HMS Victory Conservation Programme Plan

Report No. 2

Replanking the topsides of HMS Victory –

Choice of appropriate planking and butt plan

1. Introduction

1.1. The overriding aim of the HMS Victory project is to undertake a programme of conservation to deliver a fully conserved HMS Victory, in an open environment, and in a condition to survive for 50 years without major work beyond a programme of planned maintenance.[1]

1.2. The poor state of the hull planking from bow to stern and from the weather decks to the diminishing strakes necessitates the replanking of the ship's topsides. Work is currently underway to develop a planking system that will allow the aim set out at 1.1 to be achieved. Alongside selection of appropriate timber species and caulking, fixing and coating specifications, a decision on the planking and butt patterns is necessary in order to allow planning work to proceed.

1.3. This paper has been prepared from the available sources, both modern and contemporary, in an attempt to establish the characteristics of an appropriate planking system for *Victory*. It is intended to establish the principles from which a plan for the planking of the ship's hull from the level of the main wales to the top timber line can be developed, and provide a baseline planning assumption for the Victory Technical Committee to endorse.

2. Background

2.1. When permanently dry docked in 1922, significant rot was discovered in the outer planking of HMS Victory.[2] Approximately 32 strakes of planking on each side of the ship in the region of the tumble-home were renewed in teak, but significant quantities of oak hull planking remained; as Bugler states: 'The renewal dates of the oak planking are not known, but it is very old and was secured with treenails, copper alloy dumps and copper clench bolts.'[3] At the time of writing, no planking expansion diagram from this period has been identified and so it is not possible to articulate the outer hull planking arrangement with any degree of certainty. We

[1] Wessex Archaeology, *HMS Victory, Portsmouth Historic Dockyard - Conservation Management Plan*, November 2014, para 9.1.1

[2] A.R.Bugler, *HMS Victory - Building, Restoration & Repair*, HMSO, London, 1966, p. 49.

[3] Bugler, p129.

know only that the majority of planking was worked in parallel strakes, save for the four diminishing strakes, which employed anchor stock planking.[4]

2.2. *Victory's* sides were sheathed in teak in the course of the 1922-28 restoration. This work served to fair the ship's broken sheer and reinstate the appearance of stepped wales, black strakes &c.[5]

2.3. Between 1956 and 1964, 6,800 linear feet of teak planking was fitted on the outer bottom. Some of these planks may be of laminated construction, but are believed to have been wrought on a like-for-like basis.[6]

2.4. Beginning in 1974, the topsides were subject to a programme of replacement, concluding in 2002. In this period, the majority of futtocks and all outer planking from the first of the diminishing strakes to the sheer strake were replaced. Unlike previous repair episodes, wherein individual planks had been replaced in the existing strake formation, this programme of repair dispensed with the traditional approach and employed lamination of timbers to build up the ship's side planking to the appropriate thicknesses. Although it would not be accurate to describe the resultant planking as a cold-moulded hull, the multiple layers of laminate, albeit applied on the same plane, approximate that technique. Irrespective of the timbers used in this process, experience has clearly demonstrated the lacklustre performance of such a system when applied to *Victory*, due largely to the impossibility of obtaining a weathertight seal.

3. The Conservation Requirement

3.1. In order to meet the HMSVPC's conservation requirement of a fully conserved HMS Victory, in an open environment and in a condition to survive for 50 years without major work beyond planned maintenance, total replacement of the topside planking will be necessary.[7]

3.2. A planking plan which ensures the structural stability of the ship, can be maintained in a weathertight condition, allows for an affordable and realistic maintenance regime and meets the requirements of historical authenticity must therefore be developed.

4. Selecting the appropriate conservation approach

4.1. Whilst the HMSVPC has adapted an approach which places preservation of historic fabric at the heart of the *Victory* conservation project, the outer hull planking, ranging between 15 and 40 years old, clearly cannot be subject to preservation given the aim stated at 1.1.

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[4] Bugler states ' 'The planking strakes are worked fore and aft faying with the timbers usually as parallel planks, but the anchor-stock method of planking is adopted for four strakes…from stations 34 to 122.' Bugler, p 129.

[5] Bugler, p 49.

[6] Bugler, p 130.

[7] The presence of laminated teak from 44 station to the stern on the port side was discussed at the Conservation Programme Plan meeting of 28 May 2014. All present agreed that, whilst teak is more durable than oak, the saturated nature of the current hull planking means that the teak is extremely unlikely to survive a further 50 years. Combined with the need to replace fixings and the inability to maintain the system in a cost effective manner the logical conclusion is to remove and replaced the teak laminates to meet the conservation objective.

