Bridges and the Bottom Line

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On August 1, 2007, as rush-hour traffic carried workers home from their jobs in downtown Minneapolis, a decades-old bridge spanning the Mississippi River collapsed without warning into the waters one hundred feet below. The bridge crumbled at a moment when over a hundred vehicles—including a school bus carrying sixty-one children—were driving or parked on it. As the local *Star-Tribune* reported the next day, "The span was packed with rush-hour traffic, and dozens of vehicles fell with the bridge leaving scores of dazed commuters scrambling for their lives." "I heard it creaking and making all sorts of noises it shouldn't make," said one man who was driving on a road under the bridge, en route to a Minnesota Twins baseball game, seconds before the collapse. "And then the bridge just started to fall apart."

The collapse killed thirteen people and injured 145 more. The school bus, amazingly, landed on all four of its tires, missing the water and coming to rest on a parkway, according to the *Star-Tribune*. Its passengers escaped with only injuries.

Before the dust could settle, let alone the cause of the collapse be ascertained, the failure of the I-35W Bridge reheated a long-simmering debate over the state of American infrastructure. It was not the first major infrastructure failure in recent memory, only the latest, coming on the heels of the New Orleans levee breaks of 2005 and the Northeast power grid blackout of August 2003, and so the arguments were already familiar. Within days of the collapse,

Books by Barry B. LePatner

Too Big to Fall: America's Failing Infrastructure and the Way Forward
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Broken Buildings, Busted Budgets: How to Fix America's Trillion-Dollar Construction Industry
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the *Christian Science Monitor* asserted that the bridge failure "spotlights America's deferred maintenance" of its dams, levees, highways and bridges; the *New York Times* editorialized that as "the nation's physical foundations seem to be crumbling beneath us," "the larger problem of crumbling roads, bridges and levees and crashing electrical grids can almost always be traced to a lack of investment." The *Times* called for increased federal spending, the establishment of a national infrastructure bank, and the creation of a national commission on infrastructure priorities.

Three years later, the nation continues to grapple with fundamental questions of how to plan, build, and maintain major infrastructure. Barry B. LePatner, a New York attorney noted for his decades of experience in construction and real estate law, takes a leading role in that debate with his new book, *Too Big to Fall.* Using the I-35W Bridge collapse as his primary case study, LePatner paints a dire picture of the state of national infrastructure, and he proposes solutions whose boldness matches the magnitude of the apparent problem.

LePatner's analysis begins with a fundamental question: What, precisely, caused the I-35W Bridge to collapse? As he observes, "bridges do not collapse for 'no apparent reason.'" The National Transportation Safety Board researched that question for a year before issuing its final conclusion: a lateral shift in one of the diagonal members supporting the bridge, and the subsequent failure of the gusset plates tying together the diagonal members and other support beams, was the "initiating event" of the collapse.

But could that event have been prevented by better maintenance and inspections over the course of the bridge's life? No, according to the NTSB, because the initiating event was the inevitable consequence of the bridge's design. "Because the bridge's main truss gusset plates had been fabricated and installed as the designers specified, the inadequate capacity of the…gusset plates had to have been the result of an error on the part of the bridge design firm." Worse still, "even though the bridge design firm knew how to correctly calculate the effects of stress in gusset plates, it failed to perform all necessary calculations for the main truss gusset plates of the I-35W Bridge, resulting in some of the gusset plates having inadequate capacity."

LePatner disagrees vehemently. Reviewing the bridge's history of maintenance, he draws precisely the opposite conclusion: "The I-35W Bridge was ultimately brought down by a long history of inadequate maintenance resulting from managerial and financial shortsightedness." Displaying the skill of a seasoned lawyer, LePatner marshals the facts in a convincing attempt to prove his

indictment. Relying almost exclusively on information reported by the independent investigation into the collapse that was commissioned by the Minnesota legislature and carried out by the Gray Plant Mooty law firm, LePatner recounts "over sixteen years of inspection reports that showed continually deteriorating structural conditions."

Through 1990, the I-35W Bridge received good ratings under the National Bridge Inspection Standards (NBIS). But in 1991, the bridge abruptly received a "poor" rating, which it retained for sixteen years, until it collapsed. Such a rating generally reflects, in LePatner's words, "corrosion in critical stress areas as well as the existence of fatigue cracks, which form as the result of excessive vibrations." A rating that low on the NBIS indicates that a bridge is "structurally deficient."

