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INSIGHT

Key Bridge Collapse: Critical Infrastructure Security and Resilience Considerations

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On March 26, 2024, the Francis Scott Key Bridge in Baltimore collapsed due to a cargo ship colliding with a bridge support tower. The collapse caused loss of life and disrupted numerous critical distribution functions associated with the Port of Baltimore, and severed a major highway artery. Media reports suggested that factors contributing to the collapse included absence of adequate protection for bridge supports from shipping collision impacts and the bridge design, which made the entire structure vulnerable to the loss of a single support.

The national critical infrastructure security and resilience (CISR) enterprise prioritizes mitigating threats and hazards such as terrorist bombings, the effects of aging, extreme weather events, and cyberattacks. Catastrophic accidents are more commonly regarded as matters of industrial or environmental safety, rather than infrastructure security. However, the collapse of the Key Bridge suggests that safety risks may also affect infrastructure security and continuity of national critical functions—i.e., the ramming of the bridge by a large ship had the same effects regardless of intent of the crew. This Insight examines how major incidents (apparently) not involving malicious intent, such as the Key Bridge collapse, may evidence broader systemic risks to infrastructure security and resilience that may not be fully considered within the existing framework of public-private CISR partnerships at the federal and state levels.

Although the risks of catastrophic accidents to critical infrastructure might seem apparent in hindsight, the federal infrastructure risk management plan for transportation systems (including ports, bridges, and vessels) did not consider them in depth. Federal and Maryland authorities invested heavily in anti-terrorism measures in partnership with the Department of Homeland Security (DHS) and other federal agencies, but regarded a potential accidental collision as being largely hypothetical and cost-prohibitive to guard against.

A media account published in the wake of the Key Bridge incident detailed years-long risk management efforts focused on maritime anti-terrorism patrols and structural inspections. A former senior Maryland Transportation Authority (MDTA) official quoted in the account said, “It never occurred to anybody” that a ship traversing the narrow channel might lose control and strike a critical support structure. MDTA is an independent, self-funding state agency that owns and operates certain toll bridges and roads in Maryland, including the Key Bridge.

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At the federal level, DHS and the Department of Transportation (DOT) jointly manage risk management partnerships for the Transportation Systems (TS) Sector, which includes roadways, bridges, and ports. These activities focus on information sharing on security threats and best practices for mitigation, but also include substantial investments in direct security assistance from DHS and grant funding for state and local security programs. Federal law mandates certain physical security and cybersecurity requirements for maritime facilities (enforced by the U.S. Coast Guard), focusing on intentional acts. In February 2024, the Biden Administration announced an Executive Order "On Safeguarding of Vessels, Harbors, Ports and Waterfront Facilities of the United States," which expanded U.S. Coast Guard authorities under 33 C.F.R. §6. Under the order, the Coast Guard may take direct control of vessels within a designated security zone "that present a known or suspected cyber threat to U.S. maritime infrastructure," among other provisions.

In 2023, DHS awarded $1.9 million in grants to Maryland port authorities and facility operators under the Port Security Grant Program "to implement Area Maritime Transportation Security Plans … and strengthen security at Maryland ports, including the Port of Baltimore." The grant program offers $100 million for "state, local and private-sector partners" annually, "to help protect critical port infrastructure from terrorism, enhance maritime domain awareness, improve port-wide maritime security risk management, and maintain or reestablish maritime security mitigation protocols that support port recovery and resiliency capabilities." Some funds went to MDTA, which has its own police force that it uses to secure MDTA-operated bridges, highways, and public transport. The police force has an annual operating budget for FY2024 of nearly $125 million, with $2.3 million of that amount budgeted for Key Bridge patrols. (Public officials credited MDTA officers for saving lives by blocking vehicle traffic to the bridge before the ship struck it, and pulling a survivor from the water.)

Ship collision hazards, by contrast, appear to have been a matter of largely local concern to state transportation authorities. In January 2023, the Delaware River & Bay Authority, which operates the Delaware Memorial Bridge, announced plans to spend $93 million to build a ship collision protection system, with $22.5 million of the total provided by a DOT grant. The MDTA Fiscal Year (FY) 2024 Traffic and Toll Revenue Forecast Update briefly listed a three-year construction project—due to begin in 2029—that would have added a fiberglass jacket protection system at the water pier columns of the Key Bridge. Costs and design details were not provided, and it was not clear whether this system—or any feasible alternative—would have been sufficient to absorb the impact of the cargo ship.

Although ship and barge collisions with bridges are often reported as rare events arising from unique circumstances, they are relatively commonplace occurrences. A 2000 study listed 30 major bridge collapses due to collisions worldwide between 1960 and 1998, costing hundreds of lives in some cases. Hundreds of other recorded collisions caused partial damage or fatalities. In 1981, a ship collision with the Sunshine Skyway Bridge in Tampa Bay led to partial collapse of the structure and numerous fatalities. The incident led to design improvements and development of more rigorous collision safety standards for new bridges. However, these did not apply to the Key Bridge, which opened in 1977.

Areas for congressional action may include legislation governing implementation of ship collision safety standards, funding of collision safety improvements, and guidance to federal agencies on infrastructure risk assessments.

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