COMMITTEE ON CAMPUS PLANNING, BUILDINGS AND GROUNDS

CSU Seismic Review Board Annual Report

Presentation By

J. Patrick Drohan
Assistant Vice Chancellor
Capital Planning, Design and Construction

Summary

This information item presents the CSU Seismic Review Board Annual Report.

CSU Seismic Review Board (SRB)

The CSU has worked to address seismic safety concerns throughout its existence. The Board of Trustees’ categories and criteria for prioritizing capital outlay projects have historically placed seismic safety as a high priority. In 1981, the California Seismic Safety Commission conducted a statewide seismic safety assessment of buildings that also included CSU facilities.

In 1992, the CSU established the Seismic Review Board (SRB) to comprehensively assess the seismic hazards posed by facilities, and to develop a mitigation program. This was done in response to Governor Deukmejian’s Executive Order D-86-90 issued following the Loma Prieta Earthquake. Capital Planning, Design and Construction, through a consultative process with California’s Division of the State Architect and other state agencies, selected the SRB members from a group of professionals with advanced expertise in multiple facets of structural engineering. The SRB is a group of highly respected practicing engineers that are also involved in national code updates, engineering practice guides, and seismic safety policies for other state agencies and municipalities. The board is comprised of the following members:

- Charles Thiel Jr., Ph.D., President, Telesis Engineers and Consulting
- John A. Martin Jr., S.E., President, John A. Martin and Associates,
- Greg Brandow, Ph.D., President, Brandow and Johnson, Adjunct Professor USC
- Ted Zsutty, Ph.D., S.E., Professor, San Jose State University, retired
- James Hill, S.E., President, James Hill and Associates
- Sven Nielson, S.E., Principal, Johnson and Nielsen Associates
- John Egan, G.E., Geomatrix Consultants

(replaced Nevil Donovan, G.E., Dames and Moore in 1999)
CSU Seismic Retrofit Program

The premise of SRB’s list of potential CSU seismic hazards has been the preservation of the lives of the building occupants. Neither the initial list of facilities identified by the SRB, nor any subsequent actions of the SRB are addressed to preventing earthquake damage per se, but rather to mitigate the potential collapse or other building failures that would threaten the lives of the occupants. To address the life-safety hazards posed to students, staff and faculty by existing buildings, the SRB developed the earthquake hazard risk evaluation and reduction program for the twenty campuses and off-campus centers as follows:

- Reviewed the inventory of buildings and facilities at risk at twenty campuses and numerous off-campus centers. There were 1,364 major facilities including classrooms, offices, laboratories, and support buildings (*this number does not include minor structures and utilities that were also reviewed*).

- Determined those facilities posing the highest life-safety risk to occupants that warranted further investigation. Major nonstructural life-safety hazards were segregated and addressed first.

- Developed specific site and building evaluation criteria for the individual facility. This required development of specific building code requirements since there were no applicable retrofit codes at the time. The provisions developed by the SRB were later adopted by the State of California as part of the State Building Code.

- Peer reviewed engineering investigations of the expected seismic performance of each facility and site that was evaluated as posing a high life-safety hazard.

- Recommended priorities for capital investment to reduce the earthquake hazard posed by the inventory of facilities. These were risk-based assessments reflecting the site-specific probabilistic seismic hazard, the vulnerability of the building, the occupancy and use, costs of rehabilitation and options for retrofit.

- Provided technical peer review of the preparation of seismic retrofit and mitigation plans by the assigned engineering firms, including selection of the most economically efficient approaches from alternatives.

- Observed services and modification of approved plans to accommodate conditions discovered in the field.
Since the comprehensive listing of ranked projects was established in 1992, the majority of those buildings identified by the SRB as posing a life safety hazard to the CSU students, staff and faculty have been mitigated, and all major nonstructural seismic safety falling hazards have been mitigated at all campuses.

Status of the Initial List of Potential Seismic Hazards: Of the 1,364 CSU major facilities, 101 were identified as requiring a detailed engineering assessment and possible retrofit. The chart below shows the status of those initial 101 projects.

