



National Transportation Safety Board

Washington, D.C. 20594

Railroad Accident Brief

Accident No.: DCA-11-FR-001
Location: Kelso, Washington (Longview Yard)
Date: March 23, 2011
Time: 4:25 p.m., Pacific daylight time¹
Railroad/Property: Burlington Northern Santa Fe Railway
Property Damage: \$32,000
Injuries: 1 serious
Fatalities: 3
Type of Accident: Private grade crossing

The Accident

On March 23, 2011, at 4:25 p.m., a northbound Burlington Northern Santa Fe Railway (BNSF) freight train, G-CRKINB9-16H (BNSF 7363), collided with a 2008 Chevrolet Suburban departing the Longview Junction yard at a private grade crossing in Kelso, Washington. A Coach America driver was operating the Suburban. (Coach America was under contract to BNSF to transport operating crews.) A BNSF conductor, a student conductor, and a locomotive engineer were passengers in the Suburban. The driver, the student conductor, and the locomotive engineer were fatally injured. The conductor sustained serious injuries and was flown to Oregon Health & Science University Hospital in Portland, Oregon. The BNSF train crew was not injured. The Suburban was totaled at a cost of \$30,000, and the lead BNSF train locomotive received \$2,000 in damage. At the time of the accident, the weather was partly cloudy with a temperature of about 59° F.

Accident Sequence

The Coach America driver went on duty at 3:30 p.m. on the day of the accident. He worked out of his home in Castle Rock, Washington, about 15 miles north of the accident location. He drove to Longview Junction yard for the first assignment of his shift. He picked up the locomotive engineer, the conductor, and the student conductor about 4:15 p.m. at the south end of the Longview Junction yard.

The Coach America driver then drove north, parallel to the yard tracks and main tracks that were on his right. The yard tracks merged into one track called the yard lead. At the private grade crossing there were three tracks from west to east: the yard lead, main track #1, and main

¹ All times in this brief are Pacific daylight time.

track #2. Main track #1 had railroad cars placed on it. The railroad cars obscured the view of main track #2, south of the private grade crossing that ran parallel to main track #1. (See figure 1.) When the driver reached the “T” intersection with the private grade crossing road, he hesitated slightly at the stop sign and railroad warning crossbuck sign without stopping, swung wide to the left and then turned right onto the first set of tracks, the yard lead. (See figure 2.) He continued driving across main track #1,² which was occupied by the stationary railroad cars that were 34 feet south of the private grade crossing. He then continued across main track #2 at an estimated 11 mph and was directly on the track when the northbound freight train collided with the passenger side of the Suburban at 47 mph.

