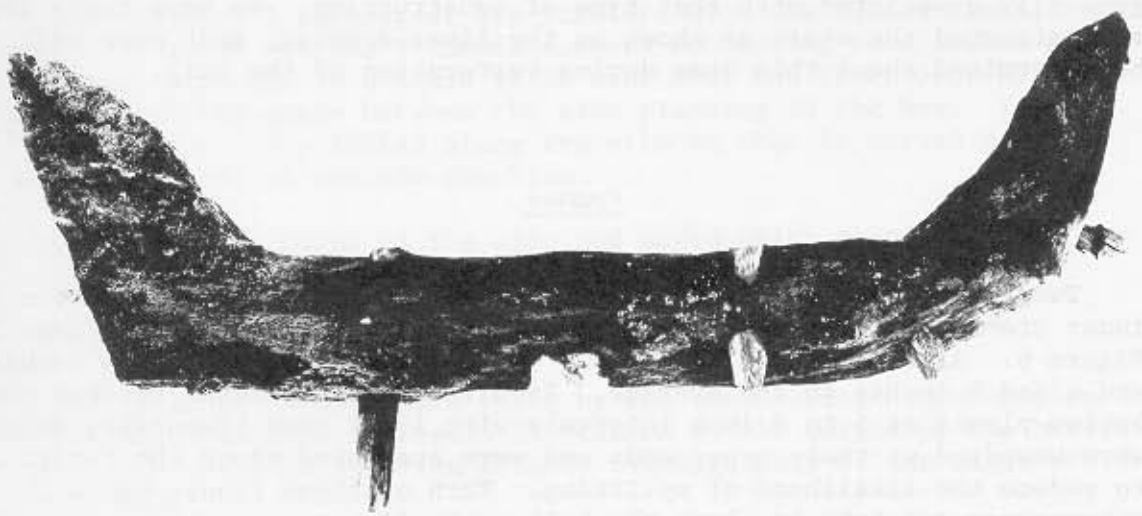

Figure 7: Floor of Frame #2 (Photo by Alan Albright).

At least 4 more floors were situated in the ends of the hull, 2 on top of the horizontal portion of inner stempost and 2 atop the inner sternpost. These sharply angled members may have been inserted only after the planking was completed, since they were nailed through the posts and into, but not through, the bottom plank. A single rectangular nail, 1/2 by 3/8 inches in cross-section, secured the forwardmost floor into the hull bottom while 2 such nails secured the floor directly aft of it. Similar fastening patterns were found in the stern.

Floors 1 through 20 had port and starboard futtocks set adjacent to their after faces. It is difficult to determine whether our shipwright took his frame shapes from a mould loft or simply laid down all the floors and added futtocks "by eye and by batten." We can be certain that the midship frame was completely erected before side planking was begun, since the first side strakes butt on futtock 13. On the other hand, futtocks as crooked as those on frame 14 would seem too difficult to work from a mould loft. We suspect, therefore, that the midship frame and probably every third frame afore and abaft it were erected first. Battens were then probably faired across their faces from the ends of the ship and the intermediate frames added. Frames in the ends of the hull were canted and unattached at the bottom, so that they could not have been installed before much of the planking was completed.

The midship futtocks nearly abut in the center of the hull, while in the ends of the ship futtocks barely step on the bottom planks. Figures 7 and 8 illustrate a typical floor and futtock. The heel of the futtock was treenailed through the bottom plank and was also laterally treenailed through its floor (see also Fig. 9). While the heels of the futtocks were fastened to the bottom planks with at least one treenail and often 3 or 4, only a few in the fore and after sections of hull were laterally fastened.

Intermediate frames and second futtocks beyond the floor arms added hull coverage where needed. Little can be determined concerning the framing in the stern, but nail holes in the bow describe that structure. Bow frames were canted forward of frame 20, but it would appear that their heels were attached only to planking. There was no evidence for breast hooks or other bow timbers.

Inner edges of frames were chamfered slightly to prevent splitting. Their outer faces occasionally had flats adzed into them to better seat the planking. Occasional traces of bark were found on some frames.

Planking

The hull was hard-chined along its ends and had a soft deadrise amidships. The centers of this transition occurred near frame 8 aft and at frame 17 forward. Thus the lowest side strake was vertical at the posts and nearly horizontal amidships, creating a complex seam

