National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: April 21, 2004

In reply refer to: H-04-15

State and District of Columbia Departments of Transportation
(See distribution list)

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation, which addresses barrier design, is derived from the Safety Board's investigation of an April 4, 2002, accident involving a child care van in Memphis, Tennessee,[1] and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has reiterated 1 past recommendation and issued 10 new safety recommendations, 1 of which is addressed to the State and District of Columbia Departments of Transportation. Information supporting this recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

On April 4, 2002, about 8:19 a.m., a 15-passenger Ford E-350 van, driven by a 27-year-old driver and transporting six children to school, was southbound in the left lane of Interstate 240 in Memphis, Tennessee. The van was owned and operated by Tippy Toes Learning Academy, a private child care center. A witness driving behind the van stated that the vehicle was traveling about 65 mph when it drifted from the left lane, across two other lanes, and off the right side of the roadway. She said that she did not see any brake lights. The van then overrode the guardrail and continued to travel along the dirt and grass embankment until the front of the van collided with the back of the guardrail and a light pole. The rear of the van rotated counterclockwise and the front and right side of the van struck the bridge abutment at the Person Avenue overpass before coming to rest. The driver was ejected through the windshield and sustained fatal injuries. Four of the children sustained fatal injuries, and two were seriously injured.

[1] For more information, read National Transportation Safety Board, *Fifteen-Passenger Child Care Van Run-off-Road Accident, Memphis, Tennessee, April 4, 2002,* Highway Accident Report NTSB/HAR-04/02 (Washington, DC: NTSB, 2004).

The Safety Board determined that the probable cause of this accident was the absence of oversight by Tippy Toes Learning Academy and the driver's inability to maintain control of his vehicle because he fell asleep, quite likely due to an undiagnosed sleep disorder; the driver's marijuana use may also have had a role in the accident. Contributing to the accident was the Tennessee Department of Human Services's lack of oversight of child care transportation. Contributing to the severity of the injuries were the use of a 15-passenger van to transport pupils, the nonuse of appropriate restraints, and the design of the roadside barrier system.

As noted above, the Safety Board believes that the roadside barrier system design contributed to the severity of the accident victims' injuries. When the van departed the roadway in this accident, it drove over the top of the guardrail terminal and became trapped behind the guardrail. Because of the backslope, the guardrail at the accident location varied in height from 5 inches at the anchored-in-backslope terminal to 26 inches above ground 57 feet beyond the terminal. Yet, because of the backslope, the guardrail remained level to the pavement surface. This allowed the van to encroach on the barrier and easily mount it at its anchor point, ride over it, and continue along and behind the length of the barrier. The use of such a design resulted in a terminal configuration similar to a turned-down[2] terminal, because of the reduction from the full barrier height to ground level, as shown in the photograph below.

Guardrail and terminal unit at accident site.

The Safety Board concludes that had the barrier system in place at the accident location not tapered into the backslope and had another type of barrier terminal been used, the van would

[2] A turned-down terminal is a W-beam guardrail that decreases from full height to ground level, typically over a distance of 25 feet.

not have been able to ride over the top of the barrier's longitudinal guardrail and would probably have been prevented from becoming trapped behind the guardrail and striking the bridge abutment.

While an anchored-in-backslope design can be effective, it is not a safe design for locations where design hazards exist along a steep backslope or a horizontal curve, as was true at the accident location. There, the anchored-in-backslope terminal essentially becomes a flared turned-down design, which is unsafe and no longer permitted because the turned-down design provides no protection to errant vehicles. Therefore, the Safety Board recommends that the State and District of Columbia Departments of Transportation:

> Identify guardrails with anchored-in-backslope terminals and eliminate any that create a situation similar to a turned-down terminal. (H-04-15)

The Safety Board is also recommending that the American Association of State Highway and Transportation Officials (AASHTO) modify the guidance contained in the *Roadside Design Guide* to clearly provide designers with information on the design of roadway barrier systems in situations where the roadway curves or where the terrain, hazards, and barrier system could trap an errant vehicle behind the barrier system. In addition, the Safety Board will ask that AASHTO inform its members of the circumstances of this accident and of the importance of considering roadway curvature and terrain configurations in the design of barrier systems.

In addition to AASHTO, the Safety Board issued safety recommendations to the State and District of Columbia child care transportation oversight agencies and to the National Association for the Education of Young Children. In addition, the Safety Board reiterated a past recommendation to 39 States and the District of Columbia.

Please refer to Safety Recommendation H-04-15 in your reply. If you need additional information, you may call (202) 314-6177.

Chairman ENGLEMAN CONNERS, Vice Chairman ROSENKER, and Members GOGLIA, CARMODY, and HEALING concurred in this recommendation.

Original Signed

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