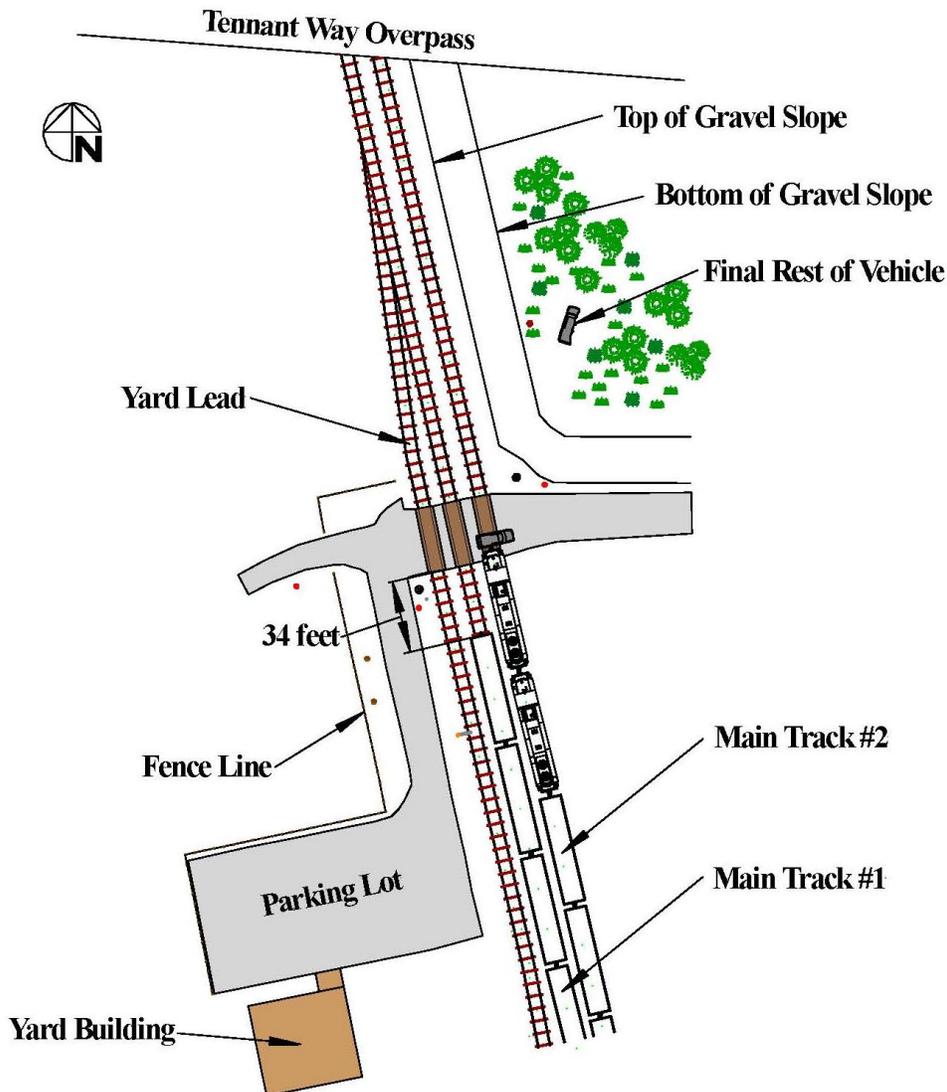


Figure 1. Diagram of accident location.

² This information was gathered from a video recorder on the front of a locomotive (BNSF 7634) that crews had been operating in the yard and was pointed north toward the accident location.



Figure 2. Stop sign and railroad warning crossbuck sign as seen by approaching accident driver.

The Suburban was thrown to the right of the northbound freight train (northeast side of the tracks) and landed about 50 feet from the private grade crossing. According to the Kelso Police Department report, all of the occupants were wearing their seatbelts.

Train Information

The northbound freight train that collided with the Suburban had two locomotives on the head end and one at the rear. The train consist contained 106 cars loaded with soybeans. The train weighed 15,126 tons and was 6,505 feet long. The train was equipped with a data recorder and a forward facing video recorder. The information from the data recorder and from the images of the video recorder was compared with the interviews of the engineer and the conductor on the train. There were no discrepancies.

The engineer stated that he saw the vehicle only briefly and put the train into emergency braking just after passing the private grade crossing. According to the event recorder, the train stopped about 2,472 feet after the engineer applied emergency braking. The train was traveling 47 mph. Postaccident inspections and testing confirmed that the braking systems were working properly.

The engineer was not required to and did not sound the horn for the private grade crossing. However, he did ring the bell on the locomotive (confirmed by the event recorder) to warn train crews that might have been working on the stationary railroad cars that had been placed on main track #1.

Vehicle Information

The highway vehicle was a 2008 Chevrolet Suburban. It was not equipped with a dedicated event data recorder. However, it was equipped with an airbag control module (ACM) and a rollover sensor (ROS). The ACM is an electronic instrument that “senses” a crash and “decides” whether the airbags should be deployed. The module, which uses an internal accelerometer to monitor sudden speed changes, also records data about the collision. These data included precollision data, such as vehicle speed, throttle position, engine revolutions per minute, and brake position, as well as postcollision longitudinal velocity change information, driver’s seatbelt use information, and general airbag deployment command parameters. Coach America hired a consultant to download the data. National Transportation Safety Board (NTSB) investigators obtained the electronic data, which contained about 2.5 seconds of precollision data from the Suburban.

The data were stored at 0.5-second intervals. The Suburban was traveling 6 mph at 2.5 seconds before impact, 6 mph at 2.0 seconds, 7 mph at 1.5 seconds, 7 mph at 1.0 second, and 9 mph at 0.5 second. About 0.5 second before impact, these data indicated that the driver had increased the throttle application from 38 to 100 percent. Using the recorded speeds and the increase in throttle application, NTSB investigators estimated the Suburban was traveling about 11 mph at the time of impact.

