

DESIGN

INVESTIGATE

REHABILITATE

SIMPSON GUMPERTZ & HEGER



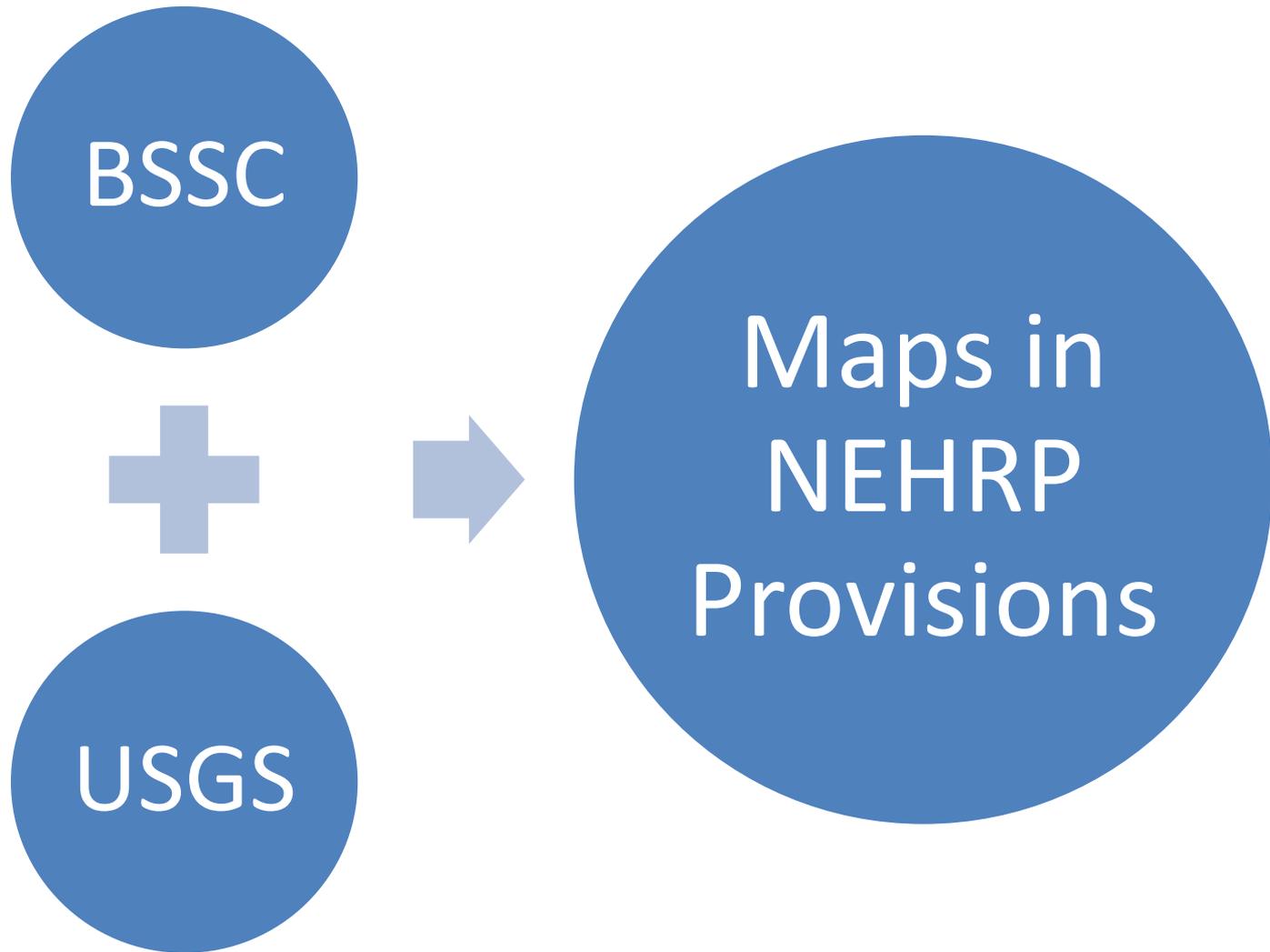
Engineering of Structures  
and Building Enclosures

