Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

RAILWAY INVESTIGATION REPORT
R05T0030

PEDESTRIAN FATALITY

CANADIAN NATIONAL
FREIGHT TRAIN Q-106-41-15
MILE 124.88, KINGSTON SUBDIVISION
BROCKVILLE, ONTARIO
17 FEBRUARY 2005

Canada

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Synopsis

On 17 February 2005, at approximately 1515 eastern standard time, Canadian National (CN) freight train Q-106-41-15, proceeding eastward on the CN Kingston Subdivision, struck two pedestrians at the Bartholomew Street public crossing (Mile 124.88), Brockville, Ontario. One pedestrian was fatally injured; the second received serious injuries. The two pedestrians stepped into the path of the eastward train after the passage of a westward train.

Ce rapport est également disponible en français.

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Photos

1.0 Factual Information

1.1 The Accident

Canadian National (CN)[1] freight train Q-106-41-15 (train 106), travelling eastward on the south main track, approached the Bartholomew Street public crossing at 60 mph. At the same time, westward CN freight train 532, proceeding on the north main track at 40 mph, had nearly completed traversing the crossing. Two young girls were standing on the sidewalk clear of the south main track and on the east side of the street (see Figure 1). They were standing directly east of the crossing gate mechanism, facing north and looking east toward the approaching rear of train 532. As the rear car of train 532 cleared the crossing, the two pedestrians began walking north onto the south track where they were struck by train 106. At the time of the accident, the roadway gates were down and the flashing lights and bell were operating.

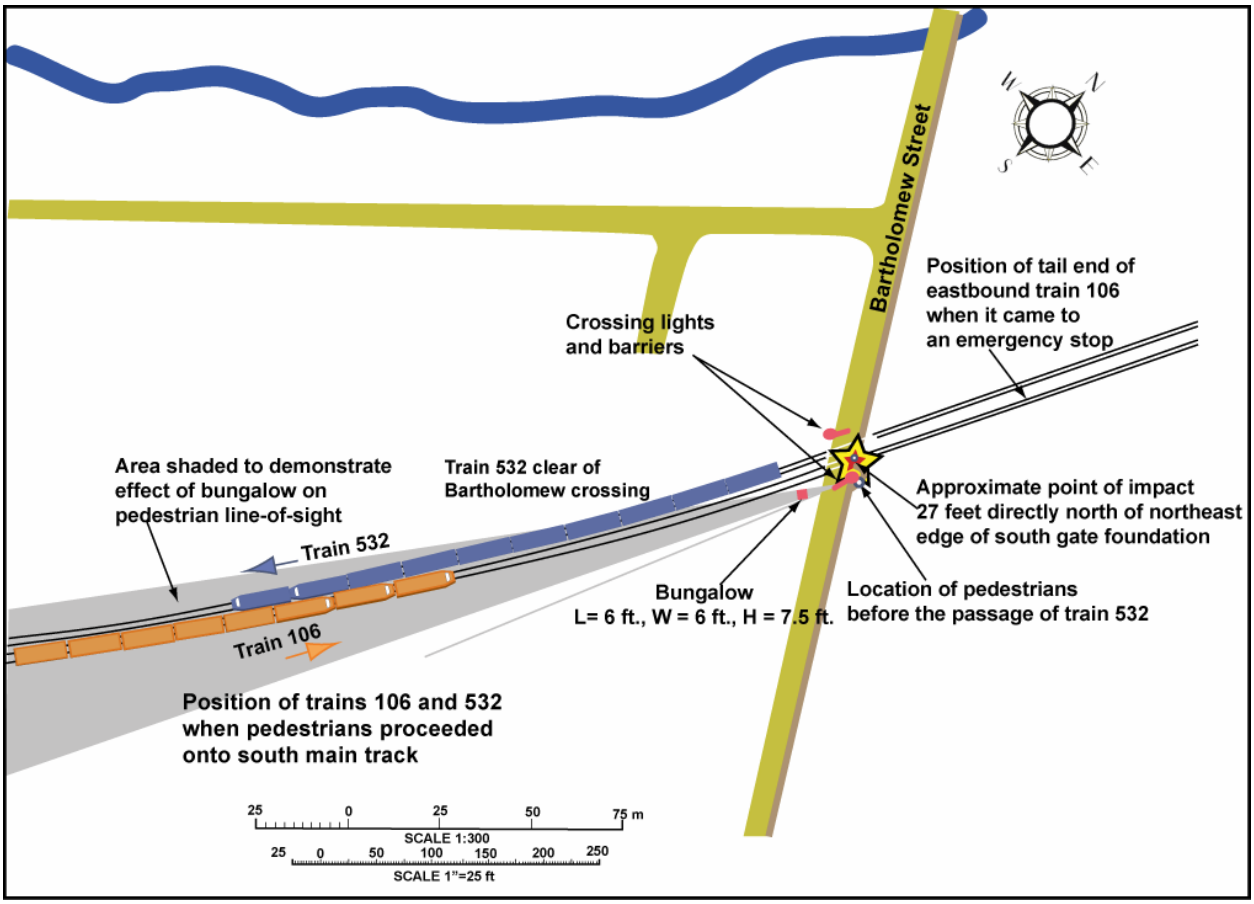

Figure 1. South main track and east side of the street

The conductor of train 106 estimated that he first observed the two girls when the train was approximately 200 feet from the crossing. The pedestrians were walking northward just south of the track and already in the path of train 106. The crew initiated an emergency brake

[1] See Glossary at Appendix D for all abbreviations and acronyms.

application. The lead locomotive stopped with the tail end approximately 126 feet east of the crossing. An anti-whistling bylaw was in effect within the Brockville city limits. However, the locomotive bell was being rung as it approached the crossing.

1.2 Injuries

The two girls were elementary school students attending classes at a school located southeast of the railway tracks. They were conversing with each other as they walked home after school to their residences located north of the tracks.

One of the girls was struck by the train and fatally injured. The other was thrown forward and to the side, incurring serious, but non–life-threatening injuries.

1.3 Weather Information

The weather at the time of the accident was clear and sunny, with a temperature of -3°C. Prevailing wind in the crossing area is normally from the west. Light winds from the west were present at the time of the occurrence.

1.4 Recorded Information

Event recorder information indicates that train 106 approached the crossing at a speed of 60 mph with the throttle in the No. 8 position. Recorded information also shows that the locomotive bell was activated at 1512:46. The whistle was not being sounded. Train 106 was placed into emergency at 1513:17 and travelled approximately 3200 feet before coming to a stop.

Train 532 approached the crossing at a speed of 40 mph, with the throttle in the No. 4 position.

1.5 Train Information

Trains operating on the Kingston Subdivision are governed by the Centralized Traffic Control System (CTC) authorized by the *Canadian Rail Operating Rules* (CROR) and supervised by a CN rail traffic controller (RTC) located in Toronto, Ontario.

Train 106 consisted of 3 locomotives and 44 cars. It weighed 2649 tons and was 3153 feet long. Train 532 consisted of 2 locomotives and 8 cars. It was approximately 590 feet long.

1.6 Crew Information

The crew of train 106 consisted of a locomotive engineer and a conductor. The crew of train 532, an industrial road switcher, consisted of a locomotive engineer, a conductor and a helper. The crews of both trains were qualified for their respective positions and met fitness and rest standards.

1.7 Kingston Subdivision

The CN Kingston Subdivision extends from Montréal, Quebec (Mile 0.0), to Toronto (Mile 333.8). According to CN's 2005 timetable, the speed limit for eastward and westward trains between Mile 124.0 and Mile 127.0 is 65 mph for freight trains and 80 mph for passenger trains.

1.8 Particulars of the Crossing

The Bartholomew Street crossing is a double main track public level crossing equipped with a two-track sign, flashing lights, a bell and short-arm gates across the municipal roadway. Bartholomew Street intersects the east-west oriented tracks at a 60-degree angle. At Mile 124.88, the two main tracks are formally designated as north and south main tracks. A concrete sidewalk extending to within 10 feet of the respective tracks parallels the east side of Bartholomew Street on both sides of the tracks. Approximately 4.5 feet of asphalt pavement completes the walking surface between the end of the concrete sidewalk and the rubber-paneled railway crossing surface south of the railway. On the west side of the street, there is no sidewalk. At the crossing location, Bartholomew Street has an ascending grade towards the south. The pedestrian crossing surface was snow- and ice-covered with no sand or salt present. There was no pedestrian stop line on the sidewalk. The roadway gates do not extend across the sidewalk.

There are no signs, barriers or visual aids to indicate a safe distance for pedestrians to remain back from the track when trains are approaching. For some locations south of the signal apparatus, the sightlines are unrestricted. However, from the location where the two pedestrians were standing before proceeding onto the track, the view to the west was limited to less than 100 feet because of the location of the signal bungalow (seven feet from the rail) and the gate protection control mechanism (see Photo 1). This is the location where the majority of northbound pedestrians were observed to stand while waiting for a train movement to clear the crossing. The signal bungalow[2] is located 7.17 feet (2.18 m) south of the nearest rail.

[2] Transport Canada's draft technical manual RTD 10 (*Road/Railway Grade Crossings: Technical Standards and Inspections, Testing and Maintenance Requirements*) refers to a signal bungalow as a "grade crossing warning system instrument housing."

Photo 1. View looking west from sidewalk in southeast quadrant of the Bartholomew Street level crossing

The automated crossing warning devices were tested following the accident and determined to be functioning within design parameters.

1.9 Behaviour of School Age Pedestrians at Grade Crossings

Developmental changes across the human lifespan are well documented.[3] These changes include the maturation of cognition and associated features such as attention. The ability to control attention develops over time; younger children are less able to selectively focus their attention on specific information to facilitate problem solving.[4] Due to this lack in attention-focusing abilities, children are less able than adults to adapt their behaviour according to the demands of the situation.[5]

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3 See for example D. Shaffer (1989), *Developmental Psychology: Childhood and Adolescence* (2nd ed.), Pacific Grove, California: Brooks/Cole.

4 A. Pick, M. Christy, and G. Frankel (1972), "A developmental study of visual selective attention," *Journal of Experimental Child Psychology*, 14, 165-175.

A. Pick (1975), "The development of strategies of attention," paper presented at the biennial meeting of the Society for Research in Child Development, Denver.

5 R. Solso (1988), *Cognitive Psychology* (2nd ed.), Boston: Allyn and Bacon, p. 370.

The under-developed attentional abilities of children may also provide an explanation for why the sounds of a train such as engine noise, whistles and bells sometimes fail to warn younger pedestrians of impending dangers. Children are likely less able to selectively focus their attention on the sounds of a train if their attention is being pulled by an alternative focus. This results in reaction times that are longer than those of adults and may create the appearance (to adults) that children do not react to train sounds if a train is very close to them. In more relevant terms, it is more difficult for children to move their attention from being involved in a conversation with a friend to properly assessing whether it is safe to enter a railway crossing than it is for adults. In addition, the lack of exposure to the situation at crossings when two trains are present would reduce pedestrian familiarity with such situations. This would further reduce attention to the sounds (engine noise, whistles and bells) of a train because a second train would not be expected.

1.10 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 northwest quadrant was positioned to the outside of the pavement (there was no sidewalk on the west side of the road). The mast in the southeast quadrant was positioned between the sidewalk and the roadway. The bell was located on the mast located in the southeast quadrant.

The design of the automatic warning devices is such that the electrical track circuits give approximately 25 seconds of flashing lights and bell ringing before an approaching train on either main track reaches the crossing. The lights and bell are activated when the train enters the crossing's approach track circuit. The gates take about 10 seconds to descend to the horizontal position, which includes a delay of 4 to 5 seconds between the lights and bell activating and the commencement of the gate descent. 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 an approach track circuit. If the gates are down and a second train enters one of the track circuits before the first train has cleared the crossing, the lights remain flashing, the bell continues to sound and the gates remain horizontal. This is consistent with the operation of most multiple-track warning systems in Canada and in the United States, which are designed in accordance with American Railway Engineering and Maintenance Association (AREMA) standards.

At selected level crossings in some other jurisdictions, such as the United Kingdom, there are not only lighted signs to indicate the presence of another train on an adjacent track, but also an additional second audible alarm. In some areas within Canada where there is high-speed train traffic, pedestrian crossing protection has been installed. Transport Canada (TC) has been conducting research into the design of warning devices for pedestrians at highway/railway crossings since the mid-1990s.

1.11 Engine Whistle (Horn) Signal

CROR Rule 14(l) requires the sounding of two long blasts, one short blast and one long blast of the locomotive whistle (also known as the horn) in the following circumstances:

> (i) At every whistle post.
>
> (ii) At least one-quarter of a mile from every public crossing at grade (except within limits as may be prescribed in special instructions) to be prolonged or repeated according to the speed of the movement until the crossing is fully occupied by the engine or cars.

