LARGO, MARYLAND

Median Crossover Accident

February 1, 2002

Staff – On Scene

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- Shane Lack
- Burt Simon
- Vernon Roberts and Jennifer Russert
- Hank Hughes and Ronald Kaminski
- James LeBerte
- Don Eick
- Ted Lopatkiewicz
- Dave Rayburn

Staff – Report Development

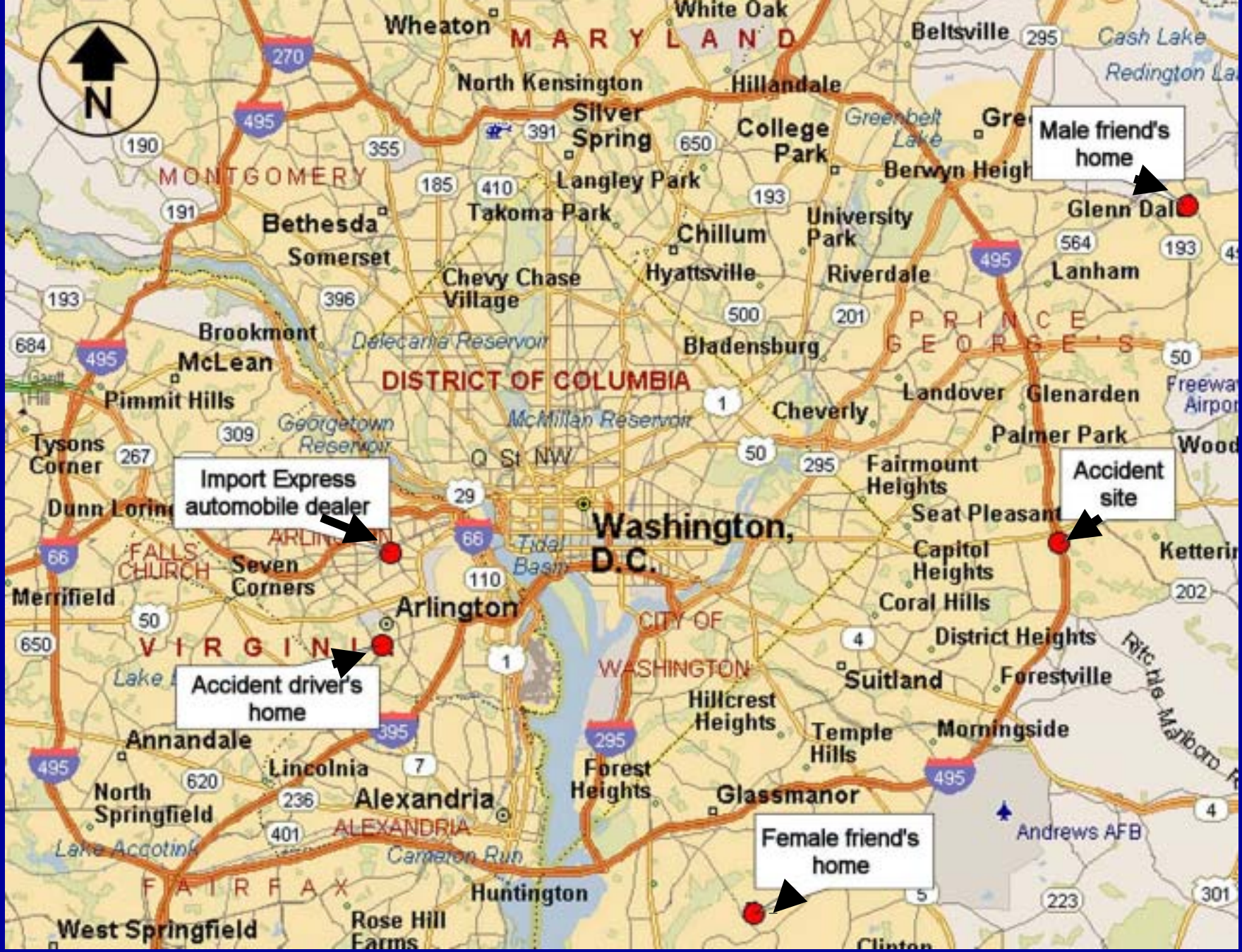
- Dr. Paula Sind-Prunier
- Dr. Jana Price
- Steve Blackistone
- Ed Pachetti
- Mary Ann Ferencz
- Michele McMurtry

Parties to the Investigation

- Federal Highway Administration
- Maryland State Highway Administration
- Maryland State Police

Safety Issues

- The accident driver's speed, operating inexperience, and unfamiliarity with the vehicle
- The use of a wireless telephone while operating a vehicle
- The need for technology to aid vehicle stability
- Adequacy of the existing barrier system



Source: MS Streets and Trips


ROAD
WORK
1/2 MILE


MSP
2-1-02
#36
0261-0125 1
LAND ROVER
DISCOVERY


Jeep

Restraint Use – Explorer

- Airbag deployed
- Three-point safety belt available
  - Not used – driver ejected
  - Sustained fatal injuries

Restraint Use – Windstar

- Front seat airbags deployed
- Lap/shoulder safety belts available
  - Driver and rear seat passengers in use – sustained fatal injuries
  - Right-seat passenger not in use – ejected and sustained fatal injuries

Restraint Use – Jeep

- Front seat airbags deployed
- Lap/shoulder safety belts available
  - Driver's belts – in use – sustained minor injuries
  - Two child safety seats in rear seat – in use – no injuries

Multiple Risk Factors

- 20-year-old driver
- Inexperienced
- Unbelted
- High profile, short-wheelbase SUV
- Unfamiliar with vehicle
- Speed 15 to 20 mph over limit
- Using a wireless telephone
- Wind gusts

Multiple Risk Factors (Continued)

- Oversteered
- Lost control
- Yawed off the left side of road
- Obsolete guardrail end treatment
- Collided with the back of guardrail

Driver Performance

Burt Simon

Explorer Driver

- Medical condition
- Driving experience
- Vehicle familiarity
- Potential distraction

