

# STEEL FUTURES

## CHRISTCHURCH: THE ROAD AHEAD

2011 has, without doubt, been a challenging year for the structural steel industry. The economy is still enduring the effects of the global financial crisis, imported prefabricated steelwork continues to pose a threat to our industry, and the rebuild of Christchurch has yet to get underway.

The next 12 months will be no less challenging. Many commentators believe that we are unlikely to see an upturn in commercial construction activity, particularly in Christchurch, until the end of 2012.

In fact, it was the devastating February 22<sup>nd</sup> Christchurch earthquake that clearly defined SCNZ's priorities for 2011 and, now, into 2012.

Interestingly, a visiting US steel researcher, who was a member of the steel reconnaissance team which inspected steel buildings in the wake of the two major earthquakes in September 2010 and February 2011, naïvely mused that the steel construction industry would not have to champion the very good seismic performance of multi-level steel buildings as "the facts would speak for themselves".

This assessment could not be further from the truth. The reality is that since the February quake, rival materials sectors have aggressively promoted their solutions. Now, more than ever, structural steel must widely promote its credentials as an ideal material for building and infrastructure projects.

This need is reflected in recent decisions made by the SCNZ executive council. In 2011 SCNZ has firmly focused on promoting the credentials of structural steel solutions and growing the material's market share in New Zealand, particularly Christchurch. To assist SCNZ with this work, we have engaged a communications company to help develop and implement an external communications strategy.

We are working on a number of initiatives that will help to create a strong position for structural steel leading into 2012. The first is our submission, prepared on behalf of the steel construction industry, to the Canterbury Earthquakes Royal Commission.

SCNZ's submission highlights the glaring omissions from the Royal Commission's Interim Report, particularly the absence of any discussion of low-damage seismic-resisting structural steel technology, and the strong seismic

performance of structural steel buildings during the Christchurch earthquakes. The use of low-damage structural steel solutions is well established in New Zealand: over \$3 billion of buildings constructed since 2005 use this technology.

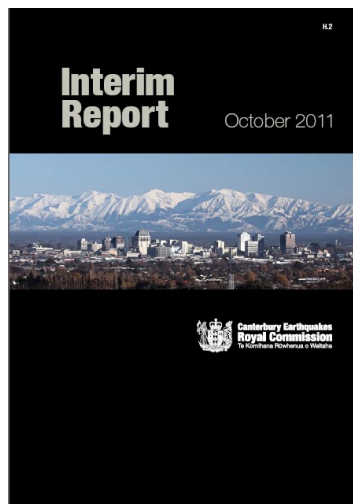
Without greater balance in its discussion and assessment of the various building materials and systems, there is considerable risk that the Royal Commission will be unable to adequately inform decision-makers of best-practice solutions for the rebuild and repair of Christchurch's (and Canterbury's) buildings and infrastructure.

With our submission now complete, our next aim is to present SCNZ's recommendations at a Royal Commission hearing on this topic in February 2012.

Another initiative gathering momentum is a steel construction forum scheduled for late February, which will target the rebuild decision-makers in Christchurch. Our primary goal is to educate the local market on the benefits of using structural steel in the city's rebuild.

Alongside this activity, SCNZ is working with HERA to update an important seismic design resource that has served the structural engineering fraternity well over the past 16 years: HERA report R4-76, *Seismic Design Procedures for Steel-Framed Buildings*.

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## UPCOMING EVENTS

<b>2012</b>	
1-9th Feb	- Achieving Seismic Performance in Steel Connections Seminar
15-22nd Feb	- Design of Steel-Concrete Composite Bridges

Clearly, there is much work to be done to grow our market share. These activities will provide us with a strong start in 2012 – the key will be to maintain that momentum. The work we do in the next 12 months to develop

## GOOD TURNOUT FOR TECHNICAL SEMINAR SERIES

The latest SCNZ organised technical seminar series was attended by nearly 140 engineers from around the country. These seminars are run twice a year at six New Zealand locations (Christchurch, Nelson, Wellington, Taupo, North Shore and Auckland).

It was great to welcome back in good numbers engineers to the Christchurch seminar. The March event this year was cancelled for obvious reasons following the devastating February 22<sup>nd</sup> earthquake event. The Taupo and Auckland events were also well attended.

It was intended that the seminars should be practical and relevant to practicing engineers. Based on the feedback received the seminar appears to have hit the mark.

