Project Overview

FRP STRENGTHENING OF GLULAM BEAMS IN HIGH SCHOOL GYMNASIUM

Name: Snowflake High School Gymnasium
Type: Gymnasium
Location: Snowflake, Arizona
Completed: August 2008

PROBLEM

On the roof of the high school gymnasium in Snowflake, a cooler and an A/C unit were built which exposed the structure to loads above the original design loads. As a result the two 80 ft long roof supporting glulam beams developed cracks. In order to avoid further deflections and a possible failure of the beams, they were supported with jacks below the load of the A/C unit.
The gym was out of use throughout this time. A conventional way of increasing the strength of the beams was considered. It turned out as too expensive and time consuming and would have required a significant increase in the beam dimensions.

SOLUTION

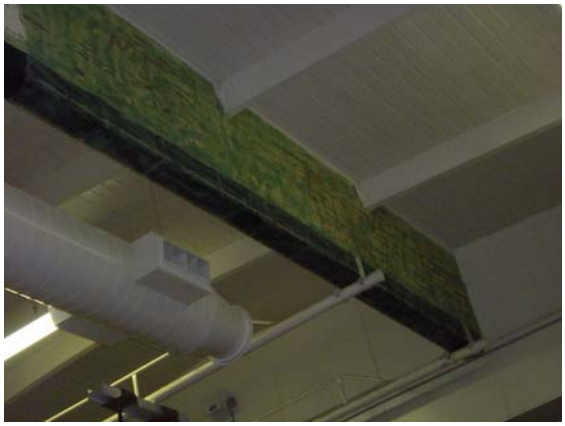
QuakeWrap® FRP Strengthening System was selected. A layer of QuakeWrap® carbon FRP was applied as a bending reinforcement, QuakeWrap® glass FRP was then applied as shear reinforcement, providing a complete confinement of the beams. The application required a scissor lift in order to access the beams.

For each beam three strips of carbon FRP were applied and overlapped. This was necessary due to the jack in the middle of the beam. It was not removed during the reinforcement of the end sections in order to avoid further deflections of the beams. Finally the jacks were used to support the end sections and the middle sections were wrapped.

Technical Highlights

- 5,000 square feet warehouse
- Roof beams required strengthening

o Two glue-laminated beams (8”x47”x80 ft) were strengthened with unidirectional FRP carbon and glass fabrics.



Credits

General Contractor: Sky Engineering, Inc., Phoenix, AZ