MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Intention to amend the Seismic Assessment of Existing Buildings: Technical Guidelines for Engineering Assessments

Consultation document
January 2018

New Zealand Government

Introduction

Purpose of this consultation document

The Ministry of Business, Innovation and Employment (MBIE) is proposing to:

- amend eight engineering equations in the Concrete Buildings section of the Seismic Assessments of Existing Buildings – Technical Guidelines for Engineering Assessments.

The amendments in question relate to seismic assessments of existing buildings constructed with reinforced concrete. The amendments were identified as part of a review of the concrete buildings section of the Engineering Assessment Guidelines. While the review of the entire concrete buildings section of the Engineering Assessment Guidelines is not complete, it is important the engineering sector and other interested people are aware of these amendments. The section is available from www.eq-assess.org.nz/part-c/c5/.

Copies of this consultation document are available free of charge at MBIE, located at 15 Stout Street in Wellington.

How to provide your feedback

MBIE invites written comments on the proposed amendments by 5pm on Monday 26 February.

You are welcome to make submissions on some or all of the amendments. A submission may range from a short email or letter on one issue to a substantial response covering multiple issues. We appreciate receiving an electronic copy of posted submissions, preferably in Microsoft Word or searchable PDF format (ie text rather than a scanned image of some text).

You can:

- request a printed copy of this document, a submission form, or both by emailing your name and postal address to: EPBconsultation@mbie.govt.nz
- provide your written feedback in a letter or email.

Please return your submission via one of the following methods:

- email to: EPBconsultation@mbie.govt.nz, or
- post or courier to:

  Ministry of Business, Innovation and Employment
  15 Stout Street
  PO Box 1473
  Wellington 6140
  Attention: Earthquake-prone buildings consultation

Please ensure you provide your contact details with your submission, whichever format you choose.

Disclaimer:

The opinions and options contained in this document are for consultation purposes only and do not reflect final Government policy. Please seek specific legal advice from a qualified professional person before undertaking any action based on the contents of this document.

The contents of this document must not be construed as legal advice.

The Government does not accept any responsibility or liability whatsoever for an action taken as a result of reading, or for reliance placed because of having read, all or any part of the information contained in this document, or for any error, inadequacy, deficiency, or flaw in, or omission from, this document.

Your submission may be made public

MBIE intends to publish all submissions, including the names of submitters, on its website at www.mbie.govt.nz.

MBIE will not publish the content of your submission on the internet if you state that you object to its publication when you provide it or if it is judged defamatory. However, your submission will remain subject to the Official Information Act 1982 and may, therefore, be released in part or full.

The Privacy Act 1993 also applies to your submission. This means that any personal information you supply to MBIE in the course of making your submission will be used by MBIE only in conjunction with matters covered by this document.

When making your submission, please state if you have any objections to the release of any information contained in your submission. If so, please identify which parts of your submission you request to be withheld and the grounds under the Official Information Act that you believe apply.

What happens next?

Your submission will help inform how the Engineering Assessment Guidelines are amended.

MBIE will analyse all submissions it receives and report to MBIE's Chief Executive.

Any amendments will only take effect when MBIE's Chief Executive approves them being incorporated into the Engineering Assessment Guidelines. It is currently envisaged that this will happen in March 2018.

Consultation: Intention to Correct Equations in Section C5 of the Guidelines for the Seismic Assessment of Existing Buildings

Following the Kaikōura Earthquake and Statistics House investigation, MBIE commissioned a project team to update the seismic assessment procedures for precast concrete floor systems. Their work will update section C5 of the Engineering Assessment Guidelines (the Guidelines, which are available from www.eq-assess.org.nz/part-c/c5/) that apply to Concrete Buildings.

Work on section C5 of the Guidelines has identified corrections that are required for eight equations and their definitions. Eight proposed corrections are presented in the following errata table. The table also describes how each correction could affect the calculated capacity of a structural element.

In accordance with the Earthquake-prone Building methodology, the Guidelines need to be used for building assessments that councils use to make decisions about whether or not a building is earthquake prone. Council decisions based on previous engineering assessments will not be automatically reviewed or changed. However, councils have the power to identify a building as potentially earthquake prone at any time. Therefore, if a council has reason to suspect assessing a particular building, or part of a building, using the updated Guidelines could lead to it later deciding it is earthquake prone, it could consider issuing a new request for the owners to have an engineering assessment of their building.

