



National Transportation Safety Board

Washington, D.C. 20594-2000

Safety Recommendation

Date: May 8, 2006

In reply refer to: H-06-19 and -20

Mr. John Horsley
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The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations address toll plaza design and the lack of national standards for toll plaza design. The recommendations are derived from the Safety Board's investigation of the October 1, 2003, multivehicle collision on the approach to an Interstate 90 (I-90) toll plaza near Hampshire, Illinois, and are consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued seven new safety recommendations, two of which are addressed to the American Association of State Highway and Transportation Officials (AASHTO). Information supporting the recommendations is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations.

A 1995 Freightliner tractor-trailer chassis and cargo container combination unit was traveling eastbound on I-90 about 2:57 p.m., approaching the Hampshire–Marengo toll plaza at milepost 41.6, when it struck the rear of a 1999 Goshen GC2 25-passenger specialty bus.¹ As both vehicles moved forward, the specialty bus struck the rear of a 2000 Chevrolet Silverado 1500 pickup truck, which was pushed into the rear of a 1998 Ford conventional tractor-box trailer. As its cargo container and chassis began to overturn, the Freightliner also struck the upper portion of the pickup truck's in-bed camper and the rear left side of the Ford trailer. The Freightliner and the specialty bus continued forward and came to rest in the median. The pickup truck was then struck by another eastbound vehicle, a 2000 Kenworth tractor with Polar tank trailer. Eight specialty bus passengers were fatally injured, and 12 passengers sustained minor-to-

¹ For more information, read National Transportation Safety Board, *Multivehicle Collision on Interstate 90, Hampshire–Marengo Toll Plaza, Near Hampshire, Illinois, October 1, 2003*, Highway Accident Report NTSB/HAR-06/03 (Washington, DC: NTSB, 2006).

serious injuries. The bus driver, the pickup truck driver, and the Freightliner driver received minor injuries. The Ford driver and codriver and the Kenworth driver were not injured.

The National Transportation Safety Board determined that the probable cause of the accident was the failure of the Freightliner truck driver, who was operating his vehicle too fast for traffic conditions, to slow for traffic. Contributing to the accident was the traffic backup in a 45-mph zone, created by vehicles stopping for the Hampshire–Marengo toll plaza. The structural incompatibility between the Freightliner tractor-trailer and the specialty bus contributed to the severity of the accident.

The Hampshire–Marengo toll plaza created a situation in which traffic backed up in the right lane 0.5 mile from the toll plaza itself; this queue caused vehicles that had been traveling in a 45-mph zone to come to almost a complete stop. Backups at toll plazas present a safety hazard; in particular, they tend to increase the incidence of rear-end collisions.

For example, in 2002, rear-end collisions represented 49.6 percent of all collisions on the Illinois State Toll Highway Authority (ISTHA) system, the highest rate for all types of collisions, exceeding the next highest category, sideswipes, which accounted for 21.4 percent of all collisions. Further, from 1998–2002, rear-end accidents within a 5-mile radius of the Hampshire–Marengo toll plaza ranged from 34.0 to 41.4 percent of total collisions.² Toll authorities nationwide experience rear-end collision rates that exceed other types of collisions, in part because toll plazas interrupt the flow of high-speed traffic to intermittently collect tolls. In 2002, rear-end accidents within a 1-mile radius of mainline plazas on the Pennsylvania Turnpike and the New Jersey Turnpike accounted for 30.2 percent and 37.8 percent, respectively, of all accidents.^{3,4} One advantage of electronic toll collection (ETC) is the elimination of queuing, and open road tolling systems improve safety for the motoring public by eliminating the traffic queue at toll collection locations and significantly reducing the likelihood of rear-end accidents.

According to the U.S. Department of Transportation, it takes “39 percent longer, on average, to make a peak period trip in urban areas compared with the time it would take if traffic were flowing freely.”⁵ The demand for expansion of the current highway system—both to relieve congestion in densely populated areas and to meet transportation needs in rapidly growing areas—continues to increase at a significant rate and shows no signs of slowing.⁶ The acceptance of electronic tolling as a strategy to meet and manage demand is growing in popularity among the general public.⁷

² See Wilbur Smith Associates, *2000–2002 Traffic Crash Data Report for the Illinois State Toll Highway Authority* (Chicago, IL: 2003) 2–8.

³ Data obtained from traffic engineering manager, Pennsylvania Turnpike Commission, January 16, 2004.

⁴ Data obtained from director of operations, New Jersey Turnpike Authority, January 20, 2004.

⁵ See Emilio Suarez and Kevin Hoeflich, “The End of the Tollbooth?” *Public Roads*, Vol. 68, No. 6 (May–June 2005): 3–4.

⁶ See Peter A. Kopac, “Dispelling Highway Construction Myths,” *Public Roads*, Vol. 68, No. 6 (May–June 2005): 3–4.

⁷ See National Cooperative Highway Research Program, *Tolling Practices for Highway Facilities, A Synthesis of Highway Practice*, Synthesis Report 262 (Washington, DC: Transportation Research Board of the National Academies, 1998) 3.

