Photo: http://www.allartnews.com

Berkeley Art Museum

The Berkeley Art Museum is a characteristic example of Brutalist architecture and as such is made of over 100,000 sq. ft. of reinforced concrete. Unfortunately its design is currently "poor" according to modern seismic standards, especially given its location near a major fault line. Its large masses of cantilevered concrete set on freestanding "tree walls" make it visually striking but also highly vulnerable to earthquakes. In 1996 roofers discovered that some concrete had separated from the underlying metal structure, and this prompted further investigation by Forell/Elsessor Engineers. The team identified some of the primary concerns as **"lack of a reliable and continuous load path, lack of ductility, and lack of adequate seismic resistance in the direction perpendicular to the tree walls".**

For our exploration of an important structural element of the Berkeley Art Museum, we chose one of the steel columns supporting the exterior. In 2000 the university decided that the whole museum needed a seismic retrofit to remain standing while its replacement was under construction. It cost $4 million and included the construction of **steel columns inside the building, cross-braces in the skylights, and the exterior columns.** These were installed at five points to provide support for the tiered concrete walls of the museum. This was the extent of retrofit work, considering the museum's need for open gallery space and for preserving its historic architecture.

Photo: Sucharitha Yelimeli

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The columns themselves sit on **concrete piers that extend up to 60 feet below the surface** and meet the concrete structure at its projecting edges where it is **most vulnerable.** The individual columns are held together with gusset plates and bolted to steel plates that fold around the lower edges of the concrete galleries. Some are single columns while others, like the one we chose to model, are assembled in groups of two or three. They **distribute the load** of the building deeper points within foundation and are designed to hold up the primary structure if it fails during an earthquake.

Detail showing floor and wall structure

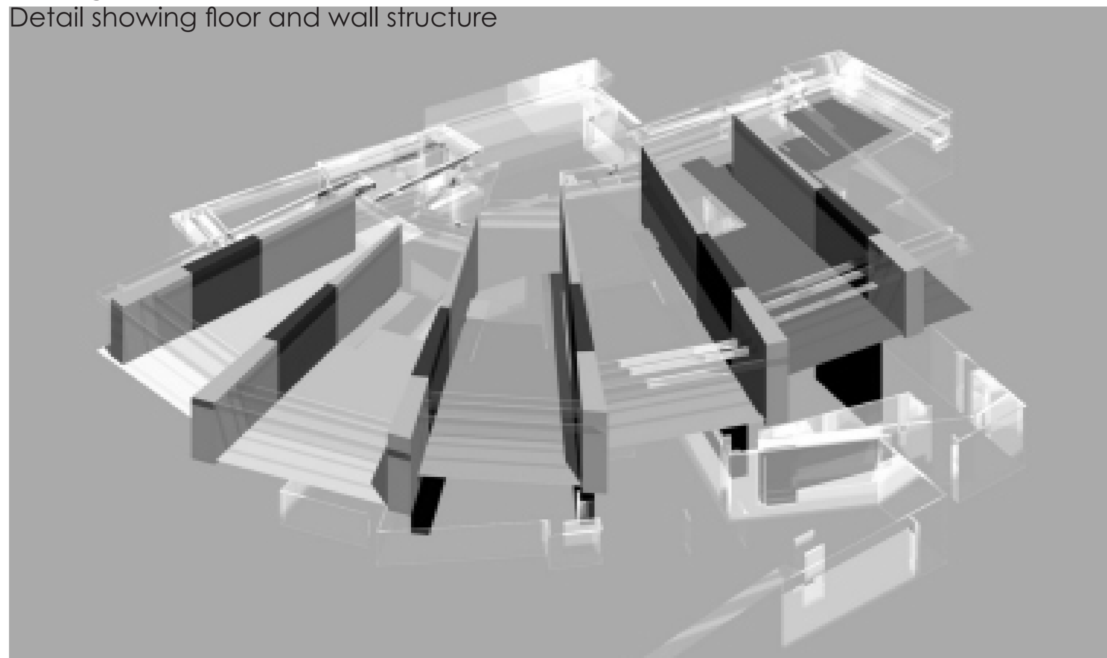

Photo: http://peer.berkeley.edu

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