Beca

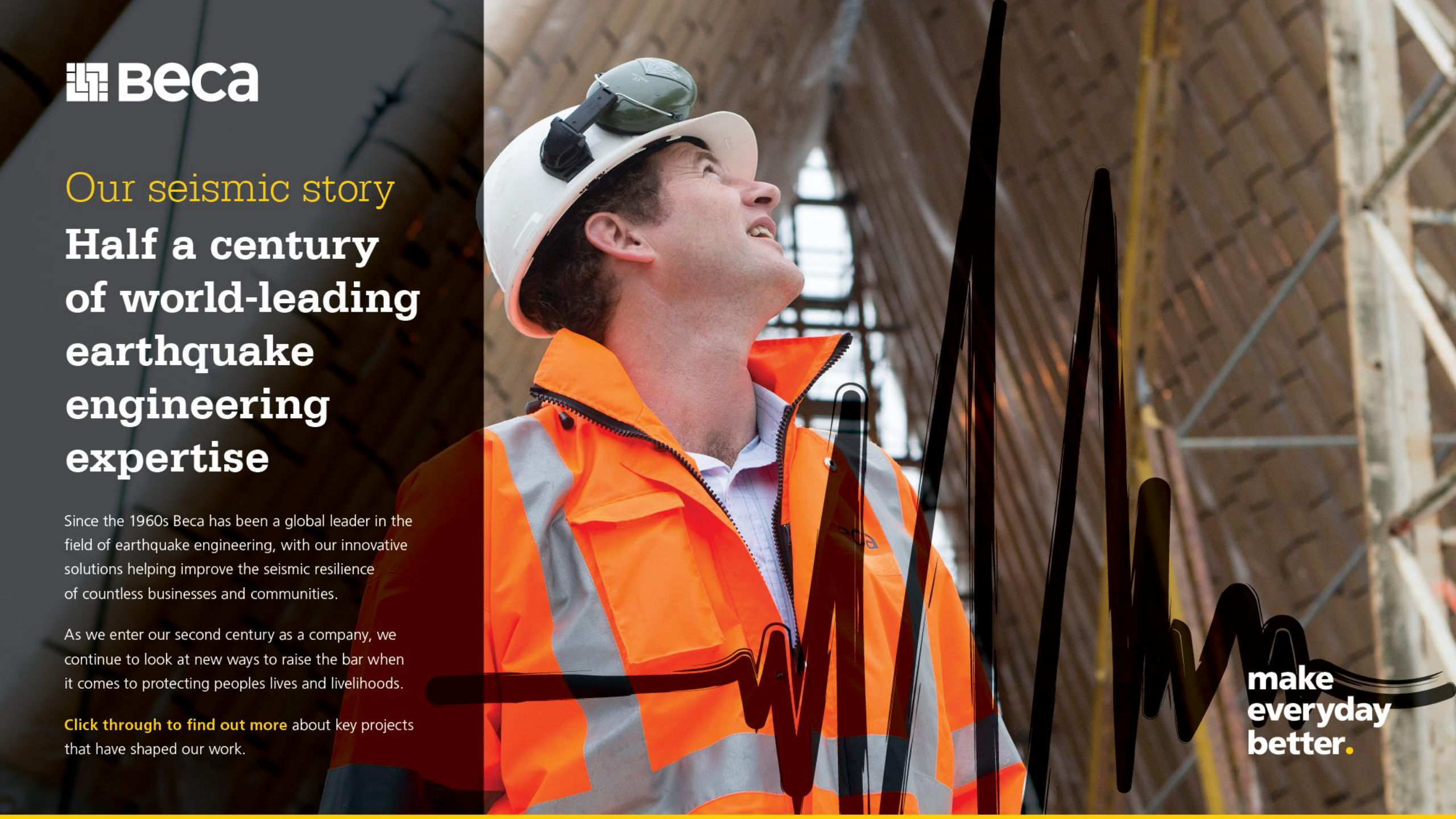
# Our seismic story

## Half a century of world-leading earthquake engineering expertise

Since the 1960s Beca has been a global leader in the field of earthquake engineering, with our innovative solutions helping improve the seismic resilience of countless businesses and communities.

