NATIONAL WINNER

ENGINEERING
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ONEIDA

Junior/Senior High School Additions

Oneida, New York

Richard L. Applebaum, P.E.

(Top) Northwest corner of the gymnasium addition showing the expression of the truss on the exterior elevation. This photo also shows the clerestory windows that separate the roof structure as a whole from the masonry box that is the gym. At night with the lights on, the entire roof "floats" over the heavy brick base. (Right) Interior shot of the gym showing the clerestory window wrapping around the corners as well as the slot windows under the trusses on the west elevation. It enhances the light feeling of the roof structure, so it may be seen as an element unto itself - a sort of "wing" floating above the gym floor.

Side view close-up of double-bowed Oneida Junior/Senior High School gymnasium truss

The Oneida High School gymnasium addition is an excellent example of how the use of structural steel, through the creativity and coordination of the design team, can create a dramatic visual impact.

The gym addition is approximately 122′ by 149′. The roof structure consists of steel trusses spanning the 122′ dimension, spaced approximately 17′-2″ on center. Spanning between the trusses are 12″ standard K-series joists. The unique aspect of the trusses is that the top chord bows up and the bottom chord bows down, meeting at a common working point at the exterior columns.

The roof structure in a gym is the dominant design element. After people enter a gym, their eyes rise up to take in its full size and are caught by the roof structure. Therefore, it was the design intent to make the roof structure a dominant element in the gym's design.

Visually, the architect was looking for a roof structural shape that would appear to be light and floating over the gym's basketball court while light poured into the gym from the long sidewalls. During the preliminary design phase, it was determined that the use of double-bowed trusses would achieve this goal. The use of conventional long span joists was considered but rejected because they did not create the desired visual effect. These structural elements are used in many gym roof structures and often appear heavy and over powering.

The curved bottom half of the roof structure brings the spectator's eye upward from the center of the gym to the exterior walls, which have an expanse of glass between the roof structure and the masonry walls below. Coupled with the reflected curve in the truss top chord, this gives the structure an appearance of a wing suspended from the end walls of the gym. To complete the gym's design, the truss was accented by expressing its double-bowed shape on the exterior of the building.

The truss is very simple and elegant with very little load going to the web members. This allowed us to use 3″ diameter standard pipe for the web, which provided a very light "feel" to the truss. The top and bottom chords consist of 8″ wide flange sections. The roof trusses weigh approximately 90 lbs. per linear foot.

The owner was initially skeptical of the gym roof structure's cost. The engineers had to convince the school district that the cost of the double-bowed trusses with small purlins between the trusses would be no more expensive than conventional long span joists before they would accept the gym's design. The popularity of this truss has grown since this project, and we have received requests for this type of roof truss on three more school projects.

Richard L. Applebaum, P.E., is President of Klepper, Hahn & Hyatt in Syracuse, NY.

OWNER:
Oneida City School District

STRUCTURAL ENGINEER:
Klepper, Hahn & Hyatt, Syracuse, NY

ARCHITECT:
Bell and Spina Architects,
Syracuse, NY

GENERAL CONTRACTOR:
B.F. Yenny Construction, Syracuse, NY

FABRICATOR,
ERECTOR AND DETAILER:
Raulli & Sons, Inc., Syracuse, NY
(AISC member)

SOFTWARE:
RISA Frame and Truss Analysis