Two prams wrecked

on the Zuider Zee in the late eighteenth century

excavation reports 15 and 16

by Kathleen McLaughin-Neyland and Bob Neyland

Nederlands Instituut voor Scheeps- en onderwaterArcheologie / ROB (NISA)

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Rapporten inzake de inrichting en ontwikkeling van de IJsselmeerpolders en andere landaanwinningswerken.

Flevoberichten zijn bedoeld als communicatiemiddel t.b.v. degenen die betrokken zijn bij het werkterrein van de Directie IJsselmeergebied; de conclusies kunnen van voorlopige aard zijn, omdat het onderzoek nog niet kan zijn afgesloten.

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Abstract

Two prams wrecked on the Zuider Zee in the late eighteenth century / by Kathleen Mc Laughlin-Neyland and Bob Neyland; Ministry of Education, Culture and Science, Netherlands Institute for Ship Archaeology (NISA),/ ROB Ketelhaven/Ministerie van Verkeer en Waterstaat, Rijkswaterstaat Directie Flevoland.- Lelystad: RWS, FL, 1993.-116 p.: 41 fig., 18 tab., 5 encl.; 30 cm.-(Flevobericht 383).- (excavation reports 15 and 16). Lit. opg.-ISBN 90-369-1155-9

The two wrecks considered in this study are the remains of a type of inland freighter generally identified as *praam* (pram). The wrecks were designated, E 14 and AZ 71, after the agricultural lots where they were found. The E 14 and AZ 71 both share a similar hull construction and have analogous artefact assemblages. Both wreck sites date to the second half of the eighteenth century, the vessels sinking within fifty years of one another. This date is supported by coins, lighthouse tokens, and the style of ceramics and other artefacts.

Although similar in vessel type and artefact assemblages, the shipwrecks were differentially preserved and recorded. The E 14 was the better preserved of the two, but was recorded in a salvage excavation. The AZ 71 was more accurately recorded, but was poorly preserved. Despite these initial research problems, an interpretion of both vessels together permits the complementary study of the pram vessel type and shipboard organization. This comparison shows marked similarities in their construction and artefact assemblages, but also shows some variance in construction and shipboard organization.

Preface

In 1988 Kathleen Mc.Laughlin-Neyland and Bob Neyland, at that time both studying at the Texas A&M University, were looking for a research-project on nautical archaeology in the Netherlands. In the winter of 1989/1990 they worked out, with great pleasure and knowledge, two older files of ship excavations in the IJsselmeerpolders at the Museum for Ship Archaeology in Ketelhaven (the Netherlands).

The preliminarily results of their study on two prams wrecked at lot AZ 71 and E 14 in Flevoland are now presented in the series Flevoberichten of the Department of Public Works - Directorate IJsselmeergebied of the Ministry of Transport and Public Works.

Let us hope that this Flevobericht will be a contribution to the fruitful cooperation between the Netherlands Institute for Ship Archaeology (NISA) of the Ministry of Education, Culture and Science and the Texas A&M University.

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Head Ship Archaeology Department

Karel Vlierman
Curator

Acknowledgements

First of all, we would like to thank Rob Oosting and Karel Vlierman for giving us the opportunity to work on this project and also for sharing with us their knowledge and expertise. We want to express our gratitude to the Directorate IJsselmeergebied of the Department of Public Works from the Ministry of Transport and Public Works, as well as the International Association for the Exchange of Students for Technical Experience (IAESTE) program for making it possible for us to stay in the Netherlands and work at the Shiparchaeological Department in Dronten (Ketelhaven).

We want to thank H.J.A. Dessens of the *Maritiem Museum Prins Hendrik* in Rotterdam and Pieter van Overbeke(†) of the *Rijksmuseum Nederlands Scheepvaart Museum* in Amsterdam for taking time from their busy schedules to show us their Museums' collections of drawings and models of prams.

G. Schutten, author of *Varen waar geen water is*, discussed at length various aspects of nineteenth-century pram construction and life onboard these vessels. J. Roelfzema, a retired Naval Architect familiar with native Dutch watercraft, shared with us his knowledge and experience. We want to thank Fred Hocker, Ph.D., from the Nautical Archaeology Program at Texas A&M University, for his much appreciated suggestions and for proofreading the portion of the manuscript concerning the two vessels' construction.

Finally we express our deepest gratitude to the staff of the Ship Archaeology Department for their assistance and patience during our stay there and for making it a very memorable experience.

Table of contents

Abstract *3*

Preface *5*

Acknowledgements *7*

Introduction *11*

1.1 Methodology *15*

1.2 The wreck of a pram on lot E 14 *17*
1.2.1 Survey and excavation *17*
1.2.2 Topography and stratigraphy *19*

1.3 Construction *21*
1.3.1 Damage *21*
1.3.2 Construction of the hull *21*
1.3.3 Deck and bulkheads *28*
1.3.4 Rigging *30*
1.3.5 Leeboard *31*
1.3.6 Rudder *33*
1.3.7 Reconstruction *33*

1.4 Inventory *37*
1.4.1 Ship's equipment *37*
1.4.2 Working equipment *42*
1.4.3 Weaponry *42*
1.4.4 Administrative *43*
1.4.5 Navigation *45*
1.4.6 Tools *45*
1.4.7 Domestic effects *48*
1.4.8 Hearth and galley *50*
1.4.9 Eating and drinking *53*
1.4.10 Victuals and provisions *55*
1.4.11 Personal possessions *58*
1.4.12 Cargo *62*
1.4.13 Intrusive material *63*
1.4.14 Dating *63*

2.1 The wreck of a pram on lot AZ 71 *65*
2.1.1 Survey and excavation *65*
2.1.2 Topography and stratigraphy *66*

2.2 Construction *69*
2.2.1 Damage *69*
2.2.2 Construction of the hull *69*
2.2.3 *Bulkheads 73*
2.2.4 Rigging *73*
2.2.5 Reconstruction *74*

2.3 Inventory *75*
2.3.1 Ship's equipment *75*
2.3.2 Working equipment *78*
2.3.3 Weaponry *78*
2.3.4 Administrative *79*
2.3.5 Navigation *79*
2.3.6 Tools *79*
2.3.7 Domestic effects *79*
2.3.8 Hearth and galley *80*
2.3.9 Eating and drinking *84*
2.3.10 Victuals and provisions *88*
2.3.11 Personal possessions *89*
2.3.12 Dating *90*

3.1 Comparison of the wreck assemblages *91*
3.1.1 Ship type *91*
3.1.2 Inventories *94*

Summary *95*

References cited *97*

Responsibility *99*

Appendices (1-3) *101*

List of tables *113*

List of figures *115*

Enclosures (1-5)

Introduction

The two wrecks comprising the focus of this study were recovered from land reclaimed by draining the former Zuider Zee or South Sea. The Zuider Zee (figure 1) was a shallow inland sea covering the central portion of the Netherlands. The geographic location of the Netherlands made it a vital component to most trade routes in the historic past. Most of the major countries of Northern Europe were accessible through the rivers Rijn, Schelde and Maas, and the open waterways of the Zuider Zee, North Sea and Atlantic Ocean. In addition, an extensive system of inland canals extended water transport to most of the large population centres in the Netherlands.

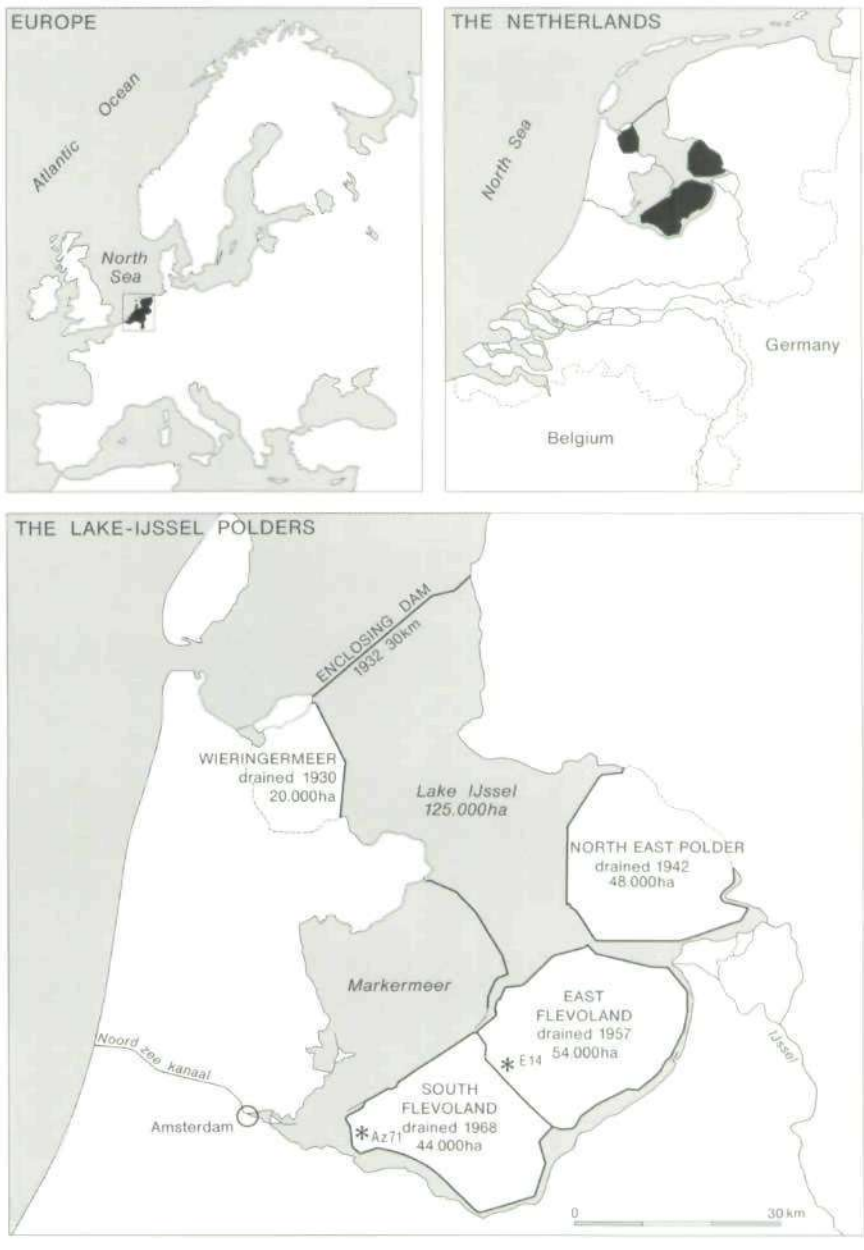


Figure 1.
The Zuider Zee water management and land reclamation project.

The need for more arable land led to the damming of this estuarine environment in 1932, creating the IJsselmeer, a brackish lake named after the IJssel River. Since that time, four *polders* (reclaimed land masses) have been drained and are now inhabited and under cultivation. This process has led to the discovery and reporting of more than 435 shipwrecks, over 200 of which have been excavated. This ongoing project was conducted by the Ship Archaeology Department under the authority of the former IJsselmeer-polders Development Authority of the Ministry of Transport and Public Works.
Nowadays the Ship Archaeology Department resorts under the responsibility of the State Service for Archaeological Investigations in the Netherlands from the Ministry of Eduction Culture and Science. Since 1995 the Department forms a part of the Netherlands Institute for Ship Archaeology (NISA).

The two wreck sites discussed here are comparable by three criteria: date of wrecking, vessel type and construction, and artefact assemblages. This study provides an opportunity to interpret a particular vessel type and the accompanying artefact assemblages.

The wreck sites date to the second half of the eighteenth century, both vessels sinking within fifty years of one another. These dates are provided by coins and lighthouse tokens, as well as ceramics and other artefacts. A light-house token gives a *terminus post quem* of 1783 for the wreck of the E 14. A badly worn farthing from the wreck of the AZ 71 has the remnants of a date of 175?, and thus gives a *terminus post quem* for the decade of the 1750s.

The wrecks are believed to represent a type of inland freighter known as *praam* (pram). Prams or pram-like vessels are known from eighteenth- and nineteenth-century representations. Both the E 14 and AZ 71 show the constructional characteristics of prams: a medium-sized vessel having a box-like shape with a fairly constant breadth throughout, a dead-flat bottom, and a sharp angular chine. These vessels primarily transported bulk cargoes such as peat, mud, stone, lumber and grain.

The artefact assemblages from the two wrecks are believed to have been the possessions of people with similar occupations, customs, and social status. The skippers of the two vessels probably had different home ports and perhaps transported dissimilar cargoes, but they had much in common. Their economic and social standing in eighteenth-century society might well have made them at home on either ship. The analysis of the two assemblages and comparison of the vessels' construction provide insights into the lifestyle of this socio-economic class.

Although the two wrecks are very similar, they differ significantly in the way in which they were recorded. While the E 14 was much more complete than the AZ 71, it was not thoroughly and intensively recorded. The AZ 71, on the other hand, was poorly preserved, but was more accurately recorded. The wreck of the E 14 was excavated in the early years of the Ship Archaeology Department's existence and excavations were far less thorough than they are today. Measurements of strakes at thirteen transverse sections were taken, but the lengths of planks were not recorded, thus making it difficult to accurately reconstruct the ends of the vessel. The frames were neither individually drawn nor measured; measurements would have aided in reconstructing the shape of the hull.

The E 14 and AZ 71 were not conserved. After the wrecks were excavated and recorded, the remains were destroyed. The current policy of the Netherlands Institute for Ship Archaeology is to preserve the remains of shipwrecks through reburial below the ground water-table. Both of these shipwrecks were excavated before this policy was enacted.

1.1 Methodology

The inventory of both ships was catalogued according to the functional classification system in Table 1, devised by Reinder Reinders in 1985. This system became necessary for the classification of inventories because of the sheer number of wrecks found in the IJsselmeerpolders. It allows for comparison between inventories of different ship types wrecked in the same period and/or comparison of changes within the inventories of similar ship types over a period of time (Reinders 1985:86). Below is an example of the functional classification system.

Table 1.
Classification system.

A. Ship's hull with standing and running rigging	
B. Equipment	
ship's equipment	1.0
ground tackle: anchors, chains	1.1
sails	1.2
cordage	1.3
windlasses	1.4
pumps	1.5
boats	1.6
aids: ladders	1.7
spares: blocks, nails, sailcloth	1.8
working equipment	2.0
loading equipment	2.1
stowing equipment	2.2
weaponry	3.0
C. Inventory	
administrative	4.0
ship's papers	4.1
finances: money	4.2
stationery and writing equipment	4.3
navigation	5.0
instruments: compass, sextant	5.1
radio compass	5.2
timekeeping	5.3
charts	5.4
information sources: tide tables	5.5
lights: running lights, towing lights	5.6
warning	5.7
miscellaneous: spyglass	5.8
tools	6.0
carpentry	6.1
caulking and bottom maintenance	6.2
sail and rigging maintenance	6.3
cleaning	6.4
miscellaneous: whetstones	6.5
domestic effects	7.0
furniture	7.1
sleeping	7.2
lighting	7.3
heating	7.4
storage	7.5
curtains and upholstery	7.6
ornamental decor	7.7
sanitation and waste disposal	7.8
hearth and galley	8.0
hearth	8.1
hearth tools	8.2
fuel	8.3
cooking vessels	8.4

cooking utensils	8.5
cleaning	8.6
miscellaneous: coffee mill, food preparation	8.7
eating and drinking	9.0
table linens	9.1
dishes	9.2
cutlery	9.3
drinking	9.4
victuals and provisions	10.0
water storage	10.1
beverages	10.2
pens for live animals	10.3
food	10.4
miscellaneous: condiments, food storage	10.5
D. Personal possessions and skeletons	11.0
clothing	11.1
shoes	11.2
sewing and knitting	11.3
tools	11.4
smoking	11.5
toiletries	11.6
pocket money	11.7
leisure	11.8
printed matter	11.9
miscellaneous: walking stick, spectacles	11.10
E. Cargo	12.0
containers	12.1

Systems of classification are arbitrarily designed to answer certain questions raised by the researcher and problems are inherent in any system of classification. Reinders placed one restriction on this system: that of being able to accurately provenience artefacts to the accommodation plan of the ship in order to correctly attribute a function to that artefact (Reinders 1985:95). Regardless of how meticulously a classification system is devised, some objects will defy categorization. The taxonomy used for this catalogue is based upon functional categories. A specific problem arising from this includes the inability to identify an object, a problem which seems to increase with the age of the wreck. The older the wreck, the more difficult to identify components of the inventory with regard to their function. A more persistent problem is the tendency of artefacts to have multiple functions thereby making it difficult to singularly catagorize them.

Because of this limitation, the functional classification system used in the site plans is a modified version of the system devised by Reinders. For the purpose of illustration on the site plan, certain classifications were regrouped into broader categories. This recategorization simplified the drawing because several related categories were regrouped under one classification, thereby allowing the artefacts to be represented on the site plan with a minimum of symbols. An additional category was added, that of Intrusive Material. This is not a functional classification, but it does allow the inclusion of material that could be relevant to site formation or site disturbance. This modified classification is presented as a legend on the site plans of the wrecks.

1.2 The wreck of a pram on lot E 14

1.2.1 Survey and excavation

In April 1968, agricultural superintendent J. Kuipers of the Development Authority for the IJsselmeerpolders reported that a ditching machine encountered ship's wood on a parcel of agricultural land in Eastern Flevoland (figure 2). A reconnaissance in June 1968 confirmed the presence of a shipwreck, fragments of which were visible in two ditches. The Ship Archaeology Department assigned the wreck the catalogue designation of E 14, in accordance with the policy of numbering archaeological sites after the lot in which they were found.

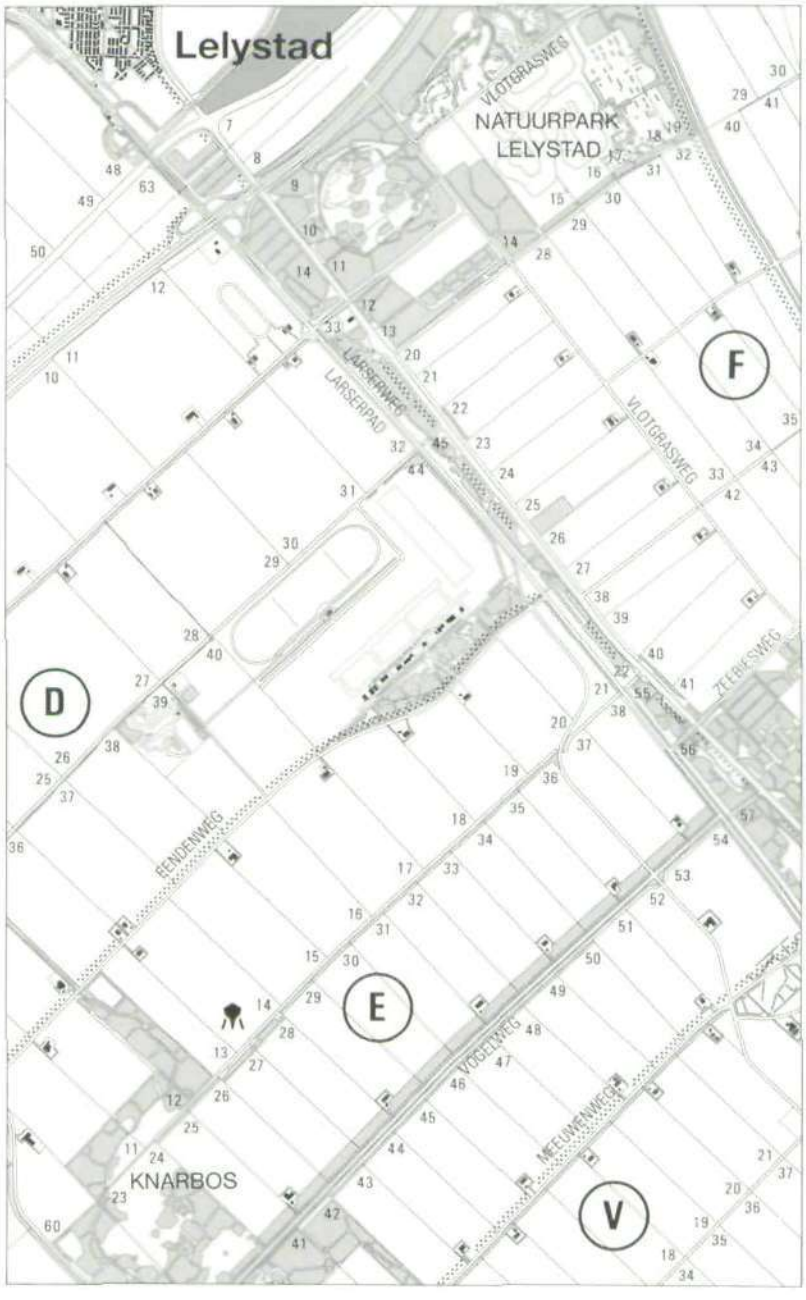


Figure 2.
The wreck site on lot E 14.

The excavation began on April 14, 1973. A back-hoe removed the bulk of overburden and the remaining sediments were hand shoveled. Artefacts and loose wreck fragments were catalogued, and the hull cleaned of soil and debris.

Methods of recording and analyzing the hull by stereo photogrammetry were utilized with the cooperation of the *Meetkundige Dienst Rijkswaterstaat* (Geographic Office for Transportation and Water), Delft. A helicopter was employed to take two series of stereophotographs of the wreck, the first with the frames intact (figure 3) and the second after their removal (figure 4). A computer reproduced drawings of the wreck from the stereophotographs at 1:20 scale.

Figure 3.
The E 14 hull remains with frames intact.

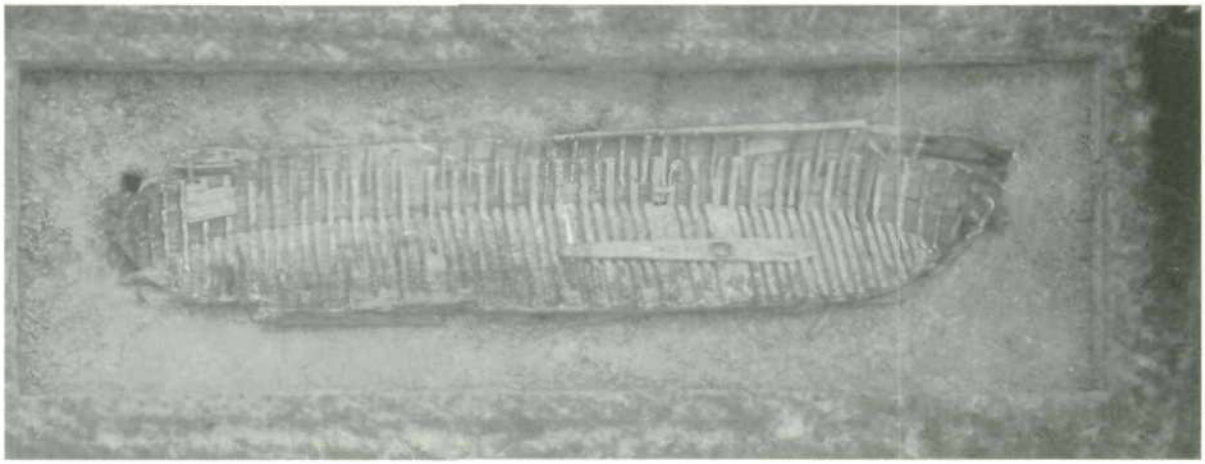
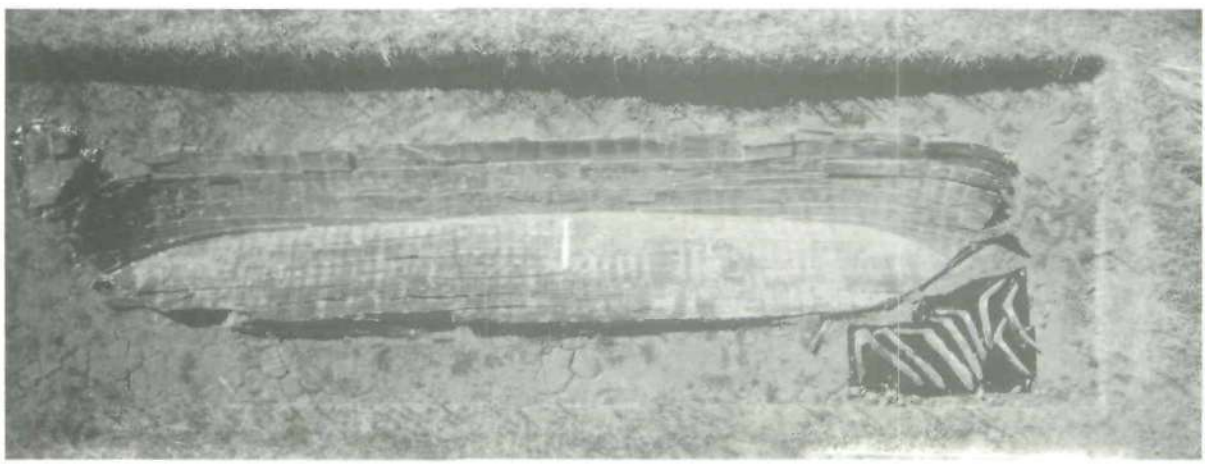


Figure 4.
The E 14, view of the hull planking after the removal of all the frames.



Thirteen transverse sections (enclosure 1) and the longitudinal length of the hull were measured utilizing steel tapes stretched over the wreck and horizontally aligned with levels. Significant plank features such as overlap, thickness, repair, and width were recorded by suspending a plummet from the steel tapes. Measurements of hull depth below field level were taken with a meter staff of one centimetre divisions. Black and white photographs were made of the excavation, selected hull features, and the associated artefacts. A few loose wreck finds, consisting of a leeboard, two hawse bolsters, a knee, and two beams were recorded individually.

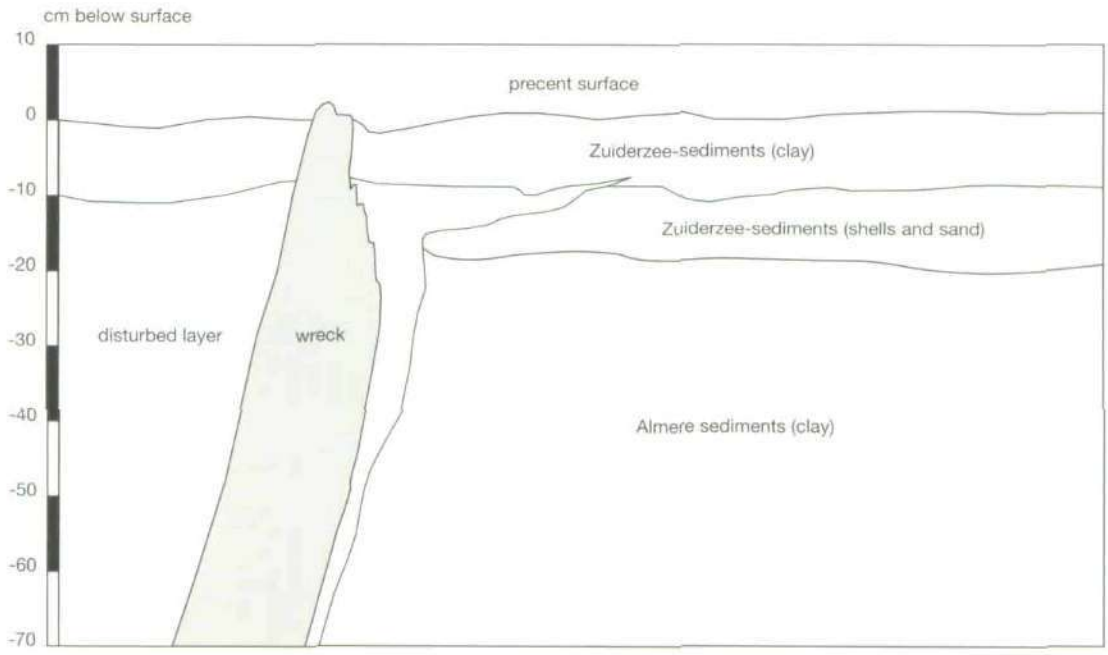
Artefacts from the E 14 were cleaned, conserved, catalogued and archived at the workshops of the Ship Archaeology Department in Ketelhaven.

1.2.2 Topography and stratigraphy

The shipwreck was located on lot E 14, 253 meters from ditch E 14/15 and 200 meters from ditch E 14/28, topographic map sheet 26E coordinates 162.975/ 493.925. The vessel sank 15 km north-northwest of Harderwijk. Water depth here at average ebb tide was 2.8-3 m (Hydrographic map 1852).

Only a partial reconstruction of the ground profile was possible due to disturbance of the soil by agricultural equipment and a heavy growth of a marsh grass, *Phragmites communis*, which has a deep root system that penetrated to the lowest part of the wreck. The ground profile revealed the shipwreck had settled into the upper layers of the sediment, a Zuider Zee deposition occurring after A.D. 1700 (figure 5).

Figure 5.
Bottom profile of wreck site E 14.



1.3 Construction

The E 14 had a flat carvel bottom with a sharp angular chine and straight lapstrake sides. A single wale angled upward abruptly to meet a vertical sheerstrake. The hull had an almost constant breadth throughout, only slightly narrower aft than forward. The vessel had a relatively full shape in both the bow and stern, but with a short, fine entrance and run. The stem and sternpost appear to have been vertical, almost straight timbers. The vessel was decked in the bow and stern over small cuddies. The hold was open, without ceiling planking and without gangways.

1.3.1 Damage

The remains had an approximate length of 19.5 m. The maximum depth of the hull beneath the field level was 1.5 m. The hull settled into the sediments listing to port, resulting in preservation of the port side from the bilge to the sheerstrake, except in the extreme bow and stern. Almost the entire starboard side was missing; only the first strake and fragments of the second and third strakes survived in the bow. The stem fragment was broken and twisted at the second strake, but continued to about the height of the fifth strake. The sternpost was completely missing, but a gudgeon and the lower half of the rudder were found. Most of the upper structure, such as beams and deck planking was not preserved. A single fragment of stern deck planking survived and a beam that probably supported the forward deck was found loose in the bow. Another beam and two hawse bolsters were also found loose in the bow. The bow and stern upperworks were destroyed by mechanical damage from ditching and agricultural machinery, as well as exposure to the atmosphere.

1.3.2 Construction of the hull

Bottom

The bottom of the vessel was completely flat from stem to sternpost. The reconstructed length of the bottom, from stem heel to sternpost heel, is 17.6 m. The toe of the central bottom plank continues underneath both posts, as reconstructed, 55 cm below the stem and 48 cm below the sternpost. The bottom is composed of sixteen planks, in most cases fitted together with Z-scarfs. These planks form seven strakes between the bow and stern. Plank thicknesses varies from 5 to 6 cm. The planks were not symmetrically arranged; widths and lengths varied, and planks narrowed considerably along their lengths.

The planks have the appearance of being pieced together as in a mosaic. This composition of irregularly shaped boards suggests an economical use of timber, but at a cost of more labour. The shipwright could have used a time and labour saving method of fitting the asymmetrical strakes together. It is possible that while sawing away the sapwood, the builder matched the fit of two planks by overlapping adjacent edges and sawing both planks with the same cut. This method of shaping carvel bottom planks would provide a good edge-to-edge fit, with no additional loss in plank width than

might normally occur in preparing planks. Fitting plank edges by this method of sawing is still used today in the Netherlands, for example in the construction of small craft such as the *punter* (Fruithof 1976:31).

A skeg was photographed below the tip of the central plank (figure 6), but otherwise was not measured and the length is unknown. The skeg's after end abutted the sternpost and had a shape similar to the central plank.

Figure 6.
In the stern a skeg was present and fastened to the toe of the central plank.

Stem and sternpost

The lower half of the stem that did survive held the hood ends of the first and second strakes in rabbets. The principal dimensions of the stem and the rabbet were not recorded, but are inferred from photographs and the computer drawing. Photographs taken during the excavation show the stem preserved to the height of the 4th strake, probably about 1.5 to 1.7 m of the stem surviving. Estimates, derived from the computer drawing and photographs, suggest inboard dimensions for a stem heel of 14 cm sided and 56 cm moulded.

The sternpost was completely missing. The central plank toe, upon which the sternpost was fitted, did survive but was broken and twisted. This plank fragment allows some interpretation of the inboard dimensions of the sternpost, as shown in the computer drawing and photographs. The computer drawing suggests inboard dimensions for a sternpost heel 10 cm sided and at least 46 cm moulded. The sternpost width was somewhat less than that of the stem.

An iron gudgeon was found near the stern. It has a maximum inner width of 21 cm and minimum width of 8.4 cm (appendix 1-132). These dimensions indicate a sternpost with a trapezoidal cross-section. There are seven fastener holes on each arm spaced approximately 5 cm apart and a W-shaped mark is incised on what is probably the upper face of the gudgeon.

Sides

On each side of the vessel were six overlapping strakes, of which only four were one part from stem to sternpost. The discontinuous strakes were stealers, shorter strakes placed in the ends of the hull to fill the space between the bottom and the third strake.

