



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
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Washington, D.C. 20590

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Division of Calspan Corporation  
Buffalo, NY 14225

REVISED 1995

**CALSPAN ON-SITE SCHOOL BUS/PEDESTRIAN ACCIDENT INVESTIGATION  
CALSPAN CASE NO. 95-5  
SCHOOL BUS: 1989 INTERNATIONAL CHASSIS/WAYNE BODY  
LOCATION:  
DATE: 1995**

Contract No. DTNH22-94-D-07058

Prepared for:

U.S. Department of Transportation  
National Highway Traffic Safety Administration  
Washington, D.C. 20590

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

**CALSPAN ON-SITE SCHOOL BUS/PEDESTRIAN ACCIDENT INVESTIGATION**

**CALSPAN CASE NO. 95-5**

**SCHOOL BUS: 1989 INTERNATIONAL CHASSIS/WAYNE BUS BODY**

**LOCATION:**

**DATE:**

**1995**

**SUMMARY**

This on-site investigation focused on a fatal school bus/pedestrian accident that occurred in                      1995. The 13 year old female pedestrian had exited the school bus in front of her residence, however, the drawstring on her jacket became snagged in the downstream end of the stairwell handrail. The driver failed to visually track the pedestrian as she exited the bus and closed the bi-fold door and accelerated from the bus stop. The pedestrian was subsequently dragged by the bus and knocked to the asphalt road surface as the drawstring broke loose from her jacket. Her head was run over and crushed by the right rear tire(s) of the bus. Students on board the bus yelled to the driver that she had run over a pedestrian, however, the driver did not acknowledge the students and departed the scene and continued to complete her assigned route to discharge the remaining 25 students on board the bus.

The involved school bus was a Type C 1989 International S1700 conventional chassis with a Wayne Lifeguard bus body. The bus was manufactured in                      1988, and was identified by the following vehicle identification number (VIN): 1HVLNZRLXKH                     . The bus body was identified with model number                      and serial number                      and had a rated passenger capacity of 65 students. The bus was inspected by Calspan personnel on                      1995, at a tow facility which retained the vehicle under an impound order from the Prosecutor's Office.

The bus was equipped with a manually operated bi-fold door that opened to the forward side of the stairwell, which provided a 22.4" opening. Three steps provided access to the bus with a vertical transition of 37.75" from ground to floor level. Attached to the trailing side of the stairwell was a 1" diameter stainless steel handrail. The handrail was attached to the padded wall adjacent to the stairwell and was approximately 42" in length. The lower end of the handrail was formed to a flat surface and was bent at an angle of approximately 35 degrees for its attachment point at the base of the stairwell. There was no modification to the lower attachment point of the hand rail. The District's Transportation Supervisor stated that he was unaware of the potential hazard of the hand rail design and that he had never received notification from the manufacturer, or state and federal officials.

The bus was equipped with a series of plane (flat) and convex mirrors to provide the driver with viewing across the frontal area of the bus and along both side areas. Mounted to the A-pillars of the bus were rectangular plane mirrors. The left side mirror was 5.5 x 14.8" while the right side mirror was 6.25 x 15". Both of these mirrors were electrically heated and the switch was found in the on-

position. Two 8" diameter convex mirrors were mounted at each corner of the engine cowl. The forward mounted convex mirrors provided the driver with a view across the frontal area of the bus while the rearward mounted mirror provided the driver with a view along the sides of the bus. The right side convex mirror provided the driver with an excellent view of the door area of the bus as depicted in Photograph No. 13. In addition to the mirrors, the school bus was equipped with a interior *Buscam* video monitoring system. The District has approximately 63 buses in its fleet and all units were equipped with the bulkhead mounted video box. Four video cameras are rotated within the fleet and it is currently unknown if the accident involved bus was equipped with a video camera on the day of the accident.

The school bus driver was reported as a 60 year old female, with an estimated height of 66" and weight of 190 lbs. She had been employed as a bus driver for the School District for 20 years and had been assigned to this particular route for 3-4 years. The investigating police officer noted that the driver did not wear or require corrective lenses for her CDL license. She has refused to be interviewed on the advisement of her attorney.

The pedestrian was a 13 year old female middle school student. She was initially seated toward the rear of the bus in the eighth row on the left side adjacent to the window. The pedestrian was wearing denim jeans, white athletic shoes, and a dark blue jacket that was zippered closed. At the bottom of her jacket was a draw string that apparently extended below the hip length jacket. The drawstring was a braided fabric that was approximately 3/16" in diameter with a plastic tapered cap at the end which measured 5/16 x 3/8" in width and 9/16" in length. Located directly above the plastic cap was a leather adjustment slide that was 5/8" in width, 1 7/16" in length, and 3/16" in thickness.

The accident occurred on a two lane residential street in a subdivision in during daylight hours. At the time of the accident, the road surface was wet due to a light to moderate rainfall. The driver's assigned bus route detailed her to discharge the involved pedestrian and two other students from the bus at the corner of the street, approximately 200' prior to the accident site, however, due to the inclement weather, the driver decided to discharge the students adjacent to their driveway.

