

Analysis of Field-Measured Reversible Deformations in Masonry Cavity Walls

A. J. Lohonyai¹, Y. Korany² and N. Trovato³

Abstract:

A remote monitoring system was installed in a 17-year-old clock tower in St. Albert, Alberta, Canada to record and analyze the vertical deformations of its masonry cavity walls. An hourly record of temperature, humidity, and vertical movements in the walls over a period of 638 days has been collected and analyzed. The observations suggest that reversible moisture effects are significant and that radiation-induced temperature spikes could be much higher than what is accounted for by current guidelines for the design of movement joints. It is demonstrated that peak reversible moisture and thermal strains estimated using the Commentaries to the 2010 National Building Code of Canada (NBCC) may be unconservative and that peak design temperature is severely underestimated. Revisions to bring the design values of the 2010 NBCC Commentaries into closer agreement with those of CSA S304.1-04 and ASTM C1472-10 are recommended.

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¹ Forensic engineer, Sintra Engineering Inc., Edmonton, AB, Canada, alohonyai@sintraeng.com

² TMS Member, Associate Professor, Dept. of Civil & Environmental Engineering, University of Alberta, Edmonton, AB, Canada, ykorany@ualberta.ca

³ Managing Principal, Building Science and Restoration, Read Jones Christoffersen, Edmonton, AB, Canada, ntrovato@rjc.ca