



Project Overview

CARBON FRP STRENGTHENING OF GLULAM BEAMS IN SCHOOL GYM

Name: Coolidge High School Gymnasium
Type: School Building
Location: Coolidge, Arizona
Completed: August 2003

PROBLEM

The Coolidge High School gymnasium was built in the 1960s with public seating on the gym floor. The school district wanted to move the spectators to elevated mezzanines with bleachers.

The existing wooden (glulam) floor beams were not capable of supporting the new bleachers. Structural calculations showed that the beam strength needed to increase by 30-40%.

SOLUTION

QuakeWrap® FRP Strengthening System was selected to provide flexural and shear strengthening of the glulam beams. QuakeWrap, Inc. generated an original design that included the use of FRP carbon plates to improve the compressive strength of wood. This allowed to further increase the flexural strength of wooden beams by reducing the probability of reaching the wood crushing failure mode before the full tensile capabilities of FRP carbon fabric were engaged.

Laboratory tests were conducted on glulam beams retrofitted with QuakeWrap's design and 67% gain in strength was measured. The same system was used to increase the strength of the wooden floor system from 40 psf to 60 psf.



Technical Highlights

- Glulam beams could not support new bleachers
- Beams needed to be strengthened 30-40%
- Retrofit took 2 weeks
- Total cost: \$8.50/ft² of floor area
- Feature article in **Structure Magazine**, Feb 2004

Credits

Consultant: Paragon Structural Design, Phoenix, Arizona
General Contractor: Adolfson & Peterson, Tempe, AZ



This project received the **2004 Award for Excellence in Structural Engineering (Retrofit)** by the Structural Engineers Association of Arizona.



"The FRP Retrofit Experts"