



Department of Civil and Environmental Engineering

DISTINGUISHED SEMINAR

Impact of Earthquake Duration on the Behavior of Reinforced Concrete Bridge Columns



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Department Chair
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**Monday
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103 Churchill
Hall
12:00 PM

*This seminar is free
and open to the public.*

ABSTRACT: Long duration earthquakes have caused extensive damage in structures, such as in the 2011 Tohoku Earthquake. Earthquake duration effects are not yet included in design codes and standards. A shake table experimental program conducted at the University of Nevada, Reno has examined the impact of duration. The experimental program along with a full-scale bridge column, tested on the University of California, San Diego shake table, have been used to calibrate analytical models. The models have been used to develop fragility curves. Fragility curves are used for performance-based seismic design and assessment but have not been specifically developed for long duration earthquakes. The low-cycle fatigue behavior of reinforcing steel is incorporated in the model to relate the damage accumulation from long duration motions to the collapse and displacement capacity of the column. The results show that the median collapse fragility can significantly change under long duration earthquakes, which demonstrates the importance of considering earthquake duration in seismic assessment of existing bridge structures or design for

new construction.

As an extra, there will be brief description of the substantial changes that have occurred in the one-way shear equations and strut-and-tie models for reinforced concrete in the recent version of American Concrete Institute Building Code Requirements for Structural Concrete (ACI318-19). The changes address the issues of size effect in beams and suspended slabs, and the impact of members without shear reinforcement and low longitudinal reinforcement percentage.

BIO: David H. Sanders is the Greenwood Professor and Department Chair of Civil, Construction and Environmental Engineering at Iowa State University. He received his BS in Civil Engineering from Iowa State University and a MS and PhD in Structural Engineering from The University of Texas at Austin. He is a member of the Mexican National Academy of Engineering and a Fellow of the Structural Engineering Institute, American Society of Civil Engineers, and the American Concrete Institute. He is the recipient of the 2017 Joe W. Kelly Award from the American Concrete Institute.