nzsee
NEW ZEALAND SOCIETY FOR EARTHQUAKE ENGINEERING

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From the President

As we approach February 22nd, I find myself reflecting on the earthquake that happened 10 years ago in Christchurch that day as I am sure you do; the sad loss of life and the profound impacts on the community as well as the built environment. It was truly a significant event in our country's history and one that will be long remembered.

I also find myself reflecting on the role of so many, including very many within the earthquake engineering community who responded to the disaster in the immediate aftermath, and in the years following. It is appropriate on behalf of NZSEE to thank all those involved, on this the 10th anniversary for their many contributions to the response. You demonstrated by your efforts care to NZ in the widest possible sense. Thank you!

It is also appropriate to reflect on the many changes that have occurred, are underway, and are planned as a consequence of the Canterbury EQ sequence: The formation and funding of QuakeCoRE with its extensive research programme. The development of guidelines for the assessment of existing NZ buildings. The changes to the earthquake prone building legislation and the National Seismic Hazard Model update currently underway are but some examples of the developments that have occurred and are occurring following the recent earthquakes. We live in exciting times! Hopefully as a result of the learnings gained from the recent earthquakes and consequent developments, we can assist NZ to be better prepared for the inevitable next "one".

The upcoming NZSEE conference has the theme "Turning challenges into Positive Legacies" where we will explore these themes. We look to your joining us in Christchurch in April for the conference. Sign up via the conference website (here). We are also planning some associated activities around the conference which you can also signup for at the conference website. This includes a visit to the Christchurch Cathedral and several QuakeCoRE organised workshops. The arrangements for the different activities varies, with some limited in numbers and restricted to those attending the conference while others are more open– refer to the conference website for details. I encourage you to sign up early both to conference and the associated activities that interest you as past experience is that places fill up fast. I want to thank Matt Fox the conference

2021 AWARDS

Applications are now open for 2021 Awards. All applications should be with the Executive Officer by 5pm, Friday 5th March 2021.

UPCOMING EVENTS

NZGS Symposium 2020
Dunedin
24 – 26 March 2021
http://www.confer.nz/nzgs2021/

2021 NZSEE Conference
Christchurch
14 – 16 April 2021
https://confer.eventsair.com/nzsee-2021/

2021 SESOC Conference
Hamilton
5 – 6 July 2021
https://2021conf.sesoc.org.nz

17 WCEE
Sendai, Japan
27 September – 2 October 2021
http://www.17wcee.jp/

NZ Concrete Conference
Rotorua
14 – 16 October 2021

3 ECEES
Bucharest, Romania
19 – 24 June 2022
http://www.3ecees.ro

convenor this year and his able committee for all the work going into organising the conference.

This year we have a new innovation at conference, which I hope you will enjoy as either a participant or observer. We are holding a design competition for younger NZSEE members. This involves teams designing building and testing a building model. The plan is for the testing to happen during one of the lunch breaks on one of the university shake tables so all can watch. The rules for the building model have been developed and the teams are busy planning their models. I am sure it will be a lot of fun for all. Much thanks to Max Stephens and his able committee for all the organising work for the competition.

Take care, stay safe and be kind.

Helen

2021 NZSEE Conference

Registration is now open

The deadline for paper submissions for the 2021 NZSEE Annual Technical Conference has now passed with many very interesting papers submitted which I am sure you will enjoy.

Registration for the conference has been open since last year, but mark 3 March 2021 in your calendar, which is the deadline for early bird registrations.

Conference planning is going well and we've now locked in a great lineup of guest speakers to discover a diverse range of topics. The preliminary programme is available on the conference website and a final programme will be published in the next few weeks.

Look forward to seeing you at the University of Canterbury from 14-16 April 2021!

Matt Fox
Conference Convenor

2021 Design Competition

The first annual New Zealand Seismic Design Competition will take place at this years' NZSEE conference. Teams in the competition are required to design and build a small-scale earthquake-resistant building that will be tested to failure on a shake table during the conference. The objectives of the competition are to promote the study of earthquake engineering and engage students and young practitioners with NZSEE. There are currently five teams registered for the inaugural competition, including four teams of young practitioners from various engineering companies around New Zealand as well as one team of undergraduate students from the University of Auckland. There is still time to register for the competition – please email Max Stephens at the University of Auckland if you are interested in participating (max.stephens@auckland.ac.nz).