4.2. Preservation of the hull planking, requiring the retention of existing components and the minimum introduction of new material, is demonstrably not appropriate – such an approach, whilst failing to acknowledge the seriously degraded nature of the topsides planking, would also be at odds with the guiding conservation principle that the retention of fabric in the structure should not pose a significant risk to the survival of the ship.

4.3. It is proposed, therefore, that the approach to the planking of the ship's topsides should be one of reconstruction, as defined in the National Historic Ships UK publication *Conserving Historic Vessels,* which states[8]:

- Reconstruction is appropriate only where an historic vessel is incomplete through damage, alteration or deterioration and only when there is enough evidence to reproduce an earlier state of the fabric.
- Traditional techniques and materials are preferred in reconstruction and any departure from this need to be carefully justified.

4.4. The ship's topside planking is incomplete due to deterioration, fulfilling NHSUK's first requirement. This paper is intended to demonstrate compliance with the second requirement by establishing that there is sufficient evidence to permit an authentic planking pattern to be reconstructed. The issues around techniques and materials will be dealt with in separate papers.

5. Selection of an appropriate reconstruction date

5.1. HMSVPC's approach to the conservation of HMS Victory is predicated upon the concept of significance and the protection of significant fabric.[9] Whilst no historic period is automatically regarded as more significant than another, it would be disingenuous not to acknowledge that the previous 90 years have seen *Victory* reconstructed to present the appearance of the ship at Trafalgar.

5.2. The ship's form, layout, presentation and decorative appearance have been modified in order to depict a first-rate ship at the time of the Battle of Trafalgar. It is proposed that any scheme to reconstruct the topside planking should be based upon a hull planking plan appropriate to the existing hull form i.e. as the ship appeared subsequent to the 1800-1803 great repair. To attempt to develop a planking plan as appropriate to the ship when first launched in 1765, repaired in 1814 or dry-docked in 1922 would succeed only in delivering a pastiche of historic shipbuilding styles.

6. Hull planking circa 1803

6.1. The approach to hull planking between *Victory's* floating out in 1765 and the end of her seagoing service in 1812 appears to have varied little.[10] '*The Elements and Practice of Naval Architecture'* by David Steel was first published in 1805, and provides thorough details of the dimensions and arrangements necessary to construct the many and varied types of vessels required by the Royal Navy. The following planking descriptions are sourced from that publication.

[8] Conserving Historic Vessels, p.147.
[9] See Guiding Conservation Principles, HMS Victory CMP and Conserving Historic Ships for further details.
[10] See Goodwin 'The Construction and fitting of the sailing man of war 1650 – 1850' and Lavery 'Building the Wooden Walls'

6.2. General observations on planking:

- Three whole planks should be wrought between every two planks, and all planks should over launch by six feet. One of the butts of the three planks between should have a double shift.
- The plank length required for the above system is 24 feet. This was the typical length of all English oak planks used for the RN.
- East country plank, used on the bottom of the ship and at the level of the sheer strakes (save for behind the channels) was typically 30 to 50 feet in length.
- The planking of the topside was generally wrought in parallel breadths about 8 inches broad (or thereabouts).
- No butt was placed over or under a port unless there were two planks between.
- Abaft the mainmast, a three port shift of butts was required, elsewhere two sufficed.
- The preference was always to butt planks between ports; a butt shift of five feet six inches where a plank comes between or five feet where two come between the butt and the level of the port being acceptable. Where a strake was immediately below a port, a shift of not less than six feet was required.
- Channels and sheer wales, in large ships, should work down to the stops of the ports in mid-ships
- Forward, the planks should be worked so that the seam comes to the middle of the hawse hole
- The sheer strakes were judged to be the greatest strengthener of the topsides. The butts were to be dispersed so as to have the greatest strength between the drifts and the best shift to one another.

6.3. Wales

6.3.1. The wales are bands of thick planking which provide additional strength to the ship. *Victory* carries three wales, which have commonly been referred to as, from lowest to highest, the main, middle and upper. Steel refers to main, channel and sheer wales, and it is this nomenclature which will be followed

6.3.2. The main wale was wrought anchor stock or top and butt. This system was used as it offered greater strength, but also minimised waste in the conversion process. On *Victory*, the main wale was 5’ 2” broad, 10 inches thick and consisted of four strakes.

6.3.3. Lavery asserts that ‘the wales…were left to stand out prominently from the sides of the ship until the early nineteenth century when their corners were trimmed.’ It may not be possible to establish how early the corners of the wales were trimmed, but it is suggested that the existing approach should be maintained unless other evidence arises.

6.4. Thickstuff upon the main wales

6.4.1. Above the main wale, two strakes of planking known as thickstuff were placed. As for the majority of the ship's planking, they were wrought in parallel breadths.

6.4.2. The first strake above the main wale was 8" thick and 1'1" broad. The second strake above the main wale was 7" thick and 1' broad.

