

Log H-582A



National Transportation Safety Board
Washington, D.C. 20594

Safety Recommendation

Date: October 31, 1995

In Reply Refer To: H-95-16

Honorable Rodney E. Slater
Administrator
Federal Highway Administration
Washington, D.C. 20590

On October 25, 1995, a school bus owned and operated by the Crystal Lake (Illinois) School District and transporting 35 high school students was stopped on northbound Algonquin Road at its intersection with State Route (S.R.) 14, in Fox River Grove, Illinois. The driver was waiting for a green traffic signal to proceed onto westbound S.R. 14. At this location, S.R. 14 is an east-west roadway paralleled by railroad tracks. The nearest rail is 30 feet, 4 inches from the intersection stop line for northbound Algonquin Road traffic. The 38-foot, 4 inch-long school bus exceeded the 30-foot, 4-inch space available, causing the rear of the school bus to extend over the railroad tracks.

About 7:10 a.m., the rear of the school bus was struck by an eastbound Metra Express commuter train en route to Chicago traveling about 70 mph, the authorized track speed. The train consisted of a locomotive and seven bi-level passenger cars operating in a push configuration. The tracks are owned by the Union Pacific Railroad Company.

Seven of the school bus student passengers were fatally injured; all the remaining students and the school bus driver sustained critical to minor injuries. The train's crew and passengers were not injured.

The grade crossing at Algonquin Road is equipped with two gates, lights, and a bell. The grade crossing signal control equipment at this crossing activates the crossing warning devices at a predetermined warning time regardless of the approach speed of the train. The train approach circuits, installed 3,080 feet east and west of the grade crossing, are designed to accommodate a maximum train speed of 70 mph. The Federal Railroad Administration requires a minimum of 20 seconds of warning time between the time that the bell and lights activate and the time that the train arrives at a grade crossing.

The intersection of S.R. 14 and Algonquin Road is controlled by red, yellow, and green traffic signals. A "city interconnect circuit" (CIC) at the grade crossing signal cabinet preempts the normal highway traffic signal light sequence upon approach of a train. When the CIC activates, a 12-second pedestrian clearance time is initiated to allow pedestrians to move out of the crosswalk over Algonquin Road. The green signal for traffic of S.R. 14 then changes to amber for 4.5 seconds, then to red for 1.5 seconds, while the traffic signal for northbound Algonquin Road remains red. Only after this sequence is completed does the traffic signal for northbound Algonquin Road turn green. This timing sequence results in an 18-second red light display for northbound Algonquin Road traffic, which allows only 2 seconds for a northbound driver to react to the green signal and attempt to clear the tracks. The CIC was installed in January 1990.

The *Manual on Uniform Traffic Control Devices*¹ (MUTCD) states:

When the grade crossing is equipped with an active traffic control system, the normal sequence of highway intersection signal indications should be preempted upon the approach of trains to avoid entrapment of vehicles on the crossing by conflicting aspects of the highway traffic signals and the grade crossing signals The preemption sequence initiated when the train first enters the approach circuit shall at once bring into effect a highway signal display which will permit traffic to clear the tracks before the train reaches the crossing. The preemption shall not cause any short vehicular clearances and all necessary vehicular clearances shall be provided. However, because of the relative hazards involved, pedestrian clearances may be abbreviated in order to provide the track clearance display as early as possible.

Conflicting indications must not be permitted and every green signal indication must be terminated with a yellow indication as specified in the MUTCD. The MUTCD states:

Vehicular clearance intervals can usually be readily provided. However, provision of normal pedestrian clearance intervals, where pedestrian signals are provided near railroad crossings, may greatly complicate the design, installation, and operation of the total system. Thus, pedestrian clearance intervals may be abbreviated, but must still be adequate.

The *Railroad-Highway Grade Crossing Handbook*² indicates that in designing the preemption, the following elements should be considered: intersection geometrics, vehicular

¹ The MUTCD is approved by the Federal Highway Administration as the standard for all streets and highways open to public travel in accordance with Title 23, *United States Code*, Sections 109(b), 109(d), and 402(a) and 23 CFR 1204.4.

²*Railroad-Highway Grade Crossing Handbook*, Second Edition, Federal Highway Administration (FHWA-TS-86-215) September 1986, pp.115-116.

volume, queue lengths and dissipation rate, proximity of the crossing to the intersection, train movements, approach speeds for trains and motor vehicles, public transportation vehicles, school buses, and trucks carrying large or hazardous cargoes.

The *Traffic Control Devices Handbook*³ indicates that when preempted by train movements, the traffic control signal (after provision of the proper phase change intervals) will immediately provide a short green interval to the approach crossing the track. However, to accommodate pedestrians the green signal for vehicular traffic can be delayed as illustrated in the aforementioned accident.


According to the Federal Railroad Administration database, of the approximately 180,000 public grade crossings in the inventory, about 1,400 are listed as having a train-activated warning device that is interconnected with a highway traffic signal. At those 1,400, there were over 5,000 accidents involving approximately 415 highway vehicle occupant fatalities during the period 1982-1994.

The Safety Board's investigation of the Fox River Grove accident is continuing. However, the Safety Board is concerned that the railroad/highway traffic signal control guidelines may permit the signal timing conditions illustrated in this accident. Consequently, the Safety Board believes that this condition may exist elsewhere at highway/railroad grade crossings where control of a highway traffic signal is preempted by train movements.

Therefore the National Transportation Safety Board recommends to the Federal Highway Administration:

Cooperate with the State Directors of Transportation and the Federal Railroad Administration to determine, at those highway/railroad grade crossings where control of a highway traffic signal is preempted by train movements, if the preemption allows sufficient time for vehicles to safely clear the crossing. For those crossings determined to have insufficient time for vehicles to safely clear, take immediate corrective action. (Class I, Urgent Action) (H-95-16)

Chairman HALL, Vice Chairman FRANCIS, Member HAMMERSCHMIDT, and Member GOGLIA concurred in this recommendation.

By: 
James E. Hall
Chairman

³*Traffic Control Devices Handbook*, Federal Highway Administration, 1983.