Call for 2021 Award Applications

Applications for 2021 NZSEE Awards are open until 5pm Friday 5th March, and should be submitted directly to the Executive Officer (exec@nzsee.org.nz). Full information on all awards can be viewed on our website here.

Awards include:

NZSEE Seismic Resilience Award for Design to Achieve Low Damage during Earthquakes

Low Damage Design case study projects are sought that have the objective of providing a low damage outcome in an earthquake event. The judges will consider the performance of the building, bridge, wharf or any other facility submitted with respect to:

- Structure
- Soil/foundation/structure interaction
- Non-structural elements
- Building services.

Projects must have been completed and opened between 2018 and 2020.For more information click here.

QuakeCoRE/NZSEE Women Leaders in Earthquake Engineering Award

This award is to recognise younger academic and professional women for ingenuity and entrepreneurial spirit in the field of earthquake engineering. It is awarded to recognise and honour an individual who has been involved in industry-leading innovative solutions to problems in earthquake engineering. The individual should be in the developing or expanding stage of her career. The intent of the award is to support increased participation of women in leadership roles in earthquake engineering. It is expected the awardee pass this intent forward through outreach and mentorship to other young women to further enhance diversity in the field of Earthquake Engineering. For further details click here.

EQC/NZSEE Ivan Skinner Award

For the advancement of earthquake engineering research and practice in New Zealand.

The objective of this award is to advance the common interest of the Earthquake Commission (EQC) and the New Zealand Society for Earthquake Engineering Incorporated (NZSEE) in promoting research to practice outcomes, which reduce the impacts of earthquakes on New Zealand communities. For further details click here.

NZSEE Research Scholarship

The objectives of the scholarship are to promote research in earthquake engineering and encourage students of high ability to continue advanced studies in earthquake engineering. Applicants should be pursuing a full-time course of study towards a post-graduate qualification at a New Zealand institution including research relevant to the mission of the NZSEE, which is to *gather, shape and apply knowledge to reduce the impact of earthquakes on our communities*. For further details click here.

Please note that no award may be given for any particular category at the discretion of the NZSEE and award committees. The decisions of the judges are final and no correspondence will be entered into.

WCEE Bid

Sadly we were not successful in our bid to host the 2024 WCEE. Instead, we will all be off to Milan, Italy, in 2024.

A massive thanks to Quincy Ma for leading the bid, and to the bid team Michael Stokoe (Tourism NZ), Jessica Skinner (Auckland Convention Bureau), Amy Abel (Conference and Events), and NZSEE members Andrew Charleson, Geoff Rodgers, Helen Ferner.

Call for Management Committee Nominations

Nominations for the 2021-22 NZSEE Management Committee are now open. The Society members annually elect nine of their members to the Management Committee. All current members of the Management Committee are eligible to be re-elected if they wish to have their nomination put forward.

Nominations shall be on a form supplied by the Executive Officer, shall be signed by the candidate, his or her proposer and seconder, all of whom shall be financial members of the Society and members for at least one year. The completed Nomination Form shall reach the Executive Officer not later than the due date of Wednesday 3rd March 2021. The nomination form can be sent to the Executive Officer as an attachment to an e-mail or by post.

In the case that an election is required, brief biographical details on members who have put themselves forward for election will be provided to members electronically on Wednesday 10th March 2021. Facilities for an electronic election of Management Committee members will commence on that date and continue through to Wednesday 7th April 2021; one week before the AGM in Wellington on Wednesday 14th April 2021.

If a member wishes to receive the biographical details by post and also would prefer to vote via a hardcopy voting form, please inform the Executive Officer by posting a request to the Executive Officer, NZSEE, PO Box 2193, Wellington, New Zealand 6140. Last day for requesting hardcopy voting documents from the Executive Officer is the 31st March 2021.

Note:
Membership of the ManCom dates from the AGM, generally held in March/April of each year, and is over the period to the next AGM the following year.

