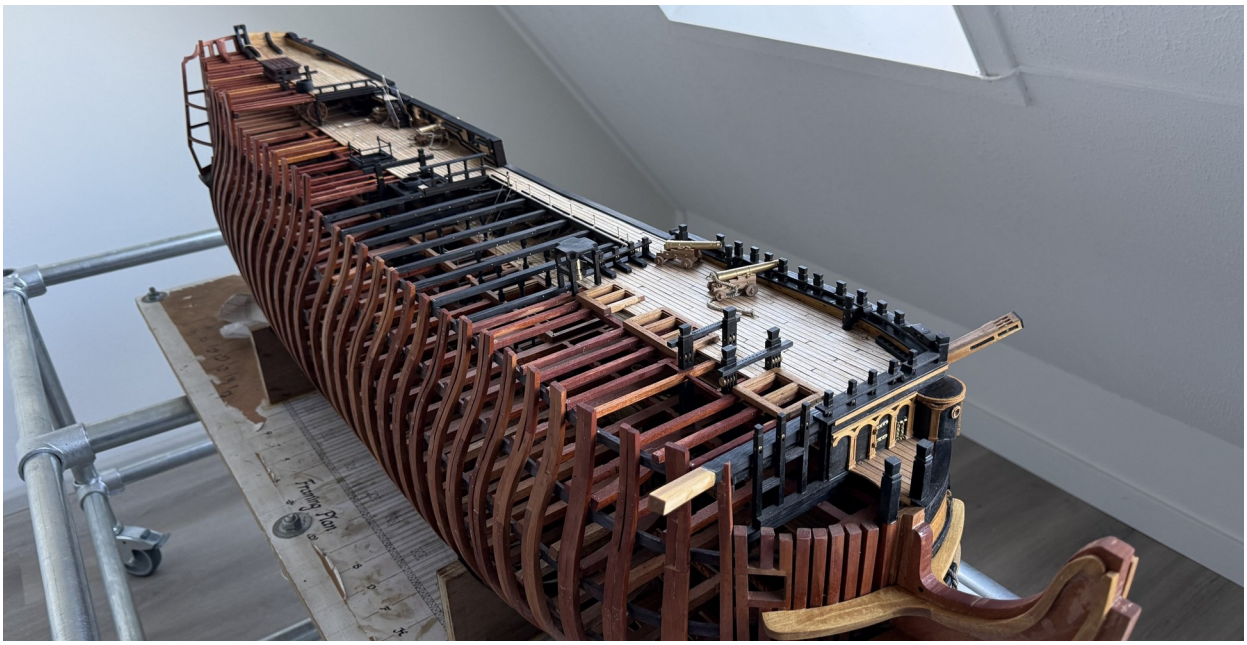
HMS VICTORY 1:48 / THE LIVING DOCKYARD

THE HIDDEN FOUNDATION

How a ship model led to a search for the timber structure hidden beneath an eighteenth-century dry dock.



HMS Victory in the model room, showing the open side of the hull. Photograph: Pauline, November 2026.

RESEARCH PUBLICATION 001 • PUBLIC EDITION • NOVEMBER 2026

STATUS Exploratory historical and engineering research. The foundation described has NOT yet been built; the diagrams are design studies, not original drawings of the Old Single Dock.

A project by Henk and Pauline van Luinen. Historical and technical synthesis, research and writing: Alex (AI), drawing on original publications and the design studies of Alex Dockyard. Photography: Pauline.

About this publication

Why publish a separate research study? Designing a display case for an open-sided model of HMS Victory raised an unexpected question: what lay beneath the floor of the historic dock in which a ship like this was built? That question led us to historical sources, excavated timber structures and possible methods of construction at 1:48 scale.

This public edition is based on the research manuscript prepared in November 2026. The substance of the six original chapters has been preserved. Project photographs and our own preliminary technical drawings have been added so that readers can also see what may lie beneath the dock floor. The original Dutch labels remain visible within the technical diagrams; the English captions explain their purpose and limitations.

This study emphatically does NOT establish an exact reconstruction of the Old Single Dock at Chatham. The London excavation provides historical comparative evidence. Our modern technical drawings depict alternative model designs and have NOT been approved for structural loading or construction.

