



# National Transportation Safety Board

Washington, D.C. 20594

## Railroad Accident Brief

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**Accident No.:** DCA-06-FR-009  
**Location:** Queens, New York  
**Date:** August 5, 2006  
**Time:** 3:53 p.m. eastern daylight time<sup>1</sup>  
**Railroad:** Long Island Rail Road  
**Property Damage:** None  
**Injuries:** None  
**Fatalities:** 1  
**Type of Accident:** Passenger fatality

### The Accident

On August 5, 2006, about 3:53 p.m., a 5-foot 6-inch, 110-pound, 18-year-old female passenger exiting a Long Island Rail Road (LIRR) commuter train at Woodside station in Queens, New York, fell through a 7 7/8-inch horizontal gap between the rail car and the station platform. (See figure 1.) After falling through the gap to track level beneath the platform, she did not follow instructions from the train conductor and her friends to remain still and wait to be rescued. Instead, the woman crawled under the platform and into the path of an oncoming passenger train. She sustained fatal injuries. Toxicology testing showed that her blood alcohol concentration (BAC) was 0.23 gram percent.<sup>2</sup> The weather at the time of the accident was sunny, clear, and warm.

The passenger was part of a group en route to a concert on Randall's Island in New York City. Some of the group had met earlier and had begun to drink alcohol before arriving at the LIRR Merrick station, where they met with more friends. They planned to travel on the LIRR from Merrick station to Jamaica station and then change trains for Woodside station, where they would take a bus to Randall's Island. At Jamaica station, they boarded train 6113 (car 7548) to Woodside station. According to witnesses, many in the group had brought alcoholic beverages on board and were drinking on the train.

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<sup>1</sup> All times in this brief are eastern daylight time.

<sup>2</sup> New York State motor vehicle law treats a BAC of 0.05 to 0.07 as Driving While Ability Impaired, a BAC of 0.08 or higher as Driving While Intoxicated, and a BAC of 0.18 or higher as Aggravated Driving While Intoxicated.



**Figure 1.** Gap into which passenger fell.

The event recorder from the locomotive showed that train 6113 stopped at the Woodside station alongside platform B on main line track 3 about 3:52 p.m. Platform B is an open, center, high-level platform<sup>3</sup> that allows trains to operate on both sides. (See figure 2.) After the train had stopped, the conductor opened the doors and the passengers began to exit. One passenger said that she noticed the gap between the car and the platform and yelled to the others, “watch the gap.” One of the group of friends traveling together said that as she exited the train, she turned and saw the door begin to close and her friend grab the door with both hands to prevent it from closing. Passengers on the platform yelled to the conductor to reopen the doors. When the conductor reopened the doors, the friend lost her balance and fell forward into the gap and onto the ground beneath the platform.<sup>4</sup>

The conductor saw the passenger fall through the gap and called the LIRR’s Movement Bureau. The conductor requested that the third rail power be turned off on main line track 3 in Woodside and that the police and emergency medical services (EMS) respond. The passenger’s friends and the conductor gathered on the platform above her and told her not to move and that they would get her out. Instead of remaining still, she crawled through the space below the platform toward the opening on the other side and, ultimately, into the path of train 6464 as it

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<sup>3</sup> A high-level platform, which is generally 4 feet higher than the top of a rail, allows a passenger to move directly from a passenger car to a platform without the need for steps.

<sup>4</sup> Two days after the accident, State of New York Metropolitan Transit Authority police, using the accident equipment and positioning the train as close as possible to the accident site, measured the gap from the train to the platform at 7 7/8 inches.

pulled into the station on track 2. Event recorder data for train 6464 indicated that the train pulled into the station about 3:54 p.m. Upon observing the passenger on the track, the engineer of train 6464 said that he placed the train into emergency but was unable to stop in time to avoid hitting the passenger.



**Figure 2.** Center platform under which passenger crawled, crossing into path of oncoming train.

Emergency personnel from the Fire Department City of New York and EMS arrived about 4:05 p.m. The passenger was treated at the scene and then transported by ambulance to Bellevue Hospital in Manhattan, where she died of her injuries.

## **Investigation of Platform Gaps and Equipment on LIRR**

The LIRR has 125 stations, 264 platform edges, and more than 700 miles of track. It carries an average of 288,000 passengers each weekday system wide; 5,700 passengers use the Woodside station each weekday. The LIRR shares track with New York & Atlantic Railway, a freight train operator that serves 53 locations throughout the system.

The space between the station platform edge and the car threshold is provided to accommodate passenger trains, freight trains, and work trains that pass through the station. Through-passenger trains may operate at speeds of up to 80 mph and through-freight trains at speeds up to 45 mph.

The station platform at Woodside is on tangent (straight) track. However, 101 stations on the LIRR are on curved track. Track curvature increases the necessary horizontal gap between a platform and a train to allow rail cars to negotiate through the curve. Further, a soft-suspension-equipped car can sway from side to side and cause a car body to move sideways up to 6 inches.

