

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Corrected copy

ISSUED: August 29, 1984

 Forwarded to:

Mr. William H. Dempsey
 President
 Association of American Railroads
 1920 L Street, N.W.
 Washington, D.C. 20036

SAFETY RECOMMENDATION(S)

R-84-35 and -36

About 1:10 a.m., e.d.t., on August 25, 1983, northbound National Railroad Passenger Corporation (Amtrak) train No. 88, the Silver Meteor, struck an S. L. Balogh Trucking Company, Inc., tractor lowboy semitrailer combination truck that had become lodged on a grade crossing of the single main track of the Seaboard System Railroad in Rowland, North Carolina. The 2 locomotive units and 2 cars of the 18-car consist of the train were derailed. The truck was damaged substantially and its cargo destroyed. Two of the 365 passengers on the train were treated at the scene, and 15 were taken to local hospitals; 1 passenger was admitted, and the others were treated and released. Six of the 22 train attendants also were treated and released. Amtrak reports that since the accident an additional six passengers have claimed injury. The truckdriver was not injured. There was no fire. Property damage was estimated to be about \$623,399. ^{1/}

The profile of the crossing pavement was made up of two vertical curves connected by a 35-foot-wide camelback hump that included the grade crossing surface; the highest elevation was at the west rail of the track. The elevation of the uphill highway gradient on the west side of the crossing over the 40-foot distance from South Railroad Street to the west rail increased 1.06 feet (2.65 percent grade); 1.01 feet of the elevation increase is developed over the last 20 feet traveled to the west rail (5 percent grade). The elevation of the downhill gradient east of the west rail decreased 0.47 foot over the first 15 feet traveled (3.13 percent grade); a downhill gradient averaging about 1 percent continued easterly. The 35-foot-wide elevated hump developed a 207.30-foot radius vertical curve profile in the roadway at the crossing.

Section 1.2, "Profile and Alignment of Crossings and Approaches," of the "Manual for Railway Engineering" published by the American Railway Engineering Association (AREA) states, "It is desirable that the surface of the highway be not more than 3 in. higher nor 6 in. lower than the top of nearest rail at a point 30 ft. from the rail, measured at right angle thereto, unless track superelevation dictates otherwise." Similar guidelines could not be found in publications of the Federal Highway Administration (FHWA) or the American Association of State Highway and Transportation Officials (AASHTO).

^{1/} For more detailed information read Railroad/Highway Accident Report—"Collision of Amtrak Train No. 88 with Tractor Lowboy Semitrailer Combination Truck, Rowland, North Carolina, August 25, 1983" (NTSB/RHR-84/01).

The longest suspended span between the six axles of the combination truck was the distance of 36 feet 4 inches from the center of the tractor tandem axle tires (where the semitrailer kingpin was resting) and tires on the first axle of the semitrailer. The bottom side of the center framing of the semitrailer was only 7 inches above the roadway between those two axle locations. Because of the long span (36 feet 4 inches) and the 7-inch frame-to-roadway clearance of the semitrailer, the combination would have become lodged on any vertical curve (hump) having a radius of less than 283.17 feet. The vertical curve at the Church Street grade crossing had a radius of only 207.30 feet. As the truck-tractor passed over the track and began its travel down the east approach, the semitrailer moved across the track. The bottom side of the two low center-spaced longitudinal frame members of the semitrailer contacted the rail and stopped the unit with the forward end of the semitrailer astride the track.

Some 3 months after the Rowland accident, the Safety Board investigated a similar accident. Shortly before 3 p.m. on November 30, 1983, northbound Amtrak train No. 98 struck a C.A. Earthmover Company tractor-lowboy semitrailer combination truck that had become lodged on the Seaboard single main track at a grade crossing on county road 318 at Citra, Florida. One diesel locomotive unit and four passenger cars of the nine-car train consist were derailed. The truck-semi-trailer and its cargo were damaged substantially. Seven of the 96 passengers aboard were taken to a local hospital; all were treated and released. Twenty-nine other passengers also claimed injury. Neither the truckdriver nor his helper was injured. There was no fire.

