



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: August 30, 2004

In reply refer to: H-04-27 and -28

Ms. Susan E. McCarthy
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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 the adequacy of temporary traffic control measures for the protection of pedestrian traffic in the Santa Monica Certified Farmers' Market (SMCFM). The recommendations are derived from the Safety Board's investigation of the July 16, 2003, rear-end collision and subsequent vehicle intrusion into pedestrian space at the SMCFM¹ and are consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued four safety recommendations, two of which are addressed to the city of Santa Monica, California. Information supporting these 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.

On July 16, 2003, about 1:46 p.m. Pacific daylight time, a 1992 Buick LeSabre, driven by an 86-year-old male, was westbound on Arizona Avenue, approaching the intersection of Fourth Street, in Santa Monica, Los Angeles County, California. At the same time, a 2003 Mercedes Benz S430 sedan, occupied by a driver and front-seat passenger, was also westbound on Arizona Avenue and had stopped for pedestrians in a crosswalk on Fourth Street at the intersection with Arizona Avenue. The Buick struck the left rear corner of the Mercedes, continued through the intersection, and drove through a farmers' market, striking pedestrians and vendor displays before coming to rest. As a result of the accident, 10 people were fatally injured, and 63 people

¹For additional information, read National Transportation Safety Board, *Rear-End Collision and Subsequent Vehicle Intrusion Into Pedestrian Space at Certified Farmers' Market, Santa Monica, California, July 16, 2003*, Highway Accident Report NTSB/HAR-04/04 (Washington, DC: NTSB, 2004).

received injuries ranging from minor to serious. The Buick driver and both Mercedes occupants were uninjured.

The National Transportation Safety Board determined that the probable cause of this accident was the failure of the Buick driver to maintain control of his vehicle due to his unintended acceleration. Contributing to the severity of the accident was the lack of a barrier system to protect pedestrians in the SMCFM area from errant vehicles.

The city of Santa Monica organizes and manages the two certified farmers' markets, the Wednesday Market and the Saturday Downtown Market, which operate on a temporarily closed portion of Arizona Avenue between Fourth Street and Ocean Avenue, where the accident occurred. The accident took place at the Wednesday Market. The city estimates that the Wednesday Market draws about 9,000 visitors per week.

When the Wednesday and Saturday SMCFMs were not in operation, Arizona Avenue was a through collector roadway open to vehicular traffic. Street closure to accommodate the SMCFMs involved a complex section of an urban collector road that included intersecting streets, alleyways, and traffic signals. Santa Monica was responsible for the maintenance and safety oversight of Arizona Avenue; it also sponsored and operated two other farmers' markets, for a total of four, in the city. Each week, city contractors restricted vehicular traffic on Arizona Avenue by erecting traffic control devices based on a 1986 temporary traffic plan for the farmers' market.

The full closures on Arizona Avenue at the alley between Third and Fourth Streets, as well as the Second Street closures, had only type I and A-frame plastic barricades in place, although the *Caltrans Traffic Manual* (CTM), the *Work Area Traffic Control Handbook* (WATCH), and the *Manual on Uniform Traffic Control Devices* (MUTCD) all recommend type III barricades. Furthermore, as this accident demonstrated, the barricades erected at the time provided no positive or rigid barrier between vehicular and pedestrian traffic along Arizona Avenue or any of the intersecting streets. In addition, Santa Monica apparently never recognized that, although Arizona Avenue was closed during the operation of the SMCFM, the traffic signals at the Second and Third Street intersections continued to operate on a normal green-yellow-red cycle, potentially providing motorists who were looking beyond the road closures, or who could not see them because of traffic, with conflicting signals. Furthermore, the city allowed traffic in the alleyway between Second and Third Streets to flow unimpeded into the pedestrian area.

At the time of the accident, Santa Monica indicated that it used the WATCH to determine what traffic controls should be in place for temporary street closings in the city. But the temporary traffic control devices erected on Arizona Avenue during operation of the SMCFM did not conform to the guidelines in this handbook. During street closures, the handbook called for two ROAD CLOSED signs mounted on type III barricades and advance warning signs on the approaches to the closed road.

The CTM and the MUTCD were also available to the city's Transportation Management Division before the accident. The CTM sets forth basic principles governing the design and use of traffic control devices for all streets and highways open to public travel in California. It also specifically requires protection of pedestrians and workers in temporary traffic control areas.

Both the CTM and the MUTCD call for ROAD CLOSED signs, advance warning signs, *at least* [emphasis added] type III barricades, and optional detour and route marking signs.

Thus, Santa Monica failed to comply not only with its own guidance, but also with State and Federal guidelines regarding temporary road closures for the SMCFM. As a result, the temporary traffic control devices erected along Arizona Avenue at the time of the accident did not provide the more robust barricades recommended in city, State, and Federal manuals and sent conflicting messages to motorists by, for example, allowing traffic signals at Second and Third Streets to function, even though the road was not open to through traffic. While the signage is unlikely to have affected the accident driver's actions, it could be critical in another situation in which a driver is impaired or distracted and does not understand that Arizona Avenue is closed to vehicular traffic.