Code Advisory Panel Update

With John Sneyd having come in as the new General Manager for the BSP branch of MBIE, there seems to be a renewed sense of optimism amongst members of the CAP. Open and constructive discussions between MBIE staff and industry representatives is being emphasised, and there is a genuine desire from the Ministry to draw upon the expertise of technical groups such as the NZSEE. Of key interest to us is the Seismic Risk work programme. Although the revised version of the National Seismic Hazard Model is only expected to be delivered in 2022, MBIE is already considering how changes that may be in it could impact upon the Building Code. Collectively the CAP endorsed this approach and specifically the plans to prioritise the updates to the Acceptable Solutions and Verification Methods that are likely to be impacted by the updated model (B1 Structure).

Furthermore the CAP has also been considering the detail of work by MBIE into updates to the H1 Energy Efficiency section of the Code, the development of a tiered framework for access and management of technical standards documents, and an improved education and training strategy to drive Building Code compliance across the industry. Looking ahead, and with a new Minister for Building and Construction in the Hon. Poto Williams, there are expected to be several more significant areas of discussion for future CAP meetings. These are likely to include further legislative reforms, MBIE's Building for Climate Change programme, and potential revisions to the consenting model.

Patrick Cummuskey
NZSEE Representative on CAP

Seismic Risk Working Group

The report has now been released. You can read the full report (here):

Alongside the release of the document, Jenni Tipler (MBIE Engineering Manager) noted,

> "*The Seismic Risk Work Programme as outlined in the attached report is still at a very early stage, but we are now starting to ramp it up. There will be significant consultation processes as part of this work, which will offer you a chance to share your feedback with us, including your thoughts on this report.*
>
> *We will continue to keep you informed as work progresses, and as opportunities to have your say come about.*"

The NZSEE management committee is regularly discussing these activities with MBIE. If you have any comments or questions that you would like us to pass on to MBIE please let us know.

Background

The National Seismic Hazard Model (NSHM) is currently being updated by GNS Science. The updated NSHM will incorporate advances in earthquake science and experience gained from earthquakes that have occurred over the last decade.

MBIE pulled together an expert group working through Engineering New Zealand, to discuss the current building regulatory system and identify possible improvements ahead of the Seismic Model's release. MBIE selected the Seismic Risk Working Group

members from both engineering practice and academia, including people with seismological, structural and geotechnical expertise. The group comprised Misko Cubrinovski, Ken Elwood, Matt Gerstenberger, John Hare, Rob Jury and Rick Wentz. The lead author was Hugh Cowan.

The Seismic Risk Working Group were asked to focus on how NSHM results should be used within the Building Code to support the design and construction of future buildings.

The group made a number of recommendations across a broad range of topics covering seismic performance objectives and expectations, current design practices, gaps in the existing system and seismic hazard considerations.

MBIE summarised the key themes in the working group feedback as:

- **Clarity of performance objectives**: The provisions in the Building Act and Building Code are generally appropriate but are not stated with sufficient clarity or transparency to inform the development of Verification Methods or Alternative Solutions.
- **Policy/risk settings**: Policy/risk settings should sit above (in terms of the legal hierarchy) the technical means to achieve them. These settings should reflect both Government intent and societal expectations. In the past, Standards' committees have at times made policy decisions based on industry consensus that may or may not reflect the intent of Government policy.
    - Certain design provisions result in inconsistent building performance: Inconsistent performance may be exacerbated due to;
        - Design provisions allowing for trade-offs between strength and ductility
        - The treatment of irregular structures
        - Liquefaction that is triggered at shaking levels between SLS and ULS
- **Geotechnical considerations**: Geotechnical provisions for seismic design should be substantially overhauled so as to appropriately incorporate ground conditions, foundation performance and soil-structure interaction in the design process.

Recommendations

The recommendations section of the main report (Appendix A) is repeated below:

The recommendations have been thematically categorised, with those in bold the most important, but are not listed in priority order. They are not mutually exclusive, nor is this an exhaustive list: it will evolve with further discussion, analysis and collaboration between the sector and with the regulator.