Medical Condition

- Good general health
- No medications
- Normal sleep/wake cycle
- Toxicology negative

Driving Experience

- Licensed for 3 years
- No violation or accident history
- High school driver education
- No vehicle ownership
- Borrowed vehicles infrequently

Vehicle Familiarity

- New purchase
- No test drive
- Less than 2 hours operating experience
- Less than 50 miles

Speed

- Witness: 70-75 mph
- Calculated: 69 mph
- Used left-hand lane
- Strong, gusting crosswinds
- 55 mph speed limit

Wireless Telephone Use

- Handheld wireless phone
- 2-3 minute conversation with driver in vehicle ahead

Research Findings: Experience, Familiarity

- Inexperience increases risk of young drivers being involved in speed-related fatal crashes
- Risk is 2 to 3 times higher if driver has driven less than 500 miles in vehicle
- Unfamiliarity interacts with inexperience
- Familiarity enhances control, speed compliance, evasive action

Dual Cognitive Task Research

- Using fMRI images of brain activity
- During single and dual tasks
- Dual tasks decrease brain activity
- Suggests reduced cognitive processing
- Driving and listening results are similar

Wireless Telephone Research Findings

- Primarily a cognitive distraction
- Decreases situational awareness
- Increases reaction time
- Hands-free offers little, if any, improvement

Summary

- Driver inexperience
- Vehicle unfamiliarity
- Excessive speed
- Cognitive distraction caused by wireless telephone conversation

Wireless Telephone Use

Michele McMurtry

Distraction Due to Wireless Telephone Use

- Vulnerability of young drivers
- Educating all drivers
- Driver education course material
- Sufficiency of available data
- Public policy

Safety Board Investigations Largo, Maryland, and Korona, Florida

Young drivers

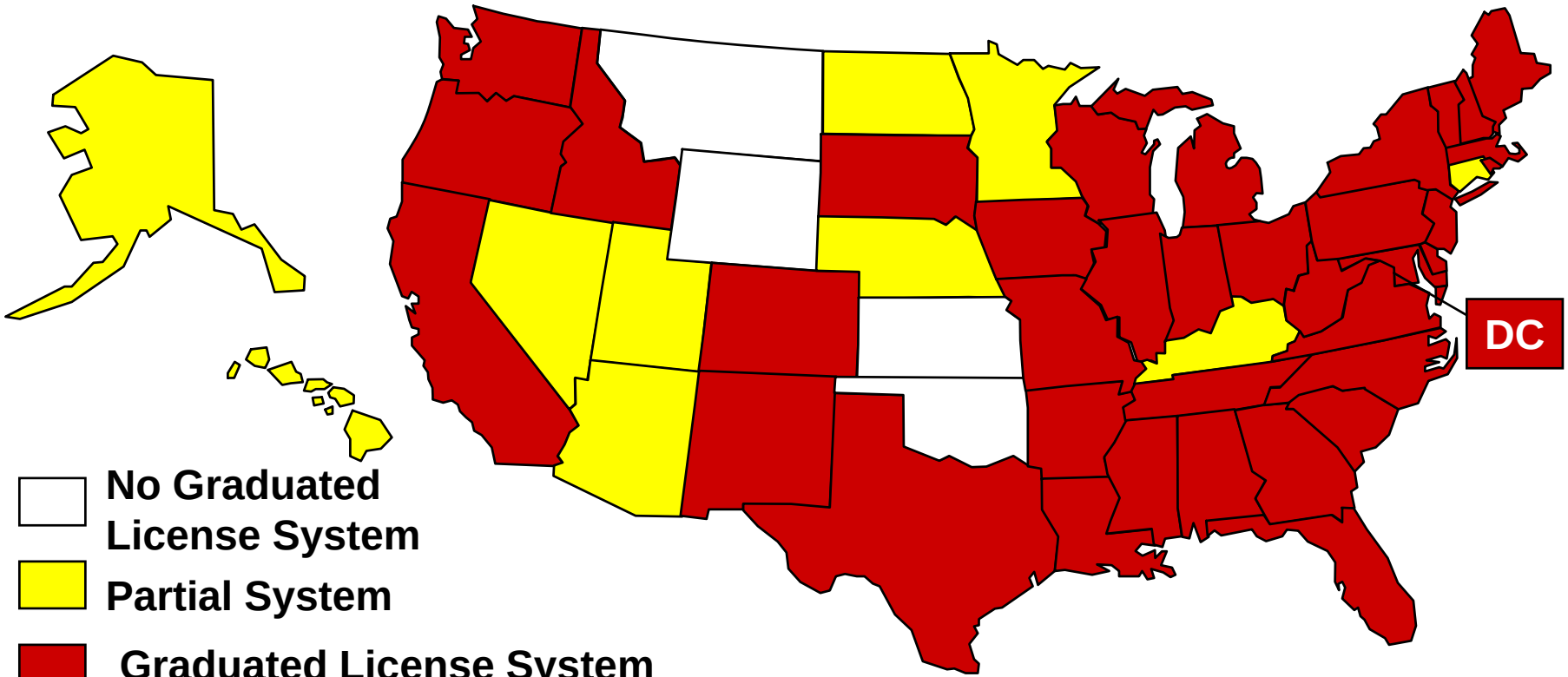
- were following another vehicle
- lost control and ran off the road
- were unbelted
- engaged in a wireless telephone conversation with the lead car driver

National Highway Traffic Safety Administration (NHTSA) Data

Drivers under 20 years old

- 6.8 percent of driving population
- 14.3 percent of fatal accidents
- 18.0 percent of total societal accident costs

