

The basque whaling ship from Red Bay, Labrador: a treasure trove of data on Iberian atlantic shipbuilding design and techniques in the mid-16th century

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A 16th century Basque whaling ship is the oldest European wreck yet discovered in America, north of Florida. Believed to be the *San Juan*, a *galleon* or *nao* sunk in 1565, the wreck was relocated in September 1978 by a Parks Canada team in the harbour of Red Bay, Labrador. It was discovered mostly buried, in an excellent state of preservation, in water 25 to 40 feet deep, some 100 feet from the inner shore of Saddle Island, at the entrance to the harbour. Loaded with hundreds of *barricas* originally filled with whale oil, the wreck was lying near a series of rendering ovens on shore.

From the autumn of 1978 until the early winter of 1985, the wreck site became the object of one of the most painstaking underwater archaeological projects undertaken anywhere. Typically each field season was 5 to 6 months long, and a total of 14000 hours of diving in Red Bay's icy arctic waters were amassed during the project. The end result was the full excavation of the site, including the dismantling and raising to the surface of 3000 timbers which were meticulously recorded in laboratory conditions and then reburied systematically on the site, in a manner which will preserve them. Since the completion of the "First Dig" over a decade and a half ago, our team of archaeologists and researchers has conducted a methodical "Second Dig" through the collected archaeological and archival data. One of our principal goals has been to understand and explain the design and construction of this 16th century ship of Iberian peninsula origin.

Parks Canada's Red Bay research has yielded a report of 3000 manuscript pages, illustrated with more than 1200 elaborate drawings, maps and photographs: putting the finishing touches on the report, which will be submitted for publication shortly, has preoccupied our team and has prevented us from contributing in due fashion to the symposium proceedings *Archaeology of Medieval and Modern Ships of Iberian-Atlantic Tradition*. At the suggestion of the editor, however, we have submitted an illustrative overview of our findings: 30 of the 1232 illustrations to be included in the final report.

Some of these illustrations are photographs of the 1:10 scale archaeological research model we developed following Richard Steffy's pioneering approach, while others are line drawings, site maps, and photographs. Most have been chosen to illustrate diagnostic elements of the 204 *tonelada* Iberian ship as found at Red Bay, particularly features in the midship and stern sections of the ship.

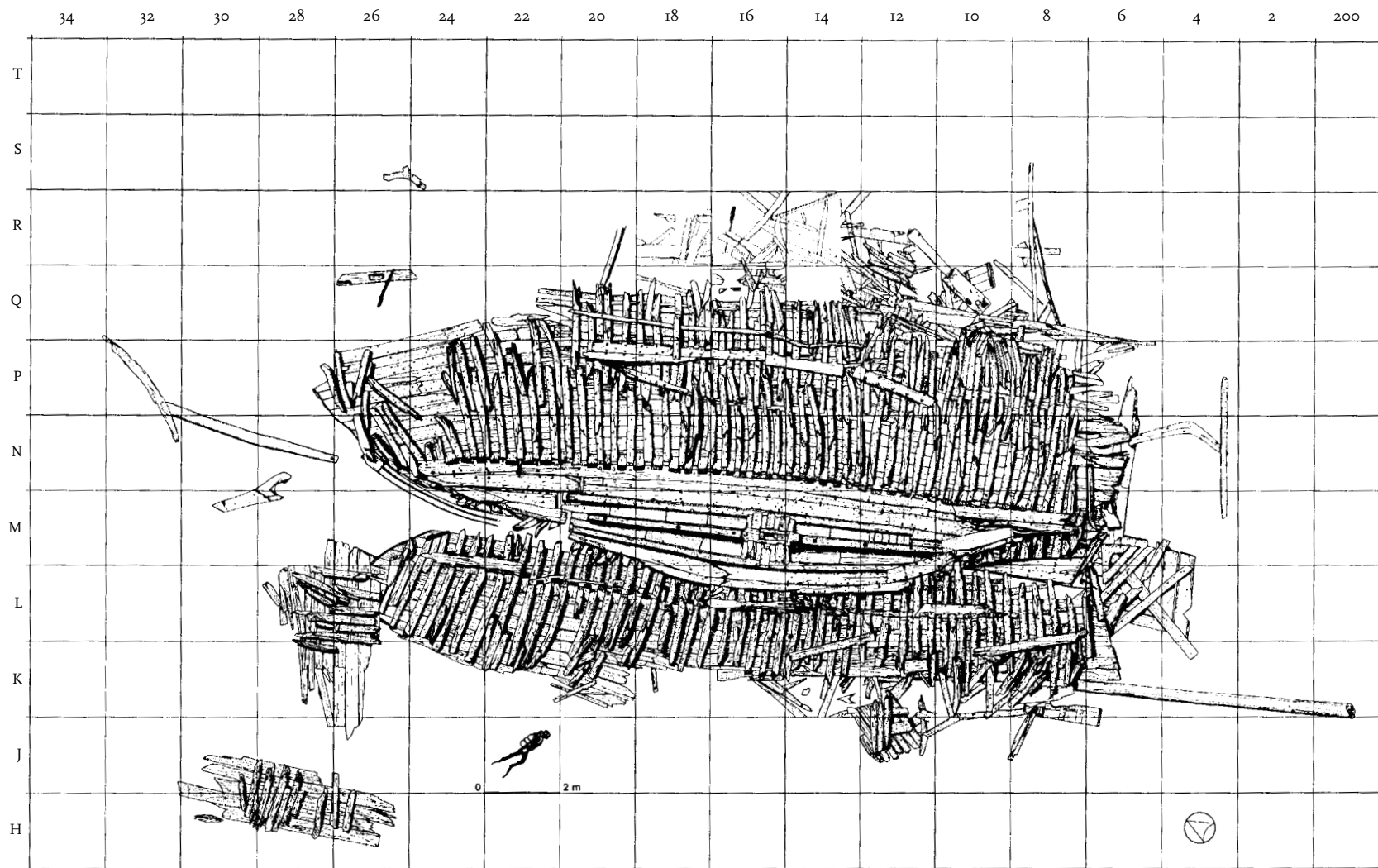


FIG. 1 – Site plan showing mostly articulated structural remains, exposed following the excavation of the hull interior. From left to right down the centreline are: the bowsprit, leading to the gentle curve of the stem, the keelson and main mast step, followed by the lower end of the stern post and the collapsed transom. The longitudinal timbers on the upper middle section indicate the level of the lower deck (Drawing: P. Waddell, Parks Canada; 24M-84-101-07).

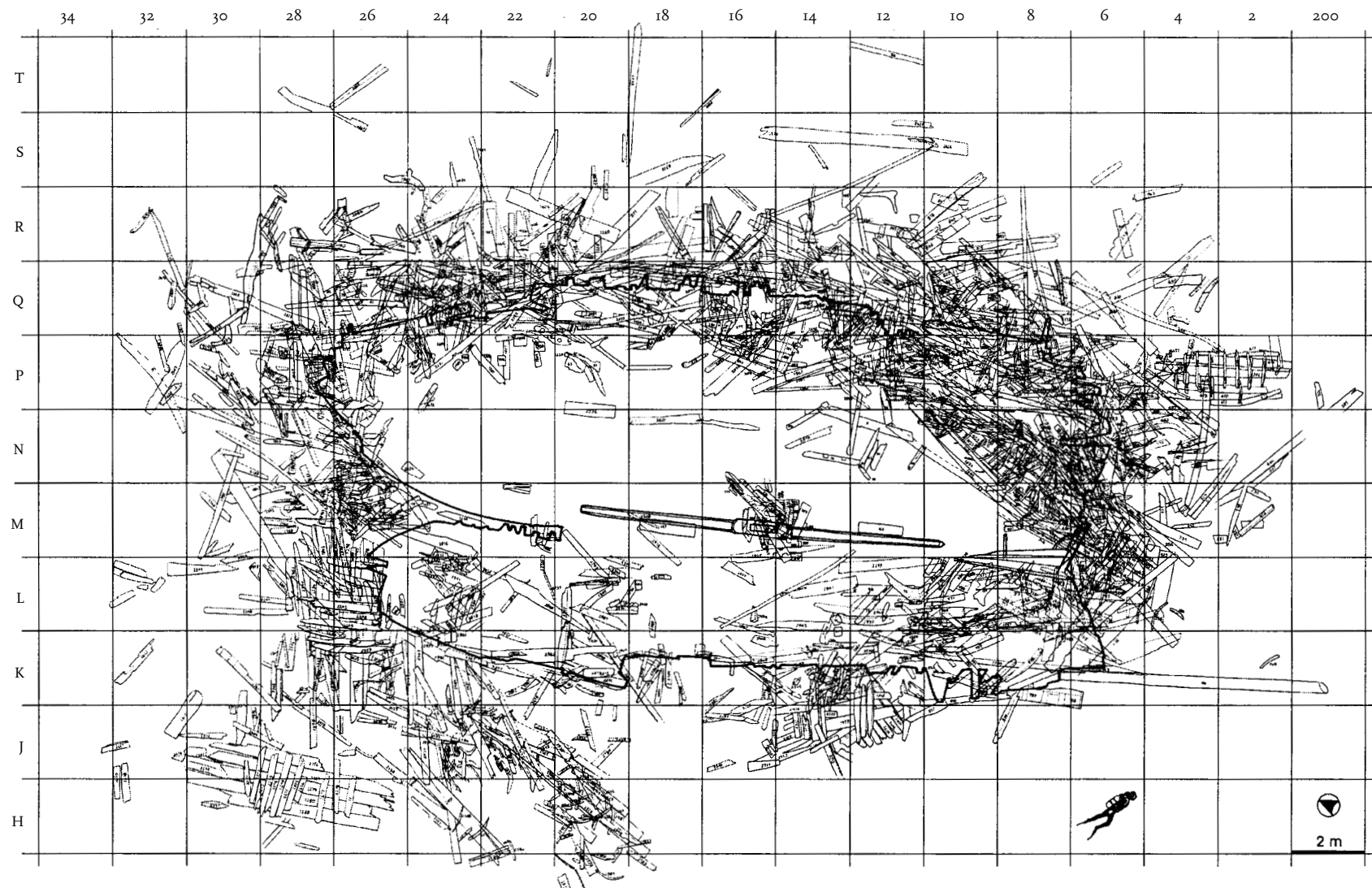


FIG. 2 – Scattered timber plan representing two-thirds of the nearly 3000 timbers recorded on site. The keelson and outline of the articulated hull, which covered much of the loose timbers, is shown superimposed (Drawing: Parks Canada; 24M-2000-101-2).

