



**Building Seismic Safety Council**

a council of the National Institute of Building Sciences

Project  
**17**

# Project 17

## Development of Next-Generation Seismic Design Value Maps

Provisions Update Committee Briefing  
19 July 2016

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# Project 17 Committee

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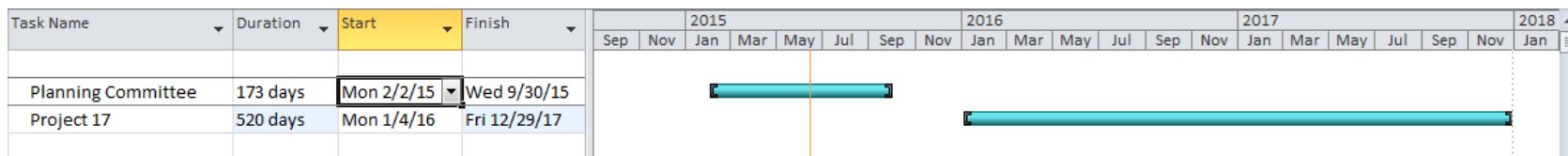


# Project Purpose

- Develop consensus among the structural, geotechnical engineering and earth science communities
- Basis for next-generation seismic design value maps :
  - 2020 NEHRP Provisions
  - ASCE 7-22
  - IBC-2024



# Schedule



- Planning phase
  - Initiated: February, 2015
  - Schedule completion: September 30, 2015
- Actual project
  - Initiate January 1, 2016
  - Complete Dec 31, 2017



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# 4 Primary Tasks

- Acceptable Risk
- Accuracy vs Uncertainty
- Deterministic Earthquake Definition
- Multi-point spectra



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# Acceptable Risk

- Goal: Avoid future U.S. urban disasters (like the 1988 Leninakan, Armenia event) for scenarios that can reasonably be expected to occur
  - Uniform hazard v uniform risk v uniform protection
  - 1%-50 years
    - Definition of collapse risk
    - Appropriate level of risk
  - 975 years



# Accuracy v Uncertainty

- Bring stability to the maps over time, by avoiding small changes in values that are not meaningful given the uncertainty
  - Blend old science with new to moderate changes over time
  - Round off fractions
  - Use zonation maps of some form





# Deterministic Earthquakes

- Follow on to UCER Forecast
  - Removed concept of “characteristic” earthquakes
- Task is dependent on definition of acceptable risk, and whether it is necessary to “cap” probabilistic motions
- Will likely involve disaggregation of hazard to evaluate dominant sources, and reducing  $\epsilon$  to comfortable levels







