

Excerpts from: NTSB Railroad Special Investigation Report PB2001-917005

Maryland Transit Administration LRT accidents at BWI Airport Terminal

"In 2000, the Maryland Transit Administration (MTA) experienced two similar accidents in the same location just 6 months apart. Both accidents involved the failure of an MTA light rail vehicle (LRV) train to stop at the designated stopping point at the Baltimore-Washington International Airport Light Rail Station. (BWI Airport Station) In both cases, the train struck a hydraulic bumping post apparatus at the end of the track. The Safety Board's investigation of the two accidents indicated that, although the direct cause of each accident was different, aspects of the MTA rail transit operation common to the two accidents influenced both their outcomes. Consequently, the Safety Board developed a special investigation report to address the safety factors affecting both accidents."

"The first accident occurred about 2:37 p.m. (Eastern Standard Time) on February 13, 2000, when MTA train 24 (composed of a single LRV), enroute from Baltimore to the BWI Airport, struck the hydraulic bumping post at the terminus of track No. 1 at the BWI Airport Station and derailed. The force of the collision detached the bumping post from the track, and the front of the train, which was lodged against the bumping post, was elevated about 3 1/2 feet into the air. Train 24 carried 26 people (25 passenger and 1 operator), 18 of whom were injured. 5 of those injured had serious injuries. The MTA estimated the cost of the accident at \$924,000.00."

"The second accident occurred about 7:14 a.m. (Eastern Daylight Time) on August 15, 2000, when MTA train 22 (composed of two LRVs), enroute from Baltimore to the BWI Airport, struck the hydraulic bumping post at the terminus of track No. 2 at the BWI Airport Station and derailed. The bumping post separated from its attachment to the track and came to rest in an inverted position. The leading LRV of the train came to rest on top of the overturned bumping post and about 4 1/4 feet up in the air. The roof of this LRV was partially embedded into the ceiling structure of the terminal building. Train 22 carried 22 people (21 passengers and 1 operator), 17 of whom were injured. None had life threatening injuries. The MTA estimated the cost of the accident at \$935,000.00."

"The Safety Board calculated that the bumping post design provided an insufficient stopping distance, which allowed for substantial deceleration G forces to be exerted upon the LRV occupants. The average level of G forces experienced by the LRV occupants in the 2000 BWI accidents, along with the LRV's longitudinal axis, were about -1.81 G for the February accident and about -0.23 G for the August accident. A safe stop can be accomplished by providing a longer stopping distance (as compared to that found in the Western Cullen Hayes WH bumping post system, which is available in alternate design end of track protection equipment."

"Since the August 2000 Accident, the MTA has replaced the Western Cullen Hayes WH hydraulic bumping post equipment at the terminus at the BWI Airport Station with friction buffer stop equipment. The Safety Board reviewed the friction buffer stop apparatus and found it to be an engineered "energy retardation device" that is fitted to the running rails of stub-end tracks and employs a "friction shoe" clamping mechanism that secures the assembly to the head of the running rail. When struck, the friction buffer stop is pushed along the running rail surface in a controlled manner."

'As the device moves along the rails, the kinetic energy of the moving rail vehicle is transferred into heat energy in the buffer stop's friction shoe, causing the vehicle to come to a stop. The friction buffer stop equipment should provide improved energy attenuation protection and end of line collision protection at the BWI Airport Station. Before the August 2000 accident, the Central Light Rail Line System had friction buffer stop equipment installed on all its stub end station tracks except the BWI Airport Station. Since the August 2000 accident, friction buffer stop equipment has been installed at the BWI Airport Station.'