

JOINT TRANSPORTATION RESEARCH PROGRAM

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Improving Safety in High-Speed Work Zones: A Super 70 Study

Introduction

Highway work zones, particularly those on urban high-speed roads, require special attention and adequate traffic management to reduce the adverse impact of altered geometry and traffic that differ from typical conditions. Super 70 was an urban reconstruction project (March-November 2007) along I-70 in the central part of Indianapolis. In that project, INDOT applied several innovative and traditional solutions such as movable barriers, prohibiting heavy vehicles, closing selected ramps, reducing the speed limit, and aggressive enforcement of traffic restrictions. Unlike many past work zones, the frequency of crashes in the Super 70 work zone segment was reported to be less during its construction period of nine months. The question addressed by the presented study was whether this reduction was merely a result of reduction in traffic volume passing the work zone, or did the novel safety countermeasures that were applied also play a role in enhancing the work zone's safety? Another important safety aspect was the potential migration of the risk of crashes away from the work zone to other roads that received the diverted traffic.

Findings

The presented study addressed these questions by applying advanced econometric models to study both the spatial differences in the risk of crash on different roads inside and outside of the construction zone and short-term fluctuations in response to changes in traffic, weather, and traffic management. The impact of the work zone on the entire Indianapolis interstate system was investigated by using before and after studies. The safety management during the Super 70 project was found to be successful. The single most successful management strategy was rerouting heavy vehicles (13+ tons) on alternative interstate routes. The second significant safety benefit was jointly generated by police enforcement, reduced speed, and other traffic management strategies. The safety benefit generated by the two sources was estimated to be 100 crashes saved inside the work zone during the nine months of the road construction. Widening shoulders was indicated as an additional means

of improving work zone safety. The study could not confirm that the moveable barriers and the consequent adjustment of the number of traffic lanes to traffic volumes brought any direct safety benefits inside the work zone. The moveable barriers may have had a positive impact on traffic safety on local roads, however, by providing additional capacity that reduced traffic disturbances on the local system. Closing interchange ramps had only a limited safety effect for the work zone safety. Overall, safety on the affected interstates was higher during the Super 70 project than before.

In light of the research results, the following recommendations for future work zones on urban interstates were derived:

- (1) Reroute heavy vehicles (13+ tons) on alternative interstate routes.
- (2) Reduce the speed limit and apply shoulders as wide as possible inside the work zone. Use of additional traffic lanes instead of wide shoulders should be considered where shortage of capacity is expected, although this may lead to traffic spillover to surface roads.
- (3) Avoid redirecting the through traffic on surface roads if possible by providing a sufficient number of lanes inside the work zone and/or using changeable barriers to adjust capacity to demand.
- (4) Reduce the impact of the work zone on local traffic by using the changeable barriers to adjust the number of lanes to current traffic demand and by maintaining as many open ramps as possible.

Consider warning drivers about crash danger via variable message signs displaying adequate messages based on the real-time assessment of the risk of crash. The models developed in this study can facilitate the risk estimation in 30-minute intervals.

Implementation Recommendations

The recommendations of the research study should be incorporated in the INDOT supporting materials for traffic management in high-speed urban work zones. The risk

prediction equations can be applied to real-time detector data and weather information to assess the risk and identify high-risk conditions. Adequate warning messages could be displayed via VMS placed in advance of work zones.

References

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