

Observed performance of unreinforced masonry in the September 2021 Victoria earthquake (and the curious case of Betty's Burgers)

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Abstract

On 22-Sep 2021, Victoria experienced its biggest earthquake on record—the M5.9 earthquake whose epicentre was located near Woods Point and which was felt as far as Adelaide and regional New South Wales. Despite the widespread reach of the earthquake, however, the reported damage to unreinforced masonry construction has (at the time of writing this) been very limited. The most notable exception to this was a lone two-storey building in the heart of Melbourne some 130 km from the epicentre (a.k.a. the “Betty’s Burgers building”), whose parapet along an entire side of the building collapsed, spilling a large amount of falling brick debris onto the street.

Although this parapet failure was no different to failure that has in past events resulted in public fatalities, luckily on this occasion no one was injured—arguably an unintended consequence of Melbourne’s COVID-19 lockdown. The purpose of this presentation is to attempt to explain using numerical modelling why so little URM damage was observed regionally and why the Betty’s Burgers building is likely to be such an outlier. This is tackled through nonlinear time-history analysis using recorded ground motion, by drawing on past earthquake performance of similar buildings, and by combining this with what is known about the Betty’s Burgers building with the limited information currently available.

Keywords: unreinforced masonry; out-of-plane parapet failure; incremental dynamic analysis; fragility curves; flexible diaphragm