The topics covered included updates to two technical design resources (HERA Report 4-76 and Steel-in-Housing), hollow steel connections and two sessions dedicated to steel-concrete composite buildings. The first steel-composite session covered a new design guide prepared for the cost effective design of steel framed carparking buildings while the second was dedicated to the vibration design of floor systems utilising a relatively new method co-developed by Dr Stephen Hicks the HERA Structural Systems Manager. One of the more interesting sessions of the day was a series

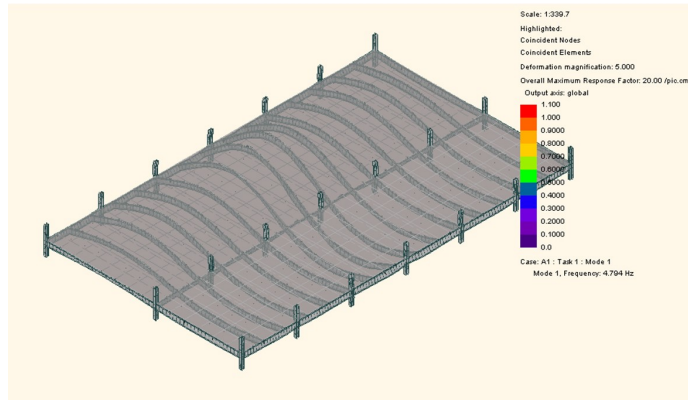
recognition and acceptance of structural steel as an ideal solution for the Christchurch rebuild is, quite simply, crucial to the success of our industry going forward.

of case studies presented by SCNZ Structural Engineer Kevin Cowie demonstrating the use of new analysis software to assess the vibration performance of steel-concrete composite floors of buildings currently under design in New Zealand.

SCNZ engineers were accompanied for this series by Arun Syam, Tubular Development Manager for OneSteel Market Mills. As a late replacement, Dr Charles Clifton Associate Professor University of Auckland, presented Arun's presentations in Auckland. We would like to thank Onesteel for making Arun available for the series. It was great to welcome Charles back as part of the presentation team. Charles' enthusiasm and expertise has not diminished with time.

No Steel Structures seminar series is planned until Spring of 2012. There is already a very congested calendar of technical seminars of interest to structural engineers in February and March next year including two seminars organised by HERA.

SCNZ will continue to provide technical assistance to designers (structural engineers and architects) of steel buildings. Those requiring assistance can contact the technical help desk at (09) 263 5635.



Case Study—Vibration Analysis

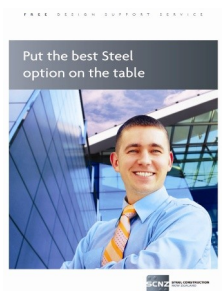
## SCNZ FREE DESIGN SUPPORT SERVICE – CHRISTCHURCH REBUILD

In the aftermath of the devastating 4<sup>th</sup> September 2010 and 22<sup>nd</sup> February 2011 Lyttleton earthquakes, there are many badly damaged buildings requiring replacement. The design of these buildings will place considerable demand on building designers.

To aid busy design professionals at the concept phase of a project, SCNZ offers a free design support service to help them explore the potential of steel solutions for their

projects. Working alongside design teams, we prepare costed preliminary structural designs that involve the efficient and cost effective use of structural steel.

For more information on this free service please refer to the attached brochure, or download a copy from the SCNZ website, [www.scnz.org](http://www.scnz.org).



## SEASONS GREETINGS

SCNZ staff members Alistair, Kevin and Rebecca, wish all members, supporters and their families a Merry Christmas and a Happy New Year!

**The SCNZ Office will be closed from 23rd December until 9th January 2012.**



# 2011 CONFERENCE AND AGM A RESOUNDING SUCCESS

A strong attendance at this year's SCNZ conference and AGM, held on the afternoon of Thursday 3<sup>rd</sup> November at the new Novotel Auckland Airport, ensured the event was a big success.

Seventy five members and guests enjoyed a range of presentations, followed by an excellent dinner and some tall tales from after-dinner speaker Phil Kingsley-Jones.

The afternoon commenced with the AGM, and changes to the Council were approved. Former Vice-Chairperson Mike Sullivan of D&H Steel Construction in Auckland has replaced NZ Steel's Chris Kay as Chairperson. Peter Donohue of Steel & Tube Holdings Ltd in Christchurch has been elected to the Vice-Chairperson role.

