

M-146

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: April 22, 1981

Forwarded to:

Honorable Ray A. Barnhart
Administrator
Federal Highway Administration
U. S. Department of Transportation
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

M-81-18 through -22

About 0734 e.d.t. on May 9, 1980, the Liberian bulk carrier M/V SUMMIT VENTURE rammed a support pier of the western span of the Sunshine Skyway Bridge in Tampa Bay, Florida. As a result of the ramming, anchor pier 2S was destroyed and about 1,297 feet of bridge deck and superstructure fell about 150 feet into the bay. A Greyhound bus, a small pickup truck, and six automobiles fell into the bay and 35 persons died. Repair costs were estimated at about \$30 million for the bridge and about \$1 million for the SUMMIT VENTURE. 1/

Theoretically, a cantilever bridge structure remains stable by a system of balanced weights. The weight of the anchor arm spans balances the weight of the cantilever arm spans and the suspended span, with the main channel piers acting as fulcrums and main supports. The anchor piers perform the dual functions of providing support for the anchor arm span and the steel deck truss span and of maintaining the stability of the structure's balance. Because of these major functions of support and balance, the anchor piers are critical elements of the structure.

The mass and design of bridge piers and pier protection systems and the configuration, weight, and speed of vessels has a direct effect on the damage which may result from a collision. The bulwark and the forecastle of the SUMMIT VENTURE struck the pier column before the lower bow struck the pier crashwall. If the pier crashwall had been larger, or if a pier protection system had been installed at that location, the initial impact would have occurred near the waterline. Because the pier crashwall is anchored through the pier footer directly into the bay bottom and is larger and stronger than the columns, it is possible that sufficient energy might have been absorbed to reduce the vessel's forward motion and perhaps to redirect the vessel before the bulwark and forecastle struck the column. While the pier still could have been damaged, only the vessel's mast would have struck the bridge span if the vessel had been redirected to starboard. The vessel could have passed under the bridge span if it had been redirected to port, and the damage to the bridge span might have been minimized.

1/ For more detailed information, read "Marine Accident Report--Ramming of the Sunshine Skyway Bridge by the Liberian Bulk Carrier SUMMIT VENTURE, Tampa Bay, Florida, May 9, 1980" (NTSB-MAR-81-3).

Because the U.S. Coast Guard and the Federal Highway Administration (FHWA) have no requirements or standards for structural pier protection, the bridge owner must determine what, if any, protection will be provided. However, the Government of France requires that all bridges over navigable waterways be protected against vessel impact. For small vessels, this is done by reinforcing the piers, while in the case of large vessels steps are taken to ensure that vessels go aground on artificial islands and do not strike the piers. The official French view is that vessel collision is so frequent an occurrence that it is absolutely essential to safeguard against it. Bridge owners should consider protecting existing vulnerable bridges and take particular care in pier placement in future bridge construction. The FHWA should examine this issue carefully in its review process for bridges built with Federal-aid funds.

Final resting positions, vehicle damage patterns, and witnesses' statements indicated that the Courier pickup truck was the southernmost involved highway vehicle, and all traffic ahead of that vehicle crossed the bridge safely. The Courier pickup truck, the El Camino, and the Scirocco were definitely on the collapsed section of the bridge. The remaining five vehicles were driven off the downward-sloped bridge section and fell into the water after the bridge section had collapsed. Those five vehicles carried 32 persons. The sequence in which the vehicles were driven off the bridge could not be determined. Since the bus was resting over the Fairmont and the Nova, it must have followed them off the bridge. However, the Citation and the LTD could have preceded or followed the bus; a speed of 25 to 30 mph when running off the bridge would have been sufficient to carry them over the bus to their final resting positions.

The bus and four sedans ran off the bridge substantially after the collapse. The time available was more than sufficient to allow the drivers to stop safely, but they were not aware of the bridge condition ahead. If a bridge span failure detection and warning system had been installed and activated, it might have alerted the drivers of those vehicles of the danger ahead and many lives might have been saved.

Therefore, the National Transportation Safety Board recommends that the Federal Highway Administration:

Develop standards for the design, performance, and installation of bridge span failure detection and warning systems. (Class II, Priority Action) (M-81-18)

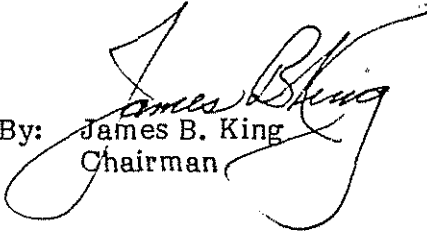
Establish criteria to evaluate the need for installing bridge span failure detection and warning systems on existing and proposed bridges. (Class II, Priority Action) (M-81-19)

In cooperation with the U.S. Coast Guard, develop standards for the design, performance, and location of structural bridge pier protection systems which consider that the impact from an off-course vessel can occur significantly above as well as below the water surface. (Class II, Priority Action) (M-81-20)

In cooperation with the U.S. Coast Guard, conduct a study to determine which existing bridges over the navigable waterways of United States ports and harbors are not equipped with adequate structural pier protection. (Class II, Priority Action) (M-81-21)

Use the results of the study conducted under recommendation M-81-21 to advise appropriate bridge authorities of the benefits of installing additional pier protection systems. (Class II, Priority Action) (M-81-22)

KING, Chairman, and McADAMS and GOLDMAN, Members, concurred in these recommendations. DRIVER, Vice Chairman, and BURSLEY, Member, did not participate.

By: 
James B. King
Chairman