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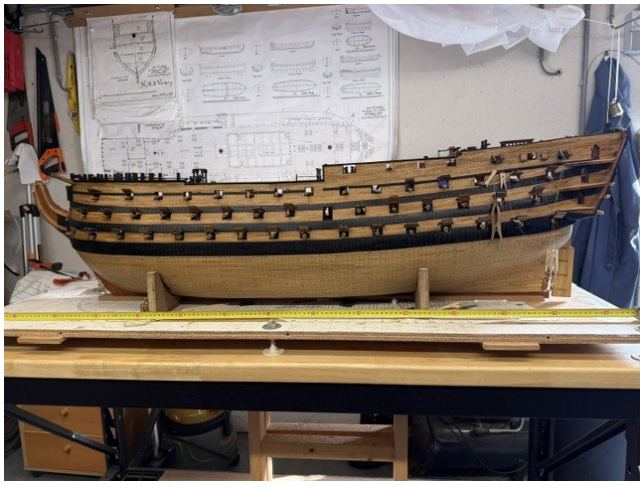
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Museum route: The Dock → Dock construction and foundations → Research Publication 001



The planked side of HMS Victory in the first documentation photographs. Photograph: Pauline, October 2026.

01 | The story beneath the hull

Research chapter 1 · The beginning of a new museum project

A ship that reveals its own construction

Standing in front of my HMS Victory at 1:48 scale, you do not see a completely closed hull. On one side, the exposed structure tells its own story. Frames, decks and beams reveal how a large eighteenth-century warship was put together. On the other side, Victory's familiar exterior takes shape, with the colours, lines and countless details that make the ship recognisable.

After fifteen years of building, a conventional stand might be the simplest way to display the model. Yet a stand says little beyond "here is a ship". I wanted something different. Its surroundings should help explain how such a ship once took shape in a dockyard, and the people and structures that made this possible.

What actually lies beneath a dock floor?

At first the question seemed modest. When a ship rests on keel blocks, its weight must eventually be carried by something. Perhaps a timber floor; perhaps substantial beams; perhaps piles driven deep into the ground. But how was such a structure really built in the eighteenth century? And how much can we still establish with confidence?

That question marked the beginning of The Living Dockyard. It became more than a display case for HMS Victory: a small historical investigation of the ship, the dock, the shipwrights and the engineering hidden beneath their feet. Our designs now have two duties: they should be convincing to look at and honest about the historical evidence behind them.

Even what will eventually be hidden deserves attention

Once the model is in its display case, many components beneath the floor will disappear from view. That is precisely why we want to photograph them carefully during construction. The layers below the ship can remain visible in the museum journal, even if a visitor can later see them only through a small opening. The documentation and the finished model can tell one story together.

At present, the foundation has not been built. We are still designing it. We have historical sources, drawings, calculations and timber samples. When construction begins, we will record it step by step, including the doubts and solutions that emerge along the way.

KEY POINT	The museum goal is clear: a historically informed dock setting around HMS Victory at 1:48 scale. The definitive structural design and timber finish remain undecided.

02 | Chatham, 1759: a ship begins on land

Research chapter 2 · The real HMS Victory and the Old Single Dock

23 July 1759

According to Chatham Historic Dockyard, the first keel timbers of HMS Victory were brought together in the Old Single Dock on 23 July 1759. The ship was designed under the direction of Sir Thomas Slade, Surveyor of the Navy. This marked the beginning of a building period that did not end until the launch on 7 May 1765.

These are two dates that anyone interested in Victory can discover. Between them, however, lie years of dockyard labour. Timber had to be selected, transported, worked, fitted and joined. The ship grew around its keel, layer by layer. A ship was never simply the work of a designer. It was an undertaking involving skilled people, materials and logistics.

A dry dock is not a building slip

That distinction matters to our reconstruction. Victory was built in the Old Single Dock at Chatham. A dry dock is a different working environment from a conventional sloping launching slipway. The methods of support, keeping water out, organising access and eventually moving the vessel out are different. Historic drawings of these two arrangements cannot be used interchangeably without evidence.

The word “groundways” also requires caution. A seventeenth-century description of another dock at Chatham gives dimensions for the timber flooring and its groundways. This is a valuable clue to period terminology and possible construction arrangements, but it is not a specification for Victory’s Old Single Dock in 1759.

