

# That Sinking Feeling

*By Jim Douglass*



## **Water Table Woes Undermine Boston Condominiums in the Wake of the Big Dig**

In this time of overheated real estate prices in Boston, billions of dollars of the city's prime real estate are under threat. The cause? Sinking foundations, caused by dangerously low ground water levels.

The sinking real estate rests on wooden piles that were meant to last more than 1,000 years, provided they remained submerged in water. When exposed to air, however, the piles rapidly start to rot and can disintegrate within a few years.

### **CITY PROJECTS POSE A THREAT**

The endangered buildings were built before 1920 in low-lying neighborhoods like the South End, Back Bay, Beacon Hill, Chinatown, and Fenway. These sections of the city were at one time wetlands, and fill was brought in to create land. When houses were built, wooden piles were driven deep into the soft ground to support the buildings' foundations.

Over the decades, public infrastructure projects like sewers and the Big Dig, along with private development, have lowered the levels of the subterranean water table in Boston, exposing those pilings to air and causing them to weaken. The damage threatens the viability of the buildings atop the pilings.

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249 A Street - Cracks on the West Exterior Wall



In recognition of the severity of the problem, a landmark agreement was signed in September in which nine city and state agencies agreed to coordinate their efforts to combat low ground water tables in Boston. The agreement proposes zoning changes in which almost all new developments will have to file groundwater impact plans. It also outlines the expansion of a groundwater zoning district. Agencies signing the compact include the Massachusetts Water Resources Authority, the Massachusetts Bay Transportation Authority, and the City of Boston's Office of Environmental Energy Services.

## OWNERS OF THREATENED BUILDINGS REACT

The changes may have come too late for more than 100 properties, which have filed insurance claims for damages they allege were caused by Big Dig construction. Many of them, alleging foot-dragging by Big Dig in processing

claims, have filed lawsuits against the state as well. Big Dig officials have reportedly defended their slow processing as a means of protecting taxpayers against unsubstantiated claims.

One property that has already filed a lawsuit is 249 A Street in South Boston. One corner of this building dipped in the wake of the Big Dig construction, causing large cracks in the building's foundation and the whole building to twist like a pretzel, says Michael Roitman, attorney for the 105 owners of the artists' cooperative.

From the beginning of the project, the owners of the building worried about the effects that the Big Dig might bring about, says Roitman, because the 100-year-old structure is situated next to the construction site

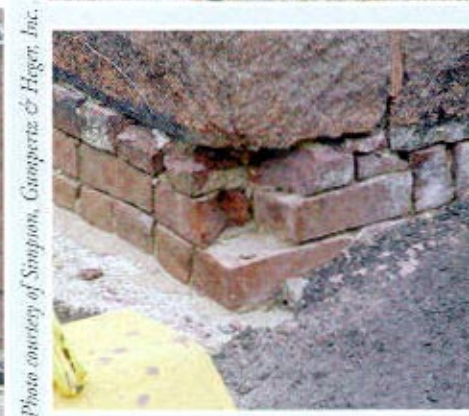


Photo courtesy of Sampson, Gumpertz & Heger, Inc.



where the Massachusetts Turnpike connects to the Ted Williams Tunnel. The owners took the proactive step of collecting control data before any construction began, so they could document any ill effects to their piles. Before the massive construction project began, a test hole was dug so engineers could examine the condition of the piles and establish a baseline. The test hole uncovered one wooden piling that supported the structure, and, more importantly, documented it to be in good shape, says Roitman.

A second test hole dug after the project was completed, however, revealed a piling that was so mushy that "you could take a screwdriver and push it into the wood [piling] up to the handle," says Roitman.

Although the new agreement and increased public awareness may bring groundwater back up to its previous level, Roitman says damage to the piles cannot now be reversed or even halted. "Once they've been exposed to oxygen, they keep rotting. It doesn't stop if they're re-immersed," he says.

The owners of 249 A are now seeking \$2 million in damages to replace the piles with steel or concrete members that won't be affected by water levels, says Roitman. And the logistics to repair the damage will be a challenge to any professional who signs on for the project. "Getting in [to make repairs], you have to go through the side of the building, you can't tear down the foundation. It's a complicated engineering problem," notes Roitman.

The problems at 249 A Street are thought to be similar to the difficulties faced by many other buildings constructed before 1920. These buildings reflect historical development patterns in Boston and the construction techniques of the times, which utilized wooden pilings.

## A PROBLEM IN THE MAKING

The origin of the groundwater problems dates from colonial times, shortly after settlers set up shop on

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## **Boston Is Not the Only City So Afflicted**

Boston difficulties caused by a low water table and rotting pilings are by no means unique.

The European cities of Stockholm, Helsinki, and Amsterdam are all facing similar problems, and some are trying to preserve much older pilings, says Boston Groundwater Trust Executive Director Elliot Laffer.

During the Big Dig, says Laffer, engineers from Stockholm came to Boston to observe construction practices because the Swedish city has buildings on wooden pilings, has groundwater problems, and is also building a new underground highway.

And in some ways, notes Laffer, Boston's problems are less severe than those faced by his European counterparts. In some European cities, pilings nearing 1,000 years old are falling prey to a bacteria that attacks wood, even if it remains submerged, says Laffer, who notes that large expenditures are being made on scientific research to combat the bug.

"That will affect us about 500 years from now," says Laffer. "By then, somebody else can worry about it."

the narrow Shawmut Peninsula and renamed it Boston. A need for more land and pollution of the salt marshes and tidal flats surrounding Boston led to the decision to fill the wet areas and build housing, almost all of it supported by wooden piles.

In the 1920s, problems began to surface. Leaky sewer lines and other underground infrastructure subsequently installed in the areas were suspected of lowering the water table and exposing building foundations to rot.

In 1929, a massive construction project was undertaken to replace rotted wooden piles under the Boston Public Library with new steel piles. At the same time, repairs were performed on the rotting pilings at Trinity Church, which was located just down the block.

Unfortunately, efforts to solve the

problem foundered during the 1930s and were dropped by the time World War II came about, says Elliot Laffer, executive director of the Boston Groundwater Trust.

## **A MODERN PROBLEM, TOO**

The problem became even more complicated in the late 20th century, when the decision was made to expand underground subway lines, and more and more structures, like parking garages, were built underground, says Laffer. "We've built a lot of structures underground that impede the flow of groundwater. Being human, we didn't build these structures perfectly, and over time they leak. The less expensive solution is to pump the water away. If you go to Home Depot and say you have a leak in your basement, they'll sell

you a pump," he says. "The water is being pumped away, [and] it's going into the sewer system and it's being pumped to Deer Island [a sewage treatment plant], and it's drawing down the water table."

While the water table was being lowered by man-made underground structures, surface activities were also reducing the amount of groundwater being replenished, says Laffer. As more land was developed, paved areas like parking lots and roads, along with roofs and gutters, also diverted rain into storm gutters and away from the ground, where it could seep down and replenish ground water.

Part of the recently signed agreement calls for new development to find ways to direct rain back into the ground instead of into the storm sewers.

## **A BETTER FUTURE AHEAD?**

While past efforts have failed to solve the problem, Laffer believes that demographics and economics now favor success of the recently signed agreement.

"We are now in an era where the assessed value of the property in the affected areas... approaches half of the assessed valuation in the city," says Laffer. "The areas that you're talking about drive the economy of the city, [and] tourists come here to look at the historical buildings. So people have come to recognize that there is a clear economic self-interest on the part of the state, the city, and the people who live here to preserve this.... [They also have to recognize] that if we don't take this step we now agree to, we could lose this.... We need to preserve what makes us special." 🏠