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Performance Based Seismic Design for Bridges

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Abstract

Performance criteria have been implemented by public works owners that require bridges to remain standing, and to be without significant damage following severe ground shaking. Based on project experience in California and other parts of the U.S., this paper will discuss the resulting design philosophy often referred to as performance based design.

This design philosophy can be applied to three key types of seismic design:

1. Identification of level of damage and collapse mechanisms
2. Designing for limited or no damage under the "design life" earthquake (250 - 300 year return period).
3. Designing for no collapse, limited damage, or no damage under the maximum credible earthquake (2000 - 3000 year return period).

This design philosophy has been developed into design production tools intended to predict levels of damage and to establish behavioural envelope for structures where the expected performance was established as "no collapse" by the design criteria. Key areas of discussion related to both concrete and steel bridges include:

1. Design using displacement based analysis.
2. Methodology for Performance Based Design
3. Design of new structures to meet serviceable performance criteria under design seismic events.

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