



New Zealand Historic Places Trust Pouhere Taonga

## Sustainable Management of Historic Heritage Guidance Series

# Information Sheet: Earthquake Strengthening – Improving the Structural Performance of Heritage Buildings (draft for consultation)

## Background

For the purpose of this information sheet, earthquake strengthening means improving the structural performance of a heritage building by modifying, or adding to, the structure of a building. This work may be required to enhance the structural capacity of the building to:

- Safely carry self and imposed gravity loads.
- Withstand probable wind loads without unacceptable damage.
- Withstand probable earthquake loads without unacceptable damage.
- Withstand other damaging effects that have been identified for a particular building.

The NZHPT endorses earthquake strengthening to improve the structural performance of heritage buildings to promote public safety and minimise potential damage to building fabric. Earthquake strengthening takes place as part of adaptive reuse which means modifying a place to make it suitable for a compatible use, involving the least possible loss of cultural heritage value.<sup>1</sup>

It is good practice that a conservation plan, prepared by a heritage professional, should inform and guide earthquake strengthening of heritage buildings.

The following checklist provides a summary of matters that should be considered in the design of strengthening solutions for heritage buildings.

## Checklist – Assessing Appropriate Earthquake Strengthening of Heritage Buildings

### 1. Sustainable management of historic heritage principles

Earthquake strengthening should meet best practice principles for the sustainable management of historic heritage. In particular, earthquake strengthening should be designed to:

- Understand significance and taking a precautionary approach.
- Enable compatible original and new adaptive uses.
- Be informed by sufficient research and documentation.
- Ensure the work involves the least possible loss of heritage significance.<sup>2</sup>

<sup>1</sup> ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value (1993)

<sup>2</sup> For further information, see Information Sheet No.1 ‘Sustainable Management of Historic Heritage Guidance Principles’ [to be updated]

This information sheet provides a summary of key information as provided in the NZHPT draft guide *Earthquake Strengthening – Improving the Structural Performance of Heritage Buildings*, 13 August 2010  
[\[link to be added\]](#)



Former Customhouse, Auckland (registered Category I historic place) Saved by public campaign in the 1970s. Earthquake strengthened in the early 1980s. Photo, NZHPT.

## 2. Alterations to heritage buildings

Earthquake strengthening involves making alterations to heritage buildings. Earthquake strengthening should be carefully designed to:

- Not alter, obscure or remove significant heritage fabric and fixtures.
- Retain and conserve ceiling heights and surfaces and significant ceiling decoration. For example, strengthening work should not alter significant interior volumes by raising floor levels or creating partitions.
- Retain and conserve significant interior finishes such as original or early wallpaper, paint, stencilling, marbling, wood graining, panelling, plastering and ceramic tile surfaces.
- Be discreetly installed. Any transparent strengthening approach should be compatible with the heritage values of the building.
- Ensure seismic bracing is not visible through prominent windows.
- Retain and strengthen elements such as parapets, towers and chimneys. Replacement of original elements with replicas in plastered polystyrene or glass reinforced plaster or concrete is not ideal.
- Where elements such as towers and parapets have been lost over time, reconstruction in lightweight materials is acceptable.<sup>3</sup>

## 3. Best practice engineering standards

- Investigation is required to determine the loading regime, structural system and existing beneficial strength of the structure and foundation support.
- The level of structural performance must be carefully considered and be appropriate in terms of the legislation, public safety, cost and the heritage values of the building.
- As appropriate, effort should be made to achieve improvement to at least 67% of the New Building Standard (NBS).
- Different structural performance options should be the subject of detailed risk assessment.
- The level of structural performance should be compatible with the existing structure and consider the degree that secondary elements are secured.

### Archaeological authority process under the Historic Places Act 1993

All pre-1900 archaeological sites are protected under the Historic Places Act 1993. An archaeological authority is required from the NZHPT to destroy, damage or modify an archaeological site.

If earthquake strengthening work requires excavations around the foundations of a pre-1900 building, an archaeological authority may be required from the NZHPT.

Further information about the archaeological authorities can be obtained by contacting the NZHPT: [www.historic.org.nz](http://www.historic.org.nz)

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<sup>3</sup> For further information, see Information Sheet No.12 'Alterations to Historic Buildings' [to be updated]

- The existing beneficial strength of the building must be considered.
- The earthquake strengthening design should reflect best current technology.
- Historic row buildings should be subject of coordinated investigation and strengthening.



Speights Ale House,  
Jackson Street, Petone  
Registered Historic  
Area  
Earthquake  
strengthened, 2004  
Photo, Havill Building  
LTd

#### **Other matters for consideration**

- The construction cost needs to consider all relevant matters including the cost of disruption to building users and the value of contents of the building. Cyclic repair and maintenance costs should also be considered.
- Work should minimise disruption by integrating strengthening work with other retrofit works such as repairs, maintenance and alterations.
- Work should maintain important internal spaces that are integral to the function of the building.

For Earthquake Policy related guidance, see the *Sustainable Management of Historic Heritage Guidance Series*, 'Guide No.9, Heritage Provisions: Dangerous, Earthquake-Prone, Insanitary Buildings and Dangerous Dam Policies, Building Act 2004, August 2007:

<http://www.historic.org.nz/en/Publications/SustainMgtSeries.aspx>

A background research paper on issues relating to earthquakes and historic heritage is also available from the NZHPT's website: 'Towards Improving National and Local Action on Earthquake-Prone Buildings', 3 March 2009

<http://www.historic.org.nz/ProtectingOurHeritage/AdvocatingForHeritage.aspx>

The NZHPT welcomes any feedback and comments on this information sheet. Comments can be provided to [information@historic.org.nz](mailto:information@historic.org.nz).

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