The whistle signal may be prohibited under special instructions in CN's operating rules as follows:

> 14(l)(iv) At locations specified in the timetable or special instructions, the sounding of the engine whistle, except to prevent an accident, in respect to public crossings at grade is prohibited.

However, Rule 14(f) requires the sounding of a succession of short whistle sounds as an alarm for persons or animals on or near the track.

1.12 Anti-Whistle Authorization for the City of Brockville

Currently, train whistling requirements are set out in the CROR, which state that trains must whistle as they pass through public and pedestrian crossings at grade. There are provisions in the *Railway Safety Act*, 2001, for eliminating the use of train whistling at a crossing at the request of a municipality. Equipment that meets specific safety standards, including adequate warning systems, must be put in place to compensate for the elimination of whistling.

On 09 March 1999, the City of Brockville enacted Bylaw No. 22-99, *A Bylaw to Prohibit the Sounding of Engine Whistles of Trains at Highway Crossings within the City of Brockville*. The bylaw, under the terms of CROR Rule 14(l), petitions CN to prohibit the sounding of engine whistles of trains at:

Oxford Avenue	Mile 124.09, Kingston Subdivision
Bartholomew Street	Mile 124.88, Kingston Subdivision
Ormond Street	Mile 125.06, Kingston Subdivision
Park Street	Mile 125.15, Kingston Subdivision
Perth Street	Mile 125.65, Kingston Subdivision

The bylaw was conditional on TC granting the necessary approvals and CN issuing the necessary bulletins to its operating staff.

TC's guideline 1, Procedures and Conditions for Eliminating Whistling at Public Crossings, outlines the conditions under which a municipality may seek an exemption from whistling and the process to be followed. This guideline sets out certain safety requirements intended to offset

the absence of train whistling and its warning of an oncoming train. There is no specific information in the guideline on consideration of pedestrian traffic on sidewalks adjacent to roadways.

In brief, the municipality must:

- contact the railway company in question;
- notify the general public and all relevant organizations of its intention to pass a resolution forbidding the use of train whistles in the area;
- discuss the issue with the applicable road authority/owner (if different than the municipality);
- jointly conduct a detailed safety assessment of the crossing with the railway company and the road authority; and
- pass a resolution prohibiting train whistling at the crossing.

Once an agreement has been reached between the railway company and the municipality to discontinue whistling at a crossing, the railway company may arrange to have TC inspect the crossing to confirm its assessment that the crossing meets the requirements of the guidelines. If TC is satisfied that requirements have been met, the Department sends confirmation to the railway company who can then issue instructions eliminating whistling at the crossing.

TC inspected the crossing as part of a corridor review for a whistle ban. As a result, some right-of-way fencing was improved and the process to eliminate whistling was completed.

1.13 Train Simulation

On 11 May 2005, a simulation was conducted to assess the defences in place to protect pedestrians at the Bartholomew crossing. A locomotive of similar design and orientation to the locomotive involved in this occurrence was equipped with a video camera. The simulation revealed that pedestrians standing at the crossing could not be observed by an approaching train crew until they were approximately 50 feet from the Bartholomew crossing. Also, the pedestrian sightlines toward the oncoming train, from the location where the two children stopped to wait, were restricted by the signal mechanism and the bungalow.

1.14 Regulations

Regulations pertaining to the safe operation of grade crossings are governed by the *Railway-Highway Crossing at Grade Regulations*[6] and the *Highway Crossings Protective Devices Regulations*[7] pursuant to the *Railway Safety Act* (RSA) of July 1988, and apply to all crossings constructed after 14 January 1981. The regulations define a highway to include "any public road, street, lane,

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6 *Regulations Respecting the Construction of a Crossing of a Railway and a Highway at Grade*, established 18 September 1980, last revised 15 January 1985.

7 General Order E-6, *Regulations Respecting the Installation and Testing of Protective Devices at Highway Crossings at Grade*, established by the *Consolidated Regulations of Canada*, 1978.

pedestrian walkway or other public way." They do not include any standards specifically for the protection of pedestrians, the positioning of signal bungalows, or the protection of pedestrian sightlines.

For nearly 20 years, TC has been in the process of developing new at-grade crossing regulations. Consultations with railways, railway unions, road authorities, association representatives and other resources resulted in the publishing of a draft Road/Railway Grade Crossing Manual (the manual)[8] in November 1995, 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.

Safety issues such as the positioning of signal bungalows in order to protect sightlines, the conducting of regular detailed safety assessments by qualified persons, and the removing of a threat to safe operations when identified are also addressed in the draft technical manual RTD 10.[9]

In 2000, TC indicated its intent to publish in the *Canada Gazette* by the spring of 2002. At the time of this occurrence, the new regulations had not been published.

1.15 Train-Pedestrian Occurrence Statistics

1.15.1 Crossing Accident Data

According to TSB records, crossing accidents involving vehicles account for an average of 96 per cent of all crossing accidents and accidents involving pedestrians account for 4 per cent. While the number of pedestrian accidents is quite small as compared to the number of accidents involving vehicles, they account for 16 per cent of all crossing fatalities. This proportion has increased to 22 per cent in the past five years (32 per cent in 2005) as the proportion of vehicle fatalities has been decreasing (see Figure 2). Pedestrian accidents also account for 8 per cent of serious injuries since 1993 (because injuries were not broken down by serious/minor before 1993, there are no records before that date).

8 Railway Safety Directorate, Surface Group, Transport Canada, draft Road/Railway Grade Crossing Manual, 23 November 1995.

9 Draft technical manual RTD 10 (*Road/Railway Grade Crossings: Technical Standards and Inspections, Testing and Maintenance Requirements*, last revised 03 December 2002.

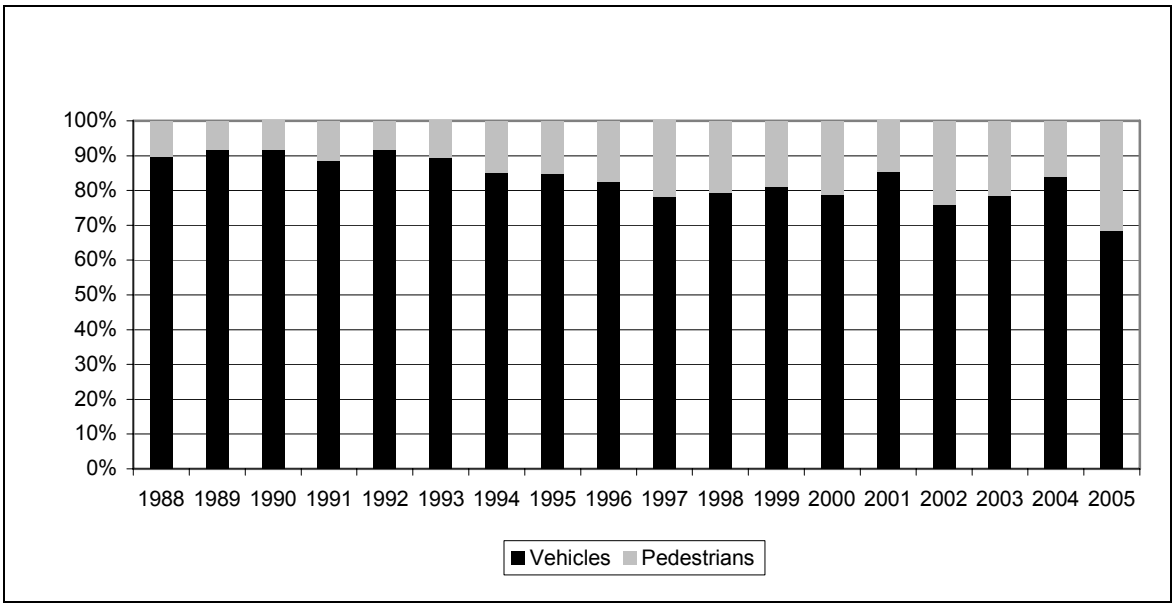

Figure 2. Crossing accident fatalities involving vehicles and pedestrians

Crossing accidents involving vehicles have shown a statistically significant decrease over the years (from 493 in 1988 to 249 in 2005), while those involving pedestrians have been fairly stable with an annual average of 14 since 1988.

The data on pedestrian accidents are presented to show trends over several years. Data classification and collection is consistent year-on-year.[10]

1.15.2 Crossing Type Accident Data

According to information reported to the TSB in the last 10 years, 48 per cent of crossing accidents involving vehicles occurred at automated crossings, 34 per cent at public passive crossings, 16 per cent at private crossings and 2 per cent at farm crossings. For the same period, 90 per cent of accidents involving pedestrians occurred at automated crossings (61 per cent at gated crossings and 29 per cent at crossings with flashing lights and bell (see Figure 3 and Figure 4)). Most gated crossings are equipped with gates that, when in the down position, extend across only the approaching lane of vehicular traffic (half barriers). The gates do not extend across the pedestrian approach.

[10] The pedestrian category statistics include cyclists and wheelchair occupants.

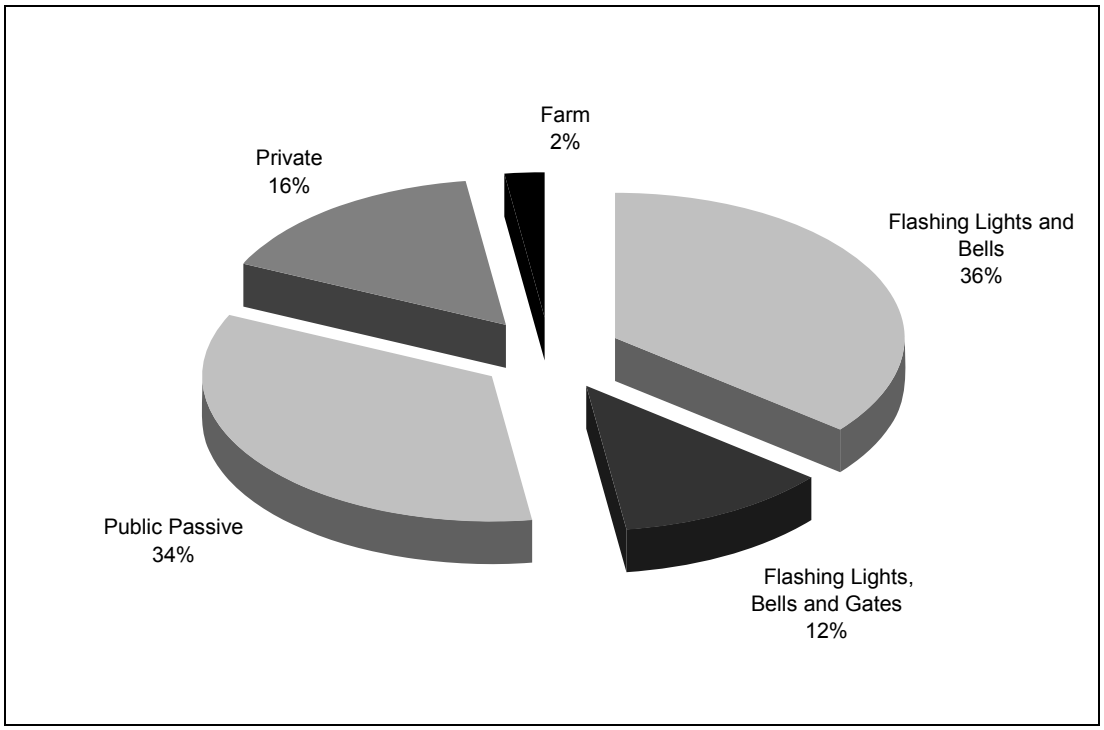

Figure 3. Crossing accidents involving vehicles by type of crossing, 1996-2005

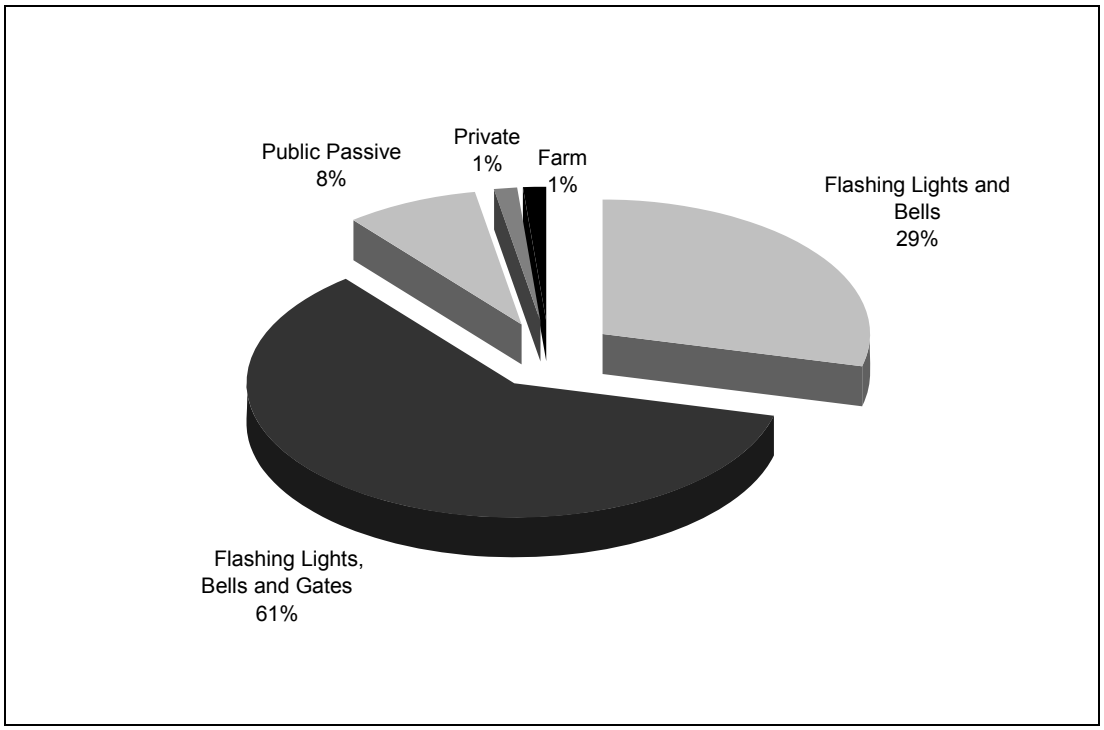

Figure 4. Crossing accidents involving pedestrians by type of crossing, 1996-2005

