

ABSTRACT

Wang, Ying, Ph.D., Purdue University, May 2014. Effects of Web Reinforcement Discontinuities on the Seismic Response of Structural Walls. Major Professor: Santiago Pujol.

Field evidence was interpreted to suggest that discontinuities in the longitudinal web reinforcement caused severe damage in structural walls during strong ground motion. To test this hypothesis, six small-scale reinforced concrete structural walls were tested under lateral displacement reversals. Test variables included the presence of web longitudinal reinforcement discontinuities and number of loading cycles. The test results indicated that unit tensile strains in longitudinal reinforcing bars in boundary elements were approximately 50% higher in structural walls with web longitudinal reinforcement cutoffs relative to walls without reinforcement cutoffs. Higher unit tensile strains caused an increase in permanent strain accumulation, increasing the likelihood of bar buckling. Additional loading cycles after yielding also accelerated permanent strain accumulation. A method is proposed for estimating the drift capacity of slender structural walls with and without reinforcement discontinuities.