As we enter our second century as a company, we continue to look at new ways to raise the bar when it comes to protecting peoples lives and livelihoods.

**Click through to find out more** about key projects that have shaped our work.



make everyday better.

# Capacity Design

**1968**

In the 1960s, Beca Founding Director John Hollings led the design of the Jerningham Apartments in Wellington's Oriental Bay.

Although relatively simple in form and appearance, this building hides a revolutionary design approach in its reinforced concrete frame. The building is designed to dissipate energy during an earthquake through what is known as a "beam-sway" mechanism, achieved by special ductile detailing to the beams and then a margin of additional strength to all other elements in the structure.

This design approach, referred to as capacity design, is described in a 1968 article by John entitled "reinforced concrete seismic design". Although this method has had a number of contributors over the years, John Hollings is widely considered the **"father" of capacity design** and the philosophy has been adopted in almost all international seismic design codes. The influence that John Hollings and the design of the Jerningham Apartments has had on the seismic safety of structures across the globe cannot be understated.


Image credit: **Google Maps**

# Seismic Loading Codes

1970

In the 1970s, Beca drafted **a new seismic loading code for Indonesia**. This project was carried out under the New Zealand Bilateral Aid Programme to Indonesia and considered a broad range of factors including zonation, ground conditions, structural types and ductility.

Over the next two decades similar projects were undertaken in Papua New Guinea, Philippines and Nepal.

The value that Beca provided was through the team's capability to utilise the latest knowledge in seismic engineering and hazard analysis – but craft it into a code that was practical and suited to local engineering requirements.

# South Rangitikei Viaduct

Early in the 1980s the Main Trunk Railway Line in New Zealand's North Island was realigned to avoid a 10km section of unstable terrain. The new alignment required three major river crossings and Beca was responsible for the design of the 320m long bridge at the southern-most end.

The high seismicity in the region required an innovative solution and this came in the form of the world's first base isolated bridge – the South Rangitikei Viaduct.

The 75m high concrete piers are designed to rock during a major earthquake and **the base can lift up to 130mm off the foundations.**

Although earthquake engineering has since come a long way, this innovative structural design would not look out of place today and has undoubtedly inspired numerous similar projects over the years.

**1981**

Image credit:
www.researchgate.net

# Christchurch Earthquake Response

Although Beca has been involved in the response to many earthquakes, none had the same impact as the magnitude 6.3 earthquake that struck Christchurch on 22 February 2011 – which resulted in the loss of 185 lives and over $30 billion of damage. After looking after our own staff and their families, **Beca engineers jumped to the aid of our clients** and assisted in the broader civil defence response. This included rapid assessments, securing of damaged buildings, specification of repairs and assistance with insurance claims. The earthquake also prompted a shift in how the risk posed by earthquake-prone buildings is managed in New Zealand.

Beca helped lead the development of the 2017 Technical Guidelines that are now mandatory for the seismic assessment of earthquake-prone buildings in New Zealand, and we apply these guidelines on a daily basis when supporting clients. The Christchurch earthquake has left a lasting imprint on Beca engineers and reinforced our drive to continue reducing the impact of similar events in future.

**2011**

# Going Digital

**In an increasingly digitised world, Beca is always looking for ways to deliver better.**

A standout example of this is the Groningen Induced Seismicity project. As a result of sustained gas extraction from an underlying gas field, the Dutch province of Groningen began to experience earthquakes – potentially putting tens of thousands of homes at risk.

Our client engaged Beca to develop a process for assessing at-risk buildings in a fast, reliable and consistent manner, helping fill the gap caused by a lack of local earthquake engineering experience. Our challenge was how to deliver Beca's expertise to the other side of the world. The solution was to collaborate with our Digital Services team to develop a Web Application that helped guide engineers through the seismic assessment process.

The Web App also automates large parts of the seismic analysis, freeing up 'engineers time to apply their judgement where it is most needed.reducing the impact of similar events in future.

**2016**

NZ HI-TECH AWARDS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