There were a total of eight stealers, four in the bow and four in the stern. Measuring from the stem heel, the first port stealer extended aft 3.5 m and the first starboard stealer 3.3 m. The disparity in lengths was somewhat less between the port and starboard second stealers, which on the port side extended aft 6.7 m and on the starboard side 6.65 m. On the port side in the stern, the first stealer ran from the stern heel forward 4 m and the second stealer 6.6 m. In the bow, the port and starboard stealers had asymmetrical widths as well as lengths. As seen from inboard, the port and starboard hood ends exhibited a lack of symmetry as far forward as the first frame. These differences in width probably continued to the stem rabbet and resulted in an asymmetrical appearance to the hood ends.

Along its outer edge, the bottom was cut away to accommodate butt joints with the stealers. This method of fitting the stealers to the bottom insured a smooth transition where the first and second stealers terminated. The stealers and the third side strake must have been fastened to the bottom with iron nails. Remnants of these iron nails were visible in a photograph (figure 6). The width of overlap between each finishing stealer and the strake directly above it increased so that the upper strake, either the second stealer or third strake, became the lower strake and fitted the bottom to form the chine. Insertion of the stealers after fastening the upper strakes is done in some carvel-built boats. However, this might not have been as easy to accomplish with the overlapping strakes of clinker-built boats (Rob Oosting, personal communication).

The third strake was the first continuous strake between the stem and stern-post, composed of two planks scarfed together near amidships. The fourth strake was composed of three patched planks, which like the pieced work of the bottom might have represented utilization of less than optimum timber.

The fifth strake was the wale. Here the hull changed direction and angled upwards. Amidships, the wale was perpendicular to the bottom, but in the bow and stern angled outboard. The cross-sections revealed a composite wale at the ends of the boat. This was probably the case throughout the wale's length. Although two boards were not recorded amidships, it seems likely that an additional board overlapped the fourth strake. The composite wale, recorded in the stern, was constructed in such a way that the exterior wale-plank overlapped the fourth strake and the sheerstrake overlapped the inner-wale strake, but fit edge-to-edge with the outboard wale strake. This resulted in a carvel appearance to the upperworks of the boat. A similar wale construction is often of one piece such as in the B 19, a 17th-century mud barge found in Eastern Flevoland, (Reinders 1984, enclosures 2 and 3), but can be a composite of two boards (J. Roelfzema, personal communication).

The inner wale was a thicker, trapezoid-shaped plank in the bow and stern where the hull begins to curve toward the posts. It had a maximum thickness of 10 cm on the upper moulded face and 4 cm on the lower moulded face. The wider dimension was intentional; it increased the breadth of the upperworks, strengthened the hull, and set the angle of the sheerstrake so it ran smoothly into the posts.

The sixth strake was the sheerstrake and ran perpendicular to the bottom. It was wider and thinner than the other strakes, with a 4 cm thickness. Throughout most of the boat it was topped by a covering board, ending in the bow at the eighth frame and, as reconstructed, 2.3 m from the stem. The board had a width of 20 cm, thickness of 4 cm, and total length of 1.37 m. It angled upward (as reconstructed approximately fourteen degrees) so that water drained outboard. An 8 cm high by 4 cm wide coaming was present on the covering board. A short toerail, which was notched to receive 92 cm of the covering board, continued to the stem.

The stern probably had a toerail like that seen in the bow. A short section of toerail was present forward of the bitt. It was notched to receive only 20 cm of the covering board. This thick, wale-like timber was rabbeted to fit over the upper edge of the sheerstrake. There was no trace of a toerail aft of the bitt, but it may have continued to the sternpost. A photograph shows a large bolt protruding inboard through this timber (figure 7).

Figure 7.
Bolt through the toerail, ceiling planking and bitt on the port side in the stern.

The width of strake overlap was dependent upon position in the boat. Amidships most plank overlaps were about 6 cm, except that of the sheerstrake, which reached 8 cm in places. Plank overlaps increased at the ends of the boat to 8-10 cm, and increased where the stealers ended. The sheerstrake overlap was exceptional because it was 6-8 cm amidships, diminished to 3-5 cm fore and aft where the strakes began to rise upward for the posts, and then increased to 8 cm in the extreme bow. The varying widths of the strake overlaps resulted in fairer exterior planking lines than interior planking lines when reconstructed.

No evidence was recorded of plank-to-plank or plank-to-frame fasteners other than the treenails and the occasional use of iron spikes where the wale fastened to the frames, and in the stern where the starboard stealer was nailed to the bottom. In selected areas of the hull, the builder fastened the wale to the futtocks with iron nails: amidships, where the mast was stepped, aft where the planks begin to curve toward the post, and probably where the hull begins to curve inward towards the stem. If there were plank fasteners, such as double-clenched iron nails, these were not recorded by the excavators, nor were any visible in photographs of the hull. The overlaps of the strakes appear to have been held together by the same treenails that fastened them to the frames. Probably, the excavators considered the presence of double-clenched nails too commonplace for comment.

If the absence of strake-to-strake fasteners is correct, then this would represent a different style of lapstrake construction from most Dutch watercraft. It seems appropriate to describe this hypothetical construction as an unfastened-lapstrake construction. This construction implies that some futtocks must have been pre-erected before the side strakes were fitted. This construction sequence can be found in some North American and English watercraft in which the overlapping strakes of the sides were added after the frames were erected (Chapelle 1951:46). If overlaps did not assist in fastening the planks together, and would have made cutting frames somewhat more difficult, their primary function must have been to eliminate the trouble of tight carvel edge fits. One problem with this construction might be a tendency for caulking to work out from between the planking overlaps.

Breasthooks

Two breasthooks strengthened the bow construction. They have reconstructed dimensions of 10-12 cm sided and 8-10 cm moulded. The first and shorter of the two breasthooks fastened to the third strake and the larger example fastened to the fourth strake. How the breasthooks were fastened to the stem was not recorded.

Frames

Frames consisted of floor timbers, futtocks, and top timbers. Through-out the vessel there was a consistent arrangement: floor timbers paired with top timbers alternated with floor timbers set between port and starboard futtocks. This pattern changed only in the extreme bow and stern where port and starboard futtocks fit heel to heel. There were a total of 58 floor timbers, of which 32 were paired with top timbers and 26 fill the space between opposing port and starboard futtocks. The latter floor timbers were not fastened to the heels of futtocks. Floor timbers were 14-18 cm sided and 8-10 cm moulded. Space between floor timbers (center-to-center) was normally 25 to 30 cm.

In the bow a V-shaped timber rested upon the heel of the stem. The port frame head terminated at the upper edge of the wale and the starboard head ended at the fourth strake. Directly aft of this frame were two pairs of futtocks, followed by the consistent arrangement of floor timbers and top timbers alternating with floor timbers and futtocks. The stern has an arrangement similar to that of the bow. Futtock heads terminated at the upper edge of the fifth strake. Futtock dimensions were 13-16 cm sided and 8-16 cm moulded.

Top timber heels normally began at the third strake, and their heads terminated at the upper edge of the sheerstrake and covering board. Estimated dimensions for the top timbers were 8-12 cm sided and 8-10 cm moulded. Some top timbers, such as the one at frame 44 (frames and frame pairs are numerically ordered from the stern to the stem) containing the leeboard bolt, were noticeably larger timbers than others.

Mast step

The mast step spanned the thirty-fourth to fifty-seventh frames. It had a maximum length of 5.64 m and was sided 58 cm. It appears to have been fastened to every floor timber with treenails. The mast was stepped 4.84 m from the heel of the stem. The mortise for the heel of the mast was 28 cm wide by 32 cm long; on each side were deeper slots for the tabernacle boards, each about 4 cm wide by 32 cm long. On the port side of the tabernacle were two iron bolts, forward and aft of the slot, and protruding 4 to 5 cm above the mast step. These two bolts were probably part of a mechanism for securing the heel of the mast, perhaps by accommodating chocks.

It was necessary to raise and lower the mast to pass under canal bridges. Whether or not the E 14 mast was lowered aft or forward cannot be absolutely determined from the data. However, archival material indicates prams frequently lowered the mast forward (G. Schutten, personal communication). Furthermore, the sail beam was forward of the mast, which would have facilitated lowering the mast forward. A large forelock bolt that might have secured the mast in the tabernacle was recovered (appendix 1-127). It is 55 cm long, and has a constant 2 cm diameter. The slotted end held a forelock key, which would have prevented accidental withdrawal from the tabernacle and mast.

Knees

The knees were identified primarily from excavation photographs. There were at least eight knees surviving in the hull, of which two were hanging and the other six standing knees.

Two hanging knees supported the bow and stern bulkhead beams at frames 9 and 62. Although these beams were not preserved, the height of the knees suggests that these were directly below the beams. At the approximate location of the stern bulkhead, the partially preserved arm of the knee appears to have had a fastener hole through its upper and lower sided faces.

The only knee measured fits at frame 54 (enclosure 2). This knee had a 1.05 m long body, with maximum moulded and sided dimensions of 18 cm by 16 cm. It was fastened to the hull by four treenails and the outboard face was notched to fit over two repair planks. The arm was 70 cm long with maximum moulded and sided dimensions of 11 cm by 18 cm. The moulded depth at the breech was not recorded, but was estimated to have been 16 to 18 cm. Probably the arm supported a beam; however, no beam fasteners were recorded. Evidently, it was a standing knee, because, as reconstructed, the arm supports the covering board. Another standing knee was 40 cm forward of this knee. These two knees might both have held a large beam.

A second pair of standing knees is just forward of the mast step at frames 48 and 52. This pair probably supported the large sail beam. Other standing knees were present at frame sections 12 and 34. The knee at frame 34 could be a small knee fastened to a top timber. Similar knees are shown on another pram wreck excavated in the *Noordoostpolder*, the R 43, which dated to the nineteenth century (Archives Ship Archaeology Department, Schutten 1981:245).

Beams

Beams reinforced the hull and supported the mast and deck structure. In the bow and stern compartments at least three beams were necessary to support the deck. Both locations had a hanging knee and a bitt with a shoulder that might have supported a beam. Neither in the bow nor in the stern was there evidence of a knee aft of the bitt, but in both locations another beam seems necessary.

Two beams recovered from the wreck were found loose in the bow. One is probably a deck beam (enclosure 2B). Its length spanned the breadth of the hull and it had a curvature appropriate for a deck. This beam had a length of 2.28 m, and was moulded and sided 10 cm. The ends were angled, probably to fit the curve of the hull. Each end had a short metal strip of unknown function on the after face. The length of this beam suggests its placement in the vicinity of frames 1 and 2. There is no evidence of a knee at this location, but the beam might have rested on a frame head or on the upper edge of the wale.

The function of the other beam is less certain. It was 1.65 m in length and had a cross-section 10 cm wide with a maximum 9 cm height (enclosure 2C). One face has two rabbets, 2.5 cm deep by 2.75 cm wide, running the length of the beam. Possibly, it ran longitudinally between the other beams. There is exactly 1.65 m between the mast-step mortise and the knee at frame 14. This beam could have fit here to serve as a ridgepole with the rabbets receiving the upper edges of hatches. A drawing of a ridgepole for a *zomp* is similar to this E 14 beam (Schutten 1981:231).

Other beams must have been present at the mast and elsewhere in the vessel to reinforce the hull. A pair of standing knees, just forward of the mast-step mortise, supported a large sail beam. On the R 43, a sail beam was located just forward of the mast-step mortise (Archives Ship Archaeology Department; Schutten 1981:245). In the E 14, such a beam was not found, but a single beam between the two knees would have had a sided dimension of 48 cm.

Forward of this construction was another pair of standing knees enclosing a space 40 cm wide. A beam located here, in conjunction with the beam at the mast-step mortise, might have supported a small deck forward of the mast or hatches to protect this portion of the hold. Such a construction is shown on the nineteenth-century model of the *Drentse Boeiermarktpraam* (*Maritiem Museum Prins Hendrik*, model # 120). Other beams were probably fastened to the standing knees at frames 36 and 58.

Hawse bolsters

Two thick blocks were found loose in the bow. One was fastened to a fragment of the starboard toerail (enclosure 2D). This hawse bolster contained two holes, each 8 cm in diameter, for the hawsers and was notched to fit over the deck. It was fastened to the stem by an iron bolt, and another iron bolt attached it to the port toerail. The second block fit above the first hawse bolster, capping it and the toerails (enclosure 2E). The fore-end of this block was rabbeted to fit against the stem. No evidence of fasteners was recorded on the upper block.

1.3.3 Deck and bulkheads

There was evidence for two bulkheads, one forward and one aft. A portion of the forward bulkhead survived on the port side and is visible in a photograph (figure 8). Fastened to the forward face of the knee at frame 62 are three boards fitted together with lap joints. The photograph shows the bottom plank edges fastened to a beam at the height of the second strake. The lower bulkhead beam appears to have been a relatively slight timber; probably, it served primarily as a lower fastening point for the boards. The bulkhead boards extended above the knee to what was probably the upper limit of the deck beam. The dimensions of the boards and lower beam can only be inferred from the photographs. The boards appear to have been thin, perhaps as slight as 2 cm, with estimated plank widths of 30 cm.

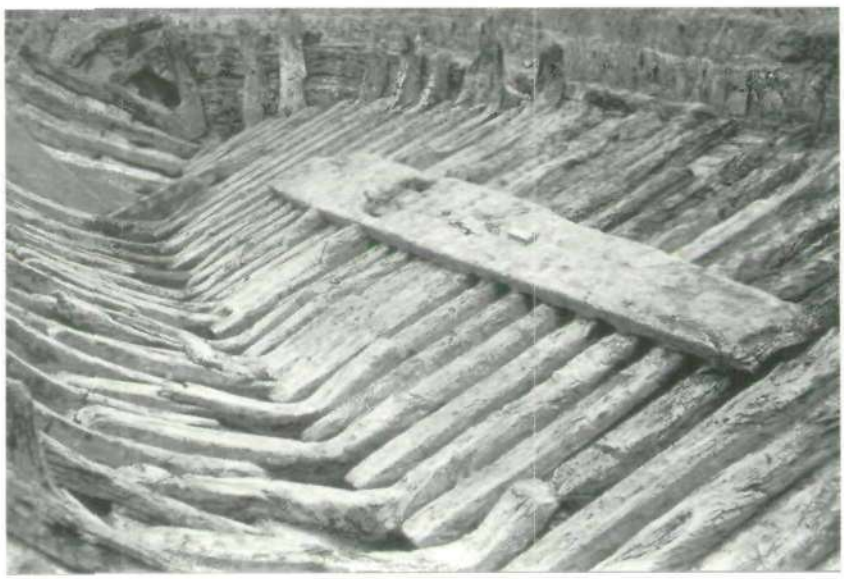


Figure 8.
View forward with bulkhead and mast step.

There was probably a similar bulkhead in the stern. The most likely location was the after face of the knee at frame 9. There was enough space for the bulkhead planks to fit between the after face of the knee and the ceiling planking. Nothing remained of the stern bulkhead and no evidence of fasteners for a bulkhead were recorded in the knee.

Ceiling planking

No remains of a ceiling were found in the hold, nor did the photographs reveal any nail holes in frames located there. Apparently there was not any ceiling planking to seal or protect the hold from damage.

The only ceiling-like planking found in the hull was in the after compartment area. Here five reverse-lapped boards were fastened to the port side bulwark and futtocks. These seem to be thinner boards, probably no more than 2 cm in thickness. Below and perpendicular to these was a narrow board with a rabbet or a lap joint on its inboard edge.

This ceiling planking functioned as the inner wall of the stern cuddy or was the remainder of a locker. A photograph shows nail holes in the futtock aft of this ceiling, which suggests that it continued further aft. No evidence was recorded of ceiling in the bow compartment, nor can any fastener remains be seen in photographs.

A window containing four glass panes was found in the stern compartment (figure 9). The glass panes seem to be too thin and fragile for the window to have been used as a porthole. A more likely function might be as a cabinet door to an interior locker. On the exterior side of the window there are traces of red paint and latches.

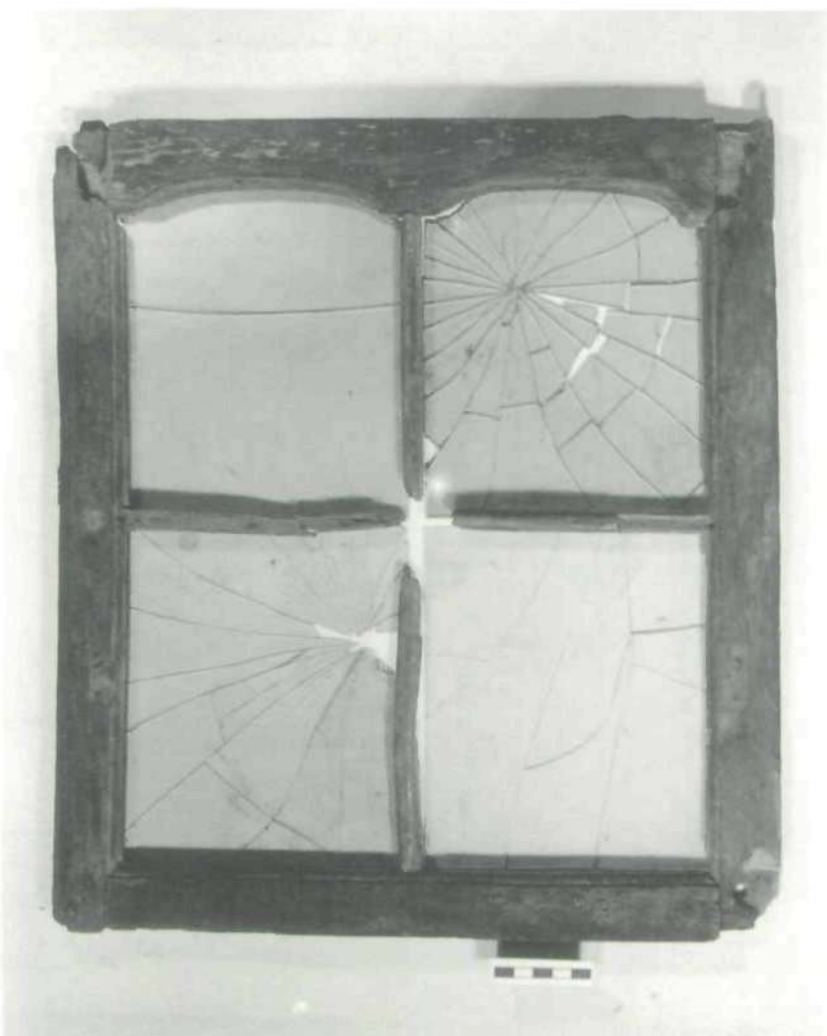


Figure 9.
Window found lying inside the wreck in the stern.

1.3.4 Rigging

No direct evidence of rigging was found. The mast step indicates only the one mast. Representations of prams - engravings, drawings, and models - normally show a standard rig consisting of a loose-footed gaff sail and fore staysail. An engraving of a *Friese praam* (figure 10), dating from 1789, approximately the same period as the wrecking of the E 14 and AZ 71, has a loose-footed gaff sail and a fore staysail hung from the forestay. A bowsprit is present, but without a jib sail, although jibs are common on representations of other coastal vessels from the period. This pram engraving could show the vessel under reduced sail. The mast is supported by two shrouds on each side, a pair of forestays secured to the stem, a jibstay, and a backstay just aft of the leeboard.

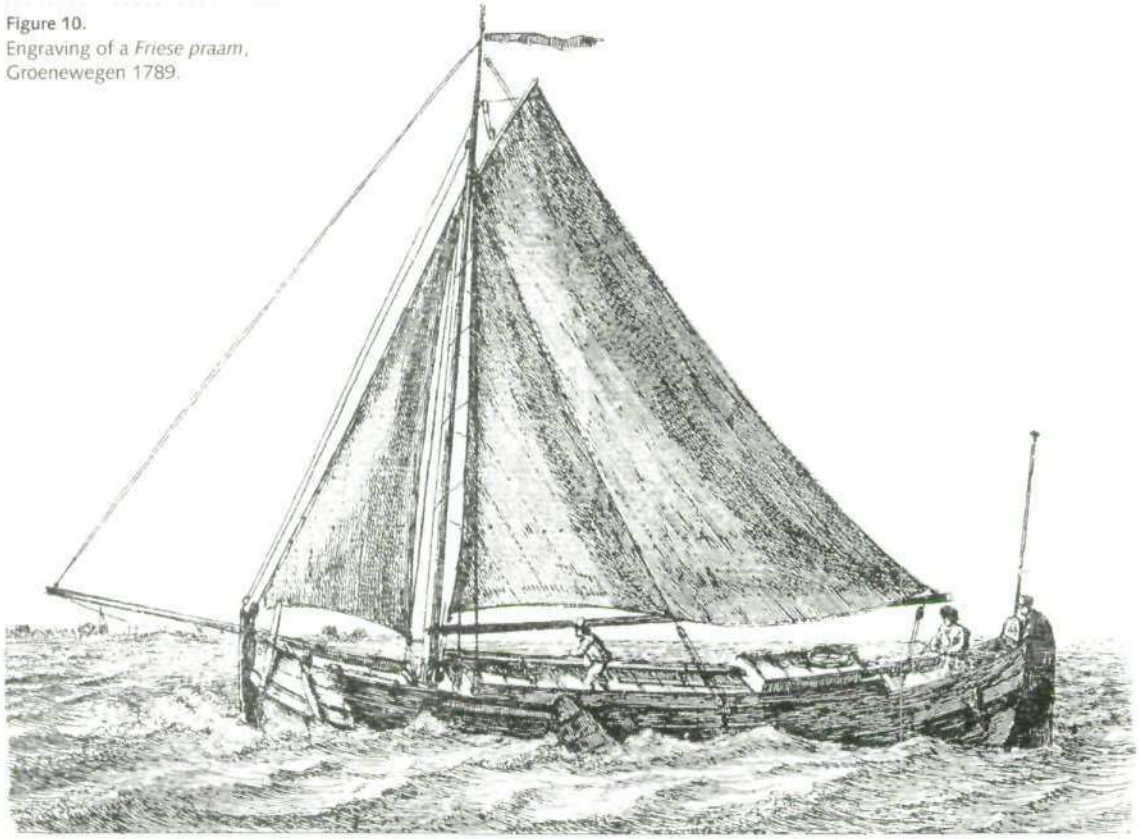


Figure 10.
Engraving of a *Friese praam*, Groenewegen 1789.

1.3.5 Leeboard

A leeboard was found lying inboard on the port side (figure 11 and enclosure 2F). It has a maximum length of 3.16 m and width of 1.99 m. On the outboard face of the leeboard are five iron straps. Four of the straps fit over three pine repair planks. A curved iron strap runs along the after end of the leeboard. Also on the after end are three holes with 3 to 4 cm diameters, attachment points for a line with which to raise and lower the leeboard. Two cheek blocks were attached to the port sheerstrake for raising and lowering the leeboard, possibly, in conjunction with a fiddle-block (figure 16-99) found beyond the port side of the hull and between the forward most cheek block and leeboard bolt. One cheek block was approximately 2.82 m and the other approximately 8.27 m aft of the leeboard bolt. Thus, the fall of the leeboard tackle lead aft. This arrangement of tackle probably allowed the helmsman to raise and lower the leeboard from the vicinity of the helm.

Figure 11.
The leeboard *in situ* on the port side of the wreck.

The port leeboard was attached to the vessel at frame 26, 92 cm aft of the mast-step mortise, by an iron eyebolt that probably hung on an iron hook. The presumed hook was not recorded in any photographs. Inboard at this location an iron bolt-end, transfixed by an iron pin over the remnants of an iron washer, was photographed (figure 12). Another photograph shows outboard, a short plank with an estimated length of 27 cm, which appears to have been penetrated by the leeboard bolt. This plank was the leeboard pad and functioned to protect the hull from wear and possibly to increase the distance of the leeboard from the hull. Because it contained the leeboard bolt and did not extend very far forward, it was not a leeboard guard. No evidence of a leeboard guard, to brace the leeboard forward, was recorded.

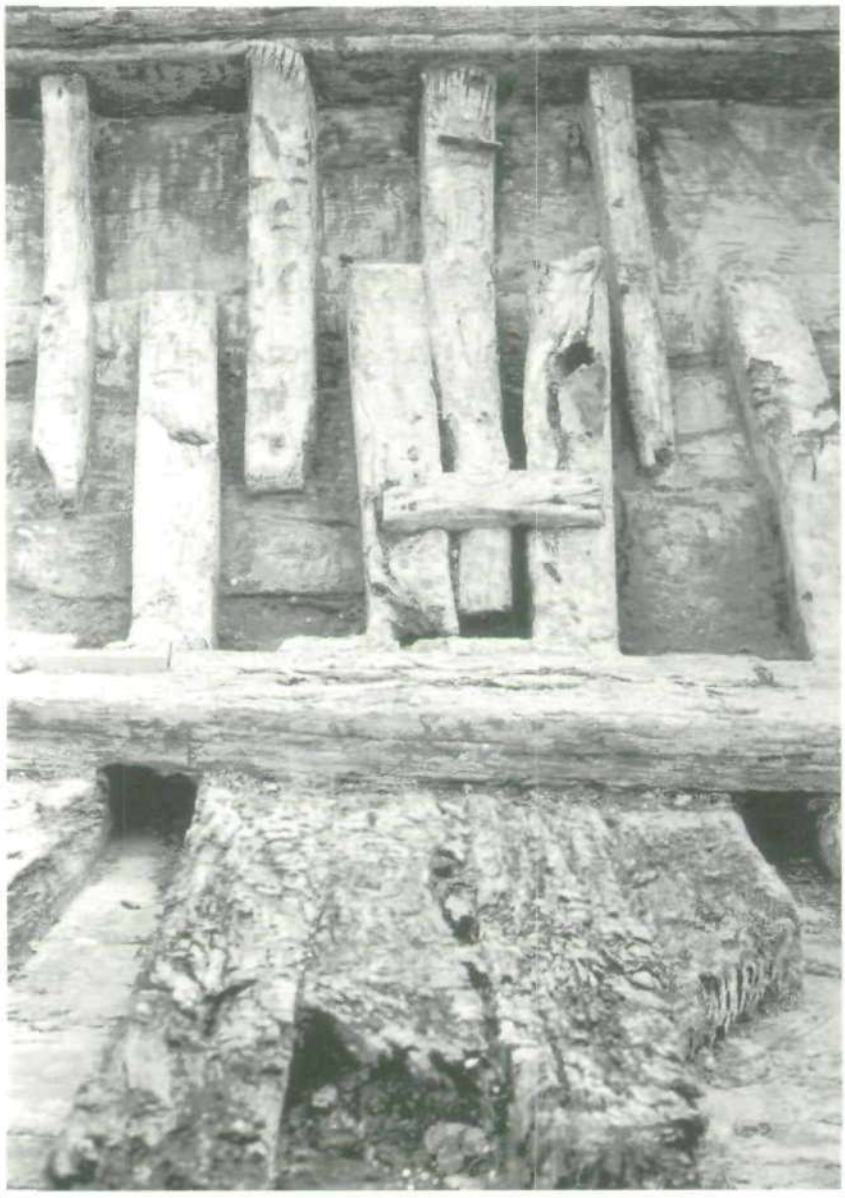


Figure 12.
The bolt that secured the leeboard to the top timber.

1.3.6 Rudder

The lower section of the rudder survived, but was recorded only in photographs (figure 13). It was found in a nearly upright position; the after end twisted to port so that it rested perpendicular to the hull. The surviving fragment consisted of the rudder shoe, to which were fastened three heavy planks held together by two iron straps. These iron straps were perhaps remains of the pintle straps. The upper and forward portions of the rudder did not survive.

Figure 13.
The lower section of the E 14 rudder.

1.3.7. Reconstruction

The E 14 has a reconstructed length of 19.5 m and maximum breadth of 3.51 m. The maximum depth, measured from the lower surface of the bottom to the top of the coaming, is 2.09 m. Over the center of the mast-step mortise the depth is 1.89 m. The displacement versus drafts of one to five feet is shown in a graph (figure 14). The foot used in calculating the draft measurements is the Amsterdam foot of 28.3 cm. Dead weight capacity at drafts of one to five feet is also shown (figure 15). The hold has a volume of 71.4 m^3 measured from the upper surface of the bottom to the lower surface of the covering board. The total volume of oak timber in the reconstructed hull, excluding decking, is 14.4 m^3. The total weight of oak calculated in this vessel is approximately 10,400 kilograms, with an average weight of oak of 720 kg/m^3 (45 lbs/ft^3).

Figure 14.
The hypothetical displacement of the reconstructed E 14 hull in fresh water.

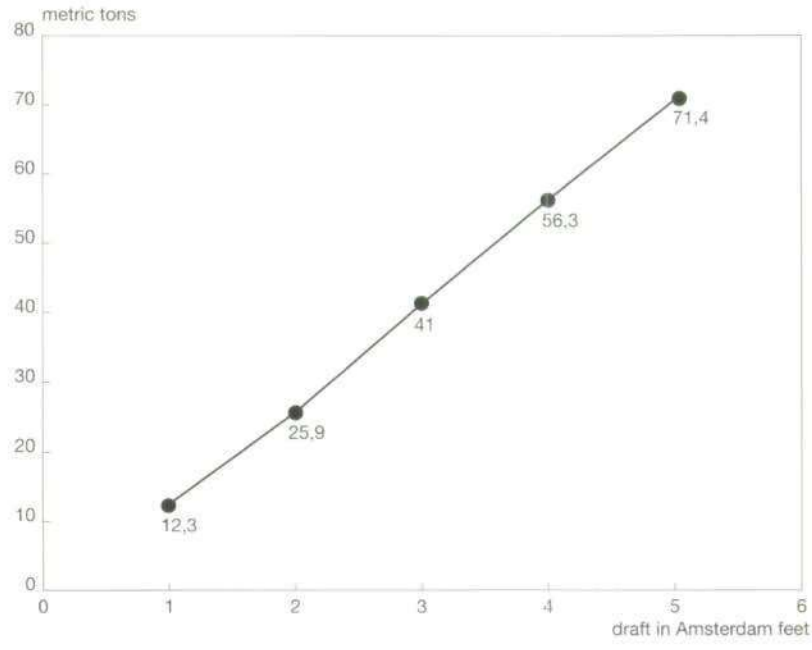
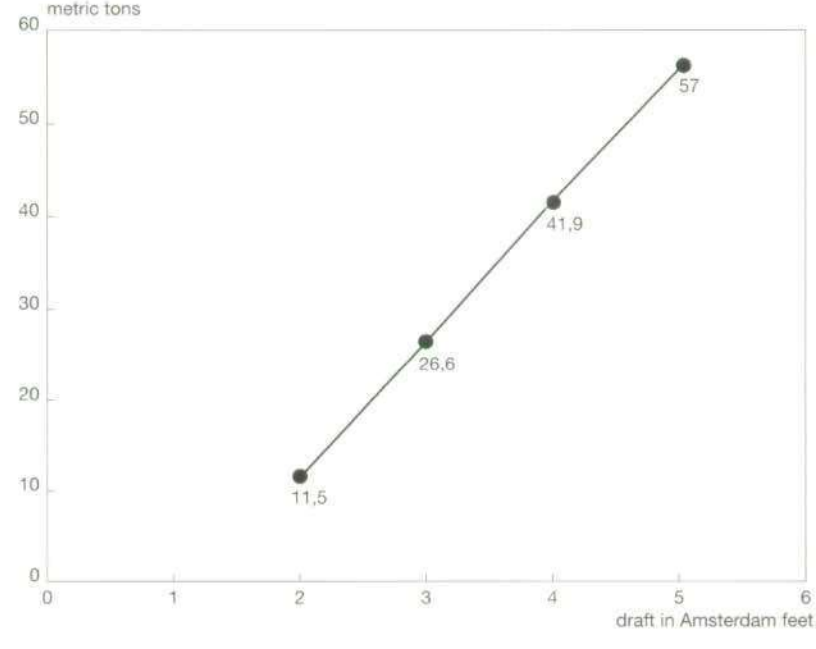


Figure 15.
The dead weight capacity calculated for the E 14 reconstruction.



The site plan in enclosure 1 and the reconstruction drawings in enclosures 3 and 4 are based on records of the hull made in the field. As mentioned above, the hull documentation consists primarily of two sources: field drawings of thirteen hull sections measured before the frames were removed and two sets of computer generated drawings derived from stereophotographs, one set taken in the first phase with frames intact and the other after the removal. All of these records were essential to the interpretation and reconstruction.

The thirteen hand-measured sections provide precise plank dimensions of thickness, width, repairs, and scarfs. The sections also supply evidence for the deck, covering board, and coaming. They did not provide any dimensions for frames, knees, or other timbers. The computer generated drawings provided an overview of the hull and wreck site and were used to reconstruct principal hull timbers, framing system, plank lengths, moulded dimensions of both posts, mast step, and the location and approximate dimensions of knees.

