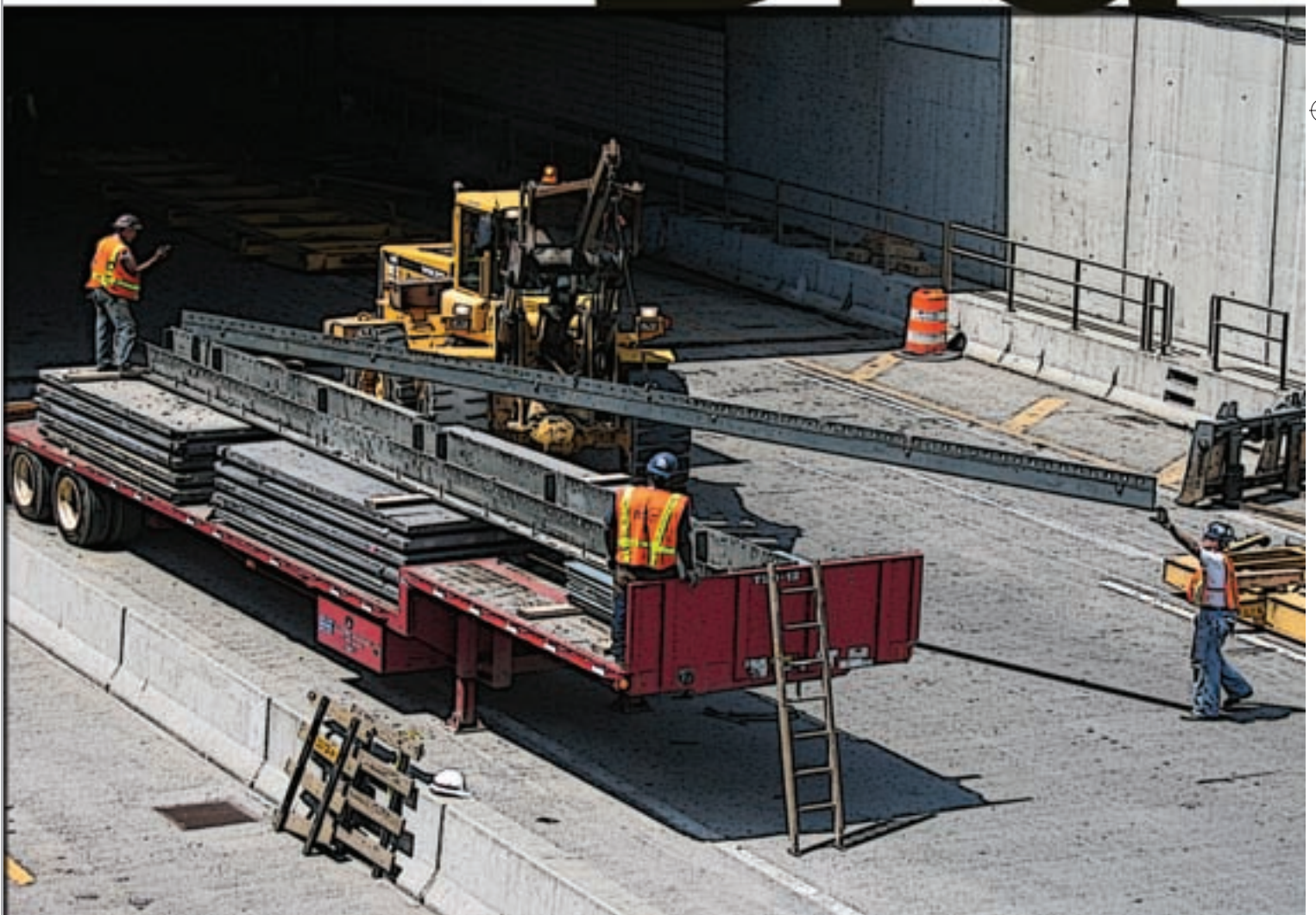


BY DAN MCNICHOL  
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# “THE BIG

*NTSB report  
on ceiling collapse  
spreads the blame*





**A**t 11:01 p.m. on July 10, 2006, a 38-year-old mother of three traveled to Logan International Airport in Boston with her husband behind the wheel of a 1991 Buick. The couple was approximately one second from exiting a new “Big Dig” tunnel when 20 anchor bolts and 10 massive concrete panels used for ventilating the tunnel pulled free from the highway’s ceiling.

