



Transportation  
Safety Board  
of Canada

Bureau de la sécurité  
des transports  
du Canada



# RAIL TRANSPORTATION SAFETY INVESTIGATION REPORT R23D0011

## CROSSING COLLISION

Réseau de transport métropolitain  
Commuter train EXO 816  
Mile 62.18, Canadian National Railway Company  
St-Hyacinthe Subdivision  
Saint-Bruno-de-Montarville, Quebec  
27 January 2023

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. **This report is not created for use in the context of legal, disciplinary or other proceedings.** See the Terms of use at the end of the report.

### The occurrence

On 27 January 2023, commuter train EXO 816 on the Mont-Saint-Hilaire line 13 of the Réseau de transport métropolitain (RTM), operating as exo, was travelling between Central Station, at Mile 74.25 of the Canadian National Railway Company (CN) St-Hyacinthe Subdivision in Montréal, Quebec, and Mont-Saint-Hilaire Station, Quebec, at Mile 52.4 of the same subdivision. This scheduled train, consisting of lead locomotive EXO 1358 and 6 Bombardier 3000 multilevel passenger cars, was carrying 80 passengers. The train weighed approximately 544 tons and was about 582 feet long.

The train crew consisted of a locomotive engineer (LE) and a conductor.<sup>1</sup> The 2 crew members were qualified for their positions, met fitness and rest requirements, and were familiar with the territory.

The train, travelling east on the north main track, had just left Saint-Bruno Station (Mile 63.8) in Saint-Bruno-de-Montarville, Quebec. At approximately 1758,<sup>2</sup> the train was approaching the public crossing at Seigneurial Boulevard West (Mile 62.18) at a speed of 62 mph (Figure 1).

Figure 1. Map of the occurrence site (Source: Google Maps, with TSB annotations)



Seeing a vehicle stopped on the crossing, the LE sounded the locomotive whistle and, around 1 second later, initiated an emergency brake application. The train struck the vehicle 1 second after the brakes had been applied, at a speed of 60 mph, before coming to a stop approximately 595 m further on. The lead locomotive headlights were on full power, the ditch lights were activated, and the locomotive bell was ringing.<sup>3</sup>

According to information gathered by the TSB during the investigation, the flashing lights on the automatic warning devices activated when the train was approximately ½ mile from the grade crossing. Three seconds later, although the grade crossing's flashing lights were activated, the vehicle stopped on the grade crossing, its front end impinging on the rails of the north main track. A few seconds later, the driver of the vehicle tried to reverse, but the crossing gate had lowered behind her, blocking the way. Several stopped motorists sounded their horns to warn the driver.

<sup>1</sup> The train crew members were employed by Alstom Transport Canada Inc., which was contracted by Réseau de transport métropolitain to operate all of its commuter train lines.

<sup>2</sup> All times are Eastern Standard Time.

<sup>3</sup> With the exception of 2 seconds before the collision with the vehicle, the locomotive whistle had not been sounded while approaching the grade crossing, as required by Rule 14(l) of the *Canadian Rail Operating Rules*, because a whistle ban was in effect at that crossing.

There was no crossing gate in front of the vehicle, which remained stationary. The vehicle's passenger intervened and asked the driver to get out of the vehicle immediately.

Five seconds before the collision, the front passenger-side door opened, and a man got out of the vehicle and took cover behind the grade crossing gate before the vehicle was struck by the train.

After the collision, several motorists came to help the vehicle driver and called emergency services. The vehicle driver was fatally injured.

Rail and road traffic were interrupted for several hours. The 80 passengers remained on board the train until they could be transferred to buses chartered by exo, around 2 hours after the collision. No one on the train was injured, and the train left the site at about 2150.

At the time of the occurrence, it was dark, the sky was overcast and the temperature was  $-5^{\circ}\text{C}$ . Visibility was good in spite of light snow showers. The wind was blowing from the west at about 5 km/h.

### **Site examination**

The collision occurred at a public crossing equipped with automatic warning devices (flashing lights, bells, and gates) that were activated. Although the road was partly snow-covered at the time of the occurrence, it was in good condition. The vehicle was struck at the front right wheel and pushed approximately 20 m toward the northeast side of the grade crossing. The train remained on the rails and the locomotive sustained only minor damage. No fuel was spilled (Figure 2).