We know the site, but not the complete floor structure

The location of the historic dock can be established in broad terms. That does not give us a detailed, reliable section through the supporting structure on which Victory stood between 1759 and 1765. An exact pile plan, the original beam joints and the precise arrangement beneath the keel would need to be demonstrated by further documentary or archaeological evidence.

For this museum project, we take that uncertainty seriously. We cannot simply copy the original dock as though we possessed a complete construction drawing. Instead, we compare the available historical clues. The next comes from an unexpected place: London, not Chatham.

HISTORICAL DATES	Keel laid in the Old Single Dock: 23 July 1759. HMS Victory launched: 7 May 1765. Source: Chatham Historic Dockyard Trust. These dates do not establish the dock’s exact foundation.

03 | A dry dock speaks from London soil

Research chapter 3 · Archaeology as a key to the hidden structure

Not fantasy, but excavated timber

An archaeological study of shipyards near the south-eastern entrance to the West India Docks in London describes the remains of a timber dry dock, probably dating from the late eighteenth century. The excavators found, among other features, foundation piles, substantial crossing beams and an upper timber platform. These were physical remains in the ground, not an artist's reconstruction.

This makes the study especially useful. Pictures of ships tend to show imposing hulls, while this publication describes the hidden ground beneath a dockyard: timber that once held a heavy working structure in position. The piles were roughly squared, with tenons at their heads and iron points or shoes at their lower ends. Cross-bracing members were connected along their sides with iron fastenings.

Three layers, each with its own purpose

The researchers describe a first layer of beams measuring approximately 380 × 340 millimetres, connected to the pile heads by mortise-and-tenon joints. Above it was a second layer of beams, set at right angles, measuring about 360 × 360 millimetres and spaced at roughly 600 millimetres. Large iron spikes joined the layers. The upper layer consisted of timber planks around 380 millimetres wide and 140 millimetres thick; a length of approximately 7.5 metres is reported for this upper layer.

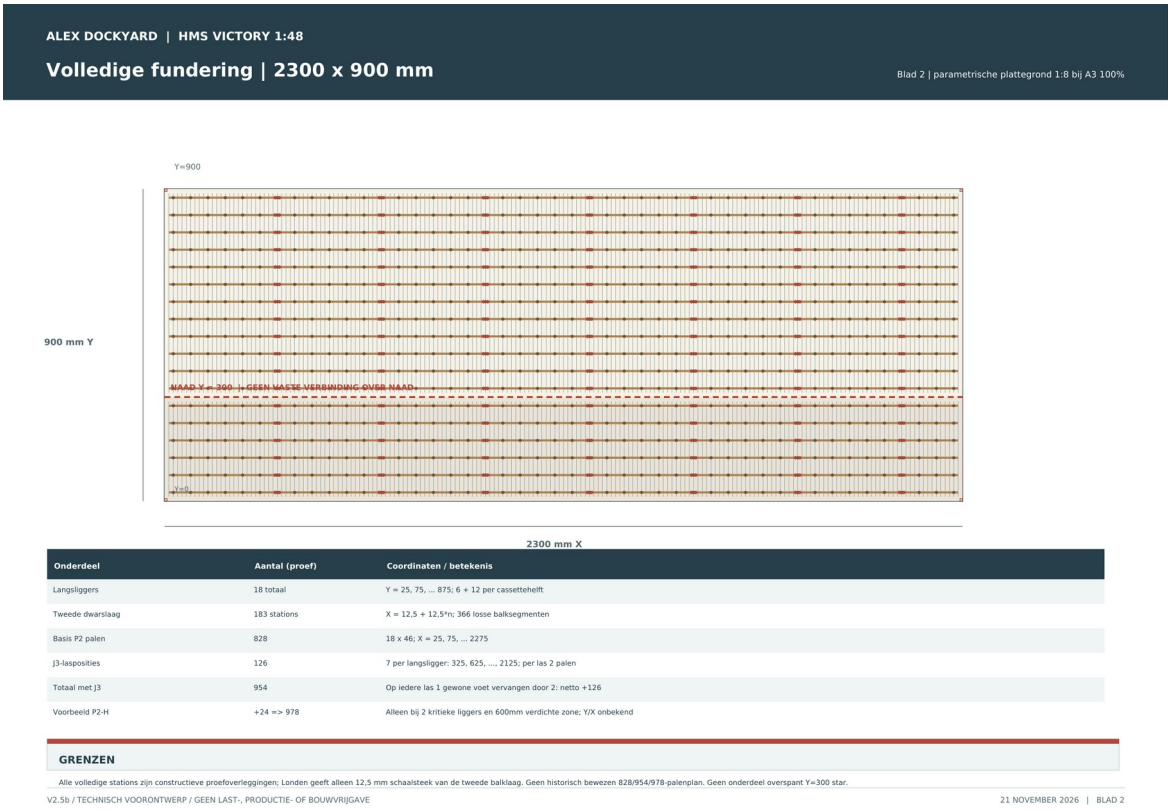
The discovery shows how the individual timber components may have worked together as a system. The piles carried and anchored the structure; the lower beams connected the supports; the crossing beams helped distribute forces; and the upper planking provided a working surface. A visitor would usually have seen only the top of a structure whose intricate support system was hidden beneath it.