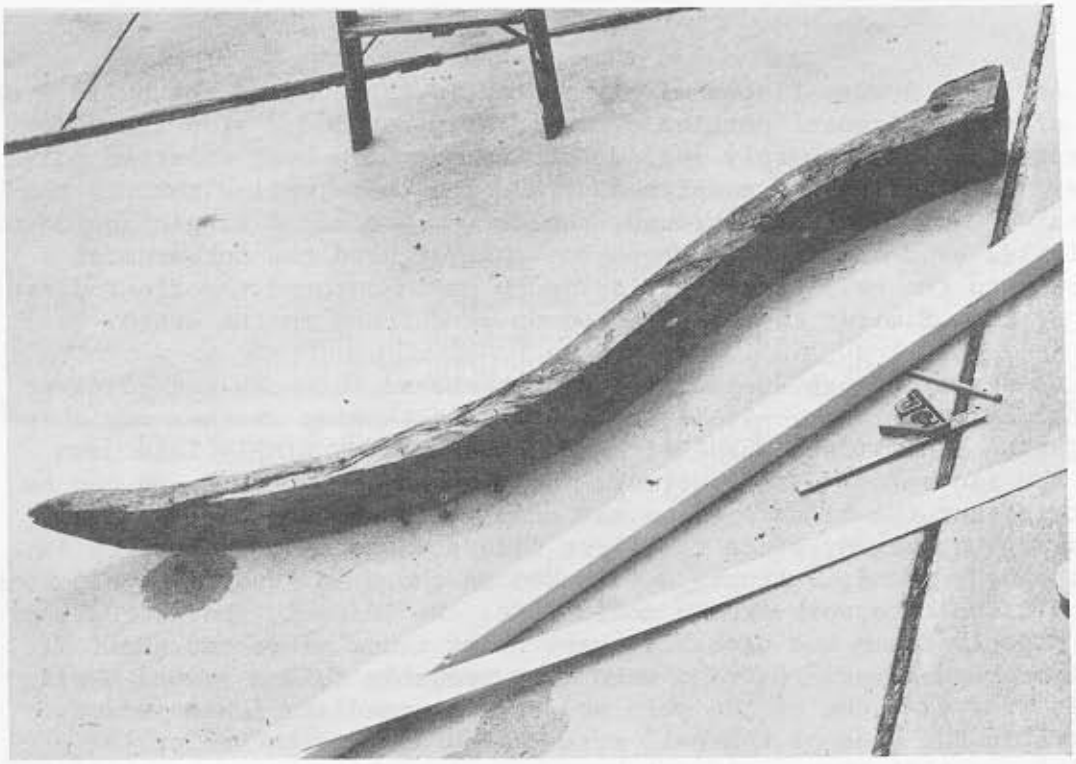

Figure 8: Starboard futtock of Frame #8 (Photo by Alan Albright).

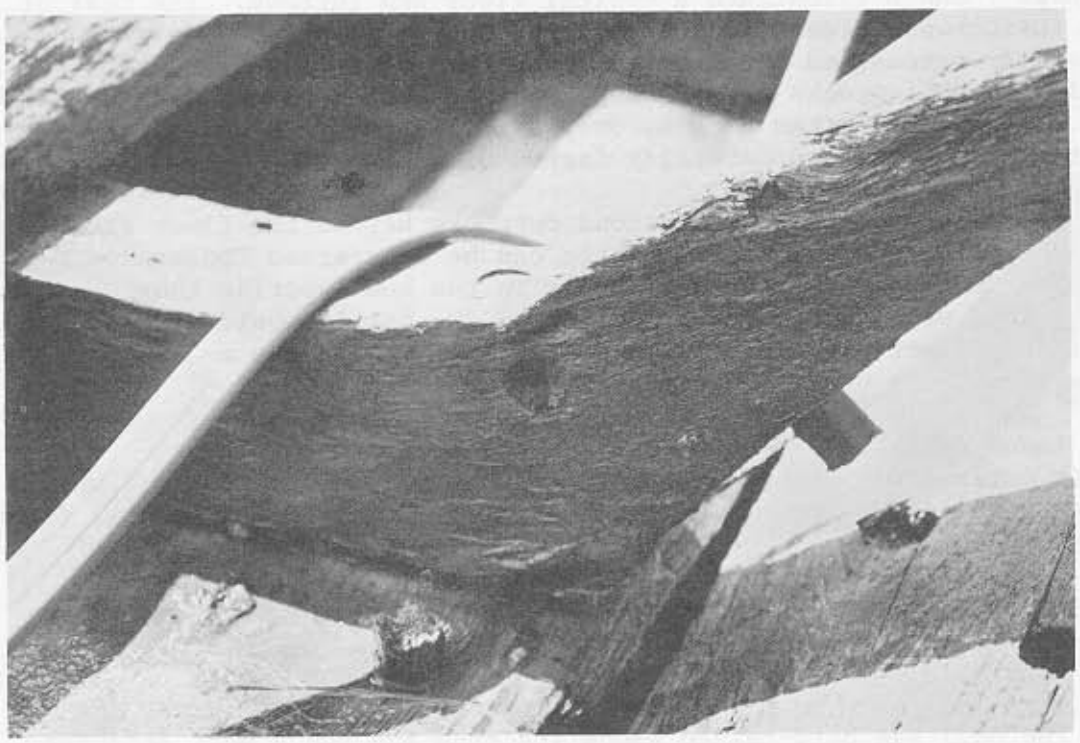

Figure 9: Floor and chine details (Photo by Alan Albright).

with the bottom planks. We had difficulty duplicating this seam on the model, but the shipwright did a masterful job on the prototype. In the bow and stern, the first side strake was set on top on the bottom plank, but as its attitude became more horizontal an angle was cut in both the strake edge and the upper edge of the bottom plank. The bevel cut into the bottom plank can be seen in Figure 9, where the chine angle is about 40° above the horizontal.

