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SNAP-TITE Composite Column Reinforcement

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SNAP-TITE COMPOSITE COLUMN REINFORCEMENT

THE NEED

Recent earthquakes throughout the world have demonstrated the vulnerabilities of older reinforced concrete columns to seismic deformation demands. During earthquakes, seismic forces cause concrete to crack and expand. Steel rings inside the column must resist these forces, but have failed during recent earthquakes. These reinforced concrete columns with substandard reinforcement details and major corrosion problems must be strengthened.

Previous technology consisted of concrete or steel jackets. Although effective, these techniques are costly, time consuming, and require their own maintenance as well. Following major earthquake damage to bridges and overpasses in 1989, the California Department of Transportation identified 1,039 bridges that were in need of seismic retrofitting to prevent spalling and catastrophic failure during earthquakes. After the 1994 Northridge earthquake, another 1,325 bridges were added to the list. The need for a more cost effective and user friendly system was imminent.

FIGURE 1 BEAMS ARE INSTALLED AT SITE

THE TECHNOLOGY

The Snap Tite Composite Column Reinforcement strengthens a concrete column by confining it in an external composite jacket, which prevents the concrete from expanding during seismic activity or prolonged freeze-thaw cycles. The pre-manufactured fiberglass jacket is comprised of glass fibers and corrosion resistant isopolyester resins. The resin completely encapsulates the reinforcing fiber network, which, for most applications, is conventional E-glass woven roving and bi-directional fabric. Each Snap Tite component is a single-seamed, cylindrical jacket that "snaps on" the column. The column is cleaned and prepared with a high performance urethane

adhesive before the first jacket is applied. More jackets are applied until the desired thickness for the job is achieved. Adhesive is applied between layers, and the vertical and horizontal jacket seams are symmetrically alternated. A typical column will require 3 to 4 layers of jackets, with a nominal jacket thickness of around 1/8 inch thick. Each nested jacket is bound with belt clamps until the adhesive cures.

THE BENEFITS

Snap Tite is recognized as one of the most cost effective and user friendly solutions for rehabilitating or upgrading existing steel reinforced concrete columns or structures. Snap Tite replaces steel, the conventional material used for column reinforcement, reducing installation and long-term maintenance costs. For example, Snap Tite, because of its light weight, can typically be installed in three hours vs. three days for steel, and can be lifted in place by workers using only a few pieces of light, mobile equipment. Snap Tite won't rust and never needs to be painted, even when installed in corrosive environments.

The other market challenge to Snap Tite is the epoxy resin composite column wrap. Although this composite does meet performance requirements, it is much more expensive to manufacture. The current manufacturer of this resin also uses extensive equipment for installation, Snap Tite does not.

Full-scale tests at two major universities have verified that columns reinforced with Snap Tite withstand three-to-eight times the deflection of columns without reinforcements. Preliminary tests indicate that Snap Tite can improve earthquake capability three times beyond that of a steel jacket.

FIGURE 2 HIGH PERFORMANCE ADHESIVE BONDING IS APPLIED TO BEAM SURFACE

STATUS

Snap Tite has been tested and approved by the California Department of Transportation to retrofit 3,480 steel reinforced columns on the Yolo Causeway in northern California. It was the natural choice for this project because the columns are submerged under water for several months each year. The technology is

also being evaluated to rehabilitate other structures such as wooden utility poles, wooden pier pilings, and parking structures.

This technology was honored as one of 1999 Nova Award Finalists by [Construction Industry Forum](#).

BARRIERS

The column to be retrofitted must be even and uniform to ensure a good fit with the fiberglass jacket, and to realize the structural improvements of the process.

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REFERENCES

1. 1999 Nova Award Nomination Entry, "SNAP TITE Composite Column Reinforcement.
2. "University of Southern California Chronicle, "A Quick Fix to Make Freeways Quake-Safe", February 6, 1995. <http://www.usc.edu/uscnews/stories/1020.html>.
3. Amoco Chemicals Winter 97 Report. "Concrete Columns to Get Isopolyester Protection."

REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

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