



NTSB National Transportation Safety Board

Office of Highway Safety

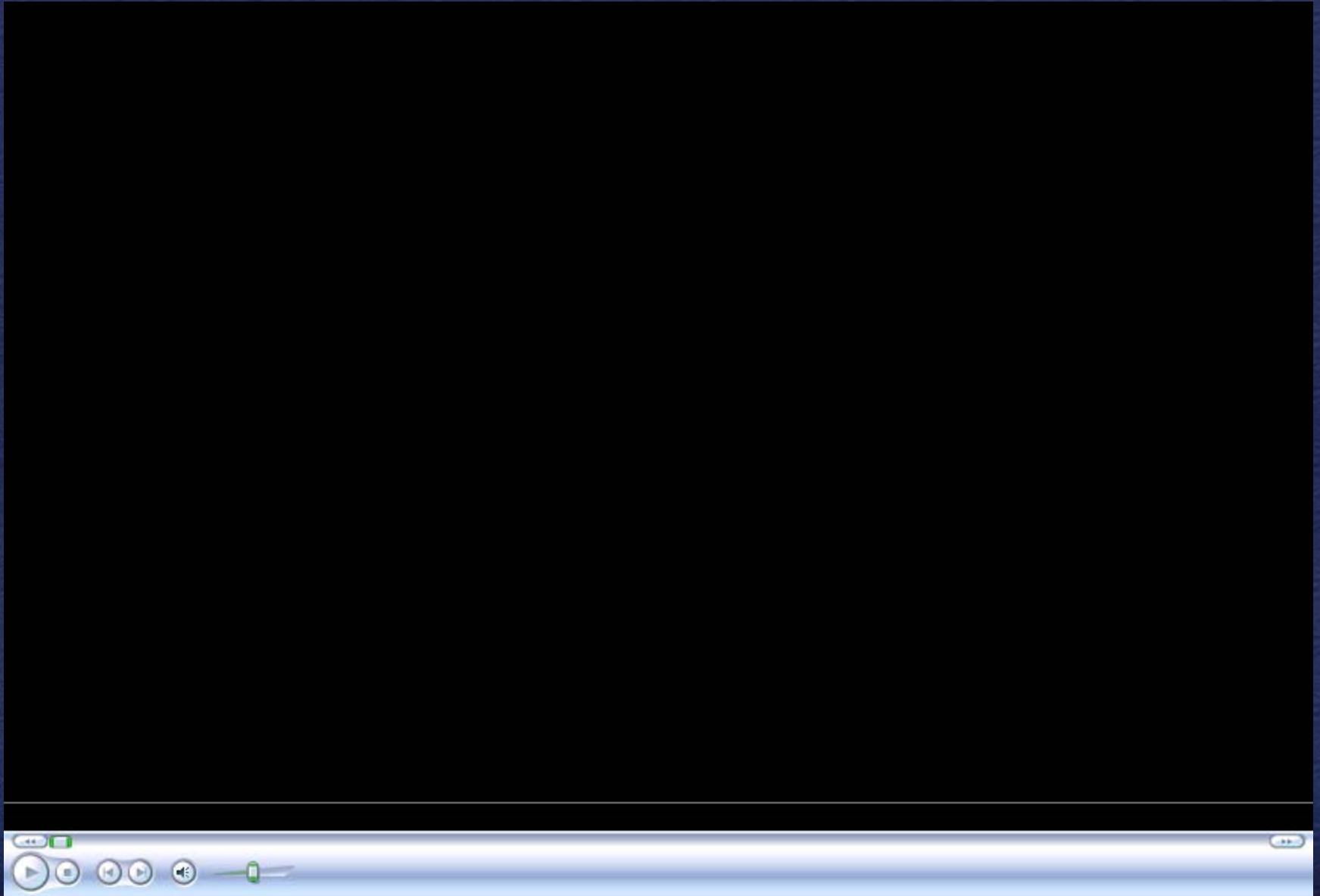
Tire Testing and Simulations

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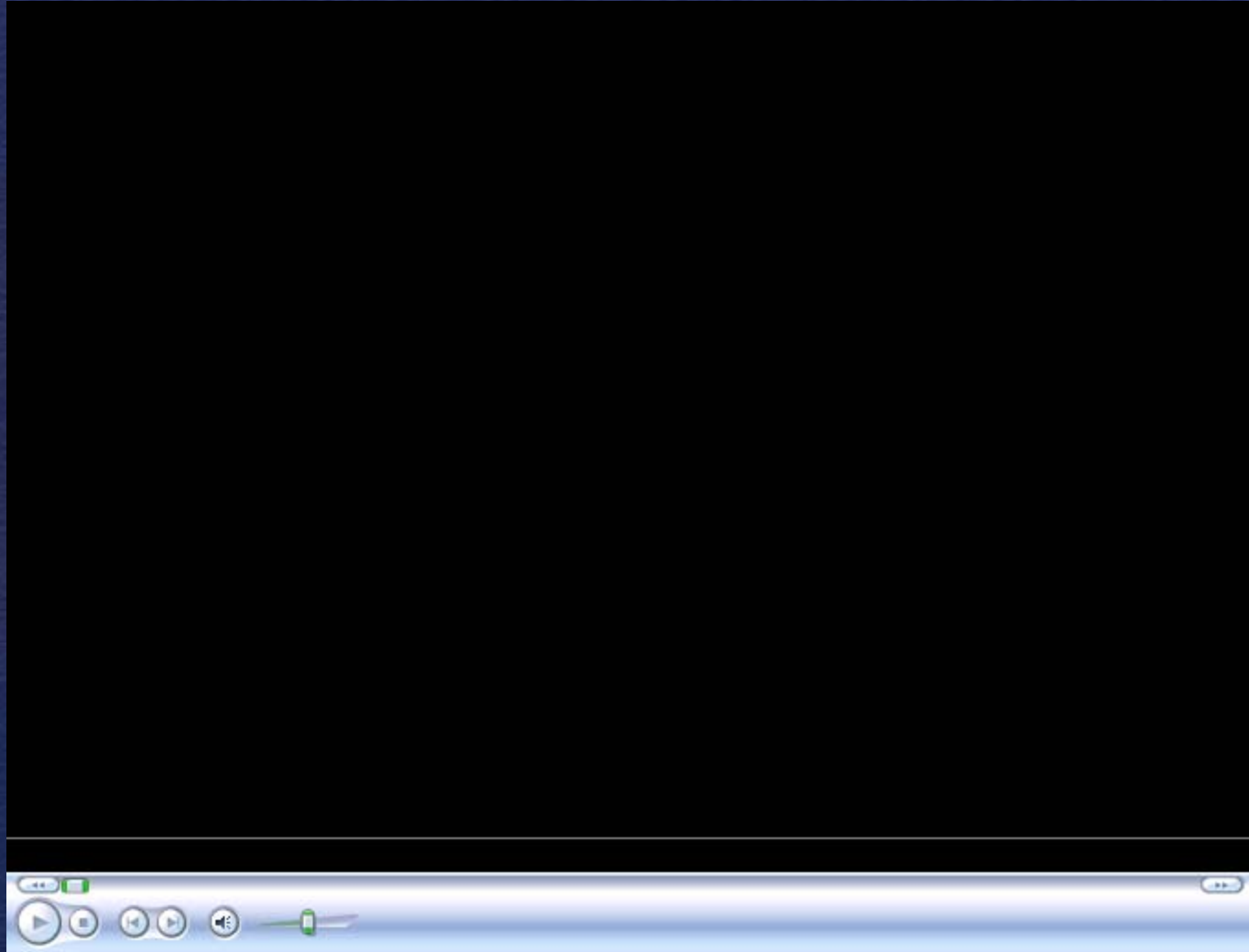
Tire Testing

- Literature review of available test data
- Preliminary simulations conducted
- Testing protocol developed
- Testing in May 2004
- Pavement surface at accident site replicated