The lower side strakes butted on port and starboard futtocks of frame 13. They were both nailed and treenailed to floors and futtocks in an irregular pattern. For the most part, one treenail and one or 2 nails per strake per frame were used. Treenails usually had a diameter of 1 1/8 inches and were mostly unwedged. Where wedges were employed, they were 1/2 inch square and driven in the center of the treenail. Nails were of square, 1/4 inch iron. The lower strakes were in no way fastened to the bottom planks.

Side strakes averaged 1 inch in thickness, usually being somewhat thinner in the ends and often reaching 1 1/4 inches amidships. Their widths were well distributed and varied considerably, but they averaged about 9 1/2 inches. Butts were always placed on main futtocks, never on floors or intermediate frames. Planking was heavily nailed, but not treenailed, into the posts.

The curvature of the ends of the hull was rather severe above the fifth side strake, and considerable force was required to bend even these thin strakes into the rabbet. The shipwright made his job easier by slicing the inside surfaces of his planking (Fig. 10). We were at first surprised at this discovery and wondered whether the cuts weakened these planks. When the process was applied to our model, however, we found that much of the strength remained while the task of bending the strakes into the rabbet was greatly simplified. Not just any notch will do, of course; the secret is to make a very thin cut which is angled away from the direction of the bend.

Planking seams were well caulked throughout, although samples of caulking have yet to be removed and analyzed. Small square and rectangular wooden patches were found along some seams, especially near the butts. They seemed to have been used to repair split strake edges, a condition which may have been created during the removal of old caulking. A layer of pitch or resin coated the inside of the outer planking; outer planking surfaces also show traces of some sort of resin at widely scattered locations. These conditions were most noticeable on the upper strakes.

Our knowledge of the planking above the fifth side strake is still rather limited. Since some of this planking had to be cut away to facilitate excavation, it was difficult under prevailing conditions to determine exactly where a few planks butted and even where some of the shorter pieces belonged. Once conservation is completed, frames can be secured and the planking fitted to them with ease. We believe there were at least 8 side planks and a wale. Final determination can only be made by fitting them to the hull, as some of the planking which was

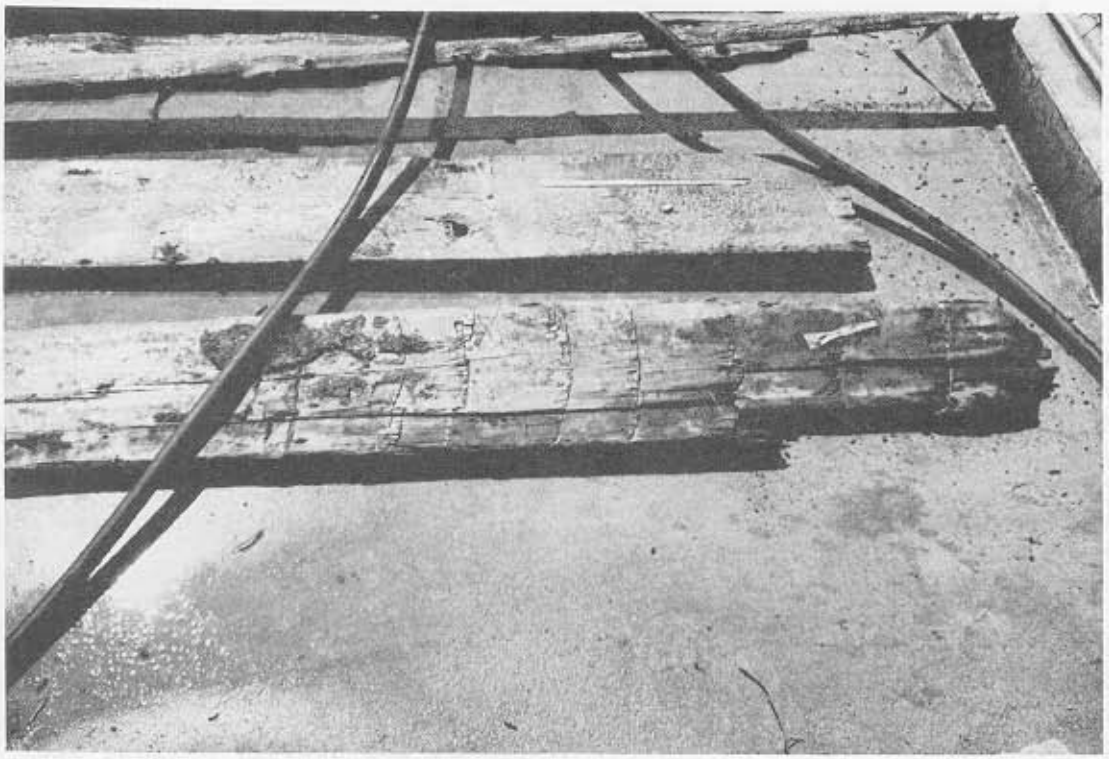

Figure 10: End of plank cut on inside face for bending into rabbet (Photo by Alan Albright).