# DIG” unglued

Looking out through the windshield, they could see the huge panels of concrete, each weighing about as much as their own car, fall in a sweeping motion from right to left, simultaneously quashing their vehicle and forcing it against the north side of the I-90 tunnel wall.

The falling infrastructure, striking the passenger side of the car first, killed Milena Del Valle instantly. Her husband was saved in part by a roughly 2½-ft-high walkway outfitted with a 3 ½-ft-high stainless steel railing running along the northern side of the tunnel wall. The 6-ft-high emergency walkway prevented the cascading ceiling panels from completely crushing the driver’s side of the car. Somehow Milena’s husband survived with only minor injuries.

## Taping off the tunnel

Initially, first responders thought no one was hurt in the collapse. Boston Fire Department crews, arriving within minutes of the failure, were stunned to find a flattened 1991 Buick beneath the pile of concrete ceiling panels. Motorists who had stopped to help were told to evacuate the tunnel for fear of further collapse. The Big Dig’s reputation as an engineering marvel had come unglued overnight.

Early-morning news broadcasts awoke Bostonians to more disbelief and outrage surrounding the Big Dig. However, this time it was not over escalating costs or disconcerting leaks. The sobering reality was a matter of public

safety. Each update from the media instilled citizens with more trepidation. Were the Big Dig’s roads, bridges and tunnels safe for commuters? Public officials debated the issue over the airwaves and in the papers, making it unclear whom to trust. The chairman of the Massachusetts Turnpike Authority and head of the Big Dig, Matt Amorello, said the tunnels were safe. Gov. Mitt Romney argued the Big Dig was a disaster. Because the Turnpike Authority managed the Big Dig, the governor was unable to control the quasi-private-public bureaucracy. The *Washington Post* reported the governor’s lament, saying, “That the largest public works project in the country would have no accountability to any public official is nuts.”

In the morning the news was local. By midday, the Big Dig ceiling collapse was prime-time national news. Despite the political battle, certain realities were indisputable. A woman was dead.

Citing alleged negligence and faulty workmanship, the Massachusetts attorney general declared the I-90 tunnel a crime scene. One section after another of the region’s primary transportation system was being shut down as inspections revealed unsafe conditions throughout the Big Dig tunnel system. Ceiling supports were being tagged, removed and hauled off in Massachusetts State Police vehicles. Logan International Airport was the scene of missed flights as a result of traffic jams as well as de-





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lays in service to the Silver Line, a transit line partially built by the Big Dig whose buses ran through the now-closed I-90 tunnel.

Over a year later, Brad Puffer, a TV reporter for New England Cable News, explained, "As far as a news event, I've never seen anything like it. The entire city was shutting down. The story was huge. It affected everyone."

In a rare public, inner-political party brawl, two of the state's most influential officeholders were hosting separate press conferences. Remarkably, they had conflicting messages. The governor, Amorello's ultimate boss, wanted the chairman fired. Laws governing the quasi-public turnpike authority made firing Amorello, a political appointee, difficult. Within three days of the collapse, the Massachusetts Legislature passed emergency legislation on July 13 stating, "It is hereby declared to be an emergency law, necessary for the immediate preservation of the public's safety." The emergency law cleared the way for Gov. Romney to take control of the Turnpike Authority and dismiss Amorello.

As the political scene began to correct itself, the physical realities inside the tunnels were growing worse. Epoxy-dependent anchoring systems in the other parts of the Big Dig I-90 tunnels were in danger of failure.

Simple inspections revealed slippage of other epoxy bolts holding up other ceiling panels. Massive ventilation jet fans in both the tunnels also were suspended from epoxy bolt systems. Inspections revealed they needed to be shored up with additional emergency retrofits. No one knew at the time, but in order to complete upgrading the tunnels' safety features, parts of the Big Dig would remain closed for a year.

Due to the Big Dig's scope, its cost to the federal government and the criminal allegations surrounding the ceiling collapse, the Massachusetts Congressional delegation asked the National Transportation Safety Board (NTSB) to conduct a thorough investigation. Eager to set the record straight and ease fears of the owners and users of other tunnel systems around the world, the NTSB made the Big Dig report one of the most technical and thorough investigative works in its 40-year history. Dramatically, on the one-year anniversary of the collapse, the NTSB revealed its findings, which were as direct as they were simple.

