



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** December 16, 2003

**In reply refer to:** H-03-30 and -31

Mr. Robert M. Garrett  
Executive Secretary  
National Committee on Uniform Traffic Control Devices  
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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 use of all-red-flash railroad hold intervals at signalized highway-rail grade crossings and adherence to, as well as the ready availability of, applicable engineering guidance in designing traffic signals and other safety features at grade crossings. The recommendations are derived from the Safety Board's investigation of the January 6, 2003, Burbank, California, highway-rail accident<sup>1</sup> and are consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued five safety recommendations, two of which are addressed to the National Committee on Uniform Traffic Control Devices. 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.

On January 6, 2003, about 9:30 a.m. Pacific standard time, eastbound Metrolink commuter train 210 struck a Ford F-550 crew cab, stake bed truck at the North Buena Vista Street grade crossing in Burbank, California. Upon impact, the truck's fuel tank was compromised, releasing fuel and resulting in a postcrash fire that consumed the stake bed, which remained at the crossing, while the truck's cab, which was not on fire, continued eastward with the train. The train derailed and came to a stop about 1,300 feet east of the crossing. The cab and second cars of the train came to rest on their sides; the remaining two cars and the locomotive remained upright. The truckdriver was fatally injured. Of the train's 59 passengers and 2

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<sup>1</sup> For additional information, read National Transportation Safety Board, *Collision Between Metrolink Train 210 and Ford Crew Cab, Stake Bed Truck at Highway-Rail Grade Crossing in Burbank, California, on January 6, 2003*, Highway Accident Report NTSB/HAR-03/04 (Washington, DC: NTSB, 2003).

crewmembers, 32 sustained injuries; 1 passenger, who was treated and then released from a local hospital, died 15 days later from internal injuries that were probably sustained during the accident.

The National Transportation Safety Board determined that the probable cause of this accident was the design of the traffic signals' railroad hold interval, which displayed a flashing red arrow for the eastbound North San Fernando Boulevard left turn lane, improperly implying that, after stopping, the truckdriver was permitted to make a left turn onto North Buena Vista Street. Contributing to the accident was the lack of a raised median at the crossing that would have obstructed the path used by the truckdriver to make the left turn.

The accident driver received confusing, potentially contradictory, messages from the highway-rail signal system that governed traffic movement at the North San Fernando Boulevard–North Buena Vista Street highway-rail grade crossing. The interconnected signal system, which had been installed less than a year before the accident, did not malfunction. As it was designed to do, the approach of the Metrolink train caused the railroad signals at the crossing to alternately flash red, an indication requiring all oncoming traffic to stop until the signal aspect was extinguished. Flashing red railroad signals are intended to have no other meaning.

The approaching train also preempted the normal operation of the highway traffic signals, which, following a track clearance interval, transitioned to all-red-flash mode for all circular red and red arrow indications. The Safety Board concludes that the signal system functioned as designed and that the accident driver behaved accordingly, stopping his vehicle for the continuous red arrow that governed the left turn lane; only after that arrow changed to the all-red-flash mode did he proceed into the intersection and onto the crossing, and the collision occurred. The *Caltrans Traffic Manual* permits use of the all-red-flash mode in California when grade crossing warning equipment is within 197 feet of a signalized intersection, but it thereby presents motorists with a potentially conflicting message that, as in this case, can have fatal consequences.

The *Manual on Uniform Traffic Control Devices* (MUTCD) (Section 8.B.05) explicitly states that “all existing turning movements toward the highway-rail grade crossing should be prohibited during the signal preemption sequences.” Yet both the MUTCD and *Uniform Vehicle Code*, which is the primary source for standards on the meaning of vehicular signal indications, agree that the all-flash-red mode essentially has the same meaning as an octagonal STOP sign, that is, vehicles are to stop and then proceed with caution. The accident driver thus encountered railroad signals that directed him to stop and highway signals that could be interpreted more permissively. Possibly compounding the confusion was the fact that southbound traffic on North Buena Vista Street had cleared after the crossing gate on the north side of the tracks descended, and, as a result, cross traffic no longer posed a risk to the accident driver.