States with Graduated Licensing for Young Drivers

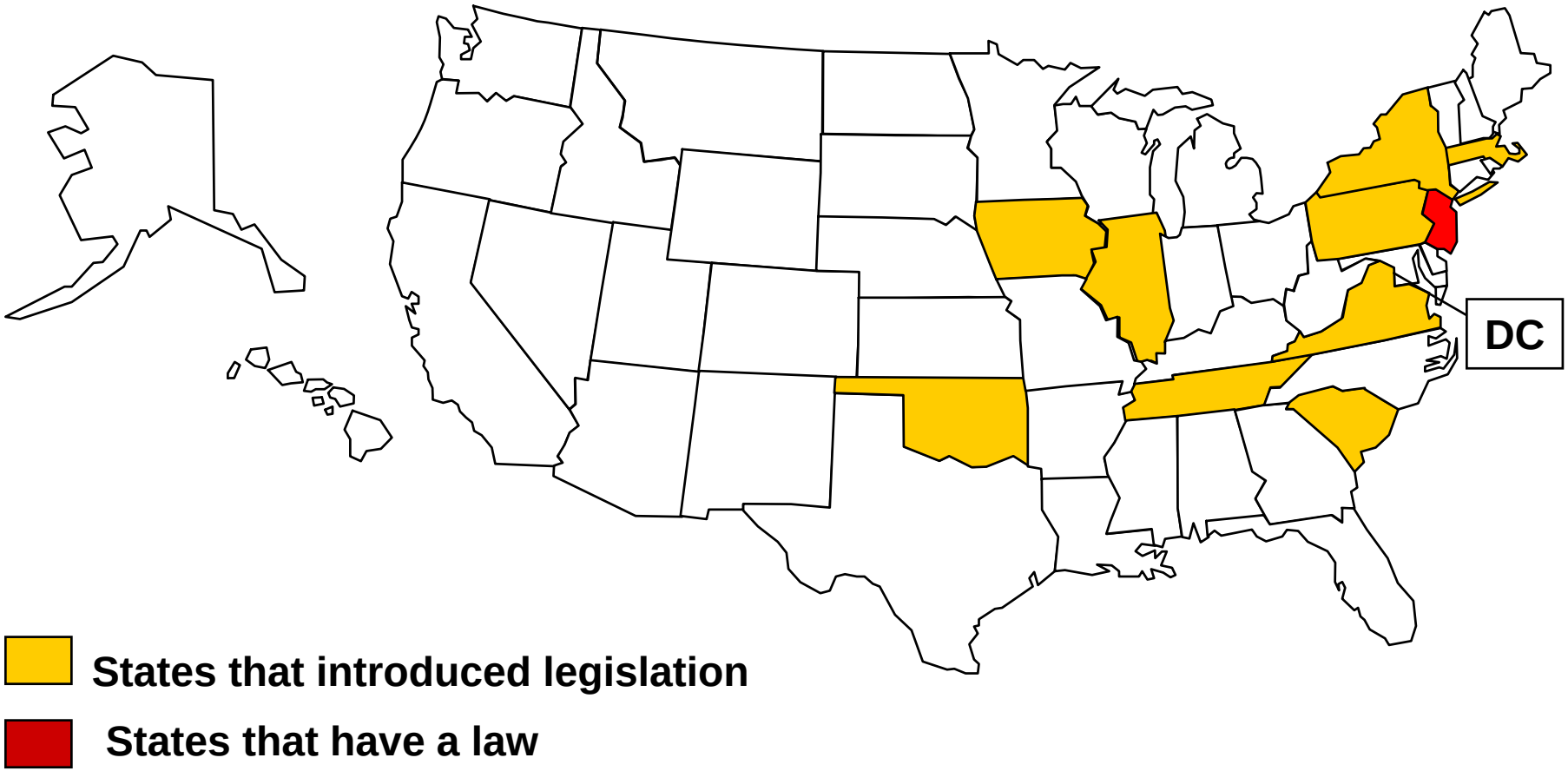


As of June , 2003

New Jersey Law

- Prohibits holders of driver's permits from using any interactive wireless device while operating a motor vehicle

States that Have Introduced Legislation to Prohibit Young Drivers from Using Interactive Wireless Devices While Operating a Vehicle



Educating All Drivers

- 145 million in U.S. subscribe to service
- 25 to 58 percent of drivers interviewed have used a wireless telephone while driving
- Minimal public awareness of dangers of distracted driving

Driver's Education

- Driver's education course material
  - Is general in nature
  - Does not stress cognitive demands of the use of wireless devices

Sufficiency of Available Data

- *An Investigation of the Safety Implications of Wireless Communications in Vehicles*
- Wireless telephone use has doubled
- Research suggests the detrimental effects of wireless telephone use while driving
- Accident data may be misleadingly low

Misleading Accident Data

- Drivers are unlikely to self-report
- Police officers are not necessarily trained to detect wireless telephone use
- Obtaining and analyzing wireless telephone records is time consuming
- Culling use from accident records is difficult
- Only 16 States have codes for driver distraction on their accident forms

100-Car Naturalistic Driving Study

- Precrash driver behavior
- NHTSA, VA DOT, VA Tech
- Data collected for 1 year on 100 drivers
- Vehicles instrumented with 5 cameras and 23 recording sensors

National Advanced Driving Simulator Projects

- NHTSA and the University of Iowa
- $1.5 million contract for two projects
  - Effects of wireless telephone use
  - Distraction influenced by the content, length, and intensity of telephone call

Public Policy

- New York law prohibits handheld wireless telephones
- 22 municipalities or counties have similar restrictions
- 24 countries have restrictions

Guidance to Policymakers

- NHTSA should update 1997 report
- Combine findings with results from
  - 100-Car Naturalistic Driving Study
  - National Advanced Driving Simulator research