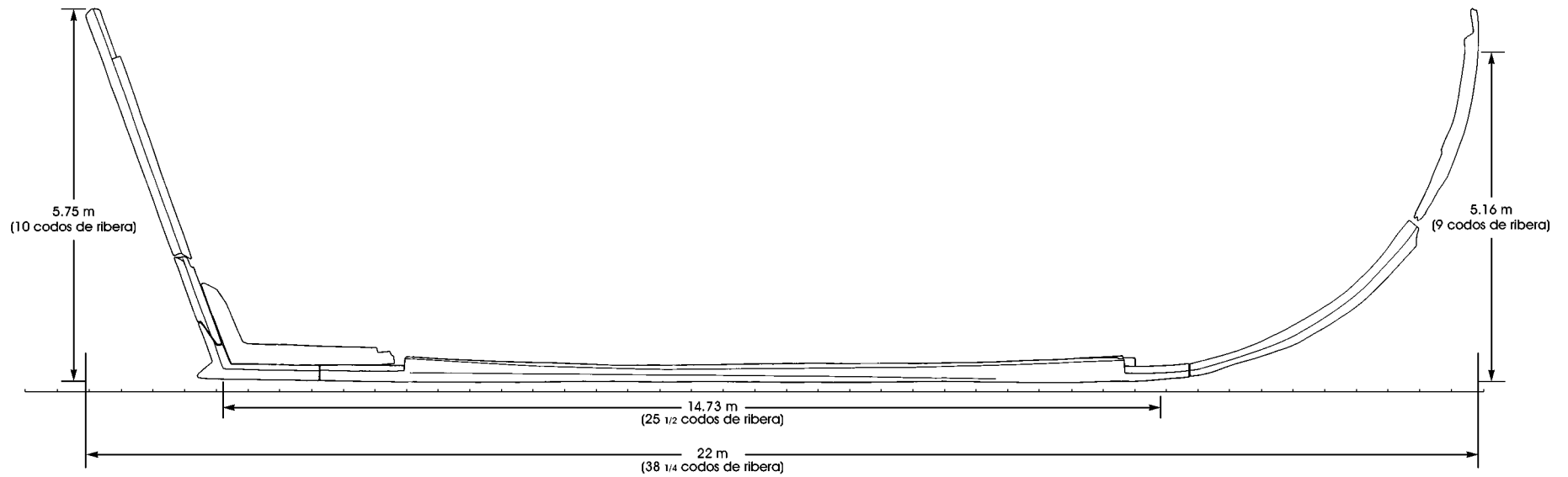


FIG. 3 – Profile of the principal timbers, showing their basic dimensions. The stem conforms roughly to an arc of 9 codos (5.16m) radius, reflecting the height of the stem at its forwardmost point. The keel length (14.73m) is presented here as a measurement between the upturn in the keel rabbet at stem and stern. At the stem this corresponds to the aft end of the keel-to-stem scarph (not visible) while in the stern this occurs at the upturn of the heel timber (Drawing: C. Piper, Parks Canada; 24M-94-103-2).



FIG. 4 – During the excavation, construction of a 1:10 scale model of the hull remains was commenced, following Richard Steffy's pioneering work on this research process. This is an outboard view of the starboard side of the archaeological model, mostly up to the waterline. Model maker Marcel Gingras is shown behind. Only selected framing and planking is in place (Photo: D. Pagé, Parks Canada, RD-4459T).

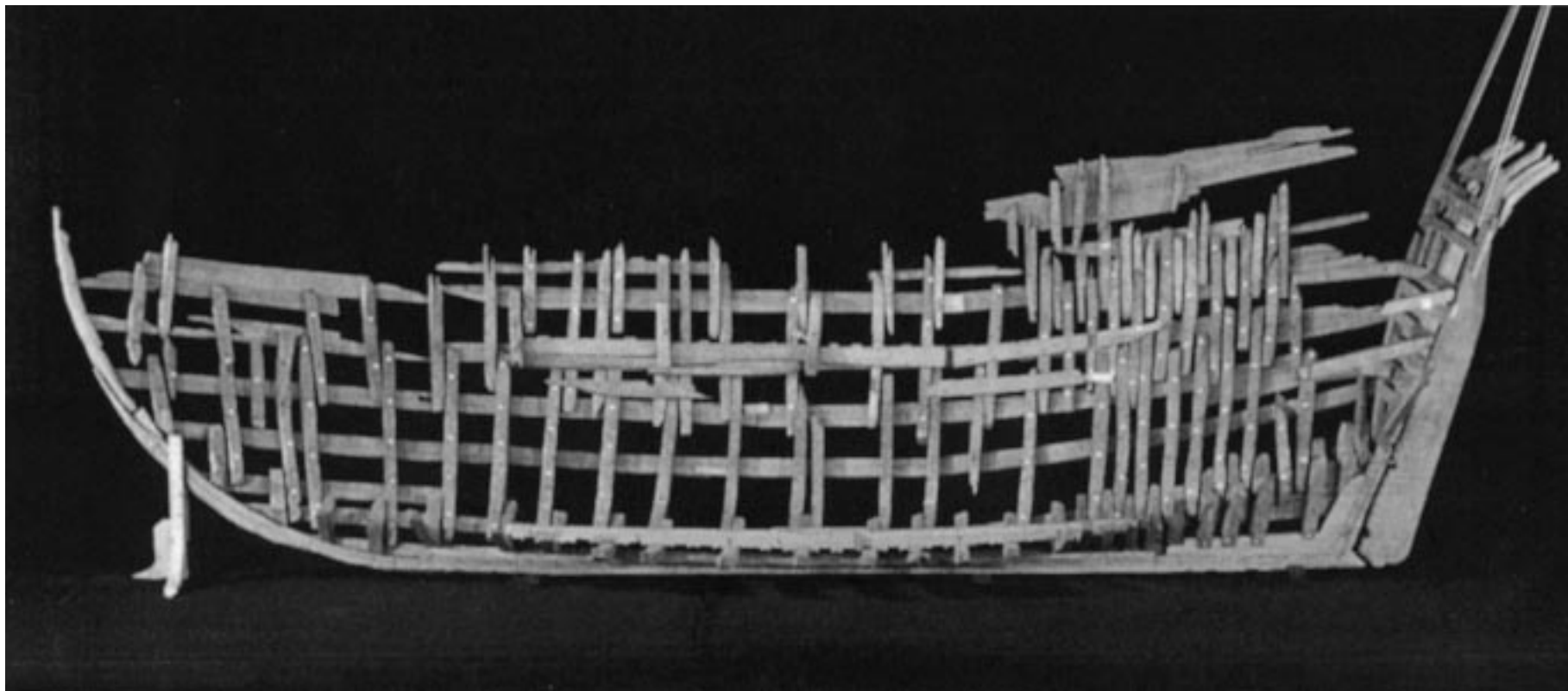


FIG. 5 – Inboard view of the starboard side of the model with selected frames and planks in place. The floors and first futtocks of fourteen midship frames, from the 7th aft to the 6th forward of the master frame, were pre-assembled and laterally connected at dovetail joints (Figures 9 – 13). ‘Floating frames’, as in shell-first construction framing method, were not laterally connected and are evident on the model at the level of the second futtocks from bow to stern and at the level of the first futtocks fore and aft of the central pre-assembled frames. The white dots show mysterious inner ‘plugs’ linked to the design and construction process (Photo: D. Pagé, Parks Canada, RD-4458T).

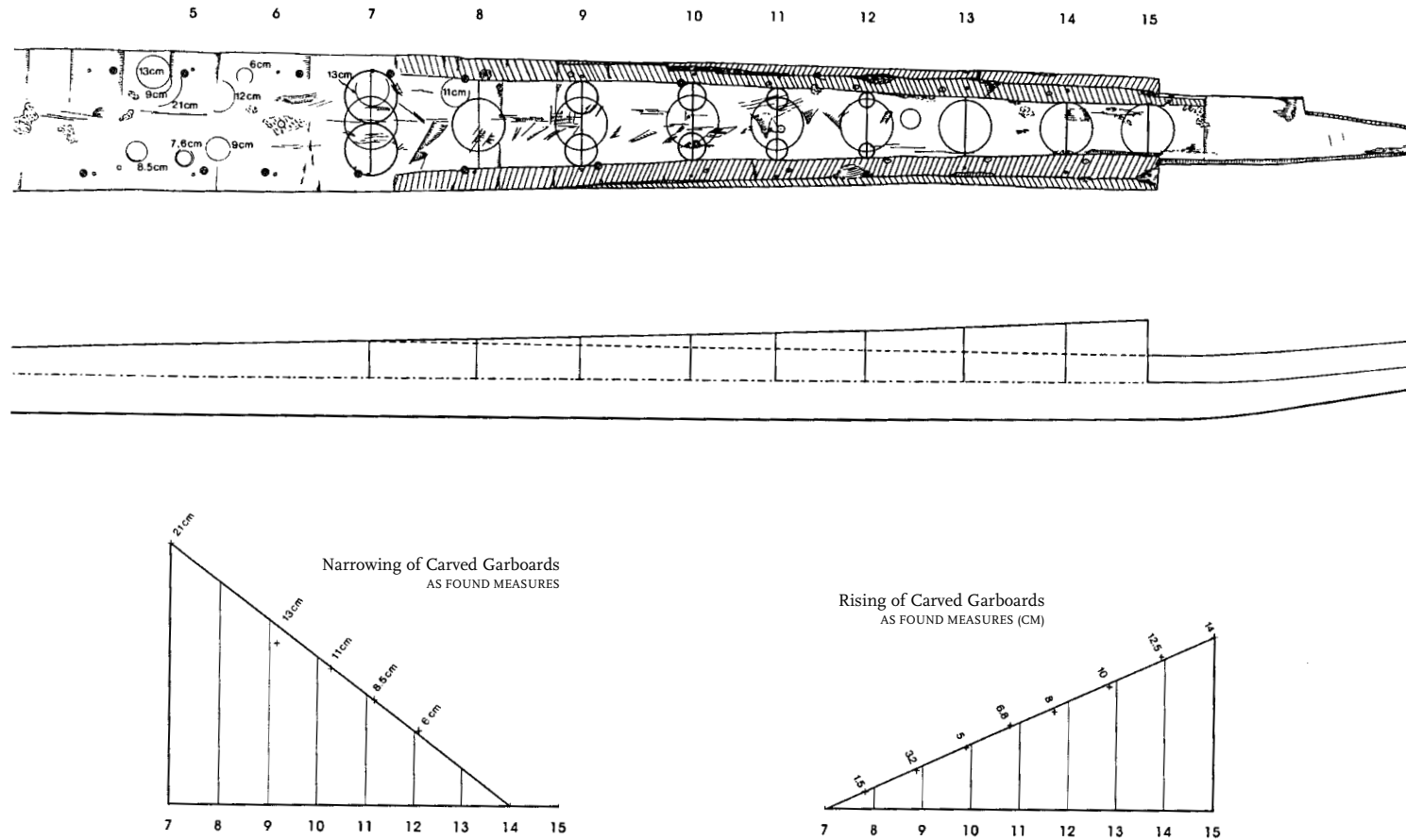


FIG. 6 – Schematic drawings showing the forward end of the keel, in plan and in starboard profile, at the positions of the 7th – 15th frames forward of the master frame. They show the keel's rising forward end with integrated carved garboards, the narrowing of the flat surface between the garboards, and our interpretation of how the scribed circles were related to the narrowing of this surface (an example of the *graminho* system). The narrowing decreased in increments that corresponded to the diameters of the scribed circles. While the flat surface of the keel is horizontal, the sides of the integrated garboards rise with no relationship to the scribed circles (Drawing: C. Piper, Parks Canada; 24M-94-103-1,1a, 1b).