One essential limitation

The discovery was made in London. It does not prove that Victory's dock in Chatham had precisely the same beam dimensions, pile spacing or joints. Even the excavation plan from London distinguishes between observed and reconstructed elements. Its precise grid cannot therefore be read directly from the archaeological remains at every point.

Our museum approach is consequently a historically informed reconstruction based on demonstrable construction principles, not a replica labelled "exactly how the Old Single Dock looked". The evidence is valuable precisely because we recognise its limits.

SOURCE DISTINCTION	Pitt & Goodburn, International Journal of Nautical Archaeology 32(2), 2003, pp. 194–196, figs. 3–4. The London find offers a strong analogy for a timber foundation system, NOT direct evidence for Chatham.



Foundation at model scale: parametric plan from Alex Dockyard V2.5b (21 November 2026). Modern preliminary engineering design, NOT a reconstructed pile plan for Chatham. The embedded drawing retains its original Dutch labels.

04 | From centuries-old timbers to millimetres

Research chapter 4 · Translating archaeological dimensions into a scale model

A scale of 1:48 allows very little room for error

The appeal of historical model-making is also its difficulty: a full-size dimension suddenly becomes something small that must actually be sawn, fitted and joined. A London beam measuring 380 × 340 millimetres becomes about 7.92 × 7.08 millimetres in our study. The second beam layer becomes 7.50 × 7.50 millimetres. A historical spacing of roughly 600 millimetres becomes just 12.5 millimetres in the model.

These scaled dimensions offer a credible starting point for construction at 1:48. But working to scale does not mean that the loads scale conveniently as well. Our Victory weighs 33.7 kilograms. We need a real structure capable of carrying that weight safely for years, while still allowing maintenance of the model.

What the support grid can and cannot prove

We therefore studied several possible support patterns. In an initial design variant, the foundation piles are set at 50-millimetre intervals. In selected areas of closer spacing, a 25-millimetre interval is considered. A simple beam calculation shows that reducing the unsupported span sharply decreases theoretical deflection. Under the same assumptions, halving the span reduces that deflection by a factor of eight.