Some hull structures found loose in the wreck were recorded in detail. These were important to the reconstruction. Measurements of the hawse bolster and the other block were used to interpret their placement and function, but more significantly to derive the bow shape by reconstructing the angle between the sheerstrake and the stem. Other hull parts individually recorded were the knee, two beams, and leeboard.

The black and white photographs taken during the excavation show some details of the hull construction. Photographs were essential for much of the final reconstruction. They were utilized to differentiate between knees and top timbers, locate the leeboard and its blocks, and interpret details of the forward and stern bulkheads. A disadvantage to the photographs is their lack of scale and it is impossible to accurately determine measurements. As a result, of this measurements derived from the photographs are at best only estimates.

Measurements of many construction features were not made and much information was lost. Such is the case for dimensions of the stem and rabbet, the majority of frames and knees, mast step, rudder fragment, and forward bulkhead. Also lacking in the field records were descriptions of fastening methods, caulking, beam placement, and other construction details that undoubtedly survived in the wreck.

Only in a few instances was information not taken directly from the original excavation records (white areas in enclosures 3 and 4). Models and drawings of what are believed to be similar boats were researched to finish the reconstruction drawings by adding a hypothetical stem and sternpost, and determining the length of the skeg (Sopers 1974:92-94). Most of the drawings and models date from the nineteenth and early twentieth centuries.

Stem and sternpost sided dimensions were derived from the central plank toe shown in the computer drawings. The planking lines were finished at the posts by following their curves to the position of the hood ends estimated from the computer drawing. In the case of the stem, planking end-points were reconstructed from the angle of the hawse bolster. The outboard shape of both posts, moulded dimensions, and height were estimated from nineteenth- and twentieth-century models and drawings of prams.

1.4 Inventory

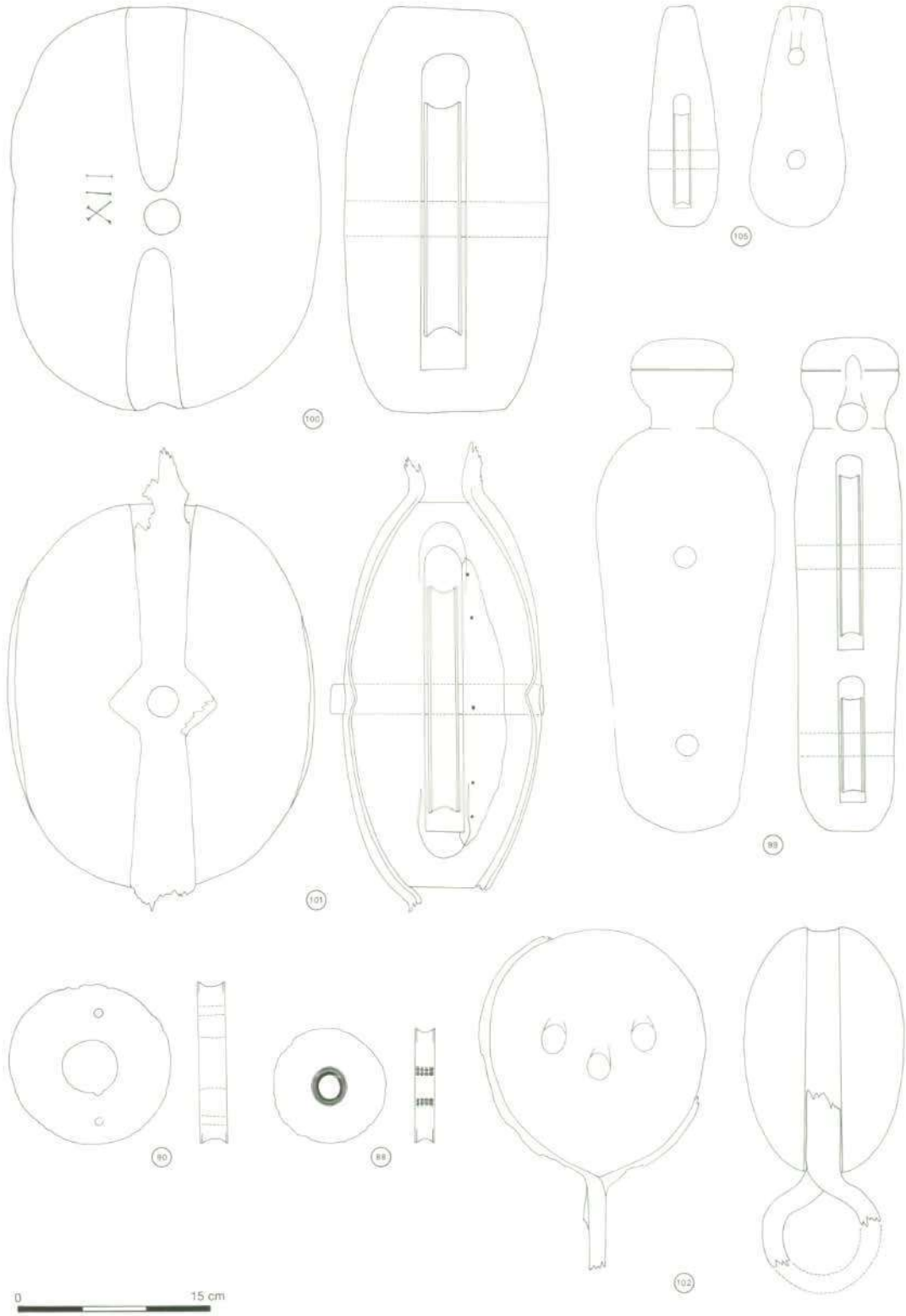
The inventory of the wreck E 14 was collected without recording provenience. This compromised the system of functional classification, because some items were assigned to categories based upon analogy instead of their relation to the accommodation plan of the ship. The site plan is a reconstruction from field notes, photographs, and personal interviews with the excavator, K. Vlierman.

1.4.1 Ship's equipment

The category of ship's equipment includes such items as anchors, chains, sails, cordage, windlasses, pumps, boats, ladders, punting poles, and spare equipment. The majority of the ship's and working equipment was recovered from the bow of the ship as shown in the site plan (enclosure 1A). A forward compartment or cuddy is evidenced by a bulkhead that partially survived on the port side of the ship. Such a compartment seems to have served as storage space for tools and equipment.

Most of the material in this category is comprised of spares including an array of fasteners, 18 sheaves and 7 blocks. The sheaves are made from ironwood and range from 8.1 cm to 15.4 cm in diameter. They cluster into three basic size ranges: two are about 8 cm, fourteen are between 10 and 12 cm, while another two are about 15 cm in diameter. All of the sheaves show signs of wear and some are quite damaged around the edges. Two of the sheaves seem to have been specialized or altered for some reason. One of these (figure 16-88) has two fragments of a leather strap lining the interior hole while the second (appendix 16-90) has two small holes, one on either side of the central hole, probably for a pin to lock it in place. Such a large number of spare sheaves might indicate that the ship had been in use for a long time. The number of used sheaves stored with the spare equipment might also suggest that the ship was run very frugally. The seven blocks found on the site may also have been spares since any blocks in use on the rigging would probably not have been preserved. One single block has the number "**XII**" carved into its cheek (figure 16-100), but the reason for this mark is unknown. The other ones are a large single block with iron strapping (figure 16-101); three dead eyes each with 3 holes and iron strapping (figure 16-102; and artefact numbers 103 and 104) and a small tackle block (figure 16-105). The fiddle block was found in conjunction with the leeboard (figure 16-99, supra 1.3.5.).

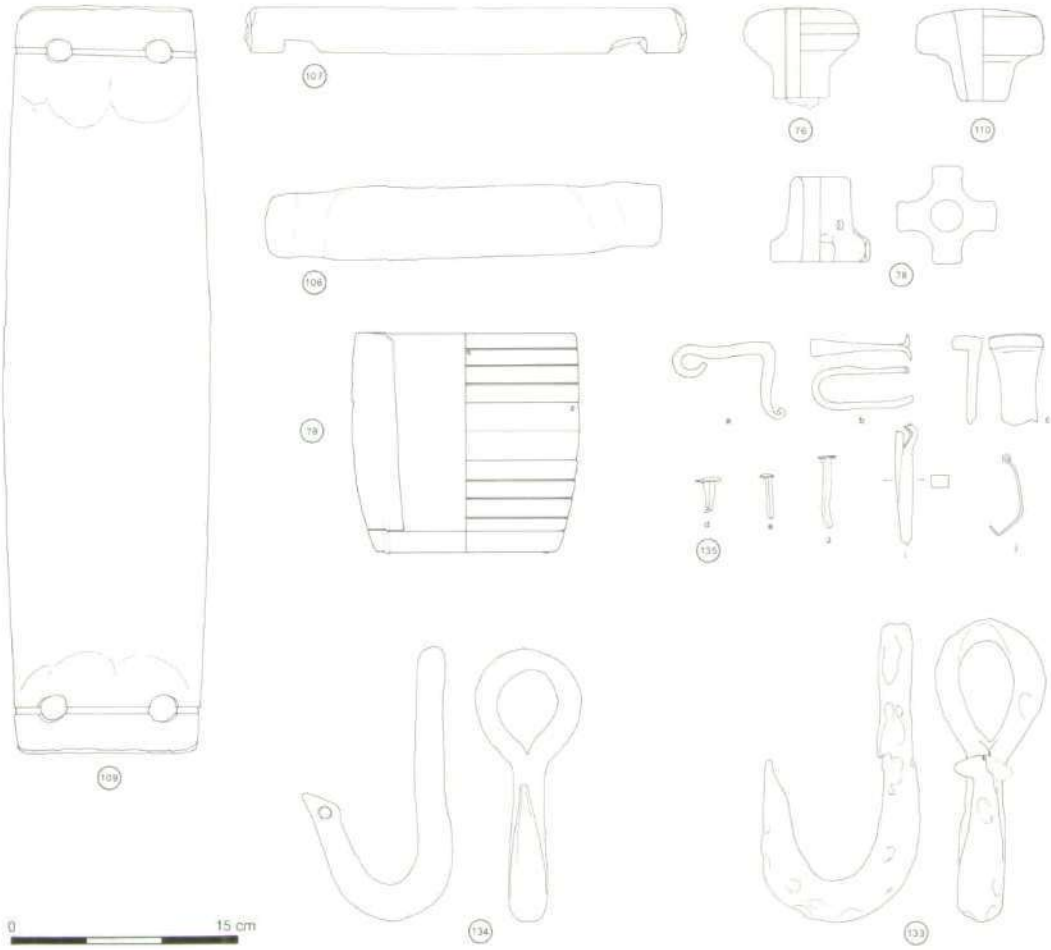
Figure 16.
Blocks.



A wooden head-stick, probably from the stay-sail (see description AZ 71 par. 2.3.1.) with a diameter of 4.2 cm is 26 cm long (figure 17-106). A variety of iron fasteners, concreted inside a small wooden barrel, were recovered (figure 17-135). Again, many of them appear to have been used and some appear purposefully bent perhaps to function as home-made latches, while others are haphazardly broken or bent. The fasteners may represent metal accumulated gradually from repairs or fasteners salvaged after a refit to the ship. The salvaging of scrap lends further support to the frugality of the skipper in operating the boat. The surviving pump components, two leather washers and a wooden cog (figure 17-78), are also categorized as spares because it is unlikely that these items, if part of the functioning pump, would have survived when the pump itself did not.

The other sub-category represented in this classification is that of aids. This sub-category includes the ladder rung and the knobs to punting poles. The ladder rung measured 28.5 cm long with a diameter of 2.8 cm and is notched 2.5 cm in from either end for a rope (figure 17-107). The ladder rung indicates that a rope ladder was kept on board. This could be used over the side of the boat or through a hatchway into the hold of the ship. The use of punting poles is suggested by two very similar knobs each with a central hole diameter of 2.2 cm (figure 17-76, 17-110). They appear to be lathe turned with simple incised lines around their circumference and could have been the work of the same carpenter. Punting was an important means of propulsion in shallows. Punting poles could be used to push away from banks and to check water depth. The seaman's chair is made from an oak barrel stave (figure 17-109). The function of the wooden barrel (figure 17-79) is unknown.

Figure 17.
Equipment.



A well preserved, small decorated *mastwortel*, or mast finial (figure 18-75), was found in the bow. This kind of decorated object is uncommon in the shipwrecks of the Zuider Zee. They were used most of the time on special occasions. The length is 12 cm and it is segmented in five sections. It has a deep hole of 17 mm diameter. The lowest section is a crown with flowers. The second and fourth ones show four angelheads or sea-gods. The third section is a crown with some leaf-work, the top a crown with four feathers. This ornamentation is common for inland and so-called pleasure vessels (Crone 1926, 296 and plate 64; Huitema 1962, 199-200).

Figure 18.
Flag pole or mast finial *(mastwortel)*.

Table 2.
Ship's equipment.

Number	Object	Class	Provenience
109	Seaman's chair from barrel stave	1.2	---
75	Flag pole or mast finial	1.2	Bow
76	Knob to punting pole	1.7	---
110	Knob to punting pole	1.7	---
106	Oak, ladder rung	1.7	---
107	Pine, ladder run	1.7	---
67	Leather washer	1.8	---
68	Leather washer	1.8	---
78	Cog from pump	1.8	---
79	Barrel, h-14.6	1.8	Bow
80	Ironwood sheave	1.8	Bow
81	Ironwood sheave	1.8	Bow
82	Ironwood sheave	1.8	Bow
83	Ironwood sheave	1.8	Bow
85	Ironwood sheave	1.8	Bow
86	Ironwood sheave	1.8	Bow
87	Ironwood sheave	1.8	Bow
89	Ironwood sheave	1.8	Bow
90	Ironwood sheave	1.8	Bow
91	Ironwood sheave	1.8	Bow
92	Ironwood sheave	1.8	Bow
93	Ironwood sheave	1.8	Bow
94	Ironwood sheave	1.8	Bow
95	Ironwood sheave	1.8	Bow
96	Ironwood sheave	1.8	Bow
97	Ironwood sheave	1.8	Bow
98	Pin from block	1.8	Bow
99	Fiddle block with knob	1.8	Bow
100	Single block, marked **XII** on side	1.8	Bow
101	Single block, iron strap	1.8	Bow
102	Dead eye, iron strap	1.8	Bow
103	Dead eye, iron strap	1.8	Bow

104	Dead block, iron strap	1.8	Bow
105	Small tackle block	1.8	Bow
88a	Ironwood sheave	1.8	Bow
88b	Strap lining sheave hole	1.8	Bow
135a	U shaped cramp	1.8	Bow
135b	U shaped cramp	1.8	Bow
135c	Broken forelock bolt	1.8	Bow
135d	Small nail	1.8	Bow
135e	Small nail	1.8	Bow
135f	Nail	1.8	Bow
135g	Nail	1.8	Bow
135h	Nail	1.8	Bow
135i	Nail type fastener with hole	1.8	Bow
135j	Fish hook	1.8	Bow
84	Ironwood sheave	1.8	Bow

1.4.2. Working equipment

Working equipment were those items necessary to perform the function for which the ship was built (Reinders 1985:87). This would include equipment involved in loading and unloading the cargo of the ship. This category is represented by two hooks found in the bow. It is plausible that they were used to load cargo into the ship. Because hooks are multi-functional, however, they may have functioned as part of the rigging. One of these hooks (figure 17-133) had a fluke end and was crudely made with hammer indentations evident over the entire surface. The second hook (figure 17-134) had a small hole in the end. This may have allowed a thin rope to secure the hook to prevent accidental loss of the load.

Table 3.
Working equipment.

Number	Object	Class	Provenience
133	Cargo hook with fluke end	2.0	Bow
134	Cargo hook, pointed with hole	2.0	Bow

1.4.3 Weaponry

The classification of weaponry refers to personal weapons excluding those carried as equipment on a warship or as part of a cargo (Reinders 1985:87). The field catalog lists three small lead bullets found among the wreckage. Unfortunately, these artefacts are currently unavailable for study. No other items from this category were recovered, therefore this remains a tenuous classification.

Table 4.
Weaponry.

Number	Object	Class	Provenience
129	Lead bullets	3.0(?)	Stern

1.4.4 Administrative

The category relating to administrative functions includes items such as ship's papers, finances, stationary, and writing equipment. A writing slate (figure 19-26) and a large lump of chalk (number 30) were found among the wreckage. Chalk was often used in carpentry and in marking cargo or the ends of barrels (K. Vlierman, personal communication). The slate measures 39.3 cm by 26.8 cm. The edges are bevelled somewhat and the impression of a wooden frame can be seen along the rim. The slate is broken into twelve pieces, which when reassembled, completes approximately 90% of the original article. The surface of the slate is marred by many permanent scratches. This may have been caused by the crystalline inclusions in the chalk or by a slate pencil, which was commonly used at that time (K. Vlierman, personal communication). Unfortunately, it is not possible to read any of the writing on the slate because one message overlies another and the orientation of writing changes frequently.

Figure 19.
Writing slate.

The most important artefact used in dating the ship is a lead token for the lighthouses in the region of North Holland and West Friesland (figure 20-125). These tokens were purchased annually by ships' captains to support and maintain the operation of lighthouses (*Rijksdienst voor de IJsselmeerpolders* 1987:38). The date on the token is 1783 and gives us a *terminus post quem* for the wreck. Also found was a small lead object resembling a baling seal (figure 20-126). Impressed upon one surface of this seal is a cipher mark of "**82**". K. Vlierman (1990:4) suggests that this seal may be an example of a lighthouse token, albeit from a different lighthouse, and the cipher "**82**" indicates the year 1782.

Table 5.
Administrative.

Number	Object	Class	Provenience
26	Writing slate	4.3	Stern
30	Chalky limestone	4.3	Bow
125	Lighthouse token, dated 1783	4.2	Stern
126	Lead seal, 82 cipher	4.2	Stern

Figure 20.
Coins and tokens.

1.4.5 Navigation

The category of navigation includes instruments such as compasses, sounding leads, charts, tide tables, and running and towing lights. There were no artefacts from this classification found in the wreckage of this ship. This is not unusual however, because this craft was primarily used on inland waterways where a compass would not be necessary and a punting pole could serve to measure the water depth. Much of the upper structure of the ship was lost and this would have destroyed any navigational lights if they ever existed. Furthermore, skippers of this type of vessel would have been well acquainted with these waterways, thus making charts and tide tables unnecessary.

1.4.6 Tools

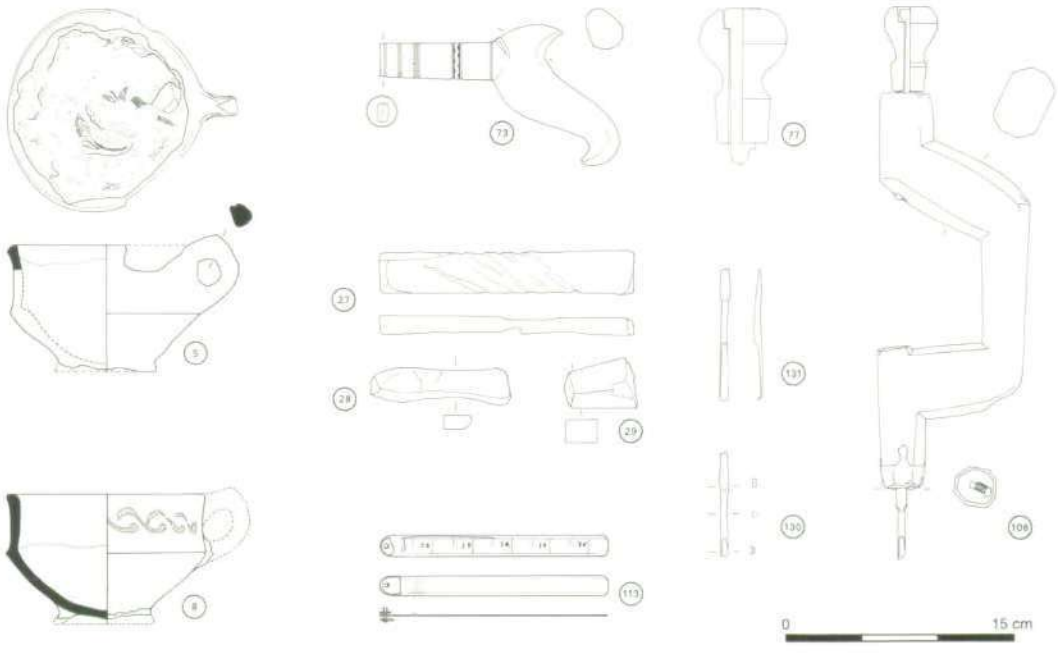
The category of tools encompasses tools that are involved with the management of the ship including the sub-categories of carpentry, caulking, sail and rigging maintenance and cleaning. Carpentry tools dominate this part of the assemblage. A saw handle (figure 21-73) is typically Dutch, with its smooth lines, pistol grip, and brass ferrule. Goodman (1964:146) dates this style specifically to the eighteenth century, indicating that it was replaced in the latter part of the eighteenth century by the English-style handle and blade. A comparable example from shipwreck M 65/O.Fl., which was wrecked about A.D. 1700, reveals that this stylistic transition is not as absolute as Goodman presumes. The evidence suggests tha this style probably evolved earlier and was used longer than previously thought, most likely co-existing with other styles during periods of transition.

The zig-zag folding rule is made of copper and divided into increments of half a *duim* (a division equivalent to an inch) numbered on the *duim* (figure 21-113). The duim was originally a natural measurement equal to the breadth of a person's thumb, and there would be anywhere from ten to twelve *duimen* in a Dutch foot (Verhoeff 1979:103). The *duim* increments on this rule are consistent with the present standard used to measure an inch. Only the last segment remains intact and is numbered from twelve to sixteen. Sixteen *duimen* must have been the full extension of the rule since there is neither a rivet nor a hole for a rivet on the terminal end, and only two segments would be able to pivot on any one axis for the rule to extend to its full length. The rule pivots at one end on a copper pin, 9 mm long, which secures a copper binding and another small piece of copper, perhaps a second segment of measurement. The holes in the two exterior segments are bevelled so that the pin is recessed into the surface of the metal. The pivotal end is bent and has semi-circular striations along this bend consistent with the expected wear patterns resulting from opening and closing the rule. These three pieces comprise only 3.5 mm of the 9 mm pin length, indicating that something is missing. According to Salaman (1975) rules of this type are usually equipped with a self-locking joint that acts to lock the rule in place when extended, but such a fastening is missing on this example. It is possible that there was a self-locking joint at one time that has since deteriorated.

The absence of a self-locking joint on the original rule would suggest that pressure was necessary to hold the rule taut when extended; a wood backing might have provided this tension. It is also possible that if backed by wood, the instrument was thus equipped to function as a bevel. Horsley (1978:150 figure 53) shows examples of boxwood and brass bevel gauges, that are similar in construction and that double as rules. The bevel gauges that double as rules (Salaman 1975, Horsley 1978, Goodman 1964) are not actually folding rules.

Three stones were found for sharpening and polishing metal blades, all of which show considerable use. The largest stone is a grey whetstone (figure 21-27). It is harder and coarser than the other two stones and deep grooves are cut into opposite surfaces. The remaining two stones are of a softer and finer grained rock. One looks like a fine-grained sandstone (figure 21-28) and the other seems to be of hematite (figure 21-29). Their wear patterns are very smooth and gently curved.

Figure 21.
Tools.



One intact brace, a knob for a second brace and two bits were recovered. The complete brace is small, measuring 36.5 cm long, with a shallow sweep (figure 21-108). It is constructed of wood with a pewter ferrule reinforcing the bit-end. Its crude construction suggests that it is homemade. The knob is lathe-turned and possesses a simple circular incised decoration around its circumference. This knob is 5.3 cm high and turned on a wooden pin. A fragment of the wooden pin survived, measuring 1 cm in diameter. The bit is wedged into the brace with two iron nails and it would have bored a hole 0.5-0.6 cm in diameter. This brace is quite similar to the shipwright's brace pictured in Salaman's *Dictionary of Tools* (1975:98-99):

For light work shipwrights sometimes use a homemade wooden brace often known as a Belly Brace or Boat Sway. These have a rather shallow sweep, and a square, tapered socket to take wooden pads. A stock of these pads is kept, each holding a different size of awl or bit, ready to be placed in the socket as required. They were used for boring the planks of smaller craft before nailing.

The knob is identified as belonging to a brace because of its similarity to the knob on the complete brace (figure 21-77). This knob is lathe-turned with an identical incised decoration. It measures 8.7 cm high and turns on a surviving wooden pin, measuring 1.5 cm diameter. It seems likely, based upon its size, that it was part of a much larger brace and possibly that the two knobs or braces were purchased as a pair from the same craftsman. The two spoon bits have a diameter of 6 mm (figure 21-130 and 21-131).

The remaining equipment in this category consists of two redware cups believed to be receptacles for caulking material or brushes. Both cups are damaged. One cup is filled with a hard pitch and remnants of fibre and iron encrustation are adhered in the pitch (figure 21-5). Some of the fibres appear to be from a plant, consistent with a type that might be used on a caulking brush. Other materials are knitted and knotted wool fragments, possibly indicating the use of an old garment such as a hat or sock for caulking. The iron encrustation protruding from the surface of the pitch might be the remains of a caulking iron; if so, it is the only evidence of a caulking iron on board. The second cup also has small patches of pitch residue on the exterior surface, on the rim, and on a large round area on the interior, off-center from the bottom (figure 21-8). This pattern is compatible with how a brush or other caulking tool might have rested in the cup.

The assemblage of tools seems incomplete for what would be expected on a boat of this type. The basic tool chest would be expected to have a hammer, chisel or caulking iron, adze, axe, caulking mallet, pincers, knives, and equipment for rigging such as a marline spike. None of these items were found, however.

Table 6.
Tools.

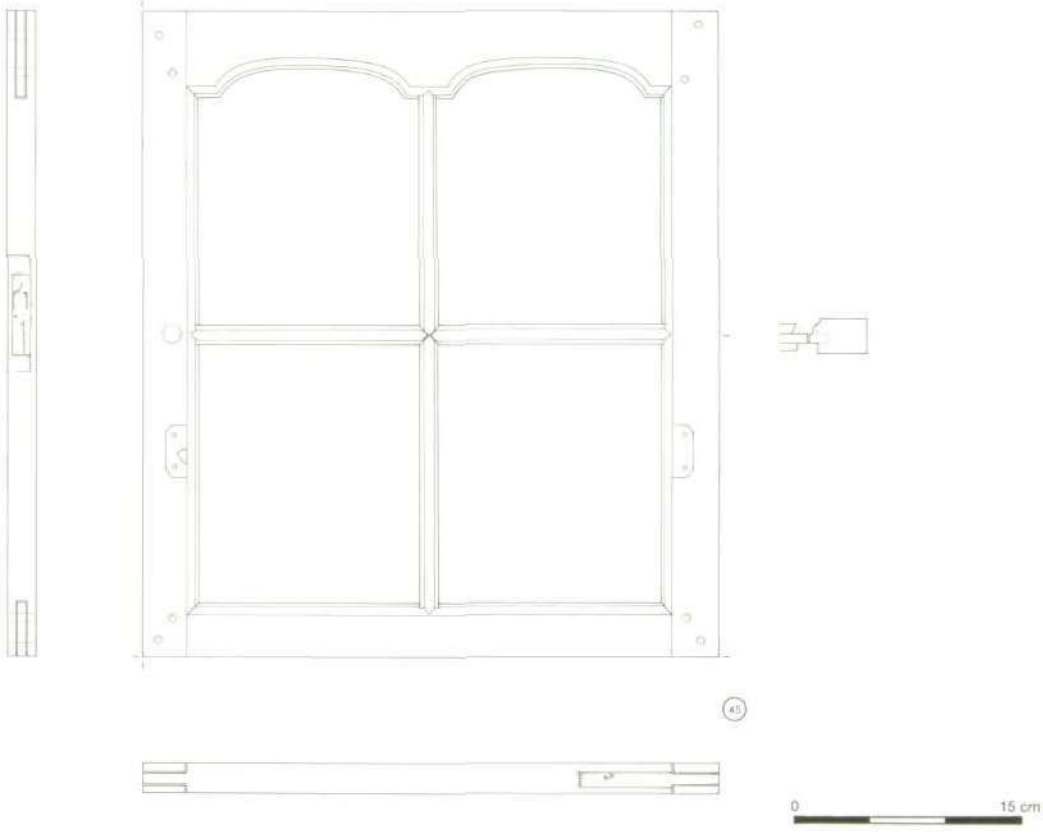
Number	Object	Class	Provenience
73	Saw handle, pewter ferrule	6.1	Bow
77	Knob to brace	6.1	Bow
108	Brace	6.1	---
113	Zig-zag rule	6.1	---
130	Spoon bit for brace	6.1	Bow
131	Spoon bit for brace	6.1	Bow
5	Pitch filled cup	6.2	Bow
8	Pitch stained cup	6.2	Bow
27	Dark grey whetstone	6.5	Bow
28	Tan polishing stone	6.5	---
29	Red polishing stone	6.5	---

1.4.7 Domestic effects

Domestic effects are those articles relating to the interior of the living quarters such as furniture, sleeping accommodations, lighting, heating, storage, and sanitation. The domestic effects in this assemblage are few, encompassing only three objects, a window, a *snotneus* oil lamp, and a chamberpot.

The window measures 38 cm across and 43 cm high (figure 9 and 22-45). It is constructed with mortise and tenon joints and has four thin glass panes held into their framework with a white plaster-like chinking. The panes are of different thicknesses and shades of light green, possibly indicating installation at different times or the use of leftover or recycled glass. Prams from the nineteenth century often had windows set into the hull in the stern of the craft, however, this window does not appear to have been sturdy enough to have functioned as an exterior portage. It seems likely that it served as the door to a locker or perhaps as an interior window between compartments. There are indentations in the top and bottom right side of the frame where hinges attached and a lock partially survived on the right edge. There are two more indentations on the outside of the frame, one on either side of the lower panes, possibly for the attachment of a metal bar spanning the breadth of these panes. The exterior moulding was painted red while the interior was left unpainted and rough. The window was found in the stern close to the stern bulkhead, which is thought to have separated the living quarters from the hold. It was surrounded by small personal objects and several bottles, cooking- and milk bowls and eating- and drinking gear which might support the supposition of its having functioned as part of a locker.

Figure 22.
Window from the stern.



The *snotneus* (oil lamp) is constructed of thin welded copper sheets and stands 23 cm tall (figure 23-112a). It is an oil burning lamp designed for interior lighting and can be placed on a level surface or hung on a wall. It is the only means of lighting that was found and probably gave only faint illumination, depending upon the type of oil that was burned; whale oil giving brighter illumination than either sheep or vegetable tallow. Lamp light would be augmented by firelight in a household setting, however an open hatch or enclosed lanterns would have been less of a fire hazard on a boat unless it was docked and stationary.

The last artefact in this category is the chamber pot, broken into several pieces, some of which were not recovered (figure 23-16). It is a red earthenware vessel with one handle and a clear lead glaze over an abstract floral slip design in yellow and green. The rim is everted and stepped, and has an estimated diameter of 18 cm. The footring is well formed and the bottom is unglazed and fire-blackened. An absence of staining inside indicates this vessel was never used for sanitation and waste disposal. The fire-blackened bottom indicates that it was heated, but there is no evidence suggesting what it might have contained.

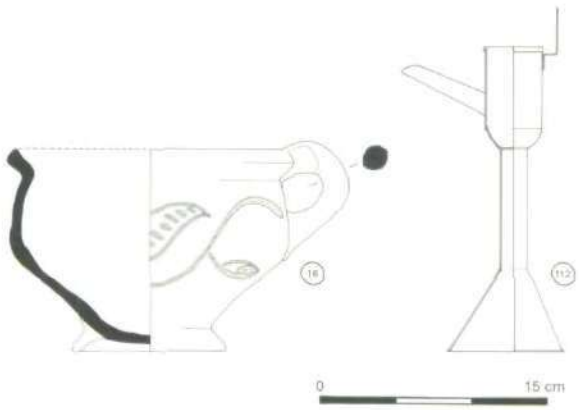


Figure 23.
Domestic effects.

Table 7.
Domestic effects.