Simulation

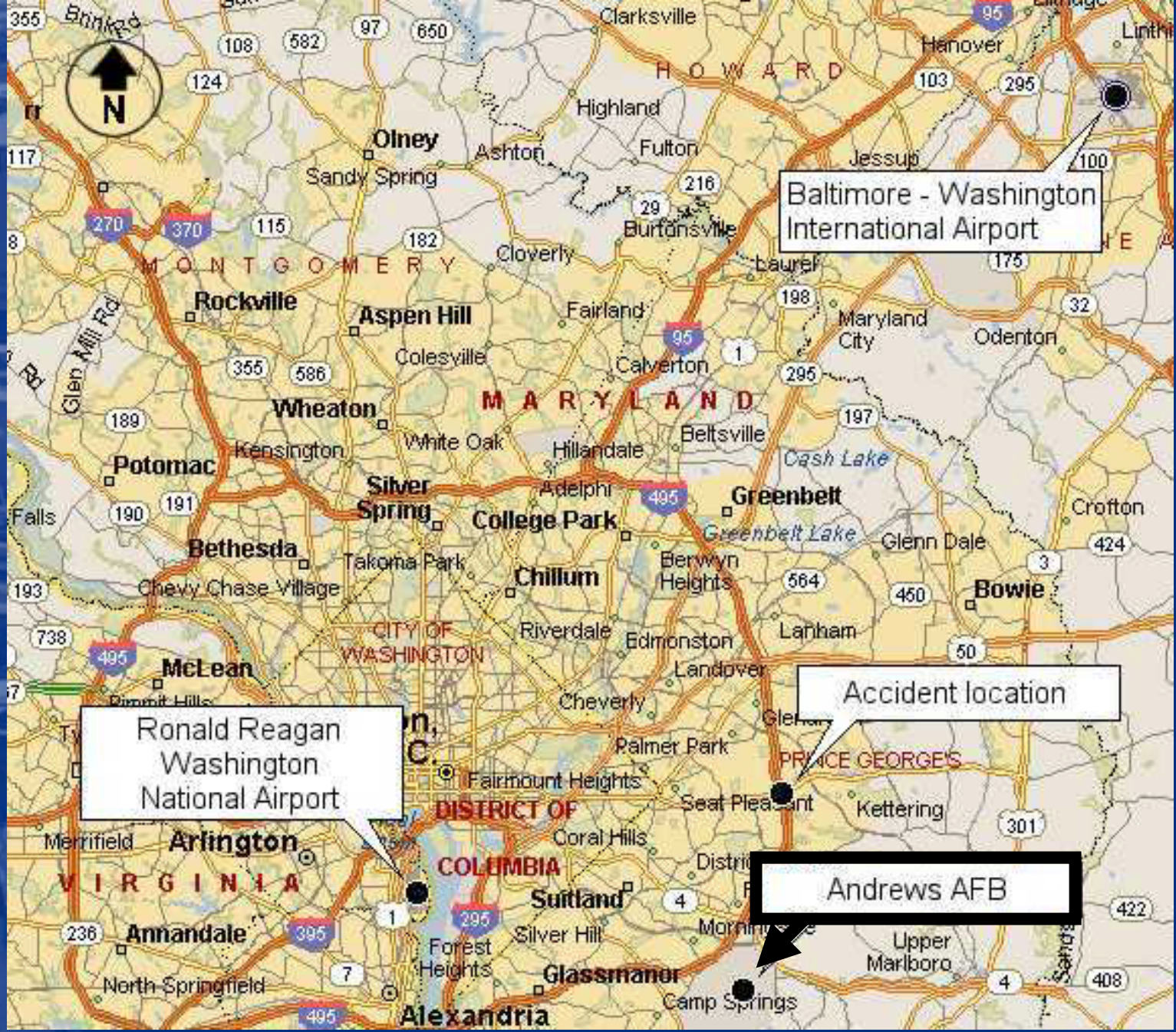
Shane Lack

Aspects of Vehicle Control

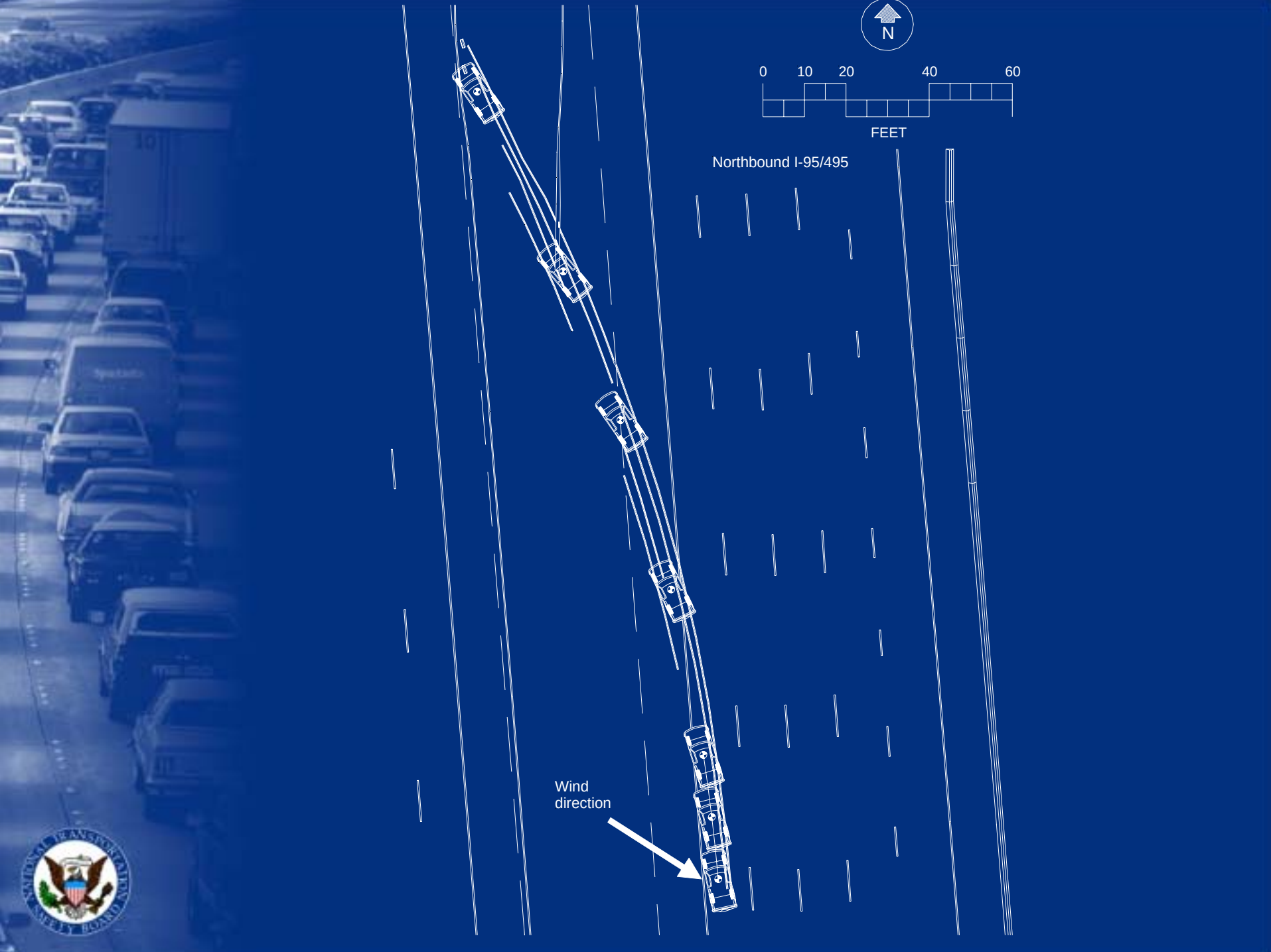
- Ability of tires to generate enough force to steer intended path
- Driver's ability to react and steer quickly enough to maintain control during handling maneuver

