MONOTONIC AND CYCLIC PERFORMANCE OF LONG SHEAR WALLS WITH OPENINGS

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(ABSTRACT)

The effect of door and window openings on long timber framed shear walls was the subject of this thesis. Four different wall configurations containing various openings and one control wall with no openings were tested to examine ultimate load capacity and stiffness. All walls were forty feet in length and contained tie-down anchorage at the extreme ends of the wall only. Two replications of the five wall configurations were built. Each of the five wall configurations was tested using a: 1) monotonic displacement pattern and 2) sequential phased displacement pattern. A better understanding of the effect of monotonic and cyclic loading (and the relationship between the two loading types) on ultimate load capacity and stiffness for a given wall configuration were examined. To efficiently design shear walls, the effect of openings on shear wall performance must be known. This thesis adds to previous work on shear walls with openings to provide valuable information for future use.

Results from this investigation are intended to provide useful information regarding performance of long shear walls with openings. Data concerning capacity, drift, elastic stiffness, and ductility are presented. Two methods of capacity prediction of shear walls with openings are examined. Sugiyama (1994) provided an empirical equation for prediction of load resistance that has been applied to capacity and is the basis for the perforated shear wall method. This thesis further validates his work to full scale long shear walls. A new method for capacity prediction was developed by the author and is also presented.

DEDICATION

This thesis is dedicated to my mom, who I love with all my heart. Thank you, Mom.

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