Quake-proofing costly, difficult

New building code could shake skyline

By Tom Charlier
charlier@gomemphis.com
May 25, 2003

Panel by panel, slab by slab, powerful saws and concrete-breaking devices chew into the Memphis Veterans Medical Center like mechanical termites that have somehow mustered their attack from the top down.

Over the past 15 months, the machines have helped devour most of the top nine floors off the hospital, shrinking it from 14 to five stories. Those bottom floors, which will remain as an administration building, will be fortified with additional concrete walls.

With its frenetic combination of demolition and new construction, the project at the VA represents by far the most elaborate effort Memphis has seen to retrofit a building to withstand earthquakes. Total cost: more than $100 million.

By the time work is finished nearly three years from now, the facility that emerges from the dust and tumult at Pauline and Jefferson should be able to endure just about anything the New Madrid fault zone can throw at it.

"I dare say it will survive any strong earthquake we may have here without any structural damage," said Jim Dorman, professor emeritus at the University of Memphis Center for Earthquake Research and Information.

But to some engineers and building professionals, the VA project stands as a daunting symbol of the staggering costs and headaches often associated with reinforcing an existing building - in this case a 36-year-old hospital - so it can survive the intense shaking of a quake.

The same challenges and expenditures taken on by the VA, they say, could face growing numbers of other building owners if state and local officials adopt a new building code based on an upgraded seismic-hazard rating for the area.

Although Memphis already has seismic requirements in its building code, new standards being reviewed by state officials could raise construction costs and bring added federal pressure to retrofit critical facilities, such as schools, fire stations, hospitals, bridges and airports.

"It (the VA project) illustrates what kinds of costs we can expect to see," said Joe Tomasello, structural engineer with The Reaves Firm in Memphis.

Tomasello, who worked on such well-known local projects as Oak Court Mall, co-authored a report published this month contending that building-code changes could unnecessarily saddle the area with some of the same requirements as those found in California.

The resulting costs could produce a major drag on growth and public services, the report says.
Many earthquake researchers, however, say the seismic hazards of the New Madrid zone are considerably greater than the report suggests.

Despite the disagreements on hazard levels, no one disputes that retrofitting buildings is costly.

"It's very expensive," said Howard Hwang, a professor of civil engineering at the U of M earthquake center. For many noncritical structures, "building a new one is probably better," he said.

The reasons for the high costs of retrofitting aren't difficult to find.

Unlike new construction projects, retrofitting requires dismantling or demolition along with working around existing structures to install steel bracing or concrete walls and anchor sections of the building.

"If you think of a building as a body with a skeleton, what you have to do is pick all the skin off, all the flesh off, and repair the skeleton and put it all back together again," Tomsellio said.

In the past few years, seismic-retrofitting projects of differing scales have been launched on Memphis buildings and facilities ranging from the Toyota Center and Hernando DeSoto Bridge downtown to the Memphis Light, Gas and Water Division's new business operations building on Whitten.

The extent of the work depends on just how much seismic safety the owner wants and can afford, said Tony Pellicciotti, an associate with Looney Ricks Kiss Architects who has worked on projects such as the anchoring of the veneer of the Toyota Center.

"Part of knowing what the client's goals are is knowing what the budget is," Pellicciotti said.

The VA project is part of a nationwide initiative to upgrade hospitals to resist quakes. It was spawned by the deadly collapse of a VA hospital in the 1971 San Fernando Valley quake in California.
The Memphis facility opened in 1967, long before seismic requirements were incorporated into local building codes.

Despite the high costs involved, the plan to build a new six-story bed tower and to downsize and reinforce the old high-rise structure represents "the most economical and best way to solve the seismic problem," said Ted Spence, chief of the facility management service at the VA center.

It would have been too difficult, Spence said, to strengthen "such a tall, limber structure" as the original 14-story bed tower.

VA officials had many reasons for retrofitting the existing hospital rather than moving to another site and building a new one, Spence said.

Although the original tower was not quake-resistant, some later-built facilities that included a clinic annex were. In addition, there are benefits to the hospital's location within the larger medical center area, Spence said.

"We looked at every aspect of it," he said. "We had a large investment in this facility."

The first phase of the project, costing $64 million, involved the construction of the new tower. It was completed in 2000. A second congressional appropriation of $34.6 million covers the dismantling of the floors, which should be finished in October, and the reinforcement of the remaining building.

The contract for the reinforcement work should be awarded by October, with the work lasting at least two years. The project will include the pouring of foot-thick concrete walls to bolster the structure.

With design and engineering and other costs included, the tab for the project could hit $107 million.

The floor-by-floor demolition has been the most challenging, and perhaps controversial, aspect of the project.

Tomasello questions whether the VA shouldn't have tried to move to another site and build a totally new facility. "I think I would've looked at selling the building," he said.

And, while it was designed to alleviate earthquake hazards, the demolition created vibrations comparable to those from a magnitude 4-5 quake in the New Madrid zone, said the U of M's Dorman, who monitored the project with instruments.

Robotic concrete-breaking machines - with jaws that Dorman likens to those of a Tyrannosaurus rex - methodically tore away at slabs and panels.

"The people in the hospital did feel the vibrations. They were really concerned at first - they didn't know if they'd look up and see something crashing through the ceiling," Dorman said.

"As the work went on down to the lower floors, the noise down below got louder, but the phone calls almost died off because they got used to it, I guess."

For all the trouble, though, the downsizing of the building was needed to lessen seismic hazards, Dorman said. "That's a tremendous amount of load from overhead that's removed," he added.

- Tom Charlier: 529-2572

Copyright 2003, GoMemphis. All Rights Reserved.