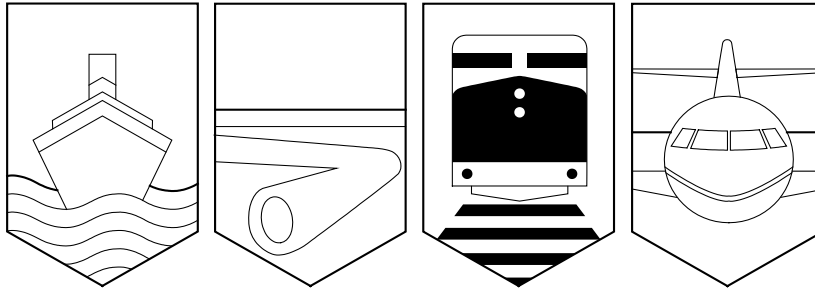




Transportation Safety Board
of Canada



RAILWAY OCCURRENCE REPORT

PEDESTRIAN FATALITIES

**CANADIAN NATIONAL
FREIGHT TRAIN NO. 395
MILE 125.15, KINGSTON SUBDIVISION
BROCKVILLE, ONTARIO
20 APRIL 1995**

REPORT NUMBER R95D0055

Canada

MANDATE OF THE TSB

The *Canadian Transportation Accident Investigation and Safety Board Act* provides the legal framework governing the TSB's activities.

The TSB has a mandate to advance safety in the marine, pipeline, rail, and aviation modes of transportation by:

- conducting independent investigations and, if necessary, public inquiries into transportation occurrences in order to make findings as to their causes and contributing factors;
- reporting publicly on its investigations and public inquiries and on the related findings;
- identifying safety deficiencies as evidenced by transportation occurrences;
- making recommendations designed to eliminate or reduce any such safety deficiencies; and
- conducting special studies and special investigations on transportation safety matters.

It is not the function of the Board to assign fault or determine civil or criminal liability.

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The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Railway Occurrence Report

Pedestrian Fatalities

Canadian National

Freight Train No. 395

Mile 125.15, Kingston Subdivision

Brockville, Ontario

20 April 1995

Report Number R95D0055

Synopsis

At approximately 1135 eastern daylight time (EDT), Canadian National (CN) freight train No. 395, proceeding westward on the CN Kingston Subdivision, struck two pedestrians at the Park Street public crossing (Mile 125.15), Brockville, Ontario. Both pedestrians were fatally injured.

The Board determined that the two pedestrians stepped into the path of the westward train while their concentration was fixed on a passing eastward train. The lack of restriction of pedestrian access to the tracks, and the absence of additional visual and audible alarm when a subsequent train entered the crossing circuit contributed to the accident.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 The Accident

Train No. 395, travelling westward on the north main track, approached the Park Street public crossing at approximately the maximum allowable train speed. At the same time, eastward CN freight train No. 390 was proceeding on the south main track and had nearly completed traversing the crossing. The pedestrians were standing clear of the north main track on the sidewalk on the east side of the street. They were facing south and looking southwest toward the approaching rear car of train No. 390. As the rear car of train No. 390 approached, the two pedestrians began walking south onto the north track where they were struck by train No. 395.

The locomotive engineer and conductor first observed the two pedestrians standing north of the track as they rounded the curve approximately 500 feet east of the crossing. The locomotive engineer had whistled for the crossing at Mile 125.06 and had continued whistling for Park Street. When the pedestrians were seen to move onto the tracks, he initiated a series of short blasts before making an emergency brake application.

1.2 Recorded Information

Event recorder information indicates that train No. 395 approached the crossing at a speed of 47 mph with the throttle in idle. Recorded information also shows that the locomotive whistle activity began approximately 1,800 feet from the crossing.

1.3 Train Information

Train No. 395 consisted of 3 locomotives and 98 cars. Train No. 390 consisted of 2 locomotives and 110 cars. Maximum permissible track speed at Park Street is 50 mph for westward freight trains and 60 mph for eastward freight trains. The maximum passenger train speed is 80 mph in both directions.