FIG. 7 – Detail of the model showing an oblique view of the scarph joint between the carved keel with integrated garboards (at right) and the heel of the stem (at left). Notice how the forward end of the carved keel yields to a standard garboard arrangement at the stem scarph (Photo: R. Chan, Parks Canada, RD-309X).

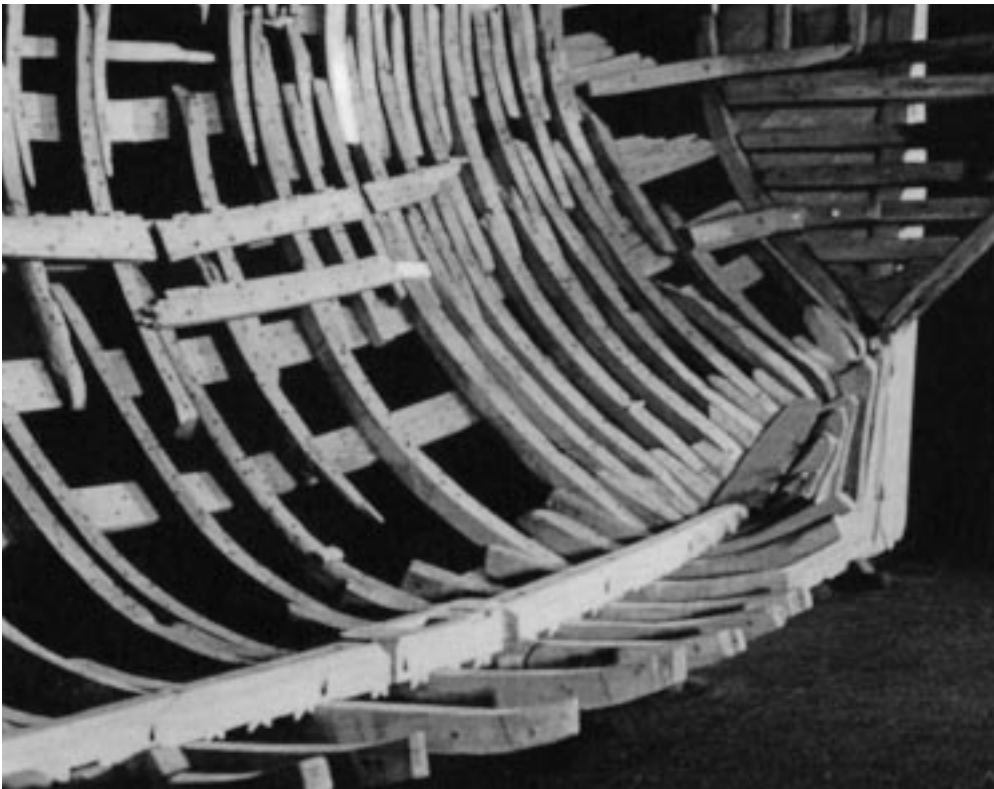


FIG. 8 – The model, looking aft viewed obliquely, from the centre towards the starboard quarter, featuring the keelson, main mast step, dovetailed floor timbers, and, in the background, a portion of the transom structure (Photo: R. Chan, Parks Canada, RD-310X).

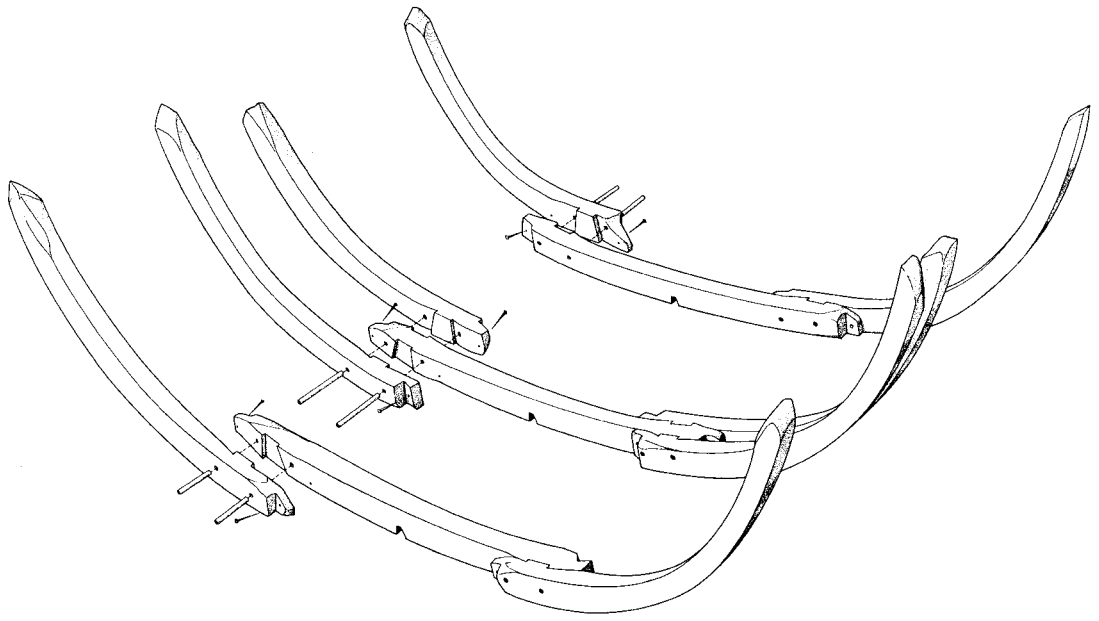


FIG. 9 – Exploded view of the lateral dovetail joints of the master frame and of the 1st frames forward and aft, both identical in section to the master. Notice the combination of two large treenail fastenings and two metal spikes at each floor to first futtock joint, all of which were driven fore-aft (Drawing: R. Hellier, Parks Canada; 24M-83-103-14).

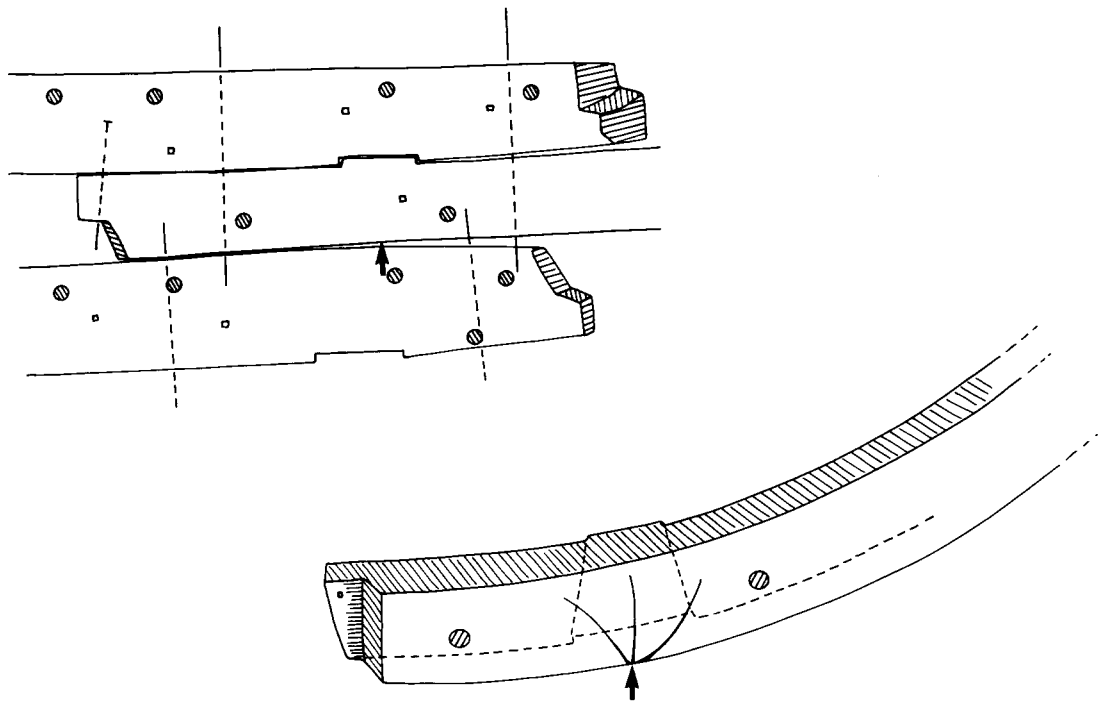


FIG. 10 – Schematic drawing showing the location of a scribed 'arrow' used to mark the turn of the bilge on the first futtock, TT 407. Similar marks were found on other futtocks from the fourteen morticed frames (Drawing: C. Piper, Parks Canada; 24M-94-103-9).

