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Engineering expert urges checks of bridges over water in Pittsburgh region

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Pittsburgh is the city of bridges.
JIM HARRIS/PBT

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Tuesday’s crash of a container ship in Baltimore and a similar accident that killed five people in China last month raise questions whether bridges over water in Pittsburgh and elsewhere could withstand the same type of hit.

There are big differences between the Francis Scott Key Bridge collapse in Baltimore and anything that would happen in Pittsburgh, especially given the fact that Port of Baltimore handles much larger ships than those that float under bridges in Pittsburgh. Bridge specifications also take into account strikes by ships when they cross over water, up to a point. But that’s usually only for slower speed and lower tonnage than could occur. And all bridges are on an inspection schedule and, for the first time in years, have more money for repair and refurbishment thanks to recent federal infrastructure funding.

Hota GangaRao, a nationally known civil engineering expert and professor at West Virginia University, said owners of bridges all over the country, including the ones in Pittsburgh that go over water, should take a closer look at them.

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“There does need to be checks periodically and look at the barge speeds, the tonnage issues and the adequacy of the openings between piers for a given side of the barge. ... These have to be evaluated very carefully,” GangaRao said.

The 1.6-mile-long bridge came down in a different manner than two high-profile bridge collapses in Pennsylvania in recent years, January 2022’s structural failure of the Fern Hollow Bridge in Pittsburgh and then June 2023’s tanker fire that collapsed a portion of a bridge on Interstate 95 in Philadelphia.

“The long-term impact will be very different from Philly’s I-95 bridge collapse,” said Sean Z. Qian, director of the Mobility Analytics Data Center at Carnegie Mellon University in Pittsburgh.

While an investigation remains to be done, GangaRao said it appeared the horizontal motion from the ship hitting the bridge was too much for it to bear.

“The truss bridge that you and I saw today on TV was not designed to resist that kind of force and movement,” he said. “The bridge is primarily designed to resist vertical load (from weight on the bridge) and some small degree of wind loads.” He said the bridge’s supports are generally not enough to take a force in the direction or the plane perpendicular to the traffic flow.

He said bridge collapses can be caused by strikes by vessels or barges.

“We have seen these kinds of failures time and time again,” GangaRao said.

It happened most recently in late February in Guangzhou, China, where a container ship crashed into a supporting column and collapsed part of the bridge. Five people were killed when their vehicles fell into the water.

GangaRao said the bridge in China that collapsed was actually designed with a bumper system that was supposed to protect it from being hit by a ship.

That didn’t work fully.

The tragedy in Baltimore has led bridge owners in the region to review what could be done to prevent a similar incident.

“It is extremely unlikely that we would face a similar situation to what happened in Baltimore this morning because large cargo ships do not use our major waterways. It is possible that barges hitting one of our bridge piers could cause damage, but barges are not nearly as large or carry as much weight as a cargo ship,” said Allegheny County Public Works Director Stephen G. Shanley. “How much a barge could damage one of our bridges would depend on a number of factors, including the weight of the barge, speed it was traveling and how it hit the bridge pier.”

He said that some bridge piers have been hit by a loose barge in the past, which closes the bridge temporarily.

“We then thoroughly inspect the bridge to determine what, if any, damage was done, and we reopen the bridge only after those inspectors determine it is safe to do so,” Shanley said.

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