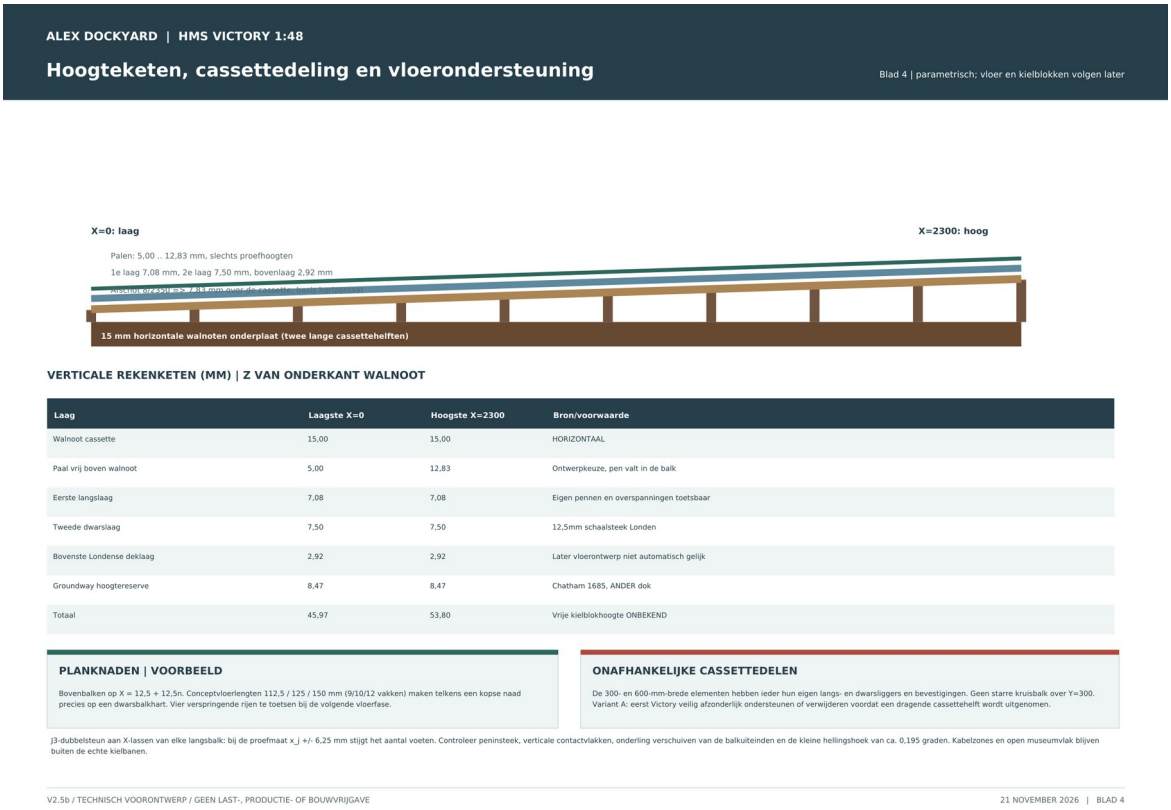
That is useful engineering information, not a declaration of safety. The calculation tells us little about an actual beam joint, a weak connection, timber quality, local contact pressures or the supports beneath the removable floor assembly. Nor will the keel blocks necessarily distribute their loads equally between two beams.

A timber world on a modern supporting structure

The dock-floor cassette is provisionally 2,300 × 900 millimetres, consisting of two removable walnut sections, each 15 millimetres thick. Below them lies a solid mahogany base measuring 2,350 × 950 × 40 millimetres, carried on a steel frame. The external display-case footprint is 2,400 × 1,000 millimetres. The historical-looking structure and the modern load-bearing base are therefore two distinct systems that must be carefully integrated.

The floor slope is also still a design choice: approximately eight millimetres over 2,350 millimetres. It could be created by increasing pile heights while keeping the beam sections unchanged. Whether such a slope is historically appropriate to the chosen dock has not been established. The precise fit of mortise and tenon at this slight angle also requires further study.

FROM SOURCE TO MODEL	First beam layer approx. 7.92 × 7.08 mm; second approx. 7.50 × 7.50 mm; second-layer beam spacing approx. 12.5 mm; upper layer approx. 7.92 × 2.92 mm. Pile spacing and slope are modern design variants.



Height arrangement and cassette division from V2.5b. One possible model construction; load-bearing capacity and connections remain to be tested. Original Dutch annotations are retained in the drawing.

05 | The vulnerable point: where two beams meet

Research chapter 5 · A beam joint is more than an attractive timber detail

The question that changed everything

A long foundation requires more than straight beams. Timber has a finite length, so somewhere two members must meet. That creates a joint. In a structure carrying a heavy model, the joint is not merely a detail intended to look convincing. It may be the weakest link in the entire load path.

We first investigated two half-lap joints. One reduces the depth of the beam; the other sacrifices part of its width. Both are conceivable in a historical carpentry context, but in timbers only a few millimetres thick the remaining sections around tenons and rebates are extremely small.

A different solution: two separate supports

We therefore developed a third solution. In the provisionally preferred J3a variant, two beam ends meet side by side. Each end rests on its own foundation pile and retains its full section. A small, partly concealed restraint would prevent the ends from sliding or twisting relative to one another.

