

INVERCARGILL CITY COUNCIL

POLICY ON EARTHQUAKE PRONE BUILDINGS

ADOPTED: 8 NOVEMBER 2005

INTRODUCTION

The Invercargill City Council, under Section 131 of the Building Act 2004, is required to adopt a policy on earthquake prone buildings within its district within 18 months of the commencement of that Section i.e. by the end of October 2006.

The policy must state:

- The approach the Territorial Authority will take in performing its functions (under Part 2 of the Act).
- The Territorial Authority's priorities in performing those functions.
- How the policy will apply to heritage buildings.

DEFINITIONS

Section 122 of the Building Act 2004 defines an earthquake prone building as follows:

1. *A building is earthquake prone for the purposes of this Act if having regard to its condition and to the ground on which it is built and because of its construction, the building –*
 - (a) *will have its ultimate capacity exceeded in a moderate earthquake (as defined in the Regulations) and*
 - (b) *would be likely to collapse causing –*
 - (i) *injury or death to persons in the building or to persons on any other property, or*
 - (ii) *damage to any other property*
2. *Subsection 1 does not apply to a building that is used wholly or mainly for residential purposes unless the building –*
 - (a) *comprises two or more storeys, and*
 - (b) *contains three or more household units.*

A "moderate earthquake" is defined in the Regulations to the Building Act 2004 as:

For the purposes of Section 122 (meaning of earthquake prone buildings) of the Act moderate earthquake means in relation to a building an earthquake that would generate shaking at the site of the building that is of the same duration as, but is one third as strong as, the earthquake shaking (determined by normal measures of acceleration, velocity and displacement) that would be used to design a new building at that site.

For the purpose of this Policy, the Council has interpreted this to mean:

- An earthquake prone building is one that meets 33% or less of the current Building Code standard.
- Or, put another way, an earthquake prone building is one that would be heavily damaged in a MMVIII scale earthquake event.

OVERALL APPROACH

The Invercargill City Council commissioned a report on Geological Hazards facing Invercargill from Phil Glassey of the Institute of Geological and Nuclear Hazards in 2002 in connection with the Council's City Lifelines Project.

That report concluded:

- There are no known active faults within the Invercargill City Council area and therefore no known fault rupture hazard.
- A 475-year return period earthquake (i.e. an event with a 10% probability in 50 years) is expected to have a felt intensity of MMVII for Class B soils in Invercargill. An Alpine Fault event is expected to produce lower intensity ground shaking but has a higher probability in the next 50 years.
- Amplification of earthquake shaking often occurs in softer, unconsolidated sediments that can result in the intensification of shaking by one (or even two) levels on the Modified Mercalli scale. Given that Invercargill is located on significant areas of Class C and D (soft) soils formed within multiple flood plains, it is likely that much of the city will experience earthquake shaking in the order of MMVIII and possibly MMIX from the 475-year return period event.
- Areas within Invercargill City susceptible to liquefaction include Bluff Island Harbour and foreshore reclamation; Invercargill dump reclamation; Invercargill Airport; and other areas underlain by recent (i.e. Quaternary) sandy silt deposits especially close to rivers and estuaries.
- The only landslide hazard identified within Invercargill City is on the eastern flank of Bluff Hill.
- Ground subsidence is most likely to occur over areas of unconsolidated material such as peat and highly organic materials (old rubbish dumps) and areas of unconsolidated fill.

The report identified three classes of buildings with respect to earthquake risk:

Type I: Weak materials such as mud brick and rammed earth; poor mortar; low standards of workmanship.

Type II: Average to good workmanship and materials, including some reinforcement, but not designed to resist earthquakes.

Type III: Buildings designed and built to resist earthquakes to normal use standards i.e. no special damage limiting measures undertaken (mid 1930s to c1970 for concrete and to c1980 for other materials).

Windows Type I: Large display windows, especially shop windows.

Windows Type II: Ordinary sash or casement windows.

Water Tanks Type I: External, stand mounted, corrugated iron water tanks.

Water Tanks Type II Domestic hot water cylinders unrestrained except by supply and delivery pipes

The report identified the following implications for buildings for the scale of earthquake events considered:

MMVII:

- Unreinforced stone and brick walls cracked
- Buildings Type 1 cracked and damaged
- A few instances of damage to Buildings Type II
- Unbraced parapets and architectural ornaments fall
- Roofing tiles, especially ridge tiles, may be dislodged
- Many reinforced domestic chimneys broken
- Water tanks Type I burst
- A few instances of damage to brick veneers and plaster or cement based linings
- Unrestrained water cylinders (Water Tanks Type II) may move and leak
- Some Type II windows cracked

MMVIII:

- Buildings Type II damaged, some seriously
- Buildings Type III damaged in some cases
- Monuments and elevated tanks twisted or brought down
- Some pre-1965 infill masonry veneers damaged
- Weak piles damaged
- Houses not secured to foundations may move

MMVIII:

- Very poor quality unreinforced masonry destroyed
- Buildings Type II heavily damaged, some collapsing
- Buildings Type III damaged, some seriously
- Damage or permanent distortion to some buildings and bridges
- Houses not secured to foundations shifted off
- Brick veneers fall and expose frames

Council sees risk in this context as having three components:

- (a) The structural integrity of the building
- (b) The number of people in it
- (c) How long the people are in it

The Council estimates that of Invercargill's commercial building stock: 7.2% were built prior to 1930 and have had no major structural upgrade

50.3% were built or undertook major structural upgrade between 1930 and 1980

8.8% were built or undertook major structural upgrade after 1980

(It is not known when 33.7% were built)

In practical terms the life of a commercial building involves a series of major and minor renovations over the "life" of the building. The intensity of occupation (numbers of people over a given time period) normally decreases as the building ages and floor rentals reduce relative to other, newer, buildings. An intensification of the occupancy of the building in most cases will involve a "Change of Use" under the Building Code.