Sight-Distance Observations

NTSB investigators made postaccident sight-distance observations using the data from the locomotive event recorder and the data recovered from the Suburban. Because the Suburban captured the data at 0.5-second intervals, the movements of the train and the Suburban were documented every 0.5 second. The following table was developed from the measurements taken during these observations.

Table 1. Time and distance calculations for train and Suburban.

Time (seconds)	Train Speed (mph)	Train Distance to Impact (feet)	Suburban Speed (mph)	Suburban Distance to Impact (feet)
0.0 (Impact)	47.0	0.0	11.0	0.0
-0.5	47.0	-34.5	9.0	-6.6
-1.0	47.0	-68.9	7.0	-11.7
-1.5	47.0	-103.4	7.0	-16.9
-2.0	47.0	-137.9	6.0	-21.3
-2.5	47.0	-206.8	6.0	-25.7

At -2.5 seconds, the locomotive engineer on board the train could not see the Suburban, and the driver of the Suburban could not see the approaching train. At -2.0 seconds and about 138 feet ahead of the train, the front of the Suburban becomes just visible to the locomotive engineer, but the train is still not visible to the Suburban driver. Finally, at -1.0 second before impact, the driver of the Suburban could have seen³ the lead locomotive of the approaching train. Because main track #1 had railroad cars standing 34 feet south of the private grade crossing, the Suburban driver had no appreciable view of the approaching train.

Sight-Distance Standards

The American Association of State Highway and Transportation Officials provides a publication, "A Policy on Geometric Design of Highways and Streets,"⁴ for determining sight distances at passive grade crossings with no obstructions. In this case, the following two events from the policy were used before calculating the appropriate or necessary sight distances.

1. The vehicle operator can observe the approaching train in a sight line that will allow the vehicle to pass through the grade crossing prior to the train's arrival at the crossing. And,
2. The vehicle operator can observe the approaching train in a sight line that will permit the vehicle to be brought to a stop prior to encroachment in the crossing area.

For this accident, two assumptions were applied: (1) the vehicle speed was 6 mph and (2) the train speed was 47 mph. With these assumptions, the sight distance required for a moving vehicle to safely cross or stop at the railroad tracks with no obstruction was calculated to be 756 feet.

A second calculation was performed with the following assumptions: (1) the vehicle was stopped before crossing the tracks and (2) the train was approaching at 47 mph. With these assumptions, the sight distance required for a vehicle departing from a stopped position to cross the railroad tracks with no obstruction was calculated to be 902 feet.

In either case, the vehicle driver would have an unobstructed view of an approaching train only if there were no railroad equipment placed on main track #1 within the distances calculated.

Railroad Operations

The railroad crews were governed by the General Code of Operating Rules (GCOR), sixth edition, dated April 7, 2010; the BNSF Northwest Division Timetable No. 4, dated Wednesday, June 17, 2009; and the BNSF System Special Instructions dated March 1, 2011.

³ During the sight-distance observations, NTSB investigators were intentionally looking for the train. It cannot be determined if the Suburban driver looked toward the approaching train on the day of the accident.

⁴ *A Policy on Geometric Design of Highways and Streets*, 5th edition (Washington, DC: American Association of State Highway and Transportation Officials, 2004), p. 733.

The two main tracks were part of a centralized traffic control system, and the trains were authorized by signal indication controlled by a train dispatcher at the Network Operations Center in Fort Worth, Texas. The maximum speeds for trains at the accident site were 75 mph for the Talgo⁵-type passenger trains, 70 mph for other passenger trains, and 50 mph for freight trains.

The following is the requirement for sounding the whistle at public (not private) grade crossings.

5.8.2 Sounding Whistle

... (7) ---- ---- O ----⁶ When approaching **public** highway-rail grade crossings at grade with the engine in front.... [Emphasis added.]

The use of the qualifier “public” in the rule is intentional, and operating crews understand this rule does not apply to private grade crossings. Further, the railroad normally places a sign 0.25 mile prior to a public grade crossing to alert the crews to sound the whistle. These signs are not displayed for private grade crossings. There was no such sign for the Longview Junction yard private grade crossing. Concerning the railroad equipment that was left on main track #1, the GCOR specified the following:

6.32.4 Clear of Crossings and Signal Circuits

Leave railcars, engines, or equipment clear of road crossings and crossing signal circuits.

