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2 probes seek cause of tunnel leak

By Sean P. Murphy and Mac Daniel, Globe Staff | September 17, 2004 (Boston Globe)

State officials announced two separate investigations into the water leak inside the Central Artery's northbound tunnel and said yesterday they will hold Big Dig contractors accountable for the costs of any mistakes that caused Wednesday's breach.

Meanwhile, the engineer in charge of construction for the Big Dig still could not say with certainty yesterday what tore a hole 8 inches in diameter in the tunnel wall. The gushing water forced officials to close two northbound lanes in the tunnel for a couple of hours, backing up traffic on Interstate 93 south of the city for miles.

While the chief engineer continued to assert that Wednesday's leak did not compromise the tunnel's structural integrity, three people contacted the Globe to say another leak was spotted close by in the northbound tunnel last week.

Workers were trying to permanently patch Wednesday's leak by forcing grout into the opening last night when traffic eased after the Red Sox game. At 11:15 p.m., about a dozen workers were at the site, where a trickle of water could still be seen leaking into the tunnel. Officials said the cost of the repairs to the tunnel has not been determined.

Two tile-covered panels, each about 15 to 20 feet wide, were removed at the point of the leak and will remain off during repairs and subsequent monitoring of the permanent patch, officials said.

Keith Sibley, an engineer with Bechtel/Parsons Brinckerhoff, the private-sector consortium that has managed the Big Dig, said construction records for the area where the leak occurred showed that crews had hit a sand layer, which made it difficult to dig the trench for the wall. He said a few other spots in the 5 miles of slurry walls in the tunnel are in areas that share this same geological characteristic.

Sibley declined to say how many sections of the walls would be inspected, but said this particular defect did not initially show up after the concrete was poured for the tunnel nearly 10 years ago. "It's not characteristic of the tunnel as a whole," he added.

But three people contacted the Globe to say another leak was spotted on the western wall of the northbound tunnel last week, when the remnants of Hurricane Frances passed through Boston.

Patricia Busacker, 59, of Quincy, said she saw water pour out of the ceiling of the northbound tunnel's western wall during the morning rush hour Sept. 8. "It was flowing," she said. "I thought, 'I hope the ceiling doesn't fall down.'"

Sean O'Neill, spokesman for the Big Dig, said that water could have leaked down along the steel footings in the ground that formerly held up the elevated Central Artery. Another cause could have been condensation on the walls flowing through a drainage area. He said there were no reports of an earlier leak.

Sibley said Bechtel/Parsons engineers would probably take about two weeks before reporting to the Massachusetts Turnpike Authority, which oversees the Big Dig, about the exact cause of Wednesday's leak and whether other sections of the tunnel are at risk for similar leaks.

In a statement, Bechtel/Parsons said, "We have launched a full investigation into the causes of and responsibility for the leak. Our preliminary assessment is that soil composition unique to that particular location was a major factor."

One investigation announced yesterday will be led by engineers from Bechtel/Parsons, which has managed the \$14.6 billion project for nearly 18 years. Matthew J. Amorello, Turnpike Authority chairman, said he delegated one of his engineers to participate in the Bechtel/Parsons investigation.

The other probe will be headed up by Jack Lemley, a veteran engineer who has worked on major tunnel projects around the world. Lemley was expected to arrive in Boston last night from his office in Boise, Idaho. He was called yesterday by Edward M. Ginsburg, a retired judge who is leading a state-appointed team that is reviewing the entire project to recover refunds for mistakes by contractors.

"The stakes are pretty big in this, because if this is a serious problem, it is going to be very expensive to fix," Lemley said in a telephone interview. He said he would review the techniques used for maintaining quality on construction of the walls.

Amorello said yesterday that he had drafted a letter to executives at Bechtel/Parsons asking what will happen if more problems crops up with the project, which is nearing completion. Amorello said that among his questions is where the consortium will be in years to come. "If this pops up again," he said, "am I going to have to chase you down?"

The leak, which prompted officials to initially close two lanes of the northbound Interstate 93 tunnel Wednesday and keep one lane closed into the night, was probably the result of a pocket of clay or sand inside the 3-foot-wide east wall, Sibley said.

All 5 miles of the tunnel walls are designed to be solid concrete and virtually impermeable to water. But an unknown quantity of clay or sand may have fallen into the wet concrete during construction about 10 years ago, Sibley said, leaving a spot that was vulnerable to groundwater working its way through the wall.

He said leaks are common during construction of slurry walls and usually are spotted when workers dig down next to the concrete to inspect a project.

"They are checked as they are put in place, and as we dig out the inside, it reveals certain imperfections that occur," Sibley said. "Those are repaired then, as we finalize our tunnel and build out the structure."

Engineers interviewed yesterday said there is no easy way to test cast concrete walls for the presence of clay or sand, which are known as inclusions.

"There are no direct method to detect pockets in the concrete," said Jeffrey C. Evans, a professor of civil engineering at Bucknell University. "There is an inherent risk of inclusions. And if there is one inclusion in 5 miles of walls, that's a pretty good job."

Sibley said construction of a nearby tunnel for the MBTA's Silver Line service may have been a factor in the leak. With construction the MBTA tunnel nearly complete, Sibley said, displaced groundwater may be pushing back to its original location.

Michael Mulhern, Massachusetts Bay Transportation Authority general manager, said: "What's occurring now is nothing more than normal hydrostatic pressures in the soil, and the walls should be built to withstand those pressures. All other issues are moot. They have a defective slurry wall."

Raphael Lewis of the Globe staff contributed to this report. ■