

An Overview of Economic Impact of Resilient Seismic Technologies on Earthquake Insurance in New Zealand

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Introduction

New Zealand has been affected by significant earthquakes over the years. Despite all the improvements introduced by developing the codes and standards since 1932, the country still suffers substantial losses after each earthquake. The series of earthquakes that hit Edgcumbe earthquake in 1987, Christchurch in 2010 and 2011 (Figure 1), Wellington and Marlborough in 2013, and Kaikoura earthquake in 2016 (Figure 2) all resulted in significant building damage and financial losses.



Figure 1. City Mall after 22 February earthquake 2011



Figure 2. Kaikoura earthquake 14 of November 2016

Methodology

This study conducts a review of the basic concepts adopted by the insurance industry to deal with the disaster impacts on residential and commercial buildings. It also reviews some significant seismic technologies newly introduced to the construction industry.

Insurance

The concept of insurance refers to a process that shifts economic risks from people to the insurer.

Seismic Resistant Technologies

Generally, seismic resistant technologies have been introduced to save lives and minimize failures. From the engineering perspective, seismic resistant solutions in NZ can be categorised into two main sections; base-isolation systems (Figure 3) and damage-resistant design of the superstructure (Figure 4). The role of isolation devices is to consume energy which needs the building and ground to be apart.



Figure 3. Base-isolated structures

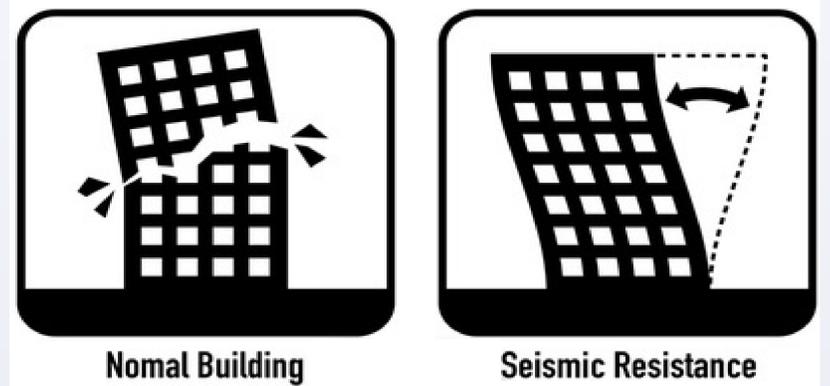


Figure 4. Damage resistant design.

The Impacts of Using Seismic Resistant Technologies on the Insurance Industry in

New Zealand

As a result of continuous earthquakes in New Zealand, the economy of the country has been significantly distracted especially, the insurance industry.

Resilient Slip Friction Joint (RSFJ) technology

To address this issue, a novel seismic technology has recently been introduced which is technically advantageous and can protect both the human safety and the building integrity. The Resilient Slip Friction Joint (RSFJ, Patent No. WO2016185432A1, NZ IP Office), combines the two most important characteristics of seismic technology – energy damping and self-centering in a compact device (Figure 5).

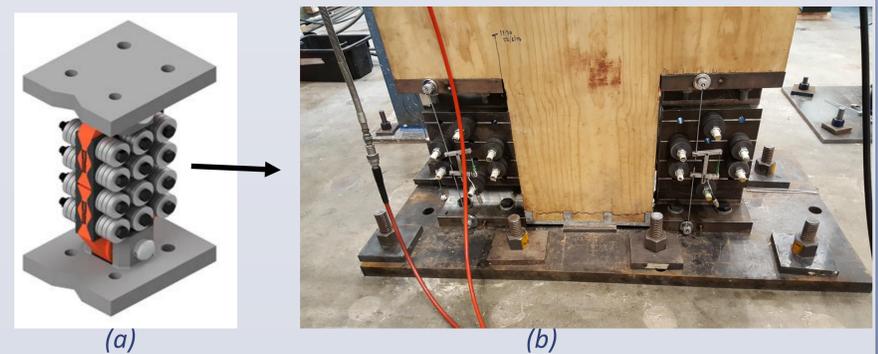


Figure 5. Resilient Slip Friction Joint (RSFJ) technology: (a) the concept developed for the new Nelson airport terminal (b) implementation

Conclusion

Earthquakes have frequently occurred in New Zealand and are expected to continue to happen the same. They have caused a large number of accidents, casualties and countless damages. The economy of the country has been significantly distracted especially, the insurance industry. The findings from a review of the seismic technologies newly become available in construction sector suggests that a unique opportunity exists for the insurance companies to reduce the risk profiles and enhance their control over the fluctuating risk models.