



Safeguarding Toll Bridges from Vessel Strikes:

Initial Risk Evaluation Results and Path Forward

September 17, 2026

Francis Scott Key Bridge Allision

On March 26, 2024, the container ship MVDali struck the Francis Scott Key Bridge resulting in its collapse.



National Transportation Safety Board (NTSB)

Investigation and Bridge Review Findings

68 *Bridges identified for further vessel allision risk review in March 2025*

- Built prior to the 1991 vessel collision design guidance
- Have an unknown level of risk of collapse from a vessel allision
- NTSB recommends owners conduct risk evaluations and develop Risk Reduction Plans where appropriate



California's NTSB Identified Bridges*



Golden Gate Bridge
Opened: 1937



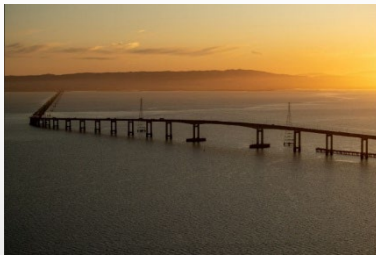
Richmond San Rafael Bridge
Opened: 1956



Carquinez Bridge
Eastbound Opened: 1958
Westbound Opened: 2003



Benicia Martinez Bridge
Southbound Opened: 1962
Northbound Opened: 2007



San Mateo Hayward Bridge
Opened: 1967



Antioch Bridge
Opened: 1978



Coronado Bridge
Opened: 1969

*NTSB acknowledges completed risk assessment for the San Francisco Oakland Bay Bridge

NTSB Recommended Actions and State-Owned Toll Bridges



Calculate the risk of bridge collapse
from vessel allisions

Risk evaluation by Caltrans

Completed



Develop comprehensive Risk Reduction
Plan

BATA & Caltrans partnering with
maritime agencies to develop &
implement the Risk Reduction Plan

In Progress



Evaluate need for Motorist Warning
System

BATA & Caltrans partnering with
maritime agencies to assess need

In Progress

Measuring Risk of Bridge Collapse from Vessel Allision

In any given year, how likely is it that a ship could cause a bridge to collapse?

Risk is based on three main factors:



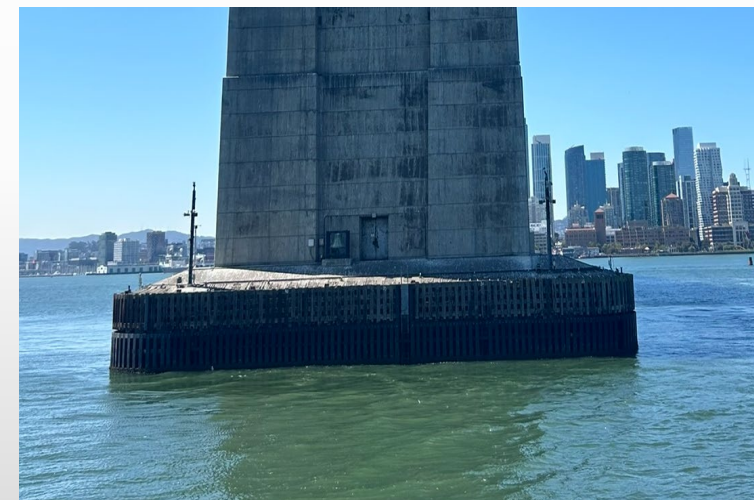
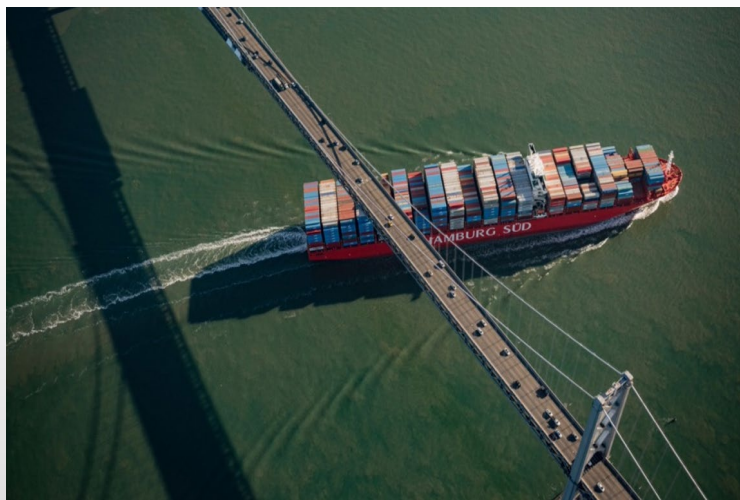
Vessel Traffic



Waterway &
Environment



Bridge Defenses



Initial Risk Evaluation Results

Risk Threshold

- For the critical Bay Area toll bridges, risk of a collapse due to a ship strike should be no more than 0.01% per year (1 in 10,000)*
- Most Bay Area Toll Bridges predate the vessel allision design guidance
- Overall, both risk and probability are very small
- Does not mean the bridges are unsafe

State-Owned Toll Bridges	Within Risk Threshold
Richmond-San Rafael Bridge	No
Carquinez Bridge	No
Benicia-Martinez Bridge	No
Antioch Bridge	Yes
San Mateo-Hayward Bridge	Yes

* Source: 2009 AASHTO Guide Specifications and Commentary for Vessel Collision Design of Highway Bridges

Path Forward: Continuing Risk Reduction

Status and Upcoming Work

COMPLETED

- ✓ Ports and Waterways Safety Assessment risk analysis completed, and a working group formed to review findings and develop actions
- ✓ Motorist Warning System evaluation launched by Caltrans
- ✓ Caltrans completed initial risk evaluation for all bridges

NEAR-TERM

- ➔ Review industry best practices
- ➔ Partner with maritime domain operators including United States Coast Guard (USCG), Bar Pilots, & CHP on emergency response plan
- ➔ Upgrade navigational aids (radar, lights, sensors)
- ➔ Develop and implement comprehensive Risk Reduction Plan

LONG-TERM

- 🕒 Enhance bridge pier protection systems, as appropriate



Factors to Consider

Waterway & Environment:

- Vessels continue to increase in size and weight
- Changing navigational routes to avoid bridges is not practical
- Effect of sea-level rise on pier protection

Bridge Defenses:

- Upgrading existing fenders to full protection involves complex set of tradeoffs

Asset Management:

- Allision is one of several risks identified in Toll Bridge Asset Management Plan



ISES (Source: <https://www.isesassociation.com/50-years-of-container-ship-growth/>)

Risk Reduction Strategies in Place



Prevention

- Operations overseen by San Francisco Bar Pilots and United States Coast Guard



Mitigation

- Navigational Aids
- Fenders



Response

- Coordination and Communication

Bay Bridge West Span Fender Replacement Update

-  **Project Scope**
Bridge mounted rubber fender system designed to absorb impact energy and protect the structure
-  **Rubber Fender System**
Improve energy absorption and reduce force transferred to the structure
-  **Estimated Project Cost**
\$130 Million



PROJECT TIMELINE



An aerial photograph of a large, multi-span bridge crossing a wide body of water. A large cargo ship with multiple white containers on its deck is positioned beneath the bridge, moving from left to right. The bridge has several tall, rectangular piers supporting its spans. In the background, a city skyline is visible across the water, including a prominent tall industrial chimney and various buildings. Hills are visible in the far distance under a hazy sky.

Questions