

How to repair US bridges without wreaking havoc on supply chains and commuters

May 16 2024, by Erin Kayata



Credit: Pixabay/CC0 Public Domain

When the [Francis Scott Key Bridge collapsed in Baltimore](#), it was a disaster not only for the sheer amount of destruction, but because [the accident prevented access to one of the busiest ports in the U.S.](#)

It was a similar scenario in Rhode Island [when the Washington Bridge was shut down suddenly in December](#) due to structural deficiencies. The closure not only caused traffic delays, but [heavily impacted local](#)

[businesses](#). In Connecticut, a recent highway fire destroyed a [bridge](#) which led to temporary [local schools closures due to the subsequent traffic](#).

Whether it's a closure from an accident or repairs, bridge shutdowns can cause a lot of issues for communities, and these traffic and economic headaches may be a preview of what's to come. Over a third of bridges in the United States need some kind of major repair or replacement, [according to the American Road and Transportation Builders Association](#).

This means our infrastructure needs to become more resilient to deal with closures, said Serena Alexander, an associate professor in civil and environmental engineering and public policy and urban affairs at Northeastern University.

Alexander said recent investments in bridge and road maintenance—and transportation infrastructure—have helped, but there's still much work to be done.

"If you look at the numbers in recent years, you will see that the nation's share of bridges that are generally in poor condition is slowly improving," Alexander said. "But that said, we have so many old bridges and there needs to be a lot more of it to make a dent in kind of to get our transportation infrastructure into the state of good repair."

However, the country tends to avoid spending on maintenance, said Stephen Flynn, a professor of political science and founding director of the Global Resilience Institute at Northeastern University.

Flynn said that many small states, like Rhode Island, were able to build their current infrastructure under the New Deal—the 1930s public works program—but they haven't had the financial resources to maintain it.

The costs to make these fixes aren't small. The [estimated cost to replace the Washington Bridge](#) is now at \$400 million, while [the estimated price to rebuild the Frances Scott Key Bridge](#) is between \$1.7 billion and \$1.9 billion. Connecticut will [pay an estimated \\$20 million](#) to replace the bridge lost in a fiery highway crash.

Outside these accidents, ARBTA estimated in [its 2023 report](#) on the state of the nation's bridges that it would take over \$319 billion to make needed repairs to other structures throughout the country. They further reported that states have committed \$3.2 billion of funding from the Infrastructure Investment and Jobs Act to these repairs.

"We're like a generation who inherited our grandparents' mansion and we've refused to do the upkeep," Flynn said. "People drive by thinking it's a nice house, but the roof is leaking and the power and plumbing don't work. For almost four decades, we've basically been approaching maintaining infrastructure like it was on life support instead of making the kinds of investments required to keep it functioning and adapting to the demands that we increasingly put on it."

According to Alexander, the country needs a resilient transportation system that can not only absorb disturbances, like closures, and bounce back to its original state of functioning quickly, but one that can also withstand future problems. However, she said much of the country's infrastructure is built for efficiency, which means it can be more prone to collapse due to a lack of alternate routes in case one point of access fails.

"We have to bounce forward and what that means is that we have to build a transportation infrastructure system that is not only good now, but it is something that can stand climate impacts in the long run," Alexander said. "It's building a [transportation infrastructure](#) system that provides equitable access, an infrastructure system that addresses the

issues that we had even before a disruption."

But what does a resilient transportation system look like?

For one thing, Alexander said it's crucial to avoid building so there's only one way of accessing certain areas. [A small island in Texas recently fell victim](#) to this when a barge hit the bridge connecting it to the mainland. Similarly, part of the reason for destruction when wildfires hit California and Hawaii is because there was only one way in and out of the areas they affected.

Bridges can serve as a similar chokepoint.

"When a bridge fails or collapses, it kind of immediately disrupts the transportation network around it," Alexander said. "It can disrupt daily commutes. It can disrupt freight movements and therefore business supply chains and even emergency responses."

One way around this is diversifying modes of transportation available not only to people, but to companies moving goods as well, Alexander said. It's often trucks moving cargo that cause traffic when one mode of transportation goes out, so creating alternate routes can avoid future disasters.

Alexander said that adding alternative routes of transportation that don't require driving can also help our overall infrastructure, as can local jurisdictions working together to respond to transit emergencies.

"A lot of the time, it's a question of how well they work together if something happens and that in and of itself can be the difference," Alexander said. "Investing in alternative modes of transportation and making sure we have adequate planning in place to be able to plan in advance and adapt."

But the biggest solution is investing in current infrastructure and approaching these investments with a proactive mindset. This has not happened on multiple levels of government, Alexander said. Many governments have avoided spending money on maintenance without understanding the long-term costs of doing so. This is now catching up to them.

"A lot of times people don't realize that doing nothing is not free," Alexander said. "It is also a policy choice. Sometimes we think if you do nothing, you're not spending any money, which in the short run might be correct. But if you're doing nothing, if you're not maintaining what you have, a lot of times it means you know you will end up spending a lot more."

Bridges should also be built so they don't have a single point failure, Flynn added. While the scenario in Baltimore was an accident, [Flynn said it was the result of the bridge being built with a single point of failure](#). After a similar accident in Tampa Bay in 1980, that bridge was rebuilt with protective barriers around it.

"It was frustrating for me that (after Tampa) we didn't look around and see what other bridges are similarly critical that have that same single point of failure," Flynn said. "We've looked at this too much through the lens of (addressing) hazards. ... We need to invest in safeguarding and protecting."

This story is republished courtesy of Northeastern Global News news.northeastern.edu.

Provided by Northeastern University

Citation: How to repair US bridges without wreaking havoc on supply chains and commuters (2024, May 16) retrieved 26 June 2024 from <https://techxplore.com/news/2024-05-bridges-wreaking-havoc-chains-commuters.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.