

IMPACT ATTENUATING AND REDIRECTIONALIZING SAFETY BARRIERS²⁹

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During the past several years, increasing concern has been expressed for the safety of occupants of wayward vehicles which have left the pavement surface or the adjacent shoulder. Several highway elements, such as bridge piers, sign supports, and other fixed objects, become potentially deadly hazards to occupants of such vehicles. Conventional protective devices such as guardrail do not provide the desired impact attenuating or redirectionalizing effects. Two specific highway features have been recognized for their potential hazards, and different measures involving similar concepts have been suggested to cope with each problem area.

The gore area of exit ramps, especially where sign supports or bridge abutments exist or in locations where the gore is part of a superstructure, is one such feature. The gore area demands a decision on the part of the vehicle operator. If this decision is delayed too long or is made too late, the errant driver may find himself on a collision course. Thus the gore area appears to be well suited for installation of an impact attenuating device. Many types of these devices exist in varying states of development. A comprehensive review of the state of the art of impact attenuating devices has been conducted. Three of these have been selected for installation at test locations. HI-DRO CUSHION CELLS are scheduled to be installed late this year at three gore locations within the Kennedy interchange (I 64 - I 65) in Jefferson County. Additional sites in Jefferson, Campbell, and Kenton Counties have been selected at which to install other impact attenuating devices such as the Barrel Protective Barrier, developed at the Texas Transportation Institute, and the Fitch Inertial Barrier, developed by the Fitch Inertial Barrier Company.

A second such highway feature is the median bridge pier. Since the first reported fatality involving an interstate median bridge pier in Kentucky (1965), many engineers have indicated that some impact attenuating or redirectionalizing device is needed at these locations. The two predominant methods are guardrail treatments and a new concept using raised earth mounds. Mounds have been constructed on certain sections of interstate roadway and on all bridge locations of the Jackson Purchase and Pennyrile Parkways. In order to evaluate the effectiveness on these earth mounds, a series of low-speed automobile tests was conducted. Speeds ranging from 5 mph to 25 mph were employed at four approach angles (head on, 7.5° from head on, 15°, and 22°). These tests were somewhat inconclusive, but the findings suggest that the following mound design changes may be warranted:

1. The mound should be lengthened to 500 feet in both directions from the bridge pier.
2. The nose should be warped off-center to better redirectionalize the wayward vehicle toward the same side of the median from which it approached.
3. The transition from the median to the mound should be made smoother.
4. The mound should have steeper slopes around the bridge pier.