### **Blame is broad**

Presiding over the members of the board assembled under the massive great seal of the U.S., with its spread eagle and banner reading, "E Pluribus Unum," NTSB Chairman Mark

Rosenker made the board's findings public to all those present and watching a simulcast online. Reading from the report, he stated, "The National Transportation Safety Board determines that the probable cause of the July 10, 2006, ceiling collapse in the D Street portal of the Interstate I-90 connector tunnel in Boston, Massachusetts, was the use of an epoxy anchor adhesive with the poor creep resistance, that is, an epoxy formulation that was not capable of sustaining long-term loads. Over time, the epoxy deformed and fractured until several ceiling support anchors pulled free and allowed a portion of the ceiling to collapse." The report's findings: Epoxy was the culprit; ignorance and negligence, it would later be explained, was the cause.

Reading on, Rosenker spread the blame wide and far: Contractors, subcontractors and even their subcontractors were at fault. In addition, the Big Dig's management consultant, federal agencies and state agencies were named as contributors to the tragic accident. Going beyond those directly responsible for the collapse, every highway department in the U.S. and several associations such as the American Association of State Highway & Transportation Officials (AASHTO) and the American Society of Civil Engineers (ASCE), who were not to blame for the acci-

dent, were called upon by the NTSB to create guidelines and material specifications in order to prevent further tunnel failures.

Simply, the NTSB explained, the wrong glue was used. And the hammer came down squarely on the company that supplied the epoxy to the Big Dig: Powers Fasteners. The NTSB stated, "The source of the anchor displacement that was found in the D Street portal tunnels and that precipitated the ceiling collapse was the poor creep resistance of the Power-Fast Set epoxy used to install the anchors." More to their point, the board said, "The information that was provided by Powers Fasteners Inc. regarding its Power-Fast epoxy was inadequate and misleading."

The *Boston Globe* reported that the first of 15 defendants to settle claims levied at them by Milena Del Valle's family, Powers Fasteners, will pay \$6 million in damages. "The tunnel ceiling collapse," the *Globe* read, "has triggered one of the most complicated legal fights in Boston history . . . drawing more than 100 attorneys, 17 companies and dozens of engineers and workers into the burgeoning lawsuits and criminal investigations spawned by the tragedy."

Next in line was the designer of the Big Dig's ceiling in the I-90 tunnel. The NTSB report explained their findings, stating, "Had Gannett Fleming, Inc., in the construction contract for the D Street portal finishes, specified the use of adhesive anchors with adequate creep resistance a different anchor adhesive could have been chosen, and the accident might have been prevented." Going further, the NTSB said, "Gannett Fleming, Inc. approved the D Street portal anchors without identifying which epoxy formulation was being used, even though the company was provided with information indicating that one version of the Power-Fast epoxy should be used for short-term loading only."

The government entity most responsible for the public's safety in the Big Dig tunnels that fateful night of July 10, 2006, was the Massachusetts Turnpike Authority. Perhaps this makes the authority the most negligent in their duties to protect and serve the public. As the owner and

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operator of the Big Dig tunnel system, they had a moral responsibility to inspect the Big Dig's tunnel ceilings. As the NTSB report stated, "No tunnel inspections were performed to determine the physical and functional condition of the ceiling system from the time the I-90 east bound connector tunnel was opened to traffic on January 18, 2003 until the day

of the fatal accident." This despite the fact that the Turnpike's management consultants in November 2003 provided the Turnpike with an inspection manual titled *Inspection Manual for Tunnels and Boat Structures*. Showing their disapproval of the Turnpike's lack of action, the NTSB report admonished the state authority, saying, "The displaced

roof hanger plates were so obvious that even a cursory examination of this area before the accident would have revealed that the structural integrity of the ceiling system was threatened."

The board's most sobering revelation and the last words in their conclusion stated: "The Massachusetts Turnpike Authority also contributed to the accident by failing to implement a timely tunnel inspection program that would likely have revealed the ongoing anchor creep in time to correct the deficiencies before an accident occurred." Dan Walsh, an NTSB engineer, expressed his frustration about the Turnpike Authority's failure to inspect their own tunnel to the *Boston Globe*, saying, "The bureaucratic delays are enough to set your hair on fire." 🗨️

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