1.16 Related Crossing Occurrences

1.16.1 TSB Occurrence R95D0055, 25 April 1995, Park Street, Brockville, Ontario

Ten years before this accident, at the Park Street railway crossing, the Board uncovered the same safety deficiencies. In that accident, the Board determined the following:

> . . . the two pedestrians stepped in the path of a westbound train while their concentration was fixed on a passing eastward train. Although the vehicular automated warning devices activated as designed, 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. (TSB report R95D0055).

As a result of the same 1995 occurrence, the Board recommended 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 main-line crossings in populated areas warranting immediate attention. (R96-14, issued December 1996)

In its response, the Department concurred with the Board recommendation and advised of a study it was initiating on the means of warning pedestrians of the approach of second trains. Additionally, work was under way to identify those crossings in populated areas with significant pedestrian traffic and the Department was working with others to identify crossings that would meet the criteria in the Board's recommendation.

The response was assessed by the Board in February 1997 as having satisfactory intent. The program, although discussed by TC with the rail industry and selected municipalities, had never been implemented.

1.16.2 Other Second-Train Events Between 1988 and 2005 Involving Pedestrians

According to records gathered in 1998 by TC and updated to include recent occurrences between 1988 and 2005 (see Appendix A):

- A total of 19 of the 20 accidents occurred at multi-track main-line grade crossings protected by flashing lights, bell and gates.
- The other accident occurred at a non-signalled multi-track crossing.
- In all, 21 pedestrians were injured, 16 fatally.
- A total of 11 of the 21 persons killed or injured were school age children.

- In all, 15 second-train accidents have occurred since the occurrence on 25 April 1995 that resulted in Board recommendation R96-14 (TSB report R95D0055).

- Four of the six documented second-train incidents that occurred since 1998 occurred at crossings that were identified in TC's preliminary list of crossings with the potential for second-train accidents to pedestrians (see Appendix B).

1.17 Crossing Safety Activities

1.17.1 Operation Lifesaver

Operation Lifesaver is a national public awareness program aimed at reducing railway-related incidents resulting in fatalities and injuries. In Canada, Operation Lifesaver is a national public education program sponsored by the Railway Association of Canada and TC. It works in cooperation with the Canada Safety Council, provincial safety agencies, unions, police, public and community groups. Emphasis is placed on dangerous behaviour such as trespassing on railway property or disobeying railway signs and signals.

To achieve its goals, Operation Lifesaver focuses on education, enforcement and engineering. It educates people of all ages about the potential dangers at highway/railway crossings and the seriousness of trespassing on railway property. It promotes enforcement of laws governing motorists and pedestrian responsibilities at highway/railway crossings and on railway property, and it supports research aimed at ensuring a high level of safety at railway crossings and on railway property.

In conjunction with Operation Lifesaver, Direction 2006 is a partnership program, launched in 1996, with the specific goal of reducing crossing collisions and trespassing incidents on railway property by 50 per cent by the year 2006.

As part of the Operation Lifesaver education effort, railway safety presentations are made to school age children.

- From January 1995 to March 1996, Operation Lifesaver representatives attended 58 schools and made presentations to 15 168 students and teachers between Mile 67 and Mile 170 of the Kingston Subdivision.

- From January 2004 to January 2005, Operation Lifesaver representatives attended 107 schools and made presentations to 6236 students and teachers between Mile 67 and Mile 170 of the Kingston Subdivision.

The most recent Operation Lifesaver presentation at the Commonwealth Public School was on 14 April 2004. One of the two girls had attended the presentation. Operation Lifesaver presentations do have modules that deal with second-train incidents.

1.17.2 Transport Canada Railway Safety Research

1.17.2.1 Research to Assess the Current Use of Second-Train Warning Systems, 1997

Research conducted between December 1996 and January 1997 produced a report identifying technologies in use in Canada, the United States, Belgium, Denmark, the United Kingdom, Sweden, and Japan to alert pedestrians to the presence of a second train arriving at a railway crossing.[11]

The findings were as follows:

- Several jurisdictions use systems that provide explicit warnings, distinguishable from first train warnings and activated when a second train is approaching a crossing. Calgary Transit has such a system in use at one crossing.
- Other jurisdictions use warnings that are indistinguishable from first train warning systems.
- Automated pedestrian gates are used in some jurisdictions.
- The U.S. Department of Transportation guidelines for highway/light rail transit grade crossings are being revised.

1.17.2.2 Research Project Team Established, 1998

In 1998, TC established a project team to participate in a study to address the use of second-train warning systems for pedestrians. The intent was to complete this study by April 1999.[12] The project team included representatives from TC, CN, Canadian Pacific Railway (CPR) and the City of Mississauga. As part of this study, TC's regional offices identified crossings with a potential for second-train accidents. Information on these crossings was recorded (see Appendix B). Of the 259 locations identified, 47 (18 per cent) have subsequently had measurements of pedestrian activity undertaken. The list includes the five level crossings in Brockville. There are no records of any formal undertaking designed to communicate the information contained in the list to the affected local communities.

1.17.2.3 Railway Safety Awareness Survey, 1999-2001

In October 2001, TC tabled results of a Federation of Canadian Municipalities Survey at the meeting of the Railway Safety Consultative Committee. The survey, conducted across 1400 municipalities, was designed to identify level of knowledge of municipalities on railway safety.

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[11] TP 13018E, *Identification of Second-Train Warning Systems for Pedestrians*, Beauchemin-Beaton-Lapointe Inc., 1997.

[12] TP 14288E, *Second Train Warning at Grade Crossings*, IBI Group, April 2005.

The survey determined that municipalities have little or no knowledge of the role of their road authorities under the RSA, and *Grade Crossing Regulations*, nor expertise in railway right-of-way access control measures.

1.17.2.4 Research into the Design of Second-Train Warning Signage, 2003

TC retained a consultant to design a second-train event safety poster concept that would effectively sensitize and educate people of the potential for a second-train event at crossings with multiple tracks.[13] A sign was developed and then tested at two multi-track locations in Montréal. The results were as follows:

- Only a minority (34 per cent) of those interviewed remembered having seen the sign.
- When shown the sign, 71 per cent of the respondents understood its meaning.
- There was no difference in comprehension among people of different ages, education levels or origins.
- Since only a minority of respondents noticed the sign, but most understood the essence of its message, signs should be installed in places where they would be more visible.

1.17.2.5 Research to Develop and Pilot Test a Second-Train Warning System, 2000-2004

In 2000, TC commenced another study to develop and pilot test a second-train warning system. The study involved 3 phases:

1. Pilot Test Development – Review of existing second-train warning systems and their effectiveness, development of criteria for selecting location for the pilot test of second-train system.
2. Pilot Test Evaluation – Acquire, install, demonstrate and evaluate a second-train warning system installed at a selected grade crossing.
3. Deployment Recommendations – Make recommendations related to the deployment of second-train warning systems in Canada.

The results of this study (TP 14288E) were published on 06 April 2005 and recommended the following:

1. Second-Train Warning (STW) systems should be pursued at sites with a high risk of second-train incidents/collisions.

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[13] TP 14232E, *Second Train Event Safety Sign – Concept Development*, Gauthier Dubois Girard Architects, October 2003.

2. Data collection efforts should be undertaken by the various rail authorities to provide a complete qualitative assessment of all road-railway intersections (RRIs) in Canada with the potential for second-train collisions.

3. The results of the qualitative screening should be used to establish a short list of sites on which full site audits should be performed and data collection efforts focused to develop the quantitative priority-ranking model.

4. Studies should be conducted to continuously monitor locations after the installation of STW systems and measure their long-term effectiveness.

5. As pedestrian and train volumes (that is, "exposures to risk") as well as operational and environmental characteristics at the various RRIs are expected to change over time, it is imperative that recommendations 1 through 4 be repeated on a regular basis. This will ensure that resources and funds are used as efficiently as possible in order to maximize safety benefits.

The Board is not aware of any decision on the implementation of the study's results.

1.18 School Proximity to Railway Crossings

Elementary school children use the Bartholomew Street level crossing each day. The Commonwealth Public School (elementary), with an enrolment of 302 students, is located in the southeast quadrant of the crossing. Many students live on the north side of the tracks and cross them on foot several times a day, as was the case for the students involved in this occurrence. In addition, children walking to and from school often travel in pairs or groups.

1.19 Enhanced Crossing Protection in High-Speed, High-Traffic Density Rail Corridors

To address the risks to pedestrians in high-speed, high-traffic density rail corridors, some communities have enhanced the level of pedestrian safety, with or without TC's involvement. For example, in Prescott, Ontario (see Photo 2), at a level crossing adjacent to an elementary school on the same rail corridor, the town has employed a crossing guard for more than 30 years. At a pedestrian only crossing in Kingston, Ontario, TC worked with CN and the municipality to upgrade the warning system (see Photo 3). At high-risk locations along the Oakville Subdivision in Mississauga, Ontario, some crossings equipped with road gates were also fitted with sidewalk pedestrian gates 18 years ago, with these specifically being upgraded as a result of a Canadian Transport Commission, CN and City of Mississauga corridor review (see Photo 4 and Photo 5). The City of Mississauga, together with GO Transit authorities, is planning to expand its implementation of enhanced pedestrian protection at-grade crossings on the Oakville Subdivision within city limits.

Although these efforts have been undertaken to address pedestrian safety, specifically aimed at second-train warning systems, there are no regulatory-approved or industry-accepted standards.

Below are examples of enhanced pedestrian protection in high-speed, multi-track main-line railway crossings at-grade in Ontario.

Photo 2. Crossing guard at Boundary Road public crossing at grade in Prescott, Ontario

Photo 3. Pedestrian only crossing near school in Kingston, Ontario

Photo 4. Pedestrian gate installation at Alexandra Road crossing at grade along the Oakville Subdivision in Mississauga, Ontario

Photo 5. Pedestrian maze gates installation along the Oakville Subdivision in Mississauga, Ontario

In Brockville, where two pedestrians were fatally injured in 1995 at a rail crossing less than one mile west of Bartholomew Street (TSB report R95D0055), a Board recommendation was made 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 main-line crossings in populated areas warranting immediate attention. (R96-14, issued December 1996)

At the time of this occurrence, no improvements had been made to the pedestrian protection at crossings in Brockville by either CN or the municipality.

1.20 Other Information

The city of Brockville has a population of approximately 21 000. The CN Kingston Subdivision divides the city. Schools, business, churches and residential areas are on both sides of the tracks. 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.

Fencing along the railway right-of-way was upgraded when the City of Brockville introduced its anti-whistling bylaw; however, a TSB survey of the right-of-way following the accident identified areas that were not fenced or where fencing had been breached. There are well travelled routes over and along the right-of-way evident throughout the city. There is no fencing in the immediate area of the Bartholomew Street crossing.

2.0 Analysis

2.1 Introduction

In this occurrence, train 106 approached the crossing in compliance with government safety standards and company procedures.

