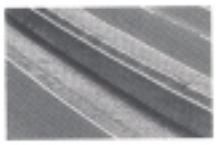
# RESEARCH PAYS OFF



## Median Jersey Barriers Reduce Severity of Freeway Crashes

Despite the substantial increase in vehicle miles traveled in the United States between 1960 and 1991, the number of fatalities and disabling injuries per vehicle miles traveled during 1991 was the lowest on record. In fact, the death rate per hundred million vehicle miles traveled dropped from 5.31 in 1960 to approximately 1.9 in 1991. The decrease in the number of fatalities and injuries may be attributed to several factors, including improvements in highway, street, and motor vehicle design, and adjustments in driver and travel behavior. Prominent among the highway and street design improvements are highway medians, which fulfill a variety of functions on divided highways such as providing a recovery area for out-of-control vehicles. However, in dense urban areas where the cost of right-of-way is extremely expensive and highway congestion is increasing, congestion relief has often taken the form of an increased number of lanes, making it difficult to design medians that meet safety standards.

### Problem

To improve safety on high-speed highways, longitudinal median barriers are often constructed to provide a buffer between opposing lanes of traffic. Concrete barriers designed to direct errant vehicles parallel to the traffic stream are the preferred median alternative. The most commonly configured barrier was designed by the New Jersey Department of Transportation and is often referred to as a Jersey barrier According to the results of several studies, accident severity has decreased after median barriers have been installed. However, accident frequency has generally increased because there is less space available for returning-to-the-road maneuvers.

A 1984 Federal Highway Administration report cited some success, particularly in the reduction of fatalities, in the use of Jersey barriers in medians but concluded that effectiveness could not be fully analyzed statistically because of insufficient data. In fact, very few research studies can confirm the effectiveness of Jersey barriers. Therefore, this study, supported in part by the AAA (American Automobile Association) Foundation for Traffic Safety and the National Science Foundation, was undertaken by the Institute of Transportation Studies of the University of California at Irvine to examine the safety aspects of Jersey-type median barriers and establish their costs and benefits.

### Solution

The safety aspects were tested under two hypotheses: (a) total accident frequency may increase, and (b) serious accident frequency should decrease. Data were extracted from the California Department of Transportation's Traffic Accident Surveillance and Analysis System (TASAS), which is a combination of an accident data base and a highway data base for all state-maintained roads. The researchers tested each hypothesis in relation to a variety of highway and accident characteristics, con-

trolling for the type of barrier used as well as for the size of the associated median.

For the first hypothesis, the frequency of nonfatal and noninjury accidents was basically unchanged after barrier installation. The estimated increases or decreases for various categories of accidents was generally not found to be significant. For the second hypothesis, both the frequency of fatal accidents and the frequency of fatalities decreased significantly (by 36 and 43 percent, respectively). The frequency of injury accidents and injuries also decreased, but not as significantly as those associated with fatalities (by 13 and 11 percent, respectively). Also studied was the impact of Jersey barriers on crossover accidents. The results, although limited by TASAS accident classifications, showed that head-on accidents decreased significantly, and the fatalities associated with these accidents were eliminated.

Finally, the effect of median width on the frequency of accidents was examined. It was determined that for highway sections on which the median width was decreased after the installation of Jersey barriers, the frequency of nonfatal and noninjury accidents increased (9.2 and 2.4 percent, respectively), whereas the frequency of fatal accidents decreased by 31.3 percent. Although decreased median width reduced the overall effectiveness of Jersey barriers, the reduction in fatal accidents remained significant.

During cost-benefit analysis, the installation cost of Jersey barriers was compared with savings in total costs of fatalities and injuries that would be prevented by the presence of the barrier. The analysis included highways in densely populated areas of Southern California. The results indicate substantial cost savings and, more important, lives saved with the installation of Jersey barriers.

## Application

This research supports the contention that Jersey barriers do have a significant impact on reducing highway fatalities and injuries. The hazard of vehicles crossing into opposing traffic lanes is virtually eliminated. Because of relatively high cost-benefit ratios and performance effectiveness, Jersey barriers are as applicable to situations in which no median barrier currently exists as they are to situations in which there is now a different form of median barrier.

## Benefits

The primary benefit of the use of Jersey barriers in medians is the reduction in fatal and serious injury crashes. If these benefits are compared with installation costs, it is found that, over the estimated life span of the barrier, the benefit-cost ratio is about two to one in favor of their installation. This is the case even when rather conservative assumptions are made in traffic growth, traffic safety advances, cost of a fatality (e.g., $270,000/motor vehicle death) and inflation rates. On the basis of the verification of the research hypotheses and the associated benefit-cost analysis, this research strongly supports the installation of concrete median barriers on freeways with high volumes, high speeds, and narrow medians.

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