2010 Darfield, New Zealand Earthquake

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Summary

• M 7.1 earthquake 40 km west of Christchurch at about 10 km depth
• No fatalities
• Liquefaction and shaking induced damage
• US$3 billion total losses (estimated 9/15/10), 60-70% insured
The Earthquake
Ground Shaking
Liquefaction
Ancillary damage
Mitigation
Summary: 
Earthquake

- M 7.1 earthquake 40 km west of Christchurch at about 10 km depth
- Occurred at 4:36 in the morning
- Resulted in 30 km east-west surface rupture with up to 4 m of right-lateral horizontal offset and 1 m down-to-the-north vertical offset
- Occurred on a fault that hadn’t produced surface rupture in ~16,000 years
Summary: Ground shaking

• Over 1.2 g vertical PGA and nearly 0.8 g horizontal PGA near the surface rupture. 0.2 – 0.3 g PGA in Christchurch.

• Ground accelerations in Christchurch were about 70% of the design values for periods less than 1.5 s, and 100% of the design values at longer periods.

• Retrofitted structures and structures built to code generally fared well.
Liquefaction

• Liquefaction occurred throughout Christchurch but tended to be concentrated in specific areas and along water courses.

• The effect of liquefaction on infrastructure and neighborhoods was dramatic.
Summary:

Costs

- No fatalities
- US$3 billion total losses (estimated 9/15/10), 60-70% insured