The train's bell was activated but the whistle was not sounded. The pedestrians, waiting on the sidewalk where there was no pedestrian-specific barrier, and likely preoccupied with the passing of the westward train and their conversation, walked into the path of the eastward train unaware of its approach. The children were already in the immediate path of the train when the crew of train 106 first observed them. The crew placed the train in emergency, but had little time to activate the whistle and have it acknowledged and reacted to by the children. Their actions were appropriate and indicated that they were vigilant: it was not possible for the train to be stopped in emergency within the available distance. Therefore, crew actions were not considered causal or contributory in this accident.

2.2 Common Safety Deficiencies Between Occurrences R95D0055 and R05T0030

The underlying safety deficiencies in this accident were identified by the Board following an occurrence in Brockville in 1995 where two school age pedestrians were fatally injured. The Board made a recommendation aimed at addressing the safety deficiency. The response to that recommendation was assessed as satisfactory intent. This analysis will therefore focus on the safety deficiencies that remained and led to the second-train accident at Bartholomew Street.

2.2.1 Automatic Warning Devices

The circumstances of the 1995 Park Street accident and the 2005 Bartholomew Street accident are similar. The crossing's automatic warning signals activated as designed and, in concert with the noise of the approaching first train, warned the two girls of one oncoming train. The girls stopped and waited for it to pass. However, there was no system to specifically warn pedestrians or restrain them from walking across the crossing when a second train was approaching.

2.2.2 Pedestrian Protection at High-Speed, Multi-Track Crossings

In report R95D0055, the Board identified a need for enhanced pedestrian-specific protection at multiple-track main-line crossings in populated areas deemed to require immediate attention. By 1998, TC had produced a list of crossings where there was a potential for second-train occurrences in populated areas. This list included all five main-line level crossings on the Kingston Subdivision in Brockville. While this list was shared with members of the second-train research project team (including representatives of CN, CPR and the City of Mississauga), it was not transmitted to other railways, nor to provincial or local authorities. Furthermore, no pedestrian-specific protection had been installed at any of the Brockville level crossings.

2.2.3 *Regulations and Standards for Crossing Protection*

In 1995, crossing regulations in force in Canada did not address pedestrian safety, although the development of new regulations had already been under way for several years. On 17 February 2005, the new regulations were still in draft form. Working guidelines have been produced based on the proposed regulations. These guidelines make recommendations as to pedestrian sightlines on new crossings, but they do not recommend any pedestrian-specific barriers nor second-train warning system. In addition, these guidelines are not enforceable. As a result, the existing standards for the design and operation of multi-track crossing warning devices do not mitigate the danger to pedestrians in a second-train situation at level crossings.

2.3 *Outcomes of Transport Canada Research into Pedestrian Protection*

In 1996, the Board recommended that TC, together with railways and provincial and local authorities, implement a program to enhance pedestrian protection, and at that time, TC demonstrated the intent of moving towards this goal. While significant efforts have resulted in reductions in the number of trespasser-train and vehicle-train interactions, they have not resulted in reductions in pedestrian-train interactions.

TC's ongoing research is almost exclusively focused on the development and deployment of a cost-effective secondary train warning system, to the exclusion of other solutions, such as crossing guards, active and passive barriers, that have been implemented at some locations in Canada. Without activities directed at enhancing pedestrian warning of second trains, the risk to pedestrians at crossings remains.

Moreover, at the time of this occurrence, TC's research offering insight into the location of crossings with potential for second-train accidents and the level of awareness of affected communities had not been shared outside the circle of direct research participants. Not sharing research results with affected communities reduces the likelihood that action will be taken to identify and minimize risks to pedestrians at level crossings.

Although the need for enhanced protection for pedestrians at high-risk railway crossings, such as the crossings in Brockville, had been brought to the attention of TC in 1996, limited improvements were implemented at these crossings.

2.4 *Decision Making by Crossing Users*

In order to make an effective judgement that it is safe to enter a railway crossing, the warnings provided must be clear and unambiguous.

At the Bartholomew Street crossing, there was no ambiguity for vehicle drivers as the north and south traffic operated in their exclusive lanes and movement over the crossing was restricted by gates. For drivers, this meant that, if the gate was down, it was unsafe to enter the crossing, irrespective of the number of trains present or the operation of other safety warning devices.

At the pedestrian crossing, there was no gate to restrict movement and no pedestrian-specific signals. Having seen the first train pass, with their westward view obstructed by the signal bungalow, and without the benefit of the second train's whistle or other second-train–specific warning, the remaining cues (the closed vehicle gates, the flashing lights and bell) were insufficient to warn the pedestrians that entering the crossing remained unsafe because of the second train.

Unlike motorists, who are provided with an unambiguous warning, daytime pedestrians – primarily school age children with under-developed focusing abilities – are required to notice and collate a number of cues to judge whether it is safe to enter the crossing. This is compounded in a second-train situation, where the completed transit of the crossing by the first train is a cue that must be discarded.

2.5 Pedestrian Sightlines

Existing TC sightline regulations only pertain to vehicular traffic. There are currently no regulations governing pedestrian sightlines. At the Bartholomew crossing, the westward view of the south track in the vicinity where the two girls were observed to be standing is restricted. The girls were adjacent to the east side of the signal mechanism where other pedestrians were observed to stand. A signal bungalow further restricts a pedestrian's view of the west side of the south track.

The positioning of the crossing protection gate mast and the signal bungalow, combined with track geometry, completely obstructed the view of approaching freight train 106 as the pedestrians waited for the passage of train 532 in the opposite direction.

2.6 Visual Obstruction, Auditory Interference and Pedestrian Behaviour

While the sightlines to the east were relatively unobstructed for pedestrians standing in the southeast quadrant of the crossing, a number of objects restricted the pedestrians' view to the west. A signal bungalow and the signal mechanism obstructed the pedestrians' view of the track.

Without the ability to see all the trains in the area, it becomes difficult to associate sounds such as the noise of a train with a specific train; therefore, visual obstructions contribute to auditory interference. The presence of objects between the train and the pedestrians would have interfered with the sound reaching the pedestrians. Moreover, the activated signal protection bell was mounted on the post directly above the pedestrians and rang constantly, thus reducing the pedestrians' ability to hear any other sounds. The masked sounds included the sound of the train engine and bell.

In communities bisected by high-speed rail corridors, school age children are required to use level crossings on their way to and from school. Most of these crossings have little or no pedestrian-specific protection. These pedestrians, due to their reduced attentional abilities, require additional protection at grade crossings.

Visual obstruction, auditory interference, and the attentional abilities of the school age pedestrians limited the pedestrians' awareness such that they were not aware of the approach of train 106 when they proceeded onto the railway right-of-way and were struck.

2.7 *Timely Response to Deficiency Identification*

Although TC's response to the Board recommendation R96-14 has generated substantial research, documentation and in some cases new but non-enforceable guidelines for crossing protection, these activities have not resulted in a measurable reduction in the number of pedestrian injuries or fatalities at grade crossings. However, there are communities such as Mississauga and Prescott that have taken direct action to reduce the risks to pedestrians at high-speed multi-track crossings. These actions have included the installation of pedestrian barriers and gates and staffing crossings with school crossing guards.

Following the Board's 1996 recommendation on pedestrian safety at crossings, neither the regulator, nor the railway or the municipality took effective action to mitigate the safety deficiency identified.

2.8 *Pedestrian-Specific Crossing Protection*

The current TC program has given limited attention to the identification, communication, promotion, and timely implementation of solutions that address the ongoing risk to pedestrians at grade crossings.

Since 1998, participants in the Study of a Second Train Warning System at Road Crossings for Pedestrians have been in possession of a preliminary list of crossing locations with potential for second-train accidents. However, the contents of this list were not communicated to the affected communities. In this time period, the majority of second-train incidents (that is, four out of six) have occurred at crossings that were identified in this list. None of these locations have received upgrades to pedestrian protection. While crossing accidents involving pedestrians and second trains are relatively infrequent, as a proportion of all crossing accidents, the percentage is increasing. The outcome of one of these accidents almost invariably results in a fatality. Without a pedestrian safety-specific intervention, the outcomes are not likely to change.

The continued absence of pedestrian-specific protection at multi-track main-line crossings in populated areas warranting immediate attention results in a significant risk of second-train accidents continuing.

2.9 *Community Anti-Whistling Bylaw*

In order to enact an anti-whistling bylaw, the community must demonstrate, and TC and the railway must concur, that an equivalent level of safety exists. In the case of potential second-train events, this may involve both the addition of vehicular crossing gates, bells and flashing lights and fencing to restrict trespasser access to the railway right-of-way. However, the TC guidelines do not specifically include the addition of protection specifically for pedestrians at highway crossings. Although protection for vehicles and trespassers apparently remains the same, with the removal of the whistle, the level of protection for pedestrians may have actually

been reduced. Therefore, the approval of the anti-whistling bylaw, without consideration to the high pedestrian traffic and its composition, may have decreased the likelihood that a pedestrian waiting at the crossing would become aware of an approaching second train.

3.0 Conclusions

3.1 Findings as to Causes and Contributing Factors

1. The pedestrians, waiting on the sidewalk and preoccupied with their conversation, observed the passage of the westward train and walked into the path of the eastward train.

2. Visual obstruction, auditory masking, and the attentional abilities of the school age pedestrians limited their awareness such that they were not aware of the approach of the second train.

3. There was no pedestrian-specific barrier and the crossing warning devices for vehicles did not specifically warn the pedestrians of the second oncoming train or otherwise deter them from crossing the tracks after the first train passed.

4. The standards for the design and operation of multi-track crossing warning devices at roadways did not provide the two pedestrians on the adjacent sidewalk the equivalent level of safety provided to vehicle drivers on the roadway.

5. Although the need for enhanced protection for pedestrians at high-risk railway crossings, such as the crossings in Brockville, was brought to the attention of Transport Canada, the rail industry, and the municipality by Board recommendation R96-14 in 1996, no substantive improvements were implemented at these crossings.

6. The positioning of the crossing protection gate mast and the signal bungalow completely obstructed the view of approaching freight train 106 from the pedestrians as they waited for the passage of train 532.

3.2 Finding as to Risk

1. The removal of the requirement to whistle at roadway crossings, without consideration of the danger to pedestrian traffic on adjacent sidewalks, may decrease the level of safety afforded to the pedestrians.

3.3 Other Finding

1. The activated automatic warning devices and the unobstructed view and sounds of the approaching westward first train allowed the two girls to recognize the danger presented by that train as they stopped for it to pass.

4.0 Safety Action

4.1 Action Taken

4.1.1 Implementation of Crossing Guards

In February 2005, as an immediate safety measure to mitigate the risk at the Bartholomew Street crossing, Brockville police services assigned a crossing guard to the crossing to supervise school children at specific times during the day during the school year.

4.1.2 TSB Rail Safety Advisories

The TSB issued two separate rail safety advisories (RSAs) in regards to this occurrence. RSA 04/05, dated 27 April 2005, addressed the identification of high-risk locations and the implementation of enhanced pedestrian crossing protection. RSA 05/05, dated 05 May 2005, addressed the obstructed sightlines at the Bartholomew Street crossing due to a signal bungalow. The TSB suggested that Transport Canada (TC) may wish to identify other locations where similar situations exist and review all locations with a view to mitigating the risk.

In response to RSA 05/05, a safety assessment of the grade crossings in Brockville was conducted by representatives of TC, Canadian National (CN) and the City of Brockville.

4.1.3 Coroner's Inquest Conducted in June 2005

The Office of the Chief Coroner of Ontario conducted a public inquiry into the fatality in this occurrence. The jury was tasked with determining the details surrounding the fatality, and with making recommendations on how to prevent or reduce the likelihood of recurrence. The jury made 19 recommendations (see Appendix C) dealing with pedestrian safety at railway crossings in Brockville. The recommendations assigned the City of Brockville as the lead authority for the implementation of safety recommendations, and tasked TC, the railway and other parties to undertake immediate safety action in areas under their jurisdiction.

Of the 19 recommendations, the following safety actions have been initiated:

> In response to recommendation 1:
>
> In May 2006, the City of Brockville made a funding application to TC for the installation of pedestrian gates and improvement to railway fencing at four grade railway crossings (Perth, Park, Ormond, and Bartholomew streets).
>
> In response to recommendation 2:
>
> CN agreed to relocate the signal bungalow in the southwest quadrant at the Bartholomew Street at-grade crossing to a location not less than 8 m from the south rail to ensure that sightlines are unobstructed when pedestrian gates and fencing are installed.

In response to recommendation 3:

In July 2005, after an internal safety audit, CN re-instituted 24-hour-a-day whistling in the city of Brockville. Subsequently, on 08 May 2006, whistling was halted nightly, between 2000 and 0600, subject to a number of conditions. The conditions include:

- The City of Brockville maintains its current program of posting crossing guards during the school year from 0730 to 0900, and 1430 to 1630 at the Bartholomew, Ormond, Park, and Perth street grade crossings.

