# NATMEC ICWIM 2002

*Driving You into the future…*

digital traffic systems

*A Transportation Sensor Services And Products Company*

# dts

- A National Traffic Data Systems Firm Offering Cradle to Grave Sensor Services
  - Project Management
  - Deployment planning
  - Systems Engineering
  - System Integration
  - Sensor Installation
  - Calibration
  - Maintenance
- Experienced in Multiple Sensor Types
  - Video Image Processing
  - Surveillance Video
  - WIM
  - Count/classifiers
  - Non-intrusive

# dts Locations

NE Ops
Harrisburg

Government Sales
Wash DC

Mid-Atlantic
Operations
Richmond

SE Ops
Palm Coast

Research Center
Colorado Springs

SW Ops
Santa Fe

Corporate HQ
Albuquerque, NM

# Introducing *TigreEye©* the "*Smart Camera System*"

- A video based, wide area surveillance subsystem providing near real-time traffic and vehicle behavior data
- Interoperable with TMC, TAS and ISP's
- Compatible with most traffic cameras

# dts
# TigreEye© System

- Operates 24/7, lights out
- Handles multiple lanes of traffic
- Bi-directional
- User defined/selectable tracking regions
- Data can be viewed real time and/or archived

# TigreEye© Traffic Measurements

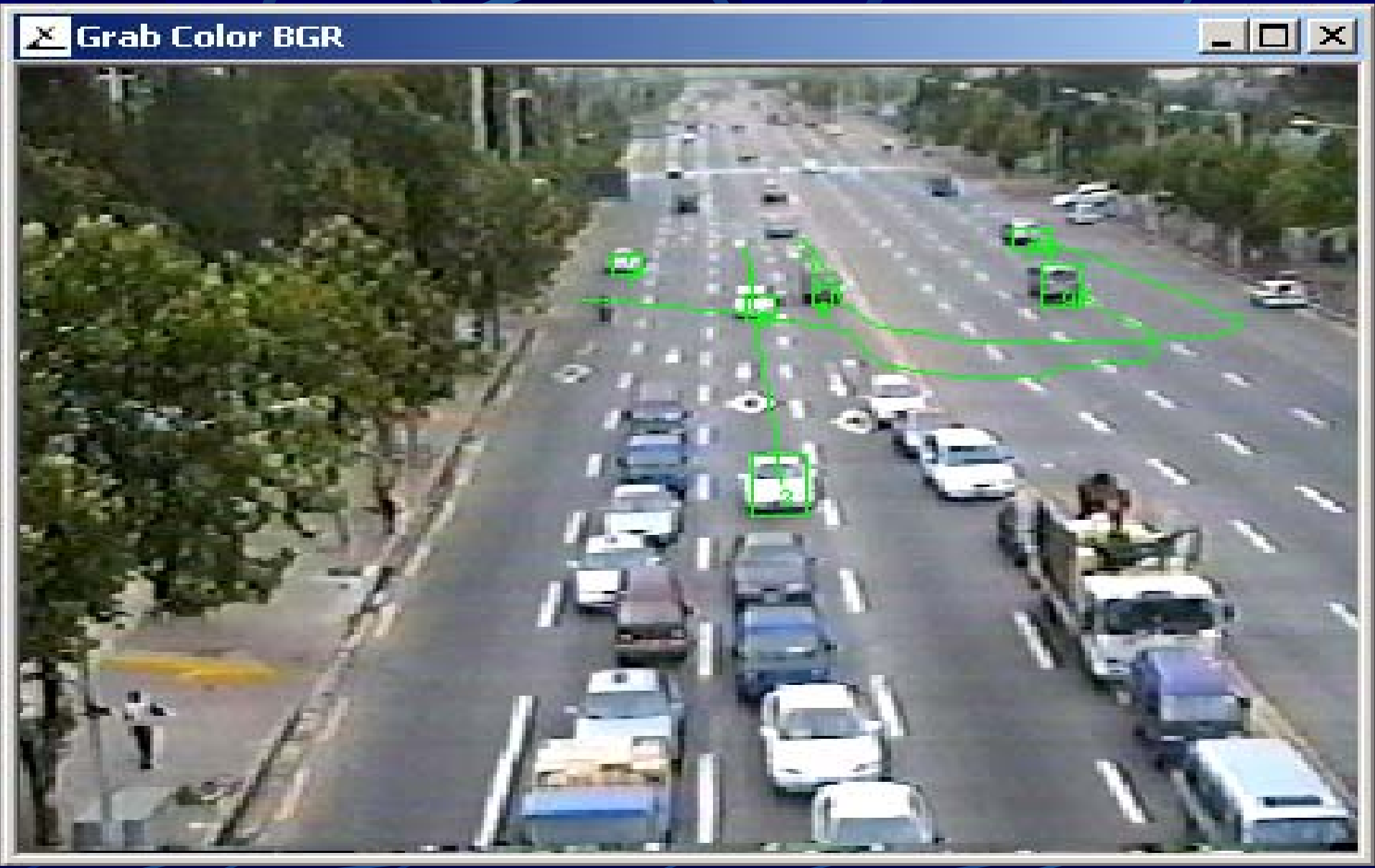
Metrics are based upon sensor geometry in three categories.

- Traffic flow
  - Average flow speed
  - Vehicle Count
- Traffic monitoring
  - Volume
  - Queue
  - Density
  - Lane occupancy
  - Headway
  - Vehicle length
- Vehicle behavior
  - Speeding
  - Illegal lane occupancy
  - U-turns

