

Seismic Upgrade Using Code-Listed FRP Laminate Helps Rehabilitate Historic UNR Manzanita Hall



BACKGROUND Historic residence hall closed for seismic inadequacy

Manzanita Hall is one of three remaining buildings on the University of Nevada, Reno, campus that were constructed prior to 1900. Originally named the Girls' Cottage, Manzanita Hall was built in 1896 and was used to house 97 women in double and single rooms. Architecturally, it created a Victorian atmosphere and offered a spacious student lounge, complete with a grand piano and a spectacular view of Manzanita Lake.

Several years ago, the hall was deemed seismically inadequate, and the electrical, plumbing and HVAC systems were likewise found to be seriously outdated and insufficient for modern college life. These structural deficiencies necessitated its closure in 2015.

THE CHALLENGE Seismic upgrades needed as wall reinforcement and remodeling

Not only did the URM (unreinforced masonry) structure need to be seismically upgraded to current IBC® standards, but the walls needed to be reinforced for new gravity loads and new walls would be needed to create larger dorm rooms.

PROJECT INFORMATION

Project

Manzanita Hall at
University of Nevada, Reno

Project Category

Rehabilitation and Retrofit

Project Owner

Lumos & Associates

Application

Reinforcing Walls

Simpson Strong-Tie Products

SET epoxy; ETS steel tubes; Composite Strengthening Systems™ FRP; SUBH bridging connectors; Titen HD® screw anchors

CHALLENGE

Unreinforced masonry structure requiring seismic upgrade and reinforced walls for new dorms.

SOLUTION

Simpson Strong-Tie was able to provide a suite of products, from FRP laminates to cold-formed steel bridging, to strengthen the structure.

RESULTS

The project was completed on time and under budget through collaboration between the contractor, architect and Simpson Strong-Tie.

THE SOLUTION Apply code-listed precured laminate along with a suite of cold-formed steel and anchoring products

The project's structural engineering firm, Lumos & Associates (Reno office), worked closely with the Simpson Strong-Tie field engineer and concrete technical sales representative to determine the best method of retrofitting the project using Simpson Strong-Tie concrete construction products. Clark/Sullivan Construction was the general contractor for the project.

The adjacent photos illustrate some of the upgrades made to Manzanita Hall using Simpson Strong-Tie products.

Simpson Strong-Tie Composite Strengthening Systems™ FRP laminates were installed on the underside of the upper-story concrete floors. The CSS laminates are used to transfer seismic forces from the floor to the surrounding retrofitted walls. CSS-CUCL, the only code-compliant precured laminate in North America, was specified instead of bolted steel plates because it is quicker to install and offers a lower surface profile.

While not visible in the image, Simpson Strong-Tie cold-formed steel bridging products, such as the SUBH, were also used at the bridging bars on the light-gauge steel studs to prevent buckling. Other Simpson Strong-Tie products used in the retrofit included Titen HD® heavy-duty screw anchors, Strong-Drive® structural screws, HTT4 holdowns and miscellaneous other wood connectors.



Drilling at the required 22.5° angle to install epoxied rebar before adding shotcrete to URM wall.



FRP laminates used for diaphragm strengthening (shown), with clips on stud walls (not shown).

THE RESULTS Onsite Simpson Strong-Tie collaboration steers project home on time and under budget

The project was successfully completed on time and within budget. Kenneth Hodson, S.E., senior structural engineer with Lumos & Associates, testified to the firm's satisfactory collaboration with Simpson Strong-Tie: "We were able to count on Simpson's field engineers and service reps for technical support; they were onsite whenever we needed them out there."

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