



# Project Overview

## FRP STRENGTHENING OF CONCRETE COLUMNS UNDER COLD WEATHER CONDITIONS

**Name:** Rocky Mountain Hardware  
**Type:** Warehouse Facility  
**Location:** Hailey, Idaho  
**Completed:** February, 2007

### PROBLEM

Several basement level columns in a warehouse facility under construction were poured with concrete below the design compressive strength value. The columns were declared unacceptable and were scheduled for demolition, which would have delayed the completion of the project for more than a month.

Retrofit had to be performed under cold weather conditions. The facility was constructed as a “green building” and as a result construction materials had to be environmentally friendly.



### SOLUTION

QuakeWrap® Strengthening System was selected since it could reestablish the original design strength of the column under the prevailing weather conditions.

Retrofit was designed to increase the existing compressive strength of the columns to their original design value. As a result, five layers of QuakeWrap® FRP carbon fabric were applied to each column. Gas heaters were used to increase the FRP system installation temperature to above 60 degrees Fahrenheit.



## Technical Highlights

- Extreme cold weather conditions.
- Several columns constructed with concrete strength below the design value.
- Columns retrofitted with 5 layers of QuakeWrap® FRP carbon fabric to reestablish original concrete design strength.
- Job performed in two days with 4 man crew.

### Credits

Consultant: QuakeWrap, Inc., Tucson, Arizona  
General Contractor: Garrett Construction, Ketchum, Idaho



*“The FRP Retrofit Experts”*