

A Different Perspective on Security: America's Infrastructural Failures

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Published 10/26/2005

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An ancient dam about to collapse in Massachusetts; levees breached in Louisiana; a blackout blanketing millions of people across the country's most populous Northeastern region; repeated media references to the shrinking number of crude oil refineries; detours forced by collapsing bridges; ubiquitous flight delays. All of these are assorted tips of the Brobdingnagian iceberg of America's aging, crumbling, strained and poorly maintained infrastructure. Studying its massive dilapidation is a depressing endeavor; writing about it is not the media's favorite choice -- how can sewers, garbage dumps or bridges compete with witless celebrities or DC gossip?; mobilizing the needed investment for its upkeep is a thankless task (after all, legislators are voting for outlays that may be buried underground or located out of sight of 99.99% of people) -- and the job is never done.



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And so the management of the country's immense infrastructure becomes repeatedly a victim of postponements, procrastination, corner cutting and outright neglect. Yet virtually everything that matters --- a country's economic performance, myriads of daily chores of a civilized society, basic personal satisfaction and safety, and (perhaps most importantly) a nation's long-term security -- depends on well-maintained, appropriately repaired, and periodically renewed infrastructures.

In its broadest definition this fundamental category includes the dense city networks of roads, bridges, tunnels, subways, water and sewer pipes, above- and below-ground electricity lines and telecommunication links. Urban landscapes are dotted with schools, recreation facilities, fire, transformer and water pumping stations, and contain wastewater treatment plants, railway and bus stops, airports and, when situated along rivers or coast, passenger and container and industrial ports. Outside the cities there are far-flung webs of interstate highways, railways, high-voltage transmission lines, crude oil, natural gas and chemical product pipelines and numerous electricity-generating plants, refineries, dams, reservoirs, levees, canals, shipping channels, water breaks, garbage dumps and sites for the disposal of toxic wastes.

Some of North America's vast infrastructure is relatively new, and much of it was originally well built and hence it has been smoothly functioning (out of sight and out of mind) for decades. But many infrastructures -- above all water mains, sewers, numerous bridges and dams, roads, railway and subway tunnels -- are truly archaic and they have been serving decades beyond their original life expectation and thousands of them are, literally, on the verge of collapse. Moreover, with so much of the nation's infrastructure built during the New Deal years of the 1930s, during the war years and during the decades of vigorous pre-1973 economic expansion, the number of badly aged structures will be increasing rapidly, often exponentially. For example, in 2004 Oklahoma had 135 bridges older than 80 years, but by 2015 that total could surpass 800.

More commonly, most of the relatively new infrastructures have been subject to such a rapidly increasing rates of usage that they now have to cope with throughputs and burdens that are often large multiples of original design specifications. Perhaps the most obvious illustrations of this phenomenon (one experienced repeatedly by millions of frequent fliers and periodically by all leisure travelers) is North America's grossly overloaded aviation infrastructure. Notwithstanding the temporary downturn of aviation business after 9/11, all major indicators have been sharply up during the past ten years: between 1995 and 2004

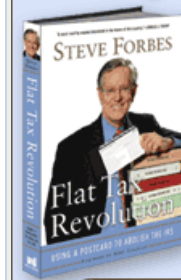
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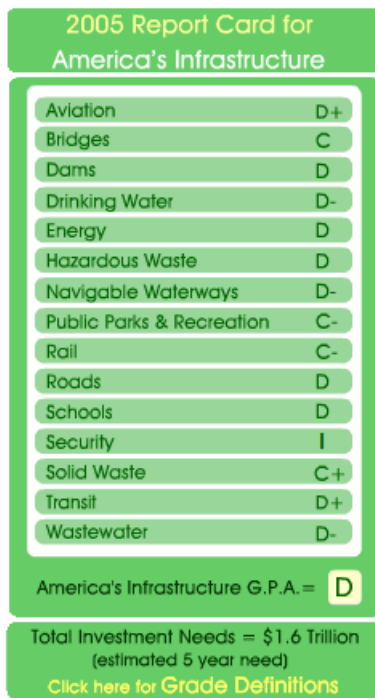
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the total number of emplaned passenger rose by more than 20%, aircraft departures increased by nearly 40% and cargo ton-miles have grown by nearly 60% -- but airport capacities had grown by a mere 1%! And if the investment into renewing and expanding America's aviation infrastructure was falling far behind the increasing rates of system use, there is no need to tell what took place after 2001, when the monies went into grossly ineffective airport security (as if scanning bare soles of babies changes anything, while people with criminal records are doing the checking and illegal immigrants have unchecked access to the apron) rather than into new runways and jet ways.