One of the more interesting speakers during the conference was Phillip Ridge of the Canterbury Development Corporation (CDC). With the tough economy top of mind for many members at present, the rebuilding of Christchurch represents a big opportunity. Phillip provided his on-the-ground perspective on the draft Central City Plan and highlighted the importance of the local supply chain to the rebuild project – which he estimates could take 10-15 years to complete. While the China free trade agreement will make it impossible to mandate the use of local content in the



Phillip Ridge of CDC presents to members

rebuild, CDC is working closely with the Industry Capability Network to maximise the opportunity for local suppliers. The other main focus of the afternoon was sustainability. David

Ryan of the Australian Steel Institute (ASI) shared his views on the implementation of an Environmental Sustainability Charter (ESC) for ASI members. Importantly, the emphasis is not just on the environment – it's about building a sound business case. With tenders increasingly asking questions about suppliers' carbon footprints etc, sustainability will in the future become part of the construction landscape. To date 23 ASI members have signed up to the ESC.

Next up, a fabricator from Adelaide, Rick Green, gave his company's perspective on the ESC. They are adding additional value to their customers through the ESC because they can now earn green star points, which are fast becoming essential for many big building projects.

The final speaker was Rohan Bush from the New Zealand Green Building Council who provided an update on the steel credit as part of the Green Star rating system.

The formal part of the conference ended with a video case study of the newly-completed Novotel Auckland Airport. Completed on a quick timetable in time for the Rugby World Cup, the hotel is an excellent showpiece for the structural steel industry.

SCNZ would like to thank all the guest speakers, plus the support of sponsors Ron Mack Machinery and Steltech, who helped make the conference and AGM a big success. We look forward to delivering another high quality event next year.



Novotel Hotel Auckland Airport

## NEW DESIGN GUIDE AVAILABLE FREE TO MEMBERS

SCNZ launched their latest report, SCNZ 19; *Steel Framed Carparks: A Design Guide* at the recently completed Steel Structures seminar series. This publication provides guidance for the cost effective design of steel-concrete composite carparking buildings. It covers the key technical and construction issues associated with this type of construction including serviceability criteria, fire and durability. A useful feature is the inclusion for preliminary

design and estimating purposes of a number of fully sized structural arrangements featuring floor systems commonly used in New Zealand. This document comes in pdf and hard copy format and is available free to members. A minimal charge applies to non-members.



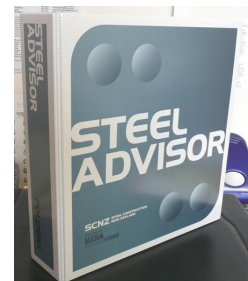
## STEEL ADVISOR LATEST ISSUE

The latest Steel Advisor issue contains three articles prepared by SCNZ Engineer Kevin Cowie. The first article is entitled **Design Example – Column in Simple Construction**. This worked example illustrates the design of columns in simple construction in accordance with NZS 3404 Steel Structures Standard.

The second article is entitled **Design Example – Column in Simple Construction Effective Length**. For continuous columns in simple construction the restraint provide by the continuity of the column past a floor level may be used to reduce the column effective buckling length. A worked example is used to illustrate this.

The third article is entitled **Bolted Splices in Compression – Splice Plate Member Checks**. For bolted splices that are non bearing with compressive axial forces, the plate member (buckling) axial capacity must be checked. This is not covered in SCNZ Structural Steelwork Connection Guide: Steel Connect This article sets out the plate member axial capacity requirements.

The Steel Advisors articles are available for subscribers at [www.scnz.org/steel-advisor](http://www.scnz.org/steel-advisor).



## Would you like to become a SCNZ member?

For an annual subscription of only \$100 + GST you can enjoy the benefits of belonging to an association dedicated to the advancement of steel construction. Please fill in the details below and fax back to 09 263 5638.

**Yes, I would like to become a SCNZ member.**

For a copy of the SCNZ Membership brochure, please visit the SCNZ website, [www.scnz.org](http://www.scnz.org).

**Company name:** ..... **Contact Name:** .....

**Phone:** ..... **Email:**.....

## ACHIEVING SEISMIC PERFORMANCE IN STEEL CONNECTIONS

Very good performance of steel framed buildings in the recent Canterbury earthquake highlighted advantages of steel as the material of choice for seismic design of multi-storey buildings.

Generally, steel frames performed very well and as expected. The fact that some inelastic demand has been observed in EBF active links along with some fractures raises the issue of reviewing current design and fabrication practices, establishing criteria for inspection, repair or replacement.

Major earthquakes have always triggered research and investigations resulting in changes to building codes and specifications. In the USA for example, an extensive and comprehensive series of investigations and reports has been completed for the Federal Emergency Management Agency (FEMA) after the Northridge earthquake in California.

Robert E. Shaw, one of the world's leading experts on seismic connections, was instrumental in this research and translating its results into codes such as AWS D1.8 Seismic Welding. Bob will share his valuable experience with assessment, retrofitting and detailing of welded and bolted connections in moment frame, braced frame and steel plate shear wall systems with New Zealand colleagues through a series of



seminars in February 2012. His popular seminars have already been offered in many countries around the globe.

