

Behavior of Hollow Concrete Masonry Prisms Under Axial Load and Bending

Ivan J. Beccia¹ and Harry G. Harris²

Abstract:

The ultimate strength of hollow concrete masonry structures is investigated in a study of eccentrically loaded prisms. Twenty-four three course face shell bonded prisms were tested under eccentric compression loads while monitoring the distribution of axial strains over the height of the prism (16 inch gage length) and over the height of the middle unit (6 inch gage length). Similar data was collected on individual block specimens tested in accordance with ASTM standards and on concrete samples taken from face shells and webs of block units. Finally, a specially designed testing apparatus was employed to produce information on ultimate compressive resultant location and under strength factors for a masonry equivalent stress block

Ultimate compressive strains observed for concrete samples taken from block units were higher than those observed in block and prism tests. Axial strain distributions around the middle block unit of three course prisms and around individually tested blocks indicate significant non-linearities through the thickness and along the length of the face shells. These findings appear to contradict the assumptions of plane sections bending theory. The amplitude of the equivalent stress block for kern loading prisms was found to be 21% of the ultimate strength of individually tested blocks. Recommendations are made to re-examine the accepted compressive failure theory as it applies to face shell bonded prisms.

To purchase full article: Please use this direct link to purchase the TMS Journal Volume of this article, Volume 2, Issue 2: <https://masonrysociety.org/product/tms-ejournal-vol-2-no-2/>

Otherwise, consider becoming a TMS member for full access to all TMS Journal articles: <https://masonrysociety.org/membership/#join>

DOI: 10.70803/001c.140533

¹ Principal, Oliver and Becica, A.I.A., P.A., Architects-Engineers, Cherry Hill, New Jersey 08003.

² Professor of Civil Engineering, Department of Civil Engineering, Drexel University, Philadelphia, Pennsylvania 19104.