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# news

## In Wake of Infrastructure Tragedies, ASCE Offers Insight and Leadership

**By Mark Fitzgerald**

Shortly after the collapse last month in Minneapolis of the Interstate 35W bridge, ASCE was flooded with calls and e-mails from journalists and other individuals and groups seeking technical information, insight, and guidance. The following day, ASCE's executive director, Patrick J. Natale, told the CBS Evening News what the Society has been stressing for decades. "One of America's great assets is its infrastructure," he said. "But if you don't invest, it deteriorates. When you throw the switch and the power doesn't come on, when you turn your faucet and clean water doesn't come out, then you pay attention to it. That's too late," remarked Natale in front of a television camera on a humid Thursday afternoon.

At least 12 people were killed and more than 100 injured after the central span of the I-35W bridge gave way during the evening rush hour and adjoining spans buckled. Large portions of the bridge fell more than 60 ft (18.3 m), sending dozens of vehicles into the dark waters of the Mississippi. "I heard it creaking and making all sorts of noises it shouldn't make—and then the bridge just started to fall apart," Jay Danz, who was driving below the bridge, told Minneapolis and St. Paul's Star Tribune.

Although the calamity has prompted states throughout the country to inspect their aging bridges, ASCE estimates that it will cost \$9.4 billion a year for 20 years to

eliminate all of the nation's bridge deficiencies. The Society assigned bridges a grade of C in its *2005 Report Card for America's Infrastructure*, but since then improvements have been negligible. More than 25 percent of U.S. bridges are currently structurally deficient and functionally obsolete. Moreover, long-term under investment has been compounded by the absence of a federal transportation program.

"We react to tragedy when lives are lost, but we fail to take preemptive action that could prevent these tragic events," Representative Jim Oberstar (D-Minnesota), the chairman of the House Transportation and Infrastructure Committee, acknowledged last month in a press release. "We ask ourselves if such a tragic failure can happen elsewhere. How many structurally deficient bridges are out there? What repairs are immediately needed? We cannot wait for another tragedy. We must act, and act quickly."

Apparently Oberstar has taken his own advice. On August 8 he announced that he would sponsor an initiative that would create a trust fund for the repair, rehabilitation, and replacement of structurally deficient bridges in the nation's highway system. Funds would be distributed on the basis of public safety and need, and the plan would prohibit any congressional or administration earmarks. The initiative would also aim to improve bridge inspection requirements by increasing the frequency of inspections, updating procedures and techniques, and providing better training for bridge inspectors.

"The announcement by Representative Oberstar of legislation to immediately address the public safety issues posed by the national highway system's structurally deficient bridges is a promising display of support that has often been lacking on this issue and will no doubt be a great service to the American public," ASCE's president, W.F. Marcuson III, Ph.D., said on August 10. "For the safety and security of our families, we as a nation can no longer afford to ignore this growing problem. We must demand leadership from our elected officials because without action aging infrastructure represents a growing threat to public health, safety, and welfare, as well as to the economic well-being of our nation."

ASCE has been working with Oberstar's staff to provide expertise on bridge safety and inspections and to help him refine his proposal. It has also been busy promoting an initiative of its own called "Raising the Grades: Small Steps for Big Improvements in America's Failing Infrastructure." This plan calls for enactment of the National Infrastructure Improvement Act of 2007 to establish a national commission on

infrastructure; reauthorizing funding for the Airport and Airway Trust Fund and increasing user fees as necessary for continued funding of airport improvements; funding surface transportation programs authorized under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU); using all funds that accumulate in the Highway Trust Fund to invest in the nation's surface transportation program; reauthorizing the Brownfields Revitalization and Environmental Restoration Act of 2001; enacting the Dam Rehabilitation and Repair Act of 2007; establishing a national levee safety program; enacting the Water Quality Financing Act of 2007; authorizing \$1 billion in annual funding for the Safe Drinking Water Act's State Revolving Loan Fund; enacting the Water Resources Development Act of 2007; and ensuring the integrity of the Inland Waterways Trust Fund.

