concretenz LEARNED SOCIETY | SEMINAR SERIES 2026

EXAMPLES OF CONCRETE STRUCTURAL DESIGN TO NZS 3101 SECTION B4 – REINFORCED CONCRETE DIAPHRAGM DESIGN

Presented by Concrete NZ – Learned Society

WHY YOU & YOUR EMPLOYEES SHOULD ATTEND THIS SEMINAR

The *Examples of Concrete Structural Design to NZS 3101* (known as the Concrete NZ *Red Book*) provide worked examples demonstrating how compliance with the New Zealand concrete design Standard, *NZS 3101*, can be achieved. The *Red Book* contains a comprehensive set of model calculations covering common concrete elements and structure types.

Section B4 of the *Red Book* covers the design of a reinforced concrete diaphragm, primarily for structural wall buildings, with details also provided for concrete frame buildings. The calculations are presented in considerable detail, with an emphasis on illustrating the process in a way that can be applied to structures more (or less) complex than the example chosen.

This seminar presents the worked example of Section B4, demonstrating the design of a reinforced concrete diaphragm in a medium rise building. Major steps in the design process will be thoroughly explained, demonstrating compliance with *NZS 3101:2006 Concrete Structure Standard* and *NZS 1170.5:2004 Structural Design Actions - Part 5: Earthquake Design Actions - New Zealand*. The application of key requirements of *NZS 1170.5* for determining diaphragm forces will be discussed, including the pESA methodology and the derivation of PGA and overstrength factors.

The seminar will cover analysing the building model to determine seismic actions, modelling the diaphragm under these actions to establish design forces, and demonstrating the reinforcement layout and detailing requirements for accommodating tension load paths, anchorage of tension ties into the lateral load resisting elements, and detailing connections within the floorplate.

THIS SEMINAR WILL COVER

- **What a diaphragm is and its role in structural response**
- **Forces in diaphragms - inertia and transfer forces**
- **Code requirements and key references from *NZS 1170.5:2004* for diaphragm forces**
- **The pESA methodology – PGA and overstrength derivation**
- **Building model analysis to determine diaphragm actions and transfer forces**
- **Diaphragm modelling approaches:**
  - Hand strut and tie calculations and sketches
  - Grillage models in analysis software
  - Verification of load paths and force distributions
- **Reinforcement design and detailing:**
  - Tension load paths and chord reinforcement
  - Collector (drag) elements and tension ties
  - Anchorage and development into boundary elements

OTHER BENEFITS

- Comprehensive resources provided through the seminar notes
- Knowledgeable and experienced speakers
- The opportunity to network with industry peers

WHO SHOULD ATTEND

Structural Engineers, Graduate Engineers, Designers, Specifiers and Students. Building Certifiers, Building Officials and Contractors may find the seminar interesting.

INVESTMENT DETAILS

- **Concrete NZ member:** $550 (GST exclusive) per person
- **Non member:** $650 (GST exclusive) per person (includes complimentary Learned Society membership until 30 June 2027)
- **Student:** $120 (GST exclusive) per person (includes complimentary Learned Society membership until graduation)

See page 3 for group discount.

SEMINAR FEES INCLUDE

- Morning & afternoon tea + lunch
- Comprehensive seminar notes, including design example

VENUES

HAMILTON
Tuesday 2 June
FMG Stadium
128 Seddon Road
Frankton, Hamilton 3204

AUCKLAND
Tuesday 9 June
Waipuna Hotel & Conference Centre
58 Waipuna Road
Mount Wellington, Auckland 1060

CHRISTCHURCH
Tuesday 16 June
Novotel Christchurch Airport
30 Durey Road, Christchurch Airport
Christchurch 8053

NORTH SHORE
Thursday 4 June
North Harbour Stadium
Stadium Drive
Albany, Auckland 0632

WELLINGTON
Thursday 11 June
Naumi Wellington
213 Cuba Street
Wellington 6011

QUEENSTOWN
Thursday 18 June
Copthorne Hotel & Resort Lakefront
Corner Frankton Rd & Adelaide Street
Queenstown 9300