The Safety Board concluded that the city's temporary traffic plan for closure of Arizona Avenue to accommodate the SMCFM was not consistent with established local, State, or national guidelines and was inadequate to ensure the safe flow of vehicular and pedestrian traffic in the area. The temporary traffic control plan for the market had been developed more than 2 decades ago and revised only once 5 years later. Since the 1986 revision, both the CTM and the MUTCD were updated several times. Considering the changes in traffic engineering guidelines and practices, as well as local traffic patterns and volumes, over time, Santa Monica should update its temporary traffic plans for roadway closures to ensure the safe operation of its certified farmers' markets and should review and evaluate the adequacy of the plans annually.

Additional signs and type III barricades alone would not have prevented the accident vehicle from entering the pedestrian zone in the SMCFM. The premise underlying the use of such barricades, as well as the guidance provided in the WATCH, the CTM, and the MUTCD, is that the road closures in question are indeed temporary situations. However, the SMCFM was a regularly recurring, albeit intermittent, event and, thus, different from the typical one-time work areas addressed in the guides. The Arizona Avenue road closure for the Wednesday SMCFM had occurred twice each week for more than 20 years and was therefore a sustained and predictable operation.

Furthermore, encouraging patrons of the SMCFM and other pedestrians to occupy the roadway when it was closed should have led city officials to consider alternative measures to protect those pedestrians from vehicular traffic. Following the accident, vendors in the SMCFM, recognizing the need for more substantial protection from errant vehicles, moved their personal vehicles to block access to Arizona Avenue. Although the vendors' intent was to provide a barrier between traffic and the market, vehicles are not generally an appropriate countermeasure for this purpose. Vehicles are not specifically designed to absorb a collision from, or to redirect, an errant vehicle, and they contain flammable liquids and components. When vehicles are used for such purposes, for example, in mobile work zones, they are typically equipped with crash attenuating devices. In situations such as the SMCFM, however, other, more appropriate options for positive separation are available to protect pedestrians from errant vehicles.

Segregating pedestrian from vehicular traffic is a key element in pedestrian safety. Positive barriers between pedestrians and vehicles, although not always viable, are the best method of ensuring this segregation. During temporary road closures, the nature, frequency, and duration of the closure does not always allow for durable positive barriers. However, in

situations such as the SMCFM, which took place every Wednesday and Saturday, the temporary closure was scheduled, recurring, and of sufficient duration to warrant use of positive barriers. A positive rigid barrier system would very likely have prevented the accident vehicle from intruding into the pedestrian area.

Santa Monica recognized the need for and value of positive, rigid barriers to protect pedestrians when the city installed removable bollards on the Third Street pedestrian promenade. Metal bollards at the entrances along Arizona Avenue protect the Third Street promenade, a dedicated pedestrian mall that was once a through street. The bollards, while designed to be permanently placed in the roadway, can also be lowered to allow passage of traffic, if necessary. By providing a rigid, positive separation between vehicles and pedestrians, bollards reduce the likelihood of vehicular incursion into pedestrian traffic areas.

Other jurisdictions have also recognized the utility of such barriers in protecting pedestrians during temporary road closures. For example, in the early 1980s, the New Orleans city council passed an ordinance making Bourbon Street a pedestrian mall during nighttime hours. To protect pedestrians on the closed street, the city placed removable bollards in the roadway. The Bourbon Street bollards, which extend about 40 inches above ground and 6 inches into the ground, are placed into metal collars embedded in the roadway. According to the traffic engineer for the city's Department of Public Works, New Orleans does not keep records of the bollards' effectiveness in stopping errant vehicles from entering the pedestrian mall. However, the poles are often bent and need to be replaced, showing that they have successfully deterred vehicles from entering the closed area.

The *Roadside Design Guide* does not specifically reference bollards. Santa Monica indicated that it did not consider bollards for the SMCFM because the road closure for the farmers' market was not permanent. However, as the New Orleans experience demonstrates, rigid barriers can be utilized effectively for recurrent, temporary road closures. Therefore, the Safety Board concluded that had Santa Monica installed a temporary rigid barrier system, such as bollards, at the closure limits of the SMCFM, the barrier system might have arrested or reduced the forward motion of the accident vehicle, thereby preventing it from continuing into the farmers' market and eliminating or greatly reducing the number of casualties.

Therefore, the National Transportation Safety Board recommends that the city of Santa Monica, California:

Install a temporary rigid barrier system at the closure limits of the Santa Monica Certified Farmers' Market to provide a physical barrier to errant vehicles entering the market. (H-04-27)

Update its temporary traffic plans for roadway closures to ensure the safe operation of the city's certified farmers' markets and review and evaluate the adequacy of the plans annually. (H-04-28)

The Safety Board also issued safety recommendations to the Federal Highway Administration and the National Highway Traffic Safety Administration. In your response to the recommendations in this letter, please refer to H-04-27 and -28. If you need additional information, you may call (202) 314-6177.

Chairman ENGLEMAN CONNERS, Vice Chairman ROSENKER, and Members CARMODY, HEALING, and HERSMAN concurred in these recommendations.

By: Ellen Engleman Connors
Chairman