The National Infrastructure Improvement Act of 2007 (S. 775)—which was introduced on March 7 by Senators George V. Voinovich (R-Ohio), Tom Carper (D-Delaware), Hillary Rodham Clinton (D-New York), and Norm Coleman (R-Minnesota) and approved by the Senate on August 2—would create a national commission on infrastructure aimed at ensuring that the nation's infrastructure met current and future demands and bolstered economic growth. The legislation would also require that the commission conduct a comprehensive study of infrastructure and develop recommendations for a federal plan outlining national infrastructure priorities. It would also specify the analyses and criteria to be used by federal, state, and local agencies in inventorying and assessing infrastructure.

On July 18 one person was killed and more than 30 were injured in New York City after a steam pipe exploded beneath a street near Grand Central Terminal. "I looked out the window and I saw these huge chunks that I thought were hail," Debbie Tontodonato told a CBS journalist that day. "We panicked. I think everyone thought the worst. Thank God it wasn't. It was like a cattle drive going down the stairs, with everyone pushing. I almost fell down the stairs."

About a week later ASCE's president-elect, David G. Mongan, was a guest on National Public Radio's Diane Rehm Show. "The steam line that ruptured in New York City was almost a hundred years old," he said. "Our water systems are that old too. Many of the bridges in the U.S. are over a hundred years old. The biggest single problem is the age of our facilities, and the lack of investment in the repair, maintenance, and expansion

of our infrastructure clearly ranks up there as another reason why [our infrastructure has declined]. Also, the growth of our population and the fact that more and more people are living in our urban areas create greater stress and impacts on our infrastructure systems.”

The nation’s drinking water and wastewater infrastructure systems each received a grade of D- in ASCE’s 2005 assessment. Although the United States faces a shortfall of \$11 billion annually to replace aging facilities and comply with current drinking water regulations, federal funding for drinking water remains at less than 10 percent of the total national requirement, says the 2005 report. Many wastewater systems have reached the end of their useful design lives and are plagued by chronic overflows during major rainstorms and heavy snowmelts, discharging billions of gallons of untreated sewage into U.S. surface waters each year. The U.S. Environmental Protection Agency estimates that the nation will need to invest \$390 billion over the next 20 years to replace existing systems and build new ones to meet increasing demands.

In a letter to Natale dated August 3, the National Transportation Safety Board (NTSB) acknowledged that the probable cause of last year’s fatal ceiling collapse in the I-90 connector tunnel in Boston’s Central Artery/Tunnel Project (“Big Dig”) was the use of an epoxy anchor adhesive with poor creep resistance. The NTSB made clear that the use of an inappropriate epoxy formulation reflected a general lack of understanding of creep in adhesive anchoring systems among members of the construction community. Epoxy is a polymer, and its stiffness is time and temperature dependent. If a load is applied suddenly, the epoxy responds like a hard solid. But if the load is then held constant, the molecules within the polymer may begin to rearrange themselves and slide past one another, causing the epoxy to gradually deform.

The NTSB urged ASCE to alert the profession of the need to assess the creep characteristics of adhesive anchors before those anchors are subjected to sustained tensile loads. “Because civil engineers and general contractors involved in civil and commercial construction are generally not expected to be familiar with the complex chemistry of epoxies or similar adhesives and yet may specify or use adhesive anchors in their projects, the Safety Board believes that the American Society of Civil Engineers and the Associated General Contractors of America should use the circumstances of this accident to publicize the problems associated with adhesive anchoring systems to their members,” the letter reads.

Overall, ASCE gives the nation's infrastructure a grade of D and estimates that \$1.6 trillion will be needed over a five-year period to improve it sufficiently to meet today's demands. Establishing a long-term development and maintenance plan must become a national priority. At its annual conference, which will be held in Orlando, Florida, November 1–3, ASCE will be sponsoring a workshop on the planning, design, construction, and management of our nation's infrastructure. Attendees will learn how to maximize the life span of today's infrastructure projects by designing them for the world of tomorrow. A special session also will be offered to discuss the lessons learned from Hurricane Katrina, the Big Dig roof tragedy, and the I-35W bridge collapse.