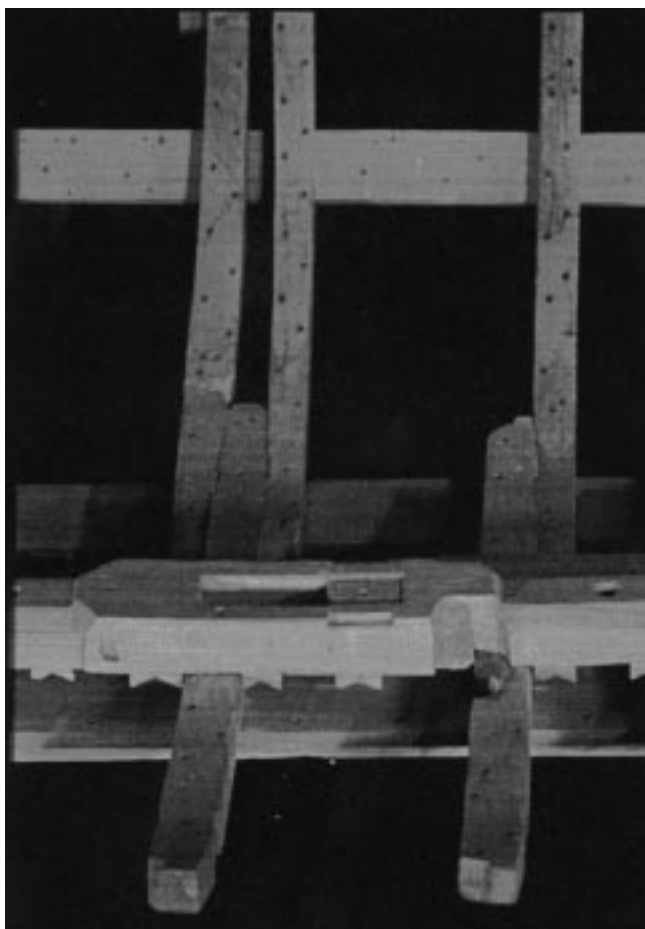


FIG. 11 – Detail inboard view of the model, facing starboard, featuring the mast step assembly locked over the master frame (at left), the main mast mortice, the roughly cut pump well sump, and the indented under side of the keelson. Notice that originally four first futtocks were dovetailed to the master floor, although only two are in place on the model (Photo: D. Pagé, Parks Canada, RD-4440T).



FIG. 12 – After they were raised to the surface for recording, four of the midship floor timbers (1st forward to 3rd aft of the master frame, top to bottom) and eight reinforcing chocks for the main mast step were placed in their original arrangement for this photograph. The second frame from the top is the master frame, with two dovetail mortices at either end. In the foreground, the floor shows the carved-out sump hole cut vertically through it (Photo: R. Chan, Parks Canada; 24M-2056M).

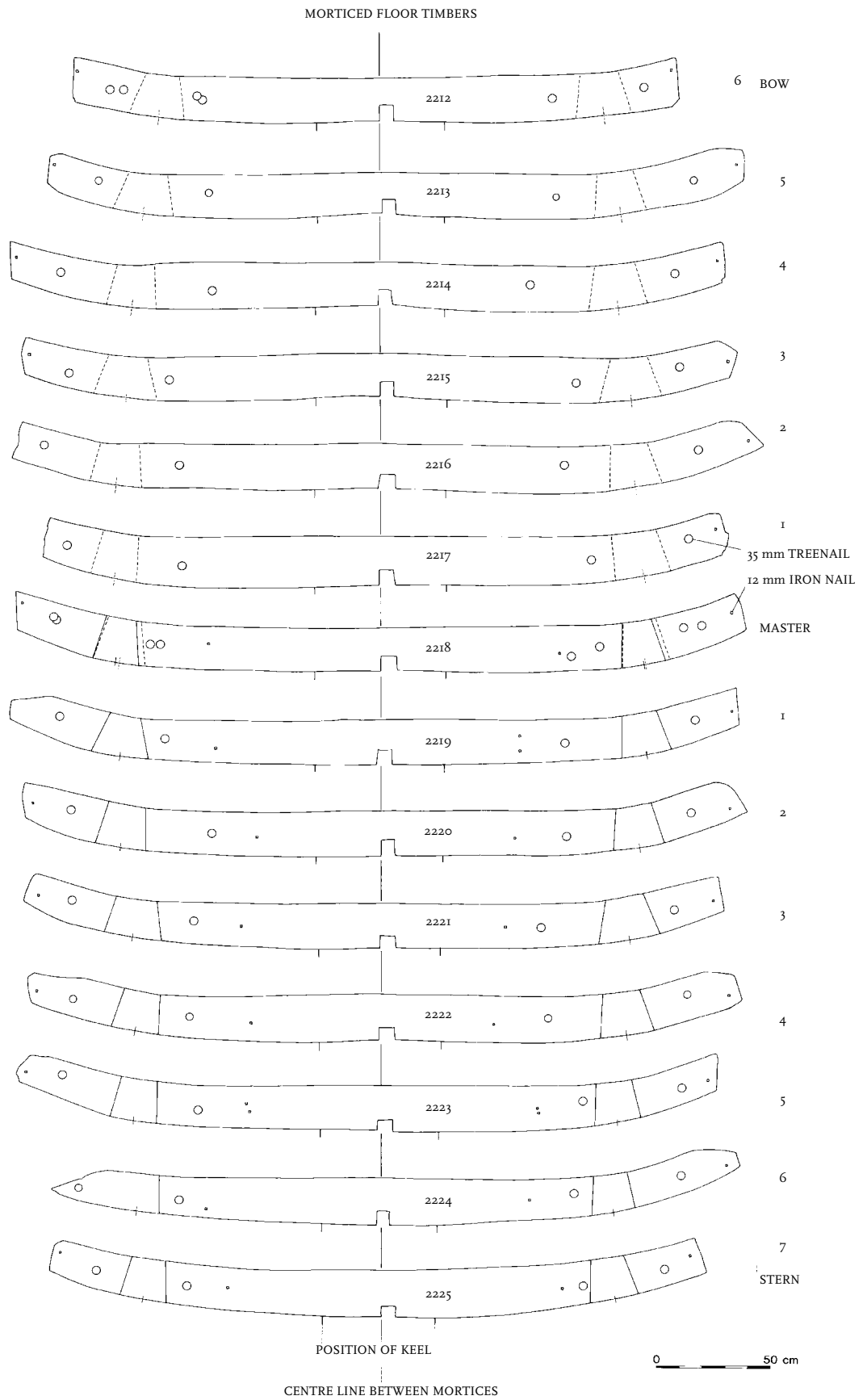


FIG. 13 – Schematic drawing showing the stern faces of fourteen morticed midship floor timbers. Mortices cut into the forward faces of the floors are indicated by a dashed line (Drawing: C. Piper, Parks Canada; 24M-92-103-5).

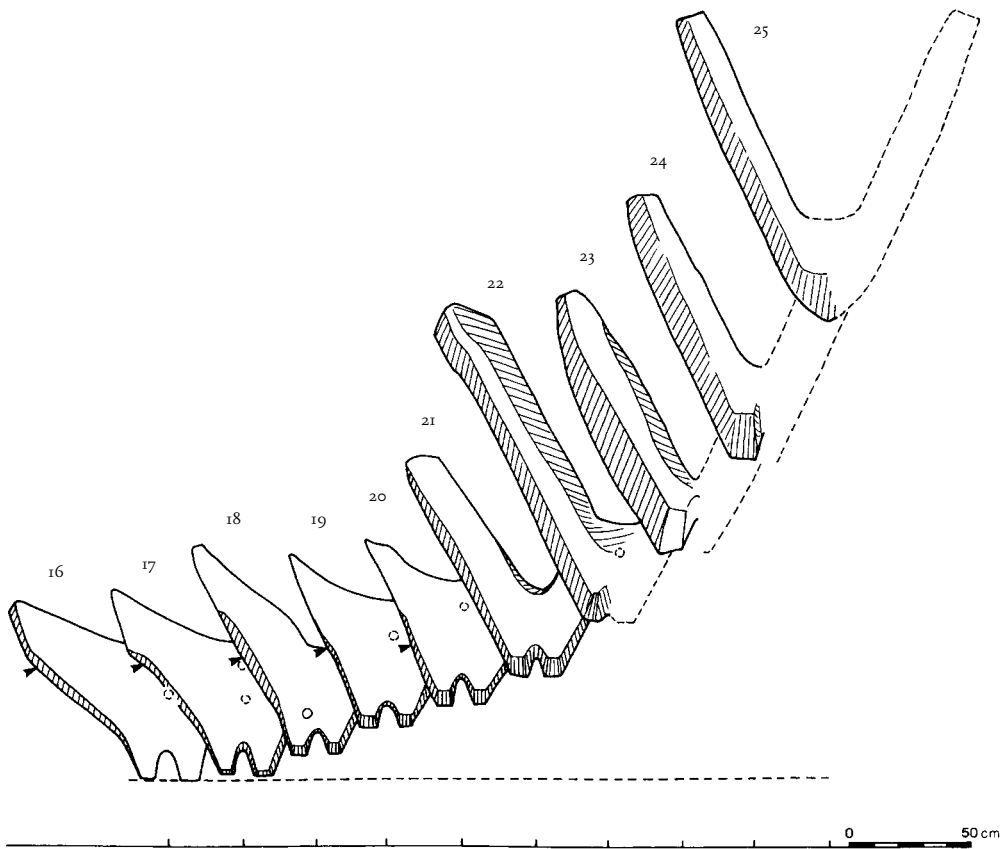
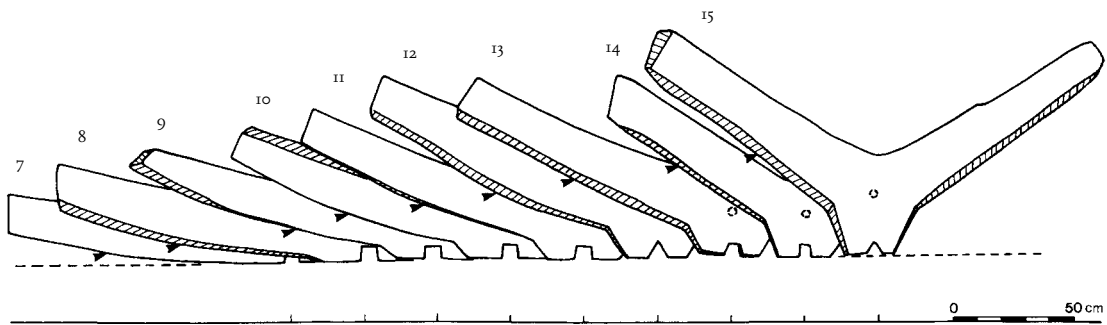


FIG. 14 – Schematic drawings of the rising floor timbers 7th – 25th forward of the master frame. Unexplained 35mm ‘plugs’ were located on the aft faces of the crutches (except the 18th forward), and are indicated here by a dashed ‘o’ since the view is from forward. The arrows indicate the position of the flower-line ribband. Notice the variability in the shape of the limber holes (Drawing: C. Piper, Parks Canada; 24M-95-103-21, 21a).