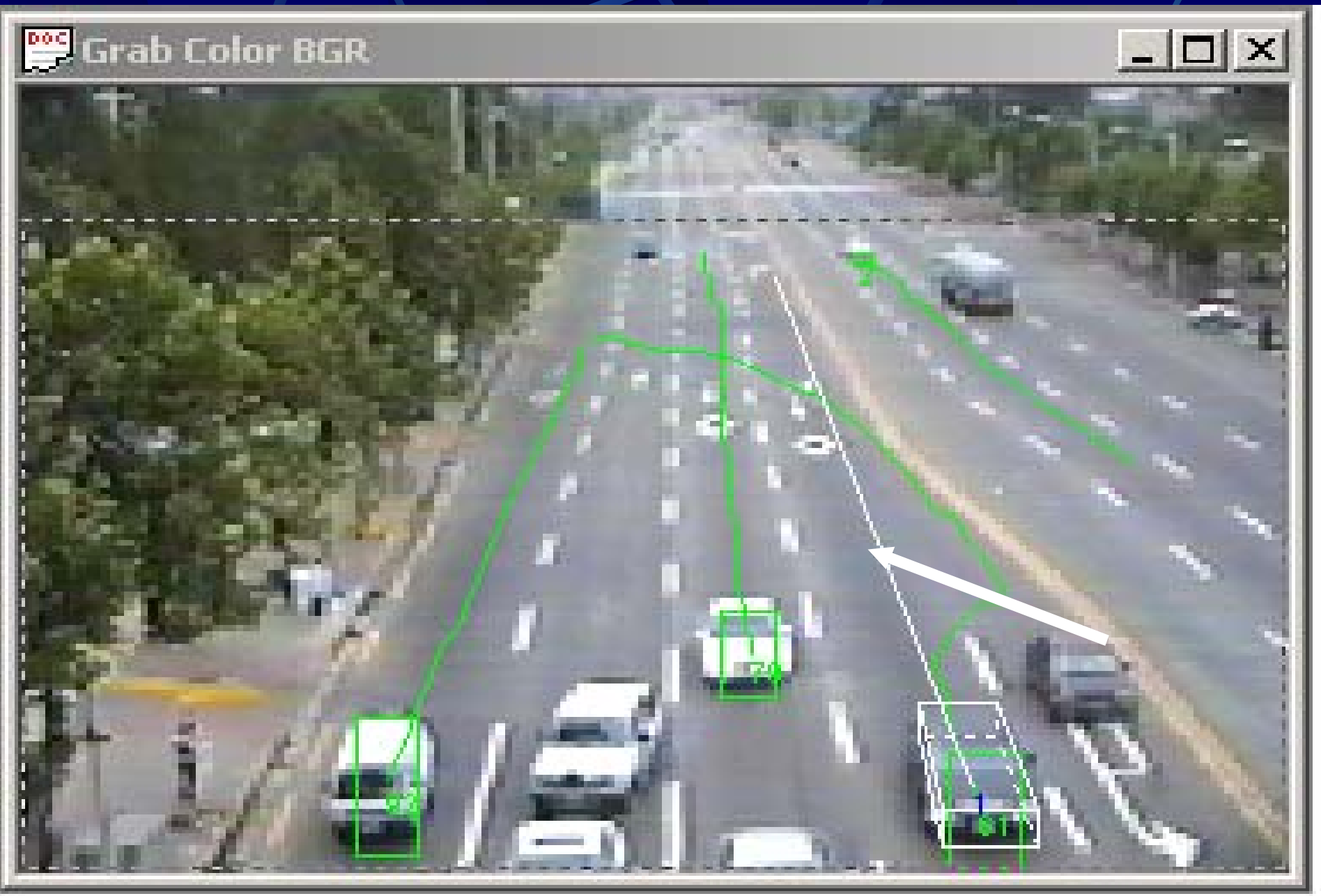
# Traffic Behavior Metrics

- Illegal/improper stopping
- Illegal/improper turning movement
- Unsafe, illegal or improper lane changes
- Driving on the shoulder, in emergency lanes, or outside traffic lanes
- Driving the wrong direction

