

Chimney Collapse: The Cause and Process for Repair

Case study: No. 1 The Barony, Cupar



No. 1 The Barony is a category B listed building situated on the Millgate, within the Cupar Conservation Area. The property which dates from the early 19th century comprises ashlar masonry and a slated roof with modern dormers. Formerly one house, it has since been sub-divided into 4 separately owned flats.

During a period of poor weather in 2016, a section of masonry supporting the chimney collapsed, falling through the neighbouring roof. Fortunately no persons were injured although the chimney remained vulnerable and hazardous to the neighbours and public.

Due to the threatening condition of the freestanding chimney stack, Fife Council enforced an emergency part closure of the street and dismantled all high level masonry to the lowest point of the collapse.

The owners of the property formed an owners association and employed a Conservation Accredited Architect and local contractor to rebuild the area of collapse. The wall and chimney were repaired using appropriate materials and traditional techniques which are sympathetic to the listed building.



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Why did the wall collapse?

Many factors of fabric decay had accumulated and contributed to the collapse of the masonry wall. Although not exhaustive, the principal items identified were:



Weathering

The historic masonry wall was built using porous sandstone. Being in an exposed location it is vulnerable to the prevailing weather and as a result, many areas of masonry had suffered from continuous weathering resulting in a loss of its structural integrity.



Cement Pointing

The gable had previously been repointed using a cement mortar. This material is inappropriate as it is impermeable and accelerates the erosion of the surrounding masonry, further weakening the integrity of the masonry.



Decayed Bridges

When the chimney was first built, all 16 open coal fires would have been in use. Burning coal releases sulphurous gases which are corrosive and attack the sandstone bridges that tie the chimney walls together.



Heating and Ventilation

Modern heating technologies had replaced the need for fireplaces and as a result, flues and chimneys have been blocked up. This means that flues were no longer heated or ventilated, which causes dampness to accumulate and accelerates further decay.



Maintenance

High level items such as the chimney capping, flashings and rainwater goods had not been properly maintained. This allows vegetation growth to take place which further contributes to the accumulation of dampness and decay of the building fabric.

How was the chimney repaired?

Due to the historical importance of the building, the owners association had to obtain planning permission and listed building consent from Fife Council before they could rebuild their chimney. Once the consents were awarded, the following works were undertaken.



Rubble Masonry and Lime Mortar

The area of existing masonry was first consolidated to enable the new masonry to be rebuilt on a stable base. Lime mortar and matching rubble stone was then used to rebuild the gable wall up to the chimney level.



Flues

To ensure the flues are ventilated and to allow for potential future reuse of the fireplaces, the flues were unblocked from debris and rebuilt using reclaimed flue liners and sulphur resistant engineering bricks.



Wall Ties

New wall ties were needed to tie the rebuilt outer masonry leaf back to the existing retained stonework. Stainless steel ties were chosen over galvanised as they can resist corrosion from the lime mortar.



Ashlar Sandstone Chimney

A geological study identified a suitable stone to rebuild the chimney. This study allowed for a good visual match and ensured the strength of stone was appropriate to balance future weathering.



Ventilation Cowl and Haunch

All flues were terminated with a ventilation cowl which prevents rain from entering the chimney whilst maintaining ventilation to the flue. The cowls are bedded into a haunch of mortar which sheds water away from the flue, helping to keep the chimney dry.

How to prevent a future collapse?

Although the chimney has been rebuilt, the following should be considered to prevent significant problems from occurring.

Maintenance Plan

Homeowners should collaborate and compile a maintenance plan that will identify when the building should be examined for defects and when key maintenance tasks should be completed.

Cement Pointing

All cement pointing should be fully removed and the masonry repointed using an appropriate lime mortar.

Stone Replacements

Severely decayed stone work should be identified and replaced with new as required.

Rainwater Goods

All rainwater goods should be kept in good working order and free flowing to discharge rainwater effectively.

Ventilation

Flues should be vented to ensure they are kept dry to minimise the build-up of moisture. This can be improved by installing a vent brick into blocked fireplaces.

Further Information

There are many buildings in Cupar that are suffering from similar fabric decay that require remedial works to ensure their longevity and public safety.

Did you know as an owner of a building, you may have rights and obligations? Further information for homeowners can be obtained from the following links:

www.engineshed.org/building-advice/building-components/chimneys-and-flues

www.newtenementhandbook.scot