

Engineer says agency leaked idea

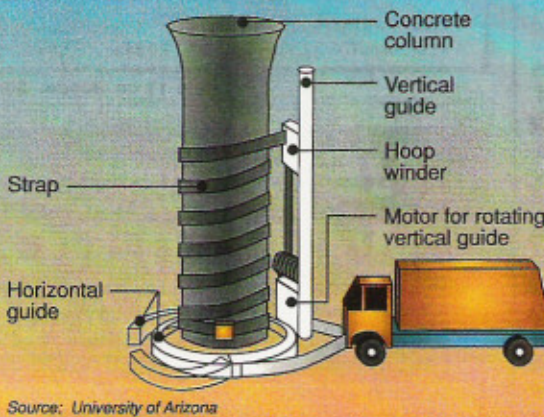
In tests that may result in an innovative way to strengthen California's bridges, concrete columns will be wrapped with a high-strength fiber now used in bullet-proof vests. But the research contract has come under fire, with officials at the California Dept. of Transportation getting flak for allegedly taking proprietary information from the University of Arizona and sharing that material with prospective bidders in California.

The university's attorneys have filed a bid protest with Caltrans regarding its award of the contract for testing fiber-wrapped concrete columns. Caltrans officials have denied that any of the university's material they shared with other bidders was proprietary. But the university's allegations are being investigated, and if they are found to be true the contract will be canceled and rebid, says Caltrans attorney Nicholas G. Tinning.

Caltrans awarded the \$42,000 research contract in June to Fyfe Associates Inc., a one-man firm in Del Mar. The firm plans to subcontract the testing to the University of California at San Diego, which leads the state in Caltrans-funded research into the retrofiting of concrete columns.

The successful bidder, Edward R. Fyfe, says there is no truth to assertions that he profited from the intellectual property of the University of Arizona. "Using fibers to wrap a column is kind of like a motherhood thing—

Fiber-wrapped column



Source: University of Arizona

Proposal was submitted after Loma Prieta Earthquake.

lots of people have thought about it," he says. There may be some truth to that. In a 1987 technical paper, Japanese researchers discussed wrapping concrete columns in carbon fibers. But as they admitted in that paper, carbon fibers are brittle.

In comparison, Kevlar is stronger and more ductile, with a tensile strength of 500,000 psi, says Mohammad R. Ehsani, an associate professor in the University of Arizona's civil engineering department. He claims he was the first to inform Caltrans officials about weaving belts of Kevlar and then winding and post-tensioning them around bridge columns for increased lateral strength. He says he sent them a pre-proposal last fall just weeks after the Loma Prieta Earth-

quake near San Francisco. Caltrans officials then disclosed this idea to California firms and requested formal proposals from them, to keep the contract in-state, he says.

Although the dollar amount of this research contract is small, the results might have widespread application. State and local agencies in California are planning to retrofit concrete columns in an estimated 1,000 bridges within the next few years. Caltrans itself plans to spend \$500 million for repairs to the state's concrete bridges, says James E. Roberts, the agency's chief bridge engineer.

An estimated one-third of that \$500 million in repairs will be spent on columns, although agency officials have not decided on how to proceed. Last month, for instance, work was halted on two quake-damaged San Francisco viaducts, in part because of concerns about using steel-plate jackets (ENR 8/2 p. 13).

Besides retrofiting columns, Caltrans plans to reinforce its concrete bridges in other ways as well. Probably half of the \$500 million will be spent on reinforcing footings, Roberts says. Furthermore, connections will be upgraded to prevent bridge girders from slipping off bearing pads in the event of an earthquake. Most of the repairs will be made to state bridges that were designed before the 1971 San Fernando quake, he says.

By David B. Rosenbaum