

Field and Analytical Analysis of Structural Damage Criteria from Blasting

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ABSTRACT

Customarily, peak particle velocity of surface wave vibrations has been the recommended criterion for the prediction of blast damage to structures. Currently blast spectrum and natural frequencies of a structure have been also recognized as important for predicting damage potential. While others have considered the importance of structural frequencies, they have not analyzed the structural response spectrum when establishing damage criteria.

The present work recommends a set of guidelines to the Ohio Department of Transportation when blasting is conducted close to highways and highway structures. The study consists of a review of previous work to determine shortcomings and to indicate the direction of future studies; the monitoring of blast induced ground vibrations and structural response; and the analyzing of field data for finding frequency spectra and intensity of the blast vibrations with respect to distance. Results of this study show that spectrum analysis is a useful method of formulating more accurate predictive models for structural damage. Highway bridges are found to be affected more by the blast induced body wave, which has a higher frequency than the surface wave. And finite element programs are shown to be useful for modeling of soil-pier and bridge deck systems.