

H-266B

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 4, 1981

Forwarded to:

Honorable John N. Dalton
Governor
Commonwealth of Virginia
Office of the Governor
910 Capital Street
Richmond, Virginia 23219

SAFETY RECOMMENDATION(S)
H-81-51 through H-81-53

About 4:36 p.m., on February 18, 1981, a D&J Transportation Company commuter bus occupied by the driver and 23 passengers was southbound in the median traffic lane of I-95 near Triangle, Virginia. As the bus approached the Chopawamsic Creek bridge, it veered to the driver's right, traveled across the right traffic lane, an acceleration lane, and off the pavement. The right front of the bus struck and overrode a W-section guardrail 59 feet north of the Chopawamsic Creek bridge parapet. After the left front of the bus struck the north end of the parapet, the bus became airborne and vaulted about 84 feet horizontally before landing on its right front in the creek, about 25 feet below the highway surface. The bus came to rest on its right side, roughly perpendicular to and facing the bridge, in about 2 feet of water. Eleven bus occupants, including the driver, were killed and 13 passengers were injured. 1/

The D&J Transportation Company operates nine buses; eight are used in the daily operation (usually 5 days per week) and one is kept as a reserve vehicle. The company was incorporated under the laws of the Commonwealth of Virginia in October 1979 and is operated by the company president and her husband. The bus was registered in the Commonwealth of Virginia and had been inspected in accordance with the State inspection requirements on January 29, 1981, just 3 weeks before the accident. The president handled all administrative facets of the corporate operation; her husband was responsible for the operation and maintenance of the bus fleet. The company's operation was limited to commuter transportation of workers from designated points in Fredericksburg and Stafford County, Virginia, to the Pentagon and Crystal City in Arlington, Virginia, and to Cameron Station and DARCOM in Alexandria, Virginia, and return to the designated pickup-dropoff points. The operation is intrastate, and as such, the company and bus fleet are not subject to the Federal Motor Carrier Safety Regulations (FMCSR).

1/ For more detailed information, read: Highway Accident Report--"D&J Transportation Company Commuter Bus Run-off-Roadway, I-95 Near Triangle, Virginia, February 18, 1981" (NTSB-HAR-81-6).

The company employs 11 part-time drivers who drive in the mornings and evenings while working at full-time jobs during the day. Drivers are compensated on a daily basis. The president and her husband work together on the selection and hiring of drivers. Other than payroll records, no formal application forms or performance records are maintained. The company does not have any formal driving training, in-service training, or driver improvement programs. Drivers are not required to have a physical examination.

Interstate 95 is a north-south, Federal-aid major transportation corridor through eastern Virginia and serves commuter traffic between Washington, D.C., and communities to the south. The accident occurred about 31 miles south of Washington, D.C., on the right-of-way passing through the U.S. Marine Corps Reservation at Quantico. The bus ran off of the road in a 1-degree horizontal left curve. There was a 2,217-foot-long, 3.4-percent downgrade approach to the bridge.

A 12-inch W-section guardrail was installed 8 feet west of and parallel to the west edge line of the road and was supported by 6-inch I-beam posts. In the transition section approach to the parapet, the posts had 8-inch I-beam blockouts. Post spacing in the transition section was: one post 1 foot 6 inches north of the parapet end; two posts at 3-foot 1 1/2-inch intervals; and four posts at 6-foot 3-inch intervals. The last of the four posts was not blocked out; post spacing to the north of that post was 12 feet 6 inches.

The guardrail height at its connection with the bridge parapet was 24 inches. When the highway was improved in 1971 and 72, the guardrail height standards, as specified by the Virginia Department of Highways' Road Designs and Standards, dated January 1, 1970, were 25 inches. National Cooperative Highway Research Program (NCHRP) Report 54 recommended a 27-inch guardrail height. Even though it was generally recognized at that time (1968) that a 27-inch guardrail height and a 6-foot 3-inch post spacing were more effective in preventing passenger vehicle penetration, the Virginia Department of Highways and Transportation (VDHT) decided that such a modification would not be a cost-effective improvement.

Guardrail height measurements of existing undisturbed guardrails made at points 80 feet, 100 feet, 120 feet, and 140 feet north of the parapet ranged from 20 1/2 inches to 22 inches above soil level. The VDHT does not have a statewide program for removal of soil buildup. The decision for such removal is left to the local maintenance engineer or the highway superintendent responsible for a given area.