Calspan Tire Testing—Cornering



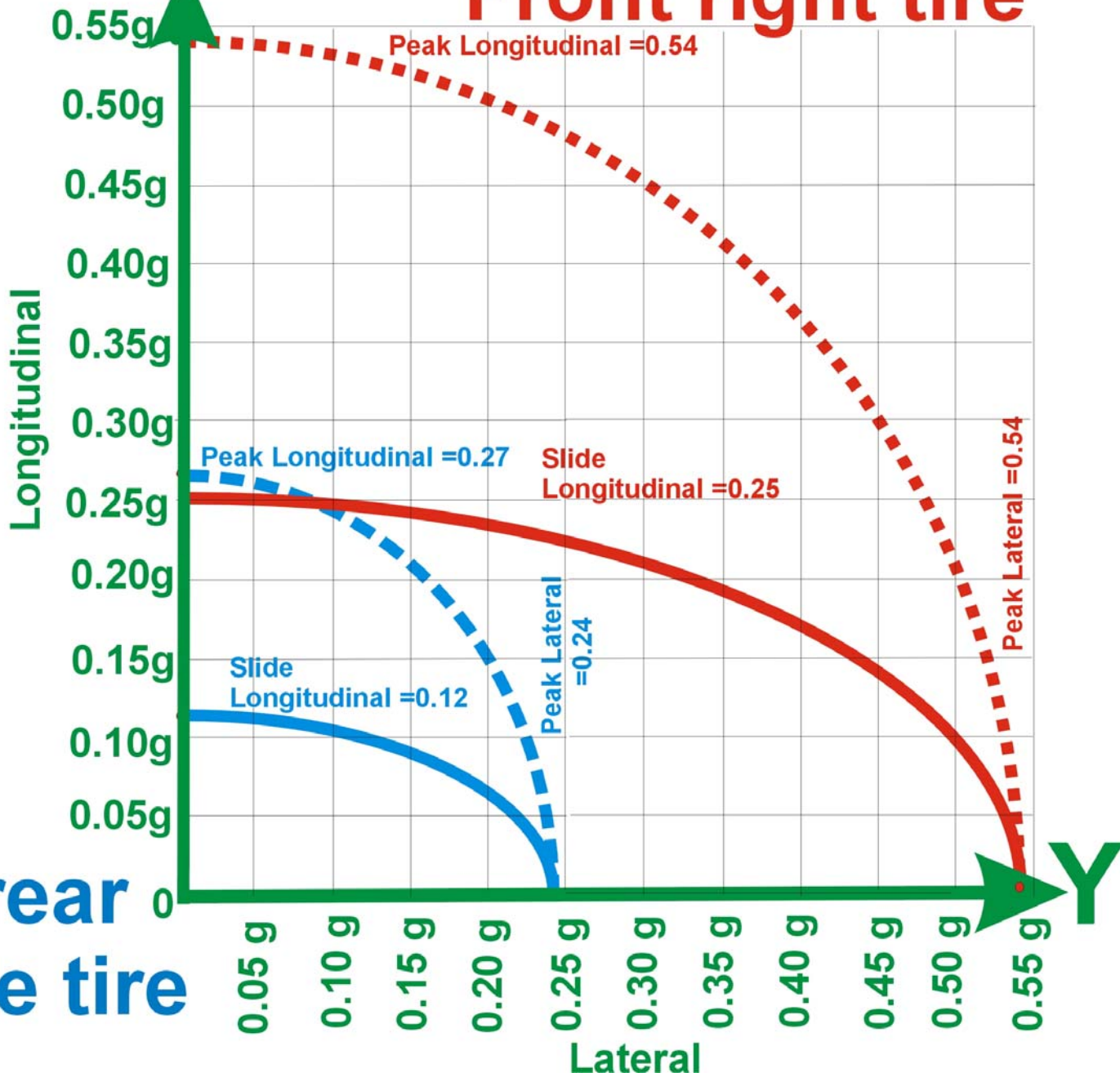
Calspan Tire Testing—Braking



Results—Drive Axle Tires

- Average peak lateral friction less than half steer axle tire
- Lower lateral friction
- Frictional braking capability about half steer axle tire
- Slide friction value equivalent to ice

