

H-254

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: October 24, 1980

Forwarded to:

Honorable John S. Hassell, Jr.
Administrator
Federal Highway Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

H-80-64 through -66

The National Transportation Safety Board has conducted a study evaluating the adequacy of bridge and highway barrier systems. The report reviews the Safety Board's past accident investigation in this area, analyzes the results of recent crash-testing sponsored by the Federal Highway Administration (FHWA), and makes recommendations concerning performance standards for traffic barriers. 1/

The Safety Board's evaluation found that the FHWA and the American Association of State Highway and Transportation Officials (AASHTO) have published policies, guidelines, and specifications for traffic barrier systems, including both bridge and highway barriers. In addition, the FHWA and the AASHTO have developed and published crash-test procedures and performance criteria that provide for a reasonable assessment of a traffic barrier's safe performance. However, the only specifications that are required to be used in designing traffic barrier systems for Federal-aid highways are certain geometrical and strength specifications for bridge barriers. Furthermore, the AASHTO/FHWA specifications do not require that traffic barrier systems be crash-tested to ensure that they both contain and safely redirect striking vehicles and that they do so without producing crash forces on vehicle occupants that could cause injury or death. Few States make use of the suggested crash-test procedures or performance evaluation criteria to determine the safety performance of barriers to be placed either on Federal-aid or other highways and bridges.

Crash-test research requested by the Safety Board and recently completed by the FHWA clearly demonstrates that typical bridge barrier systems currently in widespread use do not contain and safely redirect vehicles. Crash-test research indicates that serious problems may exist in the compatibility between barrier systems and vehicles, particularly front-wheel-drive subcompacts and schoolbuses. The Safety Board believes that this problem has not been adequately addressed by the FHWA, the National Highway Traffic Safety Administration, and the automobile industry.

1/ For more detailed information read "Safety Effectiveness Evaluation of Traffic Barrier Systems" (NTSB-SEE-80-5).

The Safety Board has repeatedly recommended that the FHWA establish mandatory crash-testing and performance standards. In testimony given at Safety Board public hearings, FHWA safety and research officials and other research engineers have stated that performance testing for traffic barrier systems is necessary. The following Safety Board recommendations, which are currently open, relate to traffic barrier performance standards: H-74-38, H-77-4, H-77-12, H-79-19, H-80-25, H-80-26. The complete text of these recommendations is given in the attached list. If the FHWA complies with recommendations H-80-64, H-80-65, and H-80-66, given below, the six previous Safety Board recommendations will be closed. Other recommendations related to traffic barriers, which are currently open but which are not specifically superseded by the recommendations below, are also listed in the attachment for your information.

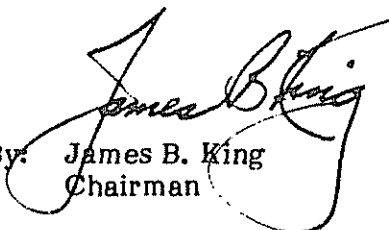
Therefore, the Safety Board recommends that the Federal Highway Administration:

Establish mandatory performance standards, and associated test procedures to be used in determining compliance, for all traffic barriers constructed on Federal-aid roads after January 1, 1982. The performance standards should first address automobiles and should be expanded for heavier passenger vehicles and trucks as research is completed to provide needed information. (Class II, Priority Action) (H-80-64)

Publish designs for traffic barrier systems which meet the performance standards to be established by the FHWA. Such traffic barrier designs should be available to States that do not desire to develop their own designs in accordance with the mandatory performance standards to be issued by the FHWA. The designs should be sufficient in number to meet the various State requirements with regard to climatic and other physical conditions that affect the operation and maintenance of a roadway system. (Class II, Priority Action) (H-80-65)

Continue and expand performance testing of traffic barriers currently in use which were designed to meet AASHTO specifications and guidelines to determine their safe performance and immediately inform the States of the results of this testing. (Class II, Priority Action) (H-80-66)

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


By: James B. King
Chairman

Attachment

Safety Board recommendations, currently open, which are related to traffic barrier performance standards and which will be closed if acceptable action is taken on new recommendations H-80-64, H-80-65, and H-80-66:

- H-74-38 Promulgate mandatory national performance standards for traffic barrier systems. Those standards should contain criteria for dynamic testing or analytical procedures substantiated by such tests for each design to increase the compatibility of barriers with both light and heavy vehicles. The standards should also contain requirements regarding the placement of the barriers in the field to assure that compatibility of the vehicle/barrier is not compromised by adjacent environment.
- H-77-4 Expedite past recommendations of the Safety Board regarding the adoption of standards for bridge barrier systems that require new installations to comply with performance standards.
- H-77-12 Develop bridge railing designs that will meet performance standards to be established by FHWA for various classes of vehicles and that will be sufficient in number to meet the various State requirements with regard to climatic and other physical conditions that affect the operation and maintenance of a roadway system. Such bridge barrier railing designs should be available to States that do not desire to develop their own designs in accordance with mandatory performance standards issued by FHWA.
- H-79-19 Establish a program to examine the feasibility of developing design alternatives to improve the performance of concrete barrier systems already in place.
- H-80-25 Assure that current and future research examines the variations in designs or construction details which can affect adversely impact performance of roadside barriers.
- H-80-26 Develop and prescribe design criteria for transition sections between W-beam guardrail sections and rigid structures that will safely retain and redirect vehicles.

Safety Board recommendations, currently open, which are related to traffic barriers but which are not specifically superseded by the recommendations of this report:

- H-76-11 Develop and publish, as a part of the FHWA research program, guidelines for the structural retrofit of bridge railings on existing bridge structures to protect vital structural members from impact by vehicles.

H-76-14 Institute a program in cooperation with the States which provides for the investigation, by multidisciplinary accident investigation teams, of the following:

- a. All bridge collapses on public roadways,
- b. Accidents involving vehicles that have struck traffic barrier railings on bridges and damaged structural members vital to the bridge's stability.

The number of such investigations should be sufficient to identify the characteristics of individual traffic barrier railings and to identify how such characteristics affect the severity of accidents.

H-77-5 In consultation with State and local governments, establish highway design criteria for the selection, location, and placement of traffic barrier systems that will redirect and prevent penetration when struck by heavy vehicles. The criteria for preventing vehicle penetration should consider the human exposure to injury and the effects of hazardous cargo that could result from barrier penetration.

H-77-13 Investigate through dynamic crashtesting and analytical procedures the effects of various geometric configurations and adjacent roadway surfaces on the performance of traffic barrier rail systems. The investigation should also consider how maintenance practices or the lack of maintenance affects the performance of the barrier rail systems.

H-77-14 In cooperation with the States, establish priority guidelines for improving, through modification or retrofit, the performance of existing traffic barrier rail systems at bridges. Consideration should be given in the priority guidelines to the potential for multi-fatality accidents involving high occupancy vehicles such as buses.

H-77-21 Insure that all State highway departments are using current Federal Highway Administration and American Association of State Highway and Transportation Officials guidelines for barriers installed at bridge approaches, and insure that the departments periodically inform and instruct their maintenance forces about changes to these guidelines.