- The Brockville police services maintain additional evening and overnight surveillance of CN grade crossings, including service roads near rail lines, on a year-round basis. CN police continues to work jointly with Brockville police on patrolling rail lines.

- The City of Brockville erect signage at the designated crossing stating that the partial whistle ban is in effect.

CN stated in writing that it will restore 24-hour-a-day whistling in Brockville if there are any future accidents or near-miss reports involving pedestrians or vehicles at the five CN grade crossings in the city.

In response to recommendation 5:

The City has painted stop lines on the sidewalk at the Perth, Park, Ormond, and Bartholomew street grade crossings. Clear and simple signage has also been installed at these locations to tell pedestrians where to stand when crossing lights are flashing.

In response to recommendations 8, 9, 10, and 11:

Beginning in September 2005, various safety events to educate school age children were delivered by CN police and Brockville police services, in cooperation with Operation Lifesaver, at schools and railway crossing locations within the city of Brockville. These events were in addition to normal Operation Lifesaver education activities, and also put special emphasis to second-train event issues.

In response to recommendations 15 and 16:

A committee was formed to consider the recommendations. The committee is chaired by Brockville's director of operations and composed of representatives from TC, CN, the Upper Canada District School Board, the City of Brockville, and Brockville police services and has been meeting monthly.

4.2 Action Required

4.2.1 Implementation of Enhanced Pedestrian Protection

In 1996, the Board issued the following:

> 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 main-line crossings in populated areas warranting immediate attention. (R96-14, issued December 1996)

Since 1996, TC has conducted significant research into pedestrian safety at railway crossings. Efforts have been made to identify the scope of the second-train safety issue, and to develop specific, cost-effective technology that addresses pedestrian safety at crossings. Work towards pedestrian safety has been initiated by TC in locations such as Kingston and Cobourg, Ontario, and along rail lines with commuter service in the Montréal area and in Chilliwack, British Columbia.

Despite these efforts, the current program has not given adequate attention to the communication, promotion, and implementation of solutions, such as crossing guards and pedestrian gates, that are already being applied with some success. TC's ongoing research is almost exclusively focused on the development and deployment of a cost-effective second-train warning system, to the exclusion of other solutions that have been implemented at some locations in Canada. TC's research into the location of crossings with potential for second-train events and the level of awareness of affected communities has not been shared outside the circle of direct research participants. Response to date has not resulted in a measurable reduction in the number of pedestrian injuries or fatalities at grade crossings.

Therefore, the Board recommends that:

> The Department of Transport assess the risk to pedestrians at all multi-track main-line crossings, make its assessment public and implement a program, in conjunction with stakeholders, to mitigate the risk of second-train pedestrian accidents.
>
> R06-02

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 19 July 2006.

*Visit the Transportation Safety Board's Web site (**www.tsb.gc.ca**) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.*

Appendix A – Pedestrian Crossing Accidents Involving a Second Train, 1988-2005

No.	Date	Mile	Subdivision	Railway	Fat.	Inj.	Tracks	Prov.	Sex	Age	Time	Warning System	Train	Speed	TSB Occurrence Number
1	21-Apr-93	12.40	Bridge	CN	1	0	2 / DML	Que.	M	7	1545	FLB&G	Passenger	68	R93Q0026
2	03-Dec-93	320.40	Kingston	CN	0	1	2 / DML	Ont.	M	16	1845	FLB&G	Passenger	49	R93T0283
3	04-Jun-94	20.85	Galt	CPR	1	0	2 / DML	Ont.	F	15	1440	FLB&G	Freight	45	R94T0174
4	20-Apr-95	125.15	Kingston	CN	2	0	3 / DML-SDG	Ont.	F	16	1135	FLB&G	Freight	47	R95D0055
5	22-Feb-96	76.84	Dundas	CN	1	0	4 / DML-SDG	Ont.	M	43	0047	FLB&G	Freight	45	R96S0017
6	30-May-96	47.50	Strathroy	CN	1	0	2 / DML	Ont.	M	19	2000	SRCS	Freight	50	R96S0086
7	08-Aug-96	76.84	Dundas	CN	1	0	4 / DML-SDG	Ont.	M	38	1330	FLB&G	Passenger	55	R96S0117
8	26-Mar-97	58.90	Cascade	CPR	1	0	3 / DML-SDG	B.C.	M	46	0320	FLB&G	Freight	25	R97V0065
9	14-May-97	249.43	Kingston	CN	1	0	2 / DML	Ont.	M	6	1610	FLB&G	Passenger	92	R97T0138
10	03-Oct-97	69.51	Saint-Hyacynthe	CN	1	0	4 / DML-SDG	Que.	M	51	0905	FLB&G	Passenger	40	R97D0224
11	08-May-98	15.53	Halton	CN	1	0	2 / DML	Ont.	F	32	1735	FLB&G	Freight	35	R98T0103
12	29-May-98	69.51	Saint-Hyacynthe	CN	0	0	4 / DML-SDG	Que.	F		1625	FLB&G	Passenger	40	R98D0080
13	13-May-98	33.31	Oakville	CN	1	0	3 / DML-SDG	Ont.	M	19	0555	FLB&G	Passenger	75	R98T0107
14	11-Feb-99	13.80	Vaudreuil	CPR	1	0	2 / DML	Que.	M	16	1635	FLB&G	Freight	47	R99D0026
15	04-Jan-00	68.52	Dundas	CN	0	1	2/DML	Ont.	M	11	2050	FLB&G	Passenger	80	R00S0001
16	19-Aug-00	9.24	Grimsby	CN	0	1	2/DML	Ont.	F	13	1310	FLB&G	Freight	25	R00T0214
17	09-Aug-02	75.35	Dundas	CN	1	0	3/DML-SDG	Ont.	F	20	1210	FLB&G	Passenger	60	R02S0076
18	17-Mar-04	15.06	Oakville	CN	1	0	2/DML	Ont.	M	80	1340	FLB&G	Passenger	80	R04T0069
19	17-Feb-05	124.88	Kingston	CN	1	1	2/DML	Ont.	F	12	1515	FLB&G	Freight	60	R05T0030
20	16-Apr-05	9.24	Grimsby	CN	0	1	2/DML	Ont.	F	24	1050	FLB&G	Freight	22	R05T0094
					15	5									

Appendix B – Preliminary List of Crossings with Potential for Second-Train Accidents

(source: Transport Canada)

Prov.	Railway	Mile	Subd.	Highway No.	Municipality	No. of Tracks	Max. Train Speed	Total No. of Trains	No. of Pedestrians	Sidewalk Width	Max. Vehicle Speed	No. of Vehicles	Anti-Whistling	Xing Protection	Comments
Ont.	CN	16.52	Bala	Green Lane Road	Markham	2	50	27	-	1.8	60	8000	Yes	FLBG	
Ont.	CN	18.15	Bala	Former Hwy #7	Markham	2	60	27	-	1.8	60	2000	Yes	FLBG	
Ont.	CN	21.11	Bala	Centre Street	Richmond Hill	3	60	19	-	0.9	50	4240	Yes	FLBG	
Ont.	CN	88.89	Bala	Quetton Road	Rama	4	35	28	-	0.6	50	500	No	FLBG	
Ont.	CN	16.32	Bala	John Street	Markham	3	50	27	-	0	60	8000	Yes	FLBG - SGL	
Ont.	CN	20.18	Bala	Hillview Drive	Richmond Hill	2	60	27	100	0	0	0	Yes	FLBG	
Ont.	CN	20.31	Bala	Weldrick Road	Richmond Hill	2	60	27	-	0	60	5000	Yes	FLBG	
Ont.	CN	21.48	Bala	Crosby Avenue	Richmond Hill	4	60	19	-	0	50	6620	Yes	FLBG	
Ont.	CPR	131.57	Belleville	Pentecostal Road	Hamilton	2	60	10	-	0	80	350	No	FLBG	Also 260.7 Kingston summer camp
Ont.	CPR	201.9	Belleville	Pharmacy Avenue	Scarborough	2	50	72	-	0.9	0	0	No	SRCS	
Ont.	CPR	11.22	Belleville	Irwin Street	Perth	3	50	15	-	0.3	50	10	No	SRCS	
Ont.	CPR	205.35	Belleville	Wickstead Avenue	East York	3	60	62	-	0	50	2500	Yes	FLBG	
Ont.	CPR	76.68	Cartier	Portage Avenue	Sudbury	2	40	31	50	0	0	0	No	FLBG	Pedestrian crossing already
Ont.	CPR	75.47	Cartier	4th Avenue	Sudbury	2	45	31	-	1.2	50	400	No	FLBG	Low traffic
Ont.	CPR	77.25	Cartier	Harry Street	Sudbury	2	75	31	-	1	50	100	Yes	FLBG	Low traffic
Ont.	CPR	80.15	Cartier	Regent Street	Sudbury	2	75	31	-	0	50	10 000	Yes	FLBG	Low traffic
Ont.	CPR	79.31	Cartier	Elm Street	Sudbury	3	10	27	-	0	50	10 000	Yes	FLBG	
Ont.	CPR	77.02	Cartier	Bellevue Avenue	Sudbury	2	75	14	50	0	0	0	No	SRCS	
Ont.	CPR	75.86	Cartier	Second Avenue	Sudbury	2	45	31	-	1.5	50	200	No	FLBG	
Ont.	CPR	83.03	Cartier		Sudbury	2	75	17	-	0.9	0	100	No	SRCS	Restricted use
Ont.	CN	221.78	Caso	Howard Avenue	Windsor	3	30	8	-	0.6	50	18 900	Yes	FLBG	Medium
Ont.	CN	220.23	Caso	6th Conc. Road	Windsor	2	30	8	-	0.6	50	2500	Yes	FLBG	Medium

Prov.	Railway	Mile	Subd.	Highway No.	Municipality	No. of Tracks	Max. Train Speed	Total No. of Trains	No. of Pedestrians	Sidewalk Width	Max. Vehicle Speed	No. of Vehicles	Anti-Whistling	Xing Protection	Comments
Ont.	CN	27.59	Chatham	Main Street	Glencoe	3	80	20	-	1	50	1500	No	FLBG	
Ont.	CN	60.89	Chatham	Park Street	Chatham	2	80	19	-	0	80	5000	Yes	FLBG	
Ont.	CN	60.93	Chatham	Degge Street	Chatham	2	25	19	-	0	50	500	Yes	FLBG	
Ont.	CN	61.27	Chatham	St. George Street	Chatham	3	80	18	-	3	50	2000	Yes	FLBG	
Ont.	CN	61.51	Chatham	William Street	Chatham	4	80	18	-	0	50	10 000	Yes	FLBG	
Ont.	CN	61.54	Chatham	Queen Street	Chatham	5	80	18	-	0	50	25 000	Yes	FLBG	
Ont.	CN	105.65	Chatham	Walker Road	Windsor	8	15	24	-	1.5	50	10 000	Yes	FLBG	
Ont.	CN	105.87	Chatham	Devonshire Road	Windsor	5	15	10	-	0	80	1800	Yes	FLBG	
Ont.	CN	24.98	Dundas	Hardy Road	Brantford	2	80	28	-	0	50	3854	No	FLBG	
Ont.	CN	27.14	Dundas	County Road No. 23	Brantford	2	80	28	-	0.9	80	1290	No	FLBG	
Ont.	CN	27.66	Dundas	County Road No. 27	Brant	2	80	26	-	0.9	80	960	No	FLBG	
Ont.	CN	49.05	Dundas	Norwich Avenue	Woodstock	4	80	34	300	0	0	0	Yes	FLBG	
Ont.	CN	58.72	Dundas	Mutual Street	Ingersoll	2	80	34	-	0	50	4000	Yes	FLBG	
Ont.	CN	58.89	Dundas	Thames Street	Ingersoll	2	70	34	250	0	50	11 000	Yes	FLBG	
Ont.	CN	68.52	Dundas	Railway Street	North Dorchester	3	80	34	-	0	50	500	No	FLBG	
Ont.	CN	73.97	Dundas	Clark Sideroad	London	2	80	34	-	2.1	60	11 000	Yes	FLBG	
Ont.	CN	75.35	Dundas	Hale Street	London	3	80	45	-	0	30	1500	Yes	FLBG	
Ont.	CN	76.44	Dundas	Egerton Street	London	7	80	45	-	0	50	11 000	Yes	FLBG	
Ont.	CN	76.84	Dundas	Rectory Street	London	4	50	46	-	1.2	50	6300	Yes	FLBG - SGL	
Ont.	CN	77.36	Dundas	William Street	London	4	35	45	-	0	50	2100	Yes	FLBG	
Ont.	CN	77.51	Dundas	Maitland Street	London	3	50	45	-	1.5	50	5000	Yes	FLBG	
Ont.	CN	77.59	Dundas	Burwell Street	London	4	50	45	-	1.5	50	200	Yes	FLBG	
Ont.	CN	77.66	Dundas	Colborne Street	London	4	50	53	-	1.5	50	9000	Yes	FLBG	
Ont.	CPR	37.94	Galt	Guelph Line R. Road 1	Milton	2	75	34	-	2.5	50	5000	Yes	FLBG	
Ont.	CPR	1.44	Galt	Strachan Avenue	Toronto	7	30	44	-	0	50	11 500	Yes	FLBG-SGL	
Ont.	CPR	12.06	Galt	Lorland Avenue	Mississauga	2	75	38	-	0	40	125	Yes	FLBG	
Ont.	CPR	13.1	Galt	Stanfield Road	Mississauga	2	75	38	-	0	50	5500	Yes	FLBG	
Ont.	CPR	13.62	Galt	Haines Road	Mississauga	3	75	39	-	0	50	5100	Yes	FLBG	
Ont.	CPR	16.56	Galt	Mavis Road	Mississauga	3	60	39	-	0	60	16 500	Yes	FLBG - SGL	