In fact, the more permissive meaning of the all-red-flash mode is the more common one. If motorists encounter flashing red signals at all, they are most likely to do so either late at night, which is usually a period of lower traffic volume, or when a signal malfunctions and its internal monitoring equipment, having detected a fault, automatically places the signal in all-red-flash.<sup>2</sup>

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<sup>2</sup> Both the *Caltrans Traffic Manual* and the MUTCD also allow the option of all-yellow-flash on one street and all-red-flash on the other street; they defer to “engineering judgment” in choosing between options.

In either situation, drivers may proceed as they would at a four-way STOP intersection. Had a train arrived at this intersection while the traffic signals there were malfunctioning and consequently in the all-red-flash mode, all traffic signals would have been the same indications that they were at the time of the accident. The Safety Board concluded that use of the all-red-flash mode for traffic signals at a railroad grade crossing has ambiguous meaning, can be confusing to motorists, and, as a result, creates unnecessary risks to life and property.

During the investigation, Safety Board staff reviewed frequently used publications, Internet Web sites, and other sources of guidance on traffic engineering design.<sup>3</sup> These included the American Association of State Highway Transportation Officials (AASHTO) publications on the design of highway intersections near highway-rail grade crossings, as well as AASHTO's 2001 publication, *A Policy On Geometric Design of Highways and Streets*, which refers users to the MUTCD for information on the design of traffic signals and signing. However, the MUTCD contains only general information on the design of highway-rail signals near crossings and does not include references.

Handbooks published by the Institute of Transportation Engineers (ITE) contained little useful information. Most referred readers to the MUTCD. Only the ITE's *Traffic Control Devices Handbook - 2001* had extensive guidance on the design of signals near grade crossings. Through its Web site, ITE also made available its in-depth 1997 publication, *Recommended Practice for Preemption of Traffic Signals at or Near Railroad Grade Crossings with Active Warning Devices*, which had guidance directly relevant to the design of the accident crossing. It discouraged use of the all-red-flash preemption mode for the railroad hold interval, for example, and also defined and explained application of presignals for crossings such as the one at the accident location.

The Transportation Research Board did list its research paper, *Traffic Signal Operations Near Highway-Rail Grade Crossings. A Synthesis of Highway Practice 271*, which provides useful discussions of railroad hold intervals and related topics. However, several searches were required to locate it. Moreover, like AASHTO and ITE publications, it was not available to government or other agencies without cost.

The Federal Highway Administration (FHWA) Web site had the most valuable resources, including the FHWA Grade Crossing Safety Task Force's 1996 report, *Accidents That Shouldn't Happen*, and a 2002 report prepared by the task force's Technical Working Group, entitled *Guidance on Traffic Control Devices at Highway-Rail Grade Crossings*. Both reports could be downloaded from the site without cost, but locating them required extensive searching. Also on the FHWA Web site was the *Railroad-Highway Grade Crossing Handbook*, 2nd edition, FHWA TS-86-215, September 1986, which is currently being updated.

The Safety Board concluded that current information and guidelines for designing safe highway-rail grade crossings and traffic signals are available but can be difficult to find and expensive to obtain.

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<sup>3</sup> Engineers for the city of Burbank delegated responsibility for design of the grade crossing and signals to the city's consulting engineering firm. The consultant declined to respond to the Safety Board's request for information on which, if any, resources the firm used in designing the site. The city's engineers stated that they did not have knowledge of current signal or grade crossing design guidelines.

Therefore, the National Transportation Safety Board recommends that the National Committee on Uniform Traffic Control Devices:

Limit the use of highway traffic signals in the all-red-flash mode to situations in which they permit motorists to stop and proceed with caution. (H-03-30)

Incorporate into chapter 1 of the *Manual on Uniform Traffic Control Devices*, at the time of each update, a list of references, including Internet Web sites, for traffic and safety engineering design guidelines. (H-03-31)

The Safety Board also issued safety recommendations to the Federal Highway Administration; the California Department of Transportation; the city of Burbank, California; the National Committee on Uniform Traffic Laws and Ordinances; the American Association of State Highway and Transportation Officials; the Institute of Transportation Engineers; and the Transportation Research Board. In your response to this letter, please refer to Safety Recommendations H-03-30 and -31. If you need additional information, you may call (202) 314-6177.

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

*Original Signed*

By: Ellen G. Engleman  
Chairman