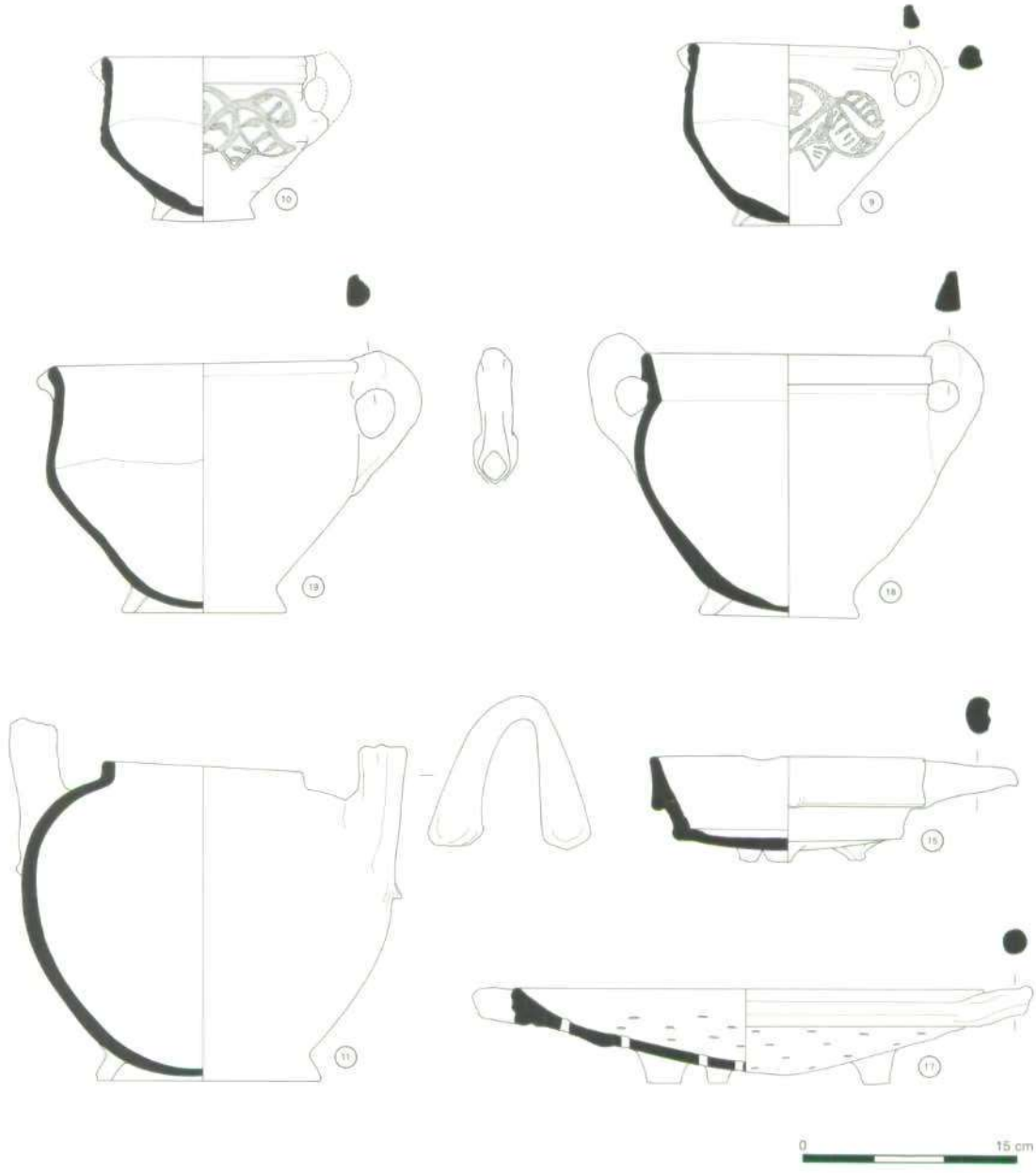
Number	Object	Class	Provenience
45a	Window frame, mortise/tenon	7.1	Stern
45b	Window glass, upper left pane	7.1	Stern
45c	Window glass, upper right pane	7.1	Stern
45d	Window glass, lower left pane	7.1	Stern
45e	Window glass, lower right pane	7.1	Stern
112a	Lamp *(snotneus)*	7.3	Stern
112b	Wick spout	7.3	Stern
112c	Base	7.3	Stern
16a-c	Chamberpot, slip	7.8	Stern

1.4.8 Hearth and galley

The category of hearth and galley includes artefacts related to the preparation of meals on board ship. This entails not only the hearth and hearth tools, but also fuel, cooking vessels, utensils, and other vessels involved in food preparation. A hearth as such was not found in this excavation, but that evidence suggests there was a hearth of some kind on board. Three unglazed redware tiles were found. They measure 22 cm square and show some burn marks. Three yellow fire bricks were also recovered, however other hearth tools are missing, such as a fire box, a grill or trivet, an iron or tile hearth plate, and fire tongs. A large cauldron was missing and the absence of a hearth plate or tiles suggest only a simple hearth arrangement, such as a firebox constructed of wood and sand. A hearth of this kind would have left little evidence of its existence, and the few unglazed tiles and bricks might be all that remain. This is only speculative as the true nature of the hearth can not be discerned.

The ashpot is another indicator of some type of hearth. It is a large red-earthenware vessel with two stirrup handles, a plain straight rim, and a well-formed footring (figure 24-11). This vessel type usually has a lid, however one was not found. It has a clear lead glazed exterior with portions of deglazed surface and clumps of glaze damaged in the firing process. It stands 22.2 cm high and the interior is fire-blackened. The ashpot functioned primarily as a container for coals and ashes from the hearth so that they could be disposed of safely, thereby reducing the chance of the boat igniting. When the ashpot was filled, it may also have served as a stove with which to warm hands or feet.

Figure 24.
Hearth and galley utensils



Three of the ceramic vessels are fire-blackened suggesting their use in cooking. The first is a small red-earthenware tripod skillet with a wide rim (figure 24-15). The rim is undercut, has a diameter of 19.2 cm, and a pouring lip at a right-angle to a short thick handle. The vessel interior and the exterior rim are covered in a clear lead glaze while the bottom is unglazed. The bottom is heavily fire-blackened and the interior has deep scratches in the glaze indicating its use in the galley. The second and third objects used for cooking are a pair of red-earthenware bowls, quite uniform in size, shape, and decoration. They both have a straight grooved rim, diameter of 14.5 cm, with only one handle. The exterior is decorated with a green and yellow slip in an abstract pattern, and the interior has a yellow slip beginning half way down the wall. The vessel is covered inside and out by a clear lead glaze. One bowl (figure 24-9) has a pouring lip opposite the handle, while the corresponding region on the second vessel (figure 24-10) is missing. Both bowls are fire blackened on the bottom and around the footring, and may have served the duel functions of heating a single portion of stew or gruel taken from a larger pot and as vessels of consumption. The similarity of these two bowls may suggest that they were perhaps purchased from the same potter, however vessel forms and decorative styles were geograp-hically diffused and spanned a period of several hundred years. Such ceramics were differentiated by small changes in rim and handle design.

Three other vessels seem to have functioned for food preparation. The first is a red-earthenware tripod sieve (figure 24-17) with a grooved hammerhead rim and two handles. The rim measures 32.5 cm in diameter. The basin is shallow and perforated with holes of 0.5 cm in diameter. The entire vessel is covered in a clear lead glaze. The second item is a red-earthenware batter bowl (figure 24-19) with an outward curving bead rim measuring 22.3 cm in diameter. It has a well-formed footring and handle with a pouring lip opposite the handle. A yellow slip coats the bottom half of the interior, while a light-greenish lead glaze covers the entire pot. The third container, a red-earthenware milk pot (figure 24-18), could have been used for food preparation as suggested by its size, or for storage as suggested by its form. It has a plain rim of 21 cm diameter with a slightly concave collar and two well-formed handles. The body is globular tapering to a footring, and the entire vessel is covered in a clear lead glaze. It is in fact a miniature of a larger storage pot found on the wreck.

Table 8.
Hearth and galley.

Number	Object	Class	Provenience
20	Redware tile	8.1	Stern
21	Redware tile	8.1	Stern
22	Redware tile	8.1	Stern
23	Fire brick	8.1	Stern
24	Fire brick	8.1	Stern
25a	Fire brick	8.1	Stern
25b	1/2 fire brick	8.1	Stern
11	Ashpot	8.2	Midship
9	Cooking bowl, slip	8.4	Stern
10	Cooking bowl, slip	8.4	Stern
15	Tripod skillet	8.4	Stern
17	Sieve	8.7	Stern
18	Milkbowl	8.7	Stern
19	Mixing bowl	8.7	Stern

1.4.9 Eating and drinking

This classification encompasses table linens, dishes, cutlery, and other vessels used exclusively for the consumption of meals. It seems unusual that no dishes were found that can be exclusively attributed to this category. Neither complete glasses nor drinking vessels of any kind were found and only a few pots are presumed to have served for heating and serving single portions. Fragments belonging to a delicate polychrome faience bowl or saucer were found which may have been used as a drinking cup or a tea bowl (4).

The E 14 assemblage contains two pewter spoons. The first (figure 25-120) has a round back and shows signs of use, possessing multiple scratches and dents. There is a maker's mark in the hollow of the spoon bowl below the handle, a crowned rose with the initials "**H H**" stamped on either side. The style itself was in use from the fifteenth through the twentieth century. This particular form of handle attachment, tapering to a point, is more common in the later examples (Dubbe 1978). The second spoon (figure 25-121) has an oval or egg-shaped bowl and appears to have been relatively new, judging from the lack of wear, at the time of deposition. Bevel marks, resulting from the manner in which it was shaped, are still visible across the back of the bowl. This oval style is usually attributed to the nineteenth century (Dubbe 1978). Yet a similar spoon, dating to the second half of the eighteenth century, was found during the excavation of *Oostenburger-middenstraat* in Amsterdam (Baart et al 1986). A silver spoon of this style, at the *Provinciaal Overijssels Museum* in Zwolle, has been dated to the eighteenth century.
Similar examples for both types of spoons were recovered from the excavation of the *Amsterdam*, an East-India merchantship that sank in 1749 (Marsden 1985:139).

Figure 25.
Two pewter spoons.

Table 9.
Eating and drinking.

Number	Object	Class	Provenience
4	Polychrome faience bowl/saucer	9.2	Stern
120	Spoon, crown/rose mark, H H	9.3	Stern
121	Oval spoon, no mark	9.3	Stern

1.4.10 Victuals and provisions

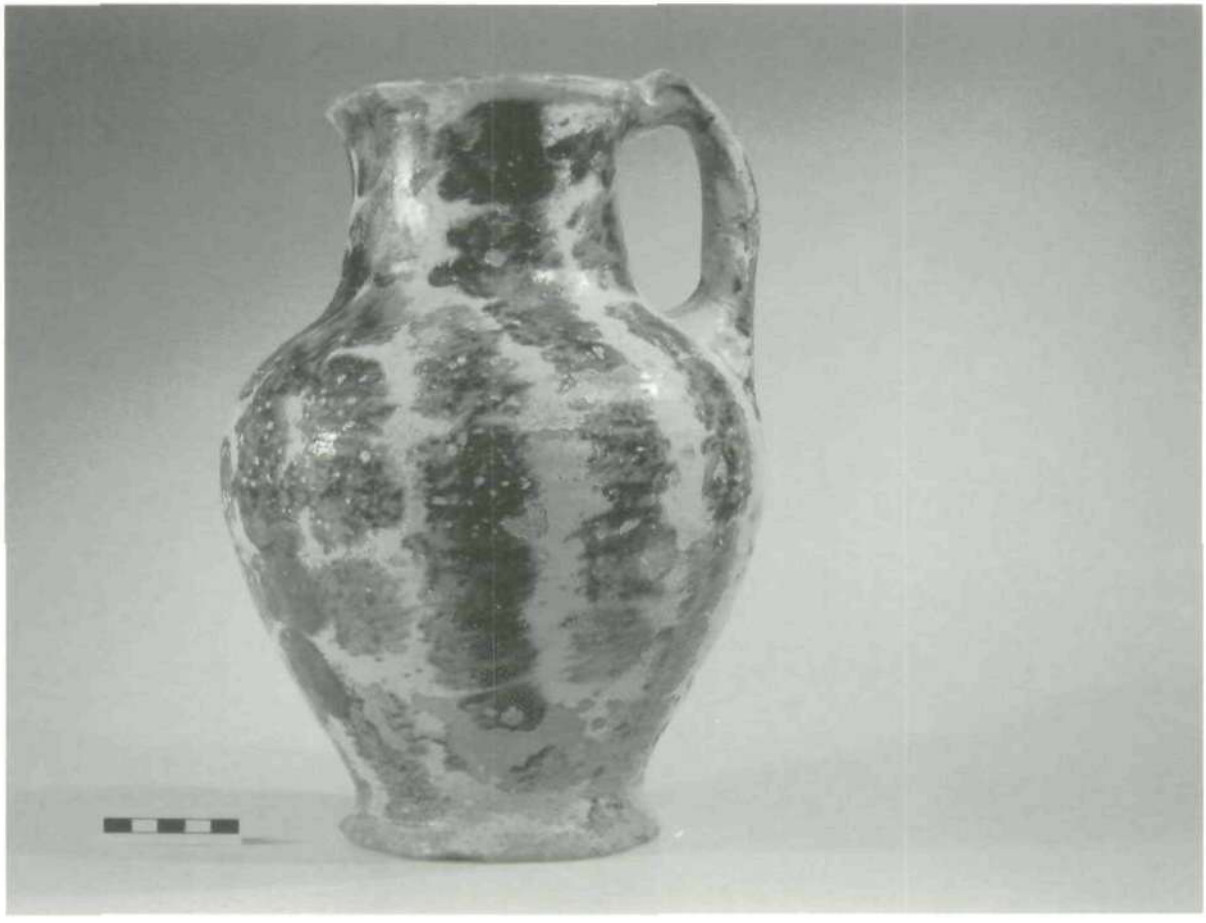
This category is predominantly concerned with the storage of food and drink onboard the ship. Sub-categories are designated for food; however, food remains are rarely preserved at this type of site. The remainder of the identifiable ceramic forms consist of storage and serving vessels. There is a Tigerware jar that stands 27.8 cm high (figure 26 and 27-14). It has a bead rim with a pouring lip opposite a well-formed and decorated handle. The globular body tapers on either end to an inward flaring neck and a footring. The exterior is covered in white slip and decorated with a brown pigment to resemble the markings of a tiger, while the interior is coated with a yellow lead glaze. It may have been used for both storing and serving a beverage.

There is also a red-earthenware jar standing 31 cm high (figure 27-13). It has a decorated handle, bead rim, inward flaring neck, and globular body tapering to a footring. The interior and exterior are covered entirely in a greenish-yellow lead glaze. The large red-earthenware storage pot that was recovered has a rim diameter of 32.8 cm and stands 28 cm high (figure 27-12). The shape and detail are the same as the smaller milk pot, however, it lacks the exterior glaze, possessing instead a simple interior lead glaze. The last storage vessel is a small stoneware pot (figure 27-7). It is made from a buff stoneware covered in a grey saltglaze and has a flat everted rim measuring 9.5 cm. There is one strap handle and a flat base, and the pot may have originally been purchased for its contents such as mustard or marmalade.

Three intact onion bottles were recovered (figure 26, 27-31, 27-32 and 27-33). They range in size from 16-20 cm high and all have a string finish. Shards from at least one more wine bottle and perhaps a case bottle comprise the remainder of this category.

The galleyware, composed of eating- and drinking-gear, victuals and provisions, are sparse and each piece probably served multiple functions, possibly indicating a lower economic states for the ship's crew. The entire ceramic assemblage is composed of only twelve pieces, eleven of which are comprised of an inexpensive lead glazed red-earthenware common in the Netherlands. This sparseness in number and variation (dishes and cups are missing) is unusual, evidenced by the assemblages of comparable ships wrecked during the same period. Many of the pieces appear to be of fair quality judging from their symmetry and attachment of handles and footrings, and approximately five pieces have some type of decoration. Deformation during the firing process did not necessarily relegate a pot to the waster pile.

Figure 26.
"Tigerware" jar and wine bottles.



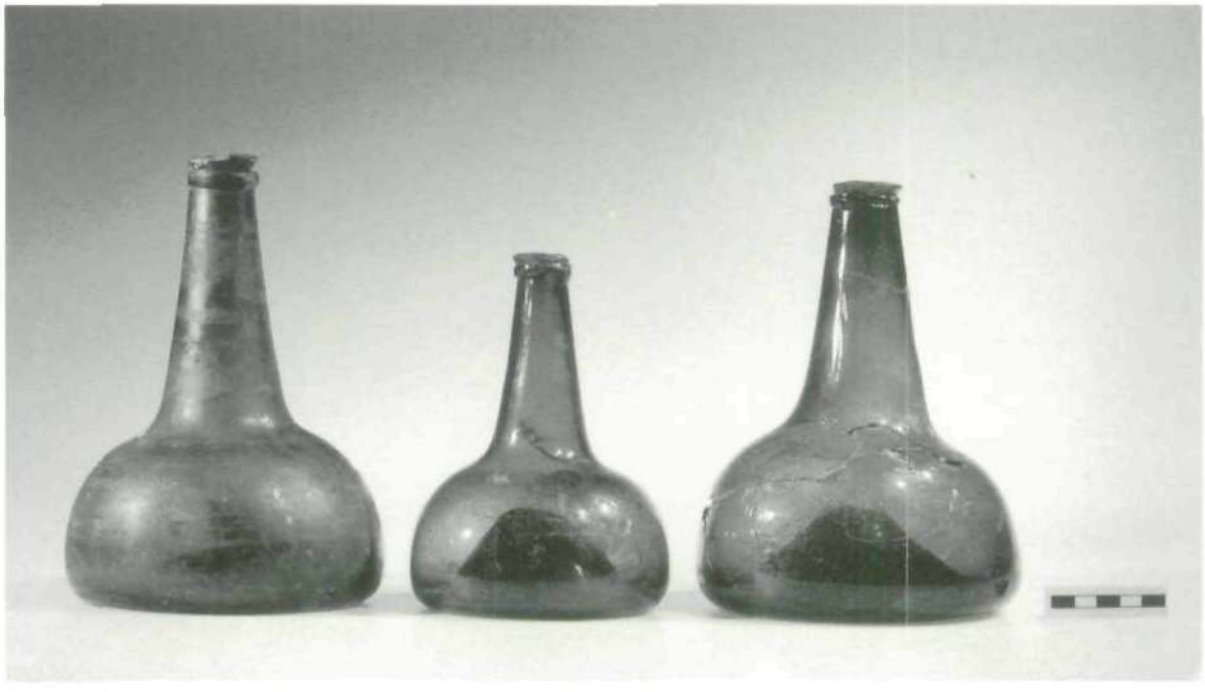
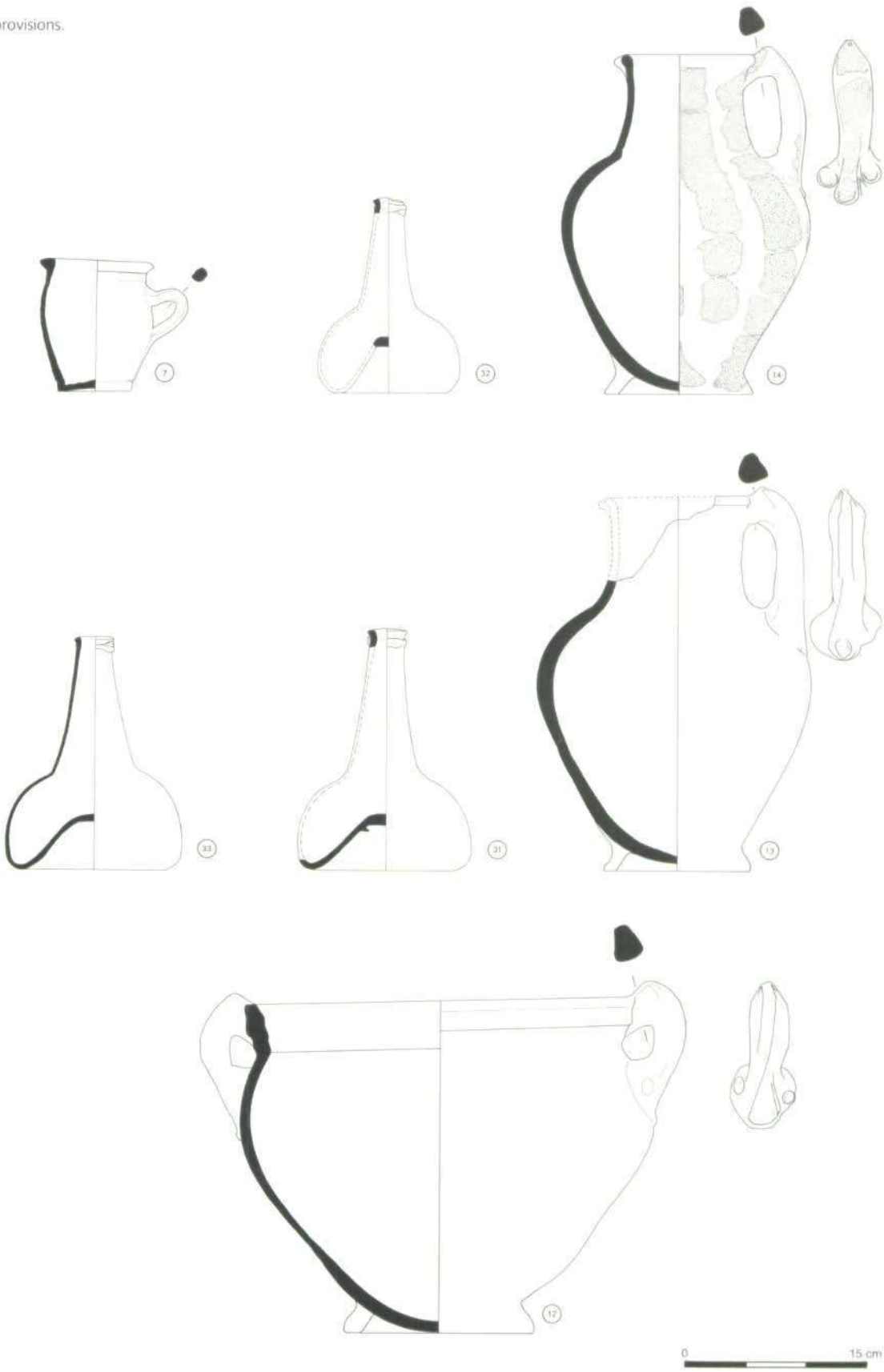


Figure 27.
Victuals and provisions.



Ceramics have been found aboard wrecks recovered in the Netherlands that would not have been considered first-quality pieces because of warping and other deformations. Items of this sort would doubtlessly have been sold at a reduced price. Yet as meagre as this assemblage is, ceramics of second or third quality were not found on this wreck (Vlierman 1990:9). Thus, the quantity and quality comprising this assemblage suggest a minimal number of people occupying this boat. It is also plausible that the crew had other more permanent dwellings and that the ship was used seasonally or for day travel. The sparseness of the artefacts recovered and the nature of those found do not suggest a full-time kitchen; rather they imply a small working galley from which food was prepared in advance and transported in storage pots to be reheated. Alternate explanations for the scarcity of this functional category are that post-wreck disturbances such as those caused by salvage, ice-drift, nets or anchors catching on the wreck, or ploughing, have reduced the number of items from the site or destroyed them entirely. The hull remains were such that an accurate reconstruction of the living quarters is not possible, so the exact nature of the hearth and galley will never be confirmed. The small size of all the cooking vessels, the few large storage pots, and the scarcity of galley-ware in general seem to lend credibility to a small make-shift galley for a skipper and his mate.

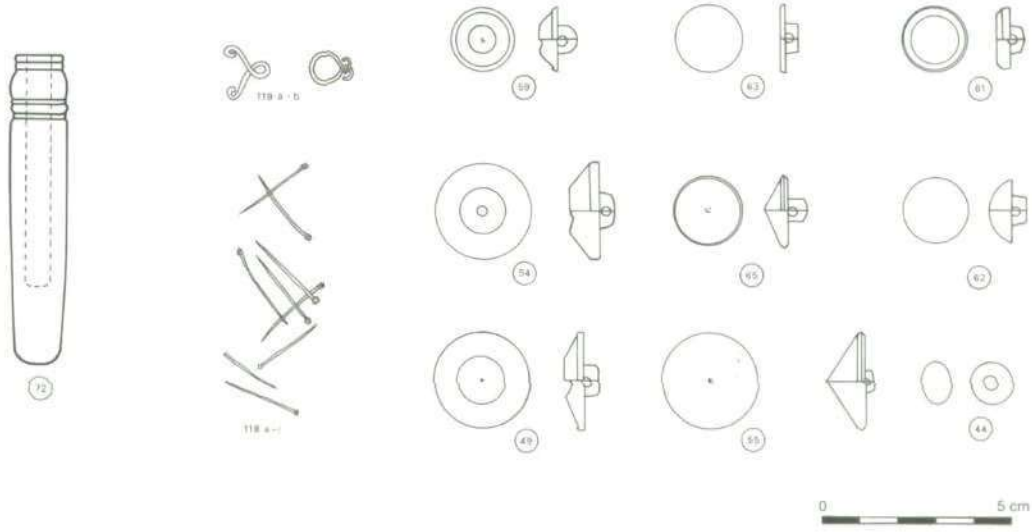
Table 10.
Victuals and provisions.

Number	Object	Class	Provenience
31	Onion bottle	10.2	Stern
32	Onion bottle	10.2	Stern
33a+b	Onion bottle	10.2	Stern
34	Shard of green wine bottle	10.2	Stern
35	Shard of green wine bottle	10.2	Stern
36	Shard of green wine bottle	10.2	Stern
37	Shard of green wine bottle	10.2	Stern
38	Shard of green wine bottle	10.2	Stern
39	Shard of green wine bottle	10.2	Stern
40	Shard of green wine bottle	10.2	Stern
7	Stoneware storage pot	10.5	---
12	Storage pot	10.5	Stern
13	Storage jar	10.5	Stern
14	Storage jar, tigerware	10.5	Stern

1.4.11 Personal possessions

The category of personal possessions includes clothing, sewing and knitting objects, personal tools, smoking and toiletries, pocket money, and items of leisure. Artefacts from this category usually provide the richest glimpse into aspects of everyday life. The largest component in this category is composed of sewing accessories (figure 28) and consists of seventeen buttons, one blue glass bead that may have served as a button, nine brass pins with round heads of coiled wire, a pin or needle case of turned wood, and hook and eye clothing fasteners, (not a matched set - two eyes). Many of these same articles, comprising more or less a sewing kit, have been recovered from the wrecks of different ship types from the same time period such as the *Amsterdam*.

Figure 28.
Sewing accessories.

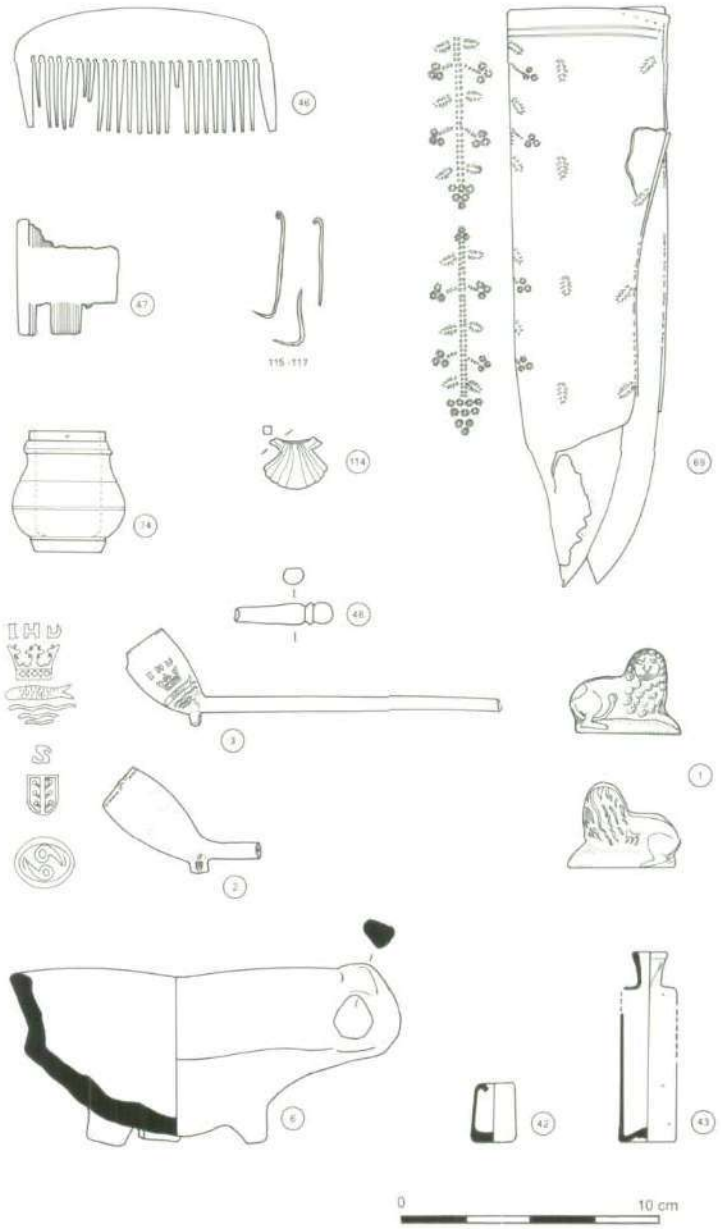


The only remains of clothing recovered were some leather fragments: a partial insole of a shoe and a small part and welting from the seam of possibly a jacket. Unfortunately, these are too fragmentary to adequately determine their identifications. These fragments might even represent the recycling of scrap leather. Other possessions of leather include fragments possibly from a bag or purse (71) and a knife sheath with an incised floral decoration (figure 29-69). The stitches on the bag and the knife sheath have deteriorated, but the stitch holes and impressions remain. The sheath is relatively intact and remarkably similar to another knife sheath, OB 19/31, in the collection of the Shiparchaeological Department. This example was found on the wreck of a mud-scow, which was dated to the second half of the seventeenth century (Reinders et.al. 1984:15-18 figure 10).

Several bottles or bottle fragments were found, all of which were missing their closures; hence, discerning their contents is impossible. There are two glass bottles that are relatively intact. One of these is a small green moulded case bottle with a minimum height of 7.5 cm (figure 29-43). This one has a complete neck which required a stopper of a softer material such as cork or leather, since the wall of the neck is fragile and would have broken easily. It would most likely have contained a thin liquid or a dry granular substance, as the diameter of the neck would not have allowed a viscous or lumpy material to pass through unhindered. Thus, it may have contained a medicine or tonic, even perhaps a scent or smelling salts. The second glass bottle, 2.3 cm high, is small enough to be considered a vial (figure 29-42). The vial curls in at the neck and the finish appears broken along a ridge at this point. With no means of comparison, it cannot be determined if this effect was purposeful or accidental. If in fact it was accidental, the vial may actually be the top to a glass stopper rather than a vessel itself. The last intact bottle is constructed of wood turned on a lathe (figure 29-74). It stands 4.7 cm high with a body diameter of 4.5 cm and a depth of 4 cm. It has a bulbous body, narrowing at the neck and a simple incised decoration around the circumference. The interior is straight-sided with a slightly rounded bottom. The rim is indented and pierced through by a small hole. The lid is missing, but the absence of threads on the neck would seem to indicate a stopper-type closure. There is a comparable example in the Museum collection, OB

19/41, found on the same seventeenth-century workboat as the knife sheath (Reinders et.al. 1984:15-18, figure 10). The closure on this example is unavailable for examination, however a Museum illustration reveals it to be a wooden stopper with a round knob on top. This example as a whole is mostly intact. A brass ferrule pinned to the rim corresponds to an indented wooden rim with two small holes on the eighteenth-century example, thereby strengthening the possibility that they are analogous. The contents and function are as yet unknown.

Figure 29.
Personal possessions.



Several possessions were recovered that do not form large sub-categories, but are isolated or paired objects. Two hair combs were recovered, one is a black, large-toothed comb made from baleen (figure 29-46), the other a very fine-toothed comb made from bone (figure 29-47). Fine- toothed combs are commonly found on wreck sites and may indicate the habitual presence of lice and the necessity to remove nits from the scalp. Two kaolin tobacco pipes were also recovered. Both are identified by bowl shape and design features as coming from Gouda in the eighteenth century. The bowls have an ovoid shape that was popular from 1750-1850, and one pipe (figure 29-3) has a relief-moulded design of a crown, fish and waves, that was produced from the second half of the eighteenth century until around 1830 (Duco 1987). The second pipe has a relief moulded "**S**" above a small Gouda crest (figure 29-2), the "**S**" indicating a pipe of common quality (Duco 1987). A coal-pot of red clay with a clear lead glaze inside and out was recovered and is thought to have served as an ashtray for the clay pipes (figure 29-6). This assumption is based upon several factors: the presence of an interior glaze (impractical on a vessel used for hot coals), the absence of burn marks, and seventeenth- and eighteenth-century paintings showing this type of vessel used as a pipe rest. Three small copper or copper-alloy fish hooks (figure 29-115 and 29-117) were found in the same area as the sewing accessories. A small kaolin lion, was found among the personal possessions and it seems to serve no other function than as a toy or decoration (figure 29-1). The next two finds suggest that a woman may have visited the ship at some time. A broken turned bone spindle resembling a hair pin (figure 29-48), and a brass scallop shell, which looks like a decoration from a woman's clothing or accessory (figure 29-114), were recovered in the wreckage in close proximity to the window. Women were often used as labourers to load peat onto the prams of the nineteenth century (G. Schutten, personal communication). Therefore, it is not improbable that a similar relationship existed during the period this ship was in use and some personal possessions may have broken and been lost in the hold of the ship.

