

Building Safety Evaluation

The rapid evaluation placarding of buildings is a useful and pragmatic way to quickly 'triage' the structural condition of buildings in the aftermath of an earthquake, in much the same way that accident victims are triaged in emergency care wards.

- Red carded buildings are considered unsafe to enter.
- Yellow carded are considered suitable only for restricted use or access until repairs are completed.
- Green carded buildings are considered safe to enter and appear to be in much the same structural condition as prior to the earthquake.
- Green placards state that building owners are "encouraged to obtain a detailed structural assessment of the building as soon as possible" and "report any unsafe conditions" to the Territorial Authority".

Detailed structural evaluations of damage, and strengthening of buildings up to current standards once the state of emergency is over, remains the responsibility of the building owner.

- All building owners are recommended to contact a structural engineer for a thorough assessment after an earthquake if they suspect some damage has occurred whether it is placarded or not.
- Some damage may not be obvious until linings are removed in critical areas to allow detailed inspection.
- The placards are a 'snapshot' of the condition of the building after a particular event and do not indicate compliance with the building regulations or whether the building can sustain another event of similar or greater intensity.

The placarding system was first used in New Zealand after the Gisborne earthquake and is an adaptation of the system used in the USA.

- It was developed by the New Zealand Society of Earthquake Engineering in conjunction with the Department of Building and Housing.
- It was further refined by a team of New Zealand engineers who used it to evaluate buildings damaged in Padang, Indonesia, after the earthquake there in September 2009.
- It was implemented to assist the building safety evaluation work of the Christchurch City Council after the Darfield Earthquake in September 2010 and allowed swift communication of damage information to local and national agencies.
- Further improvements of the system have been made by Christchurch City Council since then, to cope with the effects of aftershocks on the placarding process.

The rapid evaluations are done and placards are placed during the period in which a state of emergency has been declared after an earthquake has occurred.

- Placards assist emergency managers identify buildings that may cause danger to the community.
- They identify buildings the public may reasonably return to, that have much the same ability to resist future earthquakes as before.
- In their aggregate they allow emergency managers and relevant agencies to make decisions around moving safety cordons, opening roads to traffic and estimating the economic impact of the earthquake.

The rapid evaluations are done in two stages; Level 1 and Level 2, by teams of qualified structural engineers and building control officers.

- Level 1 evaluations are usually based on observations made from the outside of the building.
- Level 2 evaluations take longer and require the assessors to enter the building if it is greater than two storeys high. They are only undertaken once the Level 1 evaluation has shown the building to be sufficiently stable for a team to enter.
- A Level 2 evaluation supersedes an earlier Level 1 evaluation.

The rapid evaluations and placards posted during a state of emergency are recorded in the building control database of the relevant local authority.

- As aftershocks occur these assessments may be updated.
- Once a state of emergency is lifted the yellow and red placard records are converted to 'dangerous' or 'restricted use' building notices, which are changed once the local authority is advised that repairs have been effected to bring the building back to a condition comparable to that prior to the earthquake.

The building safety evaluation system has become an increasingly valuable tool in managing both the initial management of earthquake damaged buildings, and also as a means for managing the recovery process in the months and years following a quake.

- It is hoped that all territorial authorities around New Zealand take up the same system in preparedness for a similar event that may occur in their locality, recognising that it is an international best practice system.
- The system allows people to make informed decisions about reoccupying buildings after an earthquake.
- The ability of a yellow or red carded building to safely resist a future earthquake of similar intensity is reduced,
- The ability of a green carded building to resist a future earthquake remains largely unchanged from prior to the event, but does not indicate that it will survive a larger earthquake in the future.

There is a mandatory requirement that old buildings be strengthened to provide resistance to earthquake loads to a minimum of 33% of the current design level. The New Zealand Society of Earthquake Engineering recommends a minimum of 67% of current design level.

- Building owners must recognise the need for them to undertake further work, even for green-labelled buildings to ensure the minimum legal obligations are met, but are recommended to consider strengthening to 67% of current design levels.
- The strengthening process should also increase the ability of the structure to sustain damage without collapsing and causing loss of life.

Prepared with the assistance of Members of the New Zealand Society for Earthquake Engineering · 4 March 2010