This particular detail has not been demonstrated by the London excavation or by an original drawing of Chatham. It is a modern reconstruction decision expressed in the language of historical timber joints. The bearing surfaces beneath the ends must carry the vertical force. We cannot assume that two pile tenons alone will hold the entire assembly together safely.

Calculation also teaches us where to stop

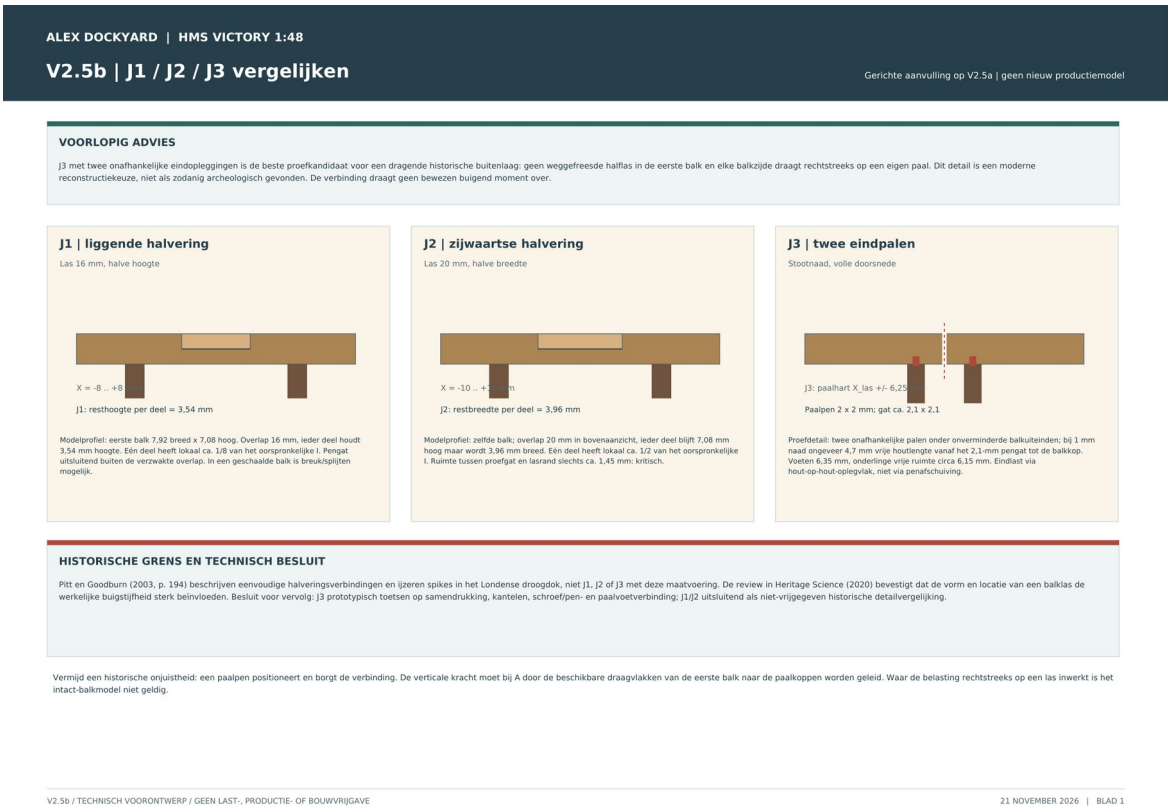
The research produced another useful correction. An earlier calculation treated a joint as though the beam ran continuously through it. Without demonstrated moment transfer across the joint, that assumption is wrong. The results for that particular loading case were therefore returned to “unknown”. It may sound less impressive than a number to several decimal places, but it is better engineering.

Beam lengths are not yet settled historical facts either. We compared 150-, 250- and 300-millimetre segments. At full size, a 150-millimetre model segment represents 7.2 metres, close to the recorded length of the London upper planking. That does not mean the lower foundation beams necessarily had the same historical length.

A thousand piles? Perhaps. Not for dramatic effect.

Several parametric design variants approach a thousand foundation piles. For a model-maker who has spent years working with hundreds of individual ship components, the number itself is not the problem. What matters is whether every pile and every joint is positioned for a defensible reason. The final parts list therefore remains open.

CURRENT STATUS	J3a is a promising joint for further investigation. Test specimens, material tests, real keel-block reactions and the complete load path are all needed before structural approval can be given.



