National Transportation Safety Board

Brake Performance Study Alteration's Effect on As-Designed, Maintained Brake System

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Accident Vehicle

- 2001 Ford Excursion altered into a limousine
- Accident weight of limousine exceeded original GVWR of Excursion by about 5,000 lbs.
- Brake design did not appear to be upgraded
- No evidence of testing to verify that brakes had been certified to FMVSS 105 at accident weight

Accident Vehicle

- Question: Did the accident weight of the limousine exceed the design capacity of the brake system?

Brake Study Objective

- To estimate whether limousine, with properly functioning brakes, would have had sufficient braking capacity to have safely negotiated accident route
- NOT intended to re-create the braking of the accident vehicle

Brake Components Used in Study

- Used Original Equipment (OE) brake components specified for the unaltered Excursion
- OE components best represent level of performance Ford intended for unaltered Excursion

Inspection of Accident Brakes

- Contained non-OE replacement brake components
- Non-OE replacement brake parts may fail at lower temperatures than OE parts
- Until accident brakes are tested, correlation between accident brakes and those used in testing is unknown

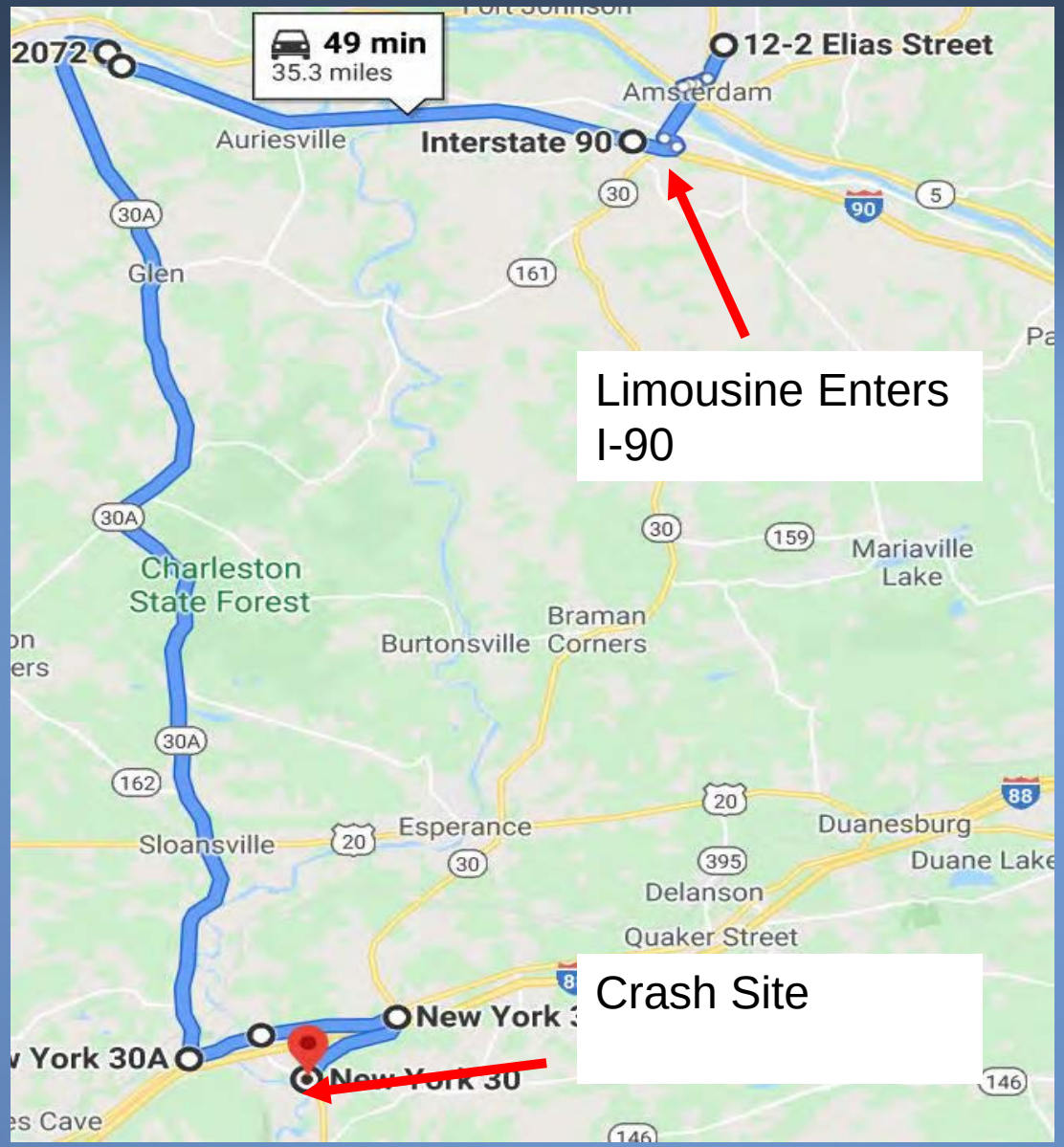
Overview of Braking Testing

- Part 1 – Full-Scale Vehicle Testing
  - Test vehicle - exemplar Excursion at accident weight
  - FMVSS 105 Fade and Recovery requirements
  - FMVSS 105 Stopping Distance requirements
  - Baseline for performance