The railroad track in the Citra accident was at a higher elevation than county road 318. On the east approach, the westbound truck traveled up a grade measuring an overall average of 3.6 percent--6.5 percent over the last 26 feet. It crossed a 20-foot-wide hump containing the track and started down a grade measuring an overall average of 6.4 percent--11.9 percent in the first 31 feet. The truck-tractor moved down the 11.9 percent grade as the semitrailer traveled over the tracks. The bottom side of the low-riding sideframe members of the semitrailer contacted the crossing surface and stopped the unit with the forward end astride the track. The surface area extending about 15 feet from the track on each approach had been paved over at least twice. The layering of asphalt created the surface hump profile. Interviews with county and railroad officials revealed that neither communicated with the other about maintenance at this crossing. However, it is reasonable to assume that the railroad, as in the past, had done the paving adjacent to the track.

The Rowland and Citra accidents demonstrate the need to provide adequate vehicle ground clearance in designing and maintaining roadway profiles. Crossing profiles that consist of a vertical curve can impede the operation of a vehicle if the distance between any two axles of a vehicle span the hump and the height of the hump exceeds the vehicle's ground clearance. Grade crossings that have a roadway profile that may be hazardous to certain vehicles can be identified and, once identified, improvements can be made. Although the American Railway Engineering Association has a recommended practice on the profile and alignment of crossings and approaches stated in its "Manual for Railway Engineering," it was not followed at either the Rowland or the Citra crossings. The Safety Board is not aware of any standard highway design specifications directed to providing adequate vehicle ground clearance on highways or at grade crossings having hump profiles.

The Rowland and Citra accidents also demonstrate the need for coordination between railroads and highway departments concerning railroad/highway grade crossing maintenance. While the maintenance of the rails is the responsibility of the railroad, repaving of a crossing may be done either by the railroad or the State or local highway

department, depending on agreements negotiated by the parties. Apparently, some jurisdictions do not take into consideration the fact that changes in the crossing profile may occur as a result of maintenance or that the changes in the profile may adversely affect certain vehicles that use the crossing.

In January 1984, the Florida Department of Transportation (FLDOT) created an internal committee to study the problem of hazardous grade crossing profile conditions such as those illustrated by the Citra and Rowland accidents. The formation of the committee followed the Safety Board's investigation of the Citra accident and discussions held by Board investigators with local and State officials.

The committee was mandated to pursue an aggressive program of corrective action. Its has proposed broad-based actions, which will require participation by the railroads, local governments, truckers, and the FLDOT, are:

1. Developing a standard roadway (profile) design for grade crossings;
2. Identifying crossings currently not in compliance with the standard;
3. Encouraging local governments to bring crossings into compliance;
4. Suggesting to the railroads that they develop and implement a procedure for coordination and cooperation with local and State governments to assure the integrity of the profiles at grade crossings at which maintenance has been performed on the track;
5. Developing and implementing the installation of warning signs at crossings identified as having hazardous surface hump profiles; and
6. Encouraging the Florida Truck Association to inform its membership of the hazards of surface hump profiles at grade crossings.

In August 1984, the FLDOT was actively engaged in implementing all aspects of the program. Those aspects that involve participation of the railroads, truckers, and local governments have taken priority and are on-going.

There is no quantitative data that would statistically substantiate that surface hump profiles at grade crossings are a national problem. However, the circumstances in both the Rowland and Citra accidents, the actions planned by the FLDOT, and the concern expressed by other State Departments of Transportation that Safety Board investigators contacted in the course of this investigation lend support to the Safety Board's belief that the hazard is significant enough to warrant corrective measures comparable to those in the FLDOT program.

Therefore, the National Transportation Safety Board recommends that the Association of American Railroads:

Establish the specifications stated in Section 1.2, "Profile and Alignment of Crossings and Approaches," of the "Manual for Railway Engineering" of the American Railway Engineering Association as the minimum acceptable specifications for railroad/highway grade crossings. (Class II, Priority Action) (R-84-35)

Encourage all member railroads to coordinate activity related to track maintenance with local and State governments to preserve the integrity of the profiles at railroad/highway grade crossings. (Class II, Priority Action) (R-84-36)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY and GROSE, Members, concurred with these recommendations.

By: Jim Burnett
Chairman

Gabriel A. Goldman
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