When practical, avoid leaving railcars, engines, or equipment standing closer than 250 feet from the road crossing when there is an adjacent track.

There are no guidelines defining what the phrase “when practical” means, which leaves operating crews to interpret the meaning at their discretion.

Crew Transport Operations

Coach America had been contracted to transport crews to and from railroad on- and off-duty locations between Portland, Oregon, or Vancouver, Washington, and Seattle, Washington.

The contract between Coach America and the BNSF also specifically addressed grade crossings within railroad yards. The instructions provided to drivers at yard crossings follow:

⁵ The Talgo-type passenger trains have a passive tilt mechanism that allows the passenger cars to operate at higher speeds.

⁶ These symbols designated the use of the whistle. The ---- means sound the whistle for a given duration and the O means sound the whistle proportionally less than the ----. This is often referred to as “two longs, a short and a long” when describing the sound.

Within yard facilities, driver shall stop not less than 15 feet from the nearest rail of any crossing, and shall not proceed until the driver first looks in each direction and in addition, listens to ascertain whether a train or other on-track equipment is approaching the crossing and determines that he or she can safely proceed. This requirement does not take precedence over traffic control devices, for example, stop signs that require a vehicle to be stopped before proceeding over a crossing.

As part of the agreement with the BNSF, Coach America required its drivers to adhere to Operation Lifesaver, Inc.'s defensive driving rules when crossing railroad grade crossings.

The following is an excerpt from the Operation Lifesaver, Inc. materials that were applicable at the time of this accident.

Proper Procedure for a Vehicle Crossing a Highway Rail Grade Crossing Safely:

1. Know the crossing and evaluate it.
2. Slow down, tap your brakes, and activate the 4-way hazard warning lights. This alerts motorists behind you of your intent to stop.
3. Stay in the right lane or right side of roadway.
4. STOP no closer than 15 feet and no farther than 50 feet from the tracks.
5. Keep your foot on the service brake so you can't move or be shoved into the path of a train. Open the driver's window and the service door.
6. Turn off radios and noisy equipment. Do not turn them back on until you have completed the crossing and are away from the track.
7. LOOK AND LISTEN
8. Start crossing when you are sure you do not see or hear a train or a warning whistle. Before moving, close the driver's window and the service door.

Driver Information

Coach America hired the 60-year-old driver of the Suburban on November 11, 2009. He had no other employment other than Coach America and worked out of his home in Castle Rock, Washington. He would pick up or drop off crews anywhere between Portland, Oregon, and Seattle, Washington.

The driver's work records indicated that Longview Junction yard was part of his regular territory. He had a current medical certificate. He also possessed a commercial driver's license. He had four citations on his record: one accident in a private vehicle, one overweight ticket (this would be applicable while driving a truck), and two speeding tickets. He had received the last citation in 2009.

The driver's hours of duty records revealed no exceptions in working excess hours or workdays, in accordance with Title 49 *Code of Federal Regulations* 395.5, "Maximum Driving

Time For Passenger-Carrying Vehicles.” In the 5 days before the accident, the driver’s work records from March 18 through March 20, 2011, show the driver had been off duty for 62.5 hours. Then on March 21, after 2 days off, he reported for duty at 7:30 a.m. He worked 2 hours 45 minutes before going off duty at 10:15 a.m. On March 22, after resting for 35 hours, the driver went on duty at 9:15 p.m.; he worked for 6 hours 15 minutes and went off duty at home at 3:30 a.m. on March 23.

In the afternoon of March 23, the driver was called at home at 3:03 p.m. and told to go to Longview Junction yard to pick up a train crew. The driver had been off work the required time according to the Federal hours of service regulations when he picked up the train crew from BNSF train M-EVELVJ4-22A at 4:15 p.m. in the yard.

