

State of California

Department of Transportation



Performance Based Seismic Design & Research

by

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Goals & Priorities

- Improve seismic capacity of existing facilities (retrofit)
- Establish and maintain a focused research program
- Update design standards when needed
- What level of performance is needed

Seismic Design Criteria

- Based on recent research and experience
- Involves post earthquake observation of structural performance
- Includes research finding from seismic retrofit program
- Moves away from a force/ force reduction philosophy to a displacement based philosophy

Seismic Design Criteria

- Caltrans Seismic Design Criteria ver. 1.1 published July 1999
- Approaches the standard of performance based design
- Includes research findings from seismic retrofit program
- Requires bridge specific design criteria for major bridges

Seismic Design Criteria

- Two levels of earthquakes are considered in the design of major structures
- Uses in-house developed seismic maps for the SEE and FEE events
- Applies to “standard” Caltrans concrete bridges
- Needs to have good integration with seismic research

Research Program



- Budget set at \$ 5 million per year
- Making the transition from a retrofit based research program to a new design based program.

Seismic Research

- Past focus was optimizing retrofit design
- Presently focusing on new design improvements
- Includes Strong motion instrumentation program

Update Design Standards

- Make changes in analysis and design codes based on result from the research program
- Make changes as quickly as possible
- Plan on this being a regular function
- Make sure that research priorities are coordinated with design priorities

Current Research Projects

- Strong motion instrumentation
- Foundation design
- Structural joint performance
- Improved structural element performance
- Seismic response modification devices
(dampers, isolators, etc.)

Seismic Response Modification



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Column Superstructure Joints



Table 1: Specimen geometry – Test scale (5/16-scale) parameters [Dim. in inches]					
Span between columns	115.0	Column diameter	24.0	Cap beam depth	20.0
Clear column height	82.0	Cap beam width	32.0	Soffit slab depth	2.0
Bridge clear span	210.5	Box-girder width	30.5	Deck slab depth	2.5
Web thickness	4.0				





End of Test



Full Scale Pile Shaft Test

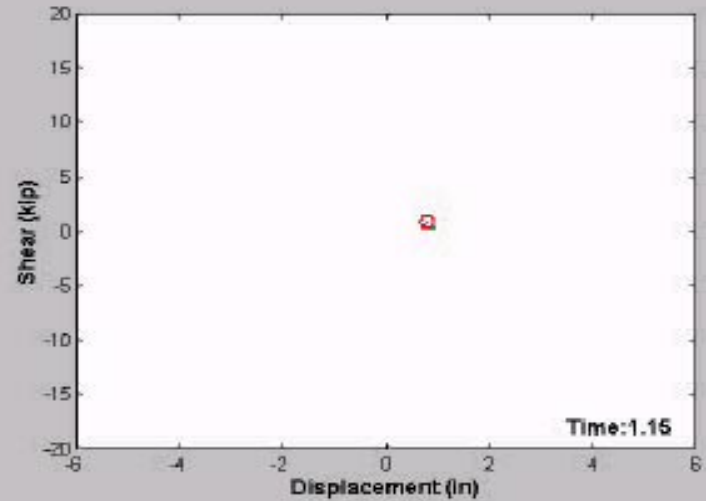




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