There were 61 passenger gap incidents on the LIRR system in 2004, 67 passenger gap incidents in 2005, and 25 passenger gap incidents between January and July 2006. The data show an average of 3.4 passenger gap incidents per year at the Woodside station between 2000 and 2006: one incident in 2000; three incidents in 2001; seven incidents in 2002; three incidents in 2003; seven incidents in 2004; no incidents in 2005; and one incident between January and July 2006. Injuries from these incidents at Woodside station included bruises and contusions, cuts or abrasions, and one head injury. The passenger fatality on August 5, 2006, was the first passenger fatality on the LIRR system resulting from a gap incident.

Safety Board staff conducted a survey to determine the gap size at 40 stations and 96 platforms on the LIRR. These stations and platforms were chosen based on their incidence of gap accidents, as well as numbers of passengers. The Federal Railroad Administration (FRA), the New York Public Transportation Safety Board (PTSB), and the LIRR participated in the survey with Board staff. The survey identified stations with horizontal gaps up to 13 3/4 inches on straight track and up to 15 1/2 inches on curved track.

The Association of American Railroads has developed clearance dimensions for the movement of different classes of rail cars. General equipment rail cars (Plate C) cannot exceed a width of 10 feet 8 inches. The LIRR passenger cars used on the day of the accident were 10 feet 6 inches wide; at the threshold plates, where passengers board and exit the cars, they were 10 feet 3/8 inches wide.

The American Railway Engineering and Maintenance-of-Way Association (AREMA) *Manual for Railway Engineering* recommends a minimum horizontal distance of 5 feet 7 inches between track centerline and passenger platform edges (on straight track) to allow trains to travel safely past platforms.<sup>5</sup> The AREMA manual takes into consideration equipment irregularities, track variations, and train dynamics. At the time of the accident, the LIRR passenger station design guidelines set the distance between track centerline and platform edges at 5 feet 8 inches; after the accident, the LIRR changed the guidelines to 5 feet 7 inches. The postaccident track-centerline-to-platform-edge measurement at Woodside station was 5 feet 8 inches at the location of the door where the passenger fell; therefore, the gap size at this location was within tolerances expected.

## **FRA Guidance**

Following this accident, the FRA established a working group within the Rail Safety Advisory Committee to study the passenger train gap issue. As a result of the committee's work, in December 2007, the FRA issued *FRA Approach to Managing Gap Safety*. The FRA's

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<sup>5</sup> The AREMA standard provides an additional 1 1/2 inches of design clearance between the track centerline and a station platform edge for every degree of track curvature to accommodate the safe movement of rail cars through curves with high platforms.

guidelines recommend that a hazard management team establish gap standards for every station using comprehensive hazard analysis and then monitor and update the standards as the situation at each station changes. The FRA provided a hazard analysis process, worksheets, and instructions for managing gaps at high-level platforms. The FRA also identified four hazard mitigation strategies: (1) hardware and technology, (2) policies and procedures, (3) passenger outreach, and (4) employee training. Hardware and technology mitigation strategies may include lighting, moveable platforms on curved track, platform edge extenders, foldup edges, and rubber fingers that extend from the platform to narrow the gap. Motorized threshold plates may be attached to a passenger car and extended when a train stops at a station. Policies and procedure changes may include restricting the number of doors that open on an outside curve and having station attendants monitor passengers entering and exiting trains to identify problem locations.

The Rail Safety Improvement Act of 2008 requires the U.S. Department of Transportation, within 2 years after enactment, to complete a study that determines the most safe, efficient, and cost-effective way to improve the safety of rail passenger station platform gaps and to minimize the safety risks associated with such gaps for railroad passengers and employees.

## **New York State Public Transportation Safety Board**

On October 11, 2006, the PTSB<sup>6</sup> recommended that the LIRR augment its efforts to reduce the number of gap incidents by displaying pictographs in conspicuous locations and adding stencil warnings on platform edges. On April 18, 2007, a special study titled “Managing the Risk of Station Platform Gaps” was published by the PTSB. In that study, the PTSB reviewed conditions on the LIRR and the Metro-North Railroad, analyzed gap issues, and made recommendations.

The PTSB report stated

In looking for statistical patterns to explain and understand these events, we learn that gap-related incidents appear to be closely related to the volume of passengers at certain locations. Major terminals and transfer points, as defined by an approximation of passenger usage, are among the most frequent locations for gap incidents, especially on the LIRR. The distribution of these incidents by age and gender is unremarkable and little can be derived from a review of current literature. Current data does [sic] not show a clear connection between the width of the gap and accident frequency.... One factor that is repeatedly evident is that the majority of the incidents involve distraction of the passenger or rushing, running, jumping, or pushing.