1.4 Particulars of the Crossing

The Park Street crossing is a three-track public crossing at grade equipped with flashing lights, a bell and gates. As a result of a change to accommodate complaints of noise from nearby residents, the bell ceased to ring once the gates were lowered (not an uncommon arrangement in Canada). The City of Brockville did not know that the bell did not continue to operate when the gate was lowered (the bell now continues to operate when the gate is lowered).

Park Street intersects the east-west oriented tracks in a north-south direction. At Mile 125.15, the north and middle tracks are main tracks formally designated as the north and south main tracks and the southernmost track is designated as other than main track. A concrete sidewalk parallels the east side of Park Street on both sides of the tracks. On the west side of the street, there is a concrete sidewalk extending south from the crossing. There is no pedestrian approach to the crossing from the northwest.

The three concrete sidewalks extend to within approximately 10 feet of the respective tracks. From the end of the concrete to the first rail, the surface is asphalt. There are no signs, barriers or visual aids to indicate a safe distance for pedestrians to remain when trains are approaching. From the location where the two pedestrians were standing, before entering onto the track, the view to the east is limited to approximately 500 feet because of track curvature.

1.5 Automatic Warning Devices

The masts supporting the automatic warning devices and gates (for one lane of traffic) are positioned in the southeast and northwest quadrants. The mast in the southeast quadrant was positioned between the sidewalk and the roadway. The mast in the northwest quadrant was positioned on the lawn around a nearby commercial building. The bell was located on the mast located in the northwest quadrant.

The design of the automatic warning devices is such that the electrical track circuits, which activate the warning devices, are on all three tracks to the east and the west of Park Street. The location of the track circuits is such that there is approximately 25 seconds of flashing lights and bell ringing before an approaching train on either main track reaches the crossing. The gates are activated when the train enters the circuit and take about 12 seconds to lower to the horizontal position. When the gate reaches the horizontal position at Park Street, the bell ceases to sound. The lights cease to flash and the gates start to rise to the vertical position when the train clears the crossing, unless another train has entered the track circuit on any of the three tracks. If the gates are down and a second train enters one of the track circuits before the first train has cleared the crossing, the bell does not reactivate and sound, but the lights remain flashing and the gate remains horizontal. This is consistent with the operation of most multiple-track warning devices systems in Canada with the exception of the deactivation of the bell when the gate is lowered.

At selected level crossings in some other jurisdictions, such as the United Kingdom, not only do they have lighted signs to indicate the

presence of another train on an adjacent track, but an additional second audible alarm. Transport Canada is aware of this and other similar types of devices and has sought information on the design and study of additional warning devices for pedestrians at highway/railway crossings.

1.6 Injuries

The two pedestrians who were fatally injured were high school students attending classes at a school located south of the railway tracks. They had walked to a store north of the tracks to purchase school supplies and were making their way back to school when the accident occurred.

1.7 Weather Information

The weather at the time of the accident was clear and sunny, with a temperature of 10 degrees Celsius.

1.8 Other Information

There are five public crossings at grade equipped with flashing lights, bell and gates, and two crossings with grade separations on the Kingston Subdivision within the city of Brockville.

The city of Brockville has a population of approximately 21,000. The railway divides the city, with schools, business, churches and residential areas on both sides of the tracks. The right-of-way is not fenced and much travelled routes over and along the right-of-way were evident throughout the city. Two crossings with grade separations are elevated above track and road levels. Many pedestrians prefer to walk over the tracks rather than to walk up and over the overpass. In the last five years, three other individuals have been either killed or injured while crossing the tracks or walking on the right-of-way within the city boundaries.

2.0 *Analysis*

2.1 *Consideration of the Facts*

Train No. 395 approached the crossing in compliance with government safety standards and company procedures. The automatic warning devices activated as designed.