Item:	**Equations C5.9 and C5.10 – page C5-64**
Correction:	Delete equation C5.9 and Equation C5.10
	Replacements will only be provided in the revision to the whole of Section C5.
Comment:	The published equations produced zero displacement capacities for columns and walls when the transverse reinforcement spacing is greater than $8.5d_b$. This was overly conservative compared with NZS 3101:2006 and Verification Method B1/VM1, which permit a transverse reinforcement spacing of $10d_b$ for columns.

Item:	**Equation C5.11 – page C-65**
Correction:	Replace Equation C5.11 with the following
	$$\Delta_{\text{cap}} = 0.0325 L_{\text{c}} \left(1 + k_{\text{e}_{\text{bb}}} \frac{f_{\text{yt}} d_{\text{b}}}{f'_{\text{c}} D} \rho_{\text{st}}\right) \left(1 - \frac{N^*}{A_{\text{g}} f'_{\text{c}}}\right) \left(1 + \frac{L_{\text{c}}}{10D}\right) \quad \text{...C5.11}$$
Comment:	The effective confinement ratio, ρ_{eff}, was replaced with $\rho_{\text{eff}} = \frac{f_{\text{yt}} d_{\text{b}}}{f'_{\text{c}} D} \rho_{\text{st}}$ in equation C5.11 to avoid defining a new term that is unused elsewhere in the document. The divisor in the last term containing L_c was corrected.
Effect:	Calculated element capacity could decrease

Item:	**Definitions following Equation C5.11 – page C-65**
Correction:	Replace the incomplete definition of ρ_{eff} with the following
	ρ_{st}= volumetric ratio of confinement reinforcement (see Table C5.6)
Comment:	This complements the previous correction.
Effect:	Calculated element capacity could increase if ρ_{eff} was ignored to calculate Δ_{cap}

Item:	**Equation C5.13 – page C-66**
Correction:	Replace the definition Equation C5.13 with the following
	$\theta_y = \phi_y \left(\frac{H}{2}\right)$ Yield Rotation …C5.13
Comment:	The divisor was incorrect. The final equation in the derivation, equation C5.16, will normally be used instead of equation C5.12.
Effect:	Calculated element capacity could increase

Item:	**Equation C5.37 – page C-74**
Correction:	Replace Equation C5.37 with the following pair of equations
	$V_{\text{prob,jh}} = 0.85 v_{\text{prob,jh}} b_{\text{j}} h \leq 1.92\sqrt{f'_c} b_j h$ …C5.37A $v_{\text{prob,jh}} = \sqrt{\left(k_{\text{j}}\sqrt{f'_{\text{c}}}\right)^2 + k_{\text{j}}\sqrt{f'_c}\frac{N^*}{A_{\text{g}}}}$ …C5.37B
Comment:	The original equation was missing a subscript. The corrected equation was split to match the form used in the related equations C5.38, C5.39 and C5.40 (see below).
Effect:	No effect

Item:	**Equation C5.38 – page C-76**
Correction:	Replace Equation C5.38 with the following
	$V_{\text{prob,jh}} = 0.85 v_{\text{prob,jh}} b_{\text{j}} h \leq 1.92\sqrt{f'_c} b_j h$ …C5.38
Comment:	The capacity was not limited the same way it was in C5.37A (see above), which applies when there is no shear reinforcement.
Effect:	Calculated element capacity could decrease

Item:	**Equations C5.39 and C5.40 – page C-76**
Correction:	Replace Equations C5.39 and C5.40 and the text before the equation numbers with the following
	$v_{\text{prob.jh}} = \sqrt{\left(k_{\text{j}}\sqrt{f'_{\text{c}}}\right)^2 + k_{\text{j}}\sqrt{f'_{\text{c}}}(f_{\text{v}} + f_{\text{h}}) + f_{\text{v}} f_{\text{h}}}$ for tension …C5.39 $v_{\text{prob.jh}} = \sqrt{(0.6f'_{\text{c}})^2 - 0.6f'_{\text{c}}(f_{\text{v}} + f_{\text{h}}) + f_{\text{v}} f_{\text{h}}}$ for compression…C5.40
Comment:	The published equations had inconsistent units, produced unrealistically high shear stresses, and failed to require both tension and compression to be checked. Both equations should now be used. They apply to both interior and exterior joints
Effect:	Calculated element capacity could decrease.

Item:	**Definitions following Equation C5.40 – page C-76**
Correction:	Replace the definition following Equation C5.40 with the following
	$f_{\text{v}} = \frac{N^*}{A_{\text{g}}}$
Comment:	The term for N^* was inconsistent with N^* that is used elsewhere.
Effect:	No effect