Kaikoura Earthquake Technical Clearinghouse

Meeting #3 – Summary

Held at the Royal Society of New Zealand, Wellington, 1 December 2016

Purpose of Meeting

The purpose of this, the third, Kaikoura Earthquake Technical Clearinghouse meeting was to:

- Share information learned from inspections and assessments of buildings following on from the initial inspections. Individual buildings were not discussed at this meeting.
- Provide an update of the research into the characteristic of the earthquake, aftershocks, and ground response effects.
- Learn of the impact on, and status of, Wellington Lifelines.
- Provide an overview from the Wellington City BCA covering consenting of repairs.
- Receive an update from the Wellington City Council Critical Buildings Team.
- Hear about assessing residual capacity, particularly that due to the elongation of frames.

The Clearinghouse meeting was organised by the New Zealand Society for Earthquake Engineering (NZSEE), the Structural Engineering Society (SESOC) and the New Zealand Geotechnical Society (NZGS). The approximately 110 attendees were mostly structural and geotechnical consulting engineers, together with staff from WCC, CDEM, GNS Science, USAR, and Auckland, Victoria, and Massey Universities.

The meeting is run under Chatham House Rules.

Key Points from the Presentations and Discussion

- Peter Smith (President NZSEE) introduced the meeting programme and presentors.

- Nick Horspool and Mat Gerstenberger (GNS Science, Lower Hutt) provided:
  - An updated overview of the seismology for the Kaikoura Earthquake and aftershock sequence. Further investigation of the rupture zone (six interconnected faults), mapping of ground deformation (international satellite radar survey), seabed survey (on going by NIWA), and concurrent slow-slip events from East Cape to Cook Strait.
  - Peak Ground Accelerations for central New Zealand and Wellington area.
  - A note that GNS Science had installed a further 11 free-field recording stations in the Wellington City area to infill gaps in the accelograph array. These additional instruments provide a more extensive coverage across the Thorndon, Featherston Street, The Terrace and Te Aro, areas to suplement existing recordings.
  - An updated probability analysis of severe future aftershocks.

A pdf of the Kaikoura Earthquake GeoNet Update material presented for 1 December 2016 can be viewed **HERE**

- Richard Mowl (Project Manager, Wellington Lifelines Group) provided an outline of the Kaikoura Earthquake Sequences impacts on and the status of Wellington's Lifelines.
  - The telecommunication system has a high level of redundency, but is very complex due to the number of providers. Therefore, difficult to determine the actual resilience of the system.
  - Stand-alone emegency radio systems for emergency services are still required.
  - The need for lifeline utility operators to be informed promptly on the status of buildings post building inspections, to help manage network nodes within buildings, was particularly emphasised for electricity with many assets (i.e substations) within buildings that require access post earthquake.

  A pdf of the Wellington Lifelines – Impact and Status material presented can be viewed **HERE**

- Liam Wotherspoon (University of Auckland, Auckland) provided a summary of the ground motion characteristics of sites around Wellington during the Seddon Earthquake compared to the Kaikoura Earthquake. Over Site Soil Classes A, B, C & D, ground motion amplification varied over a wide range due to:
  - Soil stiffness variations and depth to basement rock.
  - Non-linearity of soil response.
  - 3-D basin effects, particularly at basin edges.

  Hence there was no correlation between the amplification of ground motion for the Seddon and Kaikoura Earthquake events. Therefore, need to be aware of site specific characteristics and high frequency energy effects on stiff buildings.

  A pdf of the Kaikoura Earthquake Wellington Ground Motion Characteristics 30/11/2016 material presented can be viewed **HERE**

- Mike Scott and Chris Scott (Consenting Group, Wellington City Council) outlined the issues Wellington BCA are dealing with as a consequence of the Kaikoura Earthquake Sequence and the demands with processing consents for building repair work. They are endeavouring to provide the required service, but were having difficultly obtaining engineering services to review consents due to the high demand on engineers' time. It was important to provide good communications to retain stakeholder engagement. It was noted that the consenting process can be expedited by:
  - Early engagement with BCOs to discuss projects.
  - Provide all required documentation clearly packaged.
  - A Design Features Report will be of significant benefit.
  - Understanding the requirements of each party and working cooperatively.

  There was a strong request to all those involved in the recovery and repair to share information with the Council.

- Dave Brunsdon and Hamish Mckenzie provided an update on the Wellington Engineering Leadership Team **developments**. The group is reviewing and updating the Christchurch Guidance on Detailed Engineering Evaluation of Non-residential Buildings (DEE, draft available off the SESOC website) to provide a Detailed Damage Evaluation (DDE) that will provided principles and guidelines for the structural review of buildings. The first draft should be available at the next Clearinghouse meeting on Thursday 8th December 2016.

  It was noted that:

  - To encourage an in-depth understanding of the building and the DDE process to be followed.
  - The process should be clearly communicated to building owners, tenants and the public.
  - A thorough review of the building structure and response characteristics is required before embarking on the details of repair and retrofit.
  - Important to report to the client, and to the Wellington City Council, in a form and with terms that are clear and understandable, covering the particular critical damage to the building elements and likely performance.
  - The Wellington City Council Critical Buildings Team can be contacted to advise on issues of public safety or to discuss particular concerns. Phone: 021946 138
    E-mail: wel.engineering@wrem.nz

  A pdf of the Towards Detailed Damage Evaluations 1 December 2016 presention can be viewed **HERE**

- Ken Elwood (Director, QuakeCoRE) introduced the Residual Capacity Working Group (Ken Elwood, Alistair Catanach, Nic Brooke, Rick Henry, Des Bull, Peter Smith) who are identifying residual capacities in reinforced concrete frame buildings. Their focus is on urgently providing guidance on defining the damage state beyond which residual capacity is potentially compromised. Signs to look for to identify potential frame elongation and deterioration of support for precast flooring systems, and the loss of lateral support for perimeter columns, were illustrated.

  The conventional Detailed Sesimic Assessment (DSA) will provide the the basic %NBS. However, observed structural deterioration, particularly of the floor diaphragm support, will give a reduced %NBS.

  A pdf of the Residual Capacity Working Group 2 December 2016 presention can be viewed **HERE**

- Websites are being updated as new material becomes available.

  The Kaikoura earthquake clearinghouse features seismology, building information, and photographs of the impacts of the Kaikoura earthquake sequence:

  http://www.eqclearinghouse.org/2016-11-13-kaikoura/

  The GeoNet site includes commentaries on the Kaikoura earthquake sequence and consequences:

  http://info.geonet.org.nz/display/home/2016/11/14/M7.8+Kaikoura+Earthquake%3A+Latest+updates

Automatically generated spectra PGAs associated with aftershocks are available from:

http://spectra.rapidalert.org.nz/

Next Kaikoura Earthquake Clearinghouse Meeting

Clearinghouse Meeting #4, Wellington, Thursday 8 December 17:30, Royal Society Meeting Rooms, Murphy Street, Thorndon.