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Accident Analysis of Ice Control Operations - Abstract

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ACCIDENT ANALYSIS OF ICE CONTROL OPERATIONS

ABSTRACT

This widely publicized study by Marquette University was the first of its kind in North America to document, with statistical validity, the direct benefits of deicing operations. It was patterned after a German study of the Technical University at Darmstadt during the late 1980s.

The Marquette study was conducted during the winter of 1990-1991 in four states: New York, Illinois, Minnesota and Wisconsin. It covered a network of 520 miles of randomly selected two-lane undivided highways and 50 miles of multi-lane divided freeways in the four states. The sections included were primarily rural or sub-urban.

Data collection included estimated hourly traffic volumes, accidents, and operating parameters including the time and amount of de-icer used for equal 12 hour periods before and after "zero" hour (the hour of the actual spreading of deicer). The direct costs of the operation were also collected and calculated. Estimates of traffic volume reduction due to snow, travel time reduction and the costs associated with the above items were made using standard methodology. Data on winter events were obtained from event logs of the organizations and meteorological data available about the storms. The data collection included over 125 test sections in the four states and a total of 226 events, with almost 4600 sub-events (a single event on a single test section).

For two-lane highway sections, the rate for all accidents was about eight times higher in the four hours before than it was in the four hours after "zero" hour (hours with the most significant difference). The rate for injury accidents was nine times higher before than after and for property damage only 7 times higher. There was an 88 percent reduction in accident costs in the four hour after period. The ratio of direct benefits to direct costs was about 6.5 to 1. The average direct costs were paid for after the first 71 vehicles used the highway, or paid for in about the first 25 minutes after the "zero" hour.

For freeways, the rate for all accidents was about 4.5 times higher in the two hours before (hours with the most significant difference) than after "zero" hour. The rate for injury accidents was seven times higher before than after, and the rate for property damage accidents was two times higher before than after. There was an 88 percent reduction in accident costs in the two hour after period. The ratio of direct benefits to direct costs was about 3.5 to 1. The average direct costs were paid for after the first 280 vehicles used the highway, or paid for in about the first 35 minutes after "zero" hour.

The study suggests this type of methodology for state-of-the-art cost benefit studies in the future. It is based on a doctoral dissertation completed at the University.