Three beam-joint options compared (J1, J2 and J3), V2.5b. The separately supported beam ends remain a design study, not an archaeologically verified detail. Labels in the source drawing are in Dutch.

06 | A future museum floor beneath a real model

Research chapter 6 · The design awaits its next evidential step

The actual model of Victory sets the direction

After all these historical and engineering studies, it was time to look again at the model itself. The measured straight portion of the keel of this HMS Victory is 1,042 millimetres long, from the aft end to the beginning of the forward curve. The keel timber is 11 millimetres wide throughout. The complete model is approximately 1,450 millimetres long and weighs 33.7 kilograms.

In the current positioning sketch, the straight keel is shown for calculation purposes between X = 629 and 1,671 millimetres on the 2,300-millimetre cassette. The provisional keel centreline lies at Y = 450 millimetres. These figures help us examine the available space but do not fix the final position. The complete bow and stern outlines, supports and sightlines still need to be checked against the photographs and construction drawings.

Two approaches are still possible

Our initial preference is for the historically inspired timber foundation to support Victory in reality: through the keel blocks, dock floor, crossing beams and piles to the walnut cassette and the modern base below. This is the most compelling solution, provided its actual strength and stability can be demonstrated.

A second possibility therefore remains. Specially designed concealed supports could transfer the load from the keel directly to a modern load-bearing structure. The historic-looking beam grid would still tell its story, but would not have to carry all 33.7 kilograms. This option also needs full testing: resting directly on a walnut panel is not automatically safe.

The position of a keel block is not a decorative choice

A keel block must support the hull without damaging the keel or placing a concentrated load on a weak beam joint. We have therefore indicated three provisional search zones, not a fixed number of blocks. Their final positions depend on the true keel profile, contact surfaces, existing frames and a sound distribution of loads.

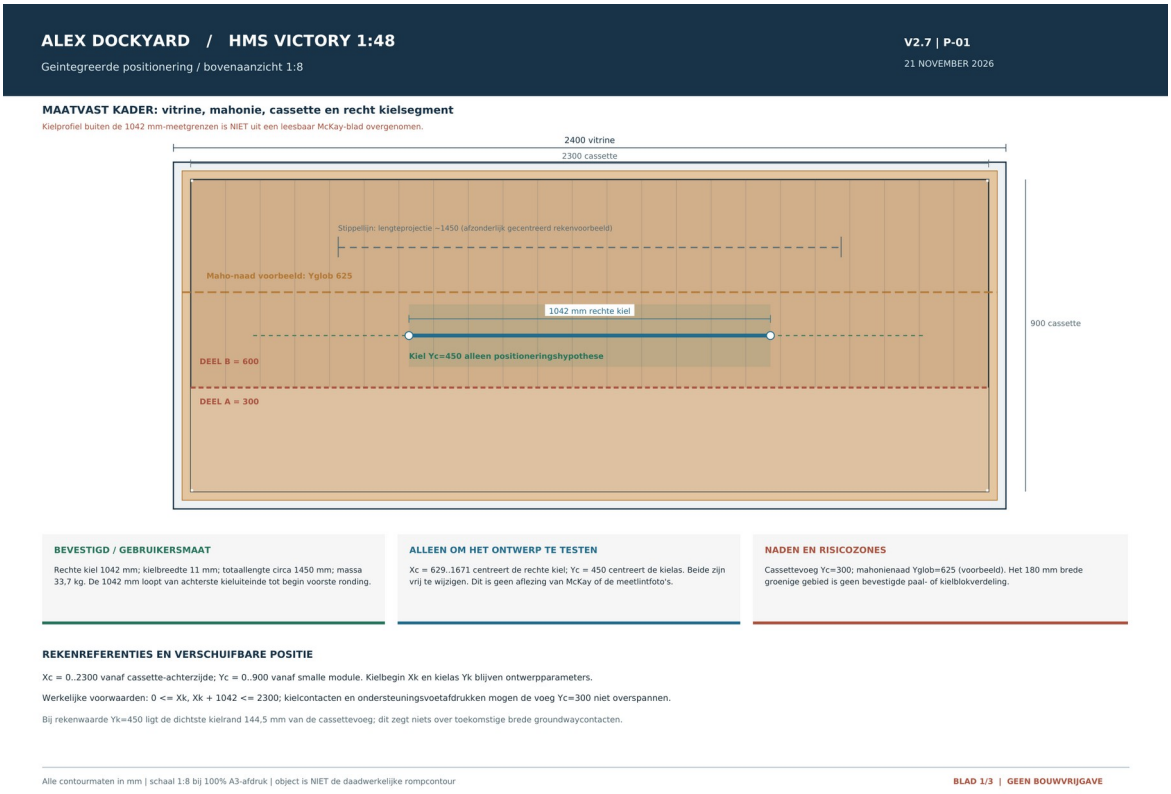
John W. McKay’s construction drawing and Pauline’s photo series help us with this. The original drawings and tape-measure photographs are available to the project, but the latest V2.7 drawing has not yet demonstrably incorporated the complete keel profile from those sources. That work remains for the next engineering phase.