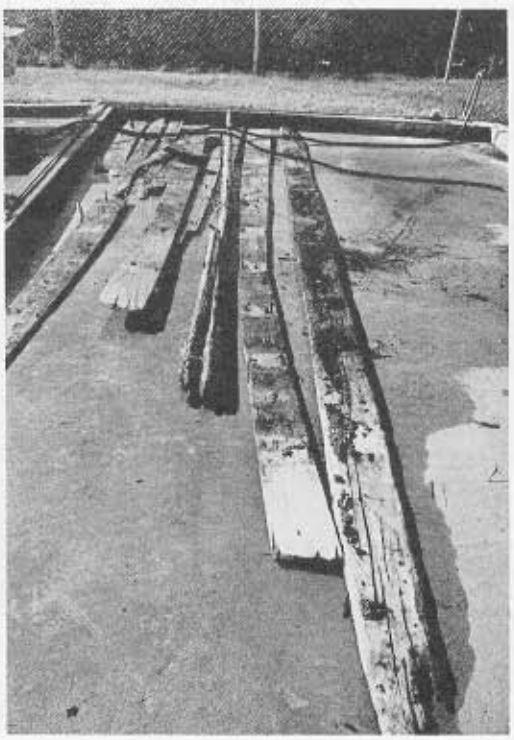

Figure 11: A sample of planking strakes. Surviving wale fragments in center of photo (Photo by Alan Albright).

already detached on the bottom has two eroded ends and will have to be fitted to the nails of similarly detached frames (Fig. 11). Planking was in relatively good condition, however, and no problem is anticipated in accomplishing a precise and convenient restoration.

The Wale

Two long, rounded timbers found just outside the flattened upper starboard side by excavators were originally thought to be parts of a caprail. They are more probably pieces of a wale, whose irregular grain pattern caused them to split in such a long diagonal fashion. From vertically driven spikes and an apparent overlap of the 2 pieces, we determined the original width of this wale to be between 7 and 8 inches. It was preserved to its original thickness of 3 1/2 inches. The surviving length of the two pieces, when joined, was 18 feet, 4 inches. One end had eroded to a mere 1-inch cross-section.

When properly fitted and laid along a straight edge, these pieces assumed a curvature nearly synonymous with that of the reconstructed sheer from midships aft. Two large vertical spikes and one horizontal bolt, the latter nearly as large as the stem bolts, were concreted into the wood. Numerous nails and treenails attached the timber to frames. Pitch still adhered to the surface, curious rubbing patterns scar two areas, and marks made by the shipwright's tools abound.

The protruding vertical spikes, perhaps used to secure chainplates or a caprail, would seem to suggest that this was the uppermost strake. The horizontal bolt may have secured a fitting or it may have gone through a frame and shelf clamp. Clearly, this timber warrants closer inspection when it has been cleaned and dried and can be scrutinized for longer periods of time.

Internal Scantlings

The keelson was cut from a single piece of cypress 36 feet, 6 1/2 inches long. Probably to provide more room in the hold, its depth was only 4 inches; it was sided 12 inches amidships, 10 inches in the bow, and 8 inches at its after end. Treenails fastened the keelson through floors and bottom planks. Two iron nails may have held it in place until treenails could be inserted. In most cases, 2 treenails per floor were employed and none of the treenails were wedged. The keelson was not attached to the stern construction in any way. Its after end terminated in suspension between 2 floors. Even in the bow, the single treenail driven through its starboard corner into the inner stempost provided little connecting strength.

The upper edges of the keelson were sharply chamfered to prevent their split by movement of cargo.

This timber served functions other than that of a keelson. It contained steps for both main and foremast. The main step was cut 12 by 4 inches, while the forestep (Fig. 12) was 5 3/4 by 3 1/8 inches. Both steps pierced the keelson. Surprisingly little wear was evident around either step.

The keelson also served as a chopping block, presumably for the cook. Hundreds of random axe or hatchet marks marred its top surface between the two mast steps. Small charred areas, as if made by ash from the galley stove, were scattered among the chop marks. Perhaps the cook cut his kindling on this solid and convenient timber. If a galley stove located in the bow were made of brick, its presence might have gone undetected, especially if it collapsed among the cargo.

A small auxiliary step (Fig. 12), cut from a plank 11 inches broad and 1 1/2 inches thick, was located just forward of the keelson and was nailed into the inner post with two iron nails. Floor 21 served as the fourth side of this step, perhaps supporting a bit. Its proximity to the stem and the height of floor 21 do not support the theory that it was the bowsprit step.