PERFORMANCE OBJECTIVES

1. Review current Building Code clauses (including consideration of seismic risk settings) to ensure they articulate societal expectations and are reflected in the Building Act.
2. Review whether NZS 1170.5 and supporting Standards provide sufficient means and criteria, including limit states, to enable design that is fully consistent with the performance objectives outlined in the Building Act and the Building Code.
3. Develop a better understanding of 'amenity' as it applies in the Building Code and ensure consistent clarity in supporting documentation.
4. Assess the required performance of fire-resisting/protection systems following earthquake and how this may be achieved in design.
5. Reassess whether the secondary effects of earthquake such as fire-following, tsunami and slope instability are adequately reflected in performance objectives and/or should be addressed in seismic design provisions.

STRUCTURE OF THE BUILDING CONTROL SYSTEM

6. Aspects of NZS 1170.5 – specifically regarding Importance Levels (ILs) for buildings – need to sit above the technical means by which those are achieved.
7. Ensure the Building Code (i.e. clause B1), relevant compliance documents and supporting documents provide clear commentary with sufficient quantitative clarity around intent for seismic performance.
8. Ensure the means by which Alternative Solutions can be demonstrated to meet the performance objectives, are clearly stated.

ASSESSING AND IMPROVING PERFORMANCE

9. Review current practice that allows additional strength to be offset by reductions in ductility. Consider whether the requirements for elastic strength and stiffness are sufficient to deliver desired objectives under moderate levels of shaking, as well as performance in aftershocks or future events that may follow large earthquakes (e.g. ULS levels of shaking) during the life of a building.
10. Require irregular structural forms or potential stiffness incompatibilities to be considered in the selection of overall building performance requirements, not just control the analysis method that must be used to design them.
11. Review the entire approach to the incorporation of geotechnical information for seismic design to ensure a consistent and robust approach that will enable designers to achieve target performance objectives. This includes challenging the basis for

retaining B1/VM4, which does not provide appropriate guidance for foundation design of engineered structures.
12. Consider incorporating the assessment of performance of the structure / ground / foundation system at shaking levels between SLS and ULS.
13. Facilitate a challenge relating to the current provision of education and training for seismic design.
14. Review assurance processes for construction monitoring to ensure seismic design is being executed and realised as intended.

ADDRESSING GAPS IN THE SYSTEM

15. Develop provisions for the treatment of damaged buildings in the Building Act, noting the absence of guidance following recent earthquakes was problematic for regulators and building owners alike.
16. Incorporate considerations of ground conditions, foundation performance and soil-structure interaction effects in the design process. Such provisions could include reference to ground failure (e.g. liquefaction), non-liquefaction-related foundation settlement and consideration of 'off-site' geotechnical hazards.
17. Relevant key Standards should be clearly aligned, accessible and able to be efficiently applied by practitioners across the industry.
18. Develop a process that assures the quality and continuity of revision for selected technical Standards (e.g. by establishing standing committees for timely review of design and material standards).

SETTING THE LEVELS (CONSIDERING THE NATIONAL SEISMIC HAZARD MODEL)

19. Consider appropriate and alternative ways (e.g. different engineering parameters) for using the seismic hazard output in design. This recommendation recognises the need to use different engineering parameters in structural and geotechnical design of buildings and infrastructure.
20. Provide guidance enabling the Seismic Model team to provide the required parameters in a manner that adequately reflects inherent uncertainties and design needs. This will need to commence early but will require an iterative process as the results are received and evaluated.
21. Consider incorporating region-specific hazard characteristics for selected regions (or urban centres), where justified by benefits and data availability.
22. Address how to practically achieve risk-based design through the Building Code. In parallel to the Seismic Model, develop a decision-support framework, explicitly based on appropriate risk targets, that uses the National Seismic Hazard Model to support the selection of design factors, such as zonation Z, importance factors, and consideration of collective risk in cities.

Resilient Buildings Project

Establishment phase for the resilient buildings project has now been completed. This phase had several key tasks:

- engaging with the engineering community about the issues, context and vision for the project,
- clarifying the relationships between the various seismic projects and how these relate and interface, and
- framing the problem and developing an operational structure for the project.