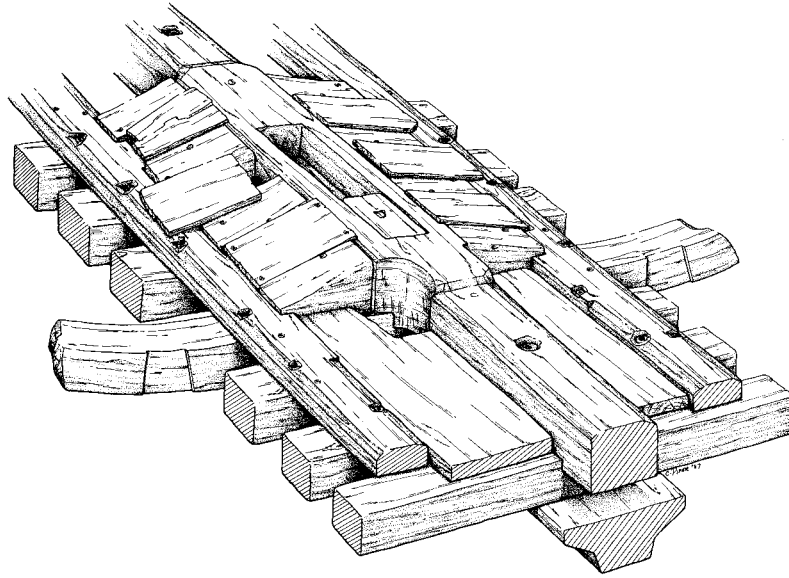


FIG. 15 – Reconstruction drawing of the mast step assembly as found, facing the starboard bow, showing: the keelson's enlarged dimensions around the rectangular mortise for the mast heel (with an inserted corrective block), the roughly cut sump hole on the port side, and, as shown in Figure 12, four chocks on either side of the step separated by empty spaces which were sealed by short planks. The chocks were morticed into heavy footwales, which ran parallel to the keelson. In the foreground, unfastened limber planks lie atop the floors between the keelson and footwales. Notice the 'T' shape of the carved keel (Drawing: C. Piper, Parks Canada; 24M-87-103-1A).

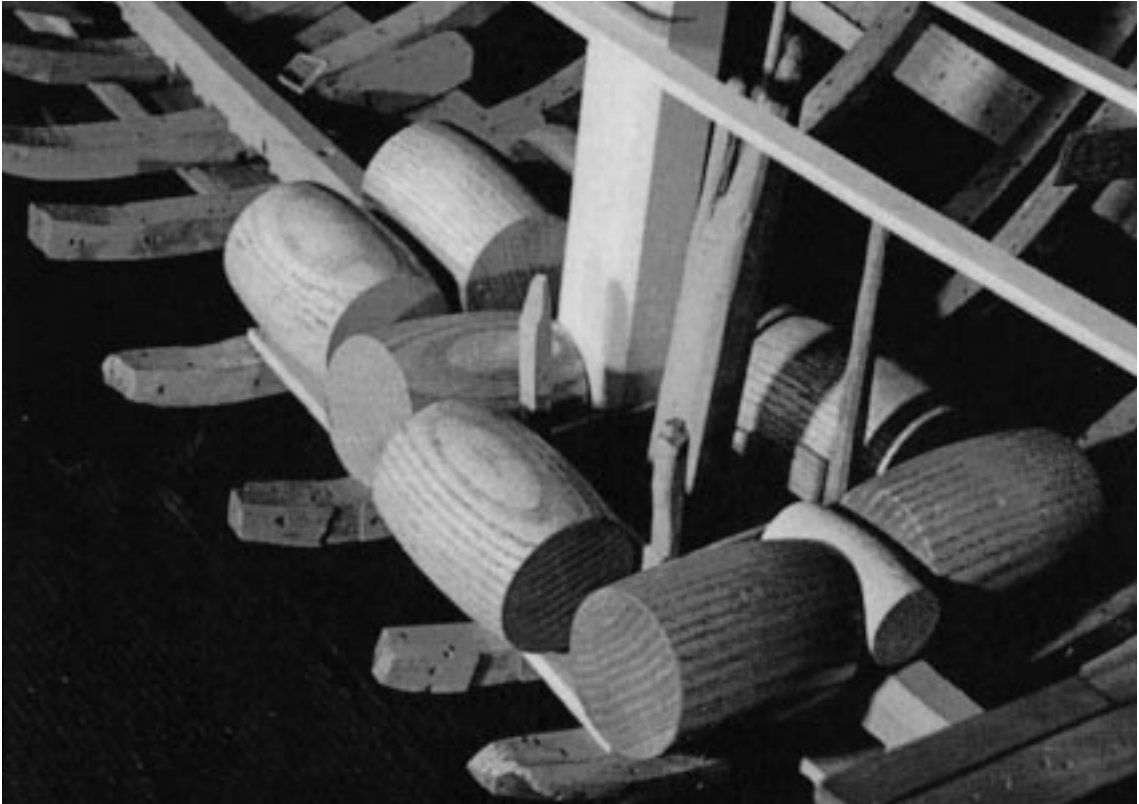


FIG. 16 – Model detail showing the base of the main mast and the pump well assembly with the pump tube in the middle, surrounded by the four corner posts of the well chamber. The cask stowage arrangement shown here was determined archaeologically by *in-situ* cask remains and dunnage patterns on the ceiling left by ballast stones around the pump well (Photo: R. Chan, Parks Canada, RD-302X).

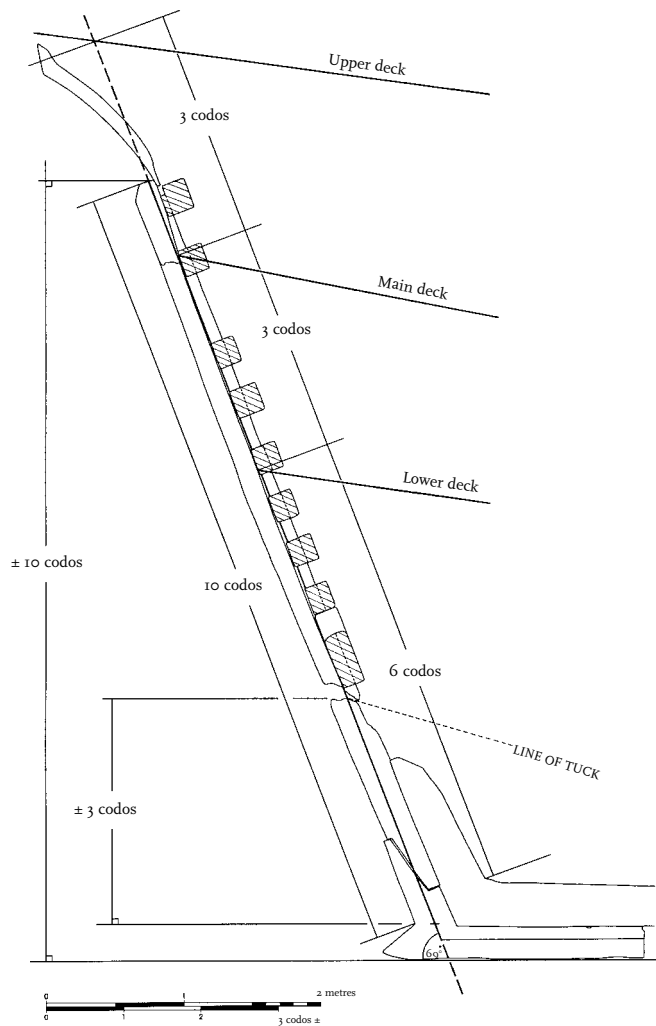


FIG. 17 – Schematic drawing of the stern post's starboard elevation showing how the basic proportions of the stern are whole *codos de ribera* (57.46cm) measurements. Also notice the 69° angle of the stern post, a diagnostic feature of ships of the period (Drawing: C. Piper, Parks Canada; 24M-91-103-15a)



FIG. 18 – Lower starboard stern of the model at the keel and stern post junction, showing carved planks wrapped around the lower end of the fashion piece, creating a seamless link between the transom and starboard side. This was a clever way to overcome weakness and leakage at this critical junction in the square tuck hull (Photo: R. Chan, Parks Canada; RD-1137W).

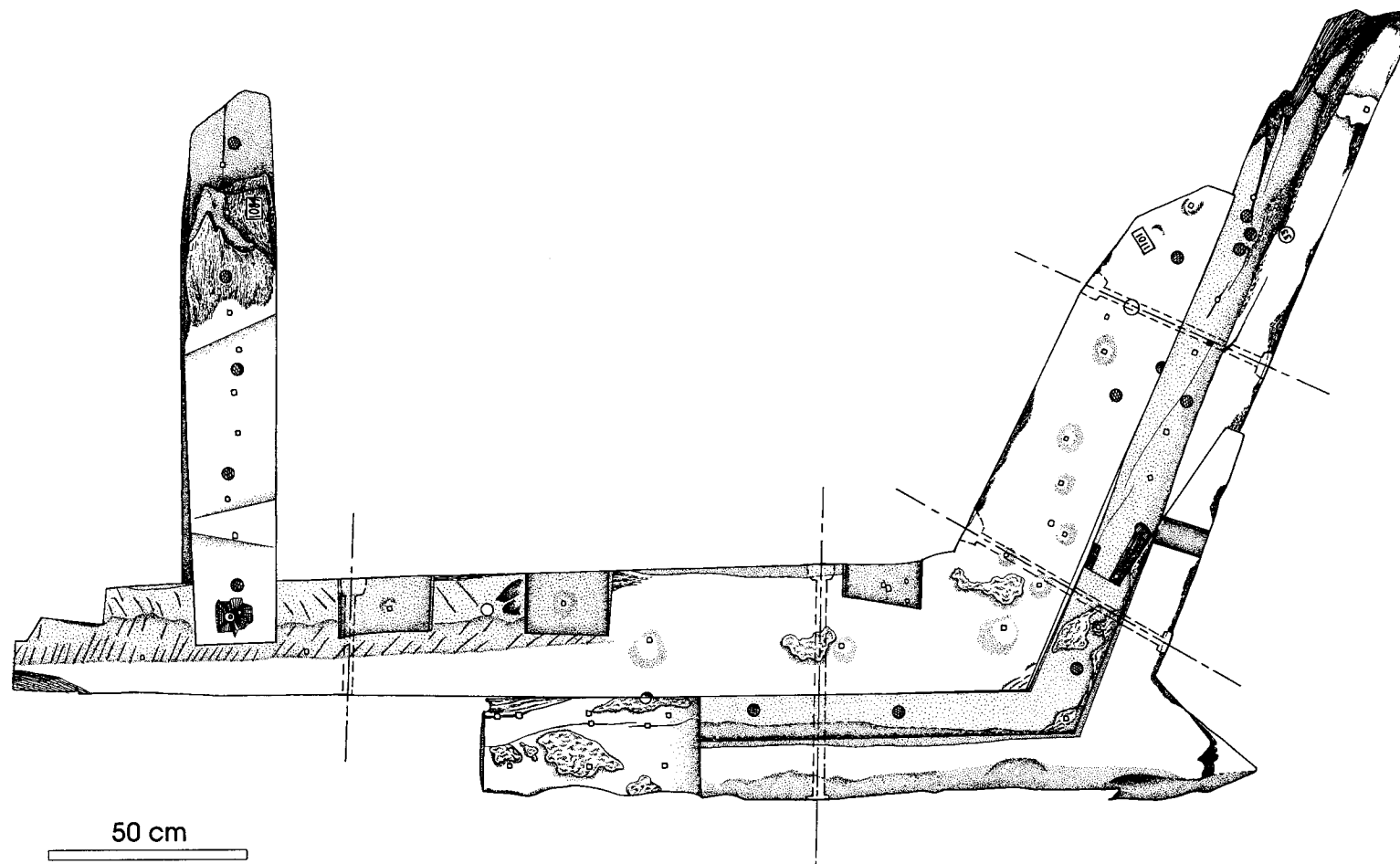


FIG. 19 – Drawing of the port side of the heel assemblage showing the lower fragment of the stern post scarphed to the heel timber and linked together by a huge stern knee and iron bolts. One crutch timber, the 17th aft of the master frame, is shown morticed over the forward end of the knee (Drawing: S. Laurie-Bourque, Parks Canada; 24M-83-103-2).