The final sub-category from this function classification is pocket money. Three coins were found in this wreck, two brass farthings and a large silver coin of greater value. One of the farthings is in fairly good condition (figure 20-123), while the other is quite deteriorated. The first is stamped Utrecht, bearing the arms of that city, and is dated 1766. Details on the second farthing are at presently indistinguishable. Before it was cleaned, the excavators discerned in the corrosion products that it was minted in Holland sometime in the eighteenth century. The last coin is French (figure 20-122). It was minted in Monaco in 1653, and is stamped "**Hono II**", indicating Honore II, a prince of Monaco (Reinders 1977:19) The denomination was a full *ecu*, but the silver content of the coin meant that it had international value that was retained over the years. Therefore, it is not surprising that it would still be acceptable payment 130 years after it was minted.

Table 11.
Personal possessions.

Number	Object	Class	Provenience
1	Moulded kaolin lion	11.0	Stern
6	Tripod coalpot	11.5	Stern
41	Glass fragments, some mirrored	11.0	Stern
42	Vial	11.0	Stern
43a+b	Base/body bottle	11.0	Stern
44	Blue bead	11.0	Stern
48	Bone spindle, from hair pin?	11.0	Stern
71	Leather fragment, from pouch?	11.0	Stern
74	Turned wood bottle	11.0	Bow
114	Shell shape ornament	11.0	Stern
49	Turned bone button	11.3	Stern
50	Bone button	11.3	Stern
51	Bone button	11.3	Stern
52	Bone button	11.3	Stern
53	Bone button	11.3	Stern
54	Bone button	11.3	Stern
55	Bone button	11.3	Stern
56	Bone button	11.3	Stern
57	Bone button	11.3	Stern
58	Bone button	11.3	Stern
59	Bone button	11.3	Stern
60	Bone button	11.3	Stern
61	Bone button	11.3	Stern
62	Bone button	11.3	Stern
63	Bone button	11.3	Stern
64	1/2 bone button	11.3	Stern
65	Bone button	11.3	Stern
66	Bone button	11.3	Stern
70a	Leather shoe fragment, insole	11.0	---
70b	Jacket fragment	11.0	---
70c	Jacket fragment, welting	11.0	---
119a	Brass clothing fastener-eye	11.3	Stern
119b	Brass clothing fastener-eye	11.3	Stern
72	Turned pin case	11.3	Bow
118	9 straight pins, wire heads	11.3	Stern
69	Decorated knife sheath	11.4	Bow
115	Fish hook	11.4	Stern
116	Top of fish hook	11.4	Stern
117	Bottom to fish hook	11.4	Stern
2	Gouda pipe, cipher stamp 69	11.5	Stern
3a-c	Gouda pipe, crown/fish/wave	11.5	Stern
46	Black baleen wide-tooth comb	11.6	Stern
47	Bone fine-tooth lice comb	11.6	Stern
122	Coin from Monaco, dated 1653	11.7	Stern
123	Utrecht farthing, dated 1766	11.7	Stern
124	18th-century farthing	11.7	Stern

1.4.12 Cargo

The only evidence for a possible cargo were some birch branches found in the forward section of the hold, at the turn of the bilge. These comprised an area of 30-50 cm high and measured 3-5 m in length (enclosure 1A). They may have been part of a cargo intended for a broom maker as they were uniform in size and were formed into sheaths or bundles (K. Vlierman, personal communication). If the ship was loaded when she sank, the cargo may have been salvaged, or it may have caught in fishing nets and been carried off the site. Depending upon its inherent characteristics, the cargo may have decomposed or been removed from the site due to natural processes such as currents and waves.

1.4.13 Intrusive material

Intrusive material may be introduced into an archaeological site in several ways, such as salvage operations, disposal of debris over or near the site, and anchors or fishing nets catching on parts of the wreck protruding above the surface of the seabed. There were several items that were identified on the field list as intrusive and subsequently destroyed, for example: necks to two green glass wine bottles, two red-earthenware rim sherds, a net that was reinforced with iron studs, and a kaolin pipe bowl and stem. There were also twenty-eight lead net weights recovered next to the rudder, suggesting that a net was dragged across and caught on the rudder, resulting in part or all of the net being abandoned or cut away.

Table 12.
Intrusive.

Number	Object	Class	Provenience
128	28 lead line/net weights	13.0	Stern

1.4.14 Dating

The wreckage of this ship can be positively dated to the fourth quarter of the eighteenth century, based upon the composition of the assemblage, the coins, and most importantly on the lighthouse token. The ceramics and saw handle are dated to the eighteenth century. Other finds such as the buttons, needle case, and spoons are analogous to finds from other wreck sites dated to the eighteenth century. The tobacco pipes from Gouda are dated more precisely to the second half of the eighteenth century, based upon their form and decoration, which were popular from the mid-eighteenth century until around 1830 (Duco 1987). Aside from the Monaco coin, which spuriously dates the wreck to the mid-seventeenth century, the brass farthings narrow the dates suggested by the artefacts to sometime after 1766. The lighthouse token gives us a *terminus post quem* and probably the actual year of the wreck as being 1783.

2.1 The wreck of a pram on lot AZ 71

2.1.1 Survey and Excavation

On July 28, 1975, agricultural superintendent M.W. Koops reported that, during drainage work on lot AZ 71 in Southern Flevoland, the ditching machine encountered ship's wood. A reconnaissance on July 30, 1975 confirmed the presence in two ditches of a flat-bottomed vessel with a sharp, hard chine. The wreck was estimated to be 19 m long and 3.5 m wide. The ditches were approximately 70 cm deep.

The excavation began on August 4, 1980 and continued until August 23. The wreck was shallow, covered by only 20 to 25 cm of overburden (figure 30). Stereophotographs were not taken because of difficulty in locating fixed and recognizable points. Recording was performed, as on the E 14, with steel tapes, water levels, and plummet. A detailed site plan of the wreck was drawn at 1:20 scale. The field drawings consist of a view from above, a longitudinal section, nine transverse sections (enclosure 4B and 4C), and a provisional reconstruction of the port-side planks with the stem attached. A separate plan shows the position of artefacts and loose fragments associated with the wreck (enclosure 4A).

Figure 30.
The hull with frames, mast step and ceiling planking.

2.1.2 Topography and Stratigraphy

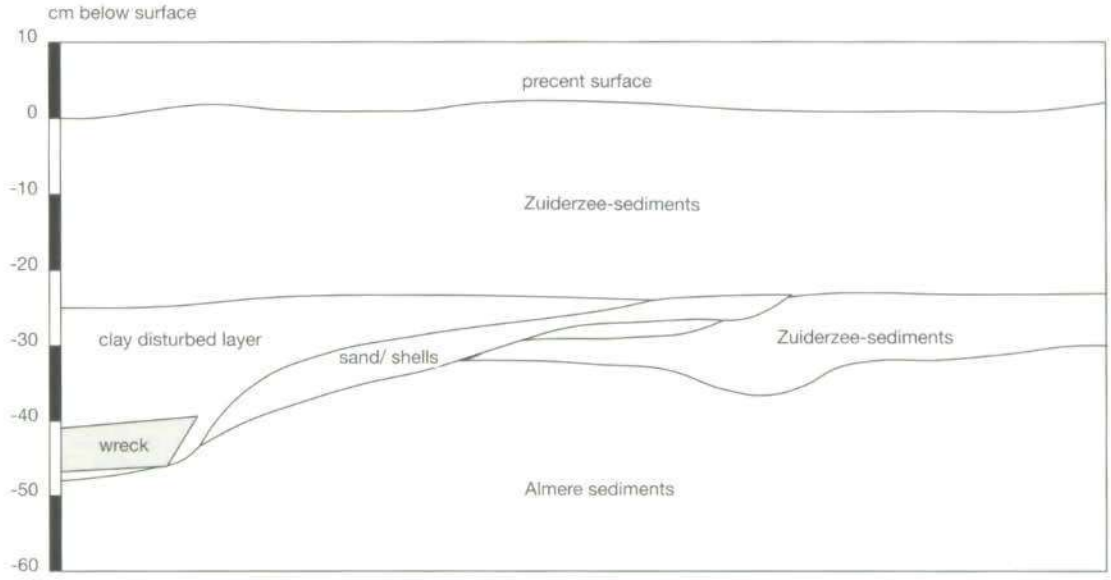
The wreck was located in Southern Flevoland on lot AZ 71. Measured from its center, the wreck was 250 m from the Brikpad and 143 m from ditch AZ 70/71 (figure 31). The vessel sank 6.5 km to the northeast of the mouth of the Vecht River and 12 km east of the harbour of Amsterdam, map 25H coordinates 138.100/487.300. At this location, the water depth once was 2.8 m at the average ebb-tide (Hydrographic map 1852).

The wreck was settled in a layer of sandy clay, but rested on a hard shell layer. Below this shell layer there was a 5 m layer of thick clay. The shell layer dated the sinking of the vessel to after A.D. 1700 (figure 32).

The sand was deposited by the Vecht River. The site may have been disturbed by shifting sands and the scouring action of currents. Many artefacts were found dispersed beyond the port side of the hull. In fact, two pieces of heavy iron hearth plate had moved in this direction and one fragment lay directly underneath the vessel.

Figure 31.
The wreck site on lot AZ 71.

Figure 32.
Bottom profile of wreck site AZ 71.



2.2 Construction

2.2.1 Damage

The wreck was listing to port, with considerably more list in the bow than stern. The vessel was in a poor state of preservation, only the bottom survived along with some floor timbers and fragments of the bow. In the bow, approximately 6 m of the port side survived. The first, second, and part of the third strakes were attached to the stem. The stem fragment reached a height of about 1.36 m. A loose portion of the starboard bow lay across the bottom of the vessel. This starboard piece consisted of first, second, third, and fourth strake fragments. The poor preservation of the wreck was due to its resting on the hard shell layer that prevented it from sinking deeper into the protective clay sediments. The upper parts of the vessel were missing and much of what remained had suffered from aerobic exposure and mechanical damage caused by agricultural equipment. The *ditching machine had also cut an 80-90 cm wide trench through the wreck.*

2.2.2 Construction of the hull

Bottom

The bottom was constructed from a total of sixteen planks that were shaped into seven strakes (enclosure 4A). The recorded length of the bottom is 17.5 m, with a consistent thickness of 6 cm. Plank widths were irregular, but adjacent plank edges were well matched, a construction similar to the E 14. Plank ends were, in most cases, joined together with Z-scarfs. The plank edges were caulked with moss. Iron nails and wear marks indicated that a skeg once fit beneath the central plank aft. The skeg impression had a length of 2.6 m and width of 12 cm.

Two wooden plugs for draining water from the vessel were located in the very stern and slightly aft of amidships. The plugs were-cone shaped with an upper diameter of 5 cm and lower of 7 cm, and thus could only be safely removed from the vessel's bottom when the vessel was hauled on shore.

After the mast step and foreship frames were removed, several marks scratched along the centerline of the bottom were discovered (enclosure 5B). The marks consist of a line 4.08 m long, extending from frames 7 to 23. Angled across this line were several 14-18 cm long slashes. The slashes were spaced 52 to 58 cm apart, but four of the total seven intervals were 56 cm (i.e. 2 foot). The marks were more complex where the mast was stepped; placed approximately at that location was an X-mark equidistant to two V-marks. Initially, the V-marks seem to have been a slash mark similar to the others, to which was added a second slash perpendicular to the long line and about forty-five degrees to the angled slash, thus resulting in a V-like mark. The midpoint of the X was equal to approximately half a slash interval, 26-28 cm. The perpendicular marks were 46 cm apart, about 6 cm longer than the measured step. The function of the marks is uncertain, but the most likely explanation is that they helped the builder measure off distance for the placement of the mast step and mast. This is not a perfect explanation, however, because the midpoint of the mast-step mortise was

not centered directly over the X, but 28 cm aft of it. Perhaps the X-mark was originally intended to position the mast, but for unknown reasons the center of the mast-step mortise was moved 28 cm aft.

Stem

A fragment of the stem survived to a height of 1.34 m. Still fastened in their rabbets were port and starboard stealers, and port second and third strakes. The stem heel was 50 cm moulded and 20 cm sided inboard, but narrowed outboard to a minimum of 16 cm (enclosure 5A and figure 33). The stem was fastened to the bottom by three treenails. The rabbet was 3-4 cm wide. A breasthook was nailed to the stem at the lower edge of the third strake with a single iron nail.

Figure 33.
Stem and part of the central plank.

On the outboard leading edge a 60 cm high gripe protected the joinery of the central plank toe and stem heel, as well as providing an increase in lateral resistance to the vessel. It was fastened to the stem and central plank by a 50 cm long treenail, two iron nails, and an iron gripe clamp. A wooden stopwater, with a diameter of 2-3 cm, was located at the junction of the stem, lower stealer edge, and central plank.

Draft marks were located on the starboard face of the stem. The marks were 1 cm diameter holes cut with a gouge. The marks began at a height of 56 cm (2 feet) and continued for 58 cm (approximately 2 feet) to the uppermost broken end of the post. The marks seem to have designated a foot and its divisions into quarters. Three and four foot marks were recognizable and the first solitary mark probably designated the two foot mark. Also, the upper edge of the gripe clamp may have been used as a one foot mark, if such a mark was necessary. The distance from the gripe to the bottom of the vessel and also to the first draft mark was approximately that of the other one foot increments. These divisions were not always precisely within a centimetre of one another, but more accuracy was probably not necessary. For example, there was at least one centimetre difference between the third and fourth foot marks and the second and third foot marks. The foot increments varied from 28 cm to 30 cm and perhaps represented the Amsterdam foot of 28.35 cm.

Sides

The only part of the sides to survive was in the bow, primarily the port side. Portions of the first, second, third, fourth and fifth strakes were present. Amidships, remnants of the second and third strakes were found on the port side, and fragments of these continued further aft, disappearing completely at the stern. A single surviving top timber from between frames 47 and 49 shows that there were at least six strakes (enclosure 5A and 5C, figure 34).

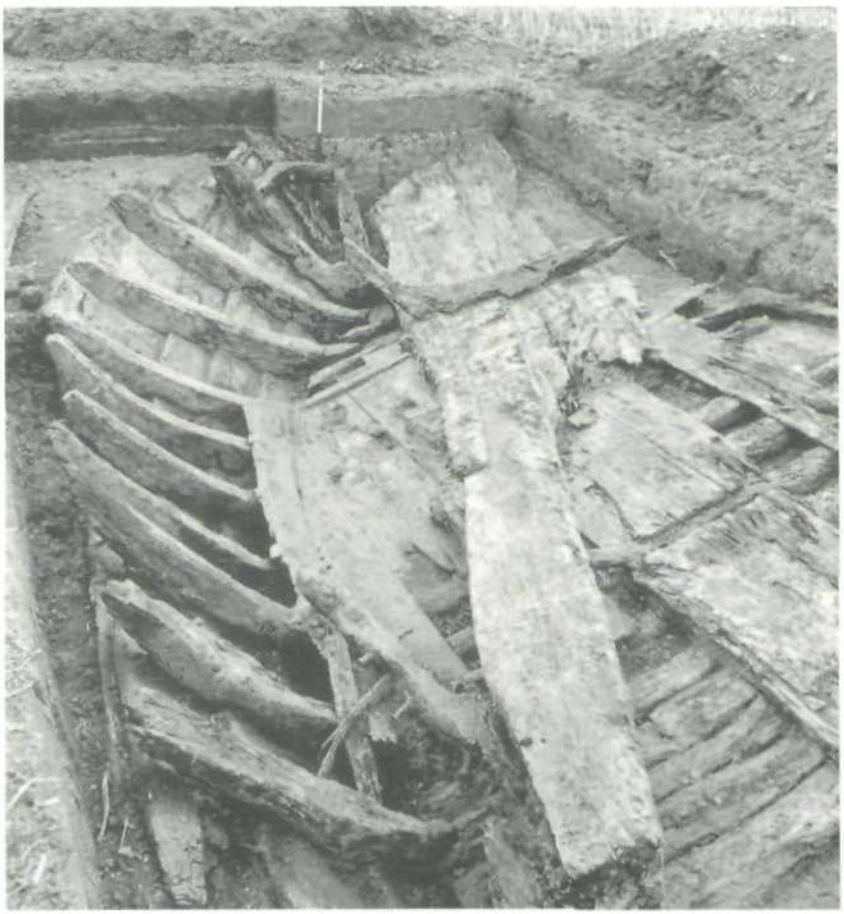


Figure 34.
View of bow showing the stem, port-side strakes and the loose portion of the starboard strakes.

The first strake on the port side was a stealer that terminated 3.12 m from the heel of the stem. At the post it reached a maximum width of 48 cm. The bottom of the hull was cut away to receive the bottom edge of the stealer. It appears to have been fastened to the bottom with iron nails driven through the lower edge of the stealer into the edge of the bottom. The vessel appears to have had only one stealer on each side in the bow and stern. The second strake was continuous from bow to stern. Although amidships it became a very narrow strake, approximately 13-14 cm, but like the stealer it became wider toward the stem, 48 cm at the first frame.

The third strake was present from the stem rabbet aft to amidships. It reached its maximum width amidships and progressively narrowed towards the stem. A Z-scarf shows that it consisted of at least two boards, but several repairs were also present.

Fragments of the fourth and fifth strakes survived, but did not continue to the stem. The fifth strake was the wale, of which 1.16 m survived in the bow. It was a much thicker strake, having a maximum thickness of 14 cm. Aft, at frame 6, it ended in a scarf that was fastened to the futtock by two iron spikes. It was rabbeted on the inboard lower edge for the top of the fourth strake and the outboard upper edge was rabbeted for the sixth strake.

The plank overlaps were usually 6 cm, but sometimes 8-10 cm. Overlaps were somewhat less for the wale fragment, 2-6 cm. Outboard, fastened to the oak hull planks, was both a lathing and a thin pine sheathing. The lathing was 4 cm by 4 cm and fit tightly in the angle of the overlaps beneath the second, third, and fourth strakes. The pine sheathing had a thickness of 2 cm and was present on the second, third, and fourth strakes. Moss caulking was recorded underneath both the pine sheathing and lathing. The pine sheathing doubtless was used to tighten a leaky hull.

As in the E 14, no planking overlap fasteners were recorded. Iron fasteners, such as double-clenched nails were not visible in either the drawings or photographs. The exception is the one instance where iron nails fastened the wale scarf to the futtock of frame 59 and fastened the lower edge of the stealer to the bottom.

Breasthook

A single breasthook secured both the third strake and the stem. It was fastened to the stem by a single iron nail and to each strake with a single treenail. It had a moulded dimension of 10 cm and sided dimension of 12 cm.

Frames

Sixty-three frames survived, but there were probably a total of sixty-six before a section of the vessel was destroyed by the ditching machine; there was adequate space to accommodate three sections within that part of the hull. The frames were arranged in a consistent pattern of floor timbers and top timbers, alternating with floor timbers set between port and starboard futtocks. The exceptions to this pattern were in the very bow and stern where the narrowing bottom excluded the use of floor timbers between the futtock heels. Space between floor timbers was usually 10-14 cm, but in the extreme bow and stern diminished to 8-10 cm. The five floor timbers located directly underneath the mast-step mortise fit tightly together, side by side. Floor timbers were moulded 12-16 cm and sided 9-10 cm.

Floor timbers, futtocks, and top timbers were all fastened to the hull almost entirely by treenails (enclosure 5D). The exceptions were the two above mentioned iron spikes used to fasten the wale to the futtock at the sixth frame section. Futtock heads terminated at the fifth strake. Top timbers began about the third strake and probably ended directly underneath a covering board or gangway.

Ceiling planking

Remnants of ceiling planking were present in the bow (figure 30). The ceiling did not survive elsewhere in the vessel, but its presence throughout was suggested by iron nails on the upper surface of floor timbers both amidships and in the stern. The eight ceiling planks on the floor timbers were 2-3 cm in thickness with widths from 20-40 cm. Two short and narrow boards were fastened on top of these ceiling planks.

One notched ceiling fragment was nailed to the port futtocks just above the floor ceiling at the bilge. This fragment was a slightly thicker piece, 4-5 cm, with a maximum width of 18-19 cm. This remnant contained five notches, 40-44 cm long, which corresponded to the spaces between frames. The ceiling planking was fastened almost completely by iron nails except for two instances where treenails were used.

Mast step

The mast step was 3.38 m long and spanned the 36th to the 49th frames. Forward, the bottom of the step was sided 64 cm, but narrowed to 42 cm at the after end. The upper edges of the step were rounded and the upper surface was 6 cm narrower than the bottom throughout. The mast step was moulded 8-9 cm and fastened to the floor timbers with both treenails and iron nails.

The mast was stepped 4.66 m from the heel of the stem. On each side were two slots for the tabernacle, 40 cm long by 9-10 cm wide. The mast-step mortise was 29 cm long by 24 cm wide. Aft the step ended in a scarf 30 cm wide by 5-6 cm long, indicating the possibility of an additional timber scarfed to the mast step. Thirteen iron nails and an impression of a small board, 49 cm by 8 cm, were found on the forward part of the mast step. Another impression of a board was directly aft of where the mast was stepped. It measured 80 cm in length and 14 cm in width, and was fastened by three iron nails.

An iron forelock key, perhaps for securing the mast bolt, was found amid ships (figure 35-52). The head has a maximum length of 25.4 cm, maximum thickness of 0.5 cm, and a maximum width of 5.5 cm tapering down to about 1-1.5 cm at the extremity, which maintains a maximum thickness of 0.5 cm. From the beaten aspect of the head it appears to have been driven with a hard object.

2.2.3. Bulkheads

No direct evidence survived of where or how bulkheads were constructed. Traces of red paint were found on the first port futtock. This paint might be circumstantial evidence of a forward compartment. One half of a large iron hinge was found loose in the bow. It contained all five iron nails secured in place by encrustation and could have fit a hatch or compartment door. It has a surviving maximum length of 21 cm, width of 9 cm, and has a 1.2 cm hole for the pin.

2.2.4. Rigging

Very little evidence of the AZ 71's rig survived. A headstick (discussed below in ship's equipment) found loose in the bow might have been for a fore staysail. It is interesting to speculate that five iron thimbles and two blocks found in the bow were for the same sail as the headstick. However, because they were all found in the bow compartment these artefacts might be old or spare equipment in storage at the time of sinking.

2.2.5 Reconstruction

Only a partial reconstruction of the AZ 71 is possible due to the poor state of preservation. It was better recorded than the E 14, however, resulting in fewer difficulties in reconstruction. Because the perspective was incorrect on the original site plan (the bottom was twisted), it was necessary to reconstruct the site plan so that the port and bottom perspectives were correct (enclosure 5).

The partial reconstruction of the lines plan relied wholly on the field drawings, with the exception of the stem above the third strake, which is a hypothetical reconstruction made possible by finishing the planking lines. Also, the sixth strake was entirely missing, but it was possible to reconstruct its width from a single top timber found loose in the wreck. The loose top timber was found about 1.5 m from the stem heel and is believed to have fastened at the fifth frame. The width derived from this fragment was also used to hypothetically reconstruct the sixth strake forward and aft of the fifth frame. The lines plan is left unfinished in the stern where the plank preservation ended and futtocks were completely missing.

2.3 Inventory

The provenience for the inventory of the AZ 71 was recorded in the field-notes and field catalogue during the excavation of this vessel. In addition, a scaled site plan was drawn by K. Vlierman positioning the inventory as found *in-situ*. This information was collected with more precision than the E 14 excavation, thereby facilitating an analysis based upon more precise data (enclosure 4A).

2.3.1 Ship's equipment

Most of the vessel's equipment was stored in the bow compartment. The equipment consists of twenty items, mostly spares. Nails, spikes and a leather washer are no doubt spare equipment, but a headstick, two blocks, four or five thimbles, and three hooks could be the remains of a fore stay-sail in storage when the vessel wrecked. It is also possible the blocks and hooks were spares or working equipment.

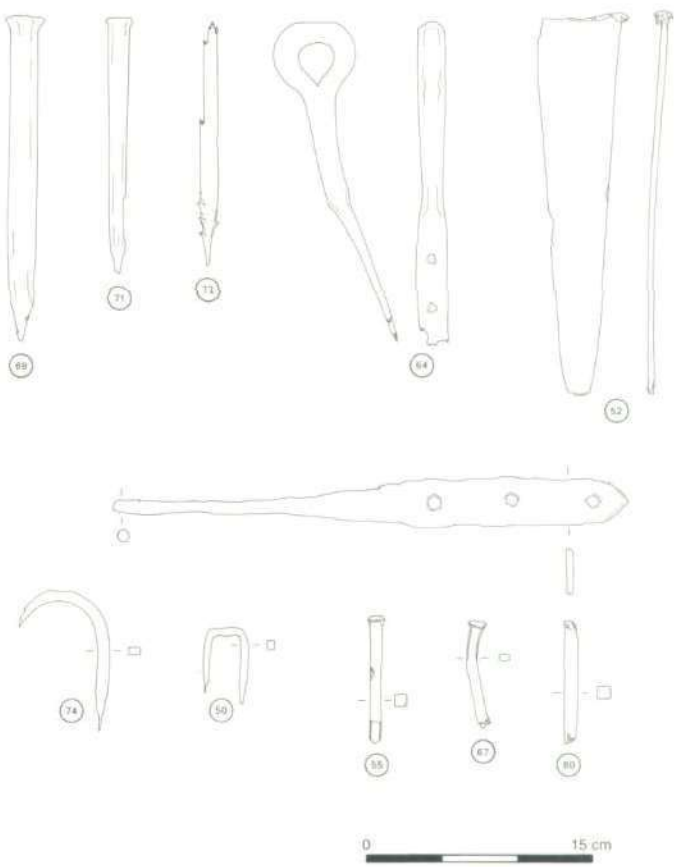


Figure 35.
Ship's fasteners.

An iron fragment, found in the stern, might have been part of a rosebolt (figure 35-62). It has a surviving length of 34 cm. About half of this length, 18-20 cm, was hammered flat and is pierced in three places for fasteners.

An U-shaped iron fragment may have been part of a pump, but is too fragmentary to be reliably identified (figure 35-74). A single leather washer, 6 cm in diameter, might also have been for the pump (30). Also considered a spare is a wooden disc, diameter of 10 cm, with a pegged center (35).

An assortment of iron fasteners was found (figure 35). The largest consist of four spikes, ranging in length from 16 to 21.5 cm with diameters from 1.3-1.8 cm. Two spikes have barbs near their ends to inhibit withdrawal. Three smaller iron nails and an iron staple were found.

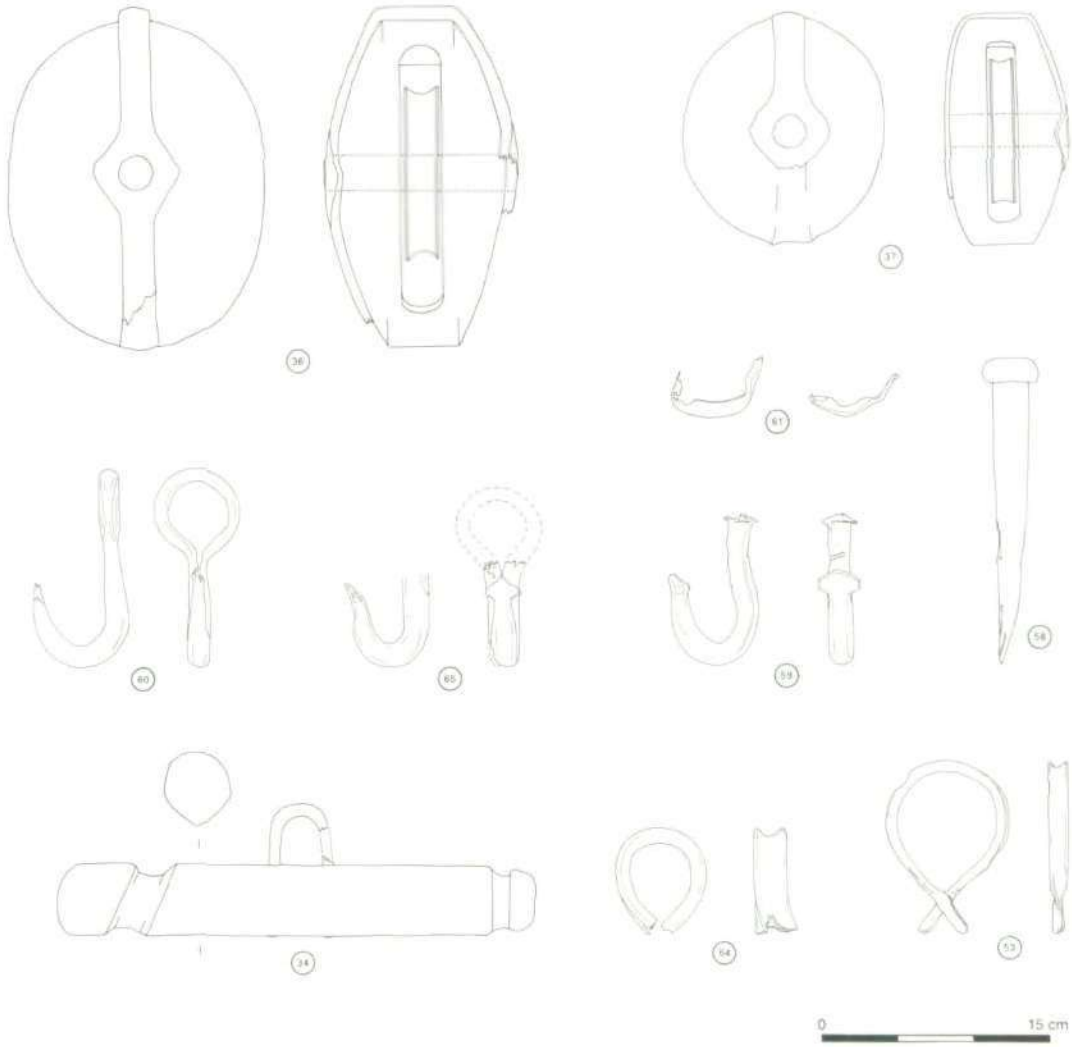
The headstick is 31.3 cm long with a tear-shaped cross-section of 4.4 cm by 5 cm and is rounded on each end (figure 36-34). A headstick of a similar size is represented in the sail plan of a nineteenth century *zomp* (Schutten, 1981:217). Another headstick of about the same size is found on the fore staysail of a nineteenth-century model (*Maritiem Museum Prins Hendrik*, model # 117). An U-shaped bolt is in the center of the headstick. Two deep asymmetrical grooves are present near either end. One groove is wider and angled more sharply than the other, which probably indicates that as the forward end of the headstick.

The four thimbles are unique (figure 36-53; and artefact numbers 56, 57 and 66). Their shape is circular to slightly oval with overlapping ends that become projections. The projections were beaten together at the point of overlap. The projections perhaps enabled them to be served into a rope. All are about the same size with an oval inner diameter of 6.6 by 8 cm. The outer diameter has a 1 cm wide groove to be served with a rope.

One example of another thimble type was found, (figure 36-54). This variety has an oval inner diameter of 4 cm by 5 cm and an outer groove with a width of 1.8 cm. Probably the groove was once served with a rope.

As mentioned above, the three hooks represent a ubiquitous tool type; they could fit into one of three related function categories: spare equipment, working equipment such as loading hooks, or as part of the rigging equipment for the fore staysail. The feasibility of the hooks fitting into either of the first two categories probably needs no explanation. Hooks are such necessary tools that spares would be expected. Also, hooks used for loading and unloading cargo might be stowed away below when not in use. The possibility for the use of the hooks with a sail should not be excluded. The three hooks are all relatively short. The above mentioned model of a nineteenth century pram is constructed with similar short hooks for forestay and foresail blocks, however these may not necessarily be made to scale. A fluked sailhook, similar to that of AZ 71/65 is shown for a *punter* (Berk, 1984:45).

Figure 36.
Equipment and rigging.



One short, fluked hook has a swivel joint fitted onto it (figure 36-59). An iron fragment seems to fit the impression on the hook left by the swivel (figure 36-61). The head of the hook was flattened over to prevent the swivel from slipping off.

The second hook is a relatively short-bodied fluke hook (figure 36-65). Most of the eye was not preserved, but was reconstructed in the drawing. The third hook is a slightly longer hook than the other two (figure 36-60). The tip is curled indicating that it also had a fluke end that was not preserved.

Two single-pulley oak blocks were found. Both blocks had iron straps around them. One block is slightly smaller than the other (figure 36-37). The smaller block is 16 cm by 13.7 cm, and has a 10.5 cm diameter sheave. The larger block is 21.7 cm by 17.2 cm, with a sheave of 12.1 cm (figure 36-36). Both sheaves were of ironwood.