6.4.3. Of this planking, Lavery states that 'there was no attempt to reduce the thickness gradually by tapering, as was done below the waterline, and there was a definite step in the timbers above the first strake of thick stuff.'[11]

6.5. Stuff between the main and channel wales

6.5.1. The planking above the thickstuff and below the channel wale was wrought in parallel breadths 5" thick and approximately 8" broad.

6.6. Channel Wales

6.6.1. The distance from the upper edge of the main wales in midships to the lower edge of the channel wales, on a perpendicular, was 4'4".

6.6.2. The channel wales were wrought in three strakes, the lower two anchor stock or top and butt and the upper, parallel. The wales were 3' Broad and 6" thick.

6.7. Plank above the Channel Wales

6.7.1. The lower edge of the first strake upon the channel wales was to be 5" thick, tapering to 4" at the top. The second strake above was to be 4" thick. This thickness was continued to the sheer wales.

6.8. Sheer Wales

6.8.1. The distance from the upper edge of the Channel Wales to the lower edge of the Sheer Wales, at midships on a perpendicular was to be 4' 0.

6.8.2. The sheer wales were 2'9" broad, 4" thick and wrought parallel in 3 strakes.

6.9. Sheer strakes

6.9.1. The distance on a perpendicular from the upper edge of the sheer wales to the top-timber line or upper edge of the sheer strakes was to be 5'7". The sheer strakes themselves were 1'8" broad, 4" thick and were wrought in parallel breadths with hook and butt scarphs, about four feet long, between the drifts. Those butts afore and abaft were square, especially behind the channels.

7. Methods of planking

7.1. Aside from the typical method of planking wrought in parallel strakes, anchor stock and top and butt methods were also used in the construction of ships.

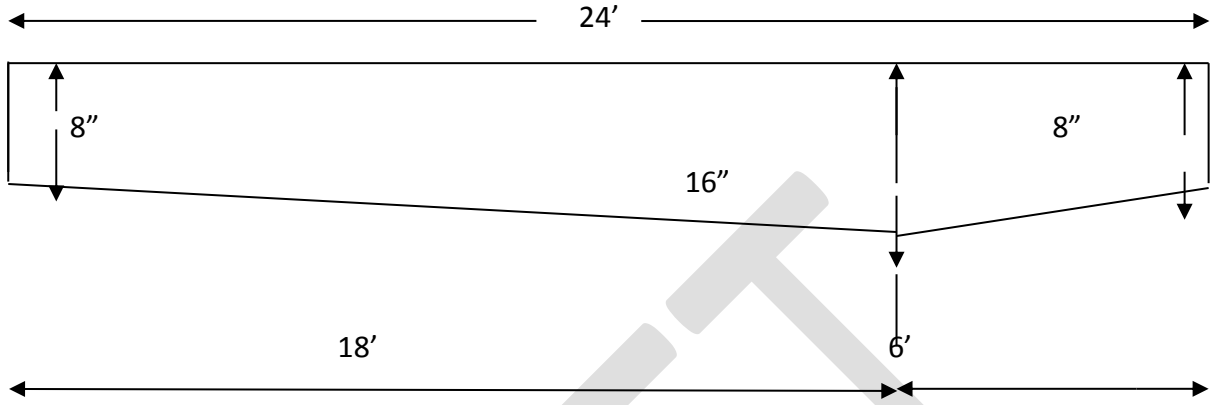
7.2. Top and Butt

7.2.1. This style of planking was used in order to maximise use of available timber and ensure strength was provided at those parts of the structure where it

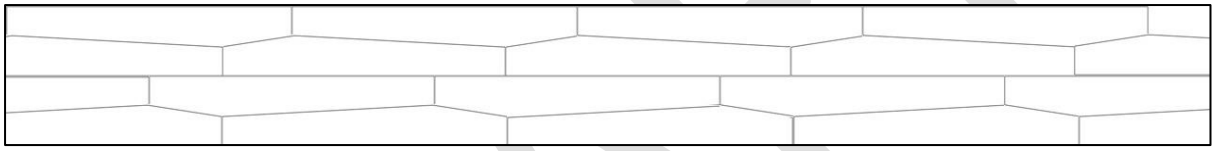
[11] Lavery, Building the wooden walls, p. 105

was required, such as the main wales, spirketting and occasionally on gun decks.

7.2.2. Each plank is formed with a straight edge, whilst the opposite side tapers from the full breadth at a point one quarter of the plank's length from one end, known as the touch, towards the butt ends which are half the width of the touch.