Prov.	Railway	Mile	Subd.	Highway No.	Municipality	No. of Tracks	Max. Train Speed	Total No. of Trains	No. of Pedestrians	Sidewalk Width	Max. Vehicle Speed	No. of Vehicles	Anti-Whistling	Xing Protection	Comments
Ont.	CPR	16.82	Galt	Wolfedale Road	Mississauga	3	75	39	-	0	60	10 703	Yes	FLBG	
Ont.	CPR	17.35	Galt	Erindale Road	Mississauga	3	65	39	-	0	60	10 400	Yes	FLBG	
Ont.	CPR	20.12	Galt	Queen Street-Reg. Road No.1	Mississauga	2	60	26	-	0.9	50	7200	Yes	FLBG	
Ont.	CPR	20.67	Galt	Regional Road No. 23	Mississauga	2	65	26	-	0	50	5200	Yes	FLBG	
Ont.	CPR	20.85	Galt	Tannery Street	Mississauga	2	75	32	-	0	50	1501	Yes	FLBG	
Ont.	CPR	21.2	Galt	Ontario Street	Mississauga	2	75	32	-	1.2	50	250	Yes	FLBG	
Ont.	CPR	25.09	Galt	Tenth Line Road	Mississauga	2	75	30	-	0.6	80	45	Yes	FLBG	
Ont.	CPR	30.16	Galt	Fourth Line Road	Oakville	2	75	30	-	0.9	80	500	No	FLBG	
Ont.	CPR	31.75	Galt	Main Street East	Milton	4	75	24	-	0	50	9000	Yes	FLBG	
Ont.	CPR	32.36	Galt	Martin Street	Milton	2	75	32	-	0	50	7000	Yes	FLBG - SGL	
Ont.	CPR	32.81	Galt	Bronte Street	Milton	2	75	32	-	1.5	50	7000	Yes	FLBG - SGL	
Ont.	CN	2.84	Grimsby	Stanley Avenue	Niagara Falls	3	65	18	-	1.2	60	3100	Yes	FLBG	Small number
Ont.	CN	16.85	Grimsby	15th Sideroad	Lincoln	4	65	16	-	0	50	800	No	FLBG	School close by
Ont.	CN	4.39	Grimsby	Dorchester Road	Niagara Falls	2	65	18	-	0.9	50	1800	No	FLBG	Small number
Ont.	CN	17.19	Grimsby	Jordan Road	Lincoln	4	65	16	-	0	50	2500	No	FLBG	Small
Ont.	CN	23.21	Grimsby	Regional Road No. 18	Lincoln	4	65	16	-	0	50	10 200	No	FLBG	Small number
Ont.	CN	23.74	Grimsby	Lincoln Avenue	Lincoln	2	65	16	-	1.8	50	700	No	FLBG	Small number
Ont.	CN	27.42	Grimsby	Regional Road No. 612		3	65	16	-	0	50	3000	Yes	FLBG	Pedestrian gates in place
Ont.	CN	30.39	Grimsby	Oaks Road	Grimsby	2	65	16	-	0.9	50	500	Yes	FLBG	School close by
Ont.	CN	32.17	Grimsby	Winona Road	Stoney Creek		65	16	-	0	60	2500	Yes	FLBG	
Ont.	CN	36.97	Grimsby	Gray's Road	Hamilton	2	65	20	-	0	50	6500	No	FLBG	Clear paths
Ont.	CN	39.04	Grimsby	Woodward Avenue	Hamilton	2	30	20	-	0	50	16 000	Yes	FLBG	
Ont.	CN	39.5	Grimsby	Parkdale Avenue	Hamilton	2	30	20	-	1.5	50	3000	Yes	FLBG	
Ont.	CN	41.57	Grimsby	Gage Avenue	Hamilton	4	30	20	-	0	50	2000	Yes	FLBG	
Ont.	CN	41.82	Grimsby	Lotteridge Avenue	Hamilton	3	30	20	-	0	50	4000	Yes	FLBG	
Ont.	CN	42.08	Grimsby	Sherman Avenue	Hamilton	3	30	20	-	0	50	2000	Yes	FLBG	

Prov.	Railway	Mile	Subd.	Highway No.	Municipality	No. of Tracks	Max. Train Speed	Total No. of Trains	No. of Pedestrians	Sidewalk Width	Max. Vehicle Speed	No. of Vehicles	Anti-Whistling	Xing Protection	Comments
Ont.	CN	42.61	Grimsby	Wentworth Street	Hamilton	4	35	20	-	0	50	2000	Yes	FLBG	
Ont.	CN	42.99	Grimsby	Victoria Avenue	Hamilton	4	35	20	-	0	50	2750	Yes	FLBG	
Ont.	CN	43.14	Grimsby	Wellington Street	Hamilton	6	35	20	-	0	50	2000	Yes	FLBG	
Ont.	CN	63.03	Guelph	King Street-Reg. Road No. 15	Kitchener	2	30	18	-	0	50	19 000	Yes	FLBG	
Ont.	CN	8.8	Halton	Goreway Drive	Brampton	3	50	36	-	0	70	11 820	Yes	FLBG - SGL	
Ont.	CN	10.49	Halton	Torbram Road	Brampton	3	50	36	-	0	60	22 000	Yes	FLBG	
Ont.	CN	15.53	Halton	Mill Street North	Brampton	2	50	46		1.7	50	3650	YES	FLBG	
Ont.	CN	19.17	Halton	Mississauga Road	Brampton	2	70	52	-	1.8	80	1000	No	FLBG	
Ont.	CN	124.09	Kingston	Oxford Avenue	Brockville	2	80	30	-	0.6	50	1200	No	FLBG	
Ont.	**CN**	**124.88**	**Kingston**	**Bartholomew Street**	**Brockville**	**2**	**80**	**30**	**-**	**0**	**50**	**1000**	**No**	**FLBG**	
Ont.	CN	125.06	Kingston	Ormond Street	Brockville	3	80	32	-	0	50	4900	No	FLBG	
Ont.	CN	125.15	Kingston	Park Street	Brockville	3	60	32	-	0	50	3800	No	FLBG	
Ont.	CN	125.65	Kingston	Perth Street	Brockville	3	80	38	-	0	50	7900	No	FLBG	
Ont.	CN	134.07	Kingston	Devil's Road	Front of Yonge	2	95	38	-	0	0	0	No	SRCS	
Ont.	CN	138.21	Kingston	County Road No. 4	Front of Yonge	2	95	40	-	0.6	50	500	No	FLBG	
Ont.	CN	146.7	Kingston	Main Street	Front of Leeds and Lansdowne	2	95	36	-	0.6	50	3500	No	FLBG	
Ont.	CN	180.27	Kingston	Collins Bay Road	Kingston	2	85	36	-	0.6	50	2300	No	FLBG	
Ont.	CN	221.14	Kingston	Moira Street	Belleville	2	70	38	-	0.6	50	2100	Yes	FLBG	
Ont.	CN	221.34	Kingston	Geddis Street	Belleville	2	70	38	-	1.2	50	800	Yes	FLBG	
Ont.	CN	241.59	Kingston	Prince Edward Street	Brighton	2	95	36	-	0.6	50	2700	No	FLBG	
Ont.	CN	260.7	Kingston	Pentecostal Road	Cobourg	2	95	38	-	0		150	No	FLBG	Summer camp, also 131.57 Belleville SLHR
Ont.	CN	265.05	Kingston	Burnham Street	Cobourg	2	95	38	-	0	50	3600	No	FLBG	
Ont.	CN	299.58	Kingston	Wilson Road	Oshawa	2	95	40	-	1.5	50	6000	No	FLBG	

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Ont.	CN	317.22	Kingston	Chesterton Shores Road	Scarborough	2	95	92	-	0	50	200	Yes	FLBG	
Ont.	CN	318.88	Kingston	Beechgrove Road	Scarborough	2	95	92	-	0.6	50	720	Yes	FLBG	
Ont.	CN	319.9	Kingston	Manse Road	Scarborough	2	95	94	-	0.6	50	827	Yes	FLBG	
Ont.	CN	320.41	Kingston	Morningside Drive	Scarborough	2	95	94	-	0	50	5000	Yes	FLBG-SGL	
Ont.	CN	320.65	Kingston	Poplar Road	Scarborough	2	95	94	-	0.6	50	750	Yes	FLBG	
Ont.	CPR	0.23	MacTier	Old Weston Road	Toronto	3	35	18	-	0	50	10 000	Yes	FLBG	
Ont.	CPR	3.17	MacTier	Denison Avenue	York	4	35	18	-	0	60	5000	Yes	FLBG	
Ont.	CPR	4.15	MacTier	Church Street	North York	3	35	18	-	0	50	3900	Yes	FLBG	
Ont.	CPR	4.64	MacTier	Oak Street	North York	2	35	18	-	1.2	50	9600	Yes	FLBG	
Ont.	CN	0.32	Meaford	Innisfil Street	Barrie	2	10	1	-	0	80	3645	No	FLB	
Ont.	CN	98.82	Newmarket	Quetton Street	Rama	4	35	20	-	1.8	50	50	No	FLBG	
Ont.	CPR	127.39	Nipigon	Calvet Street	Thunder Bay	7	70	16	-	0.6	50	300	No		
Ont.	CPR	128.01	Nipigon	St James Street	Thunder Bay	4	70	16	-	0	50	300	No		
Ont.	CPR	128.4	Nipigon	Camelot Street	Thunder Bay	3	10	16	-	0	50	400	No	FLBG	
Ont.	CPR	128.7	Nipigon	Pearl Street	Thunder Bay	2	70	16	-	0	50	300	Yes	FLBG	
Ont.	CPR	5.72	North Toronto	Osler Avenue	Toronto	3	30	40	-	0	50	1500	Yes	FLBG	
Ont.	CPR	4.62	North Toronto	Bartlett Avenue	Toronto	2	50	44	-	0	50	250	No	FLBG	
Ont.	CN	10.59	Oakville	Haig Boulevard	Mississauga	3	75	116	-	0.9	50	1612	Yes	FLBG	
Ont.	CN	10.85	Oakville	Ogden Avenue	Mississauga	3	80	116	125	0.9	80	2881	Yes	FLBG	
Ont.	CN	11.03	Oakville	Alexandra Avenue	Mississauga	3	80	116	304	0.9	100	2053	Yes	FLBG	
Ont.	CN	12.02	Oakville	Revus Avenue	Mississauga	4	60	99	-	0	50	2930	Yes	FLBG	
Ont.	CN	13.11	Oakville	Stavebank Road	Mississauga	3	95	99	-	1.5	50	2106	Yes	FLBG	
Ont.	CN	15.06	Oakville	Lorne Park Road	Mississauga	2	75	132	-	0.6	50	5020	Yes	FLBG	
Ont.	CN	16.09	Oakville	Clarkson Road	Mississauga	4	80	110	209	1.8	50	4700	Yes	FLBG	
Ont.	CN	21.96	Oakville	Kerr Street	Oakville	2	80	82	-	1	50	2000	Yes	FLBG - SGL	
Ont.	CN	23.13	Oakville	4th Line Road	Oakville	3	80	83	-	0	50	7150	Yes	FLBG	
Ont.	CN	26.98	Oakville	Burloak Drive	Oakville	3	80	82	-	0.6	80	4700	Yes	FLBG	
Ont.	CN	28.25	Oakville	Appleby Lane	Burlington	6	80	67	-	0.6	50	9724	Yes	FLBG	