- Part 2 – Dual-End Inertia Brake Dynamometer Testing
  - Simulate vehicle braking over accident route

Dynamometer Testing - Simulations

Figure 1 - Dual-end Inertia Brake Dynamometer


49 min
35.3 miles
12-2 Elias Street
Amsterdam
Auriesville
Interstate 90
30A
Glen
161
30
90
5
Limousine Enters I-90
30A
Charleston State Forest
30
159
Mariaville Lake
Braman Corners
Burtonsville
30A
162
Sloansville
20
Esperance
30
20
88
Duanesburg
Duane Lake
395
Delanson
Quaker Street
Crash Site
New York 30A
New York 30
146
146

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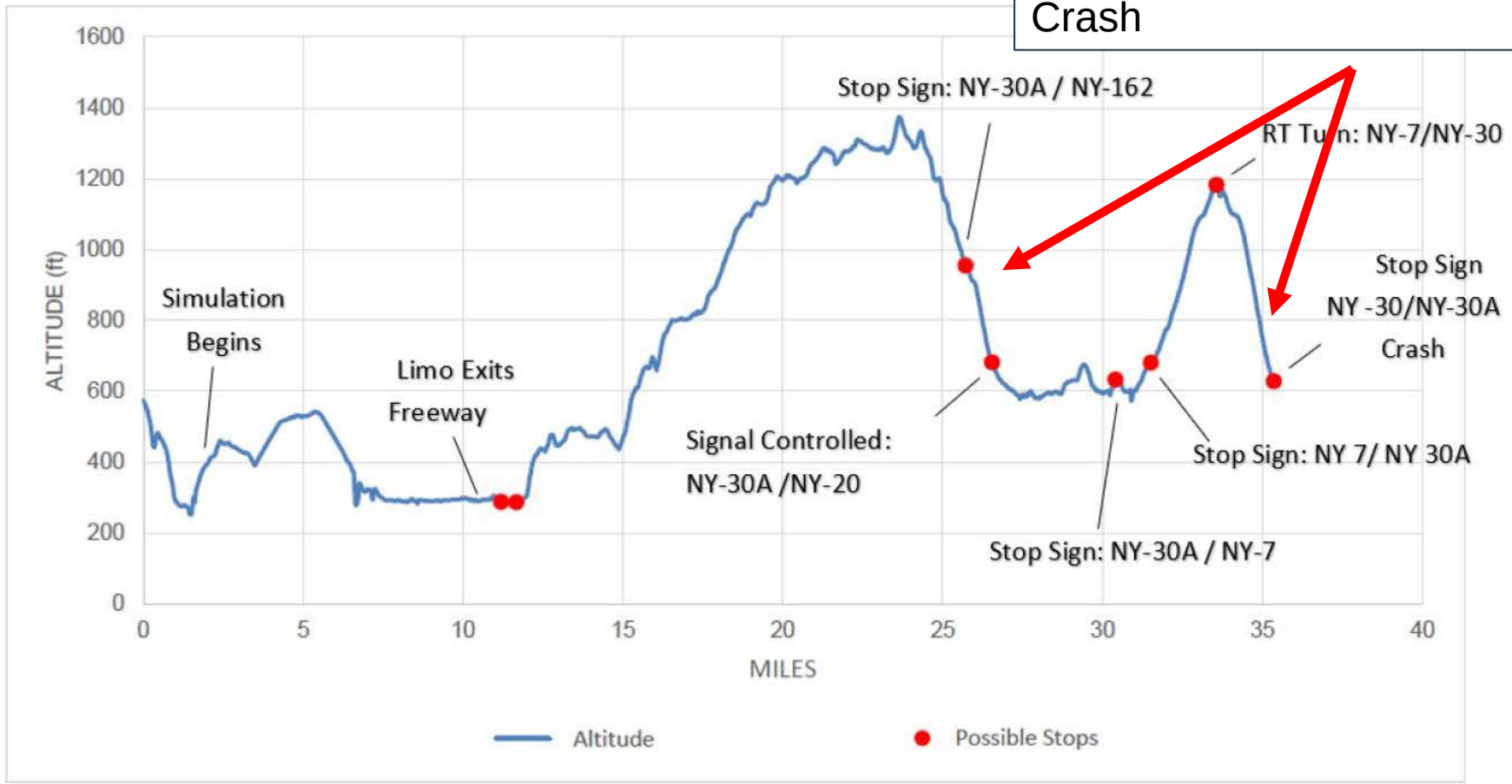
Accident Route Profile

Final Two Long Descents Prior to Crash



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Summary/Findings

With properly functioning and well-maintained brakes, limousine would have been capable of:

- Stopping safely at bottom of downgrade
- Meeting FMVSS 105 fade and recovery and stopping distance requirements (with one minor exception)