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# Spotlight on *Structures*



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## Editor's Featured Articles

The Institution's research journal, *Structures*, remains available as a member benefit during the Covid-19 lockdown. Members can access the journal via [www.istructe.org/about-us/what-we-do/structures-journal/](http://www.istructe.org/about-us/what-we-do/structures-journal/) using their IStructE login details.

This month, we highlight the Editor-in-Chief's 'Featured Articles' from the two most recent issues.

From Volume 24 (April 2020), Leroy Gardner has selected an article that attempts to

develop a volume loss fatality model for as-built and retrofitted clay brick unreinforced masonry buildings, using data from the 2010/11 Canterbury earthquakes in New Zealand. The article is currently available free of charge.

From Volume 23 (February 2020), Prof. Gardner has selected an article on slotted-hole bolted cover-plate connections. This will remain available free of charge until August.

We hope you find these, and other articles in the journal, to be of interest.



### Experimental study of slotted hole bolted cover-plate connection using full field measurement

Edouard Cavène, Sébastien Durif, Abdelhamid Bouchaïr, Evelyne Toussaint  
 Université Clermont Auvergne, CNRS, Institut Pascal, Clermont-Ferrand, France

This study investigates the ductile failure modes associated to bearing mode for bolted cover-plates with slotted holes on the basis of an experimental program. The strengths from tests are compared to those given by two analytical models based on design standards. Two tested specimens were monitored to observe the local deformations of the loaded zones at the end-distance of the plates. The deformations are measured using Digital Image Correlation (DIC) technique. Strain maps showed that the behaviour of the plates with slotted holes is very complex combining, in some cases, bending, shear and tension of the loaded part under the bolt. The wealth of information leads to a better understanding of the behaviour of slotted hole connections until failure and proposes an analysis on the limits of the existing analytical approaches.

➤ Read the full paper at <https://doi.org/10.1016/j.istruc.2019.09.003>

### Volume loss fatality model for as-built and retrofitted clay brick unreinforced masonry buildings damaged in the 2010/11 Canterbury earthquakes

Shannon Abeling and Jason M. Ingham  
 Department of Civil and Environmental Engineering, University of Auckland, New Zealand

Building volume loss can be directly correlated with earthquake fatalities and is therefore considered to be a better damage descriptor for estimating risk to occupants than traditional damage states. Empirical volume loss studies are limited and the study presented herein represents what is likely the first attempt to develop a relationship between commercial unreinforced brick masonry (URBM) buildings' attributes, ground motion, and fatalities based on empirical data. Data from two New Zealand earthquakes was utilized to develop a model that predicts the probability of a

URBM building being in a volume loss damage state (VDS) and the associated probability of an occupant fatality. To demonstrate application of the model, two New Zealand earthquake scenarios are presented and discussed. The model is intended to be applied at a broad scale, to capture an average response over a large number of New Zealand URBM buildings, with applicability to other countries having stocks of comparable URBM buildings.

➤ Read the full paper at <https://doi.org/10.1016/j.istruc.2020.02.014>



Damage Level: Major  
 Extent of Collapse: 10% of Volume

Damage Level: Destroyed  
 Extent of Collapse: 50% of Volume

Damage Level: Destroyed  
 Extent of Collapse: 100% of Volume