The possibility that some of this material might represent a fore staysail needs some justification. The headstick is the chief indication of a fore staysail. The thimbles, hooks, and blocks are evaluated as possibly part of a sail because of the headstick. If an entire fore staysail was stored below deck in the bow, then other rigging parts might have survived such as sail thimbles and blocks for hoisting the sail up the mast or pulling the sail taut to the stem. The hooks and thimbles could have been utilized as part of the fore staysail or forestay rigging.

Table 13.
Ship and equipment.

Number	Object	Class	Provenience
35	Disk, pegged center	1.0	Bow
36	Single block, iron strap	1.8	Bow
37	Single block, iron strap	1.8	Bow
55	Fastener, 2 pieces	1.8	Bow
59	Hook with fluke hammered end	1.8	Bow
60	Hook with eye	1.8	Bow
61	Fragment of U-shaped buckle	1.0	Bow
80	Fastener	1.8	Bow
30	Washer	1.8	Bow
74	U-shaped iron strap to pump	1.8	---
34	Headstick	1.8	Bow
50	U-shaped cramp	1.8	Bow
53	Thimble for thin rope	1.8	Bow
54	Thimble	1.8	Bow
56	Thimble for thin rope	1.8	Bow
57	Thimble for thin rope	1.8	Bow
64	Eye for rigging attachment	1.8	Bow
65	Hook, fluke end	1.8	Bow
66	Thimble for thin rope	1.8	Bow
67	Bent nail	1.8	Bow
68	Bent nail	1.8	Bow
69	Spike	1.8	Bow
70	Spike	1.8	Bow
71	Spike	1.8	Bow
72	Barbed spike	1.8	Bow
73	Fragment of fastener	1.8	Bow
79	Nail fragment	1.8	---

2.3.2 Working equipment

The category of working equipment would include items necessary for performing the function for which the vessel was employed. This category was not represented in the wreckage of the AZ 71.

2.3.3 Weaponry

There were no weapons found with this wreck either as personal, equipment, or cargo.

2.3.4 Administrative

This category normally includes ship's papers, finances, stationary, and writing equipment. It is unusual for paper to survive in wet environments and this classification is unrepresented.

2.3.5 Navigation

The category of navigation includes instruments, charts, and lights that are necessary to the safe manoeuvring on open waters such as the North Sea or the Zuider Zee. Since this craft was traditionally a canal vessel, it is not surprising that there are no artefacts of this type.

2.3.6 Tools

The category of tools for this wreck is sparse, consisting of a marline spike (figure 36-58) and a heather brush without a handle. Marline spikes were used for splicing and generally working ropes. The specimen recovered in this wreck measures 20 cm in length, has a button-shaped top, and a gently curved shaft. It was found aft, under the hearthplate fragment that was situated beneath the hull. The heather brush consists of twigs with a minimum length of 12 cm. Brooms of that time were commonly constructed from bundles of birch twigs, or sometimes heather, which were bound onto a handle with skeins of cleft willow, oak, or other wood (Salaman 1975). These heather twigs comprise a fragile and fragmentary bunch compacted with mud and lack indentations that might suggest how they were bound. There were two similar brushes found on the wreck of the *Amsterdam*. Both were of heather, approximately 27 cm in length, and were bound with thin wood skeins (Marsden 1985:89).

Table 14.
Tools.

Number	Object	Class	Provenience
33	Heather brush	6.4	Bow
58	Marline spike	6.3	Stern

2.3.7 Domestic effects

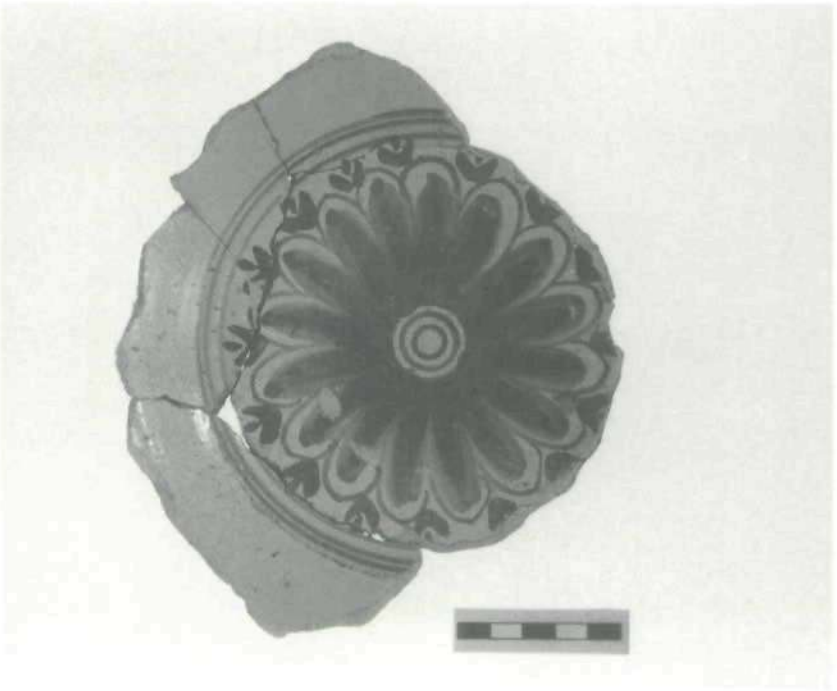
There were no artefacts found that belong to this category.

2.3.8 Hearth and galley

The remains of the hearth and galley assemblage indicate a working kitchen aboard this vessel. The hearth fragments consist of a broken iron hearth plate and pieces of six unglazed tiles. The hearth plate was found in two large sections, separated by approximately one meter. One segment was located underneath the hull, aft and slightly to the port side, situated next to several other items from the galley assemblage. The other half is located perhaps a meter away on the port side (enclosure 4A, 76). The plate measures 71 cm in length and is 1 cm thick. A precise width cannot be taken as half of the plate was used for conservation experimentation and has subsequently been destroyed. A fairly accurate estimation of 65 cm can be made, based upon photographs indicating the relationship between the two halves and measurements taken from a site plan drawn to scale at the time of the excavation. The hearth plate is very heavy and the iron, although covered by a surface corrosion, in quite good condition. It would appear to have taken tremendous force to break such an object in half. This leads one to assume that the plate was broken before the wreckage and not as a consequence of it. The tiles measure 22 cm square and are 3 cm thick. They all seem to have had a nail or bolt through their centres and some mortar still adheres to their edges. Some burn marks are evident, but not enough to allow for an accurate reconstruction. A framework or enclosure was not found, however, a strip of copper moulding (41) was found aft, clustered with other items from the hearth assemblage. It is 78 cm long, step-shaped, and has nail holes along two of its faces, as if it had been nailed in place covering a wooden corner. It is approximately 2.5 cm deep and is angled so that it may fit lengthwise over a corner piece of wood and has end pieces that would fold over the end cuts of wood. Lead, tin and copper were often used as sheathing for the wooden framework of a hearth (K. Vlierman, personal communication). This strip may have served that function, protecting such a framework from sparks and extreme heat.

The galley assemblage is comprised of vessels for food preparation and consumption, the balance of which consists of a variety of ceramics of differing forms and designs. The ceramics as a whole can be viewed from many perspectives, such as composition, decoration, place of manufacture, and market value. All of these add to a body of information that epitomizes the daily life of the crew as the ship sailed the Zuider Zee. This analysis includes each piece within the context of functional groups, taking into account provenience and wear marks as indicative of use. The market value of assemblages as a possible indicator of economic status will be addressed, as will the origin of manufacture-indicative of the concurrent market availability.

Figure 37.
Dish, bowl and iron cooking pot.



Two iron cooking containers were found. The cast iron cooking pot has a bale handle, three legs, and a rim diameter of 23.5 cm (figure 37 and 38-75). One leg is not original, but was replaced by a bolt and washer. Very little remains of the iron pancake pan (figure 38-77). Enough remains to obtain an estimated diameter of 23 cm and to note that the bottom of the pan had been repaired, as evidenced by the small nail or brad holes in it. One batter bowl was presumably used for the preparation of pancake batter, pancakes being a common staple in the crew's diet (figure 37 and 38-11). Two ceramic bowls have fire blackened exteriors indicating their use as cooking vessels. One is a red-earthenware bowl (figure 37, 38-5 and 38-6) with a spout and a handle. It is rather small having a rim diameter of only 13.5 cm. The bottom is missing, but the rest of the exterior shows evidence of heating. The second bowl (14) is fragmentary with an estimated base diameter of 10 cm. It has a white paste with a slip design in brown and green and has an interior and exterior lead glaze. The underside is fire-blackened. The last item from this category is a small copper lid to a tea kettle (39), of which comparable examples exist in the Museum collection. It is 11.6 cm in diameter and bent. There is a hole in the center where the handle should be. It was recovered aft next to the iron cooking pot, but the kettle was not found.

Figure 38.
Galley.

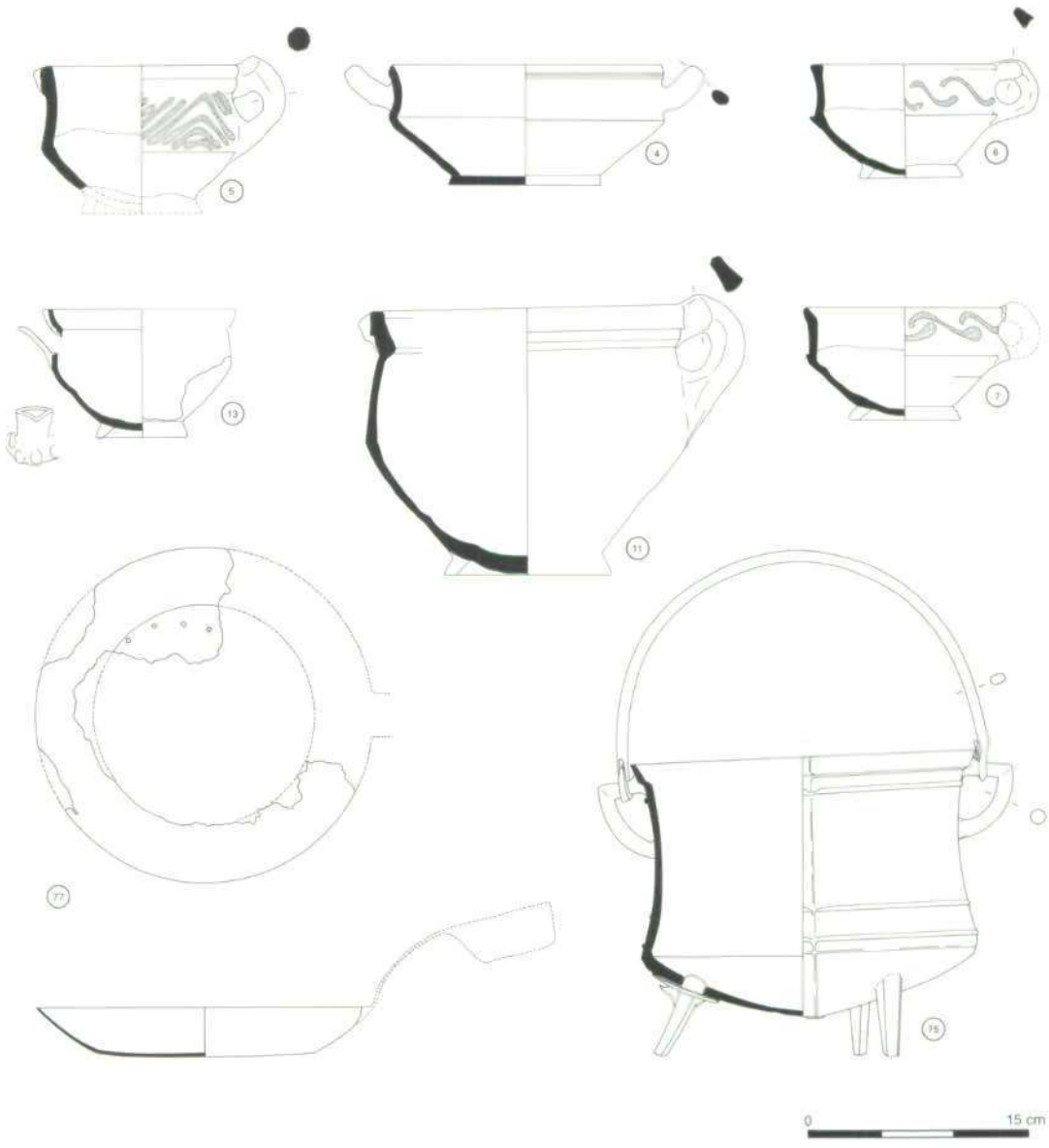


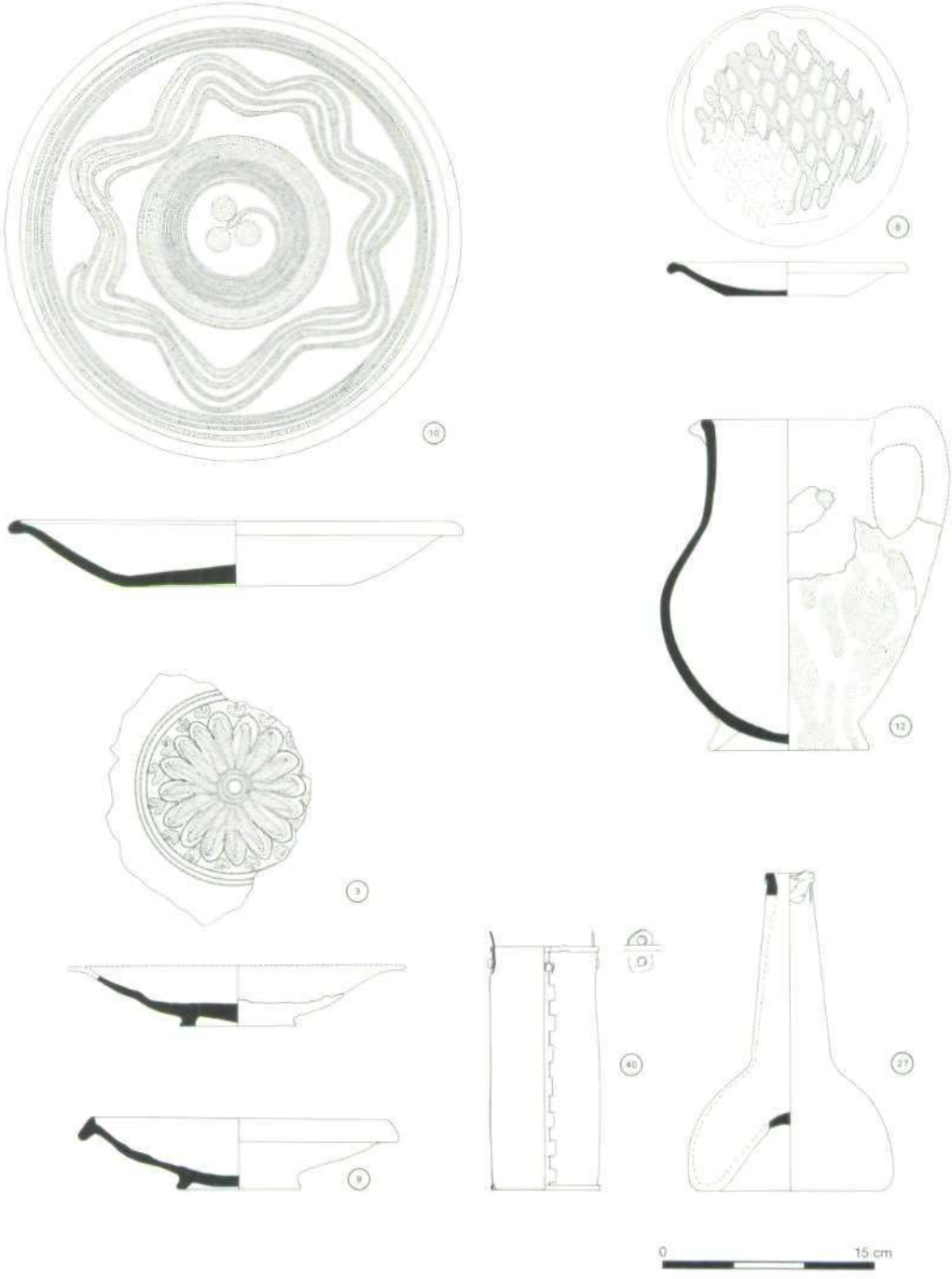
Table 15.
Hearth.

Number	Object	Class	Provenience
17	Tile	8.1	Stern
18	Hearth tile	8.1	Stern
19	Hearth tile, 4 pieces	8.1	Stern
20	1/2 hearth tile	8.1	Stern
21	Hearth tile fragment	8.1	Stern
22	Hearth tile fragment	8.1	Stern
41	Strip of copper moulding	8.1	Stern
76	Hearthplate	8.1	Stern
5	Bowl with spout	8.4	Stern
14	Bowl fragments, white paste, slip	8.4	Stern
39	Tea kettle lid	8.4	Stern
75	Iron cooking pot, bale	8.4	Stern
77	Iron pancake pan, est.	8.4	Stern
11	Batter bowl	8.7	Stern

2.3.9 Eating and drinking

The remainder of the galley ceramics, 10 items, presumably were associated with the service and consumption of food. Several of the items were recovered from a cluster of galley ware, the cooking pot, water can, a serving dish and a majolica plate. This may indicate that these items were stored together in a cupboard at the time of the wreck. A serving dish found in this cluster is of undecorated red-earthenware with a rim diameter of 22.7 cm (figure 39-9). The rim is hammer-headed, the footring is symmetrical and well formed, and the form is shallow and graceful. It is covered in its entirety in a clear lead glaze. These dishes are found in abundance and in a variety of sizes among other wrecks of this period. They have even been found used as lids covering cast iron cooking pots (K. Vlierman, personal communication). A third serving dish is identified as British, probably from the Staffordshire area (figure 38-4). Several black-glazed wares were popular from the mid-eighteenth to the beginning of the nineteenth century. Jackfield ware and Pratt ware, which usually took the form of pitchers, tea-pots, etc., were a red-ware covered in a black glaze, manufactured in Little Fenton and Shropshire (Cox 1970:909,921). Buckley ware were coarse cooking vessels, cream pans, and pitchers which were heavily black-glazed over a dark red body with yellow inclusions (Hume 1969:35). Another imitation of black ware was manufactured at Namur, Belgium (Cox 1970:908). This particular dish has two handles, a plain rim with a ribbed exterior, and a slightly concave base. The paste is red with some possible yellowish inclusions and is overlain by a thick, black lead glaze. It was found aft, outside the ship on the port side. A Rhenish platter, measuring 32 cm at the rim, was also found (figure 39-10). It has a stepped flanged rim and a slightly concave base with no footring. The slip decoration is composed of three blobs in the center, out of which begins a spiraling line that continues across the bottom. An apple-green lead glaze is dabbed on the blobs and on the outer rings of the spiral. The walls of the vessel are slipped with four wavy lines, the third one of which is overlain by an apple-green glaze while the others are covered with a clear lead glaze. The stepped rim is decorated with five thin spirals. The front of the dish is covered with a clear lead glaze and the exterior is unglazed. Another vessel form used for food service is the cream pot. This is a spouted bowl with a plain L-shaped rim which probably took a lid (figure 38-13). It has a white body covered in a yellow interior glaze and a green exterior glaze with a small unglazed circle on the interior of the bottom approximately 2 cm in diameter. The majority of the vessel is reconstructed, thus the rim diameter is estimated to be 12.6 cm. The footring is well-formed and the spout has dimpled impressions where it is

Figure 39.
Dishes, victuals and provisions.



attached to the body. The final serving form is a Tigerware pitcher (figure 39-12). This serving form can also be used for storage. It stands 23.5 cm tall and has a bead rim. The red paste is covered in a white slip decorated on the exterior with a brown pigment and the interior has a brown lead glaze. It was found aft beyond the port side.

The next five dishes may have held food. A blue and white majolica plate, minimum diameter of 20 cm, was recovered (figure 39-3). The blue and white design is characteristic of faience, however, the thick body, greenish lead glaze on the reverse, and three *proen* marks on the front identify it as majolica. The pattern is very similar to the pattern on a plate fragment re-covered from St. Olave's parish in Southwark England (Hume 1977:79 figure X-3). Hume identified that fragment as English delftware, probably of London manufacture, dating to the mid-seventeenth century. It seems possible therefore that the majolica plate found among the AZ 71 wreckage was manufactured during the mid-seventeenth century, which was the transitional period when both types of tin-glaze were in production (Wilcoxen 1987:57-65). This would make it 100 years old at the time of the wreck. If so, then its age may indicate that it was a family piece. Surprisingly, there is no hole in the footring, as was common for Netherlands majolica, allowing it to be displayed on a wall. Presumably it was used as a decorative piece as well as a serviceable dish. A second Rhenish vessel was found, a red-earthenware plate. This plate is rather small with a slightly stepped flanged rim measuring 17 cm (figure 39-8). The obverse is slip decorated in a diamond pattern and is covered in a clear lead glaze terminating just below the rim. Some areas are deglazed and look burned. The base is flat without a footring and the reverse is unglazed. A red-earthenware bowl, measuring 12.7 cm rim diameter, was found aft in the scatter off the port side (figure 38-6). It has a simple everted rim and a handle and footring that are lopsided and sloppy in their attachment. There is a simple scroll slip design along the upper sides of the exterior and an interior slip covering the bottom half of the bowl. It is covered inside and out in a clear lead glaze and the absence of burn marks seem to indicate that it was used for consumption of a single serving. A second bowl of similar design and form, measuring 13.5 cm at the rim, was also found (figure 38-7). The handle is missing, but the size and general shape suggest a single service vessel. The provenience, 0.4 m aft of the stempost, leaves this open to criticism.

The galley artefacts, for the most part, were recovered from two tight clusters aft in the chine. Ther was a wide scatter of artefacts outside the ship on the port side. The scatter resulted from the boat listing to port as it sank causing the artefacts to roll to the lowest point in the ship. Also the clustering might have resulted from these items having been stored in a locker or cabinet built against the side of the boat. Since the majority of the boat was not preserved, the presence of a locker can not be determined. The iron cooking pot was found *in situ* in an upright position. If it had rolled to the lowest point, it would be expected to have been oriented in a more haphazard fashion. Thus, the evidence suggests that a locker for the storage of galley ware was feasible. The remaining item of this sub-category is composed of two fragments of a refined white earthenware covered in a clear lead glaze, most likely an English creamware. These two fragments do not match and may represent more than one vessel. The vessel form appears to be a cup or bowl with an estimated rim diameter of 9.5 cm. They were found aft, one fragment was concreted inside the cast iron cooking pot while the other was several meters away behind the sternpost and slightly to starboard.

The majority of the ceramics appear to be of Dutch manufacture. Twelve pieces were composed of English and Rhenish wares. Among the Dutch wares are one majolica plate and two white-earthenware bowls, however, an inexpensive red-earthenware comprises the majority. J.M. Baart et al. (1986:106) provide a price list in *stuivers* of an average vessel of the eighteenth century, which they compiled from active price descriptions used in stores and estate inventories. The *stuiver* was the common denomination used by the Dutch during this period. Red-earthenware vessels from the Lower Rhine Valley could be purchased for one *stuiver*. This is comparable to the price for locally manufactured red-earthenware pots which were available for one to two *stuivers*, the more ornate and decorative vessels bringing a higher price than the simple or imperfect wares. Majolica and English ceramics were priced a little higher at three *stuivers* per piece, but these were all relatively inexpensive and well within the affordable range of the lower middle-class household. The upper price brackets were held by Chinese porcelain at eight *stuivers* per piece, local pewter at ten *stuivers* per piece, and Amstel porcelain at forty *stuivers* per piece. With this list as a guide, the worth of the recovered ceramic assemblage for the AZ 71 comes to one guilder and twenty cents or 24 *stuivers*. This represents a rather small cash investment, even when allowing for an incomplete assemblage, and could be indicative of a lower middle-class household as it was with the *Oostenburgermiddenstraat* excavation in Amsterdam (Baart et al 1986). This hypothesis is further supported by collections from comparable sites. Other pram wrecks from the late eighteenth and nineteenth centuries possess larger and more varied assemblages. Higher percentages of English and Dutch refined earthenware, metal teapots, complete tea services, drinking glasses, and personal possessions are common (K. Vlierman, personal communication). It seems that the skipper of this boat, along with any other crew, lived at the lower end of the economic scale.

Three pewter spoons were found among the rubble that comprised the galley assemblage. Two of these are very similar in style, size, and touchmark. They are 18.5 cm long and have a bowl diameter of approximately 6 cm. They both have a rose and crown touchmark which indicates a good quality pewter (Dubbe 1978). There are stamped initials incorporated into the touchmarks of these spoons. One has the initials "**LA**" along with scratches that might signify an owner's mark of "**X**" (figure 40-44). The second spoon has the initials "**KW**" (figure 40-45). The touchmark on both is located in the hollow of the bowl below the attachment of the handle, and the initials in both cases form part of the crown. Both spoons are considerably scratched and dented, but the first has four small elongated indentations and a dimple on the back of the bowl. The indentations crudely suggest a square with the dimple in the center. The nature of these marks is not known. The third spoon is quite small (figure 40-46). It measures 12 cm long and the bowl is elongated from side to side, measuring 4.5 cm at its widest point. This handle style gained popularity in the nineteenth century, but was also manufactured in the late-eighteenth century. There is a faint touchmark at the top of the handle on the back that looks like a crown and rose.

Figure 40.
Spoons.

Table 16.
Eating and drinking.

Number	Object	Class	Provenience
3	Majolica plate	9.2	Stern
4	Black lead-glazed bowl	9.2	Stern
6	Redware bowl	9.2	Stern
7	Redware bowl	9.2	Bow
8	Rhenish plate, slip	9.2	Stern
9	Plate	9.2	Stern
10	Rhenish platter, slip	9.2	Stern
13	Cream pot	9.2	Stern
15	Creamware cup	9.2	Stern
16	Rim fragment	9.2	Stern
44	Spoon, crown/rose, initials "**LA**"	9.3	Stern
45	Spoon, crown/rose, initials "**KW**"	9.3	Stern
46	Small spoon, crown/rose mark	9.3	Stern
12	Tigerware pitcher	9.4	Stern

2.3.10 Victuals and provisions

The last two items from the galley concern the storage of liquids, an onion bottle and a water measure. The onion bottle is of dark green glass, stands 23 cm high, and has a string finish (figure 39-27). The water measure is a small copper can standing 17.5 cm high with a diameter of 7.8 cm (figure 39-40). There are fastenings for a bale handle and what look like repairs from previous fastenings located 90 degrees from the current handle fastenings. It has a volume of approximately 21 fluid ounces and was used to dip a ration of water through the bung of the water barrel. The fact that glasses and mugs are absent from this assemblage may indicate that the water measure was also used for drinking. A barrel was not found, but the presence of the water measure suggests that a barrel had been on board at one time.

Table 17.
Victuals and provisions.

Number	Object	Class	Provenience
40	Water measure, bale fast.	10.1	Stern
28	Small mammal leg bone	10.4	---

2.3.11 Personal possessions

The personal possessions recovered from this wreck were few and scattered about the ship. A small cast-pewter pendant or medal was found aft, outside the ship on the shell layer (figure 41-47). A small iron box was also found, aft, next to the iron cookpot. It's contents had been replaced by mud but it may have contained snuff or possibly a spice such as pepper or salt. An undecorated wooden knife handle was recovered (figure 41-38). It measures 10.5 cm in length and was fastened with three iron nails or tacks. Two Gouda pipe bowls were recovered, one in the midships area and one aft. The first one has a Gouda crest and the letter "**S**" impressed on the heel and a cipher mark of "**77**" on the bottom of the heel (figure 41-1). The second pipe has the remains of an "**S**" on the side of the heel. The "**S**" on both indicates a pipe of common quality (Duco 1987). The last two objects from this category are two brass farthings found in the bow of the ship, under the frames of the starboard side. The first one is very worn and corroded, but some letters can be discerned on one side. The excavators suggest that the coin was minted in Zeeland, alternatively spelled Zeelandia (figure 41-42). The date on the reverse side is within the decade of 1750, the last number being indecipherable. The second coin was supposedly in very poor condition, but it is currently unavailable for study.

Figure 41.
Personal possessions.

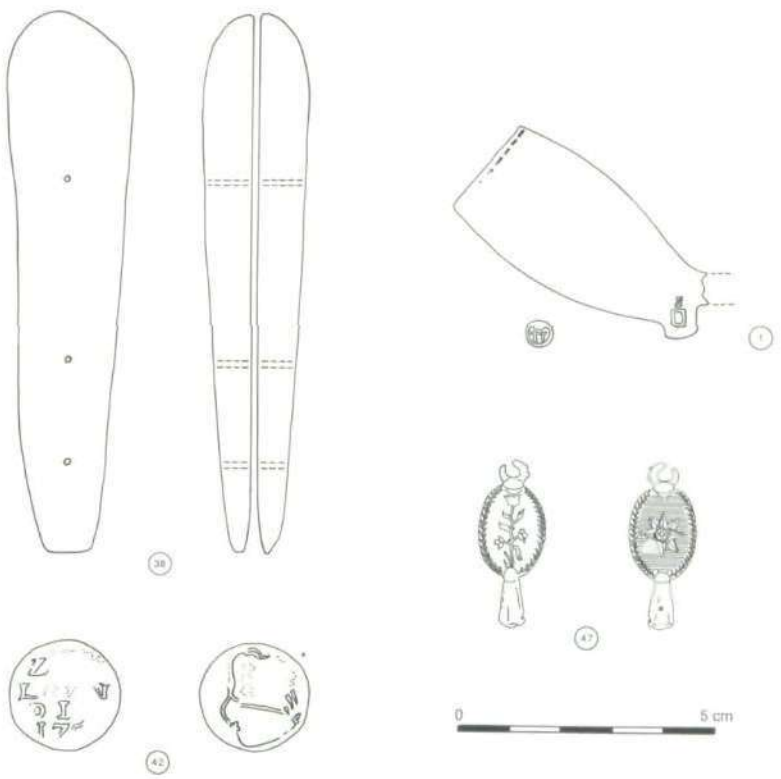


Table 18.
Personal possessions.

Number	Object	Class	Provenience
47	Cast-pewter object	11.0	Stern
51	Fragment of small box	11.0	Stern
38	Wood knife handle	11.4	Stern
1	Gouda pipe, heel stamp 77	11.5	Midship
2	Gouda pipe, crest-s	11.5	Stern
42	Farthing, dated 175(?)	11.7	Bow
43	Farthing, unavailable	11.7	Bow

2.3.12 Dating

The wreckage of this ship can be dated to the second half of the eighteenth century based on the artefact assemblage. The ceramics are in general dated to the eighteenth century by comparative analysis with other wreck sites. The Rhenish platter, AZ 71/10, can be dated stylistically to some time after 1740 (Frankewitz 1988:141-152), while the small Rhenish plate, AZ 71/8, has an analogy in the *Oostenburgermiddenstraat* site in Amsterdam (number OBM9-179) dating to the second half of the eighteenth century. The imitation black ware was popular from 1750-1800, while creamware was popular from 1750-1815 (Cox 1970:908, Hume 1969:35). The pipes from Gouda may also be used as indicators of dating; their ovoid shaped bowl was popular from 1750-1850 (Duco 1987). A brass farthing, possibly from Zeeland, gives a *terminus post quem* of 1750. It seems plausible that the vessel wrecked some years after this date because of the composition of the assemblage and degree of wear observed on the artefacts.

3 Comparison of the wreck assemblages

3.1.1 Ship type

The E 14 and AZ 71 were the remains of two eighteenth-century inland freighters. Both are believed to belong to a general class of vessel known as prams. The term pram has had a broad usage defining both a sturdy sea-going vessel or a small, flat-bottomed boat (Konijnenburg 1913:79-81). The word *praam* appears as early as the sixteenth century in Dutch port records (Unger 1978:35). Outside of the Netherlands, other areas of Northern Europe also had vessel-types referred to by names spelled similarly to the Dutch *praam* such as the English *pram*, the French *prame*, and the German *prahm*. How similar these vessels were to prams found in the Netherlands, particularly the Overijssel variety discussed in this report, remains to be seen.

The identification of the E 14 and AZ 71 is based on prominent construction features, attributed to prams - specifically the Overijssel varieties. These attributes are derived from drawings and models of prams produced in the nineteenth century and descriptions by contemporary writers of that time such as van Konijnenburg and Van Loon. A study of this material suggests that prams of the Overijssel variety commonly had these construction characteristics:

- requiring a small draft of water, they were built with a completely flat bottom;
- the bottom and sides met in a sharp, hard chine;
- a relatively upright, straight to slightly curved stem and sternpost were fastened directly to the bottom of the hull;
- a low-lying wale presented little sheer throughout most of its length, but in the stern and bow rose abruptly;
- the upper hull was full in the bow and stern and was much broader in comparison to the hull below the waterline;
- stealers were utilized to fill the space between the bottom and upper strakes;
- frames (floor timbers, futtocks, and top timbers) were arranged in systematic patterns with relatively regular lengths, widths, and spacings;
- the stern deck was flat with the tiller passing over it.