Fragments of ceiling planking were found among the cargo, but the ceiling must have been loosely laid atop the frames. There were no fastenings on the inner frame faces to indicate the attachment of any inside members with the exception of the keelson and possibly a clamp. The evidence for a clamp directly opposite or slightly below the wale was suggested by the existence of clusters of nails at the upper ends of several of the longer frames. Since these nails were located at the rot line, and the condition of both frames and nails was extremely poor, it was impossible to determine what they might have attached. However, their size and frequency seemed more appropriate for attaching a longitudinal plank than hanging knees. On the model, we have installed a shelf clamp for the purpose of supporting mast partner and deck beams. It was based on the information available to us, but should not be construed as totally factual in either size or location.

The remains of a lodge knee were found. Its curvature could only match that of the bow forward of frame 22. The presence of this knee might suggest the existence of a bow deck. We would expect the presence of a deck at bow and stern, but there was absolutely nothing among the remains to support or deny the existence of a deck throughout the length of the hull.

Figure 12: Details of small auxiliary step (Photo by Alan Albright).

ANALYSIS--THE LINES

Those not accustomed to preliminary reconstruction drawings may wonder at some of our variations from standard line drafts. The rabbet is not indicated because we have not fixed its precise angle and width in some parts of the hull. Since this drawing served also as a mould loft for the model, the sternpost, sheer, and upper bow have been reconstructed (Fig. 13). The evidence for these areas is largely secondary. No deck is indicated, again due to a paucity of information, and the rig is similarly treated. A dashed line above the sheer line suggests the possible existence of weather boards or additional planking above the wale. The crossed diagonals were used for fairing the model's frames and to study the peculiar bulge in the surviving hull. Stations are not spaced equidistantly; they are situated at the points of measurement for the table of offsets derived at the site, and are mostly located about two inches forward of the individual floors. Frame 13 served as the midship frame.

Although an attempt was made to interpolate the twisted portions of the hull, the preliminary lines undoubtedly contain a certain amount of distortion and are subject to some revision when the final plan is drawn. Part of this distortion may have been inherent, but most of it was due to the hull's sojourn on the riverbed and the excavation process. The greatest errors can be expected in the extreme ends of the hull and in the upper sides of the quarters. None of these errors are so great, however, that the preliminary lines do not represent a true picture of the shape of this vessel. The corrections can be easily made when fastenings and planking edges are aligned during physical reconstruction.

It has been suggested that this hull is similar to that of the gundalow PHILADELPHIA displayed in Smithsonian Institution. Nothing could be farther from the truth, the only major similarity being that each had a flat bottom. The PHILADELPHIA is hard-chined throughout, is separately framed on bottom and sides, and is of extremely simple design and build. Conditions at Lake Champlain demanded a craft. The cargo vessel at Brown's Ferry, on the other hand, was both simple and complex in design and construction. Its form was not quickly decided to meet an emergency, but evolved slowly and thoughtfully in a competitive atmosphere.

The Brown's Ferry vessel was flat-bottomed and keelless, apparently for the purpose of reducing draft. Our designer desired to keep his hold volume as great as possible, maintaining rather full sides as far fore and aft of midships as was feasible. The result was a complex framing plan for so small and simply appointed craft, employing softly rounded hull sections amidships, compound shapes in the quarters, and pointed bow and stern.