Accident History at Longview Junction Yard Private Grade Crossing

On December 8, 1977, a freight train moving at 48 mph on main track #2 struck a vehicle when the driver failed to stop for stop signs and posted crossbuck signs. There was \$2,500 worth of damage to the vehicle and minor damage to the train. The driver of the vehicle was injured.⁷

On July 15, 1995, a freight train moving at 40 mph on main track #2 struck a vehicle at the accident crossing. The driver had stopped before proceeding over the tracks, but the view of the approaching train was obstructed by railroad equipment on a parallel track. There was \$1,000 worth of damage to the vehicle and minor damage to the train. The driver of the vehicle was injured.⁸

Government Oversight

In May 2008, the Federal Railroad Administration (FRA) published a report titled *Private Highway-Rail Grade Crossing Safety Research and Inquiry*. The following is an excerpt that describes the history of safety efforts concerning private grade crossings:

On July 13, 1993, FRA hosted a public meeting to initiate a national, industry wide discussion on private highway-rail grade crossing safety.

In 1994, through the 1994 USDOT [U.S. Department of Transportation] Rail-Highway Crossing Safety Action Plan, the USDOT further committed to address the safety of private highway-rail grade crossings by proposing to “develop and provide national, minimum safety standards for private crossings, and to eliminate the potential impediment to high speed rail operations posed by private crossings.”

⁷ Information obtained from website of the Federal Railroad Administration, Office of Safety Analysis <<http://safetydata.fra.dot.gov/officeofsafety/publicsite/Query/gxrrpt.aspx>> (accessed February 29, 2012).

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In 1998, the National Traffic [Transportation] Safety Board (NTSB) publicly commented on the need for improved safety at private crossings through a study entitled *Safety at Passive Grade Crossings. Volume 1: Analysis* (No. SS-98-02). The report highlighted the need to improve safety at highway-rail grade crossings and recommended that the USDOT, in conjunction with the States, determine governmental oversight responsibility for safety at private highway-rail grade crossings.

In 1999, the NTSB issued a report entitled *Collision of Northern Indiana Commuter Transportation District 102 with a Tractor-Trailer, Portage Indiana* (No. RAR-99-03) in which reiterated the need for improved safety at private crossings. NTSB recommended that the USDOT “eliminate any difference between private and public highway-rail grade crossings with regard to providing funding for, or requiring the implementation of, safety improvements.”^{9]}

In 2004, the USDOT committed to leading an effort to define responsibility for safety at private highway-rail grade crossings in the 2004 USDOT Highway-Rail Crossing Safety and Trespass Prevention Action Plan. As stated in the 2004 Action Plan, the USDOT made a commitment to determine minimum criteria for signage, identify safety needs at private highway-rail grade crossings, and expedite efforts to develop policy considerations for future FRA actions.

On July 27, 2006, FRA posted a notice in the *Federal Register*, stating its intent to conduct a safety inquiry into private highway-rail grade crossings. The effort included a series of public meetings throughout the United States in cooperation with State agencies to facilitate an open, industry wide dialogue into issues related to private crossing practices, responsibility, and safety. In addition, FRA opened a public docket on these issues for interested parties to submit written comments for public review and consideration.

In 2007, FHWA [Federal Highway Administration] released an updated *Railroad-Highway Grade Crossing Handbook [Revised Second Edition, 2007]*, describing certain safety concerns regarding private highway-rail grade crossings.

In 2009, the FRA published a report¹⁰ that identified private grade crossings and those states that had varying levels of regulations concerning those crossings. The following is an excerpt from that report:

Private highway-rail grade crossings are neither open to use by the public nor are they maintained by public authority. Typical types of private crossings are as follows:

⁹ In August 2000, the NTSB classified this recommendation as “Open—Acceptable Response” in recognition of the continued interest in and activities of the FRA.

¹⁰ *Compilation of State Laws and Regulations Affecting Highway-Rail Grade Crossings*, 5th edition (Washington, DC: U.S. Department of Transportation, Federal Railroad Administration, 1990).

- Farm crossings that provide access between tracts of land lying on both sides of the railroad.
- Industrial plant crossings that provide access between plant facilities on both sides of the railroad.
- Residential access crossings over which the occupants and their invitees reach private residences from another road, frequently a public road paralleling and adjacent to the railroad right-of-way.
- Temporary crossings established for the duration of a private construction project or other seasonal activity.