Unfortunately, there are neither reliable drawings nor models of comparable vessels for the eighteenth-century. A few eighteenth century sources mention prams, but such references are written in very general terms, usually discussing vessel function more than construction (Aubin 1702, Falconer 1771). Furthermore, because nineteenth- and twentieth-century prams came in a variety of forms and sizes, it is likely that in the eighteenth century the pram vessel-type also included a diverse category of watercraft. The E 14 and AZ 71 have all of the above-mentioned construction features. In addition to these, the two wrecks have other constructional attributes in common with each other. At least five additional attributes are characteristic of their construction:

- the carvel bottom and lapstrake sides were pieced together from planks of irregular lengths and widths;
- the bottom was cut away to receive the stealers;

3.1.2 Inventories

The assemblages for these two wrecks, while not identical, remain complementary. The similarities lie in the artefact scatter which, it is assumed, represents the accommodation plan of the ship with the types of artefacts representing the functional classifications. When viewed together, these assemblages complement each other by offering a more complete representation of the functional categories. When inventories like these are viewed in a wider perspective, compared to a multitude of similar wrecks, they may suggest what was common or typical for this type of craft. This would promote more accurate predictions on future excavations and research questions for similar vessels.

The artefact scatter for both vessels consisted of ship's equipment and tools in the bow and personal possessions and galley items in the stern. This pattern indicates that equipment was stored in the forward compartment, while the galley and living quarters were located in the stern compartment.

Prams and other small cargo vessels of the nineteenth century often served as primary domiciles as well as work boats (G. Schutten, personal communication). These two craft do not support this trend, however, as evidenced by the incomplete hearths, small galley assemblages, scarcity of personal possessions, and seemingly incomplete tool assemblages. At best, these vessels were sufficiently equipped for overnight or perhaps seasonal occupation during the periods when cargo was available for shipment.

The types of artefacts representing the functional categories for these ships were, in many instances, quite similar. Ship's equipment was predominantly composed of spares such as blocks, iron fasteners, and pump and block components. The galley was represented by hearth tiles, cooking pots, and skillets. The ceramics were predominantly a local slip-decorated redware and generally inexpensive, while the pewter spoons recovered from each wreck seemed to be quite common for the time period. The category of personal possessions for both ships consisted of a knife, common pipes from Gouda dating to the eighteenth century, and a few farthings in coins. The wreck of the E 14 added combs, the remains of a sewing kit, and some small bottles to this category.

The assemblages, when viewed together, represent more complete functional categories. The categories of tools, personal possessions, administrative, and domestic effects are more complete for the wreck of the E 14, while that of hearth and galley is more comprehensive for the AZ 71. Together these inventories provide a fairly accurate concept of what work and life aboard one of these vessels would have been like. Above all, they speak of frugality and multiple functions, and may indicate the skipper's membership in a lower socio-economic profession, the ship's serving only as a temporary short-term domicile during the working season, or the general decline in the Dutch economy during the eighteenth century.

Summary

The E 14 and AZ 71 shipwrecks compare favourably with one another. Both wrecks date to the second half of the eighteenth century and represent "the type of a dutch vessel called pram". Moreover, their artefact assemblages are quite similar, but complement each other in instances where categories of artefacts were incomplete for one or the other of the wrecks. The joint analysis of the construction and artefacts of both wrecks enabled us to fill in some gaps in the archaeological record where information was either not preserved or not recorded. Therefore, the combined reporting of the two wreck sites is justifiable not only on the basis of their similarities, but also because the two wrecks together provide a more complete picture of this type of watercraft.

The two wrecks also raise similar questions pertaining to their sinking in the Zuider Zee, hull construction and artefact assemblages. Neither the E 14 nor the AZ 71 were constructed as sturdy seagoing vessels. In fact, their construction seems more appropriately that of canal or river craft. Both vessels sank in the Zuider Zee, however; the E 14 was 15 km north-northwest off the coast of Harderwijk, and the AZ 71 was 6.5 km to the northeast of the mouth of the Vecht River and 12 km east of the harbour of Amsterdam. What is known from the nineteenth and early twentieth centuries of prams constructed similar to the E 14 and AZ 71, shows that these vessels were used primarily in the canals and rivers. It was uncommon for a vessel of this type to be involved in the Zuider Zee trade. Yet both craft did venture into the Zuider Zee and the lighthouse token from North Holland and West Friesland, found with the E 14 wreckage, indicates that the vessel must have crossed the sea with some frequency.

The assemblages for both craft are quite small and several function categories are entirely unrepresented: weaponry and navigation for the E 14; and working equipment, weaponry, administrative, and navigation for the AZ 71. Additional categories are very sparsely represented in both craft: working equipment, administrative, domestic effects, eating/drinking and victuals/ provisions in the E 14; tools, domestic effects, victuals/provisions, and personal possessions for the AZ 71.

Salvage operations might explain this lack of representation for both ships. Material could easily have been salvaged from the AZ 71 because of the shallow water at ebb tide and the hard shell layer which prevented it from sinking into the mud. The E 14 would have more quickly sunk into the clay bottom, hindering any attempt at salvage. Scarcity of artefacts might also suggest a temporal nature for these craft. Equipment was mostly spares and fasteners. Tools were few, just enough to make simple repairs until the vessel could make port. Items related to the galley and personal possessions were also meagre and ordinary. Life on board would have been very basic and thus is interpreted as having been of a very temporary nature.

The two wrecks raise several questions concerning the function of prams in Zuider Zee transport, their construction, and artefact assemblages. Hopefully, these questions might be answered by future excavations of wrecks of prams or pram-like vessels in the *IJsselmeerpolders*, facilitating a more complete understanding of this vessel type.

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Responsibility

1. Excavation of the pram on lot E 14

Informant	: 10 April 1968, J. Kuipers.
Survey	: 14 June 1968, B. van Dalen, S. Jaarsma.
Excavation	: 14 April 1973, S. de Jong, J. van der Land, F.J. Tjallingii, H. van Veen and K. Vlierman.
Report	: B. Neyland, K. McLaughlin-Neyland.
Photogrammetry	: Landmeetkundige Dienst van Rijkswaterstaat.
Graphics	: B. Neyland, K. McLaughlin-Neyland.
Photography	: B. Neyland, J.U. Potuyt.
Artefact Numbers	: OE 14/1 to OE 14/135.
Photograph Numbers	: 59303, 97830-97834, 98345-98346.
Slide Numbers	: 50150-50153, 75037-75043, 75091-75097, 75101-75106, 75109-75110, 75113, 75115-75118, 75127-75129,75137, 75140, 75143-75160, 75174-75203, 75225-75227, 75246-75249, 75288-75307.
Drawing Numbers	: See files Netherlands Institute for Ship Archaeology (NISA), Ketelhaven.

2. Excavation of the pram on lot AZ 71

Informant	: 28 July 1975, M.W. Koops.
Survey	: 30 July 1975, F.J. Tjallingii and H. van Veen.
Excavation	: 4 August - 23 August 1980, K. Vlierman, L. van Dijk and members of the N.J.B.G.
Report	: B. Neyland and K. McLaughlin-Neyland.
Graphics	: B. Neyland and K. McLaughlin-Neyland.
Photography	: L. van Dijk, B. Neyland and J.U. Potuyt.
Artefact Numbers	: ZA 71/1 to ZA 71/80.
Photograph Numbers	: 83084-83090, 83158-83185, 91940, 92228-92232, 95188, 97805-97816.

Slide Numbers	: 88189, 75098-75100, 75107, 75108, 75111-75112, 75114, 75119-75126, 75130-75136, 75138-75139, 75141-75142, 75161-75164.
Drawing Numbers	: See files Netherlands Institute for Ship Archaeology (NISA), Ketelhaven.

Appendix 1 List of artefacts for E 14

l=length d= rim diameter
w=width t= thickness
h=height (all dimensions in centimetres)

1	Moulded kaolin lion
2	Gouda pipe bowl, stamped with crest and cipher mark "69"
3a-c	Gouda kaolin pipe, bowl stamped with crown/fish/wave
4	Polychrome faience bowl, estimated d 10
5	Redware cup, lead glazed interior, d 13, filled with pitch
6	Redware coalpot, lead glazed interior/exterior
7	Small stoneware storage pot, grey salt glaze, one-handled
8	Redware cup, slip decoration, pitch residue on cup
9	Redware cooking pot, slip decoration, d 14.5
10	Broken redware cookpot, d 14.5
11	Redware ashpot, lead glazed exterior, h 22.2, fire blackened
12	Redware storage pot, lead glazed interior, h 28, d 32.8
13	Redware jar, lead glazed interior/exterior, h 31
14	Tigerware pitcher, h 27.8
15	Redware skillet, lead glazed interior/exterior, d 19.2
16a-c	Redware chamberpot, slip decorated, estimated d 18
17	Redware sieve, lead glazed interior/exterior, d 32.5
18	Redware milkbowl, lead glazed interior/exterior, d 21
19	Redware mixing bowl, lead glazed interior/exterior
20	Redware tile, unglazed, 22 square, t 3.2
21	Idem
22	Idem
23	Yellow brick, l 15.6, w 7.6, t 3.6
24	Yellow brick, l 15.4, w 7.2, t 3.8
25a,b	Yellow brick, total size l 16, w 7, t 3.7
26	Writing slate, l 39.3, w 26.8, broken into 26 pieces
27	Dark grey whetstone, heavily grooved
28	Tan polishing stone, worn smoothly
29	Red polishing stone, broken, worn smoothly
30	White chalky limestone, crystalline inclusions
31	Green wine bottle, string finish, h 20.2
32	Green wine bottle, string finish, h 16.2
33a,b	Green wine bottle, string finish, h 19.4
34	Shard of green wine bottle
35	Idem
36	Idem
37	Idem
38	Idem
39	Idem
40	Idem
41	Shards of glass to more than one vessel
42	Small green vial, h 2.3
43a,b	Small green bottle, base/body/neck, total minimum h 7.5
44	Small blue bead, d 1.1
45a	Window frame, mortise/tenon joints, wooden pegs

45b	Window glass from upper left pane
45c	Window glass from upper right pane
45d	Window glass from lower left pane
45e	Window glass from lower right pane
46	Black wide-tooth comb, made from baleen
47	Brown, bone, fine-tooth lice comb
48	Brown, bone spindle fragment, possibly from hair pin
49	Large, brown, bone, lathe turned button, d 2.7
50	Idem
51	Idem, d 2.8
52	Idem, d 2.7
53	Idem, d 2.6
54	Idem, d 2.7
55	Idem, d 2.7
56	Idem, d 2.6
57	Small, brown, bone, lathe turned button, d 1.9
58	Idem, d 1.7
59	Idem, d 1.7
60	Idem, d 1.6
61	Idem, d 1.7
62	Idem, d 1.7
63	Idem, d 1.8
64	Half small, brown, bone, button, d 1.9
65	Small, brown, bone button, d 1.9
66	Small, brown, bone button
67	Leather washer, d 8, hole d 1.8
68	Idem, d 7.8, hole d 1.7
69	Knife sheath, stamped floral decoration, l 22.8
70a	Shoe fragment, insole
70b	Jacket fragment (?)
70c	Jacket fragment (?)
71	Leather fragment to bag
72	Turned wooden needle case, l 8.1, d 1.5, int. l 6.1, d 0.7
73	Decorated saw handle with pewter ferrule
74	Small, wooden, lathe turned bottle, h 4.7, body d 4.5
75	Small decorated mast finial, h 12, 5 graduated tiers
76	Knob to punting pole, pole d 2.1
77	Knob to brace with pin, pin d 1.5
78	Cog from underside of pump, hole d 2
79	Small barrel, h 14.6, body d 15.8, 13 deep
80	Ironwood sheave,d 10.6, t 1.8
81	Idem, d 11, t 1.5
82	Idem, d 15.4, t 2.5
83	Idem, d 12.8, t 1.7
84	Idem, d 14.9, t 2.7
85	Idem, d 11.8, t 1.9
86	Idem, d 12.4, t 2.3
87	Idem, d 15.1, t 2.5
88a	Idem, d 8.4, t 1.6
88b	Leather strap lining sheave hole, t 0.6
89	Idem, d 8.4, t 1.8
90	Idem, d 11.9, t 2.2
91	Idem, d 8.1, t 1.9
92	Idem, d 11.2, t 1.7
93	Idem, d 12.4, t 1.7
94	Idem, d 12.4, t 1.8
95	Idem, d 10.4, t 1.6

96	Idem, d 11.2, t 1.7
97	Idem, d 10.8, t 1.5
98	Pin from block sheave, d 2.1, l 13.1
99	Fiddle block with knob
100	Single block, "**XII**" carved on one surface
101	Single block with iron strapping
102	Dead eye with iron strapping
103	Idem
104	Dead block with iron strapping
105	Small tackle block
106	Oak head stick
107	Pine ladder rung, l 28.5, d 2.8
108	Brace with bit, l 36.5, bit d .5
109	Seaman's chair from barrel stave
110	Knob to punting pole
111	Cork
112a-c	*Snotneus* oil lamp
113	Segment to zig-zag folding rule, 16" maximum extension
114	Shell shaped ornament
115	Fish hook
116	Top of fish hook
117	Bottom to fish hook
118a-i	9 straight pins with heads of coiled wire
119a	Clothing fastener-eye
119b	Clothing fastener-eye
120	Round, pewter spoon, crown/rose touchmark
121	Oval pewter spoon, no touchmark
122	Coin from Monaco, dated 1653, denomination full ecu
123	Farthing from Utrecht, dated 1766
124	Farthing from Holland, dated to the 18th-century
125	Lighthouse token, dated 1783
126	Lead seal, "82" cipher stamped on it
127	Long bolt with grooved hole, possibly for the mast
128	28 lead line/net weights
129	3 small bullets
130	Small spoon bit for brace, d .6
131	Small spoon bit for brace, d .6
132	Gudgeon, l 39.7, W stamped on one edge
133	Hook with fluke end
134	Hook, pointed end with hole
135a	U-shaped cramp
135b	Idem
135c	Broken forelock bolt
135d	Small nail
135e	Idem
135f	Nail
135g	Idem
135h	Idem
135i	Nail-type fastener with hole
135j	Fish hook

Appendix 2 List of artefacts for AZ 71

l=length d=rim diameter
w=width t=thickness
h=height (all dimensions in centimetres)

1	Gouda pipe, heel crest and stamp with cipher mark "77"
2	Gouda pipe, heel stamp "S" indicating common quality
3	Blue and white majolica plate, minimum d 20
4	Bowl "black ware", 2 handles, black glaze, d 18.5
5	Redware bowl with spout, slip decorated, d 13.5
6	Redware bowl, slip decorated, d 12.7
7	Redware bowl, slip decorated, d 13.5
8	Rhenish plate, slip decorated, d 17
9	Redware plate, lead glazed, d 22.7
10	Rhenish platter, slip decorated, d 32
11	Redware batter bowl, lead glazed, d 21.5
12	Tigerware pitcher, h 23.5
13	Green lead glazed pot with spout
14	Brown and green lead glazed bowl, est. base d 10
15	Creamware cup fragment, d 9.5
16	Redware bowl rim fragment, estimated d 13, lead glazed
17	Hearth tile, l 22, w 22, t 3, nail through centre
18	Idem
19	Idem, 4 pieces
20	Half hearth tile
21	Hearth tile fragment
22	Idem
23	Red brick fragment
24	Grey brick fragment
25	Small slate fragment
26	Idem
27	Onion bottle, string finish, h 23
28	Small mammal leg bone
29	Leather shoe tongue, rolled up
30	Leather washer, d 6, hole d 1.3
31	Caulking from plant fibres (moss)
32	Idem
33	Heather brush, bristles estimated l 12
34	Wooden headstick, d 5, l 24.5 groove to groove
35	Small wooden disc, d 10, peg through centre
36	Single block, iron strapped, l 21.5
37	Single block, iron strapped, l 16.5
38	Wooden knife handle, l 10.5, 3 Iron fastenings
39	Copper plate with rolled edge, d 11.6, hole in centre
40	Copper water measure, 835 cm^3 capacity, bale fastenings
41	Strip of copper moulding, l 78, possibly to hearth
42	Farthing from Zeeland, dated 175(?)
43	Farthing, poor condition
44	Pewter spoon with round bowl, crown/rose touch, initials "LA"
45	Idem, initials "KW"

46	Small pewter spoon with round bowl, crown/rose touch
47	Small cast-pewter object with floral decoration
48	Lead strip with 2 holes, w 2.8, holes 9.5 apart
49	Net weight, l 8.4, d 1.8, with rope fragment
50	U-shaped cramp
51	Fragment of small iron box, possibly for snuff
52	Iron drift pin fragment
53	Iron thimble for thin rope
54	Iron thimble
55	Two fragments of iron fastening, minimum l 16.5
56	Iron thimble for thin rope
57	Idem
58	Iron marlin spike, l 20, button head
59	Iron loading hook with fluke end, hammer marks
60	Iron loading hook with eye
61	Iron fragment to a U-shaped buckle
62	Iron strip, one end spiked, l 34, with 3 holes - 5.5 apart
63	Iron fragment, possibly from fastening
64	Iron eye for rigging attachment
65	Iron hook with fluke end, possibly for rigging
66	Iron thimble for thin rope
67	Bent iron nail, l 7
68	Idem, minimum l 7
69	Spike, l 21.5, d 1.8
70	Spike, l 21.5, d 1.7
71	Spike, l 17, d 1.3
72	Spike, minimum l 16, d 1.3, barbed end
73	Fragment of iron fastening
74	U-shaped iron strap to pump
75	Cast-iron cooking pot, 3 legs, bale, d 23.5
76	Half cast-iron hearthplate, l 71, estimated w 45
77	Iron pancake pan, d 23, bottom shows repair
78	Iron hinge, minimum l 21, w 9
79	Nail fragment
80	Fastening

Appendix 3 Glossary of ship terms

Accommodation plan	: The internal compartmentalization of the ship into specific activity areas.
Backstays	: Ropes forming part of the standing rigging, which stretch from the masthead and tend aft from the mast. Their lower ends are fastened on each side of the ship to chain plates. They serve to support the masts against forward pull.
Bitt	: A single vertical timber head, forward or aft, with a pin through it, and around which mooring and towing lines are secured.
Bowsprit	: A spar which projects forward from the stem of a sailing vessel. Its purpose is to extend head sails such as the jib and support the mainmast, which is fastened to it by stays.
Caulking	: The sealant of moss placed between the edges of planks or their laps to make the hull water-tight.
Ceiling	: The internal lining of a ship's hull fastened to the inside faces of the frames. It functioned to keep heavy cargo from wearing against the hull planking and prevented foreign matter from entering the bilges.
Cheek block	: In the case of the E 14, a block whose sheave is set against the side of the ship with only one cheek to support the pin.
Chine	: The point at which the bottom of a boat meets the sides. In the E 14 and A 71 this is a sharp angle, which can be referred to as hard-chined.
Clinker	: A method of planking in which the lower edge of a plank overlaps the upper edge of the one below it. The overlaps are always fastened together with iron rivets riveted over iron washers called "roves".
Coaming	: A raised wooden curb to keep out water usually bordering a hatch, but in the E 14 bordered the covering board.

Covering board : *The plank running longitudinally that covers* the heads of the top timbers and standing knees. Its inboard edge is angled upward to permit water to drain outboard.

Cramp: An U-shaped fastener, or a clamp, often used to hold timbers together.

Cuddy : A cabin or compartment in a small craft separated from the hold by a bulkhead at the forward or afterend.

Dead eye : *A disk of hard wood, strapped with rope or* iron, and pierced by 3 holes for the reception of lanyards.

Dead block : A block without a sheave and used as a deadeye; it usually has a large three-cornered hole in the middle and is also called a heart block.

Ecu : Any of several gold and silver coins of France from the 14th-century onward.

Entrance : *The immersed part of the hull forward of the* parallel body or, if the latter is nil, forward of the cross section of greatest area.

Fiddle block : A type of block having two sheaves, one larger than the other and one above the other, tandem fashion.

Floor timbers : Frames extended across the bottom of the hull and perpendicular to the center-line of the hull.

Fore staysail : A triangular or trapezoidal fore-and-aft sail hoisted on a stay. It is held down by its tack, and is confined to the stay by iron thimbles, rings, hanks, bridles, or lacings, toggled into the stay holes or into eyelets.

Frames : Single or composite timbers mounted perpendicular to the center-line of the hull. They function to strengthen the hull and maintain its shape. The frames of these two vessels were composed of three different types: floor timbers, futtocks, and top-timbers.

Futtocks : The frames that extended from the bottom, near the chine, up the sides of the hull to the upper face of the wale. In all but a few instandes, the futtock's heels abutted floor timbers.

Gripe : A timber fastened to the fore side of the stem. In the A 71 it was fastened to the stem with a metal band called a "gripe clamp" and by a long treenail.

Gudgeon : A metal fitting fixed to the sternpost into which the rudder pintles are fit. The gudgeon consists of a metal plate with a protruding eye, into which fits the pintle of the rudder.

Hanging knee : An angular piece cut from that part of the tree where a large branch or root joined the trunk. Used to brace the juncture of a beam with the ship's side, its body was attached to the inner face of the hull planking and its arm fastened below the beam.

Hawse bolster : A triangular block containing the holes for the hawsers. In the E 14 its forward face abutted the stem and was fastened there and to the port and starboard toerails. It was rabbeted to fit over the upper faces of the deck planking.

Headstick : A batten in the head of a fore staysail or jib.

Hood end : The end of a plank that fits into a rabbet of the stem or sternpost.

Jibstay : A line running from high on the front mast to the stem or bowsprit from which the sail known as the jib is hung.

Lap joint : A joint in which one piece overlaps the other.

Lapstrake : A method of planking a boat in which the lower edge of the upper plank overlaps the upper edge of the lower plank. The overlaps are fastened together with iron nails, wooden pegs, lashings, and any method other than with rivets and roves.

Leeboard : A plate or frame of planks, constructed in a flat, fan-shaped construction, lowered over the lee side of a shallow-draft boat with a flat bottom. It lessons the leeway when the vessel is sailing close-hauled by giving increased lateral resistance. There is usually one leeboard to each side, but sometimes a vessel only uses one. Leeboards are fixed to the hull by an adjustable bolt locked by a cotter pin.

Leeboard pad : A board or short plank placed between the leeboard and the side of the ship for protection from wear and helped the leeboard stand vertical so as not to follow the flare of the hull. The pad was through-bolted to the sheerstrake and top timber by the long bolt onto which the leeboard attached.

Locker : A cabinet or closet in the stern or forward compartment of this vessel.

Loose-footed gaff sail : A four-sided fore-and-aft sail extended by two spars, a gaff and a boom, which has its forward side or luff pivoting about a mast to which it is attached by hoops or slides. In loose-footed gaff sails the foot is not laced to the boom, but is secured only to the tack and clew.

Mast step : The large timber fastened to the floor timbers and containing the mortise in which the heel of the mast is placed.

Mast-step mortise : The chiseled out area in the mast step that contains the heel of the mast.

Pintle : A vertical pin, usually one of two or more, fixed to the front of the rudder that fits into the ring of the gudgeon and holds the rudder to the vessel.

Proen : A triangular support inserted between dishes before firing in a kiln to prevent fusion of the glaze between objects.

Rabbet : A groove cut into the stem or sternpost or other member for the purpose of seating planking edges.

Ridgepole : A horizontal timber extending forward from the sail beam.

Run : The immersed part of the hull aft of the parallel body or, if the latter is nil, aft of the cross section of the greatest area.

Sail beam : A large beam either immediately forward or aft of the mast. It strengthens the hull where the mast is stepped and supports the mast at deck level.

Sheave : A grooved wheel in a block, over which a rope passes.

Sheerstrake : The uppermost strake in the hull. It forms the upper curvature or sheer of the hull.

Skeg : An additional timber fastened under the stern of small craft, acting as a deep keel to keep the boat on a straight course.

Standing knee : An angular piece cut from that part of the tree where a large branch or root joined the trunk. Used to brace the juncture of a beam with the ship's side, its body was attached to the inner face of the hull planking and its arm fastened to the forward or after face of the beam.

Stealer : A short plank inserted into the hull to fill out the wider areas of its sides, towards the stem and stern. In these two vessels the stealers were placed between the bottom and an upper strake.

Stem : The timber extending forward and up from the bottom, and forming the upright post to which the two sides of the bow are attached.

Sternpost : The timber extending aft and upward from the bottom to which the sides of the stern are attached.

Stopwater : A wooden dowel driven into a seam between the bottom and the stem where the wood is too thick to allow caulking. The hole for a stopwater is bored directly across the seam and so situated that the center of the hole is on the seam.

Strake : Planking made up of one piece or several pieces scarfed together.

Tabernacle : A vertical trunk to take the heel of a mast that does not pass through a deck. It is built so that the mast can be lowered, in which case a heavy bolt is fitted through the sides of the tabernacle and serves as a pivot for the mast. In these vessels it was constructed of at least two boards, one on the port and one on the starboard sides of the mast.

Tackle block : A combination of ropes and blocks working together comprising a tackle which affords a mechanical advantage assisting in lifting or controlling weight.

Toerail : A moulding set at the edge of the deck to offer a degree of safety on slanting decks.

Top timbers : The uppermost frames, which in the E 14 and A 71 usually began about the third strake and continued to the upper edge of the sheer strake. The heads of the top timbers supported the covering board.

Unfastened lapstrake : A form of lapstrake construction, in which the overlapping strakes are not fastened together by strake-to-strake fasteners, such as rivets and roves or twice-bent nails, but are secured only when the strakes are fastened to the frames. This implies a frame-first or skeletal construction. Unlike other lapstrake and clinker-built constructions where fastened overlaps hold the sides together, here the overlaps function to make the hull water-tight and dispense with the necessity of tight carvel joints.

Wale : A heavy piece of planking strategically placed to gird the upper part of the hull.

List of tables

Table 1. Classification system *15*

Table 2. Ship's equipment (E 14) *41*

Table 3. Working equipment (E 14) *42*

Table 4. Weaponry (E 14) *42*

Table 5. Administrative (E 14) *44*

Table 6. Tools (E 14) *47*

Table 7. Domestic effects (E 14) *49*

Table 8. Hearth and galley (E 14) *52*

Table 9. Eating and drinking (E 14) *54*

Table 10. Victuals and provisions (E 14) *58*

Table 11. Personal possessions (E 14) *62*

Table 12. Intrusive (E 14) *63*

Table 13. Ship and equipment (AZ 71) *78*

Table 14. Tools (AZ 71) *79*

Table 15. Hearth (AZ 71) *84*

Table 16. Eating and drinking (AZ 71) *88*

Table 17. Victuals and provisions (AZ 71) *89*

Table 18. Personal possessions (AZ 71) *90*

List of figures

Figure 1. The Zuider Zee water management and land reclamation project *11*

Figure 2 The wreck site on lot E 14 *17*

Figure 3. The E 14 hull remains with frames intact *18*

Figure 4. The E 14, view of the hull planking after the removal of all the frames *18*

Figure 5. Bottom profile of wreck site E 14 *19*

Figure 6. In the stern a skeg was present and fastened to the toe of the central plank (E 14) *22*

Figure 7. Bolt through the toerail, ceiling planking and bitt on the port side in the stern (E 14) *24*

Figure 8. View forward with bulkhead and mast step (E 14) *28*

Figure 9. Window found lying inside the wreck in the stern (E 14) *29*

Figure 10. Engraving of a Friese praam, Groenewegen 1789 *30*

Figure 11. The leeboard *in situ* on the port side of the wreck (E 14) *31*

Figure 12. The bolt that secured the leeboard to the top timber (E 14) *32*

Figure 13. The lower section of the E 14 rudder *33*

Figure 14. The hypothetical displacement of the reconstructed E 14 hull in fresh water *34*

Figure 15. The dead weight capacity calculated for the E 14 reconstruction *34*

Figure 16. Blocks (E 14) *38*

Figure 17. Equipment (E 14) *40*

Figure 18. Flag pole or mast finial *(mastwortel)* (E 14) *41*

Figure 19. Writing slate (E 14) *43*

Figure 20. Coins and tokens (E 14) *44*

Figure 21. Tools (E 14) *46*

Figure 22. Window from the stern (E 14) *49*

Figure 23. Domestic effects (E 14) *49*

Figure 24. Hearth and galley utensils (E 14) *51*

Figure 25. Two pewter spoons (E 14) *54*

Figure 26. "Tigerware" jar and wine bottles (E 14) *56*

Figure 27. Victuals and provisions (E 14) *57*

Figure 28. Sewing accessories (E 14) *59*

Figure 29. Personal possessions (E 14) *60*

Figure 30. The hull with frames, mast step and ceiling planking (AZ 71) *65*

Figure 31. The wreck site on lot AZ 71 *66*

Figure 32. Bottom profile of wreck site AZ 71 *67*

Figure 33. Stem and part of the central plank (AZ 71) *70*

Figure 34. View of bow showing the stem, port side strakes and the loose portion of the starboard strakes (AZ 71) *71*

Figure 35. Ship's fasteners (AZ 71) *75*

Figure 36. Equipment and rigging (AZ 71) *77*

Figure 37. Dish, bowl and iron cooking pot (AZ 71) *81*

Figure 38. Galley (AZ 71) *83*

Figure 39. Dishes, victuals and provisions (AZ 71) *85*

Figure 40. Spoons (AZ 71) *88*

Figure 41. Personal possessions (AZ 71) *89*

In de reeks Flevoberichten zijn m.b.t. Scheepsarcheologie na 1985 verschenen:

140. Verslag van het onderzoek van een vissersschip op kavel W 10 in Oostelijk Flevoland, Lelystad, 1978.
166. REINDERS, H.R., H. VAN VEEN, K. VLIERMAN et al. Drie schepen uit de late Middeleeuwen. Lelystad, 1980.
197. REINDERS, H.R. Shipwrecks of the Zuiderzee. Lelystad, 1982.
221. Drie Middeleeuwse rivierschepen gevonden bij Meinerswijk (Arnhem), opgravingsverslagen 5, 6 en 7/onder red. van H.R. Reinders. Lelystad, 1983.
235. REINDERS, H.R., H. VAN VEEN, K. VLIERMAN e.a. Vier werkschuiten uit de zeventiende eeuw: het onderzoek van vier werkschuiten gevonden op de kavels B 19, Mz 6, B 13 en B 51 in Flevoland: opgravingsverslagen 8, 9, 10, 11. Lelystad, 1984.
248. REINDERS, H.R. Cog finds from the IJsselmeerpolders. Lelystad, 1985.
258. ENTE, P.J., J. KONING en R. KOOPSTRA. De bodem van Oostelijk Flevoland. Lelystad, 1986.
271. KONING, J. en P.J. ENTE. De bodemkundige code- en profielenkaart van Zuidelijk Flevoland, schaal 1:25000, kaartbladen, toelichting. Lelystad, 1986.
280. REINDERS, H.R. Raakvlakken tussen scheepsarcheologie, maritieme geschiedenis en scheepsbouwkunde: inleidingen gehouden tijdens het Glavimans Symposium 1985. Lelystad, 1987.
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331. MOORTEL, A. VAN. A cog-like vessel from The Netherlands. Lelystad, 1991.
383. KATHLEEN MCLAUGHLIN-NEYLAND and BOB NEYLAND. Two prams wrecked on the Zuider Zee in the late eighteenth century excavation reports 15 and 16.