2.1.1 *Locomotive Engineer's Actions*

The short blasts on the locomotive horn and the application of the emergency brakes occurred quickly after the locomotive engineer saw the pedestrians moving onto the tracks. His actions were appropriate and indicated that he was vigilant; however, it was not possible for the train to be stopped in emergency within the available distance.

2.1.2 *Influences on the Pedestrians' Actions*

Based upon their actions, it is apparent that the pedestrians assumed that there was only one train moving through the area. It is most likely that their attention was focused on train No. 390 and their decision to move forward was based upon seeing the last car of that train clear the crossing. Although short repetitive blasts on the horn of train No. 395 were made to alert the pedestrians of its approach, the sound of the latter cars of train No. 390 passing may have obscured the warning or the source may have been incorrectly attributed to the locomotive of train No. 390. It would appear that these attempts by train No. 395 to gain the pedestrians' attention were ineffective and/or too late for the pedestrians to acquire an adequate level of situational awareness. Had more compelling safeguards warning the pedestrians about the presence of the other train at this multi-track crossing been in place, it is likely that the pedestrians would have had a better appreciation of the events as they were unfolding.

2.1.3 *Automatic Warning Devices*

Apart from the presence of the flashing lights, bell and gate, there are no barriers or visual aids specifically to warn pedestrians of all multi-track crossing hazards or for restraining pedestrians from walking across tracks when there is/are train(s) approaching. The

current warning device system may be adequate for single-track crossings, but when there are two or more tracks, the lack of a supplemental warning of a second oncoming train can easily contribute to this type of occurrence happening again. There are such pedestrian supplemental warning/restraining systems available. In this respect, there is an inconsistent logic in providing gates to block the path of vehicle traffic in situations where a driver may incorrectly assess the situation at multi-track crossings and not providing a similar supplemental warning or restriction for pedestrians at such crossings.

A two-gate system can never provide a barrier at all four corners of the crossing but, in the subject instance, one mast was installed between the sidewalk and the road and the other was located where there was no sidewalk. They did not, therefore, provide even the limited safety advantage that such a system can provide. Indeed, it appears that the options of having the bell activated until all trains have passed have been compromised on the basis of sound aggravation to the local residents.

This accident demonstrates the danger to unwary pedestrians at multi-track crossings protected by automatic warning devices that adhere to current crossing protection standards. Not only is there no provision to specifically warn pedestrians of an oncoming train or to otherwise restrain pedestrians from proceeding onto the tracks when a train is approaching, there is no specific additional warning when a second approaching train enters the track circuit about the crossing such as employed in the United Kingdom. The only warning of a second train approaching is the oncoming train whistle which can be obscured by the sound of the passing train. A supplemental warning bell alone may, however, confuse pedestrians.

2.1.4 Trespasser Fatalities

It is evident that the location of the tracks and demography of Brockville lead a significant percentage of the population to be exposed to the dangers of this busy, high-speed rail corridor on a daily basis. It is also apparent that many of the individuals making their way over the right-of-way, either at the crossings at grade or the many and well-travelled routes between the crossings, are children.

Several presentations and campaigns by Operation Lifesaver in the greater Brockville area have taken place. Transport Canada reports that it has made efforts with persons concerned with the trespasser problem in the area. Also, from January 1995 to 20 March 1996, CN employees attended 58 schools and made presentations to 15,168 students and teachers between Miles 67 and 170 of the

Kingston Subdivision. Such educational activities alone do not seem sufficient to reduce the Canadian annual toll of more than 100 trespasser occurrences with over 50 trespasser fatalities and more than 350 crossing accidents with over 50 fatalities.