# Update on Building Code Adoption of the USGS Seismic Design Value Maps

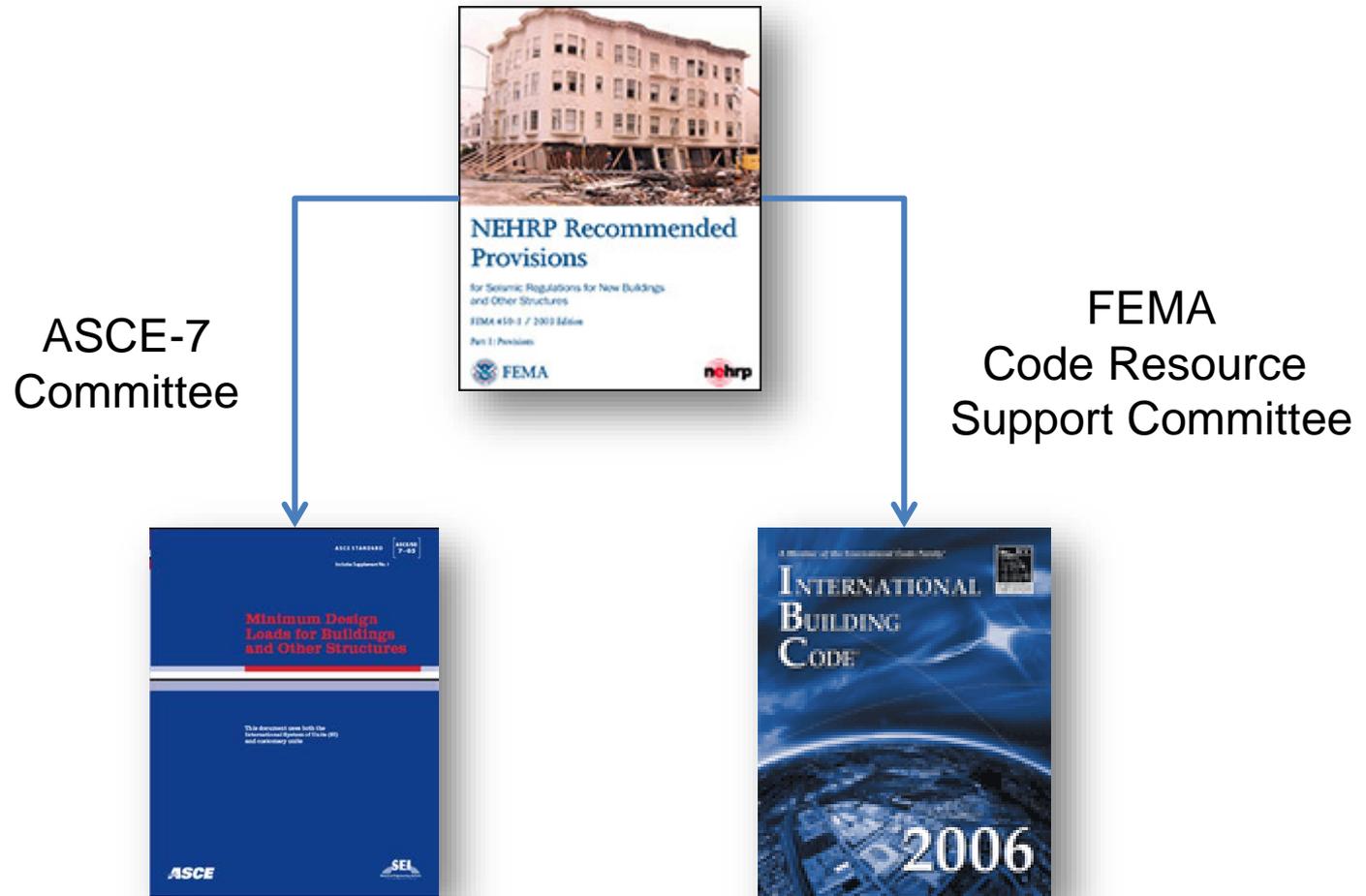
Presented to:  
National Seismic Hazard and Risk Assessment  
Steering Committee

Ronald O. Hamburger, SE  
Chair, ASCE-7 Committee  
Chair, Project 17 Committee  
Member BSSC, Provisions Update Committee

# Adoption Process – Seismic Design Value Maps



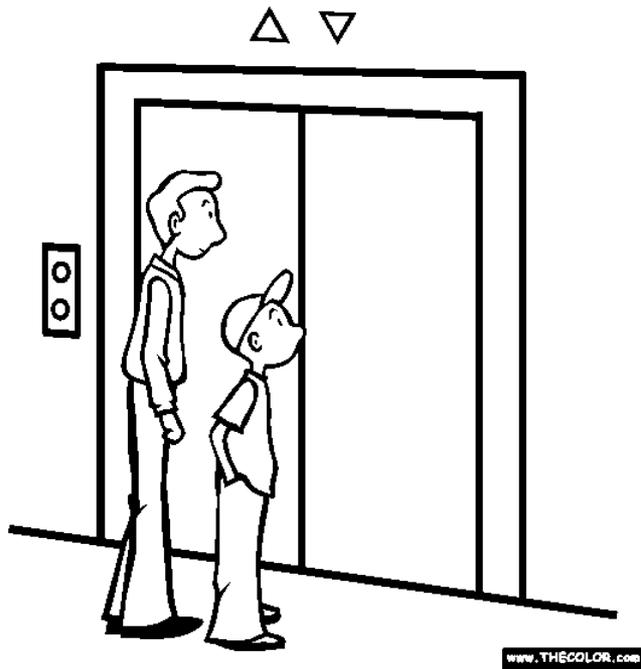
# Adoption Process – Seismic Design Value Maps