There may be exceptions e.g. a growing company that maintains a single premises. However, it is highly unlikely that a growing company would maintain an intensified presence in a pre-1930 building without upgrade. In such a case, the company's obligations to provide a safe workplace may have more urgency than a Council Policy. Another exception may be a special purpose building such as a church. However such buildings tend to be occupied only for periods of short duration, therefore the probability of the building being full when an earthquake occurs is low.

For these reasons:

- (1) The Invercargill City Council believes it must:
 - (a) Ensure that its citizens and in particular building owners are aware of the scale and probability of the earthquake risk in the Invercargill area.
 - (b) Encourage ongoing and incremental improvement in the likely performance of the Invercargill building stock in relation to earthquake risk.
- (2) The Invercargill City Council concludes that in Invercargill the appropriate time to require structural upgrade of a building for enhanced earthquake performance will normally be at the time of reclassification of the building in terms of the Change of Use criteria of the Building Act 2004 (Section 115).
- (3) Invercargill City Council concludes, with respect to risk from earthquake prone buildings in Invercargill, that:
 - It is prudent to plan to sensibly minimise risk.
 - Significant numbers of injuries or fatalities are only likely to result in or near buildings of *poor structural integrity* from the *worst scenario* of an event with a *fairly low (10%) probability of occurring in the building's life (50 years)*.
- (4) Council does NOT consider the degree of risk from earthquake prone buildings to be such that an interventionist approach is needed or desired by the community.
- (5) Council does consider that the building owners need to be aware of the likely performance of their building in an earthquake. To facilitate this Council will:
 - Include advice of when the building was constructed (where known) on all LIMs and PIMs.
 - Actively encourage owners of heritage buildings to obtain a structural assessment of their buildings from an appropriately qualified structural engineer.

IDENTIFYING EARTHQUAKE PRONE BUILDINGS

Within 24 months of the date of this Policy being adopted, Council identify and classify as “Potentially Earthquake Prone” from its records as far as practicable which pre-1930s non-residential buildings could be earthquake prone. In so doing it will take into account work which has been carried out over the life of that building.

ASSESSMENT CRITERIA

The Invercargill City Council will use the New Zealand Society for Earthquake Engineers document “Recommendations for the Assessment and Improvement of the Structural Performance of Buildings in Earthquakes”.

TAKING ACTION ON EARTHQUAKE PRONE BUILDINGS

Where a building is classified as potentially earthquake prone, Council will:

1. Advise the owner in writing and make an appropriate note on the Council’s property file.
2. Encourage the owner to address the hazard, acting on the advice of an appropriately qualified structural engineer.
3. Note on any application for a PIM or a LIM that the building has been identified as potentially earthquake prone.
4. Consider any appeal from the owner as to the classification.

Council will follow the procedure set out in Sections 124-130 of the Building Act 2004 where an earthquake prone building is also dangerous or insanitary.

INTERACTION WITH OTHER SECTIONS OF THE BUILDING ACT

Section 112 Alteration to existing building. There is no requirement under Section 112 to require structural upgrading, however Council would draw to the owner’s attention under the PIM process that the building had been classified earthquake prone.

Section 114 Change of use, extension of life and subdivision of buildings, and Section 115 Code compliance requirements – change of use. There is a requirement under these sections to upgrade any building to current code standards “as nearly as reasonably practicable”. In such cases, Council will require:

- (a) An assessment from an appropriately qualified structural engineer
- (b) That the building be upgraded as far as is reasonably practicable to meet or better 66% of current performance standards

SOCIAL, ECONOMIC, ENVIRONMENTAL AND CULTURAL IMPACT OF POLICY

The Council believes that by adopting a policy based on education and sharing of knowledge, and intervention only as a last resort, an improvement in the earthquake performance of Invercargill's non-residential building stock will be achieved in a way that is:

- Socially acceptable
- Economically viable
- Environmentally sustainable
- Culturally sensitive

A degree of risk is accepted and acceptable but that sensible procedures are in place to identify, control and reduce the level of risk.

APPLYING THE POLICY TO HERITAGE BUILDINGS

Where a building is identified as potentially earthquake prone from Council records and where that building is also classified as Category I or Category II by the Historic Places Trust, the Council will notify the building owner and the Historic Places Trust of its initial assessment and take into account any submissions from the Trust and the building owner before making a decision on the earthquake prone classification.

Council will take into account the heritage value of the building, any particular structural characteristics of the building and characteristics of its use with respect to risk to people and property from earthquakes.

Council may then decide, or may then decide not, to classify the building as earthquake prone.

The Council shall also apply this process to building consent applications involving Sections 112, 114 and 115.