This initial work identified significant interest and support about the project across the engineering and resilience communities with acknowledgement the project is both needed and timely.

"*aligns and follows on from the seismic risk working group project*"

"*a positive and timely legacy 10 years on from the Christchurch earthquakes*"

In support of the project a workshop was held in conjunction with the QuakeCoRE Annual Meeting in Nelson in early December where early findings from the Earthquake Stories Project were discussed and options for stakeholder engagement explored for the resilient buildings project.

We are now starting the next stage: "Understanding Societal Expectations" where we aim to discern societal expectations using a mixture of interviews, surveys and targeted workshops to gain an understanding of the levels of tolerable performance for various stakeholders.

We are very grateful for the support EQC are providing to make this work possible

Steel Construction NZ Chair's Award

Congratulations to NZSEE member Greg MacRae, who in November 2020 received the Steel Construction NZ (SCNZ) Chair's Award.

Canterbury academic wins coveted industry award

Greg MacRae, Associate Professor of Civil Engineering at the University of Canterbury, is this year's recipient of the prestigious Steel Construction NZ (SCNZ) Chair's Award. The annual award recognises individuals who have made a significant and lasting contribution to New Zealand's structural steel industry.

SCNZ Chair and John Jones Steel managing director Frank Van Schaijik presented Greg with the award at a gala dinner in Queenstown on 13 November.

"Greg has had a deep impact, not only on our structural steel industry, but also on the wider construction industry. He has demonstrated a clear focus on finding the best structural solutions for both the community and the industry using safe, strong and resilient structures," says Mr Van Schaijik.

When the devastating Canterbury earthquakes struck, Greg was head of the Structures Group at Canterbury University exploring structural steel frames that could withstand seismic events. Unsurprisingly, Greg's expertise were soon keenly sought after. With a focus on structural resilience and low-damage design, he consulted on many seismic-frame solutions.

Mr Van Schaijik says Greg's willingness to engage with industry to find the most cost-effective and buildable solutions led to the successful completion of many projects as part of the Canterbury rebuild.

"The 2011 earthquake made people rethink how buildings are constructed and how they perform during and after a 'quake. While the primary concern for buildings is to ensure people can safely walk away after an earthquake, operational continuity where buildings can be quickly reoccupied following a seismic event is also critical."

The Christchurch rebuild showed a decisive shift from the traditional reinforced concrete frames towards the use of low-damage, seismic-resisting materials. As a result, demand for structural steel rose steeply and the material's share of the multilevel construction market grew from virtually nil to over 80 percent in Christchurch. The trend has seen architects favour exposed steel frames as part of the overall aesthetic, proudly displaying the critical seismic-resisting elements.

"Today, structural steel's uptake in Christchurch has become a blueprint for high-quality, seismically resilient construction throughout New Zealand," says Mr Van Schaijik.

Greg's work is internationally recognised. Results from his research have been incorporated in design guidelines around the world and have influenced the construction of millions of dollars' worth of buildings in New Zealand, Japan and the USA.

Greg was the director of the University's postgraduate earthquake engineering research programme and he was a member of its Quake Centre board. He has written for the Royal Commission on the Canterbury earthquakes and from 2011-2019 he was the New Zealand representative to the International Association of Earthquake Engineering. He currently heads the New Zealand-China ROBUST test programme, which is associated with the International Association of Earthquake Engineering.

NZSEE Regional Groups

NZSEE Regional Groups are active in Auckland, Wellington and Christchurch. The Regional Groups organise regional events and presentations and host New Zealand wide travelling lectures, and they are interested in presentations from local members. There are plans to set up an additional regional group in Dunedin soon– keep an eye out for further details.

Contacts for the regional groups are:

Auckland	Liam Wotherspoon & Sam White
Wellington	Jenni Tipler & Karina Dahl
Christchurch	Anna Winkley & Nigel van den Akker
Dunedin	Mark Stirling

For further information please contact Tony Holden: tony.holden@aurecongroup.com

Contact

All correspondence regarding the Society should be sent to

E-mail: exec@nzsee.org.nz

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