

School Bus Crash Investigation  
Dynamic Science, Inc.  
**Case 99002**  
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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 be 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.*

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## **Background**

This crash involved a 1991 International bus which was struck in the rear by a 1993 Dodge Caravan. The school bus was stopped at an intersection and the 1993 Dodge Caravan stopped at some point behind of the bus. Prior to the traffic signal turning green, a pedestrian who was apparently having a conversation with the driver of the Caravan, hit the driver in the face. At this point the driver of the 1993 Dodge Caravan pulled away and struck the bus in the left rear plane. After striking the bus, the driver of the Dodge Caravan drove away without making her identity known or rendering aid. It was selected for additional follow-up study due to the injury of a child passenger. A remote-style investigation was conducted during which information was sought from the investigating police jurisdiction, the bus owners (the school district).

## **Summary**

This crash involved a 64 passenger yellow school bus which was traveling east toward an intersection. The Dodge Caravan struck the left rear corner of the bus, drove around its left side and continued on without stopping. According to the police report there were 33 school aged children on the bus in addition to the bus driver at the time of the collision.

The weather was clear, the road surface was dry and it was daylight. The roadway is four lanes, with three lanes east bound and one lane westbound. The speed limit is 56 km/h (35 MPH) and there were no defects noted at the scene.

Contact on the bus extended from approximately the center of the rear bumper to the left rear bumper corner and consisted of scratches and a small dent in the area of the license plate and holder. Damage to the vehicle was repaired by the Department of Education Vehicle Maintenance Facility with no costs listed. Both vehicles were driven from the scene.

The school bus has a seating capacity of 64 passengers. It was transporting 33 children between the ages of 11 and 17, and the bus driver. There were 11 rows of seats in the bus, as depicted in figure 1, with the left side seats having 3 designated seating positions and the right side seats having 3 designated seating positions.

An exemplar school bus was photographed and measured. The seats were of the high back design 64 cm (25 in.) above the seat cushion and at an 83.3 degree angle. The leading edge of the seat cushion was 38 cm. (15 in.) above the floor while the rear edge was 39 cm. (15.4 in.) above the floor. The angle of the seat cushion was 4.1 degrees while applying pressure to the measuring device. The lateral dimension of the seat cushion was 97 cm. (38 in.) on the left side, and 97 cm (38 in.) on the right. The seat cushion width was 38 cm (15 in.). The lateral width of the bus (interior) is 228 cm (89.8 in.) .

The distance between the seat back to seat back cushion was 63 cm (24.8 in.) The aisle width measured 35 cm (13.8 in.)

The bus was not equipped with restraints for each seating position. The driver's position had a 2-point manual lap belt.

Two people were transported to a local hospital via ground transportation. Both of these students were treated and released. Both students were treated as outpatients for some time after the collision.

One of the injured was a 15 year old female who was in seating position 18 (left side) on the aisle. It was unknown what position her body was in at impact. She was treated for a dislocation (subluxation) of the cervical spine and a cervical strain/sprain. She claimed to have hit the seat, but the area of impact is not known.

The second of the injured children was a 14 year old male passenger who was not listed on either the police report or the school bus driver report. This passenger was treated for a broken nose and cervical strain/sprain.

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