



Sustainable Management of Historic Heritage Guidance Series

Replacement of high-risk elements with lightweight materials

High-risk elements refer to exterior fabric of a building that may be a threat to public safety. It includes chimneys, gables, parapets and other decorative elements on a building façade. If these elements are not properly maintained and securely connected into the structure of the building, their integrity may be compromised. They may also be susceptible to collapse in an earthquake. These elements may be a critical structural weakness, even if the rest of the building may be structurally sound.

The repair and strengthening of high risk elements should be a high priority for all building owners. *See separate information sheets for the repair of brick and stone on historic buildings.*

If repair and strengthening is not possible, replacement with lightweight materials may be an option. Replacement is considered the least desirable option from a heritage retention perspective. However, there will be occasions when it may be necessary to reproduce discrete elements within a building which have been lost or destroyed due to a destructive event (ie, earthquake).

There are many examples where lightweight materials or constructions have been used on significant heritage buildings in New Zealand. Examples are provided in a list below.

Solutions for each building must be carefully considered on a case by case basis.

- Any reconstruction should accurately replicate the visual appearance of the original fabric.
- In order to ascertain the form of the original structure architectural plans (if available) should be studied. Photographs taken pre-damage will also provide valuable information.



Canterbury Club, Christchurch,
2012 replacement with single
wythe brick over steel frame .
Photo, Heritage New Zealand

**Union Fish Company Building
(Britomart Precinct), Auckland.**
Example of reconstructed
lightweight concrete parapets.
Photo, Heritage New Zealand



- If sufficient information is not available to accurately replicate the original form, rebuilding should not proceed. In such cases it may be deemed most appropriate to remove the element altogether. Use of conjecture is not considered acceptable on a heritage building.

Using original materials which have been modified.

Instead of replacing the element with bricks laid two or three deep, a single wythe of bricks can be laid around and attached to a frame. Alternatively, cut down bricks (brick slips) can be affixed to a suitable substrate to create a lightweight brick 'skin' over a substrate. The original bricks or matching bricks, carefully cleaned and prepared, should be used for the slips if sound enough. Note – it is important to consider that the brick slip technique is new and issues such as longevity are yet to be proven. All lightweight rebuilt chimneys require engineer input.

Using lightweight composite materials.

A number of companies are now manufacturing fibreglass replica chimneys. Fibreglass can potentially reduce the weight of a chimney from more than 1300kg down to approximately 60kg. This approach should be treated with caution. There may be a variation in the quality of replication provided by various companies. It is essential the colour matches the existing bricks, the form is accurate and the detailing is authentic and weathering longevity has been considered.

Examples of buildings with lightweight replacement material

BNZ Building No.3, Customhouse Quay, Wellington	Parapets replaced with polystyrene back in the 1990s.
Government Buildings, Wellington	22 Chimneys were removed during the restoration and replaced with replica during the 1990s.
Parliamentary Library, Wellington	Gables were rebuilt during the restoration and the chimneys are replica.
Holmslee Farm Homestead, Canterbury	Following the Canterbury earthquakes, chimneys were replaced with lightweight materials.
Otahuna Homestead, Canterbury	11 chimneys were damaged in the Sept 2010 earthquake. 10 were replaced in lightweight materials, one strengthened.
Government House, Wellington	Chimneys were reinstated using lightweight materials.
House, 16 Ngatitama Street, Nelson	Chimneys were replaced using lightweight materials.
Whitcoulls Building, Wellington	Parts of the parapet and façade detailing were replaced in 1984 using lightweight materials.
Former Government Buildings (Heritage Hotel) Christchurch	Parapets were replaced with lightweight plastered polystyrene foam, well before the earthquakes.



Knocklynn, Selwyn District. The chimney removal was part of a multi-million repair and strengthen with new concrete shear walls internally and removal of all chimneys to the frame shown on the front lawn, where they were rebuilt as brick slip (for paint finish) lightweight engineered replica designs with internal steel frames going down into building. Rebuilt chimneys were craned back onto the roof. Photos, Heritage New Zealand

Contact details for Heritage New Zealand are available on our website:

<http://www.heritage.org.nz/contact-us>

Heritage New Zealand welcomes any feedback and comments on this information sheet. Comments can be provided to information@heritage.org.nz. Copyright ©Heritage New Zealand Pouhere Taonga, November 2016