Crash standards save lives, spur innovation

A horn blares, brakes squeal, and a sport utility vehicle skids off a curve into the right of way … where a guardrail stops the SUV from plunging into a ditch. The guardrail withstands the vehicle's impact without injuring the passengers, thanks to the rigorous crash-test standards employed in its design.

National standards for crash-testing guardrails were first developed in the 1960s, and in the 1980s *NCHRP Report 230* became a worldwide model for crash-testing roadside hardware. But in the early 1990s, light trucks and SUVs began to make up an increasing portion of highway traffic. This change in vehicle mix along with advances in roadside safety technology meant that state DOTs needed updated crash-testing procedures.

To address these issues, in 1993 NCHRP published *Report 350: Recommended Procedures for the Safety Performance Evaluation of Highway Features*, which was written by researchers at the Texas Transportation Institute at Texas A&M University.

The new procedures broke ground on many fronts. Incorporating the pickup truck as a test vehicle was among the report's greatest safety advances, says Keith Cota of New Hampshire DOT, who chairs the AASHTO Technical Committee on Roadside Safety.

"As the SUV market took off and passenger vehicles were getting heavier and longer and their center of gravity was getting higher, the older barrier systems just weren't performing for those types of vehicles," Cota says. "Adding the pickup truck as a test vehicle brought the test procedures in line with the vehicles actually in use on the roadway."

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Fellow committee member David Little, an assistant district engineer with Iowa DOT, agrees. "*Report 350* was really a watershed document. I don't think we can overstate its significance in improving the performance of our safety devices," Little says.

Report 350 also introduced testing procedures that aligned safety performance with traffic volume and speed, requiring higher performance for hardware along high-traffic urban highways than on low-volume rural roads. "The use of six different test levels in *Report 350* lets developers take advantage of economy in designing for lower performance levels," says Ronald Faller, research assistant professor at the Midwest Roadside Safety Facility at the University of Nebraska–Lincoln.

In the late 1990s, FHWA began requiring that all roadside hardware installed on the national highway system comply with the crash tests outlined in *Report 350*. This nationwide implementation led to many other hardware safety improvements as well.

"As manufacturers sought to get their devices in compliance with *Report 350*, the implementation became the force that drove a lot of innovation," Little says.

Little cites the development of energy-absorbing guardrail terminals as one such innovation, and Faller points to improvements in the crashworthiness of work zone devices and advances in guardrail and crash cushion design.

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Texas DOT has used *Report 350* extensively, and has relied on the procedures in recent years for selecting cable barrier systems.

"*NCHRP Report 350* is widely known throughout the whole DOT," says Rory Meza, director of TxDOT's Roadway Design Section. "Everybody is either looking for something that will meet the *Report 350* testing requirements or developing things and having them tested to those requirements."

NCHRP Report 350 is available online at http://www.trb.org/news/blurb_detail.asp?id=9525. Hard copies may be purchased from the TRB Bookstore at http://www.trb.org/bookstore. NCHRP is updating the guidance in *Report 350* through Project 22-14(02), which will produce the AASHTO Manual for Analysis of Safety Hardware. AASHTO is currently balloting the draft procedures.

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