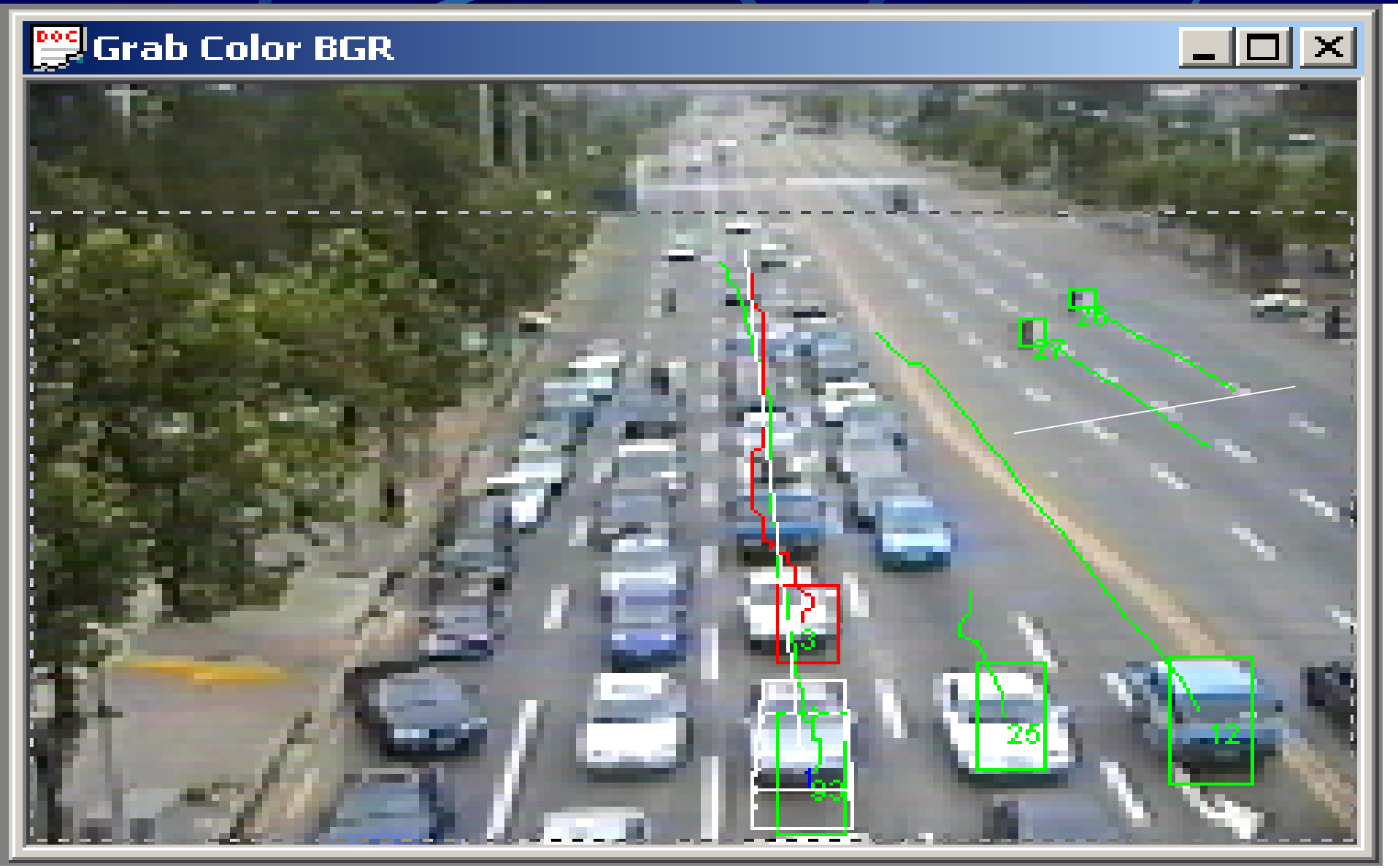
# U-turn Across Six Lanes



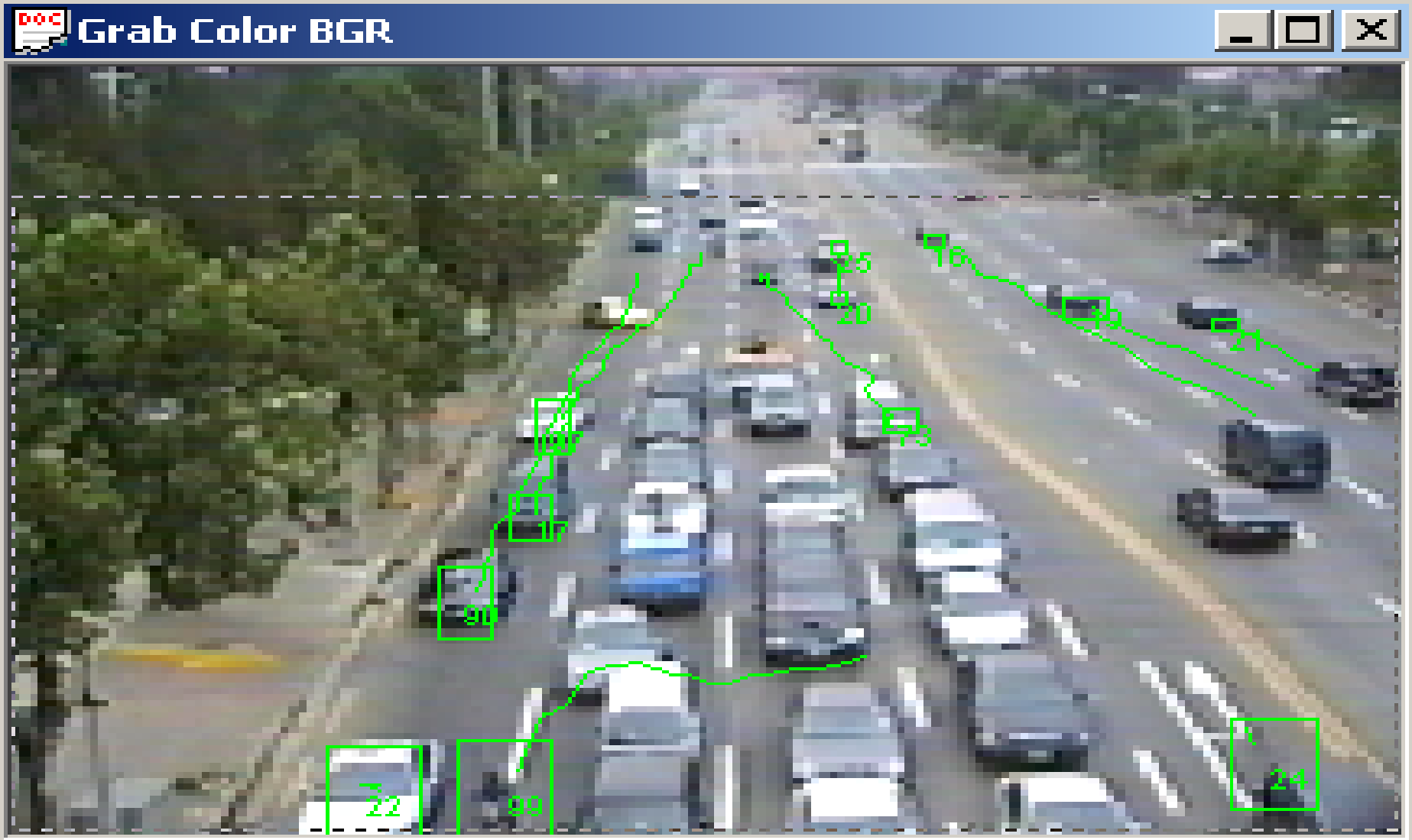
# Lane Changes



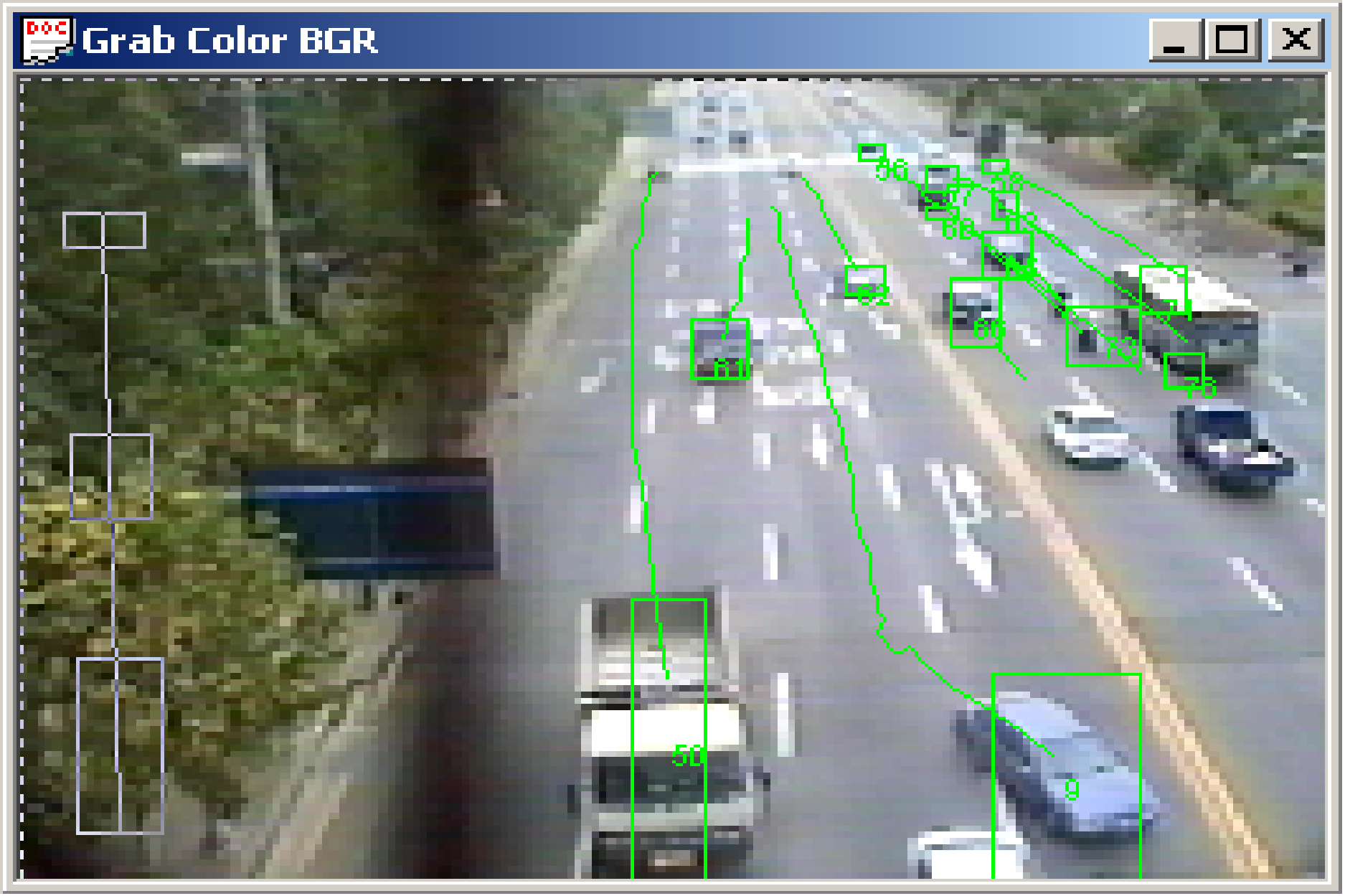
# Wrong Way



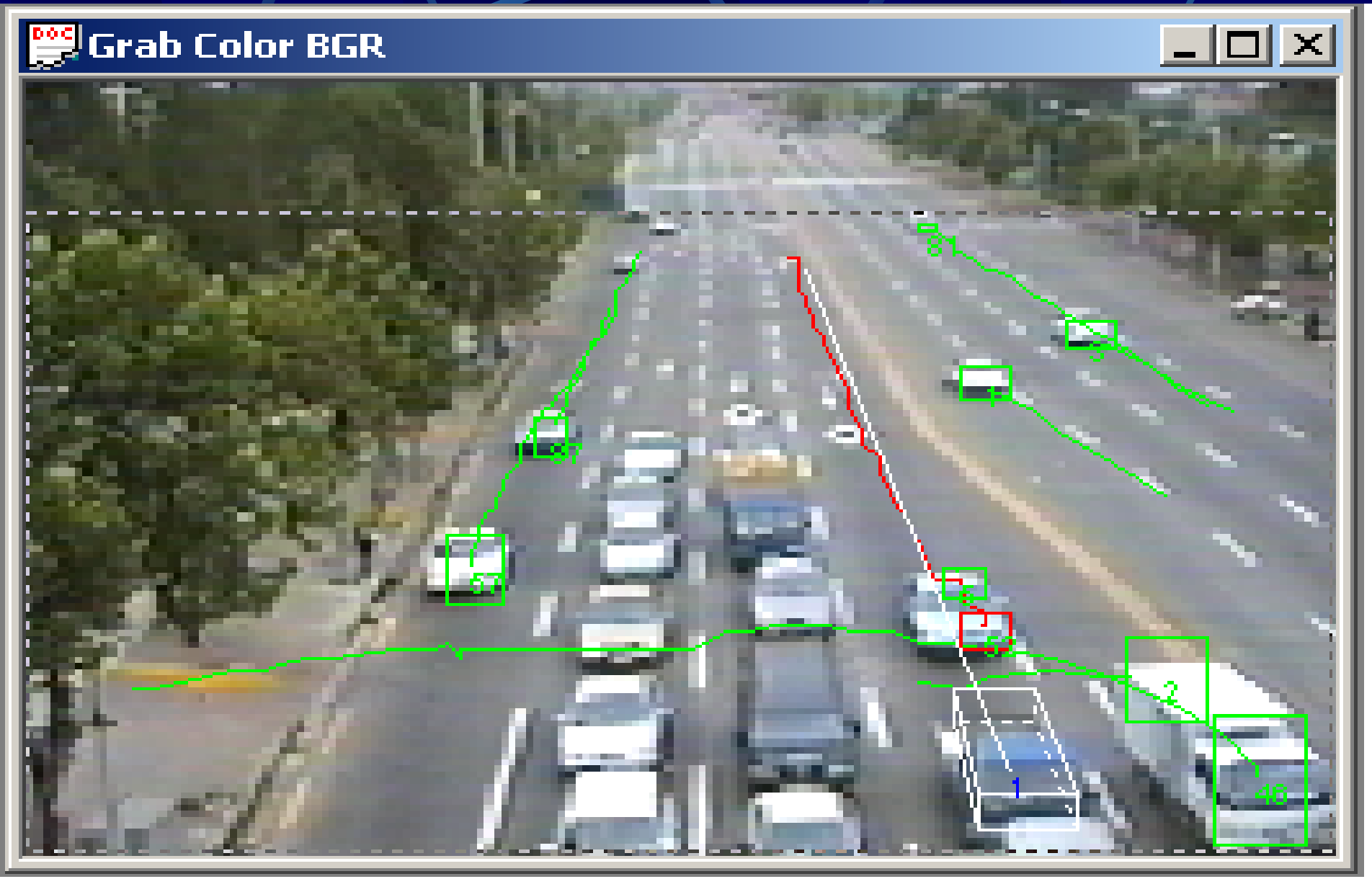