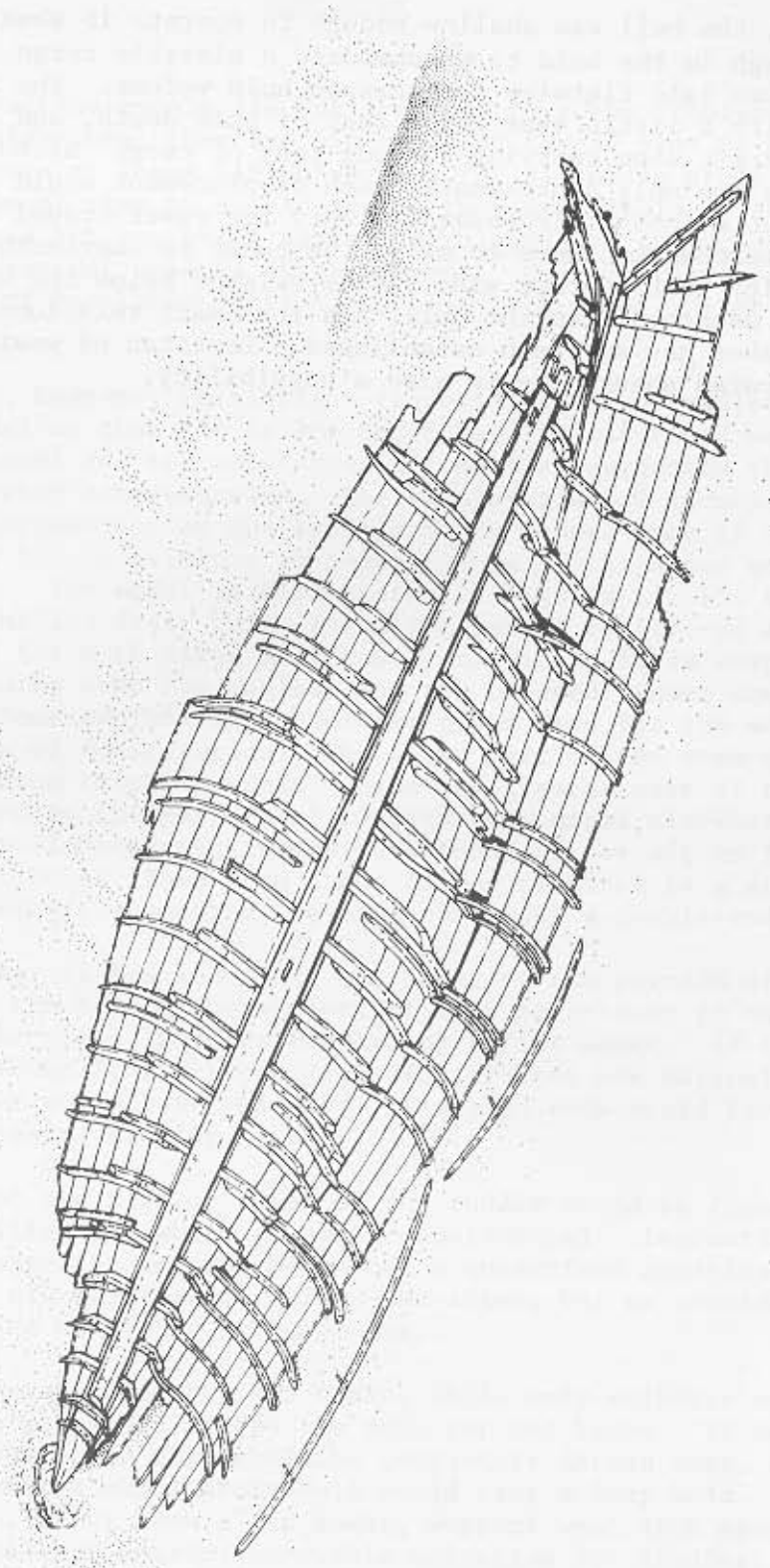

Figure 13: A reconstruction of the sternpost, sheer and upper bow (Drawing by Darby Erd).

Thus, the hull was shallow enough to operate in shoal waters but full enough in the hold to accommodate a sizeable cargo. Even the keelson was laid flatwise to increase hold volume. The drawing indicates a hull with a little over three feet of hold depth, and less than three feet of draft when carrying 25 long tons of cargo. Although our calculations are only approximate, such displacement would give the vessel only about a foot of freeboard--plenty for river travel but a bit slight if this merchantman were to skirt the coast to Charleston. There is a possibility that another side strake existed below the wale, since the wale was detached from the hull, and its exact relationship to other side strakes has not been established. Erection of weatherboards above the indicated sheer line is also a possibility.

THE MODEL

Our reconstruction models are built solely to solve problems. When we are finished with them, they are discarded or turned over to nautical archaeology students at Texas A&M University for classroom study. Made from a cheap grade of pine to a 1:10 scale, they are highly detailed in investigative areas but are never sanded, varnished, or subjected to any other processess not used in the prototype. Nor are they completed beyond the scope of our investigation, so that such models never become museum pieces.

In this case, however, Mr.Albright requested that we complete the now-abandoned model so that his fellow South Carolinians could better understand the vessel and its appointments. He also suggested that it be rigged for further comprehension. The resulting model incorporates our ideas of the appearance of the Brown's Ferry vessel when it sank, although there is little evidence to support some of the areas we were required to include. The model is illustrated in Figures 14, 15, and 16. It shows a low, shallow draft hull--a sailing barge, really--of a type possibly intended for both river and coastal sailing. It is complete even to the axe marks atop the keelson and the crooked frames shown in the wreck plan. Some explanation should be given here for the more hypothetical areas of construction. The upper part of the stem was merely projected from existing areas, while the greater part of the sternpost was based on the pattern of construction noted elsewhere in the hull. Since well preserved frames were found as far aft as frame 2, and the projection of lines from these frames resulted in a stern that was almost certainly pointed, we made our model a double-ender.

The steep sheer in bow and stern was based on the pattern of planking lower in the hull. The shipwright made no attempt to narrow his planking at the posts in order to develop a flat sheer. If the planking pattern found in the first five side strakes was maintained, the suggested sheer would have resulted. The high ends would have been well suited for coastal sailing.

Not a hint for the size or shape of the rudder could be found, so that we have installed one which is purely conjectural. Leeboards have often been suggested and may have been a convenient addition, especially if the rig was that of a fore-and-after, but we considered such an installation to be too presumptuous.

Decks were installed at bow and stern, while only walkways covered the hold along the sides and across the main partner beams. It seems unlikely that so shallow a hold would be completely decked over, and equally unlikely that a shoal draft hull would have a deep hold. A single shelf clamp, along with a few knees, support what deck beams were necessary. Weather boards, removable amidships for loading, offered additional freeboard for coastal travel. A small galley stove, made of brick and situated under the foredeck, supported culinary efforts.