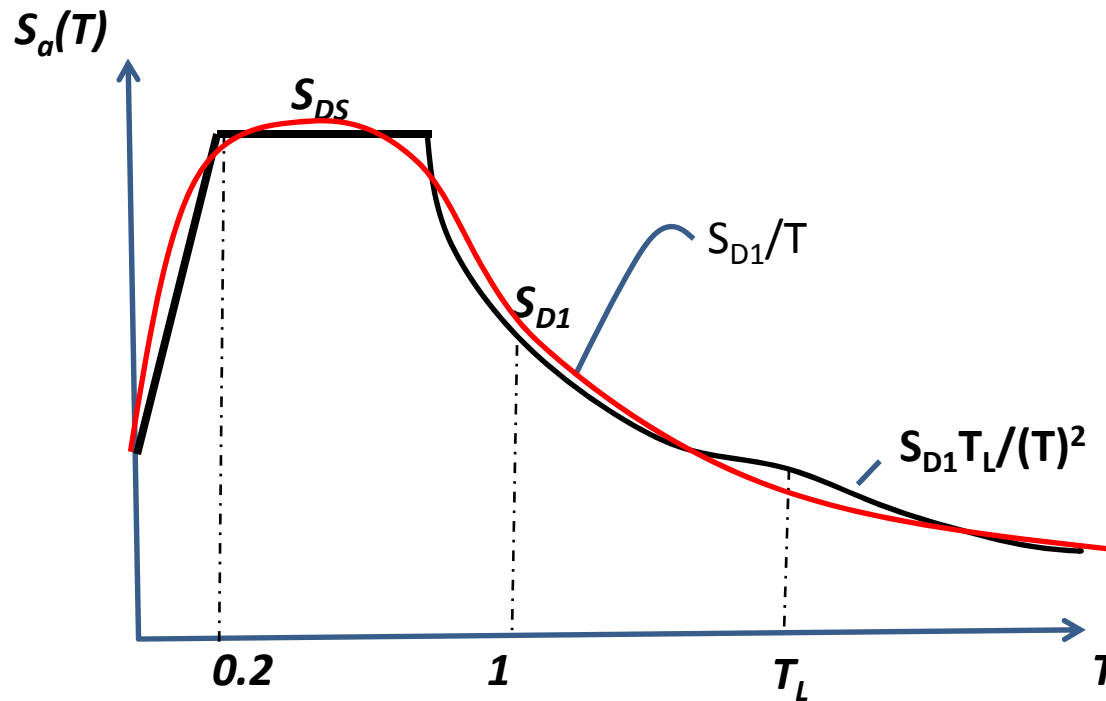
# Multi-Point Spectra

- Follow on to 2015 NERHP Provisions
  - Inability of three parameter (SDS, SD1, TL) generated spectrum to capture true spectral shape for softer sites and large magnitude events

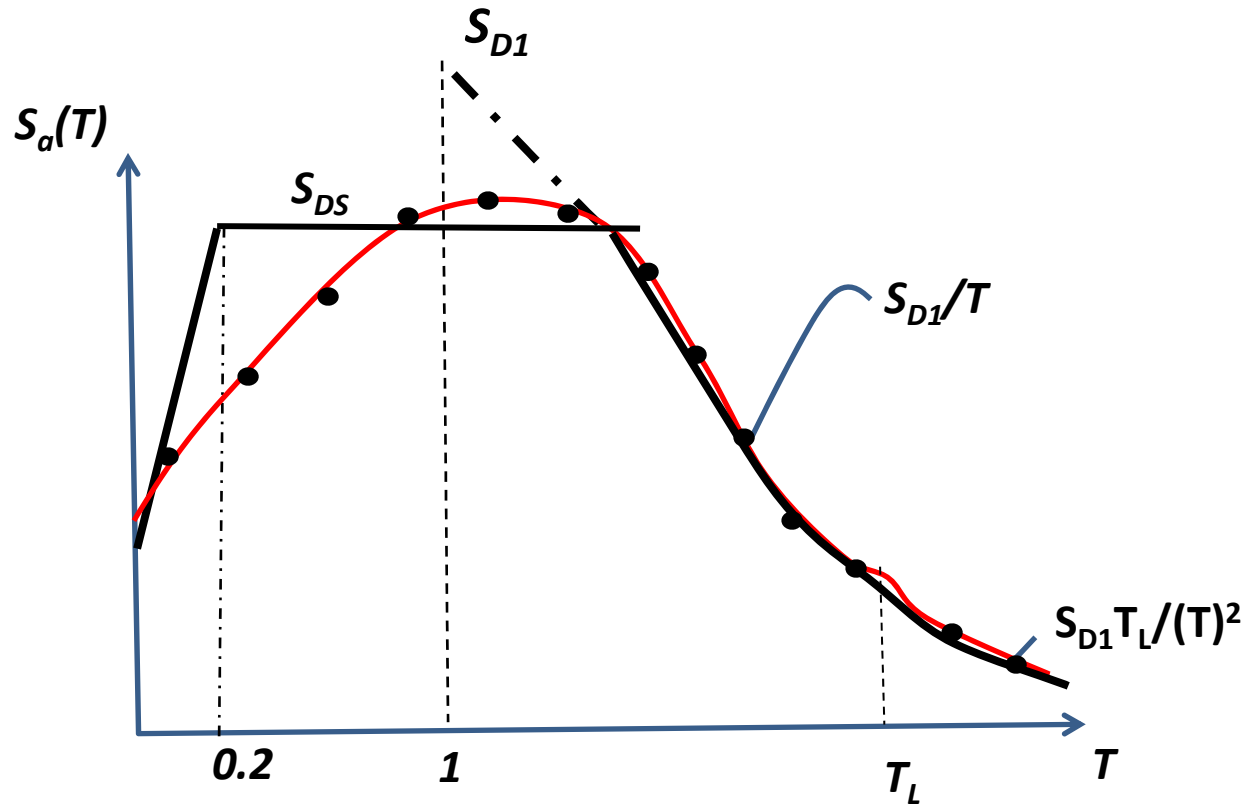




# Classical Spectrum



# Multi-point Spectrum



- $F_a$  and  $F_v$  no longer used, soil class used directly in hazard analysis
- $S_{DS}$  taken as 90% of max spectral response
- $S_{D1}$  selected, so as to fit the spectral shape



# Some Big Questions

- Do we have the courage to make major changes, if this seems appropriate or are we going to “buff up” the existing hazard?
- Since we don’t believe risk is as high as the commentary indicates (1%-50 years) how do we admit this without losing credibility?
- Can / should we separate Seismic Design Category & Detailing from the design values?





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# Your Questions?



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