The Archbishop's Palace Conservation Trust

A Safe pair of hands

Replacement lintels: Supporting the masonry for 500 years

1. The need

Four of the old wooden lintels in the main Tower are in poor condition and three of them need to be replaced as a matter of urgency. This application seeks scheduled monument consent for their like-for-like replacement.

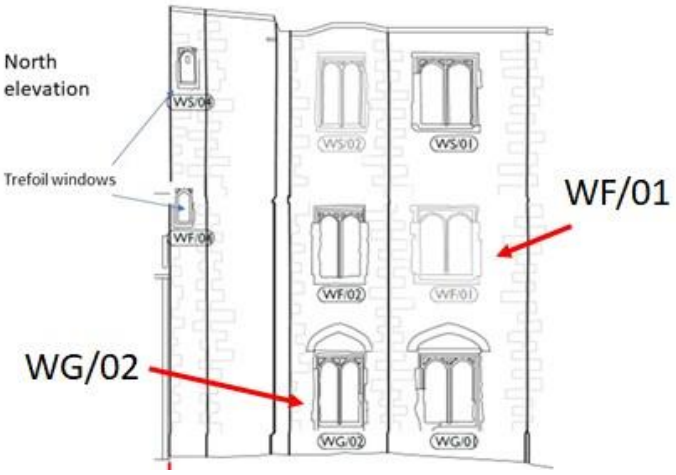

Figure 1: The North elevation of the Tower showing windows WG/02 and WF/01

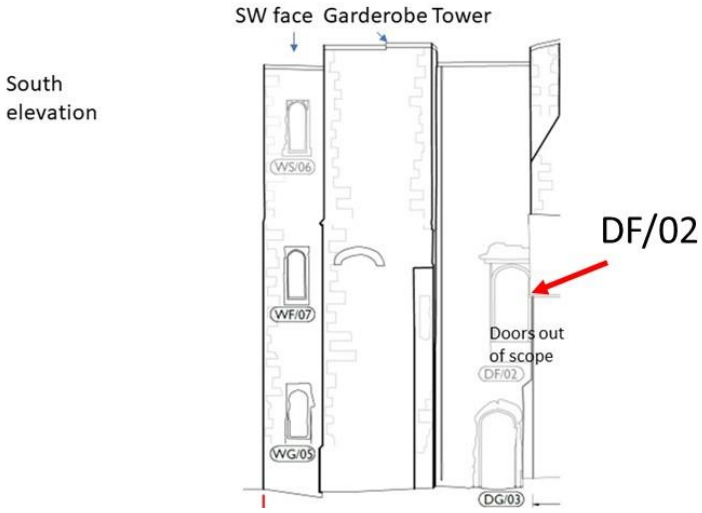

Figure 2: South elevation of the Tower showing door opening DF/02

Figure 3: Left: Window WG/02 on the ground floor. Two timber supports.

Figure 4: WF/01 on the first floor with brick infill

Figure 5: Doorway DF/02

Figure 6: Second floor fireplace

The lintel above the fireplace on the second floor is well supported by a wooden framework installed in 2017 and although it will need to be replaced in the future, this work can wait until the main stage of the restoration works in 2025-6.

2. The investigations

The structural engineer carried out an inspection of the lintels on 4th August 2022. His report concluded that "the timber lintels were likely to be providing some beneficial support to the brickwork immediately above. However, the actual condition of the timber is uncertain, and we recommend that the condition be tested by a competent carpenter drilling with for example, a 3mm diameter drill bit to assess the extent of decay. If most of the timber is found to be sound, and budgetary considerations limit action at this time, we recommend that 100mm x 50mm timber props be inserted tight up to the lintel at the bearings and centrally to maintain support as a temporary measure. "The presence of some decay is evident, and we therefore propose that the long-term solution would be a new seasoned Oak lintel of rectangular cross-section to replace the existing lintel."

The results of the test drilling were disappointing and confirmed that the lintels were about 80% rotten, and the engineer's advice was that they should be replaced without delay.

3. The plan

Acting on the advice of the structural engineer, we installed Acrow props as temporary supports for these three openings.

Figure 7: A temporary Acrow prop to support the decayed lintel

The Principal Contractor suggested the following method for replacing the lintels:

a. Install a temporary scaffold structure below each of the windows which would comprise tube and fitting based from the ground.
b. Strongboys will then be installed to support the brickwork above the arch.
c. This will require the careful extraction of mortar joints to the brickwork above the lintel.
d. A permit to load would be required post installation of the temporary works and a temporary works coordinator would be appointed.
e. The lintels could then be replaced by an experienced conservation carpenter and the temporary works removed accordingly.
f. The rotten lintels will be disposed of appropriately.

This was approved by the structural engineer and the architect and Scheduled Monument Consent was given by Historic England.

4. The replacements

The lintels are large pieces of oak, over 2 metres long, 60cm wide and 85mm thick. Each piece weighs about 100Kg!

The Archbishop's Palace Conservation Trust obtained competitive quotes from suppliers of oak in Kent and East Sussex. Round Wood of Mayfield were able to supply single pieces of air-dried timber. These were delivered to the Palace on 6th March.

Figure 8: The lintels are delivered

Before the lintels could be installed, they needed to be treated with two coats of preservative. This is a mixture of beeswax, pure turpentine and boiled linseed oil.

Figure 9: Applying the preservative mixture

JR Scaffolding erected the scaffolding on 23rd March in time for the work to start the following Monday.

Figure 10: Scaffolding for the lintel replacement - inside and outside

On closer inspection, it became clear that the proposed approach of using strongboys would not work, because the supports would interfere with the extraction and insertion of the timber. Plan B was therefore to use 'needles' – rods that go through the masonry above the lintel and support it while the lintels are removed. This support is crucial: without the lintel in place, the bricks above the window could be dislodged and, in the worst case, the whole of the wall could collapse!

Figure 11 shows the how a substantial piece of timber was fixed above the window opening and then supported by an Acrow prop at each end, well clear of the ends of the old lintel.

Figure 11: Support for the needles (visible in the right-hand image)

With the bricks above the lintel being supported, it was then possible to remove the old timbers. That revealed the extent of the decay which had not been visible earlier.

Figure 12: Removing lintel WF/01

Figure 13: Decay on lintel WG/02

Using the old lintels as templates, the new oak was cut to size and then lifted into position. Given the right saw, oak cuts surprisingly easily!

Figure 14: Sliding the new lintel for WG/02 into position

Once the mortar had hardened the support and the needles were removed and lime mortar

was injected into the holes left by the needles. The new lintels should be good for another 500 years!

Figure 15: The new lintels WF/01 and WG/02

Thanks go to the team from Pierra for their work in replacing these three lintels.

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