

TARGET LEVELS OF RELIABILITY FOR DESIGN OF BRIDGE FOUNDATIONS AND APPROACH EMBANKMENTS USING LRFD

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ABSTRACT

Levels of reliability for civil engineering designs are normally established from historical precedent, by specification committees, or based on the variability of loads and resistances. It is common to establish a single target level of reliability for all structures of similar type based on general consideration of costs and anticipated performance. While establishing a single target value makes implementation straightforward, it requires that target values be established based on broad consideration of many structures rather than more refined consideration of individual structures. In some cases, use of broadly established target levels of reliability can lead to excessive costs for construction, while in other cases, it may lead to unacceptable performance.

The research reported herein proposes an approach to establish target levels of reliability from combined consideration of socially acceptable risk and economic optimization. The economic optimization analysis includes mathematical minimization of a total cost function and, in the present work, probabilistic analysis of the likelihood of unacceptable performance for bridge foundations and approach embankments. The minimum values from these functions were used to establish optimum probabilities of failure that minimize expected total cost as a function of consequences. These economically optimized probabilities of failure were plotted on *FN* charts and compared and evaluated with respect to socially acceptable risk boundaries. Recommended target levels of reliability were established from these comparisons using engineering judgment.