

## **Animation of Accident Reconstruction**

Motorcoach Run Off Road - Collision with Bridge Signpost

Interstate Highway 95 Southbound

New York, New York

March 12, 2011

HWY11MH005

This animation is a shelf item and may be obtained by contacting:

National Transportation Safety Board

Records Management Division (CIO-40)

490 L'Enfant Plaza, SW

Washington, DC 20594

(202) 314-6551

800-877-6799

Online request: <http://www.nts.gov/pubmail/pubmail.asp>

This animation is also available on the NTSB website.

This three-dimensional animated reconstruction shows the accident sequence for a motorcoach run off road and collision with a signpost on Interstate 95 (I-95) southbound in New York, New York, which occurred on March 12, 2011.

This animation illustrates the overall accident sequence from just before the motorcoach departed from the travel lanes until the vehicle was at its final rest position. The roadway and the area of the accident including the guardrail and signs are scale models built from the three-dimensional survey data. The animation depicts the vehicle motion developed through a simulation that was based on the physical parameters of the motorcoach coupled with the evidence of the tire and scrape marks on the road and the damage to the motorcoach, guardrail and signs. Uncertainties in the vehicle parameters, limited physical evidence and approximations used in the computer models would permit some variation in the calculated motion of the motorcoach while still matching the overall vehicle behavior. The animation does not depict the weather or visibility conditions at the time of the accident. The animation does not include audio.

The animation sequence shows the motorcoach initially traveling in the right hand lane at 64 miles per hour. The motorcoach departs the road, crosses over the 10-foot-wide shoulder, and strikes the guardrail along the right side of the road way. After a sharp roll to the right during the initial impact, the motorcoach veers away from the guardrail and then veers back. After striking the guardrail the second time, the motorcoach continues

to travel forward while leaning to the right on top of the guardrail before overturning onto its right side, flattening the guardrail. The motorcoach continues to slide forward while on its right side, striking a signpost, which penetrates partway through the motorcoach along the windows.

The animation sequence is shown twice divided by the title "Repeat of Animation Sequence".

### **Occupant Kinematics Simulation**

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This simulation shows the general occupant kinematics for a motorcoach run off road and collision with a signpost on Interstate 95 (I-95) southbound in New York, New York, which occurred on March 12, 2011.

This simulation illustrates the general occupant kinematics for four 50<sup>th</sup> percentile adult male anthropomorphic test devices (ATDs or simulated crash test dummies) in both an unbelted and a lap/shoulder belted condition from just before the motorcoach departed from the travel lanes until after its overturn but prior to impact with the signpost. The simulation is based on the vehicle motion developed through a simulation combining the physical parameters of the motorcoach coupled with the evidence of the tire and scrape marks on the road and the damage to the motorcoach, guardrail and signs. The

occupant simulation study characterized general occupant kinematics and was not intended to represent the actual motion of specific individuals in the crash. The simulation did not account for intrusion when determining injury.

The screen is split with the lap/shoulder belted occupants shown on the left and the unbelted occupants shown on the right. The animation does not contain audio.

The simulation shows that unbelted occupants are vulnerable to injury during the bus overturn due to impacts with other occupants and impacts with interior surfaces. After the bus overturned, unbelted occupants were on top of one another in the region beside the window between the seats and the luggage racks. This places the occupants in a position vulnerable to injury given the intrusion that followed from the secondary impact with the sign pole structure.

Lap/shoulder belted occupants are contained within their seating compartments. Occupants sitting on the far side of the roll (opposite the side near the ground) are able to partially escape the shoulder harness during the roll sequence, which then places them in a position closer to the floor of the bus rather than closer to the luggage racks, reducing their vulnerability during intrusion at the window level later in the impact sequence. Near side occupants remain in a more upright position during the simulation, making them potentially more vulnerable to impact and intrusion of the sign pole structure.

The animation sequence is shown twice divided by the title "Repeat of Animation Sequence".