Tall Buildings Initiative

• 3 year initiative to advance design of tall buildings

• Main participants
  – PEER, SCEC, USGS, FEMA, CSMIP, Pankow Foundation, SFDBI, LADBS, OES, CSSC, ATC, LATBSDC, SEAOC, SEAONC
  – Project Management Committee (T-PAC)
    • J. Moehle, Y. Bozorgnia
    • N. Abrahamson, M. Lew, P. Somerville
    • R. Hamburger, H. Krawinkler, M. Moore (SEAOC), F. Naeim
    • R. Lui
Performance Objectives

- Core group: W. Holmes, C. Kircher, L. Kornfield, B. Petak, N. Youssef
- Stakeholder views

<table>
<thead>
<tr>
<th>Earthquake Design Level</th>
<th>Frequent (43 years)</th>
<th>Occasional (72 years)</th>
<th>Rare (475 years)</th>
<th>Very Rare (2500 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake Performance Level</td>
<td>Fully Operational</td>
<td>Operational</td>
<td>Life Safe</td>
<td>Collapse safety</td>
</tr>
<tr>
<td>Basic Objective</td>
<td>Unacceptable</td>
<td>Unacceptable</td>
<td>Unacceptable</td>
<td>Unacceptable</td>
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<tr>
<td>Essential/Hazardous Objective</td>
<td>Basic Objective</td>
<td>Unacceptable</td>
<td>Unacceptable</td>
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<tr>
<td>Safety Critical Objective</td>
<td>Essential/Hazardous Objective</td>
<td>Basic Objective</td>
<td>Unacceptable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Not Feasible</td>
<td>Safety Critical Objective</td>
<td>Essential/Hazardous Objective</td>
<td>Basic Objective</td>
<td>Basic Objective</td>
</tr>
</tbody>
</table>
Ground motion simulation, review, and selection and scaling guidelines

- **Simulation**: P. Somerville, B. Aagaard, N. Collins, R. Graves
- **Review**: F. Naeim, Y. Bozorgnia, N. Abrahamson, B. Chiou, CB Crouse, D. Dreger, Y. Moriwaki, Y. Zeng
- **Guidelines**: Y. Bozorgnia, N. Luco, F. Naeim, J. Hooper, N. Abrahamson, J. Maffei
Input ground motions for tall buildings with subterranean levels

- Report available for review
Guidelines for Modeling and Acceptance Criteria (ATC 72)

- Core group – J. Malley, G. Deierlein, H. Krawinkler, J. Maffei, M. Pourzanjani and J. Wallace

- Approach: Workshop identified key issues, assignments to experts to develop principles, procedures, and values.

- Key issues:
  - Good practices in nonlinear dynamic analysis (H. Krawinkler, G. Deierlein, J. Heintz)
  - Podium and basement modeling and performance characterization (J. Maffei, J. Malley)
  - Wall modeling and performance characterization (J. Wallace, M. Pourzanjani)
Building Pilot Studies

• Core group: J. Moehle, S. Mahin, J. Hooper, T. Yang, C. McQuoid, Tea Visnic

• Approach
  – Representative building models
  – Variations in model parameters
  – 100s of ground motions in various M, r, etc. bins
  – Ground motion selection and scaling tests
Performance of TBI-designed buildings
Guidelines for performance-based seismic design of tall buildings

October 2010