Current toll industry practices and policies can be a useful frame of reference for government entities or organizations that are contemplating or implementing tolls on transportation facilities or retrofitting tolling facilities to increase efficiency and reduce congestion.⁸ In the United States, toll plazas have been designed and constructed for more than 50 years without national design standards.⁹ An extensive literature search revealed that no general standards exist for the design of toll plazas.¹⁰ The standards developed by individual toll operators have been based on years of experience in improving or expanding their facilities.¹¹ Consequently, the design practices and safety of toll plazas vary considerably nationwide.

Toll authorities are becoming more prevalent across the country, and the Federal Government supports them through policies¹² contained in the Transportation Equity Act for the 21st Century and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The new SAFETEA-LU legislation charges the Secretary of Transportation to address toll plaza safety, focusing on toll *worker* safety.

Historically concentrated in the eastern States, toll roads operate across the country today. As more toll roads are built and many toll plazas are retrofitted for ETC, the need for standards and guidelines to ensure uniformity and safety becomes paramount. According to AASHTO staff, the next update of the Green Book will be in 2007 or 2008.

The Federal Highway Administration (FHWA) expects to release *State of the Practice and Recommendations on Traffic Control Strategies at Tollbooth Plazas* in 2006. The purpose of this report is to provide recommended safety and operations guidelines for agencies that operate or are planning to operate toll facilities. Although the FHWA plans to incorporate information from this report into the next edition of the *Manual on Uniform Traffic Control Devices* (MUTCD), as appropriate, the revision process can take 3 or more years. Currently, neither the AASHTO's Green Book nor the FHWA's MUTCD contains any guidance or discussion of toll plaza design techniques or ETC systems.

Much has changed in the tolling industry since 1997–1998, when the most recent National Cooperative Highway Research Program (NCHRP) synthesis reports were published. Information and guidance on current practices should be a priority, given the increasing demand for highway expansion and the removal of toll plazas or incorporation of ETC on existing toll roads. Toll plazas with manual and coin-operated collection booths create sudden stops in traffic flow. The resultant traffic queues on high-speed interstates increase the likelihood of accidents and present a safety hazard to the traveling public that ETC systems largely eliminate. Other benefits of ETC include reduced congestion, improved fuel economy, and reduced pollution. Some toll roads even provide ETC customers with nonstop travel lanes adjacent to the median.

⁸ See NCHRP Synthesis Report 262, 4.

⁹ See U.S. Department of Transportation, Federal Highway Administration, *Developing Traffic Control Strategies at Toll Plazas: Signing and Markings* (Washington, DC: FHWA, 2005) 2.

¹⁰ See National Cooperative Highway Research Program, *Toll Plaza Design, A Synthesis of Highway Practice*, Synthesis Report 240 (Washington, DC: Transportation Research Board of the National Academies, 1997) 1.

¹¹ See NCHRP Synthesis Report 240, 1.

¹² See <www.fhwa.dot.gov/tea21/index.htm>, April 19, 2006.

The Safety Board concludes that traditional toll plazas, such as the Hampshire–Marengo toll plaza (as configured on the day of the accident), create traffic backups that present a safety hazard; the conversion of traditional plazas to ETC systems should greatly reduce such hazards and improve safety on toll roads.

When either building or redesigning a toll plaza, the responsible authority needs up-to-date guidelines and standards to help ensure the safety of the traveling public. NCHRP Synthesis Report 240 identifies problems associated with electronic tolling, many of which, such as the following, have been resolved since its publication in 1997:

- Differences in systems and protocols between adjacent toll facilities (in Texas, for example, customers can now buy a TollTag for interoperable use on toll roads in Dallas, in Houston, at Dallas–Fort Worth International Airport, and at Dallas Love Field Airport), and
- Incentives to encourage ETC program participation (on the ISTHA system in Illinois, automobile customers are given a 50-percent discount for using I-PASS lanes [\$0.40] rather than cash lanes [\$0.80], and commercial vehicles receive a discount for traveling during nonpeak hours).

Technology has thus evolved since 1997. To present the current practice in toll plaza design, a cooperative research and analysis effort among the FHWA, AASHTO, and the International Bridge, Tunnel and Turnpike Association is needed to establish new AASHTO guidelines that will eventually be used in updating the next edition of the Green Book.

The National Transportation Safety Board therefore makes the following recommendations to the American Association of State Highway and Transportation Officials:

Cooperate with the Federal Highway Administration and the International Bridge, Tunnel and Turnpike Association to develop written guidelines on toll plaza design that provide information on current tolling practices, electronic toll collection strategies, and other equipment designed to eliminate queuing at toll plazas and to improve toll road safety. (H-06-19)

Include the information from the written guidelines on toll plaza design in the next update of *A Policy on Geometric Design of Highways and Streets* (Green Book). (H-06-20)

As a result of this accident investigation, the Safety Board also issued safety recommendations to the U.S. Department of Energy, the U.S. Department of Transportation, the Federal Motor Carrier Safety Administration, the Federal Highway Administration, and the International Bridge, Tunnel and Turnpike Association. In addition, the Safety Board reiterated two recommendations to the National Highway Traffic Safety Administration.

Please refer to Safety Recommendations H-06-19 and -20 in your reply. If you need additional information, you may call (202) 314-6177.

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS, HERSMAN, and HIGGINS concurred in these recommendations.

[Original Signed]

By: Mark V. Rosenker
Acting Chairman