# Motorcycle Moving Between Cars



# Swerving Lane Change



# Crossing Traffic



# Pedestrian/Car Relationships

Child on Bicycle entering Traffic

Jaywalking Pedestrian

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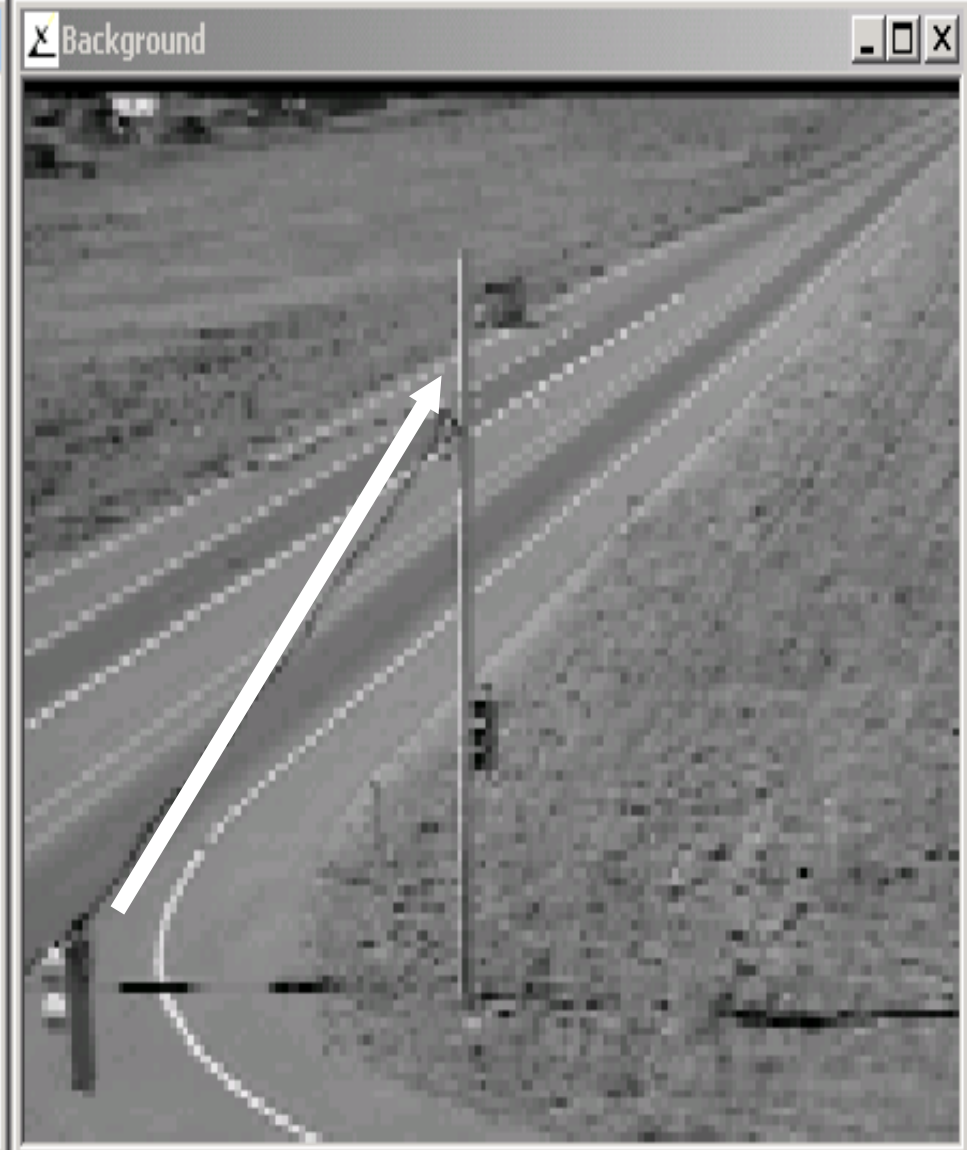
