

Lessons Learned from Accident Investigations

Roadway Designers Urged to Modify Barrier Systems

A fatal accident in Memphis, Tennessee, that killed the driver of a van and four children has lessons for roadway barrier designers across the country, according to the National Transportation Safety Board (NTSB).

“Our investigation uncovered a string of failures that led to this tragic accident,” said NTSB Chairman Ellen Engleman-Conners. “It demonstrates once again that everyone in the transportation safety chain, including those who design and maintain safety barriers on our highways, plays a critical role in avoiding crashes, deaths and injuries.”

The NTSB is asking that the *Roadside Design Guide* be revised 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.

The recommendation stems from the Safety Board’s final report on the Memphis crash. A 15-passenger Ford E-350 van, transporting six children to school on Interstate 240 in Memphis, drifted off the right side of the roadway, overrode the guardrail and struck a bridge abutment.

While the primary cause of the accident was the lack of oversight by the child care provider that owned the van and the driver’s inability to maintain control of his vehicle because he fell asleep, the roadside barrier contributed to the severity of the accident.

As the van departed the roadway, according to the report, it drove over the top of the guardrail terminal and became trapped behind the guardrail. While the guardrail remained 26 inches above the pavement surface, because of the backslope, the guardrail was only 5 inches above the ground at the anchored-in-backslope terminal. 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 steep grade of the backslope and the wall of the bridge abutment, when combined with the barrier, created a trap. Once trapped behind the barrier, even had the driver tried to steer to avoid striking the abutment he would not have been able to return to the roadway because the van was trapped between the guardrail and the backslope, effectively directing the van into the bridge abutment.

The NTSB's report concluded that had the barrier system in place at the accident location not tapered into the backslope, the van would not have been able to ride over the top of the barrier's longitudinal guardrail. The NTSB believes that State Departments of Transportation should identify guardrails with anchored-in-backslope terminals and eliminate any that create a situation similar to a turned-down terminal.

NTSB investigators also said that because of the curvature of the roadway, a vehicle could depart the roadway at a distance further from the hazard than that predicted by the American Association of State Highway and Transportation Officials' recommended runout length. When a vehicle "straightens out" the curve, it departs the roadway further from the hazard but still needs to be redirected or provided room to stop. When this occurs, the vehicle can completely miss the barrier system designed to protect against the hazard, as was the case in this accident and two others at the same location since 1997.

With sufficient stopping distance, investigators said, a vehicle could stop before striking the bridge abutment. The Safety Board concluded that due to the roadway curvature and the lack of a clear zone, the barrier at the accident site was not long enough. A longer barrier could have prevented a vehicle that departed the roadway from going behind the barrier or allowed an errant vehicle to recover before striking the bridge abutment.

For the complete accident report, visit the NTSB Web site at this address:
<http://www.nts.gov/publictn/2004/HAR0402.pdf>