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Ont.	CN	106.34	Redditt	Secondary Highway	Kenora	3	50	11	-	0.9	80	150	No	SRCS	
Ont.	CN	19.85	Strathroy	Caradoc Street	Strathroy	5	80	18	-	0	50	10 000	No	FLBG - SGL	
Ont.	CN	20.04	Strathroy	Metcalfe Street	Strathroy	3	80	18	-	1.8	50	2350	No	FLBG	
Ont.	CN	19.59	Strathroy	Queen Street	Strathroy	3	80	18	-	0.9	50	1000	No	FLBG	
Ont.	CN	20.19	Strathroy	Richmond Street	Strathroy	4	80	18	-	0	50	2000	No	FLBG	
Ont.	CN	20.29	Strathroy	Oxford Street	Strathroy	4	80	18	-	0.6	50	600	No	FLBG	
Ont.	CN	20.39	Strathroy	Victoria Street	Strathroy	3	80	18	-	0.6	50	1500	No	FLBG	
Ont.	CN	0.22	Strathroy	Rideout Street	London	2	90	34	-	0	50	10 000	Yes	FLBG - SGL	
Ont.	CN	0.31	Talbot	Williams Street	London	2	10	2	-	0	50	2100	Yes	FLBG	
Ont.	CPR	3.76	Waterloo	Clark Street	Cambridge	2	35	2	-	0	50	50	No	SRCS	
Ont.	CN	1.59	Weston	Stachan Avenue	Toronto	7	30	36	-	0	50	10 000	Yes	FLBG - SGL	
Ont.	CN	4.99	Weston	Old Weston Road	Toronto	2	35	10	-	0	50	10 000	Yes	FLBG	
Ont.	CPR	109.83	Windsor	McDougal Avenue	Windsor	3	35	44	-	1.2	50	5500	Yes	FLBG	
Ont.	CPR	110.26	Windsor	Dougall Avenue	Windsor	3	35	34	-	0	60	12 886	Yes	FLBG	
Ont.	CN	15.21	York	14th Avenue	Markham	2	50	25	-	0	50	5000	No	FLBG	
Ont.	CN	5.63	York	Centennial Road	Scarborough	2	60	20	-	0.6	50	100	No	FLBG	
B.C.	BN	153.7	New Westminster	Renfrew St.	Vancouver	2	40	15	1000	2	50	26 000	Yes	FLBG	
B.C.	BN	153.2	New Westminster	Rupert St.	Vancouver	2	40	17	500	2	50	26 500	Yes	FLBG	
B.C.	CPR	107.35	Cascade	Harris Road	Pitt Meadows		60	37	400	3	50	15 000	Yes	FLBG	Nearby West Coast Station
B.C.	CPR	106.2	Cascade	Maple-meadows Way	Maple Ridge	2	60	41	200	1.5	50	10 000	No	FLBG	Nearby West Coast Station
B.C.	CN	1.82	Ashcroft	Singh St.	Kamloops	2	50	25	250	0	50	2000	Yes	FLBG	
B.C.	CPR	58.9	Cascade	Hwy#9	Kent	3	55	33	200	1	50	7000	Yes	FLBG	Agassiz - recent fatality
B.C.	BN	153.82	New Westminster	Kaslo St.	Vancouver	3	40	15	200	0	50	1500	Yes	FLBG	
B.C.	CPR	119.92	Shuswap	Pat Rd.	Kamloops	2	60	33	200	1.5	50	800	Yes	FLBG	
B.C.	CPR	112.8	Cascade	Westwood St.	Port Coquitlam		60	36	100	0	50	15 235	Yes	FLBG	Recent trespassing fatality
B.C.	CN	102.85	Yale	Church St.	Langley	2	50	22	100	1.5	50	359	No	FLBG	

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B.C.	CN	102.92	Yale	Glover Rd.	Langley	2	50	22	100	0	50	3000	Yes	FLBG	
Que.	CPR	6.35	Adiron-dack	Saint-André St.	Farnham	3	20	10	200	1.2	50	2200	No	F CSB	Résidentiel
Que.	CPR	6.39	Adiron-dack	Saint-Alphonse St.	Farnham	3	20	10	50	1.5	50	2000	No	FCSB	Résidentiel
Que.	CPR	34.58	Adiron-dack	Principale St.	Delson	2	50	6	-	0	50	3000	No	FCSB	Résidentiel
Que.	CPR	35.96	Adiron-dack	Saint-Pierre St.	Saint-Constant	2	50	6	-	1.5	50	13 900	Yes	FCSB	Résidentiel
Que.	CPR	36.53	Adiron-dack	Petit Rang Saint-Régis S	Saint-Constant	2	50	15	10	0	50	10	Yes	FCSB	Résidentiel, fini en piste cyclable
Que.	CPR	48.81	Adiron-dack	Wilderton Avenue	Montréal	3	20	30	-	1.5	50	10 148	Yes	FCSB	Résidentiel/ Commercial, Gare Canora
Que.	CN	11.75	Bridge	Père Lelièvre Boul.	Vanier	2	75	10	150	1.5	50	13 000	Yes	FCSB	Commercial/ Résidentiel
Que.	CN	12.21	Bridge	Pedestrian Crossing	Vanier	2	75	10	200	2.8			No	FCSB	Résidentiel (de la rue Santerre)
Que.	CN	12.4	Bridge	Pedestrian Crossing	Vanier	2	75	10	990	3.8			Yes	FCSB	Résidentiel (de la rue Bélanger)
Que.	CN	12.59	Bridge	Plante St.	Vanier	2	75	10	-	1.5	40	5300	Yes	FCSB	Résidentiel/ Commercial
Que.	CN	4.89	Deux-Montagnes	Pedestrian Crossing	Mont-Royal	2	65	42	400	13.4			Yes	FCSB	Résidentiel (de la rue Lazard), Gare Mont-Royal
Que.	CN	7.57	Deux-Montagnes	O'Brien St.	Saint-Laurent/Montréal	65	65	44	250	3	50	16 164	Yes	FCSB	Résidentiel, parc public
Que.	CN	17.52	Kingston	Woodland Ave.	Beaconsfield	2	100	51	20	2	50	2700	Yes	FCSB	Résidentiel, Gare Beaurepaire, aussi 12.15 Vaudreuil CFSLH
Que.	CN	19.21	Kingston	Morgan St.	Baie-D'Urfé	2	100	50	100	5.4			Yes	FCSB	Résidentiel, Gare Baie-d'Urfé, aussi 13.8 Vaudreuil CFSLH
Que.	CN	22.07	Kingston	Perrot Boul.	Île-Perrot	2	95	50	-	0	30	2100	Yes	FCSB	Résidentiel, Gare Île-Perrot, aussi 16.62 Vaudreuil CFSLH
Que.	CN	23.57	Kingston	3e Avenue	Terrasse-Vaudreuil	95	50	50	-	0	40	4000	Yes	FCSB	Résidentiel / Commercial côté sud aut. 20, aussi 18.07 Vaudreuil CFSLH
Que.	CN	37.54	Kingston	Sauvé St.	Coteau-Station	95	50	50	-	1	50	2100	No	FCSB	Résidentiel

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Que.	CN	43.48	Kingston	Principale St.	Rivière-Beaudette		95	40	-	1.2	50	2500	No	FCSB	Résidentiel, école du côté sud de la voie ferrée
Que.	CN	43.64	Kingston	Saint-Clair Road	Rivière-Beaudette		95	40	-	1.2	50	500	No	FCSB	Résidentiel, église du côté nord de la voie ferrée
Que.	CPR	7.25	Lachute	Pedestrian Crossing	Montréal	2	40	14	500	3			Yes	FCSB	Commercial/ Résidentiel (boul. Crémazie à ave. Querbes)
Que.	CPR	9.91	Lachute	Gouin Boul.	Montréal	2	45	14	-	1.5	50	9335	Yes	FCSB	Résidentiel, Parc de l'île Perry
Que.	CPR	10.21	Lachute	des Prairies Boul.	Laval	2	45	14	400	1.7	50	8000	Yes	FCSB	Résidentiel, piste cyclable à proximité
Que.	CN	2.94	Montréal	Saint-Ambroise St.	Montréal	4	45	60	70	2	50	6300	Yes	FCSB	Résidentiel, entrepôt du côté du Canal Lachine
Que.	CN	3.6	Montréal	de Courcelles St.	Montréal	6	20	70	1000	4	50	4430	Yes	FCSB	Résidentiel, école du côté nord de la voie ferrée
Que.	CN	51.36	Saint-Hyacinthe	Couillard Road	Mont-Saint-Hilaire		95	33	-	0	50	325	Yes	FCSB	Résidentiel côté nord, Arrêt d'autobus sur route 116 côté sud
Que.	CN	53.55	Saint-Hyacinthe	Ste-Anne St.	Mont-Saint-Hilaire		95	33	130	1.3	50	3000	Yes	FCSB	Résidentiel
Que.	CN	54.34	Saint-Hyacinthe	Montée des Trente	Mont-Saint-Hilaire		95	33	-	0	50	3050	Yes	FCSB	Résidentiel
Que.	CN	59.03	Saint-Hyacinthe	Principale St.	Saint-Basile-le-Grand		33	95	-	1.5	50	5000	Yes	FCSB	Résidentiel
Que.	CN	59.36	Saint-Hyacinthe	Robert St.	Saint-Basile-le-Grand		95	34	100	1.2	50	12 700	Yes	FCSB	Résidentiel/ Commercial
Que.	CN	62.33	Saint-Hyacinthe	de la Rabastalière St.	Saint-Bruno-de-Montarville		95	28	100	1.2	50	10 000	Yes	FCSB	Résidentiel
Que.	CN	69.51	Saint-Hyacinthe	Saint-Georges St.	Le Moyne	4	38	60	200	1	50	8700	Yes	FCSB	Résidentiel/ Commercial
Que.	CPR	0.04	Vaudreuil	Westminster Avenue	Montréal	3	25	26	370	2.4	30	12 660	Yes	FCSB	Résidentiel/ Commercial, Gare Montréal-Ouest; accident le 2 oct. 1997

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Que.	CPR	12.15	Vaudreuil	Woodland Avenue	Beaconsfield	2	70	44	20	2	50	2700	Yes	FCSB	Résidentiel, Gare Beaurepaire, aussi 17.52 Kingston CN
Que.	CPR	13.8	Vaudreuil	Morgan St.	Baie-D'Urfé	2	70	44	100	0			Yes	FCSB	Résidentiel, Gare Baie-d'Urfé, aussi 19.21 Kingston CN
Que.	CPR	16.62	Vaudreuil	Perrot Boul.	Île-Perrot	2	60	44	-	0	30	2100	Yes	FCSB	Résidentiel, Gare Île Perrot, aussi 22.07 Kingston CN
Que.	CPR	18.07	Vaudreuil	3e Avenue	Terrasse-Vaudreuil		75	44	-	0	40	4000	Yes	FCSB	Résidentiel, Commercial côté sud de l'aut. 20, aussi 23.57 Kingston CN
Que.	CPR	4.48	Westmount	Elmurst St.	Montréal	3	15	26	-	0	50	10 000	Yes	FCSB	Résidentiel/ Commercial, Gare Montréal-Ouest
Que.	CPR	29.73	Winchester	Sainte-Anne St.	Saint-Clet	2	60	18	-	1.2	50	3500	Yes	FCSB	Résidentiel
Que.	CPR	41.66	Winchester	Montée Dalhousie	Saint-Télesphore		60	16	-	0.9	50	650	No	FCSB	Résidentiel
Man.	CPR	47.43	Broadview	King Street	Virden	3	45	17	-	1.2	50	4600	No	FLBG	
Man.	CN	0.90	Carberry	Public Roadway	Cornwallis	2	25	3	-	0	50	50	No	SRCS	
Man.	CPR	55.55	Carberry	Main Street-3rd Sreet	Portage la Prairie	3	75	31	-	0	50	363	Yes	FLBG	
Man.	CPR	56.40	Carberry	11th Street	Portage la Prairie	3	75	31	-	0.6	50	50	No		
Man.	CPR	56.93	Carberry	18th Street	Portage la Prairie	2	73	24	-	0	50	200	Yes	FLB	
Man.	CPR	16.02	Estevan	1st Street	Souris	2	20	5	-	1.8	50	680	No	FLB	
Man.	CN	0.05	Gladstone	8th Street	Portage la Prairie	3	60	11	-	1.5	50	2000	No	FLBG	
Man.	CN	36.76	Gladstone	Regent Avenue	Gladstone	2	15	9	-	1.2	40	175	No	SRCS	
Man.	CPR	146.77	Glenboro		Souris	2	35	1	-	0	100	680	No	FLB	
Man.	CPR	50.60	Keewatin	Burton Lake Road	Ellice	2	60	25	-	0	50	361	No	FLBG	
Man.	CPR	51.92	Keewatin	Hartley Avenue	Reynolds	4	60	25	-	0	50	50	No	FLBG	
Man.	CPR	70.38	Keewatin	Public Road	Whitemouth	2	60	25	-	0.9	50	25	No	SRCS	
Man.	CPR	71.94	Keewatin	Main Street	Whitemouth	2	60	25	-	1.2	50	425	No	FLBG	
Man.	CPR	72.50	Keewatin		Whitemouth	4	60	25	-	2.4	100	1500	No	FLBG	