# Vehicle Stopped



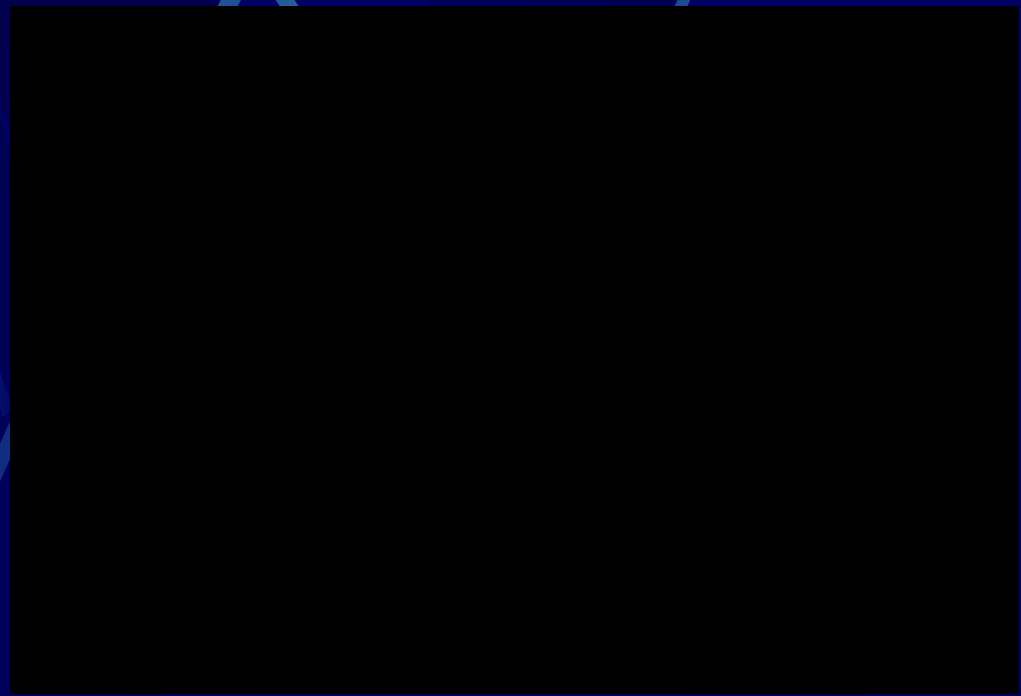

Isolation on stopped vehicle

# *dts* TigreEye© Process

- Field of View
- Region of Interest
- Vehicle Tracking & Counts
- Calibration
- User Interface