The PTSB noted that the LIRR had a greater number of gap-related incidents than the Metro-North Railroad and attributed this to three factors: (1) the LIRR operates considerably more passenger trips than the Metro-North Railroad operates; (2) each railroad has different equipment and thus different station platform offset standards, creating a 3-inch greater nominal

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<sup>6</sup> The PTSB is part of the New York State Department of Transportation. The PTSB is responsible for the safety oversight of all public transportation systems operating in New York State that receive State transit operating assistance.

gap in most locations on the LIRR; and (3) the operating structures of the two railroads are different in significant ways. Also, the LIRR has more passengers and a more complex track-and-platform system.

The PTSB report notes that the passage of a train can induce a dynamic deflection in the track structure up to 1/2 inch. Over time, the alignment of the track can become permanently deformed, and increase or decrease the gap. The report noted that wheel tracking characteristics and suspension variations (such as bearings, center bolster wear, and soft suspensions for passenger trains that allow body roll of 8°) can affect the horizontal position of a rail car by up to 6 inches, although 3 inches is typical.

The PTSB report concluded

In adding the worst case scenario of wear in the rail car components, asymmetric car loadings, and maximum suspension travel in combination with maximum allowable horizontal and vertical track defects, the total variability in the gap would appear to add up to 7 1/2 inches. However ... the dimensions provided are the extreme limits of the working tolerances for each component and the apparent 7 1/2 inches of total variability can only be achieved if every component is at its extreme limit and all variability is acting in the same direction simultaneously. While it is still theoretically possible to strike the platform at the current industry standard of 5 feet 7 inches, there is a distribution to the variability in each component and some components will cancel out others.

As part of its study, the PTSB analyzed each carrier's gap-related accident reporting program and found that eight locations accounted for about half of each year's incidents. The number of passengers during rush hour, not the size of the gap, was the controlling factor.

The PTSB recommended the following three courses of action:

- Make the public more aware of the problem by using signs, visual cues, pamphlets, and announcements and by soliciting customer input.
- Strengthen inspection and accident investigation protocols by periodically inspecting and measuring factors that affect the gaps, by improving data collection about gap events, and by periodically evaluating the effectiveness of the program to make the public more aware of the gaps.
- Develop an engineering and operational plan that minimizes gap variability, and review practices to better manage passenger risk (such as improving crowd control).

## **LIRR Response to Accident**

According to the PTSB, the implementation of its recommendations by the LIRR was immediate and thorough. A public awareness campaign was initiated to include greater use of 5-inch diamond-shaped signs on each door (at least three interior and three exterior decals on each car). Additional warnings were placed on platform edges and in bilingual (Spanish and

English) brochures. A Web-based gap awareness video is available in many languages, and the LIRR website contains safety information and tips addressing many potential hazards of riding a train. “Watch the Gap” audio announcements are being made more frequently both inside and outside trains at more stations, and stickers are given to children that state, “I can step over the Gap.” A special program was initiated at the LIRR’s Shea Stadium station: “Watch the Gap” flyers were placed on train seats on game days, and announcements were broadcast inside the stadium and displayed on the scoreboard. The LIRR held a community forum to solicit input on a proposal to extend the length of the platform at one station and thereby eliminate stopping trains on the curve at the station.

The LIRR also conducted a systemwide measurement and analysis of every station and platform edge. The LIRR identified 154 door locations with gaps greater than 10 inches and reports that it has reduced the size of the gaps at 137 of those locations to date. In May 2008, the LIRR issued “Project Plan Book for 2008–2012: Gap Mitigation Plan.” The LIRR states that the book was prepared “to align the Departments on the LIRR with the initiatives that the Engineering Department will implement over the next four years to mitigate the gap.” There are several initiatives for this 4-year period, including the following: modifying existing station platforms to address the most serious gaps; installing 1-inch edge boards on platforms, which will allow the LIRR to revise the 5-foot-8-inch track-centerline-to-platform-edge to a 5-foot-7-inch standard; and installing 2-inch threshold plates at the doorway of passenger cars to reduce the gap by 2 inches.<sup>7</sup>

Finally, an LIRR special subcommittee and a hazard analysis consultant now review gap incidents. A revised accident report form was created to collect more focused data, including information about passenger flow, customer behavior, and platform loading conditions. The loading conditions are reviewed to determine the effect of platform and vestibule crowding on gap incidents. Quarterly reports are prepared to review existing mitigation programs and to help target future actions.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the passenger fatality on August 5, 2006, at the Long Island Rail Road Woodside station in Queens, New York, was the passenger falling through a gap between the rail car and the platform while attempting to disembark the train, not following instructions from the train conductor to remain still until help arrived, and then crawling under the platform and into the path of a moving train on the opposite side of the platform. Contributing to the accident was the passenger’s alcohol-impaired condition.

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<sup>7</sup> These actions will reduce the gap size at Woodside station by 3 inches.

# **BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

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