PROGRAMME

10.00 – 10.30 am Registration

10:30 – 10:40 am Introduction

10.40 – 12.00 pm Sessions 1 & 2

Session 1: Introduction & Background
- Function of Diaphragms
- Background to pESA loading
- General approach to diaphragm design

Session 2: pESA & Load Derivation
- Building overstrength
- Storey forces
- Load application

12.00 – 12.45 pm Lunch

12.45 – 2.45 pm Sessions 3 & 4

Session 3: Diaphragms - Strut and Tie
- Derivation of strut & tie forces for diaphragms
- Strut & tie limitations

Session 4: Diaphragm Force Derivation
- Grillage modelling
- Loading input
- Forces within diaphragms

2.45 – 3.15 pm Afternoon Tea

3.15 – 5.00 pm Sessions 5 & 6

Session 5: Diaphragm Detailing
- Detailing steps
- Collectors, drag beams/ties, anchorage, strut design, node design & connections

Session 6: Diaphragms in Frame Buildings
- Derivation of forces
- Frames & capacity design
- Detailing & eccentricity

SPEAKER PROFILES

Alistair Russell

Alistair is Technical Director at Holmes in Hamilton, specialising in structural engineering and concrete performance. He has held senior technical and research leadership roles across consultancy, academia and industry. Formerly Manager of Concrete Research at the UC Quake Centre, University of Canterbury, he led nationally significant research programmes. He previously managed Structural Performance & Engineering Systems at Concrete NZ, supporting best practice and guidance. Alistair has worked at Ausenco as a structural engineer and project manager. He holds a PhD from the University of Auckland.

Des Bull

Leading the development of structural engineering services with a focus on concrete structures and material performance in diverse environments, Des holds the position of Technical Director at Holmes in Christchurch. He has been at the forefront of research and practice into reinforced concrete diaphragms in New Zealand, with much of the national guidance in this area stemming from his work. As Holcim Adjunct Professor in Concrete Design at the University of Canterbury, he taught concrete design and led major research programmes. Des is a Past President and Honorary Member of the NZ Concrete Society (now Concrete NZ Learned Society), a Life Member of SESOC, a Fellow of NZSEE, and has served on the technical committees for NZS 3101 and NZS 1170.5.

PRESENTERS

The Concrete NZ Learned Society acknowledges the following organisation for making this seminar series possible:

Alistair Russell and Des Bull, Courtesy of Holmes

concretenz LEARNED SOCIETY | REINFORCED CONCRETE DIAPHRAGM DESIGN

A) REGISTER ONLINE

Register online for the *Reinforced Concrete Diaphragm Design* seminar at www.tickettailor.com/events/concretenz

B) REGISTRATION FORM

You can also register by filling out the form below:

Name(s)/Email(s):

Company: Mobile:

Phone: Dietary Requirements:

PLEASE INDICATE WHICH SEMINAR AND VENUE

☐ **HAMILTON** **Tuesday 2 June** ☐ **NORTH SHORE** **Thursday 4 June** ☐ **AUCKLAND** **Tuesday 9 June** ☐ **WELLINGTON** **Thursday 11 June** ☐ **CHRISTCHURCH** **Tuesday 16 June** ☐ **QUEENSTOWN** **Thursday 18 June**

PAYMENT DETAILS

No. of member registrants	[1] at $632.50 GST inc. + [ ] group discount*	=	$
No. of non-member registrants	[1] at $747.50 GST inc. + [ ] group discount*	=	$
No. of student registrants	[ ] at $138.00 GST inc.	=	$

* For 2026 seminars, the Learned Society offers group discounts for Members and Non-Members on a single booking:
10% off 2nd attendee | 15% off 3rd attendee | 20% off 4th attendee | 25% off 5th attendee... and so on.

Total = $ ☐ I wish to pay by credit card: ☐ Visa ☐ MasterCard

A receipt will be issued once payment in processed.

Card No: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date: Cardholders Name:

☐ I wish to pay by bank deposit

A tax invoice containing Concrete NZ's Bank Account details will be issued on receipt of your completed registration form.

Tax Invoice: *GST Registration Number 122-984-249.*

Please complete this form and email to: admin@concretenz.org.nz. For all enquiries phone Adam Leach on 027 535 5144.