

Why insurers prefer base-isolated structures with stable foundations for commercial buildings in earthquake zones

Insurance advisory

The issue

Insurers are concerned about vulnerability of commercial buildings (including apartment blocks) to earthquakes. Insurers are particularly concerned about buildings in the Wellington region due to the area's high earthquake hazard exposure.

Foundation damage can have a big impact on overall building damage. In some cases, commercial buildings with damaged foundations can't be repaired. In both the 2011 Canterbury and 2016 Kaikōura earthquakes, multi-level buildings suffered foundation damage and structural failure. In Wellington, a number of the affected buildings were less than 15 years old and met minimum code requirements.

Learning from the past

These events have led to much greater understanding around how seismically fragile New Zealand buildings can be. They've also led insurers to reassess projected claims costs for these sorts of events. After Canterbury and Kaikōura, insurers paid out on not only the property damage suffered in the events but also on loss of business for the organisations situated within the damaged buildings. These costs were much greater than had been anticipated for these sorts of events.

This updated understanding has led insurers and reinsurers to reprice earthquake insurance for commercial and apartment buildings. In Wellington, this repricing resulted in significantly higher insurance costs for many building owners and occupiers.

It's also led insurers to review their exposure to commercial earthquake risk. In many cases, insurers are hesitant to increase their portfolios in the areas of commercial building, business interruption and residential apartment insurance. In Wellington, some insurers have declined to take on new commercial property risks or been unable to renew existing cover due to concerns about the building's seismic resilience.

Improving for the future

The good news is that there are ways to increase the insurability of commercial property. Commercial buildings with base-isolated, steel frame constructions that have stable foundations that

are not prone to liquefaction or lateral spread are more likely to get cover and at better terms than traditional standard frame or shear wall buildings designed to meet the current minimum loadings code.

Why base isolation?

Base-isolation systems allow the ground to move below a building's superstructure without causing the damaging upward accelerations that normally damage multi-storey buildings. Buildings that have base isolators are technically better risks for insurers and their owners.

Taller base-isolated structures also need to have a stiff superstructure, so most of the building's movement from a seismic event occurs in the isolators only, rather than in the superstructure itself. It's this movement, or drift, between floors that can cause both structural and superficial damage, including damage to partitions, ceilings and cladding.

Sturdy foundations

It's important foundations are protected from liquefaction and lateral spread. Shallow foundations can lose their support when liquefaction occurs, resulting in structural instability and differential settlement, both of which can cause damage. For buildings on deep or soft soils, stabilising foundations often requires the use of deep piles.

As in all buildings, it is vital that non-structural elements, including mechanical plant and services such as ceiling grids, fire sprinklers and HVAC, are correctly restrained to standards NZS4219 and NZS1170.5. Even sturdy foundations can't prevent a poorly installed pipe fracturing and flooding a building from the top down, which could result in months of repair time and lost revenue.

Difference in outlay cost

The margin between the cost of a comparable, standard steel or concrete construction with foundations designed to the current minimum loadings codes and a base-isolated, steel frame construction with stable foundations can be up to 10%. This varies with ground conditions and will depend on whether a building has a basement.

Benefits of base isolation

Long term savings

Higher costs for insurance and concerns that the building owners may have to absorb additional risk when the insurance market lacks capacity to fully insure the replacement value of the building will make base-isolated buildings a more economic proposition.

As a measure of confidence, three insurers have recently leased office space in Wellington in new buildings that are base isolated with deep pile foundations.

Increased business confidence and staff and occupant wellbeing

Modern, base isolated buildings do provide less risk of damage. That means less chance of medium- to long-term business interruption for tenants and loss of home for apartment dwellers.

Increased economic sustainability for New Zealand

As a country, we cannot afford to continually replace buildings that become damaged from seismic events, nor can we afford to see businesses incur significant costs or even fail because their place of business is no longer habitable. We also want apartment owners to enjoy a comfortable, safe home and a sustainable investment.