Simulation Examined

- Explorer's controllability in crosswinds
- Effects of driver-delayed reaction time due to wireless telephone use


Baltimore - Washington International Airport
Accident location
Ronald Reagan Washington National Airport
Andrews AFB
N
Clarksville
Hanover
Highland
Olney
Ashton
Fulton
Sandy Spring
Jessup
Burtonsville
Cloverly
Laurel
Rockville
Aspen Hill
Fairland
Maryland City
Odenton
Colesville
Calverton
Wheaton
White Oak
Hillandale
Beltsville
Cash Lake
Kensington
Potomac
Silver Spring
Adelphi
Greenbelt
College Park
Greenbelt Lake
Glenn Dale
Crofton
Bethesda
Takoma Park
Berwyn Heights
Chillum
Chevy Chase Village
Bowie
CITY OF WASHINGTON
Riverdale
Edmonston
Lanham
McLean
Landover
Cheverly
Palmer Park
Fairmount Heights
Seat Pleasant
Kettering
Merrifield
Arlington
Coral Hills
COLUMBIA
Suitland
Silver Hill
Forest Heights
Glassmanor
Upper Marlboro
Annandale
North Springfield
Camp Springs
Alexandria
MONTGOMERY
MARYLAND
HOWARD
PRINCE GEORGE'S
DISTRICT OF
VIRGINIA
Glen Mill Rd

Source:


N
0 10 20 40 60
FEET
Northbound I-95/495
Wind direction

Simulation Parameters

- Speed: 70 mph
- Wind
  - 23 mph crosswind
  - 44 mph gust
- Driver reaction time
  - Alert driver: 0.30 to 0.59 seconds
  - Distracted driver: 0.685 to 1.15 seconds

Simulation Results

- High and gusting wind conditions would have caused vehicle to deviate off path, but did not render vehicle uncontrollable
- Additional effect of delayed reaction time caused by wireless telephone use would not have made the vehicle uncontrollable

Simulation Results (Continued)

- Additional effect of delayed reaction time caused by wireless telephone use could have resulted in greater lateral motion to right, increasing likelihood of intrusion into next lane