Whilst the general principles of seismic design have much in common, there are significant differences in detailed approach and emphasis for application in different countries. Therefore relevant NZ standards (NZS 3404.1 1997 and 2009, and AS/NZS 1554.1) will also be discussed and compared to the newly updated US standards (AISC 341, AISC 358, AWS D1.8).

### VENUES

- Auckland 1 February 2012
- Wellington 2 February
- Christchurch 9 February

Robert is an excellent presenter – so do not miss this outstanding professional development event! For more info please refer to HERA Events on [www.hera.org.nz](http://www.hera.org.nz) or email: [welding@hera.org.nz](mailto:welding@hera.org.nz)

## SEMINARS ON THE DESIGN OF STEEL-CONCRETE COMPOSITE BRIDGES

The combination of the compressive strength of concrete with the tensile strength of structural steel results in efficient and cost effective bridges. The resulting longer spans contribute to a lighter superstructure meaning fewer piers and smaller foundations reducing the environmental footprint and construction time.

This one-day course is ideal for Engineers wishing to update their steel bridge knowledge; particularly in relation to the design of steel and concrete composite bridges according to AS5100



and the Steel-Concrete Composite Bridge Guide.

The newly published Steel-Concrete Composite Bridge Guide will be launched and introduced, with all delegates receiving a complimentary copy on attendance.

For more information and a registration form, please visit: [www.hera.org.nz](http://www.hera.org.nz).

# WATCH OUT FOR UPDATED TECHNICAL DESIGN RESOURCES IN NEW YEAR

The SCNZ team are currently updating two technical design resources. These projects include updating of HERA report R4-76, *Seismic Design Procedures for Steel-Framed Buildings* and *Steel in Housing*. The R4-76 work is a joint HERA/ SCNZ initiative. The changes to these resources were overviewed during a recent SCNZ seminar series. The purpose of this article is inform potential users of these resources of the nature of the changes and the timeline for such changes.

## HERA Report R4-76

The guide covers seismic design procedures, based on the technical requirements of the Steel Structures Standard NZS3404, for three types of systems: moment frames, concentrically and eccentrically-braced frames. The latter is the first part of the document to be updated.

There are no major changes to the methodology, the main driver for the update has been to bring it in line with the latest design standards which have undergone a number of amendments and revisions in the past 16 years. The very good seismic performance of steel buildings in the recent Christchurch earthquakes and after shocks has confirmed the adequacy of the current steel structures seismic design provisions and the design methodology in R4-76.

Aside from bringing into line with the latest design standards, the guide will also feature new material which will include a section on the seismic performance of steel buildings during the recent Christchurch earthquakes, removable links and a worked example.

In light of the economic cost and disruption caused by earthquake damage to buildings in Christchurch this year, it is likely more buildings will be designed with readily repairable seismic resisting systems. An example of this is eccentrically braced frames with removable active links. These links provide the energy dissipating mechanism for the system and are readily replaceable after a severe earthquake event. The performance of removable links has been confirmed by recent Canadian research which has shown these links give similar performance to conventional link arrangements. The updated report includes design guidance on these removable elements.

Holmes Consulting Group has prepared a worked example



Removable eccentrically braced frame link

for an 8 storey eccentrically braced frame. This comprehensive worked example includes full design checks for each type of element (link, brace and column) and connection (beam/brace/column and frame base) with suitable commentary to facilitate understanding of the various design steps. The revised report will be available early 2012.

## Steel-in Housing

Steel in housing is an online design aid to assist builders, draftspersons, engineers and architects specify a range of pre-engineered structural steel beam and moment frame wall bracing solutions for residential building applications. These solutions are intended to be compatible with the timber framed standard NZS 3604 terminology, definitions, loading and design criteria.

Until recently the solutions covered included:

1. Lintel beams supporting roof and floor loading, including cantilevered decks
2. Floor beams and bearers

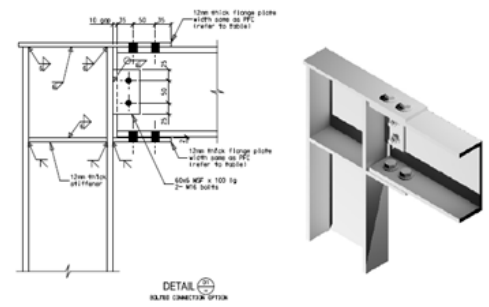
Lintel and floor beam solutions are provided up to 8m spans.