Figure 2. Collision site (Source: Google Maps, with TSB annotations)



The track appeared to be undamaged. The automatic warning devices on the median north of the grade crossing were torn off when the vehicle was pushed by the impact.

### Crossing information

The grade crossing is located in the immediate vicinity of the intersection of Route 116<sup>4</sup> and Seigneurial Boulevard West<sup>5</sup>—two high-volume roads. This intersection features a complex array of road and rail signage. The traffic lights and the grade crossing warning devices are interconnected (Figure 3).

<sup>4</sup> Route 116 is a 4-lane provincial highway divided by a median, with a speed limit of 90 km/h. The average annual traffic (from 2021) on the highway is approximately 35 000 vehicles per day in both directions.

<sup>5</sup> Seigneurial Boulevard West is a 4-lane urban boulevard divided by a median, with a speed limit of 50 km/h. The average annual traffic on this boulevard is approximately 10 700 vehicles per day in both directions.

Figure 3. Intersection of Seigneurial Boulevard West and Route 116, looking south from Seigneurial Boulevard West (Source: TSB)



The St-Hyacinthe Subdivision is part of CN's main rail corridor linking Canada from east to west. In the area of the occurrence, the subdivision comprises Class 5 double tracks, which handle approximately 14 exo commuter trains, 12 VIA Rail Canada Inc. passenger trains, and 12 freight trains per day, on either of the 2 main tracks and in both directions. The authorized speed is 95 mph for passenger trains and 65 mph for freight trains.

The grade crossing is equipped with flashing red lights, electronic bells, standard reflective crossing signs, and gates with reflective strips and flashing red lights. There were bright seasonal decorations hanging from the lampposts located on the median of Seigneurial Boulevard West.

The traffic lights at this intersection are interconnected with the detection systems installed on the track. As a result, trains approaching the grade crossing are detected at least 25 seconds before the grade crossing's automatic warning devices are activated. The traffic lights then go into advance pre-emption mode in a specific sequence to clear traffic before the grade crossing warning system is activated. One of the features of this system is that it activates the flashing yellow lights of the advance signs warning motorists on Route 116 to prepare to stop. These signs are located approximately 250 m on either side of the intersection with Seigneurial Boulevard West (Figure 4).

Figure 4. Advance sign installed on Route 116 (Source: Google Maps)



The crossing was compliant with the applicable Transport Canada standards.<sup>6</sup> All of the automatic warning devices were functional at the time of the occurrence. They were activated automatically 27 seconds before the train occupied the grade crossing. The crossing gates began lowering 4 seconds after the automatic warning devices were activated, and they were fully down 9 seconds later.

### Vehicle information

The occurrence vehicle was an automatic transmission front-wheel-drive sedan. It was built in 2017. It had winter tires in good condition on all 4 wheels. The vehicle's airbags, as well as the right-side curtain airbags, deployed during the

occurrence. No mechanical defects were identified.

### Vehicle occupant information

The driver of the vehicle, a woman in her eighties, was with a passenger at the time of the occurrence. She had just left her home, which was less than 4 km from the collision site. The driver was familiar with the route.

### Visual and auditory clutter

When driving a vehicle, drivers must constantly focus on many elements in their visual field. When many elements are close together, there is the possibility of visual clutter, which requires more scanning to be able to fully assess the situation, a phenomenon that increases with age.<sup>7</sup> This can increase the driver's reaction time.

The driver stopped inadvertently on the track when the flashing lights of the grade crossing's automatic warning devices were activated. Several light stimuli were in the driver's near field of vision, including the multiple traffic lights at the intersection, the illuminated decorations on the lampposts, the headlights and position lights of the many other vehicles, and the flashing lights and moving gates of the grade crossing's automatic warning devices.

Before impact, the driver's attention was also drawn to auditory stimuli from the horns of vehicles stopped behind her and the bells of the grade crossing.

In this occurrence, the combination of visual and audio stimuli is likely to have confused the driver, considerably slowing her reaction time and affecting her decision-making ability.

<sup>6</sup> Transport Canada, *Grade Crossings Standards* (January 2019), Part B: Existing Grade Crossings.

<sup>7</sup> G. Ho et al., "Visual search for traffic signs: The effects of clutter, luminance, and aging," *Human Factors*, Volume 43, Issue 2 (2001), pp. 1-2.