The involved pedestrian was the third of the three students to exit the bus near the mail box adjacent to her driveway. The other two students included the pedestrian's 12 year old brother and a female neighbor. As the involved pedestrian exited the bus, the right side drawstring from her jacket became snagged in the wedge-shaped gap between the handrail and the lower attachment point with the stairwell wall. The driver apparently failed to visually track the pedestrian as she exited the bus or check for her position in the mirrors prior to closing the bi-fold door and accelerating forward.

The pedestrian was subsequently pulled by the bus which probably rotated her in a clockwise direction into the right side surface of the vehicle. She was then dragged by the school bus as she began to fall. The drawstring loaded against the painted surface of the bus directly outboard of the handrail and scuffed the paint 37" above ground level, or 22.5" above the bottom step of the bus.

A yellow paint transfer was noted to the draw string located 12.5" above the end cap. There was a wipe mark (area where road film had been removed) on the leading edge of the fuel tank safety cage that probably resulted from contact with the pedestrian's leg as she fell between the wheelbase of the moving bus. The drawstring broke and the pedestrian fell in a face down attitude on the asphalt road surface with her head lying near the center of the road and her feet toward the right roadedge. The right rear tire(s) overrode the left posterior shoulder and upper scalp of the pedestrian resulting in fatal injuries. The pedestrian came to rest approximately 75' beyond the point at which she exited the school bus.

The autopsy report identified the injuries as massive cranial destruction with avulsion of the brain (AIS-6), abrasions of the right mastoid region (AIS-1) consistent with tire marks, multiple left facial and left anterior neck abrasions and contusions (AIS-1), fracture of the hyoid bone (AIS-2), fracture of C1 (AIS-2), fractures of left ribs 2-3 (AIS-2), left pulmonary contusion (AIS-3), and abrasions and contusions of the left upper extremity (AIS-1). Based on this injury data, they suggest that the pedestrian was lying with her head turned to the right and that the tire(s) initially contacted the posterior aspect of the scalp and continued over the scalp above the right ear region.

The investigating police officer stated during our investigation that he had interviewed numerous students who were on board the school bus at the time of the accident. Several of these students informed the driver that she had run over a girl, however, the driver ignored the students and proceeded to the next assigned bus stop. The rear tires had accumulated brain matter and deposited four transfers on the road surface from tire rotation as the driver accelerated from the scene.

The bus driver proceeded to the next assigned bus stop which was located at a three-leg T intersection approximately 150' beyond the final rest position of the pedestrian. At this location, several students were discharged from the bus and the driver continued through the intersection and completed the remainder of the route.

Upon completion of the route, the driver drove the school bus to the middle school. At this location, she was contacted by radio and directed by her supervisor to return the bus to the bus garage. At the garage, the driver was informed of the accident by her supervisors. The driver presented the snagged end of the drawstring to one of her supervisors and stated that she "found this on the bus". A union representative advised the driver of her rights and requested that the driver submit to a blood test.

The investigating police officer departed the scene of the accident at approximately 1730 hours and responded to the school bus garage to interview the driver. As he arrived at the garage, the officer was informed that the driver was at a medical facility for a blood specimen test. At approximately 3.5 hours following the accident, as the driver was returned to the garage, the investigating police officer informed her that she had been involved in a serious accident which resulted in a fatality. The driver responded by requesting her rights to speak to her attorney and refused to provide a statement to the police. Criminal charges are pending.

The separated end of the snagged drawstring was examined at the Police Headquarters on [redacted] 1995. This section of the drawstring was 28.25" in length. The bottom end treatments (tabs) were previously identified. The broken end of the string was frayed, however, the string did not yield evidence of stretching. The jacket was identified by the coroner as having three separate drawstrings; one for the attached hood, a mid section (waist) drawstring, and the lower hip length drawstring which snagged in the handrail.

### *Causal Factors*

There are two primary causal factors for this accident. The handrail design allowed for an object such as the drawstring to become snagged between the downstream end of the rail and the stairwell wall. Secondary, driver error resulted in the pedestrian being dragged and subsequently run over by the rear tires of the bus. The driver failed to allow the pedestrian sufficient time to safely clear the bus prior to closing the door and accelerating from the bus stop. In addition, the driver did not visually track the pedestrian to ensure that she was a safe distance from the vehicle or check the mirror system for potential hazards prior to accelerating the bus.

The Wayne Corporation school bus division that manufactured this bus was out of business prior to this accident. Wayne Wheeled Vehicles, which purchased certain assets of the Wayne Corporation, issued a [redacted] dated [redacted] 1994, offering a retrofit rubber bushing for the handrail and a complete handrail package to all owners of these buses. The Transportation Supervisor of the [redacted] School District stated that he never received this [redacted] and therefore was unaware of the potential hazards. A copy of this [redacted] is included as an attachment to this summary.