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Man.	CPR	106.59	Keewatin	L-33-11-6EPM	Springfield	2	60	25	-	0.3	50	300	No	FLBG	
Man.	CPR	120.80	Keewatin	Plessis Road	Winnipeg	2	40	25	-	0.6	50	2000	No	FLBG	
Man.	CPR	121.80	Keewatin	Peguis Street	Winnipeg	2	80	18	-	0	50	10	No	SRCS	
Man.	CPR	122.60	Keewatin	Panet Road	Winnipeg	2	40	20	-	2.4	50	5000	Yes	FLBG	
Man.	CPR	122.86	Keewatin	Munroe Street	Winnipeg	2	50	29	-	0	50	500	Yes	FLBG	
Man.	CPR	123.71	Keewatin	Manhattan Avenue	Winnipeg	2	25	20	-	0	60	300	Yes	FLBG	
Man.	CPR	123.92	Keewatin	Talbot Street	Winnipeg	2	25	20	-	0	50	1500	Yes	FLBG	
Man.	CPR	124.02	Keewatin	Grey Street	Winnipeg	2	45	29	-	0	50	500	Yes	FLBG	
Man.	CPR	4.60	La Rivière	Grant Avenue	Winnipeg	2	10	6	200	0	50	5000	No	FLBG	
Man.	BN	3.23	Northern Rly of Man	Ellice Avenue	Winnipeg	2	10	2	-	0	70	18 430	No	FLBG	
Man.	CN	3.89	Rivers	Waverley Street	Winnipeg	3	40	54	50	0	50	14 000	Yes	FLBG	
Man.	CN	5.18	Rivers	Kenaston Boulevard	Winnipeg	3	45	70	-	4.6	50	1000	Yes	FLBG	
Man.	CN	30.56	Rivers		Cartier	3	80	42	-	0.9	100	510	No	FLBG	
Man.	CN	41.80	Rivers	2nd Street	Portage la Prairie	3	80	31	-	0.3	50	100	No	FLBG	
Man.	CN	55.12	Rivers	Main Street	Portage la Prairie	3	20	42	-	0	50	2000	Yes	FLBG	
Man.	CN	55.18	Rivers		Portage la Prairie	3	20	42	-	0	50	300	No	SRCS	
Man.	CN	55.81	Rivers	8th Street	Portage la Prairie	3	80	42	-	1.5	50	1000	Yes	FLBG	
Sask.	CN	118.74	Aberdeen	Main Street	Maymont	2	40	4	-	1.2	50	400	No	FLB	
Sask.	CN	0.04	Blaine Lake	1st Avenue	Prince Albert	2	10	12	-	2.4	50	2500	No	FLB	
Sask.	CN	0.15	Central Butte	McCarthy Boulevard	Regina	2	20	5	-	0	50	2500	Yes	FLBG	
Sask.	CN	0.15	Craik	McCarthy Boulevard	Regina	2	20	1	-	0	50	2500	Yes	FLBG	
Sask.	CPR	50.52	Indian Head	24-18-13	Indian Head No. 156	2	75	20	-	0	50	2700	No	FLBG	
Sask.	CPR	91.89	Indian Head	Park Street	Regina	3	60	24	-	1	50	20 000	Yes	FLBG	
Sask.	CPR	94.62	Indian Head	Elphinstone Street	Regina	2	35	20	-	0	50	12 100	Yes	FLBG	
Sask.	CPR	128.86	Indian Head	28-29-16-25	Moose Jaw No. 161	2	60	23	-	0.9	90	125	No	FLBG	
Sask.	CPR	104.23	Lloydminster	49 Avenue	Lloydminster (Part)	2	30	1	-	0	30	2000	No	FLB	

Prov.	Railway	Mile	Subd.	Highway No.	Municipality	No. of Tracks	Max. Train Speed	Total No. of Trains	No. of Pedestrians	Sidewalk Width	Max. Vehicle Speed	No. of Vehicles	Anti-Whistling	Xing Protection	Comments
Sask.	CPR	1.72	Maple Creek	ns w26-15-14-3	Swift Current No. 137	2	55	27	-	2	80	525	No	FLBG	
Sask.	CPR	2.74	Maple Creek	ns w27-15-14-3	Swift Current No. 137	2	75	20	-	0.6	50	50	No	SRCS	
Sask.	CPR	3.70	Maple Creek	ns w28-15-14-3	Swift Current No. 137	2	75	20	-	0.3	30	50	No	SRCS	
Sask.	CPR	4.90	Maple Creek	ns w29-15-14-3	Swift Current No. 137	2	75	20	-	0	80	10	No	SRCS	
Sask.	CPR	5.80	Maple Creek	ns w30-15-14-3	Swift Current No. 137	1	75	18	-	0	20	1	No	SRCS	
Sask.	CPR	111.40	Prince Albert	14th Street East	Prince Albert	1	8	6	-	0	30	100	No	SRCS	
Sask.	CPR	4.12	Swift Current	E27-16-27	Moose Jaw No. 161	2	60	20	-	0.6	90	75	No	FLBG	
Sask.	CPR	109.09	Swift Current	PTH 4	Swift Current	2	70	22	-	1.2	60	2000	No	FLBG	
Sask.	CPR	109.82	Swift Current	11 Avenue E	Swift Current	3	20	22	-	0	50	4000	Yes	FLBG	
Sask.	CN	90.35	Warman	1st Avenue W	Prince Albert	2	10	2	-	3	50	14 000	No	FLB	
Sask.	CPR	3.37	Wilkie	Fairlight Drive	Corman Park No. 344	3	25	5	-	0	30	10 000	Yes	FLB	
Alta.	CN	39.38	Edson	ns	Wabamun 133a	2	70	25	-	0.5	40	1000	No	FLBG	
Alta.	CN	41.56	Edson	ns w32-52-3-5	Wabamun	2	70	27	-	1.2	70	1200	No	FLBG	
Alta.	CN	42.88	Edson	ns w6-53-4-5	Kapasiwin	2	70	27	-	0.6	50	460	No	FLBG	
Alta.	CN	130	Edson	54 St s 1 Avenue	Edson	4	50	31	-	0.5	50	300	No	FLBG	
Alta.	CN	127.21	Vegreville	129 Avenue E 62 St	Edmonton	3	20	262	1200	1.8	50	8000	Yes	FLBG	
Alta.	CPR	87.01	Aldersyde	Maple Leaf Road	Foothills No. 31	2	45	8	-	0.6	80	450	No	FLBG	
Alta.	CPR	117.59	Bassano	ns w16-21-18-4	Newell County No. 4	1	75	1	-	0.9	20	300	No	FLBG	
Alta.	CPR	2.56	Macleod	50 Avenue SE	Calgary	3	30	338	150	0	50	7400	Yes	FLBG	
Alta.	CPR	3.06	Macleod	58 Avenue SE	Calgary	3	50	336	250	0	50	20 000	Yes	FLBG	
Alta.	CPR	3.31	Macleod	61 Avenue SE	Calgary	3	50	336	200	1.5	50	12 500	Yes	FLBG	
Alta.	CPR	4.63	Macleod	Heritage Drive	Calgary	3	50	336	500	3	50	24 500	Yes	FLBG	

Appendix C – List of Brockville Jury Recommendations, 14 June 2005

These Recommendations are not necessarily in order of priority.

1. To CNR, Transport Canada and the City of Brockville, install pedestrian gates/arms together with chain link fencing at each multiple track grade level rail crossing in the City of Brockville by August 31, 2005. (This will restrict access to train tracks when trains are passing.)

2. To CNR, immediately relocate signal bungalow located in the southwest quadrant at the Bartholomew rail crossing to a location not less than 8.0 metres from the south rail. (To ensure that all sightlines are thereby unobstructed.)

3. To CNR and the City of Brockville, amend Anti-Whisling Bylaw Number 22-99 so as to allow train whistling between the hours of 6:00 A.M. and 8:00 P.M. (To increase situational awareness. These times conform with current permitted times in Kingston, Ontario.)

4. To the City of Brockville, maintain current crossing guard hours at Park Street, Ormond Street and Bartholomew Street crossings for a period of no less than one year after the installation of pedestrian gates. (This will allow a transitional period for pedestrians to become familiar with the pedestrian gates.)

5. To CNR, Transport Canada and the City of Brockville, stop lines to be painted on the sidewalk not less than five metres from the nearest rail or two metres in advance of stop sign, rail crossing sign or other warning signal at each of the five Brockville grade crossings, along with clear and simple signage. (Directing pedestrians where to safely stop and wait.)

6. To CNR, Transport Canada and the City of Brockville, install active, visual and audible second train warning systems at all multiple track crossings within the City of Brockville. (This will increase the awareness of second train hazards.)

7. This jury endorses the extensive community education programs to promote railway safety co-operatively undertaken by the Brockville Police Service and/or the CN Police through initiatives like Operation Lifesaver, Direction 2006, Rail Safety Week, Risk Watch, All Aboard for Safety, and the Very Effective Person Program, and would encourage that Transport Canada actively promote the education model used in Brockville, Ontario to other communities in Ontario.

8. Partnerships between the local school boards, the City of Brockville, Brockville Police Service, and CN Rail Police create strategies for a media blitz at the beginning of the school year to focus on rail and road safety.

9. We recommend that the local school boards in co-operation with the CN Police and the Brockville Police Service, ensure that the Operation Lifesaver or equivalent instruction program is offered at the commencement of each school year to supplement any additional activities undertaken during Rail Safety Week. In addition, the spontaneous visits to high-risk schools continue through the school year. (To reinforce the importance of rail safety in local schools.)

10. We recommend that the "safety walk" program undertaken by the Brockville Police Service be expanded to include all students attending Commonwealth Public School, Prince of Wales Public School and St. Francis Xavier Catholic School, and further, that this "safety walk" program be undertaken in the fall of each school year. (To reinforce the importance of rail safety in local schools.)

11. Schools to inform parents on rail safety through school newsletters and/or other means. (To reinforce the importance of rail safety and encourage parents to provide rail safety education at home.)

12. To CNR, reduce track speed for all trains, freight and passenger to 50 M.P.H. within the City of Brockville until the physical pedestrian safety improvements have been installed and are fully operational. (These reduced speeds will allow more reaction time if an emergency situation should arise.)

13. CNR to incorporate into the Canadian Rail Operating Rules a rule that mandates at least one member of the crew operating the train maintain constant and continual visual observation upon approach to all grade level crossings. (This will allow train operators to monitor vehicle and pedestrians at level crossings.)

14. Transport Canada to hire additional Safety Rail Crossing Inspectors for the Province of Ontario to ensure that every listed crossing with potential for second train accidents undergoes a safety inspection assessment within one year and implement safety upgrades on a priority basis.

15. CNR, Transport Canada and the City of Brockville to establish a Joint Rail Safety Committee mandating that each stakeholder share current and relevant safety information concerning railway grade crossings.

16. The City of Brockville to be designated as the lead authority for implementation of safety recommendations.

17. Give Transport Canada the legal authority to force safety upgrades forward if they are not implemented in a timely fashion. (To ensure and enforce action in an expeditious manner.)

18. The Federal Government of Canada to place a priority on passing the draft Rail Guard Crossing Regulations.

19. CNR, Transport Canada and the City of Brockville to report back to the Chief Coroner for the Province of Ontario within one year of the verdict of this jury with respect to the status of the implementation of the above recommendations.

Appendix D – Glossary

AREMA	American Railway Engineering and Maintenance Association
CN	Canadian National
CPR	Canadian Pacific Railway
CROR	*Canadian Rail Operating Rules*
CTC	Centralized Traffic Control System
DML	double main line
DML-SDG	double main line and siding
FLB&G	flashing lights, bell and gates
ft.	feet
H	height
L	length
m	metres
mph	miles per hour
RRI	road-railway intersection
RSA	*Railway Safety Act*
RTC	rail traffic controller
SGL	interconnected traffic signal
SRCS	standard reflectorized crossing sign
STW	Second-Train Warning
TC	Transport Canada
TSB	Transportation Safety Board of Canada
W	width
°C	degrees Celsius