<table>
<thead>
<tr>
<th>1992 Assessment of Facilities</th>
<th>Current Status of 92 List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings Deemed Potentially Hazardous</td>
<td>Total Inventory: 1,364 (includes 239 nonstate)</td>
</tr>
<tr>
<td>101</td>
<td>Completed Projects: 61.5</td>
</tr>
<tr>
<td></td>
<td>Buildings Evaluated No Life Safety Threat</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Projects Remaining 24.5 (includes 9 nonstate)</td>
</tr>
</tbody>
</table>

Current List of Potential Seismic Hazards: The SRB’s list of CSU facilities requiring assessment is dynamic, and changes with improved understanding of seismic forces, code updates, discovery of unforeseen site conditions, and the addition of new campuses. The current list identifies 145 facilities, including the initial 101. The chart below shows the status of the current list of 145 projects.
The following summarizes the status of the forty-five remaining projects noted on the preceding chart:

- Thirteen engineering assessments in progress
- Seven retrofits in bidding/construction phase
- Three retrofit designs completed and construction pending
- Five minor capital outlay retrofit projects pending
- Fourteen retrofit designs pending
- Two replacement facilities pending
- One facility vacated and awaiting demolition

**SRB—CSU Activities in 1999/2000**

The SRB met six times during the past year to consider seismic construction issues, monitor progress in the CSU seismic retrofit program, develop technical provisions for retrofit design, and to advise the Chancellor's Office on technical issues. Each CSU campus has been assigned a SRB member to advise it on seismic construction issues and to manage the peer review of construction projects on the campus. Additional activities of the SRB during this period include:

1. Initiated the development of a comprehensive seismic safety policy manual for use by project architects, engineers, and campus staff involved in the CSU design and construction program.
2. Implemented systemwide seismic peer review agreements for campus administered building projects.
3. Assisted Capital Planning, Design and Construction with systemwide code enforcement seminars to educate campus staff on the Board of Trustees’ seismic safety policy and its peer review process.

4. Developed improved code review and enforcement procedures for design-build projects.

5. Assisted the Division of the State Architect with committee work and presentations on building code issues before the Building Standards Commission.

6. Performed building and construction reviews for new and existing construction projects for all CSU campuses.

7. Initiated seismic safety review of several new CSU buildings where seismic performance was questioned due to recent research findings and observations.

8. Revised the 1999 seismic evaluation of all CSU buildings and developed an updated priority list of seismic retrofit projects. The list only includes the major life-safety retrofit projects to be completed. Each year, new seismic retrofit projects are selected for implementation based on the ranking and available resources.

9. Created a CSU Building Data Base to record the status of the seismic condition of all CSU buildings. Population of the database with building specific information is continuing.

10. Completed a study of the San Jose fault at the Pomona campus. The study concluded that the fault is potentially active with evidence that its last movement was less than 10,000 years ago. Upon determination of possible activity, the SRB initiated four steps:

   - Required that all new construction have detailed geologic studies of the site to determine if a fault trace passes through the site.
   - Required all new construction to utilize structural systems that can accommodate fault rupture within the supporting soils without posing a life-safety risk to the occupants.
   - Initiated more detailed geological investigations to quantify the risk and identify the specific sites at risk of fault rupture.
   - Initiated a building-by-building engineering assessment to determine those buildings that are at risk of collapse if fault rupture occurs beneath the foundation.

   The development of specific mitigation plans for individual buildings will await more definitive information on where fault traces are, or can be expected. Additional geo-technical studies are being performed to more accurately trace the line of the fault through the campus. Further assessment of each existing building’s potential seismic risk due to the fault location is also underway.

**SRB—Other Activities**

The SRB has performed several functions outside of the CSU that has furthered seismic safety and provided a broadening of experience that benefits the CSU system. Among these are:
1. Prepared the seismic retrofit standards for existing buildings adopted by the California Building Standards Commission as part of the California Building Code. At the request of the Division of the State Architect (DSA), the SRB modified and extended the standards used for CSU buildings so they could be applied to all state buildings. This is the first seismic retrofit standard adopted into a widely applicable building code and complied with a DSA legislative mandate contained in SB 597 and AB 3313.

2. Prepared the seismic evaluation and retrofit standards for critical care hospitals adopted by the California Building Standards Commission as part of the California Building Code. At the request of the Office of Statewide Hospital Planning and Development, the SRB modified and extended the standards developed for state buildings so they could be applied to critical care hospitals whose seismic performance standards require continued functioning of the hospital.

3. Provided peer review of the Community Colleges’ evaluation of the seismic hazards posed by college buildings. The SRB reviewed and advised the DSA as they conducted this program. It was similar to the first step in the CSU evaluation program.