Despite the sudden low rating, the Minnesota Department of Transportation (Mn/DOT) took no direct corrective action. Mn/DOT continued with inspections and worked with experts from the University of Minnesota and elsewhere to evaluate the bridge's condition and the need for remediation. But the department put off until at least 2017 and possibly as late as 2022 the plans to redeck the bridge, a major repair that would have cost "a financially unobtainable $15 million." By the time Mn/DOT even began to pursue the less-expensive option of retrofitting steel members, it was too late. In 2007, as Mn/DOT began to plan for the retrofitting project, it was warned that the project could itself weaken the bridge. And ironically, when the bridge collapsed later that year, it was laden with a half million pounds of construction equipment for a cosmetic repaving project.

According to LePatner, Mn/DOT's reluctance to undertake major maintenance operations was due to budget constraints. Mn/DOT would not undertake the $15 million repair project until at least 2017, and it would not allow for full replacement—at least a $75 million project—before 2057. Even its inspections were cost-constrained, relying on visual inspections rather than a surface-penetrating radar survey that would have revealed severe deck deterioration, at a cost of $40,000.

It is a compelling story, to be sure. But LePatner ultimately fails to prove his fundamental accusation. Major, costly maintenance surely would have improved the condition of the bridge, but did Mn/DOT's failure to undertake that maintenance actually *cause* the bridge's collapse? LePatner offers conjecture, but no direct, convincing evidence proving that maintenance proposals would have prevented the collapse despite the design flaw.

Even the Gray Plant Mooty report, LePatner's major source for his account of Mn/DOT's record, refused to draw the conclusions LePatner does. Instead, it urged

that, without a final report from the NTSB, "we do not know whether any of the concerns addressed in this Report are related to the actual cause of the collapse, or even a contributing cause." But the NTSB's subsequent conclusions were unequivocal: Mn/DOT's maintenance record was not at fault for the collapse; the design flaw was. And because of the design flaw, better maintenance could not have prevented the collapse.

LePatner's failure to disprove the NTSB's conclusions is exacerbated by his overheated rhetoric. He compromises his own credibility by fundamentally mischaracterizing the content of the NTSB's report. He asserts that it "tellingly ignored the maintenance record for the I-35W Bridge," but even a casual review of the NTSB report demonstrates otherwise. It relates the bridge's inspection history in detail, including the University of Minnesota's and other outside consultants' inspections and reports described by LePatner. It recounts the bridge's history of renovations and modifications, and the staging of construction equipment on the bridge at the time of its collapse. The NTSB did not ignore the evidence cited by LePatner. It reviewed the evidence and rejected LePatner's preferred conclusions.

But one need not share LePatner's opinion as to the cause of the I-35W Bridge collapse to agree that the nation's bridges and highways are in troubling condition. According to the 2009 *Report Card for America's Infrastructure* from the American Society of Civil Engineers, "one in four of the nation's bridges are either structurally deficient or functionally obsolete." "Simply maintaining the current overall level of bridge conditions—that is, not allowing the backlog of deficient bridges to grow—would require a combined investment from the public and private sectors of $650 billion over fifty years…for an annual investment level of $13 billion."

As for roads, the 2009 *Report Card* concludes that "one-third of America's major roads are in poor or mediocre condition and 36 percent of major urban highways are congested. The current spending of $70.3 billion per year for highway capital improvements is well below the estimated $186 billion needed annually to substantially improve conditions." Those are startling statements, particularly for a nation barely a half century removed from its massive post-World War II infrastructure build-up.

As with his description of the Minnesota Bridge collapse, LePatner does an excellent job of recounting the facts of the matter. In the nineteenth century, road maintenance was a state concern, not a federal one. President Monroe vetoed a bill for the maintenance of national roads, on the grounds that it exceeded the national government's constitutional authority.

