Cambuskenneth Abbey PIC057

Condition Assessment & Conservation Recommendations

HLM Zone 2 obs. 4

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HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

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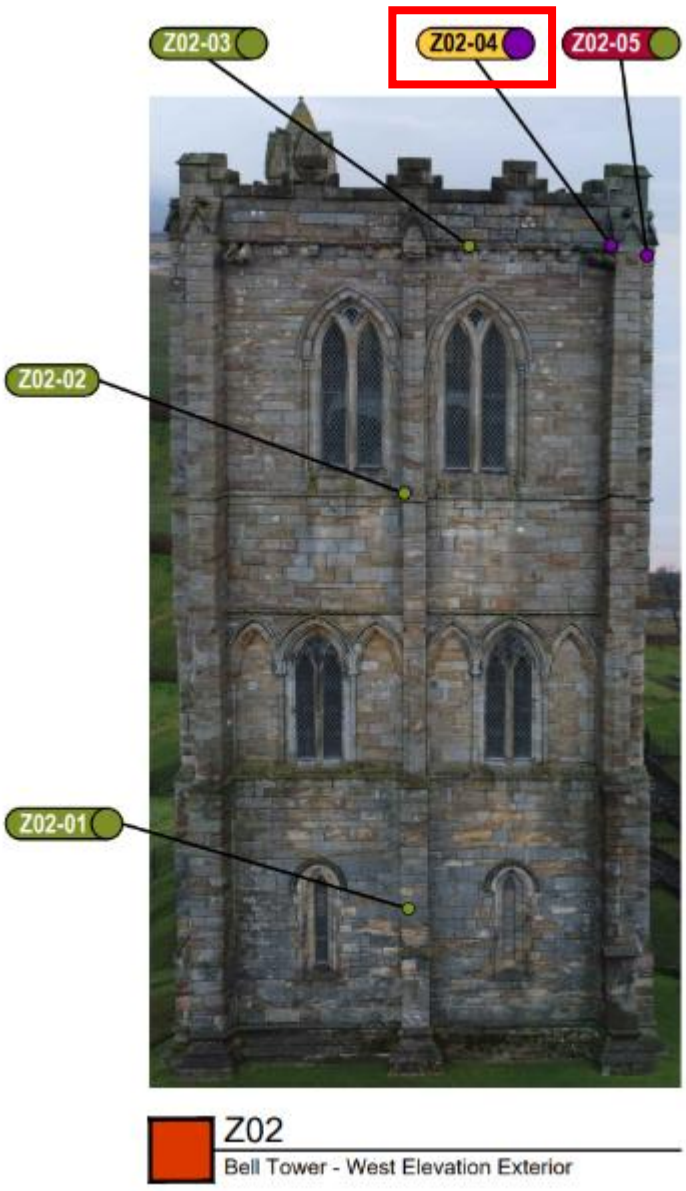
Introduction

The High Level Masonry Project is referred to as HLM for the purposes of this report, and High Level Masonry Inspector is referred to as HLMI. This desk-based condition assessment covers observations prioritised for inspection by the District Architect Jacqueline Mulcair, in HLM Zone 2 obs. 4.

Pictures and Text Extracted from the HLM Technical Report

The HLMI team carried out their inspection in March 2024.



A General Note on HLM AC Conservation Recommendations

In the case of *all* HLM observations the condition of the stone should be reviewed for changes with full access in place and before carrying out conservation as some time may have elapsed between the condition assessment and return to site to carry out conservation.
Conservation recommendations may require adjustment if the condition of individual observations is found to have changed.
HLM applied conservation is aimed at stabilising the defective carved and decorative details and reducing to a minimum the risk of falling masonry. It will not address any other conservation problems.

For the purposes of conservation assessment and reporting, a list of specifications is applied. Historic Environment Scotland Senior Stone Conservators have developed this to assist with Applied Conservation recommendations and Scheduled Monument Consent applications. A full Key to the list with detailed descriptions can be found in Appendix 1.

Condition Assessment and Recommendations for Conservation

HLMI risk rating: Medium

Frass on the surface.

Lichen and biological growth have colonised most of the surface of the spout.

Micro-cracks.

Open crack/joint between the head and body, filled with biological growth. This is obscuring any evidence if there had been previous pointing or fills. It is noted in the HLMI report that there is 'Slight movement on what looks like previous repair, probably doweled'. The covering of the crack by moss and lichens, and the worn edges, indicate that the crack is not a new feature. Removal of the bio growth would be necessary for a fuller assessment of the stone.

Unclear if the spout hole is still functioning or has been sealed over with a lead reservoir.

Conservation Recommendations

Preparation[1] followed by

Option 1: If there is separation between the stones but both parts immobile, or movement in stone is minor and there seems to still be a reasonably good attachment,

A local consolidation

B review of existing (legacy) repairs still in situ, followed by action where required. This would include removal and replacement with appropriate material.

[1] Remove Bio-growth (mosses, high plants, lichen – following advice from HES Environmental Advisor) to better assess the condition and conduct conservation. Clear the cracks, open and de-laminating areas of loose debris, dust, cobwebs (soft brushes, dental tools, spatulas, puffers). Dry the stone surface with Acetone (if required) and flush the cracks with Industrial Methylated Spirit (IMS).

C filling and edge pointing of fine and narrow cracks and fissures with acrylic resin based mortar. Fill areas of water catchment.

D addition of HMG or polyester resin stitches where required.