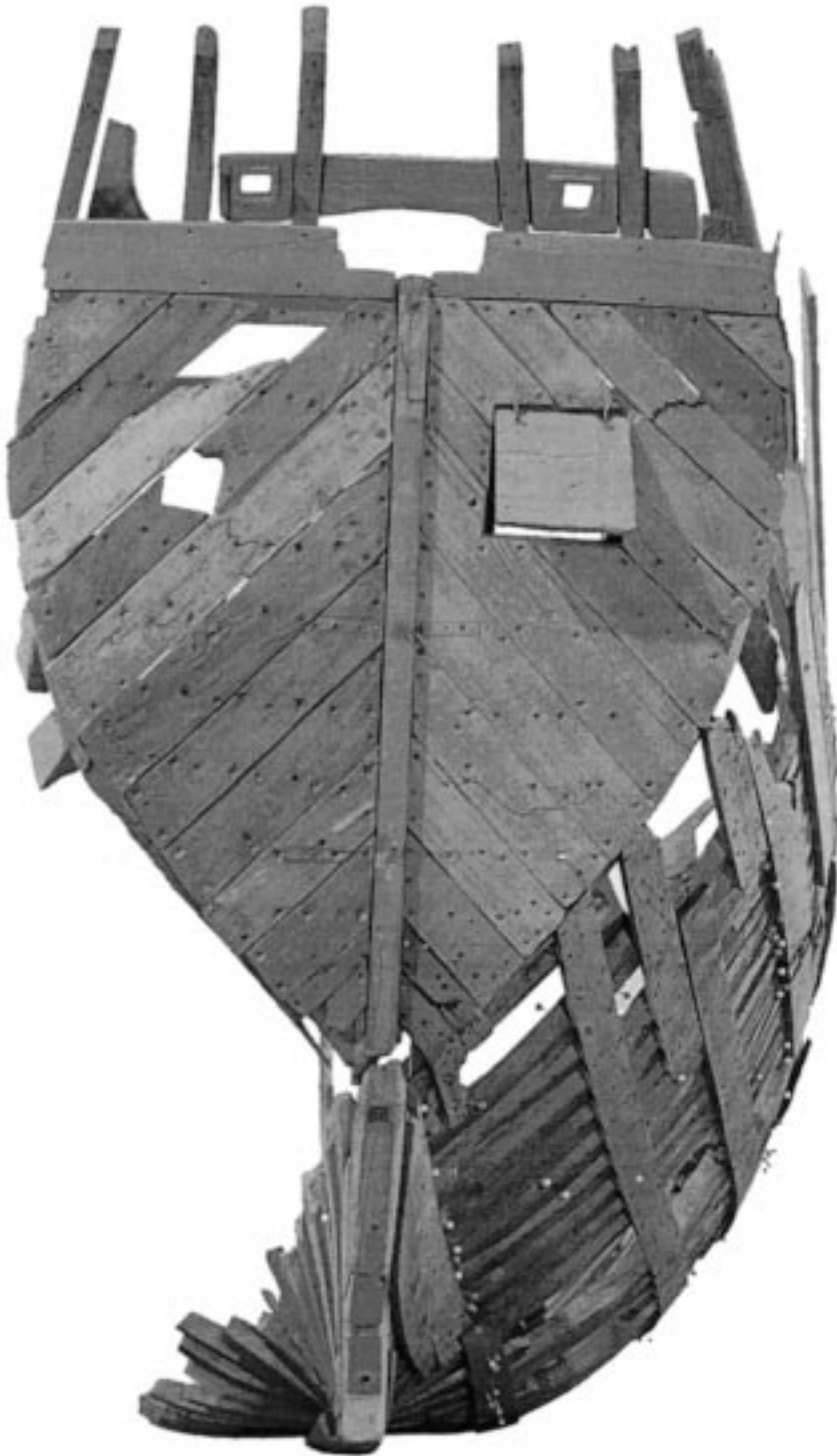


FIG. 20 – The model's transom planked in a chevron pattern with the carved planks shown in Figure 18 at its base. The starboard transom is pierced by a large, square loading port with a hinged cover. On the port side, a much smaller square port shows signs of a nailed cover on the outside. The transom and stern post also show the imprint of two rudder gudgeons and straps. A third gudgeon mortice appears at the very top end of the stern post just below the tiller port. Above the tiller port is a single carved timber morticed over the counter frames and pierced with two hawse holes. On the port side top corner above the transom beam, a standing knee defines the tumblehome of the absent fashion piece (Photo: C. Moore & R. Chan, Parks Canada, RD-1106W).

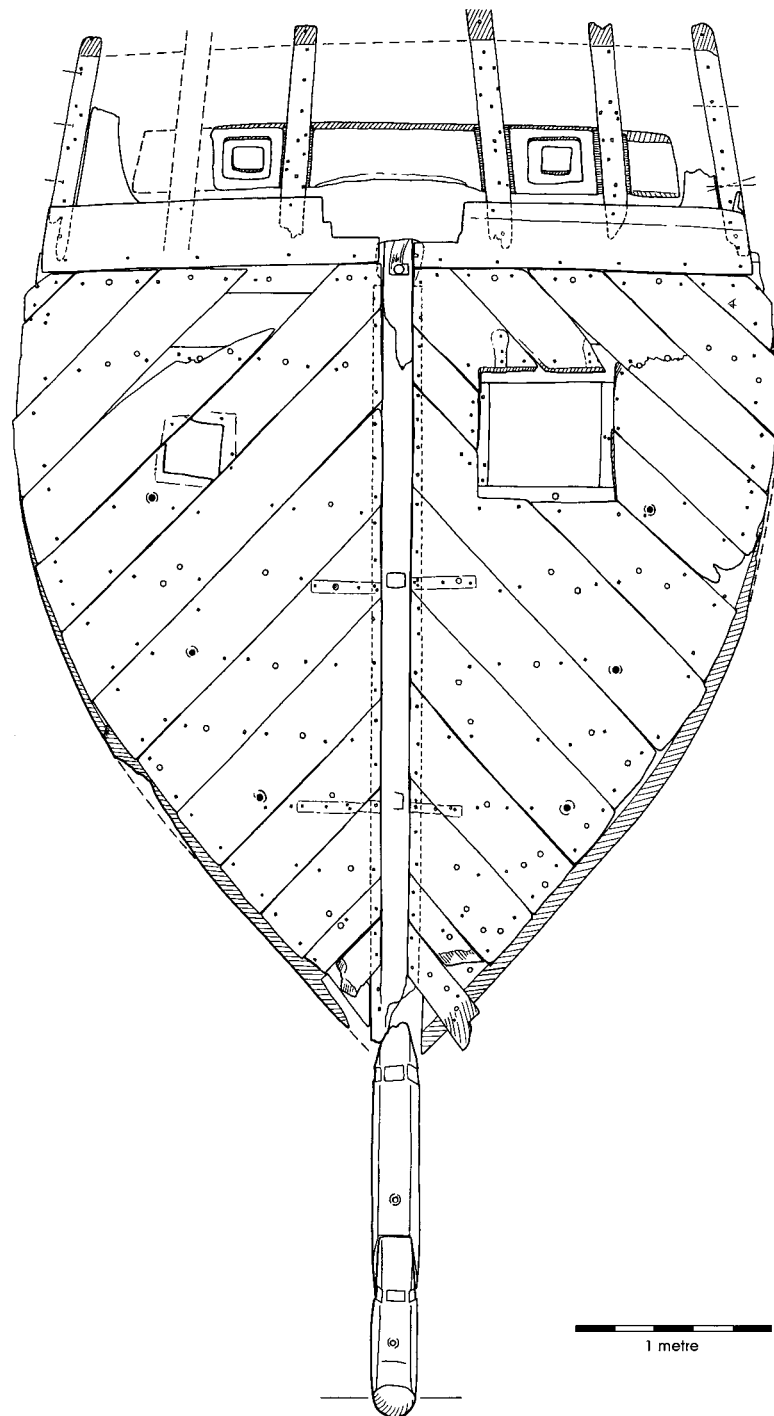


FIG. 21 – A drawing of the flat transom showing many of the features identified in Fig. 20. Notice the six large iron bolt holes which reveal the positions of internal lodging knees, some of which are shown in Fig. 22. This drawing also emphasizes the location of the two lowermost rudder gudgeons and their strapping, out of a total of five (Drawing: C. Piper, Parks Canada; 24M-91-103-14a).