3.0 Conclusions

3.1 Findings

1. Train No. 395 was operated in compliance with railway procedures and government safety standards.
2. The automatic warning devices activated as designed.
3. The automatic warning devices warned the pedestrians of the hazard of the oncoming first train as they stopped for it to pass.
4. The automatic warning devices did not specifically warn the pedestrians of the second oncoming train and did not otherwise deter them from crossing the tracks after the first train had passed nor was there any device installed to do so.
5. The whistling of the approaching train may have been obscured by the noise of the passing train.
6. The pedestrians, apparently preoccupied with the passing of the eastward train, walked into the path of the westward train unaware of its approach.
7. The standard for the design and operation of multi-track crossing warning devices does not compensate for the danger to pedestrians in a situation where two trains are approaching a crossing within the time interval of the actuation of the warning devices.
8. Multi-track pedestrian warning/restraining devices that may compensate for a two-train approach situation are operational elsewhere; however, a supplemental warning bell alone may confuse pedestrians.

3.2 Causes

The two pedestrians stepped into the path of the westward train while their concentration was fixed on a passing eastward train. The

lack of restriction of pedestrian access to the tracks, and the absence of additional visual and audible alarm when a subsequent train entered the crossing circuit contributed to the accident.

4.0 Safety Action

4.1 Action Required

4.1.1 Protection for Pedestrians

Regulations pertaining to the safe operation of grade crossings are governed by the Grade Crossing Regulations pursuant to the *Railway Safety Act* (RSA) of July 1988, and apply to all crossings having been constructed after 14 January 1981. The regulations define a highway to include "any public road, street, lane, pedestrian walkway or other public way or communication." In November 1995, Transport Canada (TC) published a draft *Road/Railway Grade Crossing Manual* (the manual) to be used in conjunction with the provisions of the RSA and its regulations.

Two critical factors were identified in the manual to be considered in the protection of road users as they approach grade crossings. First, drivers of vehicles and pedestrians need to be aware of the crossing and, second, they must be able to identify any and all trains that are approaching or occupying the crossing.

In addressing warning protection, the manual outlines specific requirements for: a) new works which apply only to new or replacement crossings; and b) all works which apply to both new and existing crossings. In addition, the manual states that "unless a specific threat to safety exists, upgrading to modern standards may be gradual, dependent upon availability of financial resources or development of a specific safety concern."

The Board does have such a "specific safety concern" with respect to the adequacy of the warning protection provided to pedestrians at multiple-track crossings -- whether new or existing. Ideally, the presence of railway crossing signs, railway tracks and the crossing surface itself would provide sufficient information to indicate an area of potential danger for pedestrians and stimulate a safe response. Gates, bells and flashing lights which are primarily directed at vehicular traffic also should alert pedestrians to the potential danger area. This accident demonstrates a shortcoming in that there is no warning protection available at multi-track crossings to specifically warn pedestrians when more than one track is (or is about) to be occupied.

In this occurrence, the students were apparently not aware of the developing situation regarding the oncoming second train. Such lack (or loss) of situational awareness is not atypical. (Indeed, many operating and maintenance errors are directly attributable to loss of situational awareness.) Strong intervention is required to attract the attention of the involved individuals, sufficient to provide the necessary cues to (re)establish an accurate mental model of unfolding events.

TC has apparently recognized the need to provide supplemental warning protection at pedestrian/cyclist walkways, proposing in its new manual that two lights and gate arms extend across the full width of the travelled way. However, no such protection is proposed for simple pedestrian walkways beside roads or highways.

In spite of all the warning and alerting systems already required at multiple-track crossings, pedestrians in populated areas remain vulnerable to misinterpreting the available cues, unwittingly assuming that the way will be clear after the passage of the train in sight. Therefore, to protect against concurrent train passage at multi-track crossings, the Board recommends that:

The Department of Transport, in cooperation with the railways, the provincial and local authorities, implement, on a priority basis, a program to upgrade the pedestrian protection systems on those multiple-track mainline crossings in populated areas warranting immediate attention.

R96-14

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson, Benoît Bouchard, and members Maurice Harquail and W.A. Tadros, authorized the release of this report on 24 October 1996.