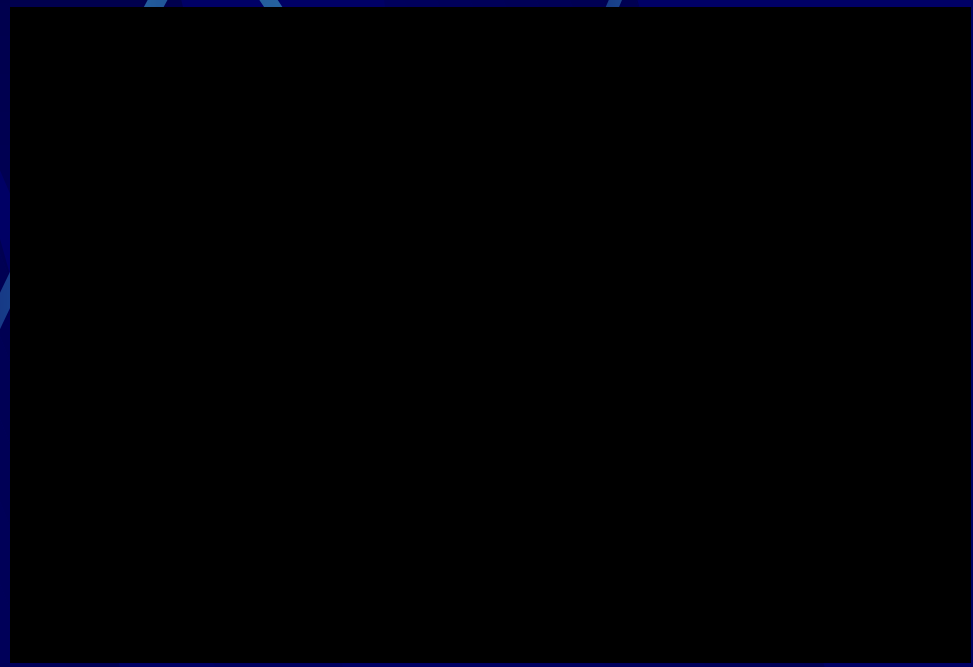
# *dts* TigreEye© Field of View

- Geometry Dependent
- Optimum: 40’ camera mount
  - Horizontal FOV
- Camera Tilt: Overhead
  - can be off angle
- Minimize obstructions
  - Shadowing
  - Occlusion



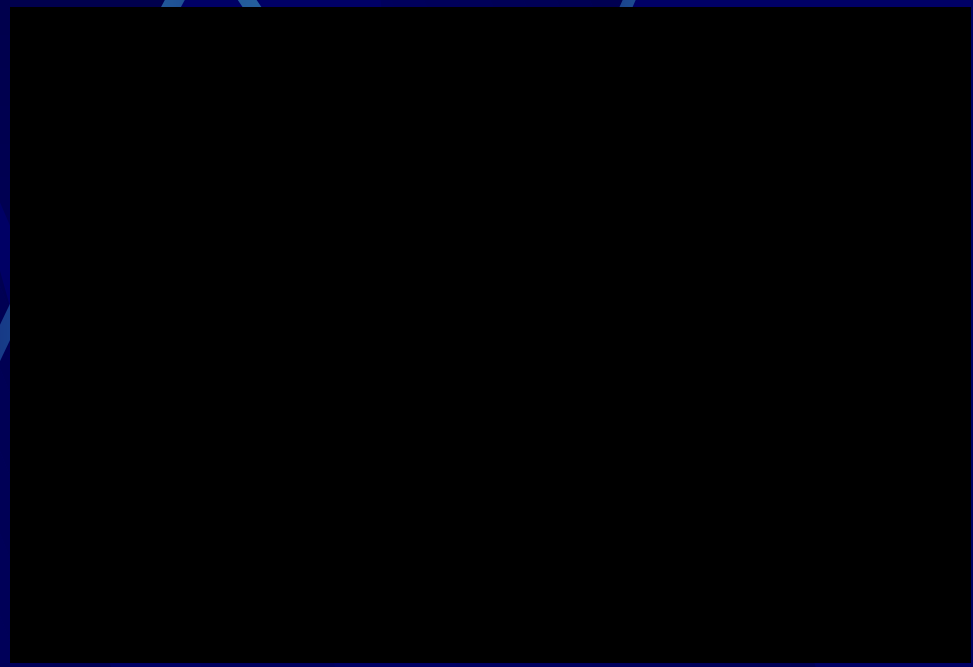
# *dts* TigreEye© Region of Interest

- User Selectable
- Lanes or regions
- Only limited by FOV
- Bi-directional



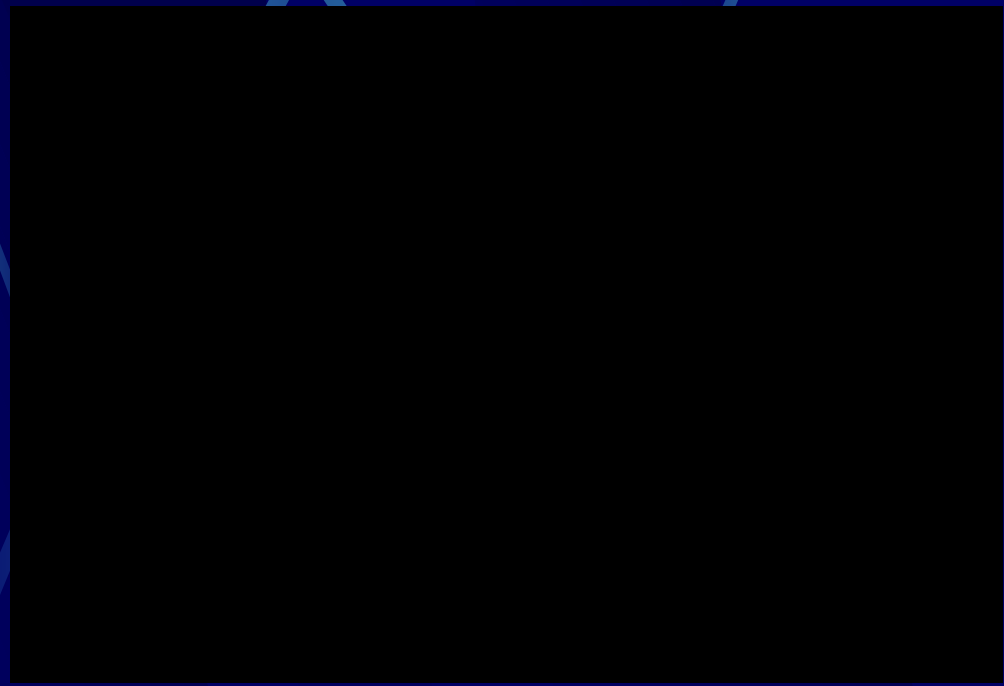
# *dts* TigreEye© Tracking/Count

- User Defined site
- Multiple locations in FOV
- Counts vehicles at exit point/box
- Track Objects
- Classifies Vehicles