Only upon the dawn of the automobile age did the federal government step in. By the Federal-Aid Highway Act of 1921, Congress offered matching funds to cover half the cost of constructing primary roads, while leaving states the authority and responsibility to design and maintain those roads. That allocation of roles set the course that brought us to today, according to LePatner. By interjecting federal matching funds into the building of roads but not their maintenance, Congress created an incentive for states to build new roads but no corresponding incentive to maintain them. Eventually, Congress had to intervene with funds for infrastructure maintenance—first for bridges, in 1970, and then for federal highways.

By the 1990s and 2000s, the condition of the nation's highways had improved to some degree; bridges, less so. Still, LePatner concludes, "the growing gap between needs and resources for the maintenance and repair of the nation's roads and bridges makes it clear that, in spite of more than thirty years of efforts, the federal government has largely failed to address this problem." He identifies four reasons for that failure. First, the federal government continued to fund more new roads and bridges than it could maintain. Second, states used federal funds not to supplement state infrastructure investment but as a substitute for it. Relatedly, states often diverted federal funds to their own non-infrastructure projects. And finally, federal emphasis on construction over maintenance created perverse incentives by which states could receive more funds by allowing infrastructure to deteriorate to the point that it was eligible for funding to replace it entirely.

LePatner also asserts that the problem is exacerbated by the divide between politics and engineering. Politicians relish ribbon-cuttings and fear tough budget calls, whereas engineers make tough calls based on objective scientific judgment. A politician's investment of public funds in the construction of new projects brings much greater profit for him at the ballot box than investment in easily overlooked maintenance projects.

Here, too, LePatner indulges in overheated rhetoric, claiming that after the 1950s, "political actors began to wrest power away from engineers in highway policymaking," and "a new type of nonengineering expertise intruded into the sacrosanct world of the professional engineer." LePatner attempts to support that accusation by first returning to his view of the I-35W Bridge collapse: he claims that the NTSB's conclusion that a design flaw by engineers rather than neglect by the government caused the collapse was not merely a difference in expert opinion, but "an attack on the [engineering] profession as a whole." Then he oddly invokes the space shuttle *Challenger* disaster, attempting to draw a comparison

with the management failures that led to its ill-fated launch with defective O-Rings—but he never establishes its connection to the bridge disaster or to infrastructure problems in general, nor acknowledges the many significant ways that the aims and requirements of the enterprises differ. The fact that engineers were ignored at NASA does not mean that engineers should control national infrastructure policy.

Who should pay for bridges and highways, and how? The U.S. Highway Trust Fund, which is drawn from federal fuel taxes, is already stretched thin. Alternative funding mechanisms could include tolling and "congestion pricing," federal loan guarantees, public-private partnerships, privatizing the management of existing roads in order to raise funds (as in the recent cases of the Indiana Toll Road and the Chicago Skyway), and, for lack of better options, higher fuel taxes.

None of these mechanisms offers a perfect solution. Tolling focuses costs on the narrow set of users of that infrastructure rather than on the general public, and thus fails to take into consideration the diffuse externalized benefits that infrastructure provides the public as a whole. Loan guarantees are an indirect mechanism, and may encourage imprudent borrowing at a time when too many states are already dangerously overleveraged. Public-private partnerships and the leasing of existing roads raise complicated questions of how much profit to allow the private parties, and how to guarantee that private companies promote the public interest. And no matter how additional funds are raised, the question remains as to how to ensure that state and local officials do not merely transfer the windfall gain to non-infrastructure priorities.

LePatner also raises the question of cost control, which connects *Too Big to Fall* to his previous book, *Broken Buildings, Busted Budgets*, a primer on the troubles facing the construction industry. According to LePatner, large construction projects are prone to systemic problems that limit the ability of the competitive market to constrain costs. The projects are often bought by persons or institutions who are unlikely to be repeat players in this market, and are thus unable to develop the knowledge necessary to match the expertise of those seated across the bargaining table. And once a contract is awarded and the project begins, the contractor enjoys a great advantage over the buyer: he becomes a monopolist, and can claim increased costs and demand compensation, knowing that the buyer is unlikely to halt the project in light of the costs already sunk. At the same time, the contractor will not allow the buyer to shift all risk of increased cost onto him; he is a contractor, not an insurer. *Broken Buildings, Busted Budgets* offers both

specific and general suggestions as to how to solve these problems, without offering the false hope that the structural problems of project development will be resolved anytime soon.