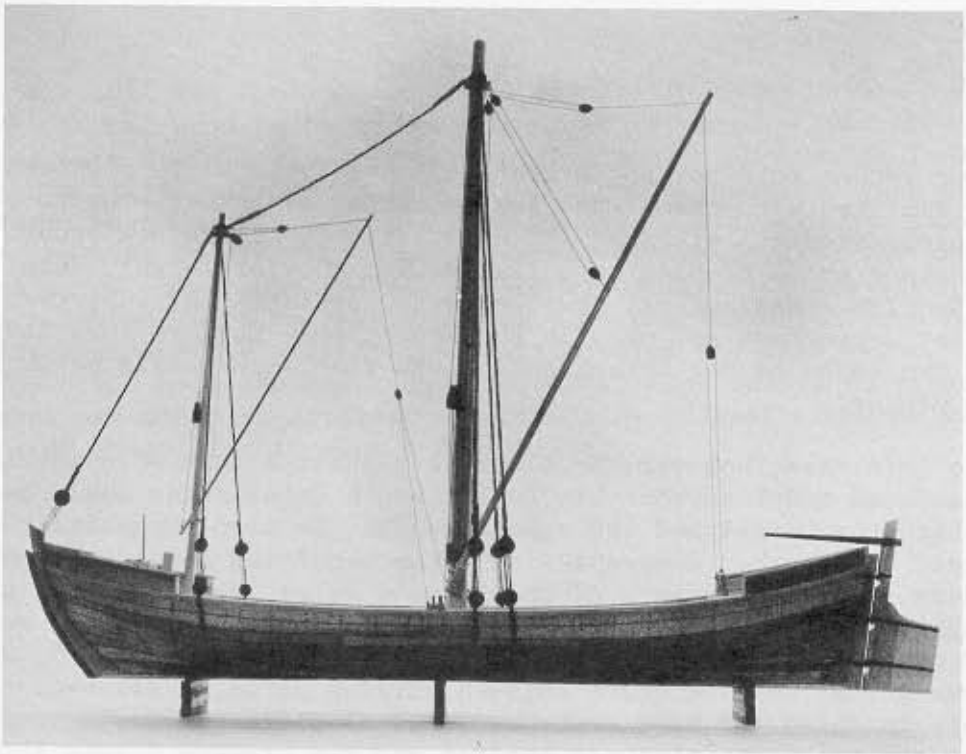

Figure 14: The completed model. Rigging, rudder, and topside details are conjectural (Photo by Gordon Brown).

Figure 15: Stern view, port side (Photo by Gordon Brown).

Figure 16: Bow view, port side (Photo by Gordon Brown).

The single block found with the wreck helped little in defining the rig of this vessel. The two mast steps in the keelson have prompted many to declare that this was certainly a cat schooner. Such suggestions might be based more on nostalgia than supporting evidence. The rig could have taken any number of two-masted forms, with or without bowsprit and leeboards. She could well have been square-rigged, using the main exclusively when sailing off the wind (Baker 1962). Or she could have sported square tops and fore-and-aft lower courses. If completely fore-and-aft rigged, a number of variations would have been possible in this period. There is not yet sufficient evidence to establish precisely how she was rigged.

The rig on the model, although totally hypothetical, was based on our limited research of period coastal trading in the South and upon the working of the vessel as we envision it. To begin with, designer, builder, owner, and skipper might well have been one person. Such was frequently the case with American coastal and river craft, the crew often consisting of family members. Teredo damage indicated the vessel must have wandered beyond the confines of the Black River; she may have been one of many coastal vessels supplying ports such as Charleston with building materials, farm products, and cargoes to be forwarded to deepwater ships. As such, her crew could be small and her speed relatively unimportant. We see her as a vessel which may have occasionally run her flat bottom on a bank to load where docks did not exist; to float downstream with the current and upstream with the tide, using the poles and oars we saw to keep off the banks or provide propulsion when wind and tide failed; and finally, to beat along the coast to Charleston, or an other port within her reach, as safely and conveniently as possible.

To meet all these conditions we gave her a sprit rig. Such a rig will not satisfy many, to be sure, but at least it is one which could be easily handled by a very small crew (perhaps only two or three in this case) and would satisfy the requirements for sailing along the coast as well as among fickle river winds.

CONCLUSIONS

What is the value of such a small, unimpressive little freighter? In my opinion, it is the most important single nautical discovery in the United States to date. In the first place, it establishes primary evidence for American shipbuilding nearly fifty years earlier than previous discoveries. More importantly, this was a merchant hull, built without the anxiety, bureaucracy, and inefficiency often associated with vessels of war. As such, it defines everyday technology in a competitive atmosphere. Additionally, this was a local type--important to any maritime scholar--representing a period and area in which far too litle maritime information has been forthcoming.

The southern colonies had farmland, timber, deep rivers, and seaports. Certainly, South Carolina and neighboring states must have been heavily involved in shipbuilding and waterborne commerce. In some respects, these ventures must have been as impressive as the well-documented maritime ventures of New England and the Chesapeake. Hopefully, the Brown's Ferry vessel will signal the beginning of more fruitful research into those Southern maritime activities.