# *dts* TigreEye© Calibration

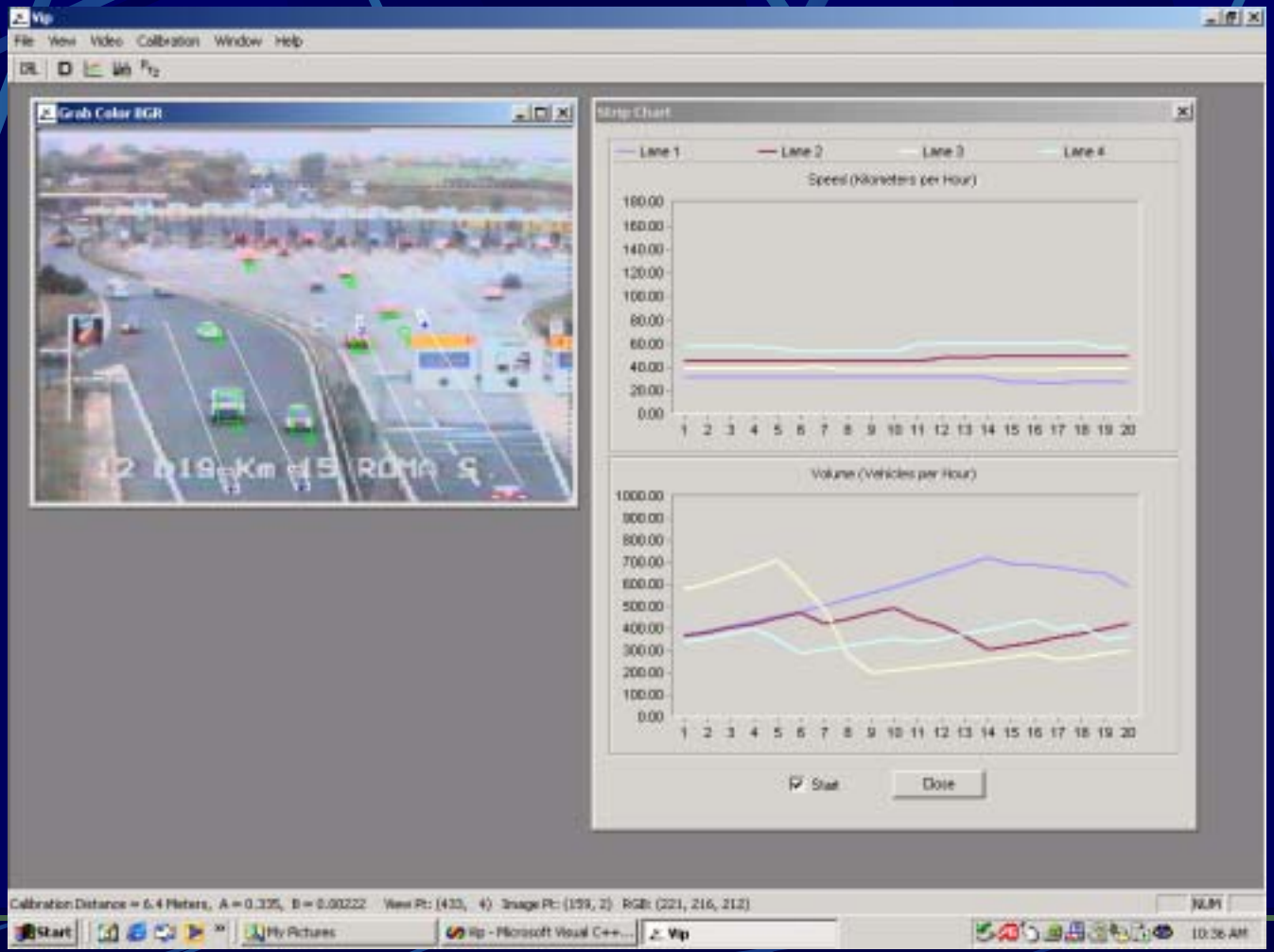
- User friendly
- On screen references
- Within FOV
- Based upon distance



