Earthquake Engineering Issues for the Pacific Northwest

- Earthquake Engineering Issues for the US
- Earthquake Engineering Issues for the Pacific Northwest
- Key Issue for Both: Minimizing Changes in Resulting Design Values, Unless Warranted

Earthquake Engineering Issues for the US

- **NERHP Provisions and ASCE 7-10 Uses:**
  "Risk-targeted" Maximum Considered Earthquake (MCE_R) Ground Motion Spectral Response Acceleration maps and associated design parameters

- **Targeting Uniform Risk of Collapse**
  - 1% in 50 year collapse risk

- **Calculated Assuming a Generic Collapse Fragility with:**
  - 10% collapse probability given MCE ground motions

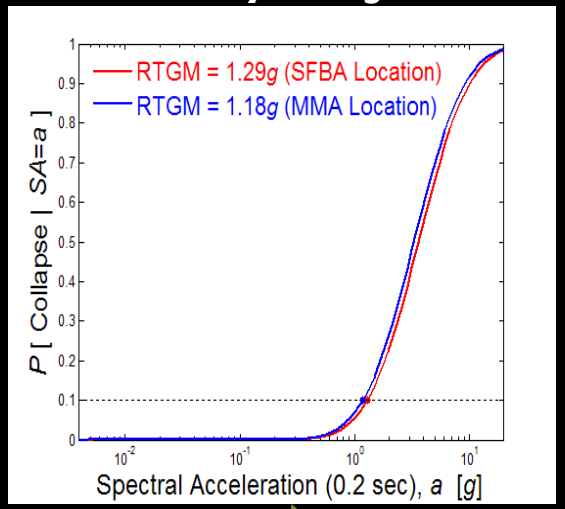
Calculating MCE_R Ground Motions

Calculated Iteratively by Combining:

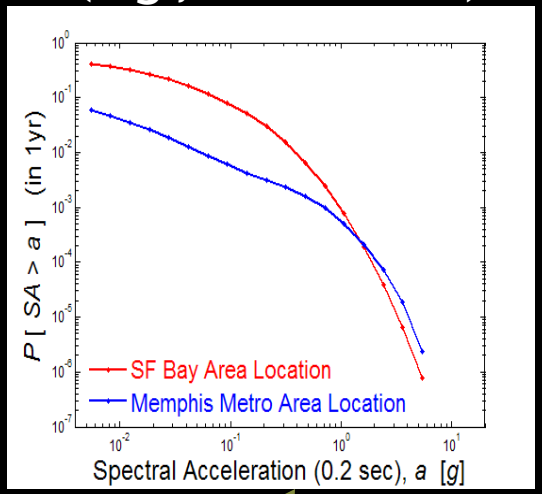
Risk Target
defined by Project '07

Prob. of Collapse
in 50 yrs = 1%

Building Fragility Curves
defined by Project '07



GM Hazard Curves
(e.g., from USGS)



… via "Risk Integral" (e.g. ATC 3-06), i.e., …

$$P[Collapse] = \int_0^\infty \frac{dP[Collapse|SA=a]}{da} P[SA>a]\,da$$

Earthquake Engineering Issues for the US

- Risk-targeted Spectral Response Accelerations for:
  - Functional Level EQ
  - Service Level EQ
- Maximum Direction Spectral Response Accelerations

Earthquake Engineering Issues for the US

- Multiple-point Spectrum (up to 10 seconds, if possible), including:
  - T_L
  - Near source ground motions
- Updated Site Amplification Factors
- Basin Effects for Multiple Locations

Earthquake Engineering Issues for the Pacific Northwest

- Existing and New, hypothesized Fault Updates
- Approximate 50-year Probabilities

Earthquake Engineering Issues for the Pacific Northwest

- PNW Basin Effects (Seattle, Everett, etc.)
- CSZ Attenuation Relationships and Their Impact on Design Values

Earthquake Engineering Issues for the Pacific Northwest

- Update on CSZ Durations and Their Effect on Building Performance
  - Work together to develop a meaningful design parameter
- CSZ Ground Motion Records for use in Nonlinear Response History Analysis