## Other collisions at this grade crossing

Between 01 January 2003 and 31 January 2024, 8 collisions with trains at this grade crossing have been reported to the TSB. In 3 of these occurrences, 1 person was fatally injured. In another occurrence, 1 person sustained minor injuries. A review of each of these occurrences showed that there was no common link between them.

Every year since 2016, Transport Canada has compiled and published a list of all grade crossings in Canada, whether under provincial or federal jurisdiction, classified using the GradeX<sup>8</sup> tool according to risk level. According to the most recent risk ranking,<sup>9</sup> the Seigneurial Boulevard West public grade crossing was the 564th highest-risk crossing out of a total of nearly 25 000 listed grade crossings.

## Safety message

Motorists who stop inadvertently on a grade crossing when the automatic warning devices are activated must immediately clear the track to avoid a collision. Even if the crossing gates are down and block the way, they are designed to detach when struck by a vehicle so that the vehicle can clear the track.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 08 May 2024. It was officially released on 14 May 2024.

Visit the Transportation Safety Board of Canada's website ([www.tsb.gc.ca](http://www.tsb.gc.ca)) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

---

<sup>8</sup> GradeX is an internal online analysis tool that compares grade crossings against each other based on the following risk factors:

- number of rail occurrences at the crossing;
- volume of road and rail traffic;
- maximum train and road vehicle speeds;
- number of railway tracks and road lanes;
- urban or rural environment; and
- warning systems in place at the crossing (gates, bells, lights).

<sup>9</sup> Government of Canada Open Data Portal, at <https://open.canada.ca/data/en/dataset/d0f54727-6c0b-4e5a-aa04-ea1463cf9f4c> (last accessed on 23 April 2024).

## TRANSPORTATION SAFETY BOARD OF CANADA

This report is the result of an investigation into a class 4 occurrence. For more information, see the Policy on Occurrence Classification at [www.tsb.gc.ca](http://www.tsb.gc.ca)

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.

### TERMS OF USE

#### Use in legal, disciplinary, or other proceedings

The *Canadian Transportation Accident Investigation and Safety Board Act* states the following:

- 7(3) No finding of the Board shall be construed as assigning fault or determining civil or criminal liability.
- 7(4) The findings of the Board are not binding on the parties to any legal, disciplinary, or other proceedings.

Therefore, the TSB's investigations and the resulting reports are not created for use in the context of legal, disciplinary, or other proceedings.

Notify the TSB in writing if this report is being used or might be used in such proceedings.

#### Non-commercial reproduction

Unless otherwise specified, you may reproduce this investigation report in whole or in part for non-commercial purposes, and in any format, without charge or further permission, provided you do the following:

- Exercise due diligence in ensuring the accuracy of the materials reproduced.
- Indicate the complete title of the materials reproduced and name the Transportation Safety Board of Canada as the author.
- Indicate that the reproduction is a copy of the version available at [URL where original document is available].

#### Commercial reproduction

Unless otherwise specified, you may not reproduce this investigation report, in whole or in part, for the purposes of commercial redistribution without prior written permission from the TSB.

#### Materials under the copyright of another party

Some of the content in this investigation report (notably images on which a source other than the TSB is named) is subject to the copyright of another party and is protected under the Copyright Act and international agreements. For information concerning copyright ownership and restrictions, please contact the TSB.

#### Citation

Transportation Safety Board of Canada, *Rail Transportation Safety Investigation Report R23D0011* (released 14 May 2024).

Transportation Safety Board  
Promenade du Portage, 4th floor  
Gatineau QC K1A 1K8  
819-994-3741; 1-800-387-3557  
[www.tsb.gc.ca](http://www.tsb.gc.ca)  
[communications@tsb.gc.ca](mailto:communications@tsb.gc.ca)

© His Majesty the King in Right of Canada, as represented by the Transportation Safety Board of Canada, 2024

Rail transportation safety investigation report R23D0011

Cat. No. TU3-11/23-0011E-PDF  
ISBN 978-0-660-71602-2

This report is available on the website of the Transportation Safety Board of Canada at [www.tsb.gc.ca](http://www.tsb.gc.ca)

*Le présent rapport est également disponible en français.*