There is a growing trend in architecturally designed houses to have significant portions of glazing in external walls, thereby precluding the use of sheet lined bracing elements. Wellington based consulting engineering company Silvester Clark have been engaged to design load rated moment frame bracing elements for use in residential housing applications. The solutions provided cover member sizing and all the connections (knee and base). The solutions cover ceiling heights of 2.4, 2.7 and 3 metres and are applicable for frames up to 5.4metres long. The frames are rated for 100,150 and 200 BU (bracing units)

While the pre-engineered solutions have been designed in accordance with the appropriate loadings (AS/NZS 1170) and material (NZS 3404) design standards and established New Zealand practice for domestic housing structures, a Chartered Professional Engineer is required to provide the appropriate certification (Producer Statement Design) to accompany a building consent application.

SCNZ's web developer is currently uploading the new moment frame solutions. It is hoped to complete the necessary quality assurance over the Christmas /New year period and to have the revised on line version available early 2012. The Steel in Housing Online is hosted on the Steel Construction New Zealand website [www.scnz.org](http://www.scnz.org).

The Steel in Housing Online can be accessed by SCNZ members from the navigation bar on the front page of SCNZ website under Design Tools.



Steel-in-Housing – New steel moment frame bracing elements

# CONCRETE OUTCOMES FROM INDUSTRY FORUM

An important industry forum was held in conjunction with the SCNZ AGM in early November to discuss the current state of the construction market and how the industry can best respond to the commercial challenges it faces.

An independent facilitator Brent Murray was engaged to maximise the value of the event. SCNZ members representing many of the major local steel fabrication companies engaged in the commercial construction market were present along with a number of representatives of companies involved in the steel supply chain such as steel manufacturers and distributors.

The forum attendees were broken into four groups to answer a series of key questions related to the current commercial market and what could be done collectively as an industry to improve the situation. Communication between members and between members and SCNZ was identified as important to the wellbeing of the industry. The role of SCNZ in researching future trends and demand and disseminating such information to members was also seen as important. The forum ended with three action steps which will be initiated by SCNZ in early 2012. The three action points were:

1. The formation of regional steel fabricator groups to foster greater understanding of national/regional issues and their implications for us. These groups will also improve our relationships for the good of NZ Steel Inc.

The regional groups will be centred on areas with



**Construction in progress on the Forsyth Barr Stadium.**

concentrations of member companies and with an active member who is prepared to coordinate such groups.

2. Create a member chat forum on the SCNZ website
3. SCNZ is to plan and execute a major promotional event in Christchurch in early 2012 to create demand for the steel construction sector going forward.

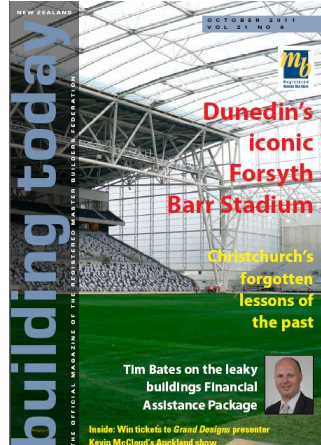
SCNZ would like to thank those members who attended this important industry event and the event facilitator Brent Murray who did a good job of ensuring some concrete outcomes in a very compressed time frame.

Members will be advised in due course of progress on these three initiatives.

# STEEL CONSTRUCTION IN BUILDING TODAY MAGAZINE

SCNZ is running a steel construction feature with Building Today. In each feature we will be promoting excellence in steel construction. In particular we are looking for projects big or small in which a member company has shown excellence in some or all of the following:

1. Quality management in the workshop and on-site
2. Technical innovation
3. Project management
4. Health and safety practices
5. Environmental management in the



workshop and on-site

SCNZ will write the article, you just need to tell us what you have been doing.

If you have a project you would like considered for an article please contact Rebecca at [rebecca.symonds@scnz.org](mailto:rebecca.symonds@scnz.org) or phone 09 262 6682. Thank you.

*Previous articles can be viewed in the Building Today magazines or on the SCNZ website.*

# SCNZ RECOGNISES ACHIEVEMENTS OF STEEL DESIGN STUDENT

Steel Construction New Zealand were delighted to recognize the achievements of a budding structural steel designer at the recent University of Auckland Civil and Environmental Engineering School end of year prize giving ceremony.

The \$1000 prize for the top steel design student in the final year Civil Engineering Design class was awarded to Jonathan Watkins. Jonathan, who was described by his lecturer Colin Nicholas as an exceptional student, will undertake a PhD next year.

Congratulations to Jonathan, we wish him all the best for his future study and career.



**SCNZ Manager, Alistair Fussell, presenting Top Steel Design Student, Jonathan Watkins, with his prize**