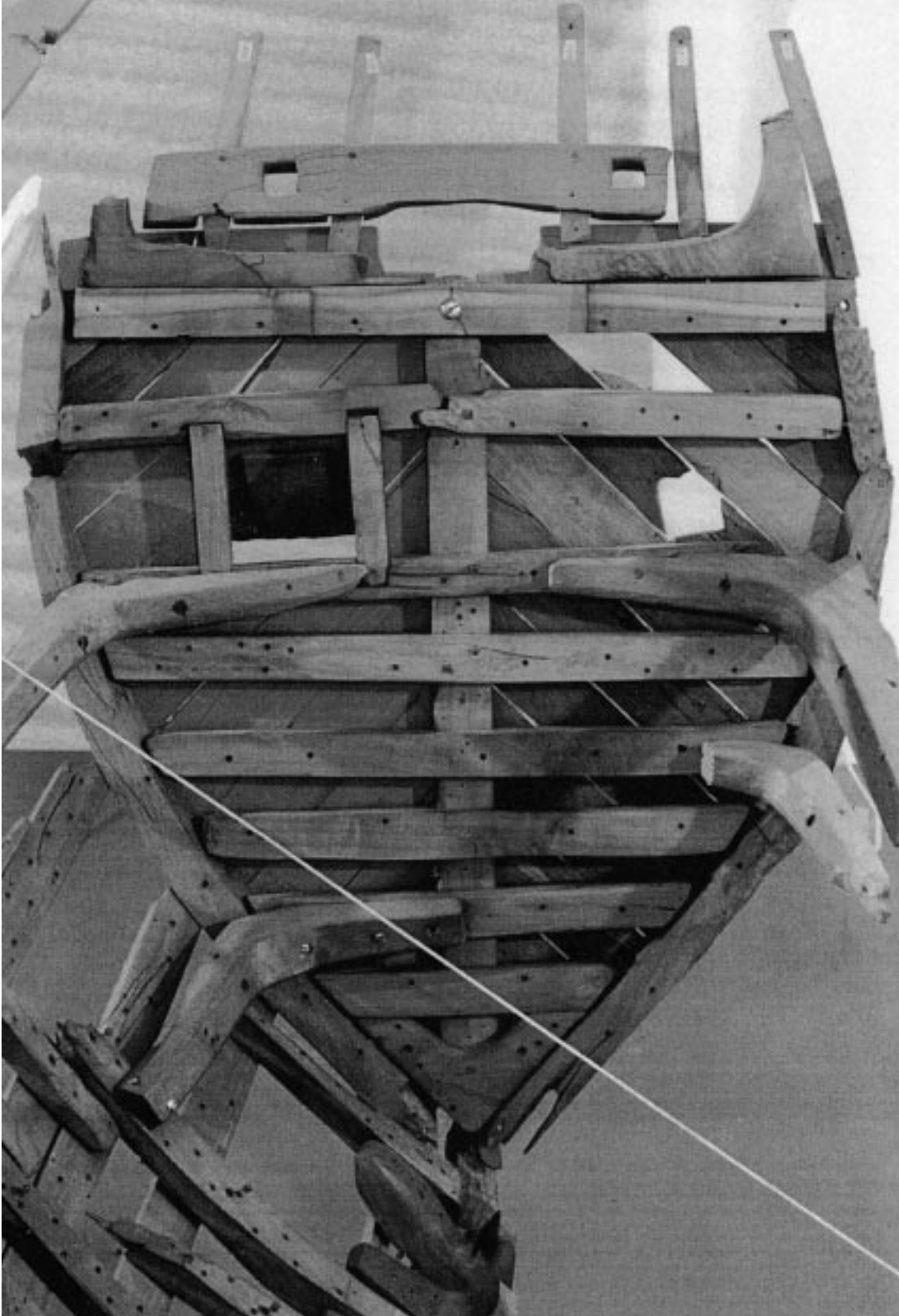


FIG. 22 – The model, showing the inboard structure of the flat transom stern. The break-up of the hull scattered many of the lodging knees, and at least two examples missing here were not relocated on site (Photo: C. Moore, Parks Canada; RD 1162W).

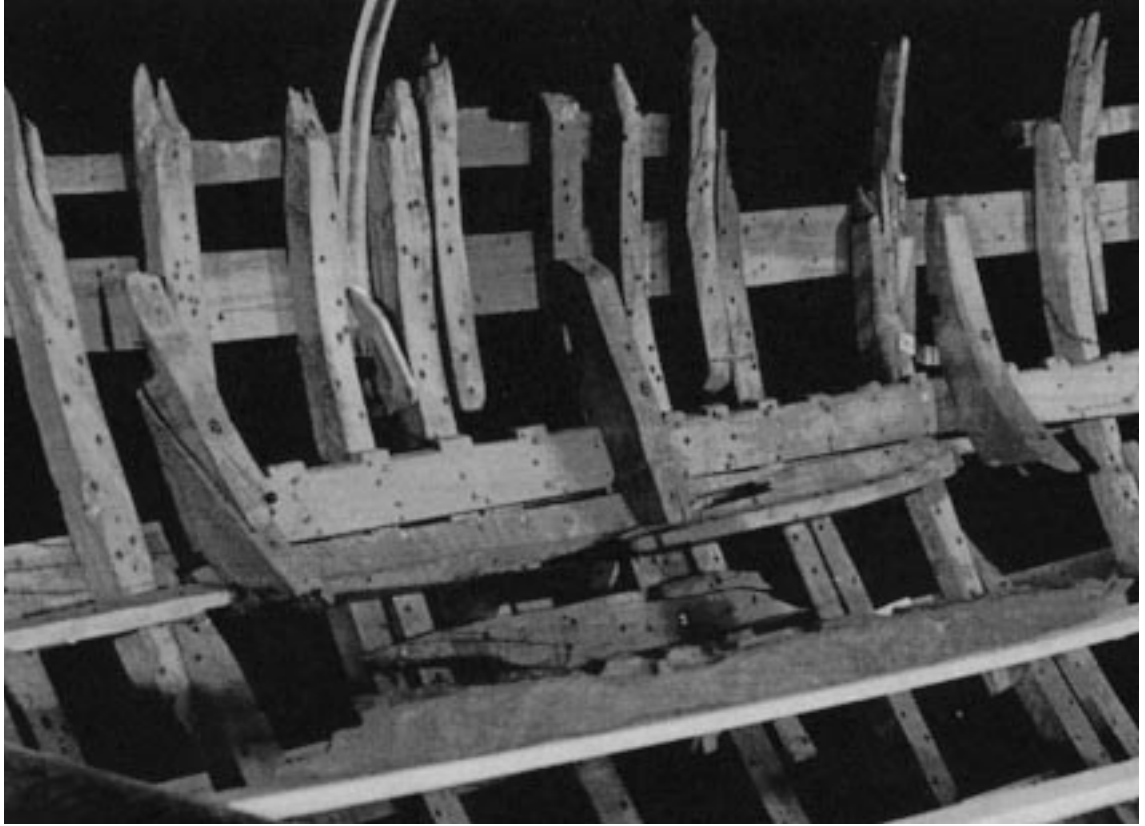


FIG. 23 – Inboard view of the starboard side of the model, showing three lower deck standing knee fragments fixed to the wall of the ship. They were flanked by short, notched sill planks (*albaola*), and sat over a carved waterway. Below the carved waterway fragment on the model, in the centre of the photograph, is a short section of the beam shelf (Photo: R. Chan, RD-326X).

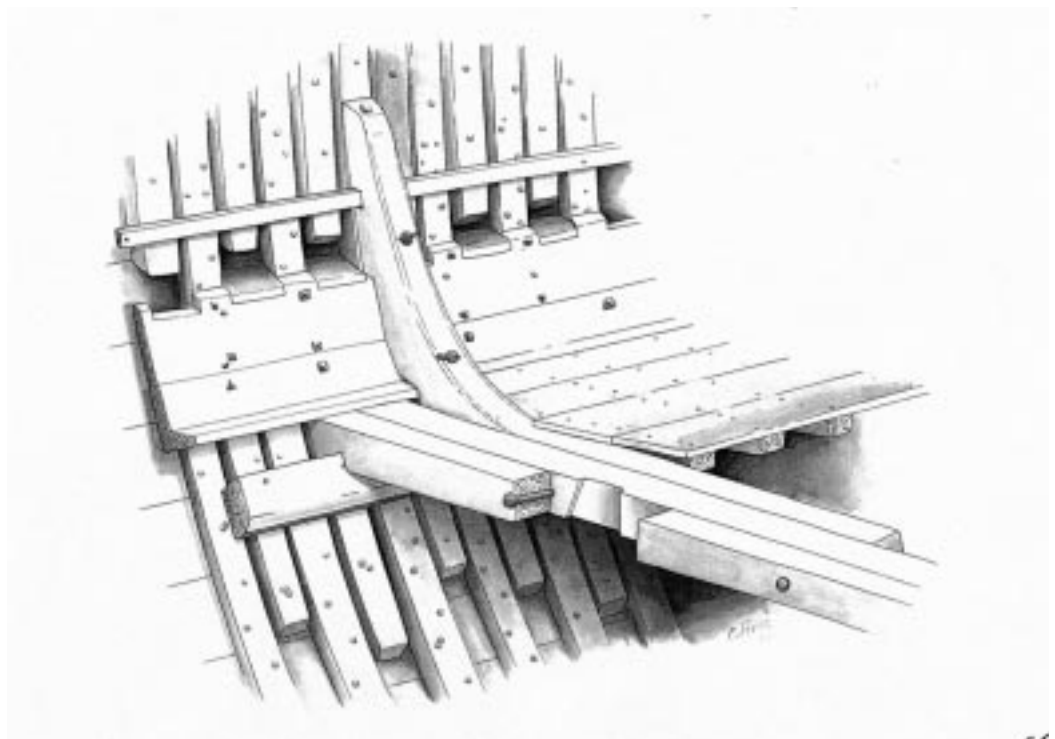


FIG. 24 – Lower deck reconstruction drawing from archaeological evidence, featuring: double deck beam, standing knee, waterway, *albaola*, and stringer (Drawing: C. Piper, Parks Canada; 24M-93-103-8).