SUGGESTIONS

There remains the question of "where do we go from here" The most pressing problem is that of conservation. The hull remains continue to suffer some deterioration, even though they are soaking in fresh water. There is little advice I feel qualified to advance concerning the method of conservation, merely that it be done as quickly as possible.

Once conservation is completed, reconstruction of the hull should be a relatively easy matter. Physical reconstruction of the hull will take four to six weeks, depending upon the type of supporting structure and accommodations provided. The hull can be displayed on a variety of stanchions and blocks, a method similar to that used for the PHILADELPHIA being the most practical and probably the most economical. The hull can be fastened with either stainless steel rods and pins or with treated wooden pegs; either type of fastening can be inserted so as to be largely invisible.

Cosmetization will require another week to ten days, but can be handled by inexperienced help under the supervision of the conservator. I do not foresee the materials and equipment needed for assembling and cosmetizing the hull to cost more than a few hundred dollars, provided tools such as electric drills, C-clamps, and hand tools can be borrowed for the job. These estimates are based on the assumption that the ship will suffer little or no further damage.

The hull is in such fine condition that conservation, not reconstruction, poses the major obstacle in time and expense. Perhaps a publicity campaign, making more people aware of the historical value of this vessel, would help with funding, and public relations. The technical aspects of preservation can only be solved by a conservator.

One can make all manner of suggestions for displaying the hull and its artifacts, but such suggestions would be premature here. The model complementing this report should eventually be replaced, however, with one of museum quality.

One thing is certain--the Brown's Ferry vessel is far too important a piece of Americana to be neglected. Its secrets of early American technology should be shared by all. I suggest that continuing efforts be made to insure prompt and efficient preservation and display.

It has been called to my attention that interest is being generated concerning the construction of a replica of this vessel. I suggest that a replica NOT be built solely on the information from this report. Only three days were spent at the site in order to gather information presented here. The study was aimed toward developing a basic understanding of the hull construction and answering certain questions concerning reconstruction procedure. While the report has accomplished

this goal, it is not complete enough to establish the many details necessary to construct a full-scale replica. Similarly, the preliminary lines drawing should be expanded and a construction plan developed for such an undertaking.

This information could be acquired, of course, but only with more detailed investigation of the remains. For instance, it does not seem proper to construct a replica without knowing exactly how many strakes of planking made up the sides, whether shelf clamps existed, etc. To answer such questions, it would be necessary to study certain parts of the hull much more thoroughly than we were able to do at Fort Jackson. I doubt the intact portion of hull would have to be disturbed, as we already have documented that fairly well; but it would require a careful examination of all the loose remains, which we were reluctant to scrutinize for fear of their drying out.

Even though conservation is not close at hand, the following suggestions might prove to be a feasible solution to the problem.

1. Build a long, shallow tank, large enough to hold the planks and frames in question and shallow enough to study them while they are submersed. It could be a temporary affair, such as a plastic-lined wooden trough. These members could then be raised individually, carefully examined without risk of drying, and then returned to the pond.

2. Since the time and expense has already been invested, the preconservation drawings might well be done at this time. Thus the data needed for the replica and also for permanent excavation records could be combined in one operation, provided damage or distortion of timbers does not follow. Since most of the detached material is large, the work should progress rapidly.

3. With sufficient information from step 1, a construction plan and set of specifications could be drawn up from which a replica could be more accurately built.

Prior to conservation, we can only accomplish the necessary study of hull timbers by keeping them completely wet and sheltered. I am sure there are other solutions, but the above method is one way to proceed. The important fact to remember is that this first report is not, nor was it intended to be, informative enough to enable the construction of so elaborate and expensive a replica.

APPENDIX A

PRINCIPAL DIMENSIONS AND SCANTLINGS

Length	
between perpendiculars (sheer)	50 feet, 5 inches
Length	
along the centerline of the kingplank	45 feet, 9 1/4 inches
Breadth	
extreme	14 feet
moulded	13 feet, 5 inches
Height	
bottom of kingplank to sheer amidships	3 feet, 10 1/4 inches
to sheer at bow rabbet	6 feet, 6 3/4 inches
to sheer at stern rabbet	7 feet, 5 1/4 inches
Depth	
in hold (est.)	3 feet, 1 1/2 inches
Draft	
afore and abaft	2 feet, 10 inches
Burthen - c.	30 tons
Bottom planks	
of yellow pine	4 inches thick
Frames	
of oak, floors sided	±5 inches,
moulded	±4 inches
futtocks sided	±4 inches
moulded at the head	±4 inches
moulded at the heel	±2 1/2 inches
Posts	
of oak - dimensioned as in text	
Planking	
of pine	1 inch thick
Wale	
of cypress	3 inches thick
	±7 inches broad
Keelson	
of cypress, moulded	4 inches
sided	12 inches amidships,
	10 inches in the bow,
	8 inches in the stern

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