It would be great if flying were the only ordeal largely attributable to inadequately renewed and insufficiently maintained infrastructures. But as the latest US infrastructure report card, issued this year by the American Society of Civil Engineers (ASCE), the first update since 2001, makes clear, the decay is utterly systemic. The society graded the country's infrastructural status in 15 categories and their collective average D+ of 2001 slid to the mean of D (poor) by 2005 as such key categories as drinking water, wastewater treatment and navigable waterways are on the verge of totally failing grade.



Source: [Report Card for America's Infrastructure](#)

The complete report makes for an extremely depressing reading as the only bright spot (increased waste recycling has cut the total volume of solid waste and waste-to-energy plants now consume nearly 20% of all garbage) is overwhelmed by a litany of degradations, failures, risks, backlogs, shortfalls and warnings. Just half a dozen bullets convey the overwhelming nature of the report's findings:

- by the year 2000 27% of all bridges were structurally deficient or functionally obsolete
- investment in roads and bridges would have to increase by 94% in order to reach the projected cost of maintaining and improving the current level
- many sewer systems (some a century old) and water treatment facilities are well past their designed lifespan and while there is a shortfall of \$ 12 billion a year to pay for their renewal, federal funding has remained flat for a decade
- total number of unsafe dams has increased by 23% since 2001, to nearly 2,600

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- most states have just a decade's worth of remaining landfill capacity
- half of all navigation locks work beyond their 50-year design span, inland navigation increased by more than 30% since 1980 but construction funding dropped by some 60%

Government keeps grossly underestimating the resources needed to stop a further slide. For example, the FAA put the cost of airport development and reconstruction at \$ 6.5 billion a year but the American Association of Airport Executives sees the need for at least \$12 billion a year during the next five years. Expectedly, the overall bill to fix these ubiquitous inadequacies and near-failures would be staggering. In 2001 ASCE put the cost of needed infrastructural renewal at \$1.3 trillion over a five-year period; this year it raised the estimate by nearly 25% to \$1.6 trillion. But the real cost is certainly much higher: ASCE total is just an aggregate expert estimate and a detailed inventory of needs would undoubtedly uncover more inadequacies and failures and, as with any large-scale projects of this kind, cost overruns on the order of 10-20% would be considered a success once the repairs were underway. Consequently, a more realistic total may be now at least \$2-2.5 trillion and rising.

This prorates to \$400-500 billion a year for the next five years, while the Department of Defense had a budget of about \$450 billion in 2005. This is perhaps the most revealing way to think about the country's endangered infrastructure: what would be needed to make it adequate is a Pentagon-size budget spent annually for the next five years. Obviously, nothing even remotely close is going to happen but if there ever was a case for governments, industries and academics coming together and developing a set of rational priorities this is it. There will never be enough money to fix everything and to erase the entire backlog and hence any rational, long-term program of effective investment should be guided by carefully defined priorities (designed, above all, to strengthen national security and to reduce user risks) rather than by dubious congressional deals and by competing, piecemeal interventions. The enormity of the problem calls for a grand strategy: I wish I could say that there will be no shortage of bold initiatives to bring it about.

Vaclav Smil is a Professor at the University of Manitoba in Canada. His latest book is [Creating the 20th Century](#) (Oxford University Press 2005) to be followed by [Transforming the 20th Century](#) in May 2006.

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