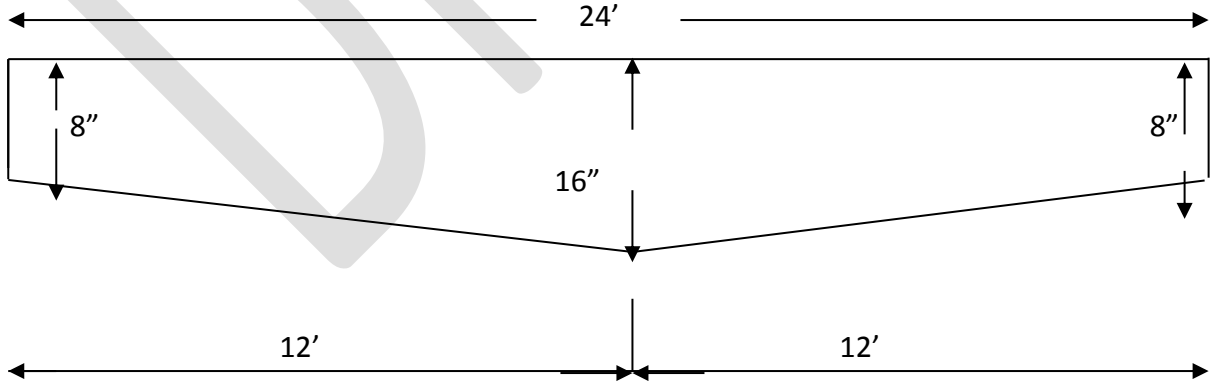


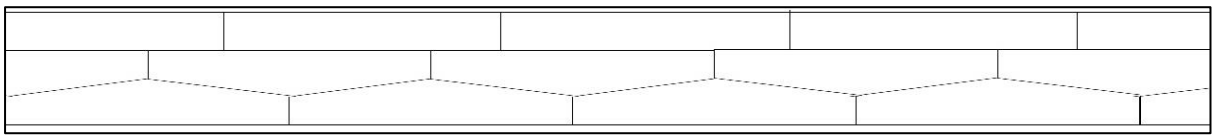
7.2.3. Top and butt planking applied to the main wales would appear as below:



7.3. Anchor Stock

7.3.1. This style of planking was occasionally used for the wales. It is similar to top and butt planking in that one side of the plank is straight whilst the other tapered, but the touch occurs at the centre of the plank as opposed to a quarter of the way along its length.





8. Proposed planking at midships

8.1. Given the above specification, a perfect planking system at midships would be as follows:

	2 sheer strakes, 1’ 8” broad in total, wrought parallel with hook and butt scarphs, 4 inches thick.
	Six strakes of planking, each strake 8” broad, 4“ thick, wrought parallel
	Sheer wales, 2’ 9” broad. 3 strakes, wrought parallel. 4” thick
	5 strakes of planking, 8” broad, 4” thick, wrought parallel
	1 strake, 8” broad, 5” at bottom narrowing to 4” at top, wrought parallel.
	Channel wales, 3’broad, bottom two wrought top and butt, topmost wrought parallel. 6” thick
	4 strakes of planking, each 8” broad, 5” thick, wrought parallel
	1 strake of planking, 1’ broad, 7” thick
	1 strake planking, 1’1” broad, 8” thick
	Main wales, 5’ 2” broad. 4 strakes wrought top and butt. 10” thick.

9. Rationalising the 'perfect' planking system against reality

9.1. Whilst differing materially from the manner in which the ship's sides are currently planked, the proposed scheme described above matches precisely the profile of the ship's planking as it exists today, i.e. position of the main, channel and sheer wales and sheer strake is identical. The difference between the two schemes focusses, therefore, on the use of historically accurate plank lengths, widths, thicknesses and shapes.

9.2. The ship's sheer has broken, and is very far from the 'perfect' sheer of 1803. Whilst the central dock wall has prevented the keel from hogging further, the movement of the last forty years has served to accentuate the distortion in the ship's structure.

9.3. Previous planking efforts have aimed to mask the distortion of the hull by adjusting the planking scheme below the level of the main wales. The wales as they exist on the ship, today, therefore, have been placed to provide an impression of sheer which the ship no longer has. The sheer has been further corrected with the replacement of the futtocks and the adjustment of the positions of the gun ports.

9.4. It is proposed that the broken sheer will continue to be masked at the interface between the main wales and diminishing strakes, where adjustments to planking are most easily made without impacting upon weathertight integrity or the ship's aesthetic qualities.

10. Recommendations

10.1. The planking and butt plan outlined in sections 6 – 8 should be adopted as the preferred planking scheme for planning purposes. A diagram of the proposed planking scheme is attached to this paper.

10.2. On selection of timber, caulking, coating and maintenance specifications for the conservation programme, a trial of the proposed planking system should be undertaken, by constructing a test section, in order to evaluate the proposed butt pattern, materials and methods.

10.3. The proposed planking system and the accompanying proposed changes to the ship should be subject to a Heritage Impact Assessment in the course of planning works, in accordance with Policy 24 of the CMP.