

Krannert Center for the Performing Arts

Roofs Analyses, Upgrade for Snow Accumulation

Urbana, Illinois

Client: University of Illinois, Board of Trustees, Urbana/Champaign
Architect: Severns Reid Architects



Range of Services

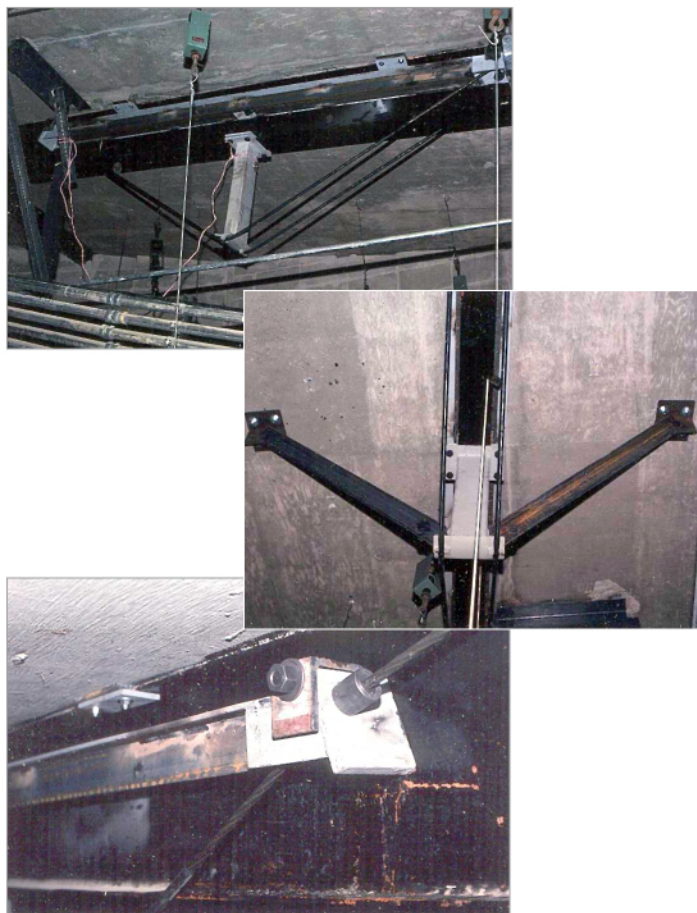
- ▶ Structural Consultant: Analysis of each theater roof; design upgrade using post-tensioning system
- ▶ Prepare construction documents; construction administration services

Project Overview

Roof collapses of major sports arenas across the USA prompted discussion about the snow load capability of the Krannert Center, since the latest codes were now including snow accumulation around roof projections, like the prosceniums for each of Krannert's four theaters. The Krannert complex was designed and built prior to these new code developments. The analysis based on the latest snow provisions proved that two theaters – the Tryon Festival Theater and the Colwell Playhouse – were in need of structural upgrade for the beams, but not the girders. The criteria imposed on the upgrading design were as follows:

- The Krannert Center had a schedule in place and did not want disruptions, particularly scaffolding within the seating area.
- The fire marshal would not permit welding
- Large, heavy and long members could not be carried up to the attic

The solution was to upgrade the existing beams in place with additional angles bolted in place by drilling and clamping to the existing members. A king-post vertical tube was bolted to the mid-span of each beam. Then two post-tension cables were jacked off the ends of the angles, which pushed up against the king-post, causing the beam to go into reverse curvature and thus be able to carry more load. This procedure was done at each beam to a varying degree of post-tension force. The king-post was braced laterally with diagonally placed angles bolted to the concrete and clamped to the king-post. All the client's requirements were satisfied.



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