Vehicle Stability

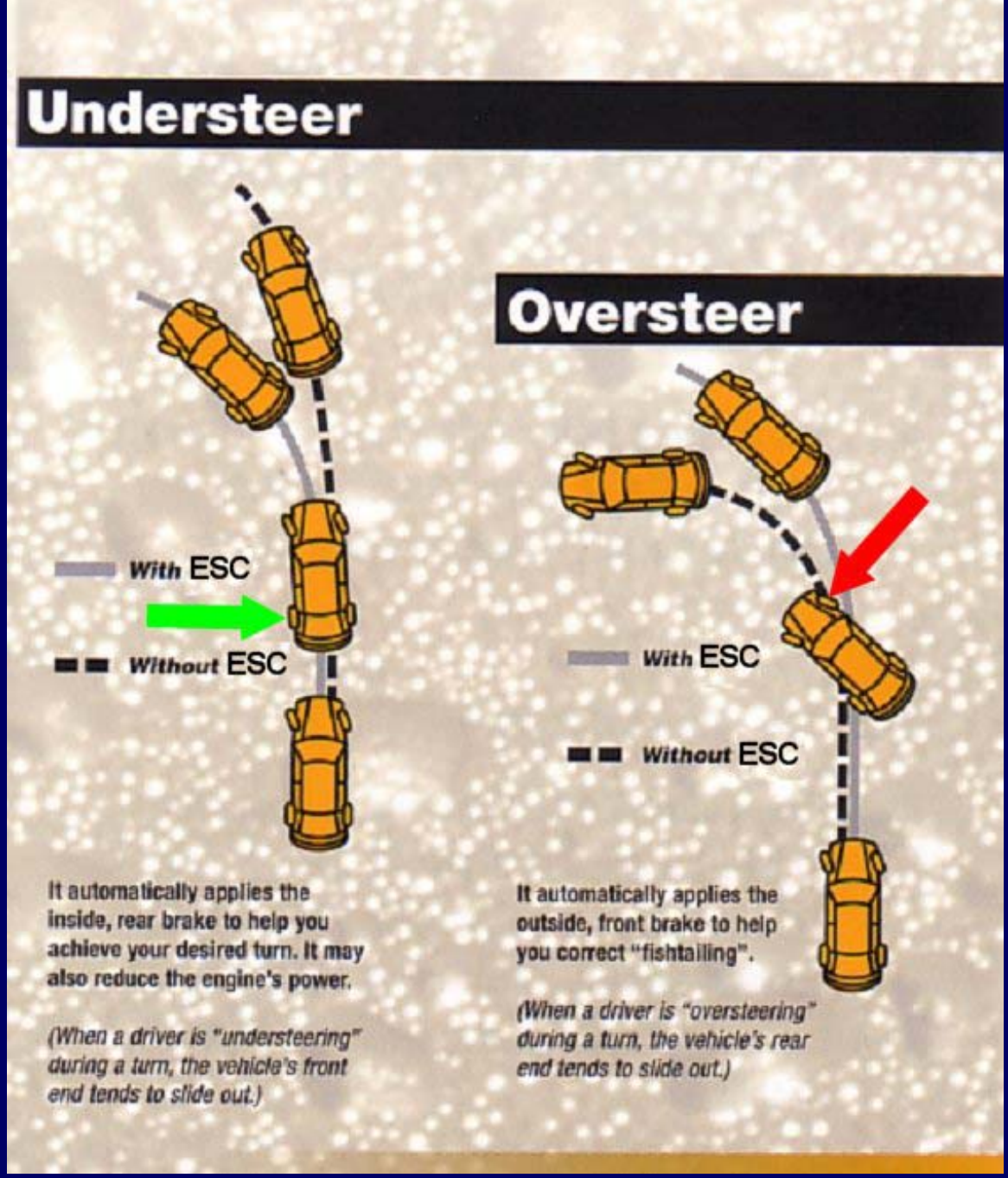
Vernon Roberts

Crash Avoidance Technology

- Antilock braking systems and traction control
- Monitor wheel rotational speeds and release or apply braking force as needed

Electronic Stability Control (ESC)

- Includes
  - Yaw rate sensor
  - Steering wheel angle sensor
- Monitors vehicle motion and driver intent
- ESC algorithm initiates precise brake applications



Source: Continental Teves

ESC Installation

- 6 percent of vehicles manufactured in the United States have ESC
- Most European cars sold in the United States have ESC as standard equipment

Real World Experience

- German accident data
  - 15 percent reduction
- Swedish accident data
  - 22 percent reduction
- Japanese accident data
  - 35 percent reduction

U. S. Experience with ESC

- No data analysis to date
- Potential for greater ESC benefits than that shown by European and Japanese data

Largo Accident Assessment

Possible ESC intervention

- Vehicle push to right by wind
- Driver's sharp left steer input

Largo Accident Assessment (Continued)

- ESC can increase vehicle stability in situations such as this accident
- This accident similar to many occurrences each year