Preliminary Photographs  
Calspan Case No. 95-5  
, OH



1. Right front three-quarter view of the 1989 Type C International/Wayne Body school bus.



2. Right side view of the involved school bus.





3. Loading door area of the school bus.



4. Stairwell and the downstream end of the handrail.





5. View of the stairwell, door opening, and handrail.



6. Lower handrail attachment point.

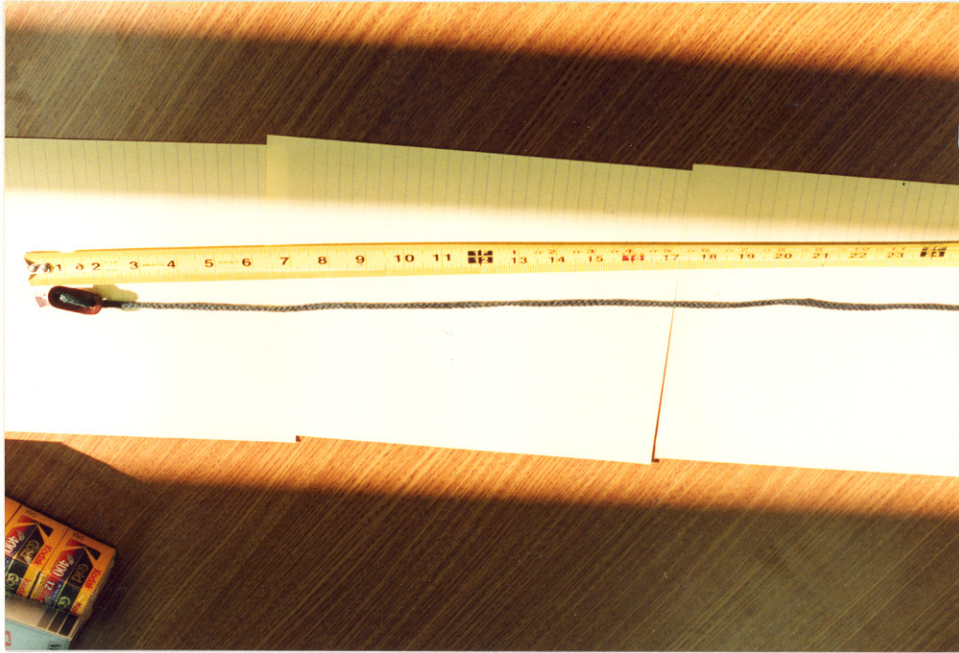




7. Paint abrasion from draw string contact on the rearward edge of the door opening.



8. Probable pedestrian leg wipe mark on fuel tank safety cage.

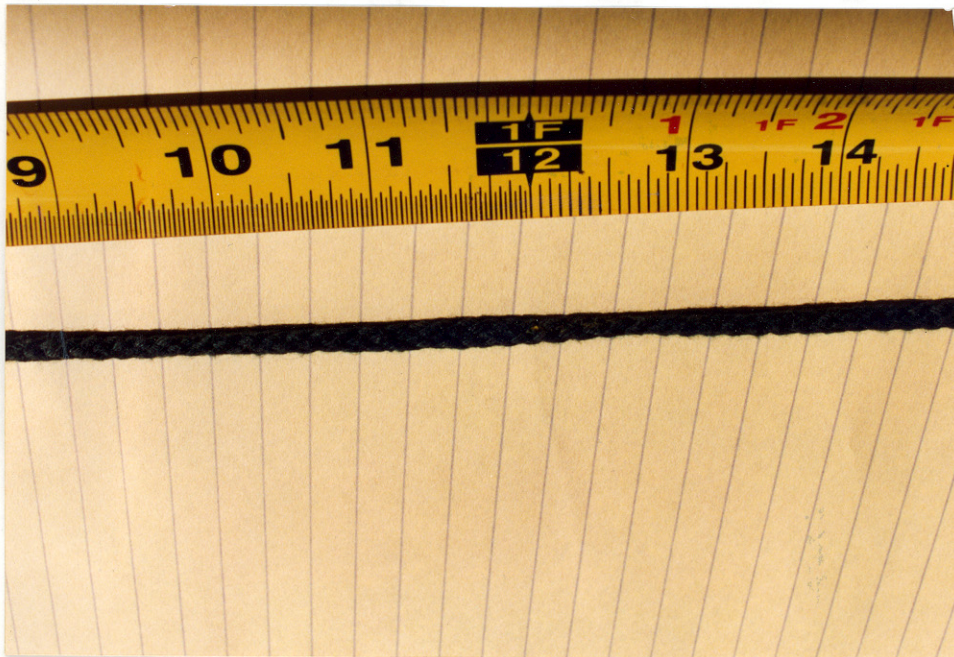


9. Torn right side draw string.



10. Plastic tab and leather slack adjuster which snagged in handrail/stairwell juncture.





11. Yellow paint transfer at the 12" mark on the draw string.



12. Frayed and torn end of the draw string.



13. Conspicuity of a pedestrian adjacent to the right door area in the right side convex mirror.