In some instances, changes in land use policy have resulted in expanded use of such private crossings to the extent that they have become public crossings as evidenced by frequent use of the general public. This occurs whether or not any public agency accepted responsibility for maintenance or control of the use of the traveled way over the crossing. There are an estimated 83,129 private highway-rail crossings on the U.S. rail system (Source: *United States Department of Transportation, Federal Railroad Administration Grade Crossing Inventory Records*). Casualties and property losses resulting from accidents at these crossings remain a continual concern. At present, authority for closure or treatment of private crossings does not exist in all states. Those that do are listed in this chapter. Usually, there exists some kind of an agreement between the land owner and the railroad that governs the use of the private crossing.

The 22 states that have a limited amount of regulation authority covering private grade crossings are California, Connecticut, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Utah, and Virginia.

According to the *Compilation of State Laws and Regulations Affecting Highway-Rail Grade Crossings* (page 11-10), the state of Washington had “No applicable statute related to this topic [private grade crossings].”

Preaccident Safety Concerns

The BNSF has a process called the Safety Issue Resolution Process (SIRP) through which employees can submit identified safety issues or potential hazards. In accordance with the process, an employee submits an SIRP Safety Report, the report is processed, and a response is provided and documented.

On March 1, 2010, an employee filed an SIRP Safety Report stating that there was “... a need for crossing warning devices at road crossing MP 100.2.” This was the accident crossing location. The report was processed, and on March 18, 2010, the employee received a verbal response that was documented. The BNSF explained to the employee that the crossbuck and the

stop signs posted at the private grade crossing met the standard requirement for such a crossing. The issue was shown as closed.

In 2008 and 2009, the Union Pacific Railroad (UP), which operates trains by agreement on the BNSF railroad at the accident crossing, issued a notice to its employees explaining that railroad equipment should be left 400 feet south of the Longview Junction yard crossing to allow adequate visibility for vehicular traffic approaching the crossing. In 2009, trees were removed along the tracks, and the UP cancelled the notice and reverted to the GCOR requirement of 250 feet, when practical, when leaving standing equipment near the Longview Junction yard crossing.

Postaccident Actions

Coach America

At the BNSF's request, Coach America implemented a safety improvement plan that contained the following actions:

- Conduct a safety briefing with all of its drivers to reinforce crossing safety—with an emphasis on private, unprotected crossings.
- Hold tailgate meetings at Longview Junction yard to specifically address the risks at private highway-rail grade crossings.
- Perform ride-along[s] with drivers by location and regional managers.
- Increase the driver supervision in the Longview area and perform additional observational testing of the drivers.
- Complete the installation of Drive Cam cameras in all remaining vehicles.
- Have all drivers complete the supplemental Operation Lifesaver Training.
- Complete the audit of the entire driver files to ensure drivers meet contractual requirements.

Coach America also issued a new policy for railroad crossings that are similar to the Longview Junction yard crossing. This new policy states the following:

In the case where the visibility at a railroad crossing is impaired in ANY way such that the driver cannot determine a clear path to cross, the driver must contact the yardmaster or trainmaster responsible for train operations at the crossing and determine if the path is clear to cross. If such contact cannot be made, an alternate route must be taken which provides a clear crossing.

BNSF

The first step taken by the BNSF was to restrict the routes approaching the crossing. In this accident, the Suburban was traveling parallel to the tracks and then made a right hand turn onto the crossing. This configuration allowed drivers to observe southbound trains but hindered

their ability to see the northbound train traffic. With the crossing perpendicular to the tracks, drivers can more easily look to the left and right for approaching trains before crossing. (See figure 3.)



Figure 3. First improvement to grade crossing was to block entry from road parallel to tracks with cement barricades.

The BNSF also put more emphasis on leaving railroad cars a minimum of 250 feet from grade crossings, especially when there is another track involved and the equipment would obscure the visibility of approaching trains from drivers intending to cross the tracks.

In December 2011, the BNSF completed the installation of an active warning system for the private grade crossing. There are now warning lights, bells, and gates to alert vehicle traffic to approaching trains. (See figure 4.)



Figure 4. Grade crossing now equipped with warning gates and lights.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Suburban driver to stop his vehicle before he drove onto the tracks to ensure there were no approaching trains. Contributing to the accident was the placement of railroad equipment too close to the crossing, obscuring the visibility of approaching trains.

Adopted: March 29, 2012