# Adoption Process – Seismic Design Value Maps

- Major collaboration & major change
  - Project 97 (1997)
    - Adoption of:
      - 2,500 yr hazard
      - Deterministic caps
      - $S_s$  and  $S_1$  as mapped parameters
  - Project 07 (2007)
    - Adoption of:
      - 1% - 50 year uniform risk
      - Maximum Direction
      - Use of NGA
- Minor collaboration & evolutionary change
  - 2002 update to maps
  - 2014 update to maps

# Adoption Process – Seismic Design Value Maps



- Adoption of the 2014 maps at BSSC was controversial
  - ASCE 7-16 has not adopted the 2014 maps
    - Dissatisfaction with frequency of change
    - Mapped values seem to go up then down then up
    - Apparent accuracy of mapped values seems inconsistent with the inherent uncertainty
    - Design maps should not be science maps, but engineering maps, a feeling the engineering side did not have adequate time to make the conversion
- It is not clear whether IBC will adopt the 2014 maps

# Project 17

- Develop consensus among the structural and geotechnical engineering and earth science communities
- Basis for next-generation seismic design value maps
  - 2020 NEHRP Provisions
  - ASCE 7-22
  - IBC-2024
- Project Planning phase (Feb 2015-Sept 2015)
  - Determine critical issues to be included in Project 17 deliberations
  - Recommend budget and resources
- Project 17 Execution phase (2016- 2017)

# Project 17 Committee

- BSSC

- CB Crouse
- Ron Hamburger
- Jim Harris
- Bill Holmes
- John Hooper
- Charlie Kircher
- Robert Pekelnicky

- Mai Tong

- Robert Hanson

- USGS

- Ned Field
- Art Frankel
- Nico Luco
- Morgan Moschetti
- Mark Petersen
- Peter Power
- Senaz Rezaerian

- Phillip Schneider

# Planning Process

- Initial meeting
- Identification of issues to be considered
- Public webinars and request for comment/input
- Final meeting to cull down issues
- Final report

# Project 17

## Identified Issues

- Procedural
  1. Timing for map publication
  2. Design Value Conveyance
  3. Precision v. Uncertainty
  4. Acceptable Collapse Risk
  5. Collapse Risk Definition
  6. Maximum Direction Component or Geomean

# Identified Issues

- Mapped Parameters
  7. Multi-Period Spectral Values
  8. Duration
  9. Damping Levels
  10. Vertical Motion

# Identified Issues

- Value Derivation
  11. Deterministic Parameter Derivation
  12. Basin Effects
  13. Use of 3-D Numerical Simulation in Seismic Hazard Models
  14. Induced Seismicity

# Project Budget

- Two year effort
- 10 Engineering Side members
- USGS members
- Two meetings per year for group
- One public outreach

# Last Men Standing

- Precision and uncertainty
  - Reconstitute seismic zones or use other means of conveying design values with precision commensurate with the associated uncertainty
  - “Coarse tuning”
- Acceptable Risk
  - 1% - 50 year collapse risk or other?
  - Maintain uniform risk or return to uniform hazard?
- Use and definition of deterministic cap parameters
- Multi-period Spectra
  - Provide spectral parameters at 0.2, 0.5, 1, 1.5, 2, 2.5, 3, 4 , 5 sec
  - Incorporate basin effects
  - Incorporate site class effects

# Possible model

- Seismic zone maps (more than 5 zones less than 20) giving coarse definition of ground motion spectral parameters
  - Applicable to ELF or RSA analysis
  - Not permitted for longer period structures on soft soil sites
  - Delivered through “maps”
- Site-specific procedure “A”
  - Multi-period spectra including basin effects, site class
  - Delivered through electronic data base and access tool
  - Permitted for any structure
  - Required for long period and soft soil sites
  - Required for response history analysis
- Site-specific procedure “B”
  - Retain geotech to perform site specific hazard study
  - Permitted for any structure
  - Constrained to X% of Procedure “A” values



# Questions?