Thoughts From a Practicing S.E. On Potential Applications for NEES Facilities and Organization

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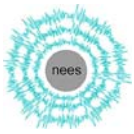
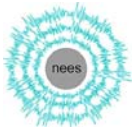


Discussion Topics

- General Discussion and Thoughts
- SAC "Redux"
- Challenges Before You (and Us)

Nees Consortium 2nd Annual Meeting
May 21, 2004



General Discussion and Thoughts

- NEES presents the profession with a great opportunity to significantly expand knowledge.
- Exciting new tools and "toys" for Structural testing (Geotech too)
- The NEES tag line "If it sounds different…it's because it hasn't been done before" should create both excitement and concern
- Boundary conditions, boundary conditions, boundary conditions…..

General Discussion – Testing Facilities

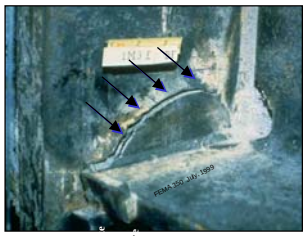
- The NEES facilities obviously represent a quantum leap in the nation's abilities to perform experimental simulation of structural engineering applications
- Multi-column excitation, field testing, biaxial loading, large shake tables, combination shake table/reaction walls, almost real time pseudo-dynamic loading, etc.-

General Discussion – Information Sharing/NEESgrid

- Ability to share the resources and information will hopefully eventually become the most powerful and important aspect in the NEES system
  - Synergy of the shared platform could be great benefit to all participants
  - Will depend on cooperation, commitment, patience and extremely good planning
  - This will be a major and continual challenge, taking significant resources to be successful

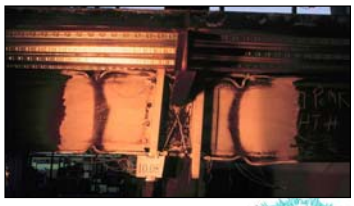
SAC "Redux"

- SAC Funded by FEMA after Northridge EQ at $11 million over 6 years to study steel frame fractures
  - $100 million problem????
- Over 100 primary participants from research, profession and industry
  - Outstanding cooperation occurred to address important, complex problem
- Resulted in series of FEMA guidelines and changes to building codes
- So, what if the Northridge damage had occurred today???????



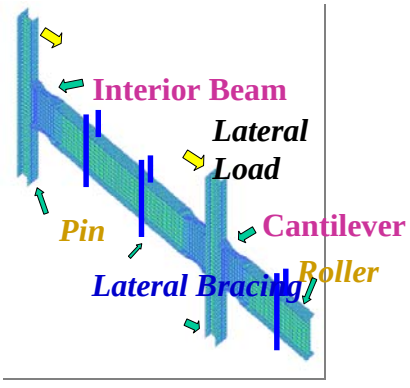
SAC "Redux" – What We Tested

- Single column, mostly one-sided, static, bare steel tests with maximum loading of 200 kips (over 100 of these on various details)
- Some two sided tests
- A few dynamic tests on smaller scale
- Some with floor slabs
- Many joint and weldment tests
- Many tests limited by displacement stroke



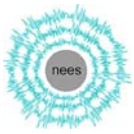
SAC "Redux" – What We Didn't/Couldn't Test, But Could Now

- Bigger, faster and farther than what we did before
- Frame tests to better determine shortening effect
- Bi-axial column bending
- Shake table test on building substructure
- Integration of testing from element to substructure, with analysis models, possibly pseudodynamically



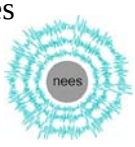
SAC "Redux" – What Data We Didn't/Couldn't Collect, But Could/Would Now

- SAC attempted to standardize data collection format from connection tests, with intent to archive
  - Mixed results at best
  - Not aware that this data has been used by others since
- Remote participation ("teleoperation"), digital video
- Not convinced that collecting more data is the answer
  - Needs to be useful and easy to access and manipulate
- If we could agree to common site for critical data to be collected, this might facilitate use by others



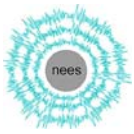
Challenges Before You (and Us)

- Making the "Co…" words (community based, collaboratory, coordination, cooperative, colleagues, community based, etc.) happen!
  - Don't think that the internet is the solution
- Getting enough practicing S.E.'s engaged
  - Hard to tear us away from billable hours (reduced rates might help)
  - Make it practical. Most worry about next week, not next decade.
- Focus on elements that will improve codes and guidelines



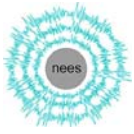
Challenges Before You (and Us) (cont.)

- The big issues are protecting lives and $'s. Some ideas include:
  - Soil/Foundation/Structure Interaction is still very clumsily handled in the profession (foundation uplift, e.g.)
  - Having a SAC-like project on other systems that exist in present building codes (80 plus)
    - Most are not well understood beyond element performance



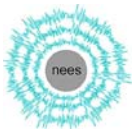
Challenges Before You (and Us) (cont.)

- Big Issues, cont. Existing Buildings that pre-date modern seismic design concepts
  - May "never" know enough about these
  - UMB. May be pretty well understood.
  - Non-ductile concrete. PEER making great strides. Testing database could definitely be augmented to reduce uncertainties
  - Infill systems. Much more needed due to complex interactions creating modeling challenges



Challenges Before You (and Us) (cont.)

- Big issues, cont.
  - New structural elements and systems. Need standardized approach for acceptance
  - Non-structural elements. Big $ losses result, but historically of little academic interest



Challenges Before You (and Us) (cont.)

- Once the Consortium is fully functioning, getting NSF to “Show you THE MONEY!!” And keep it up for many years.
  - Can’t rely on a big earthquake to generate interest
  - Need for entire earthquake community to solidly support with a unified voice