Three XJ-1 bridge expansion joints crossed both southbound travel lanes and the acceleration lane. These joints located 150 feet, 280 feet, and 770 feet north of the north end of the Chopawamsic Creek bridge were in a condition which contributed to pavement roughness. While documenting the accident site, a Safety Board investigator observed an automobile lose a hubcap when it crossed the northernmost joint.

Accident statistics for the southbound lanes had to be tabulated manually using copies of police accident reports because computer data did not separate accidents which occurred in the northbound and southbound roadways. Tabulations indicated that about 30 percent more vehicles ran off the road in the southbound lanes than in the corresponding segment of the northbound lanes. Accident experience was not considered by the VDHT in selecting the location of guardrails as part of the I-95 widening project scheduled to start this year.

Highway Safety Program Standard (HSPS) No. 9, Identification and Surveillance of Accident Locations, promotes systematic analysis of accidents to assist highway engineers, among others, "in focusing available resources upon corrective measures with

highest priorities and best likelihood of producing significant improvements." The manual further states: "Corrective action programs will also be assisted by loss experience analysis keyed to the location of crashes. . . . Spot improvement measures, including maintenance, should be considered in combination with other measures."

The guardrail at the accident site was not designed to contain or redirect large vehicles, such as the bus, traveling at highway speeds. Before 1975, extensive performance evaluations of guardrails were not made for heavy vehicles. The limited empirical data do not permit an accurate assessment of the extent to which a 25- or 27-inch guardrail might be expected to have deflected the bus before failure and penetration occurred. Also, no computer simulation programs are currently validated which would provide an accurate evaluation of how a 25- or 27-inch guardrail would have performed under the circumstances of this accident. Therefore, the Safety Board is unable to assess the role of the reduced guardrail height in the crash dynamics.

The 1977 American Association of State Highway and Transportation Officials' (AASHTO) "Guide for Selecting, Locating, and Designing Traffic Barriers" lists the types of barriers available, their strength and safety characteristics, selection criteria, and placement. Among the recommended standards for W-section guardrails are a 27-inch height and 6-foot 3-inch post spacing. The use of the AASHTO guide is acceptable to the Federal Highway Administration (FHWA), and the States have generally adopted standards and specifications to conform with it. Standards and specifications promulgated by the VDHT to be used with respect to barriers installed in the forthcoming widening project on I-95 conform with the AASHTO guide recommendations.

On an interstate highway, which is in effect two separate roadways, the lack of easy accessibility to accident experience data for the northbound and southbound lanes separately is a distinct disadvantage to hazard correction through accident analysis. A number of factors, such as rough or slippery road conditions, wear, grades, etc., may account for the 30-percent higher run-off-road accidents in the southbound lanes when compared to the northbound lanes. This, in turn, could indicate the need for spot improvements on one roadway but not needed on the other.

A major justification for the placement of roadway appurtenances to enhance safety comes from the documented accident history of the individual locations under consideration. In this investigation, it was found that the VDHT did not consider accident history in the selection and location of traffic barriers on I-95 in the accident area. Nationally accepted guidelines for selecting and locating traffic barriers stress that safety must be considered and put forth the concept that the severity is paramount to the number of accidents. The consideration of an accurate accident history is then mandatory for arriving at the optimum selection and location of traffic barriers.

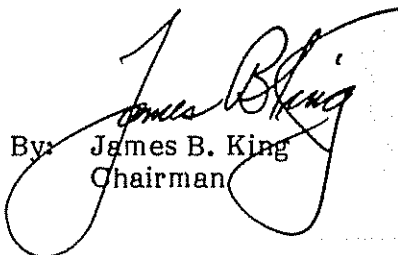
Therefore, as a result of its complete investigation of this accident, the National Transportation Safety Board recommends that the Commonwealth of Virginia:

Establish a statewide program for soil buildup removal at guardrail installations to provide for optimum rail height throughout the design life of the rail. (Class II, Priority Action) (H-81-51)

Revise the State's accident history data system to permit storage and retrieval of information for each roadway on divided highway facilities. (Class II, Priority Action) (H-81-52)

Revise methods for selecting and locating traffic barriers on all highways within the State to include a consideration of the severity of accidents. (Class II, Priority Action) (H-81-53)

KING, Chairman, DRIVER, Vice Chairman, and McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.



By: James B. King
Chairman