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Two prams wrecked

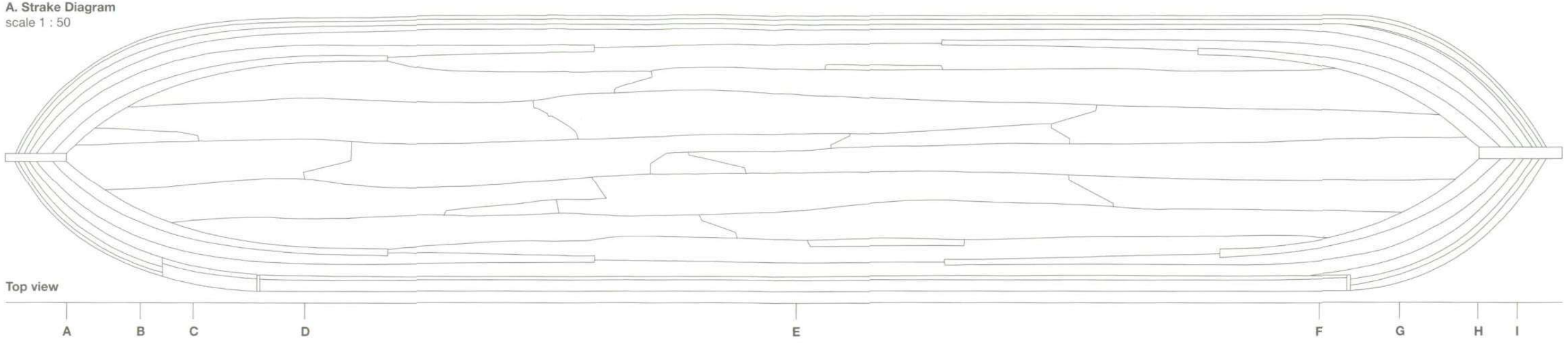
on the Zuider Zee in the late eighteenth century

excavation reports 15 and 16

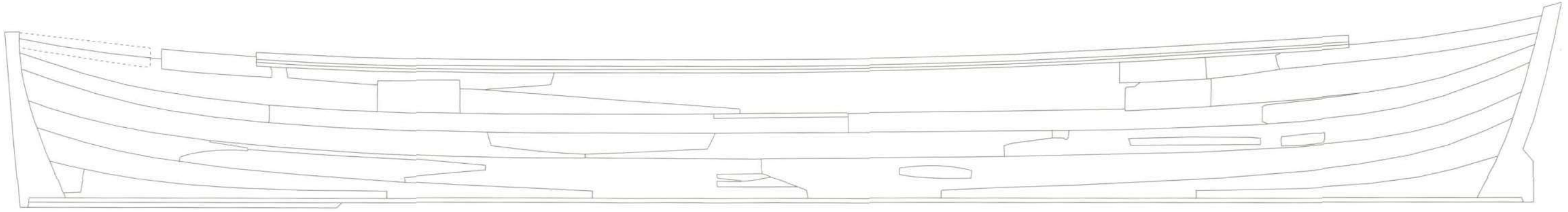
by Kathleen McLaughin-Neyland and Bob Neyland

Nederlands Instituut voor Scheeps- en onderwaterArcheologie / ROB (NISA)

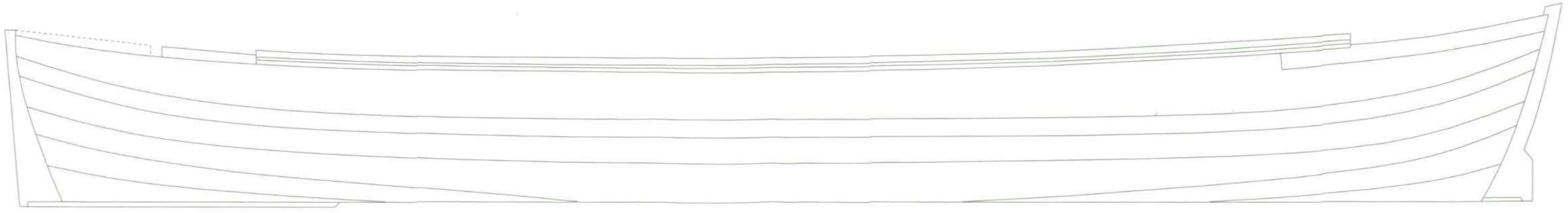
A. Strake Diagram
scale 1 : 50



Top view

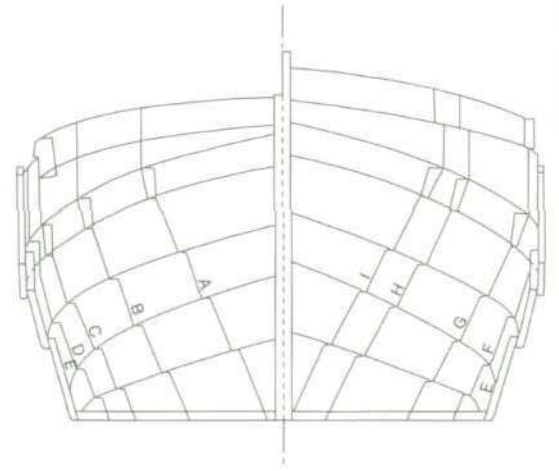


Inside view

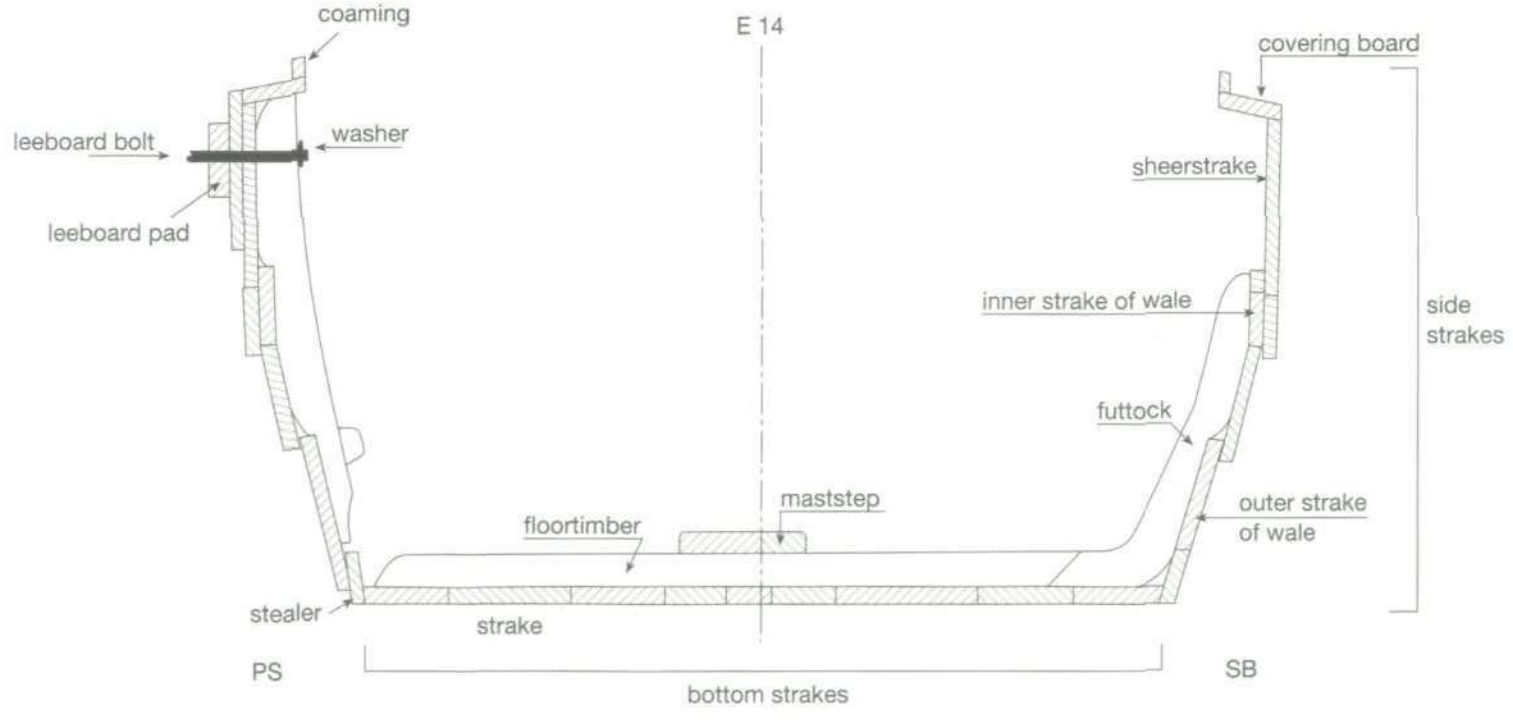


Outside view

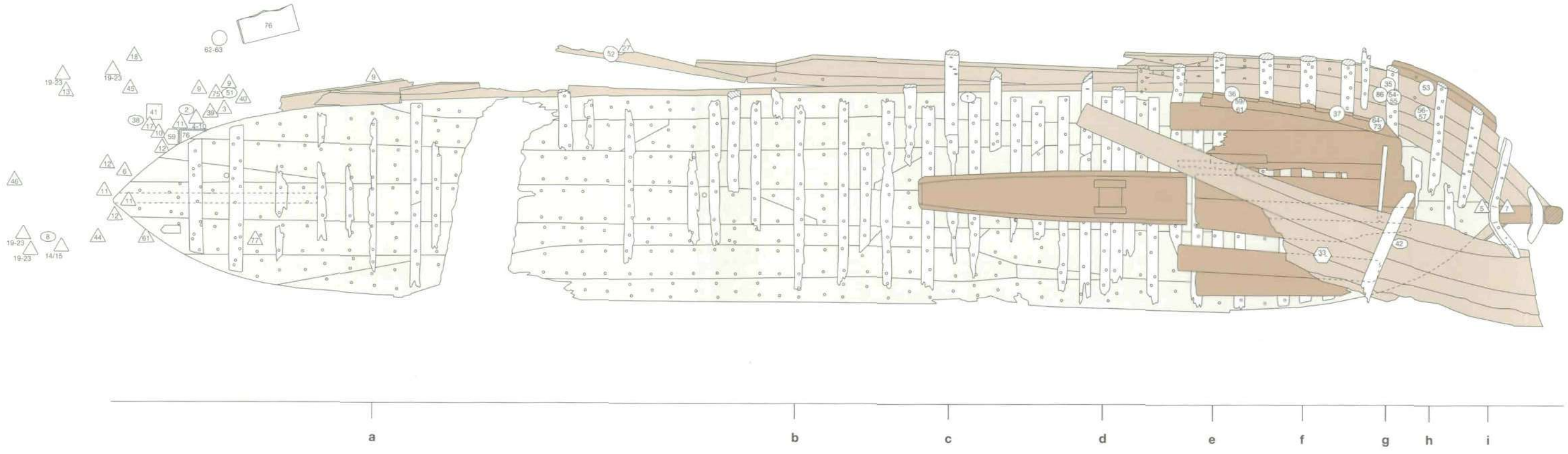
B. Cross sections and strakes
scale 1 : 50



C. Main frame
scale 1 : 25



Two prams of the eighteenth century
Excavation on lot E 14 in Oostelijk Flevoland
Enclosure 3 **A. Strake diagram**
(drawn to the inside corners of the landing)
B. Cross sections and strakes
C. Main frame



A. Ship with inventory
scale 1 : 50

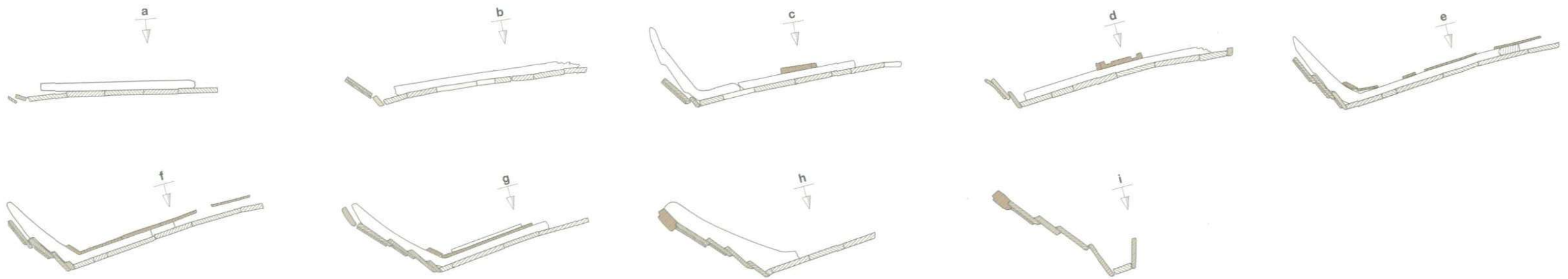
- stem, wale, ceiling and mast step
- bottom strakes
- side strakes
- timbers
- end grain

Legend of function categories

- ship's equipment (1)
- working equipment (2)
- documents and stationary (4)
- navigational equipment (5)
- tools (6)
- domestic effects (7)
- galley utensils (8)
- eating and drinking gear (9)
- victuals (10)
- personal possesions (11)
- cargo (12)

B. Longitudinal section
scale 1 : 50

- stem, ceiling and mast step
- bottom strakes
- timbers (end grain)

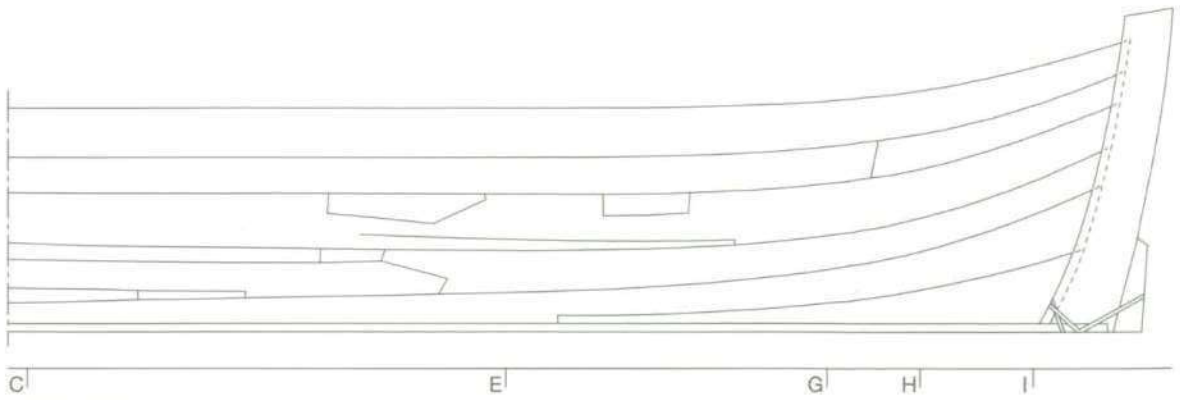


C. Cross sections
scale 1 : 50

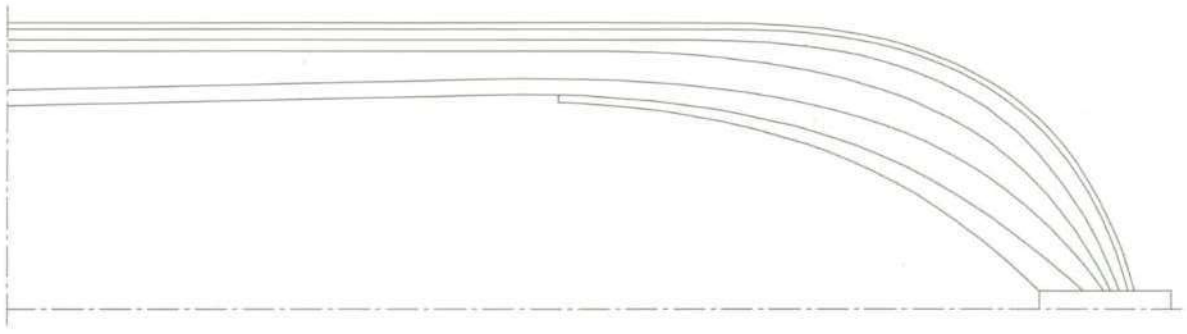
- wale (end grain), ceiling and mast step
- bottom strakes (end grain)
- side strakes (end grain)
- timbers

Two prams of the eighteenth century
Excavation on lot AZ 71 in Zuidelijk Flevoland
Enclosure 4 **A. Ship with inventory**
B. Longitudinal section
C. Cross sections

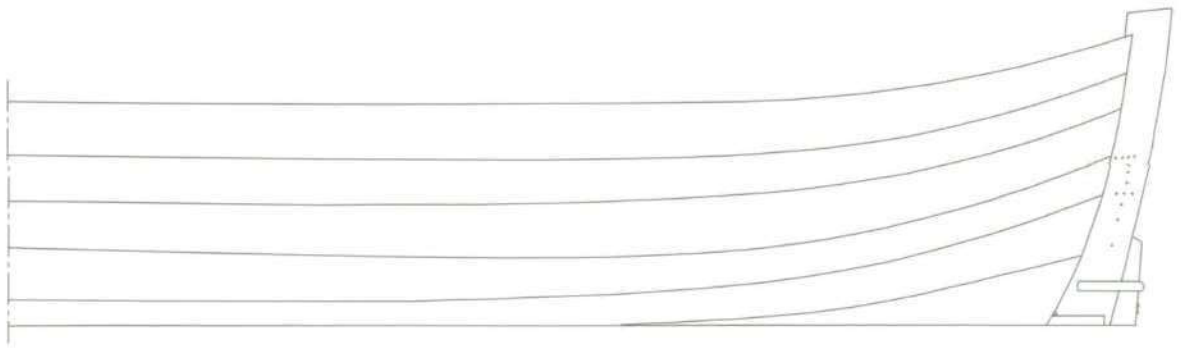
A. Strake Diagram
scale 1 : 50



Inside view

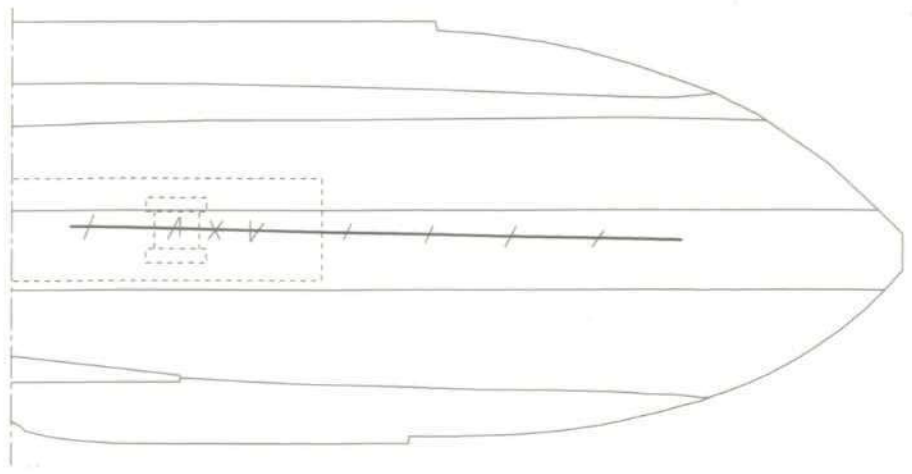


Top view

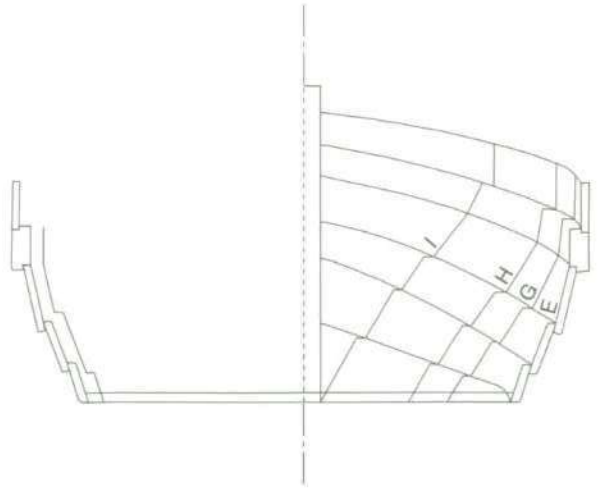


Outside view

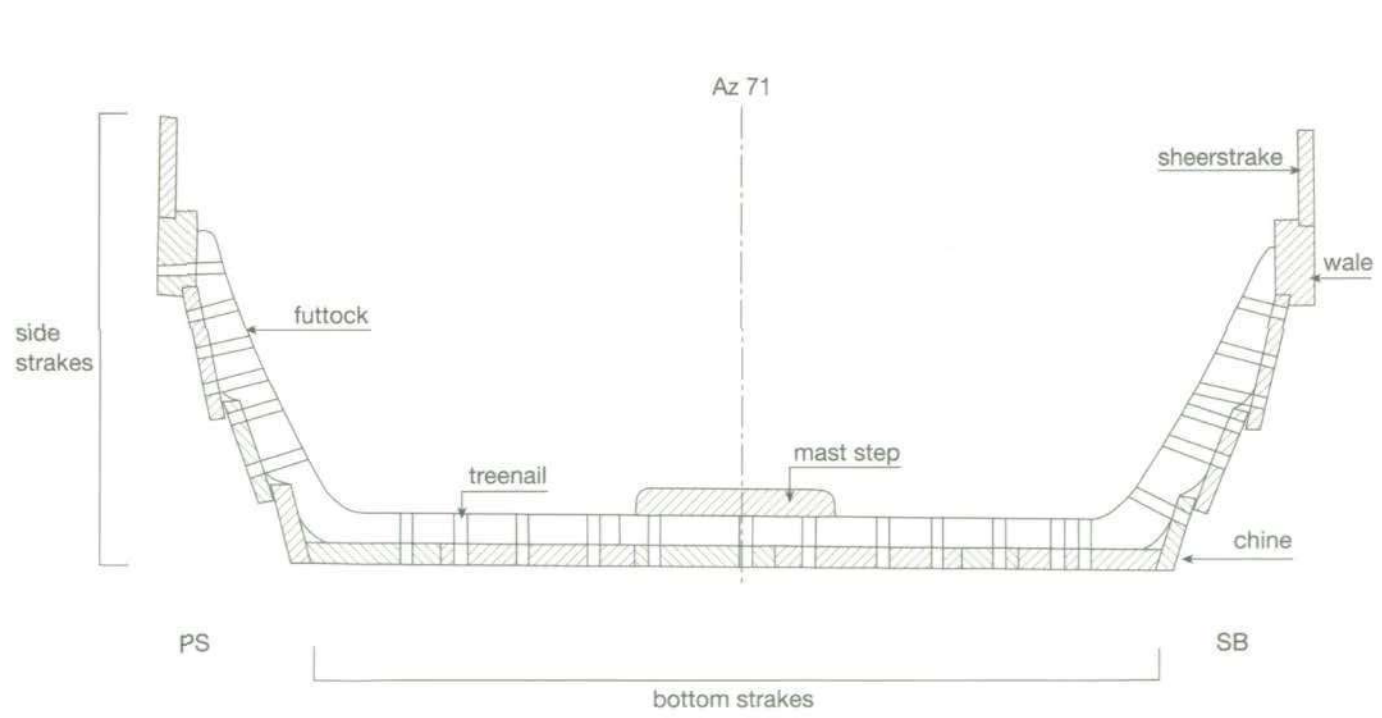
B. Bottom planks and marks
scale 1 : 50



C. Cross sections
scale 1 : 50



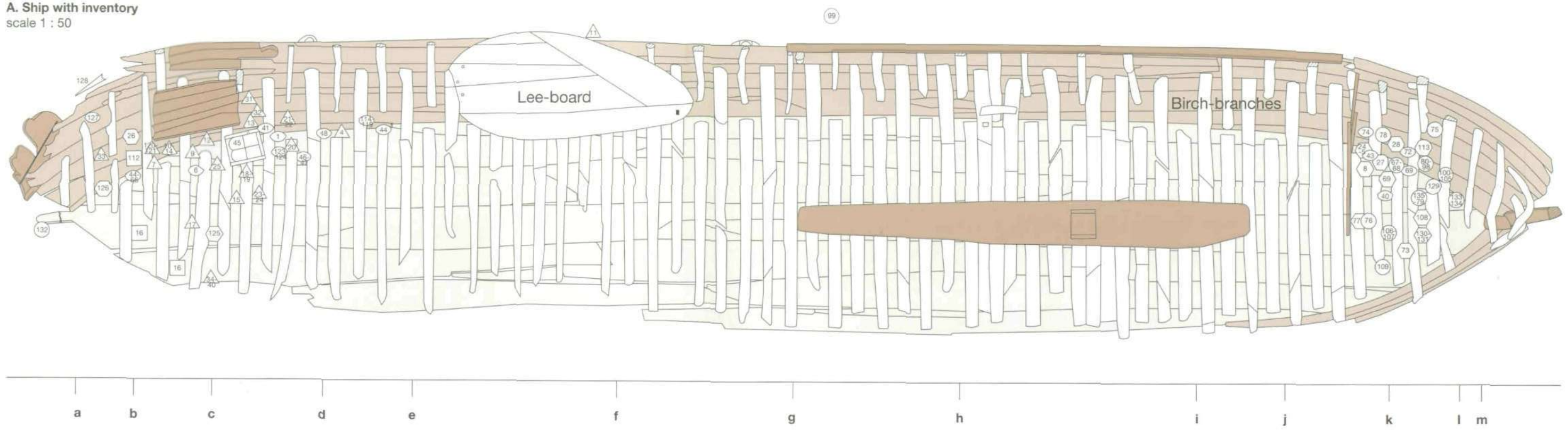
D. Main frame
scale 1 : 25



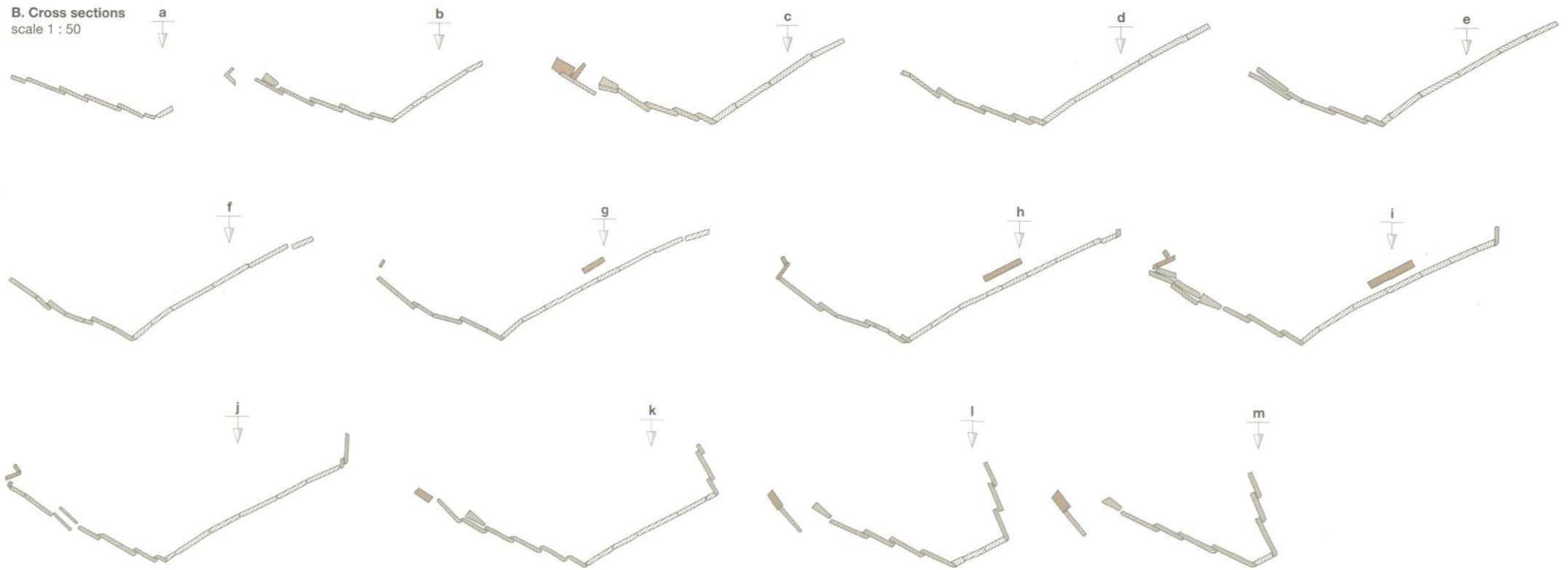
Az 71

Two prams of the eighteenth century
Excavation on lot AZ 71 in Zuidelijk Flevoland
Enclosure 5 **A. Strake diagram**
B. Bottom planks and marks
C. Cross sections
D. Main frame

A. Ship with inventory
scale 1 : 50



B. Cross sections
scale 1 : 50



A. Ship with inventory
scale 1 : 50

- timbers
- stem, bulkhead, mast step, covering board, coaming, ceiling and rudder
- bottom planks
- side shell
- end grain

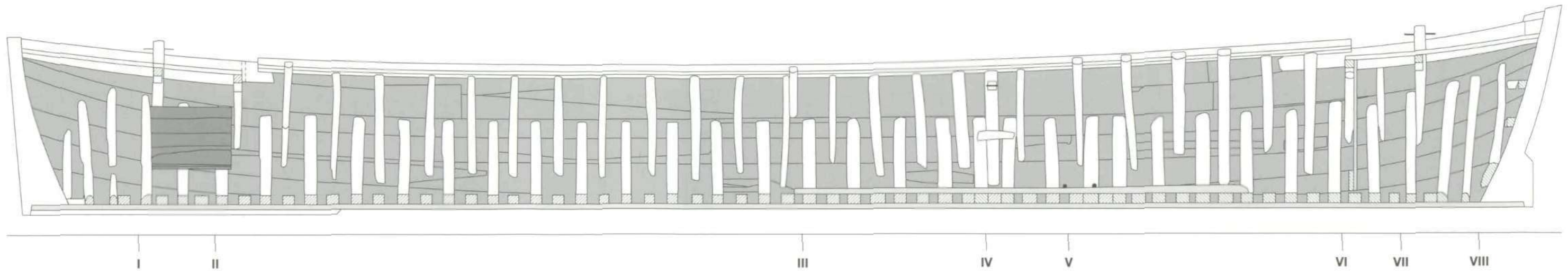
Legend of function categories

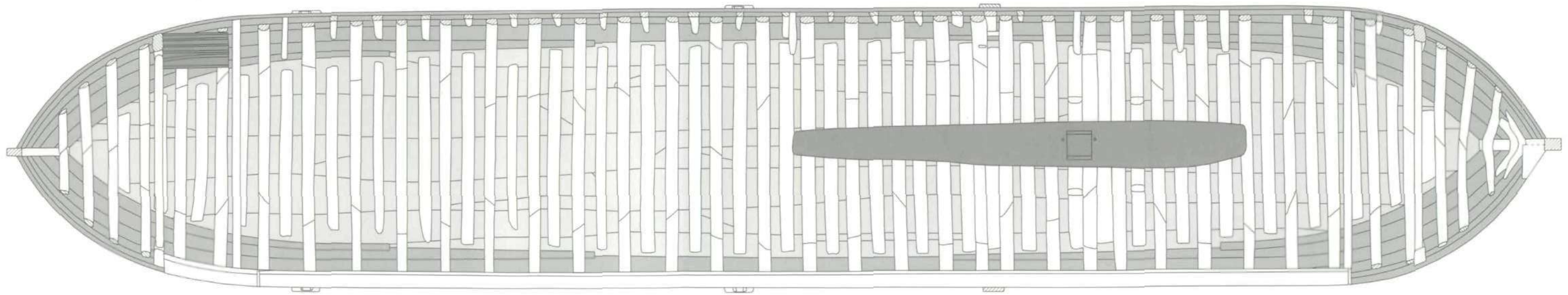
- ship's equipment (1)
- working equipment (2)
- documents and stationary (4)
- navigational equipment (5)
- tools (6)
- domestic effects (7)
- galley utensils (8)
- eating and drinking gear (9)
- *victuals* (10)
- personal possesions (11)
- cargo (12)
- non-related artefacts (13)

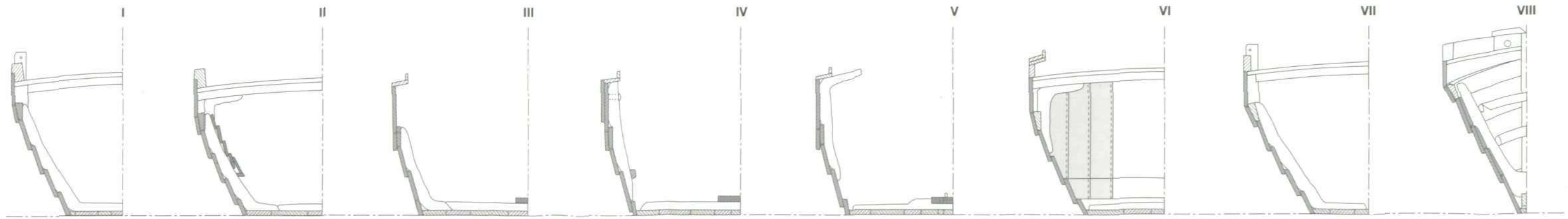
B. Cross sections
scale 1 : 50

- bottom strakes (end grain)
- side strakes (end grain)
- mast step, covering board and coaming (end grain)

Two prams of the eighteenth century
Excavation on lot E 14 in Oostelijk Flevoland
Enclosure 1 **A. Ship with inventory**
B. Cross sections







A. Longitudinal section
scale 1 : 50

- bottom strakes, bulkhead
- mast step, ceiling
- side strakes
- end grain
- timbers, stem, stern, decks, covering board and coaming

B. Top view
scale 1 : 50

- bottom strakes, bulkhead
- mast step, ceiling
- side strakes
- end grain
- timbers, stem, stern, decks, covering board and coaming

C. Cross-sections
scale 1 : 50

- bottom strakes, bulkhead
- mast step, ceiling
- side strakes
- end grain
- timbers, stem, decks

Two prams of the eighteenth century
Excavation on lot E 14 in Oostelijk Flevoland
Enclosure 2 reconstruction

A. Longitudinal section
B. Top view
C. Cross-sections

Two prams wrecked

Kathleen McLaughin-Neyland and Bob Neyland

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