Single-Wythe Concrete Masonry Walls—Investigation of Early Age Shrinkage of Masonry Mortars

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Abstract:

With the rising popularity of Single-wythe Concrete Masonry Unit walls, concern has developed regarding the water resistance of this system. The University of Wyoming worked with Atkinson-Noland & Associates (ANA) to create a comprehensive testing program to quantify crack development in single-wythe masonry construction. The research objective was to better understand the mechanisms that drive the development of bond line delaminations in this popular masonry construction. Multiple variables were analyzed with respect to mortar shrinkage and crack development: mortar type, block type, temperature, relative humidity, wind, admixtures and block height. Over one-hundred wall specimens were constructed and cured in different environmental conditions, and cracks were measured and monitored in order to isolate root causes and identify solutions. The critical factors were temperature, block-type and mortar type. Combining integral water-repellent units with an appropriately paired mortar produces results without cracking under the most severe conditions. In cases where environmental conditions are less severe, normal blocks could be used with minimal risk of bond line delaminations.

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