SIESMIC RESPONE AND CAPACITY EVALUATION OF SACRIFICAL EXTERIOR SHEAR KEYS OF BRIDGE ABUTMENTS

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After the Northridge earthquake, extensive abutment damage in bridges was reported. The main damage occurred at the structural elements of abutments such as shear keys. Shear keys are used in bridge abutments to provide transverse support for the superstructure. The observed damage prompted the need to study and to revise the seismic design of shear keys. As part of this revision, experimental and analytical work was conducted to investigate the seismic behavior of exterior shear keys in bridge abutments designed in accordance to current guidelines and on shear keys designed for damage control.

To protect abutment supporting piles from severe damage under transverse forces, shear keys must be designed as a locking mechanism to limit the magnitude of the transverse force transmitted into the abutment. Ten shear keys were built at 40% scale of a prototype abutment design provided by Caltrans. The study concluded that a smooth construction joint should be considered at the interface of the shear key-abutment wall to allow sliding shear failure. A mechanism model was developed for capacity evaluation of shear keys with sliding shear failure. The results of the experimental program and development of the analytical model for capacity evaluation of exterior shear keys are presented in this paper.

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