Highway Issues

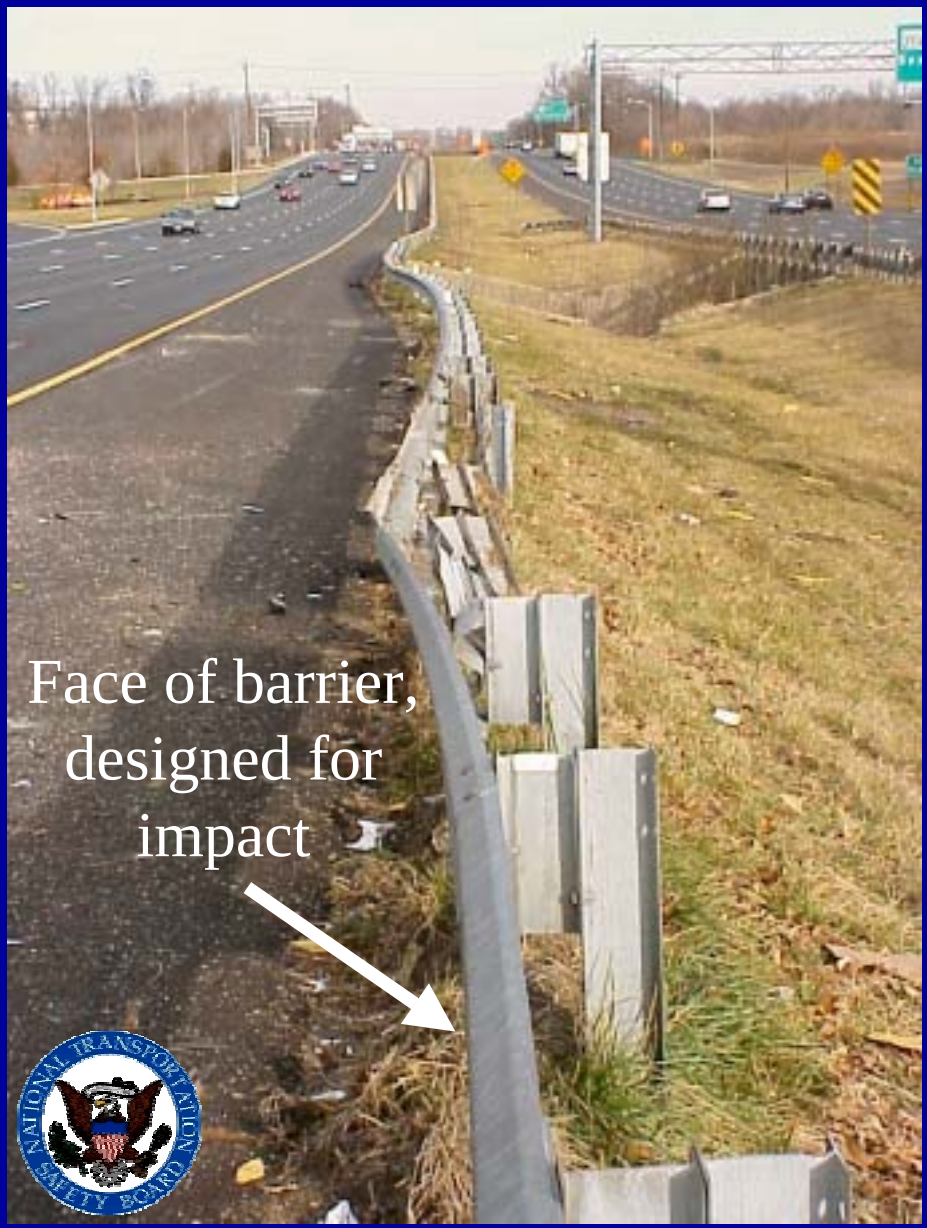
Mark Bagnard


ROAD
WORK
1/2 MILE

Turned-down terminal used at accident location

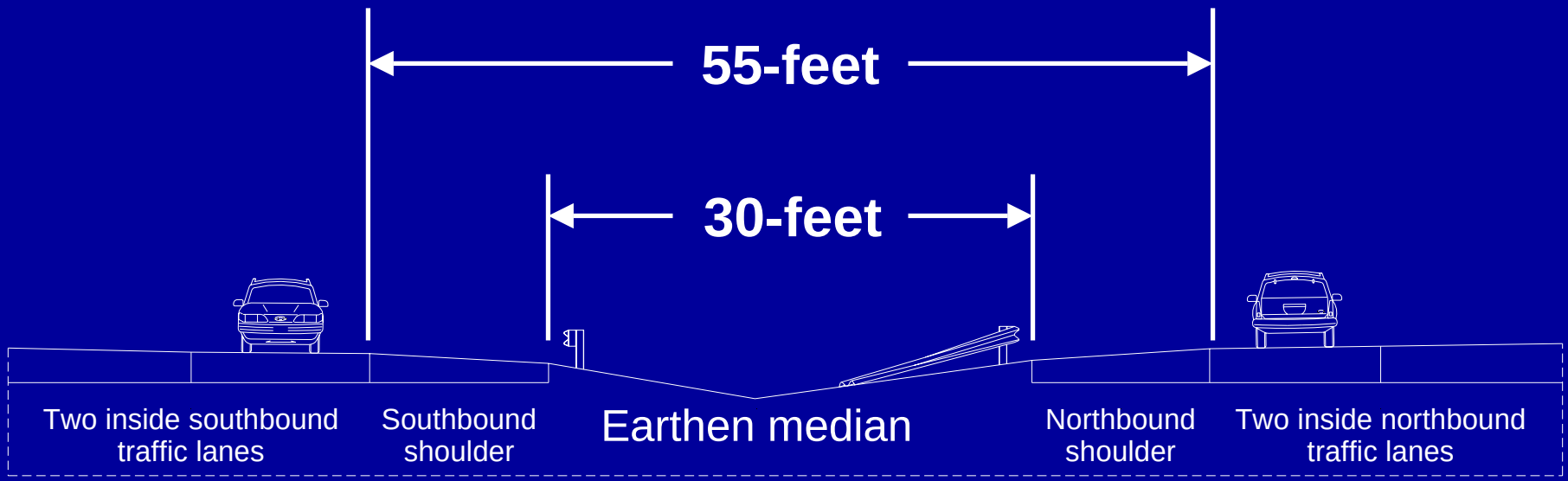
Flared Energy-Absorbing Terminal (FLEAT)

FHWA photo



Single-sided W-beam barrier

Double-sided W-beam barrier

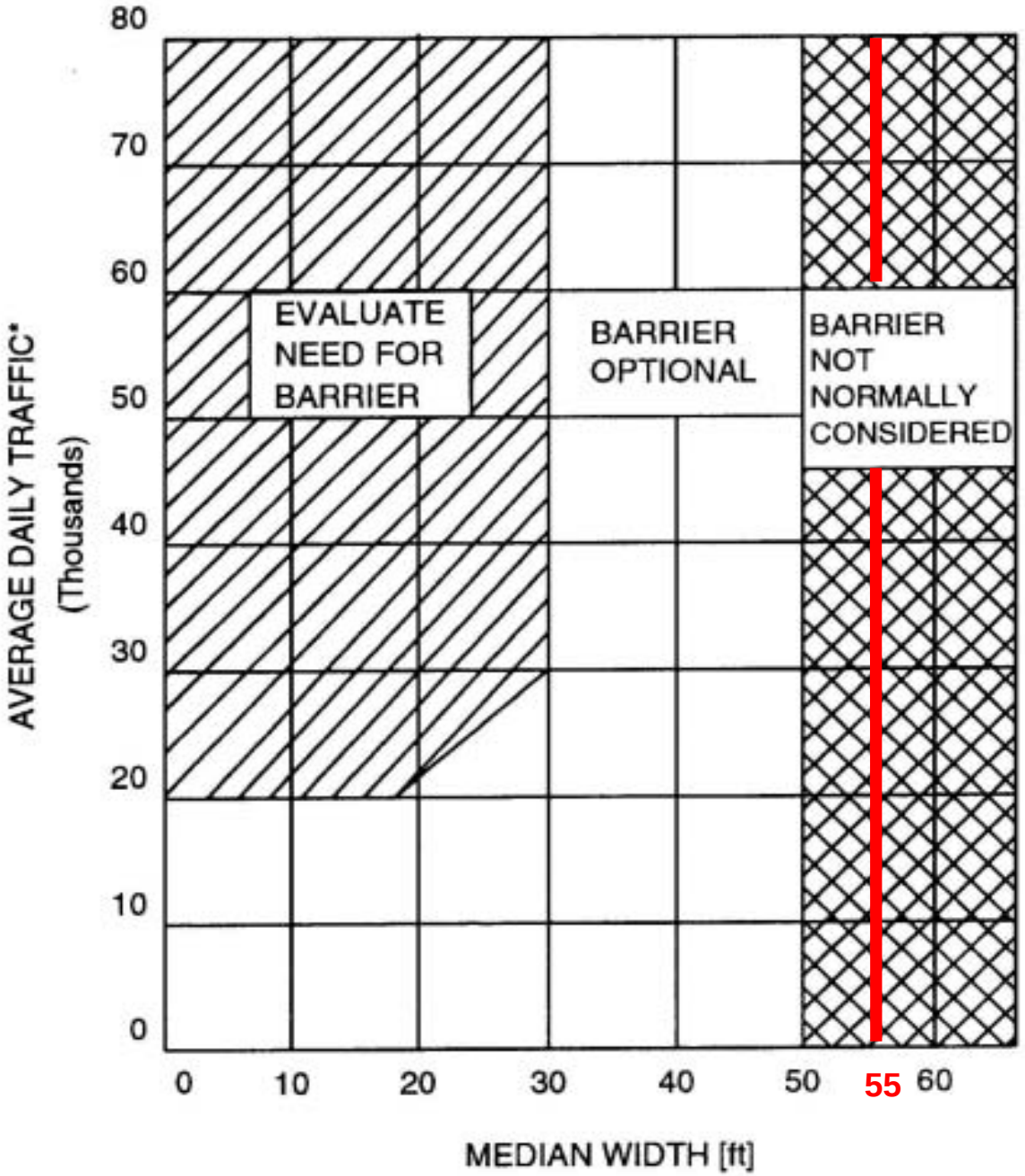

55-feet
30-feet
Two inside southbound traffic lanes
Southbound shoulder
Earthen median
Northbound shoulder
Two inside northbound traffic lanes