With respect to bridges and highways, *Too Big to Fall* proposes several solutions to management issues, but the proposals often lack an obvious connection to the problems diagnosed in the book. For example, LePatner joins a chorus that already includes President Obama, the editorial board of the *New York Times*, and famed banker Felix Rohatyn in calling for the creation of a "National Infrastructure Reinvestment Bank" to loan funds for the maintenance, upgrading, and replacement of national infrastructure—including not merely bridges and roads, but also dams, wastewater treatment facilities, and the like. But he fails to explain precisely why states already unable or unwilling to raise funds through their own sovereign debt would be more effective at borrowing from and repaying money to the federal government for such purposes.

LePatner also challenges federal and state officials to spend existing dollars more effectively. A worthy goal, but how to attain it? By convening a commission, of course: "a national symposium…to recommend the best tools and practices to enable our federal and state agencies to better monitor their infrastructure assets." Creating a commission is not exactly a promising start, and even so, LePatner's proposal is too narrowly defined. A focus on "best practices" entirely ignores the much more fundamental questions raised by LePatner's own historical account of federal and state authority on the subject. After tracing the roots of today's infrastructure neglect to poor incentives created by a mix of federal and state control, LePatner offers no thoughts on how to solve the problems inherent in combining federal funds with state discretion. Is it possible to give state officials vast sums of money for infrastructure development without encountering the problems that LePatner himself has identified? If some forms of infrastructure so clearly promote the national interest as to justify federal funding, then why not commit the federal government to be responsible for their entire design, construction, and maintenance?

And while LePatner himself urges that federal matching funds have historically resulted in a disproportionate amount of infrastructure being constructed, he fails to follow that point to its logical conclusion: if too much infrastructure has been built, then why should it all be maintained—and at federal expense? If LePatner's version of history is correct, then his prescription would in many cases simply throw good money after bad.

In his most grandiose proposal, LePatner calls for the creation

of a "Federal Commission on Infrastructure Remediation," manned by "our most experienced transportation experts, finance experts, engineers, and scientists, who would be asked to define the nation's needs during the twenty-first century from a host of perspectives." LePatner's commission would not only have a startlingly broad domain—"ports, airports, high-speed rail lines, power grids, and multistate transportation projects"—but also unprecedented powers: "to raise capital, issue tax credit bonds, provide grants and loans, and give loan guarantees for states and local governments seeking approval for infrastructure projects."

Setting aside the sheer political infeasibility of reorganizing the federal and state governments in order to reassign control of these issues to a new commission, LePatner's commission poses fundamental questions about democratic self-governance. Can the federal government responsibly and lawfully transfer to a commission of unelected technocrats the core sovereign powers of taxation and debt issuance, in the service of such a broadly defined mission? LePatner does not begin to grapple with the fundamental questions that would be raised by the creation of such an unprecedented governmental body.

LePatner ultimately issues a general call to restore "the engineers in our transportation system to positions where they can exercise their professional judgment *free of political or financial constraints*" (emphasis added). Again, LePatner's technocratic rhetoric simply ignores the fundamental questions that it raises. While no one disputes the importance of engineers and other experts contributing their scientific judgment to questions of public policy, it is quite another thing to call for engineers to be able to put their judgments into effect via government mandate but "free of political or financial constraints." Should engineers dissatisfied with the condition of a bridge or highway be given unfettered discretion in spending federal or state funds until they are satisfied? What about the myriad public needs and priorities that compete with infrastructure spending for taxpayer dollars?

In the end, effective management of the nation's infrastructure cannot be separated from politics. Questions of competition for scarce governmental resources are inherently political; no transportation bill is apolitical. In the foreword to *Too Big to Fall*, the Brookings Institution's Robert Puentes pretends otherwise, asserting that the "half-trillion-dollar" federal reauthorization bill that languished in Congress last year "isn't being held up by policy. It's stuck because there is no politically palatable way to pay for it." Of course, that is not true. Congress, like the nation's general population, finds itself debating fundamental priorities as to federal spending and investment. The transportation bill has

not been slowed by questions of how to pay for its contents; it has been slowed by questions of whether its contents are worth paying for, in light of the government's other commitments and priorities. And those are questions that no engineer alone can answer.

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