

Project Reference: 256015

**Abermad Mansion
Llanfarian
Aberystwyth
SY23 4ES**

Structural survey of two chimney stacks

for

Aber Heating Engineers Ltd

Report prepared by

S D Pontin
BSc (Hons)

Report checked by

D A Barratt
MSc CEng FICE FGS

BARRATT ASSOCIATES
The Old Brewery
Kings Sutton
OX17 3RR

Mobile: 07702 252255

e_mail: barratt.associates@yahoo.co.uk

CONTENTS

- 1.0 Introduction**
- 2.0 Scope of work**
- 3.0 Observations and assessments**
- 4.0 Conclusions and recommendations**
- 5.0 Photographs**

1.0 Introduction

This report has been prepared by Barratt Associates, The Old Brewery, Wales Street, Kings Sutton OX17 3RR, acting on instructions from Mark Sandford of Aber Heating Engineers Ltd.

Barratt Associates has worked for over 40 years in the construction industry with considerable experience in the forensic examination, structural appraisal, and restoration of buildings, and is currently involved with similar projects throughout Wales.

The report has been made following a site visit and inspection on 22nd April 2025 by S D Pontin and by D A Barratt via video link. Weather conditions were dry with sunny spells.

2.0 Scope of work

The survey was requested to assess the condition of two chimney stacks and to advise on any remedial works that may be required.

3.0

Observations and assessments

Abermad Mansion is a south-southwest facing three-storey building constructed, it is understood, in the 1870's comprising dressed stone walls with traditional slate-covered roofs. The building is currently undergoing extensive renovation, and scaffolding has been erected on the north and south elevations and over part of the roof.

There are three large chimney stacks located at the apex of the roof on the south side of the building, two of which display cracking and deterioration of some of the stonework. The chimney stacks are constructed of dressed limestone with a profiled sandstone collar in the mid-section (see Section 5.0 Photographs). Close inspection was made of the westernmost stack as this was scaffolded, whereas, at the time of the visit, the other defective chimney stack was not.

Both stacks display stepped vertical cracking extending from the sandstone collar, and the cracks are widest just above and below the collar. Some of the mortar joints have become denuded, and the sandstone on the westernmost stack has suffered from extensive erosion. There is a ferrous metal ring installed on top of the sandstone collar. Denudation of the mortar has exposed part of the metal ring, which is in an advanced state of oxidation. Ferrous metals, when exposed to water and air, will rapidly oxidize and, in so doing, can expand by as much as seven times. The rings may be of cast iron rather than steel, as this would have been easier to fabricate locally at the time of construction. The stepped cracking as described above can be directly attributed to the expansion of the metal, which is lifting the stones on the top of the stack. As moisture has ingressed the mortar joints, the oxidation process will inevitably continue, and without remedial action, the stonework will eventually be pushed apart to the point where collapse may occur.

4.0

Conclusions and recommendations

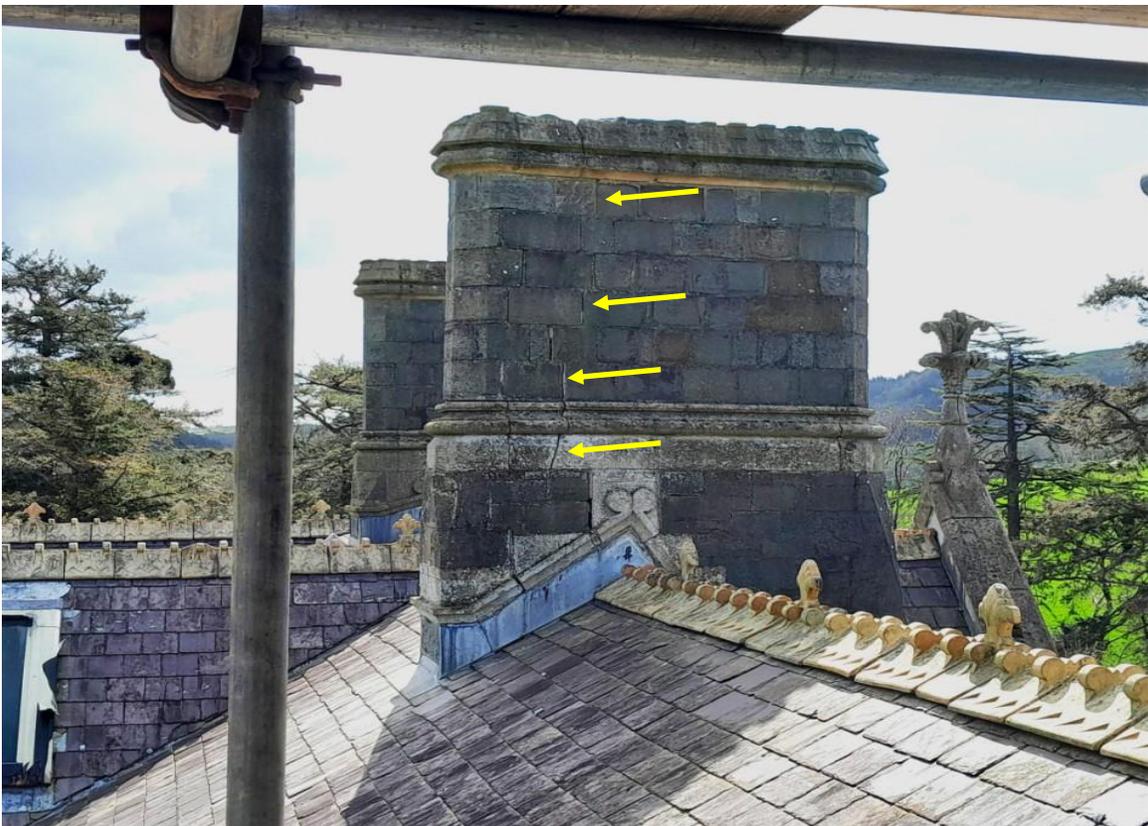
Any attempts at arresting the oxidation of the metal and repairing the mortar joints will only be a temporary solution, with a high probability that, within five years or so, further repairs will again be necessary. We strongly recommend, therefore, that the chimney stacks be taken down to the level of the sandstone collar, which will enable the metal rings to be removed completely before rebuilding the stack.

The stones that are to be taken down will need to be numbered so that the rebuilt stack will be identical to the original. The metal ring can be replaced with a binder, which can be a bed of lime mortar with stainless steel helical ties set within the mortar.

The stonework around and below the sandstone collar will need to be re-pointed, and for this, lime mortar should be used. Some of the joints will require deep pointing (>25 mm), which will necessitate applying the mortar in two stages. Lime mortar cures by a reaction between the lime (calcium hydroxide, Ca(OH)_2) and carbon, usually in the form of atmospheric carbon dioxide (CO_2), which has a diffusion distance of about 25 mm through the mortar. A pozzolan additive can be introduced into the mortar, which will provide additional carbon, thereby enhancing the curing process. Pozzolans are high-carbon compounds, such as volcanic ash, or, in the absence of any local supplies, fly ash from incinerators is typically used.



Photograph 1. Chimney stack at southwest end of building



Photograph 2. Central chimney stack showing vertical cracking



Photograph 3. West chimney stack showing damaged stonework and position of corroding metal above the sandstone collar (arrowed)



Photograph 4. Cracking in stonework, west chimney

Reproduction of this report is permitted if presented in its entirety and without alteration.

Any queries should be addressed to the author at Barratt Associates on 07702 252255

D A Barratt
MSc CEng FICE FGS

23rd April 2025