Option 2: If movement in stone is significant, e.g. can be pulled or twisted to expose more of the fixing, attempt removal of head and reattachment. Measurements will be taken beforehand to calculate whether the weight of the stone is safe for removal from a MEWP, or if it will require a more specialist approach. If removal is feasible, head of the gargoyle will need to be slung and tethered during the dowel-cutting procedure to remove risk of stone inadvertently falling.

Dowel can be severed using a hacksaw blade, followed by the two ends of the dowel extracted by sequential drilling around it or by using a closely-sized core drill. Once removed, the same holes can be used to fit a new non-ferrous dowel - likely threaded stainless steel. Dowel holes may need to be deepened for additional safety.

Due to the assumed significant weight of the stone and its height above the ground, HIT-HY 270 (or similar epoxy resin) would be used to anchor the rod.

F Reattachment supported with micro-pinning

A local consolidation

C filling and edge pointing of fine and narrow cracks and fissures with acrylic resin-based mortar. Fill areas of water catchment.

Recommendations for Future Monitoring of HLM Observations Detailed in this Report

Unstable masonry can become a major health and safety risk to visitors and staff alike, may lead to the loss of irreplaceable carved detail and could cause damage to other aspects of the building during falls.

Such potentially catastrophic events cannot always be predicted. Such risk can be reduced by undertaking regular detailed surveys of carved elements and associated stonework from elevating working platforms (MEWP) or scaffolds and through timely conservation.

From previous comparisons, it is estimated that consolidation work will last 2-5 years after which point, retreatment will become necessary.

Frequent general inspections with binoculars/drones from the ground and regular (bi-annual annual/where feasible) detailed condition surveys from a MEWP are advisable for areas of stonework where health and safety are a prime consideration.

Appendix 1 - Key to full list of conservation options

Preparation
Remove Bio-growth (mosses, high plants, lichen – following advice from HES Environmental Advisor) to better assess the condition and conduct conservation. Clear the cracks, open and de-laminating areas of loose debris, dust, cobwebs (soft brushes, dental tools, spatulas, puffers). Dry the stone surface with Acetone (if required) and flush the cracks with Industrial Methylated Spirit (IMS).

Specification A Surface Consolidation

Where surfaces being treated show signs of disintegration/disaggregation the surface can be locally consolidated with an application of 2.5% acrylic resin solution (Paraloid B72 in 50/50 Acetone IMS) prior to any further actions.

B Failing Previous Acrylic Resin Repairs/other legacy repair materials

In case of the presence of old, failing acrylic resin repairs, soften them with a mixture of Acetone and IMS, cover with plastic film (if required to slow evaporation) and carefully separate/remove from the stone surface (syringes, needles, cotton wool, absorbent paper, spatulas).

Where other materials used for previous repairs remain they may need to be identified, where possible, before attempting removal if feasible. In some cases, removing previous repairs can cause more damage to the original stone than leaving them in place.

Cementitious materials can have a detrimental effect on adjacent stone*

C Narrow Cracks

In case of narrow cracks along bedding planes, de-laminations inject with 2.5-10% Paraloid B72 solution in Acetone/IMS 50/50 (syringes, needles) and fill with acrylic based mortar repair where feasible (5% Paraloid B72 in 50/50 Acetone/IMS, sand, stone dust) (spatulas, dental tools).

D Wider Cracks, Open Bedding Planes or larger Width Splits

Cracks, widely open bedding planes or splitting of a larger width consider application of an appropriate number of acrylic ‘plugs’ or polyester resin ‘stiches’ in selected, equally distanced locations. The plug to consist of a Paraloid B72 based adhesive mixed with coarse sand and micro balloons (hollow glass microspheres in varying grades). Alternatively use a mortar repair based on the highly concentrated solution of Paraloid B72 (30-40%) in Acetone/IMS at regular intervals as required. In each case fill the remaining space with acrylic based mortar repair with sand, stone dust, micro-balloons if necessary.

E Repair After Dislodgement

For detached/dislodged sections of stone re-attach with Paraloid B72 based adhesive or if the section is larger in size polyester resin-based adhesive. Fill remaining cracks with Paraloid B72 based mortar (see Specification C).

F Micro-pinning

Typical instances of use for micro-pinning are where a structural repair is required to support larger sections of detached stone. Drill small holes at an appropriate angle in corresponding break surfaces and fit bespoke 316 stainless steel threaded rod or phosphor bronze fixings, secured in place with Polyester Resin, to bring the two sections of stone back into alignment. Fill remaining cracks with Paraloid B72 based mortar (see Specification C).

G Removal of Material/Descaling

Carefully remove fractured or loose section of masonry or mortar. Careful brushing off the scaling, disintegrated surface, salt efflorescence. Where necessary to avoid water pooling/catchment areas repoint as in specification C.

H Deep consolidation with product based on TEOS (Tetraethyl orthosilicate).

I Edge pointing/cracks filling/mortar repairs/re-pointing with acrylic resin, lime-mortar or alternative (possibly including Nanolime, colloidal silica-based mortars).

J Lead flashing proposed to shed the rainwater.

K Deteriorating stone to be replaced by indent. Suitable stone based on petrographic analyses.

L Structural repairs/mechanical fixings – based on advice from Structural Engineer.

M Non – ferrous brackets/clamps.

N Restraint (carbon tape/non-ferrous mesh).

O Laser cleaning.

P Steam cleaning (to remove residue of the bio-growth/ or residue of the poultice residue).

Q Gentle removal of cement pointing/repairs where feasible.

R Black pollution crusts removal/reduction (poultices/laser).

S Desalination by application of poultices**

T Specialist cleaning enhanced by water (soft plastic brushes, scalpels or dental tools if needed)

U Grouting, filling the hollow areas.