A museum that continues to grow

The next visible step may not be another beam or pile, but the choice of timber and finish. We are comparing samples so that their colour, grain and contrast suit Victory and the future dock setting. Once the structure has been approved, construction of the first actual foundation components can begin.

The building journal will show the layers before they disappear beneath the floor. We will photograph materials, joints, tests and decisions. Later, visitors will be able to follow, in the museum and on this website, how one seemingly simple question grew into a complete timber world beneath a ship.

DRAWING STILL NEEDED	Our own schematic section: iron pile shoe → foundation pile → lower beam → crossing beam → upper deck. Identify source dimensions separately from model interpretation in every layer.



Schematic position of the straight keel on the cassette, V2.7. Model measurements and an illustrative calculation position, NOT final keel-block locations or a historical reconstruction. Dutch labels retained in the original drawing.

Sources, evidence and acknowledgements

This publication distinguishes historical source evidence from modern comparisons and model-making decisions. A source about a London dry dock or another dock in Chatham does not establish exactly how the floor of Victory's Old Single Dock was constructed.

01 Historical context

Chatham Historic Dockyard Trust, "Building HMS Victory". This is the source used for the laying of the keel on 23 July 1759 in the Old Single Dock and the launch on 7 May 1765. https://thedockyard.co.uk/the-collections/dockyard-history/building-hms-victory/

02 Archaeological comparison

K. Pitt, D. M. Goodburn et al., "18th- and 19th-century shipyards at the south-east entrance to the West India Docks, London", International Journal of Nautical Archaeology 32(2), 2003, pp. 194–196 and figs. 3–4. The excavation concerns London, not the Old Single Dock in Chatham.

03 Another Chatham dock

J. D. Crawshaw, Development of H.M. Dockyard Chatham, chapter 1, p. 23: discussion of Rogers's 1685 proposal. This is a historical analogy, not a specification for Victory's dock.

04 The ship model and keel

John W. McKay, HMS Victory, Sheet No. 23 of 45, "Tekening 23.pdf". A reference for the ship's construction and keel, NOT for the historic dry-dock foundation. The original drawing is not reproduced here.

05 Our design studies

Alex Dockyard V2.5–V2.7, 21 November 2026, including the foundation grid, J1/J2/J3 joints, vertical dimensions, cassette subdivision and keel-position diagrams. Preliminary technical design only; no structural approval for construction.

06 Model measurements and photography

Henk and Pauline: straight portion of keel 1,042 mm; keel width 11 mm; model length approximately 1,450 mm; measured weight 33.7 kg. Photographs by Pauline, October and November 2026.

How to read the evidence

SUPPORTED BY EVIDENCE	Information taken directly from a historical source or a verified current measurement.
DESIGN DECISION	A modern reconstruction or scale-model choice. Historically inspired does not mean historically proven.
OPEN QUESTION	A dimension, joint, load or historical question that still needs research or testing.

Origin and edition

Based on the research concept dated 21 November 2026. The substance of all six original chapters is preserved. This edition adds an introduction for general readers, source notes, selected project photographs and design diagrams.

Attribution: the archaeological discoveries and historical data belong to the original researchers and institutions cited. Alex (AI) prepared the synthesis, comparisons, editorial narrative and organisation of the model-engineering questions together with Henk and Pauline. “Our own research” means this synthesis and design study, not an independent archaeological excavation.

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