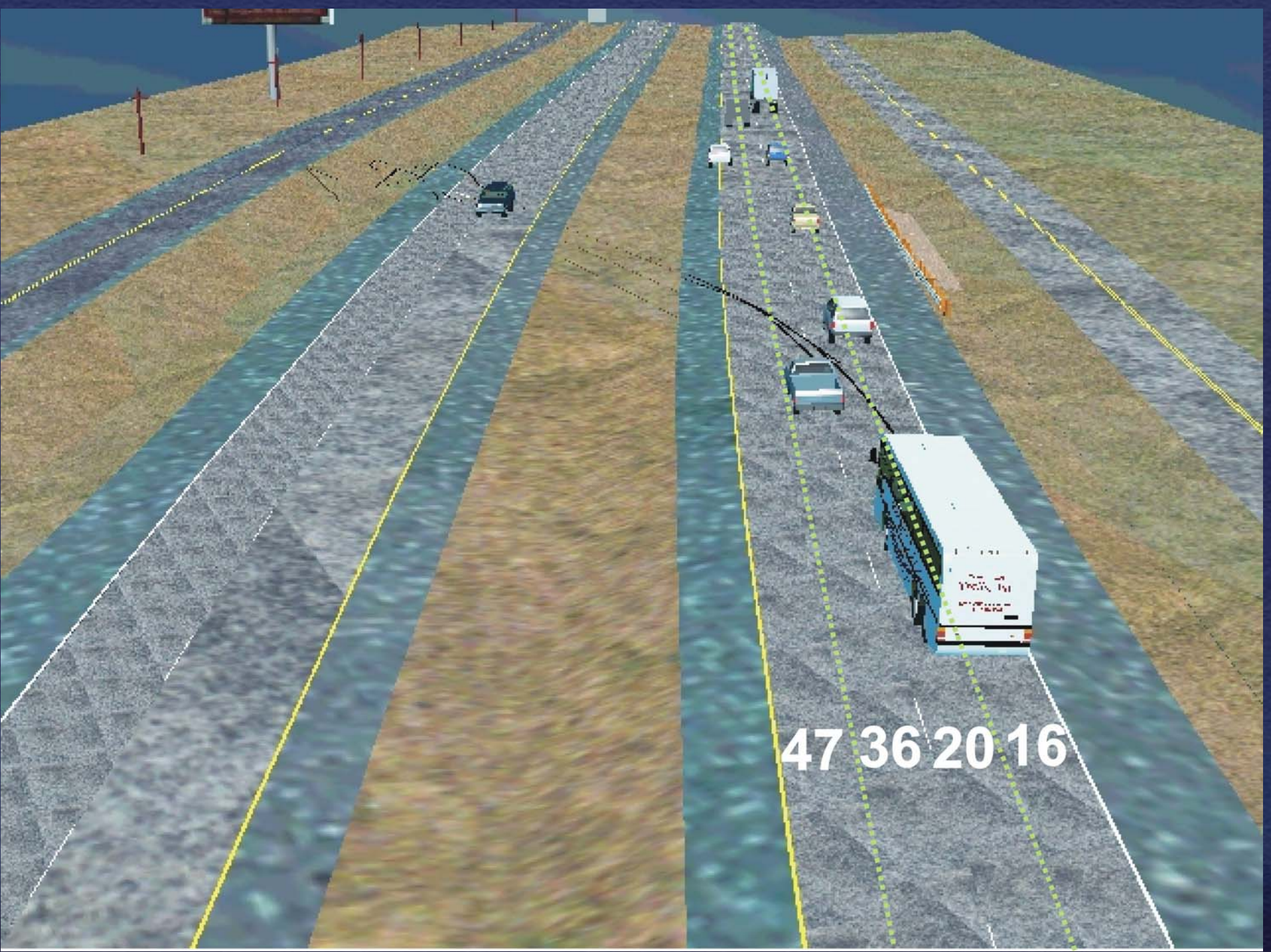
Front right tire



Left rear
inside tire

Simulation Purpose

- Evaluate motorcoach driver's statements
- Motorcoach's braking and cornering capability
- Contribution of roadway and tires
- Speeds at impact
- Dynamics of vehicles postcollision



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Simulations

- Depict best fit to physical evidence
- Representative of accident sequence
- Shown real time
- Do not represent lighting and weather conditions

Simulation Views

- Motorcoach chase
- Motorcoach driver's potential view
- Fixed view
- Suburban driver's potential view
- Motorcoach chase with good tires



Accident Severity

	<u>Motorcoach</u>	<u>Suburban</u>
Speed at impact	40 mph	33 mph
Peak acceleration	7.6g	46.8g
Delta V	16 mph	57.8 mph
Suburban's longitudinal change in velocity		
- Recorder:	48.7 mph	
- Simulation:	51.3 mph	

Summary

- Motorcoach steered hard left and braked
- Motorcoach: 40 mph at impact
- Suburban: 33 mph at impact
- With good tires, motorcoach could have avoided impact with Suburban
- Unequal pavement friction induced counterclockwise rotation



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