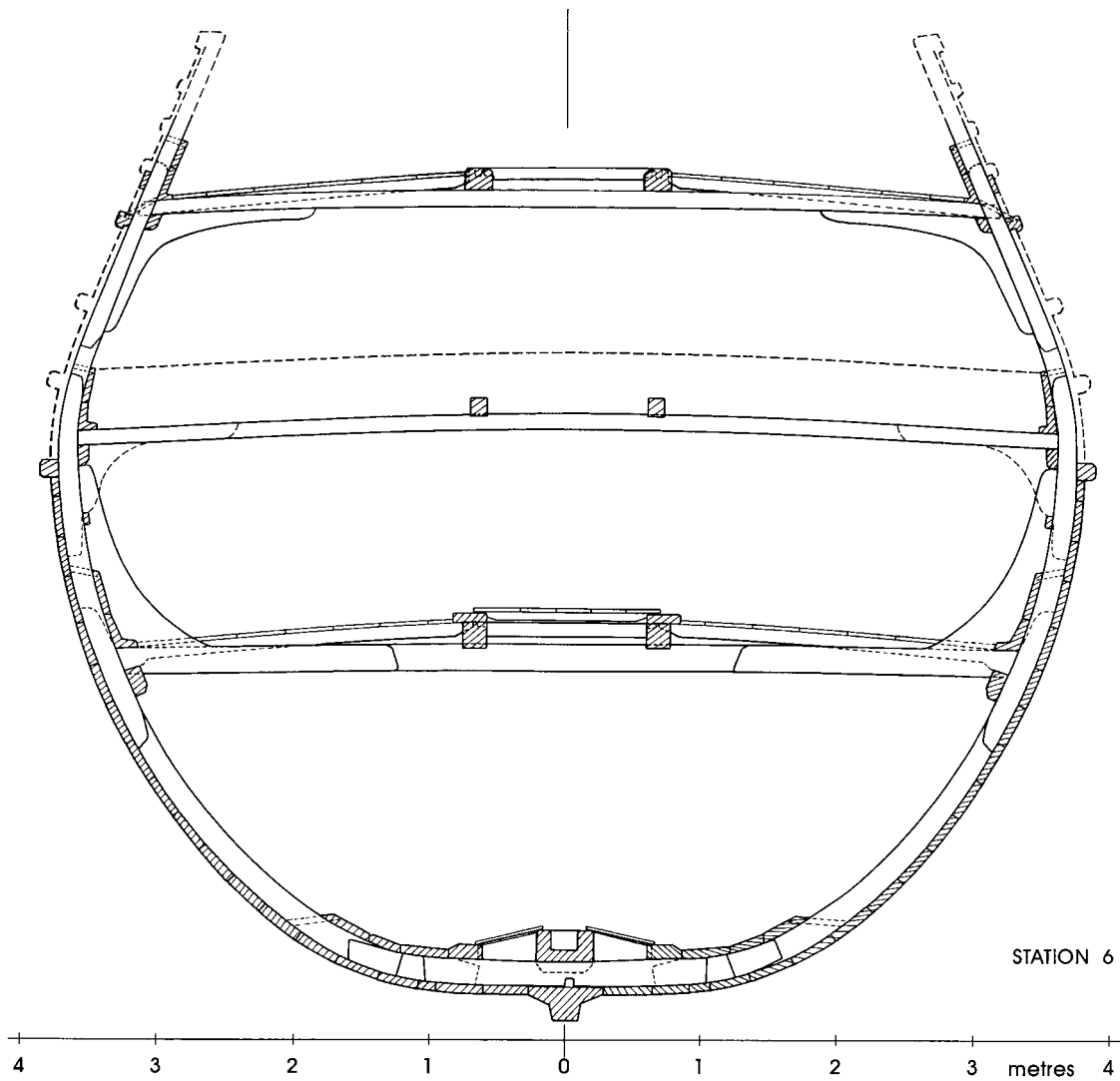


FIG. 25 – The Red Bay vessel's reconstructed midship section, taken at the master frame. Most of the main deck features had vanished, except for a few indicators on fragments of related futtocks. While evidence for the level of the main deck in the bow and stern is firm, the evidence available for its level at midship is somewhat ambiguous. On the one hand an initial location at 3 cubits (*codos de ribera* of 57.46 cm) above the lower deck as expected from the documents and Basque practices, while on the other hand a subsequent raising of this deck there (shown by the dotted line) is suggested by fastener evidence. It should be noted that the available evidence suggests the absence of planking on the main deck at midship. The upper and lower deck levels are more firmly established by archaeological evidence (Drawing: C. Piper, Parks Canada; 24M-92-103-7b).

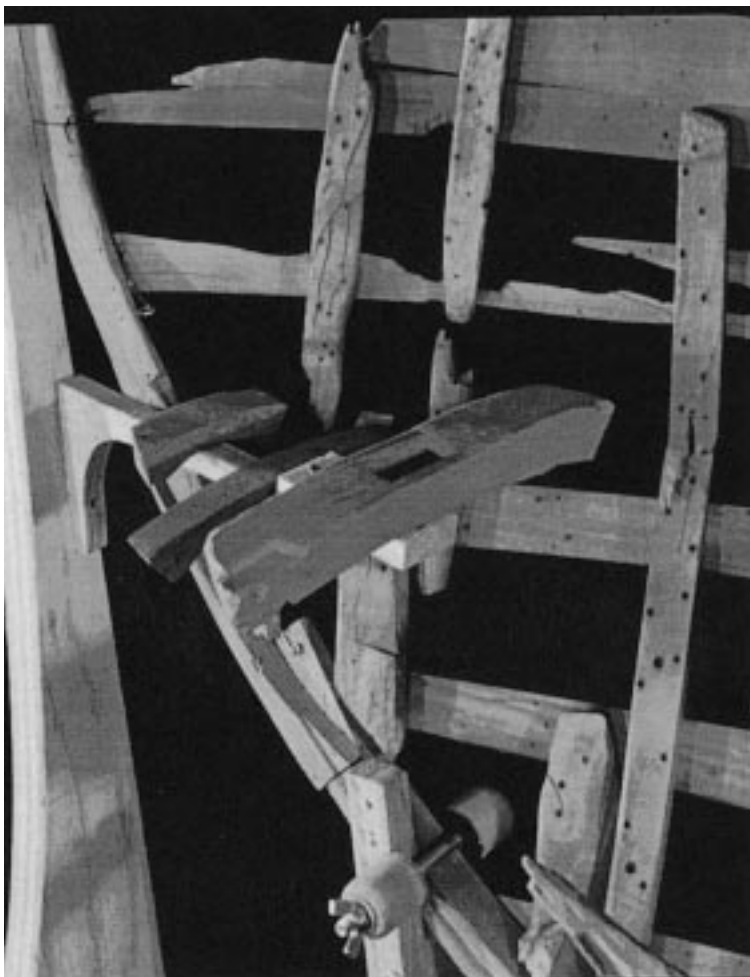


FIG. 26 – Inner starboard side of the model showing the position of the transverse foremast step resting close to the stem, at lower deck level. Below the step is the second scarp of the stem (Photo: R. Chan, Parks Canada, RD-341X).



FIG. 27 – Model looking forward, just aft of the stem, showing the two main components of the port side hawse hole assembly (*escobenque*). The outer portion with the large carved hole shows a rounded recess where it overlapped a wale. The inner portion of the assembly, oriented at an angle, was secured over hull framing, thereby reinforcing the bow assembly (Photo: R. Chan, Parks Canada, RD-340X).



o 50 cm

Timber tag:	Drawing#:
443	83-88-D42
	-D43
448	83-87-D42
45	84-22-D73

FIG. 28 – Drawings of three futtocks of different types illustrating the level of detailed archaeological recording of timbers conducted at Red Bay, including tool marks and fastener angles and depths of penetration (Drawings: J.C. Farley, C. Piper, R. Hellier, Parks Canada; 24M-95-103-9A).

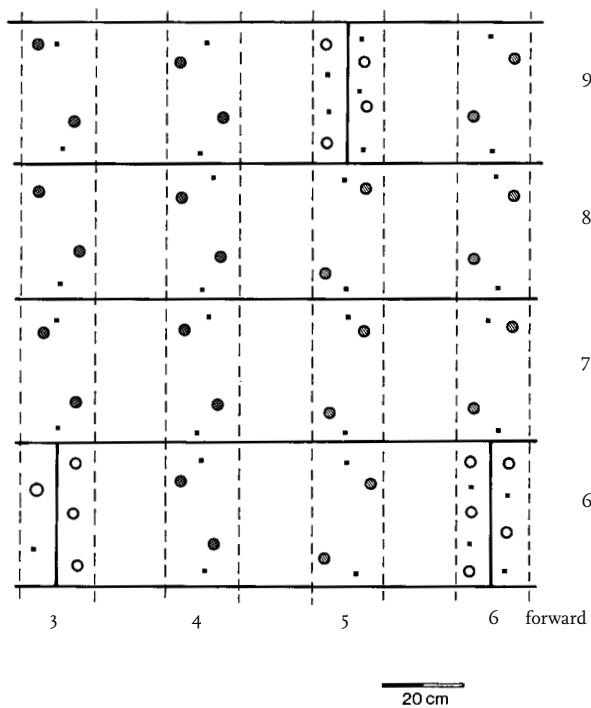


FIG. 29 – Schematic drawing showing the typical fastening pattern of two treenails and two iron nails per frame in the outer hull planking. This detail shows strakes 6 to 9 in the area of the 3rd to 6th first futtocks forward of the master frame. Notice the change of treenail pattern: treenails on the 3rd and 4th futtocks angle aft, while those on the 5th and 6th futtocks angle forward. Also observe the variability in the butt-end fastening pattern (Drawing: C. Piper, Parks Canada; 24M-94-103-13).

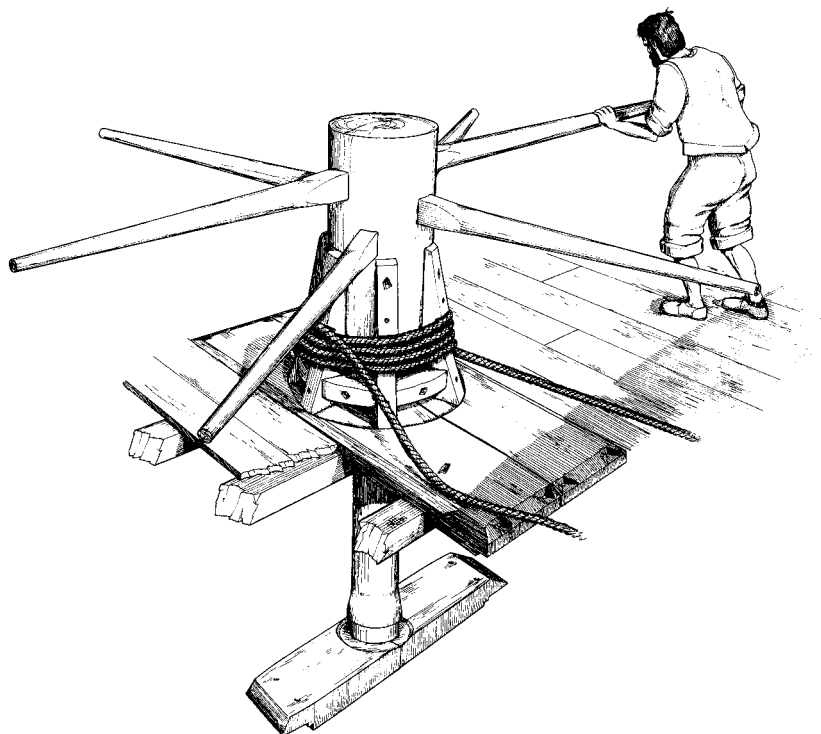


FIG. 30 – The capstan reconstruction, with bars, partner, and step, positioned between the main and mizzen masts on the upper deck. The increased thickness of the partner assembly at its forward end (middle right) is noticeable, designed to compensate for the deck sloping down forwards. The step sits transversely astride two hatch carlings on the main deck below. The capstan is a one-piece timber fitted with six whelps to guide and grab the turns of the rope at its lower end (Drawing: R. Hellier, Parks Canada, 24M-83-103-4).

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