ROAD
WORK
1/2 MILE
EXIT 15A
214 EAST
Central Ave
Largo


ROAD
WORK
1/2 MILE

American Association of State Highway and Transportation Officials (AASHTO)

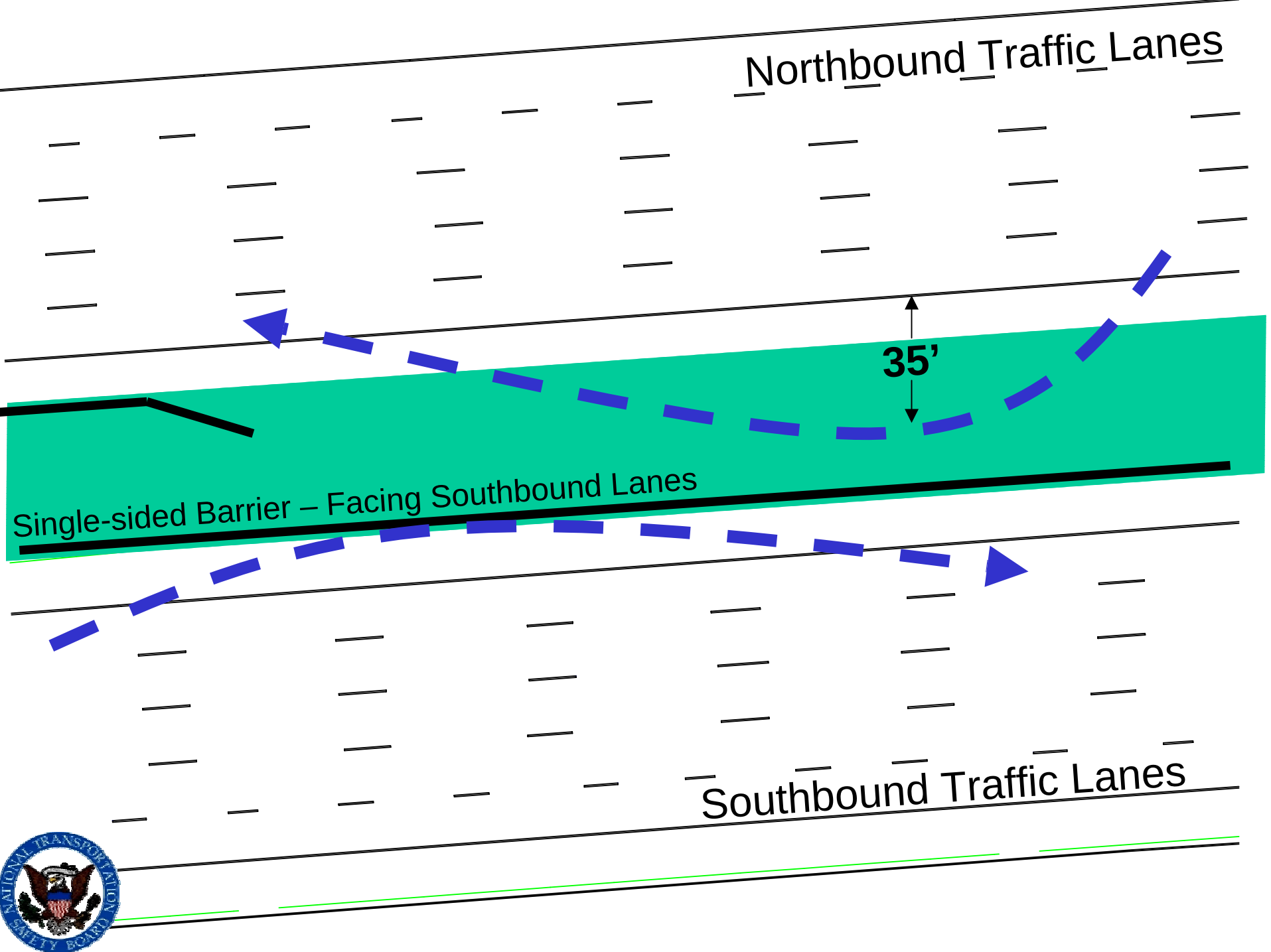
- Established median barrier guidelines in 1967
- Median widths and traffic volumes added to guidelines in 1977
- Same guidance used for past 26 years



Source: AASHTO

Maryland State Highway Administration

- 1990 review of median crossover accidents
- Number of median crossover accidents small, but severe
- Barrier installation in medians less than 75 feet wide


Northbound Traffic Lanes
35’
Single-sided Barrier – Facing Southbound Lanes
Southbound Traffic Lanes

Guardrail Inventory

- 3,400 turned-down terminals in use
- System upgrade costly --$34.3 million
- $2.0 million project for the Baltimore/Washington corridor to be upgraded in FY 2003

Previous Recommendations

- From Slinger, Wisconsin, median crossover accident
- To AASHTO and FHWA
- Regarding the median barrier warrants

Revisions to AASHTO 2002 Roadside Design Guide

- No changes made to chart used for barrier evaluations
- Unshielded median widths of 30-feet may be inadequate
- Description of warrants currently in use by California and Florida

National Cooperative Highway Research Project Test Parameters

- Level surface
- 1992 Ford Explorer
- 58 mph speed
- 20° impact angle