# *dts* TigreEye© User Interface

- Open Architecture
- User Defined
- Data tables
- Web based
- Remote VIP

# Sample Interface

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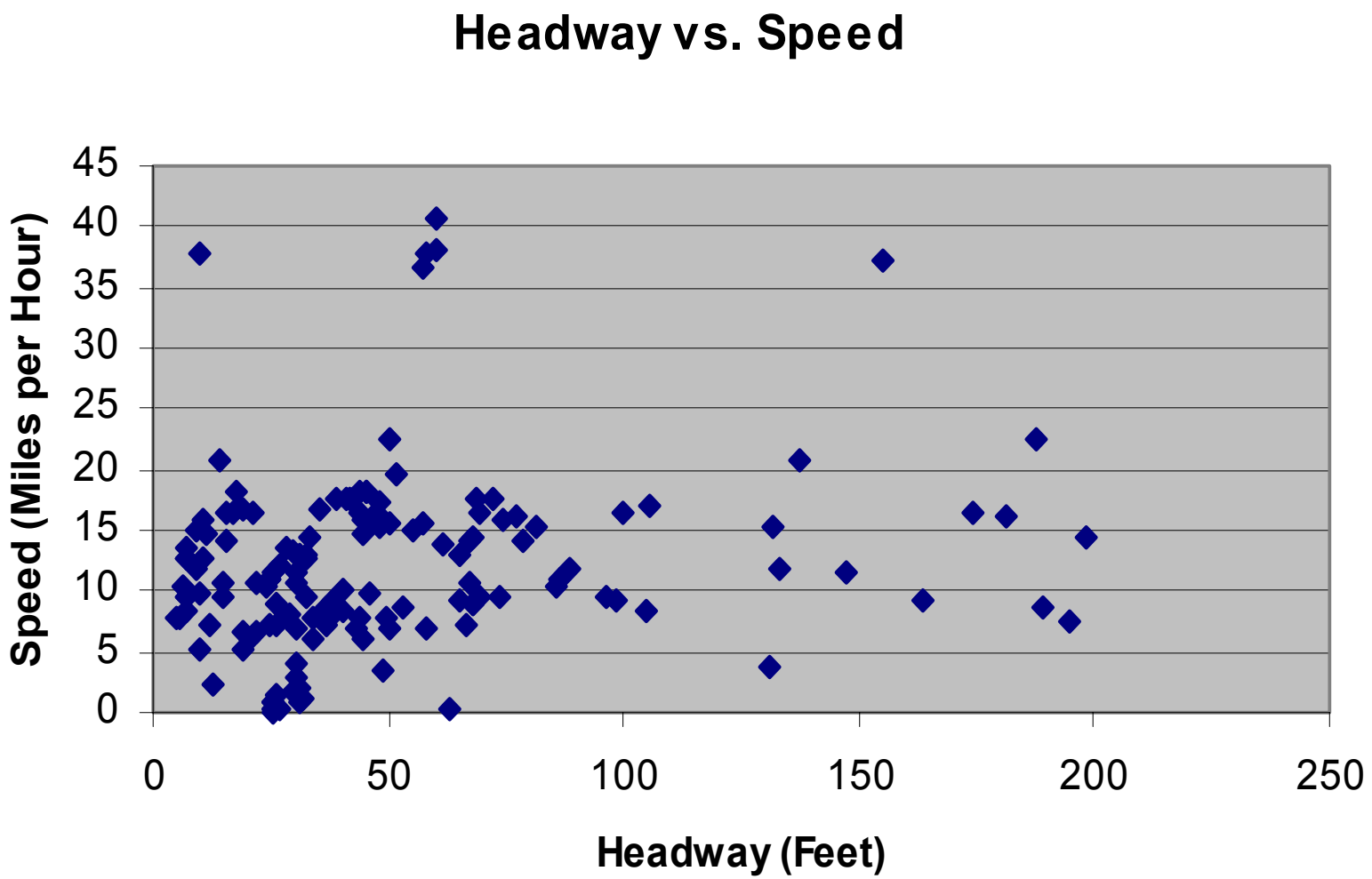
# Sample Database

| Vehicle Trace File RVIP started 8- 3-2001 11: 4:48 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | sec | | ft | ft. | mph | delta y | delta x |
| ID | time | nLane | pos.x | pos.y | speed | length | width |
| 12 | 1.218 | 3 | 96.4 | 87.8 | 10.1 | 15.3 | 12 |
| 12 | 1.562 | 3 | 93.7 | 83.3 | 8.2 | 15 | 15 |
| 12 | 1.89 | 3 | 91.9 | 78.7 | 8.2 | 15 | 15 |
| 12 | 2.234 | 3 | 90 | 73.7 | 8.9 | 15 | 15 |
| 12 | 2.562 | 3 | 88.6 | 69.6 | 8.4 | 15 | 15 |
| 12 | 2.906 | 3 | 86.7 | 65.5 | 8.5 | 15 | 15 |
| 12 | 3.234 | 3 | 84.9 | 61.6 | 8.5 | 15 | 15 |
| 12 | 3.562 | 3 | 83 | 57.8 | 8.9 | 15 | 15 |
| 12 | 3.906 | 3 | 80.9 | 53.6 | 8.6 | 15 | 15 |
| 12 | 4.234 | 3 | 78.9 | 49.6 | 8.6 | 15 | 15 |
| 12 | 4.578 | 3 | 76.8 | 45.5 | 8.2 | 15 | 15 |
| 12 | 4.906 | 3 | 74.9 | 41.8 | 8.2 | 15 | 15 |
| 12 | 5.25 | 3 | 73.1 | 38.1 | 7.5 | 15 | 15 |
| 12 | 5.578 | 3 | 71.4 | 34.6 | 7 | 15 | 15 |
| 12 | 5.906 | 3 | 69.8 | 31.4 | 7.3 | 15 | 15 |
| 7 | 1.015 | 3 | 89.5 | 70 | 8.3 | 15.2 | 14 |
| 7 | 1.359 | 3 | 87.6 | 65.9 | 8 | 15 | 13.8 |
| 7 | 1.687 | 3 | 85.8 | 62.2 | 7.1 | 15.7 | 14 |
| 7 | 2.031 | 3 | 83.8 | 58.2 | 7.8 | 15.1 | 13 |
| 7 | 2.359 | 3 | 82.1 | 54.6 | 8.4 | 15 | 12.8 |
| 7 | 2.703 | 3 | 80.1 | 50.6 | 8.3 | 15 | 12.8 |
| 7 | 3.031 | 3 | 78.2 | 46.7 | 8.6 | 15 | 12.8 |
| 7 | 3.375 | 3 | 76 | 42.5 | 8.6 | 15 | 12.8 |
| 7 | 3.703 | 3 | 74 | 38.5 | 8.8 | 15 | 12.8 |
| 7 | 4.031 | 3 | 71.8 | 34.4 | 9.2 | 15 | 12.8 |
| 7 | 4.375 | 3 | 69.2 | 30.1 | 9 | 15 | 12.8 |
| 7 | 4.703 | 3 | 66.8 | 26 | 8.7 | 15 | 12.8 |
| 7 | 5.047 | 3 | 64.5 | 22 | 7.9 | 15 | 12.8 |
| 7 | 5.375 | 3 | 62.5 | 18.4 | 7.3 | 15 | 12.8 |
| 7 | 5.718 | 3 | 60.5 | 14.8 | 6.9 | 15 | 12.8 |
| 7 | 6.047 | 3 | 58.8 | 11.6 | 6.7 | 15 | 12.8 |
| 7 | 6.375 | 3 | 61.7 | 16.7 | 7 | 37 | 13.2 |
| 7 | 6.718 | 3 | 59.9 | 13.6 | 5.5 | 37 | 13.2 |

# Traffic Parameter Plots



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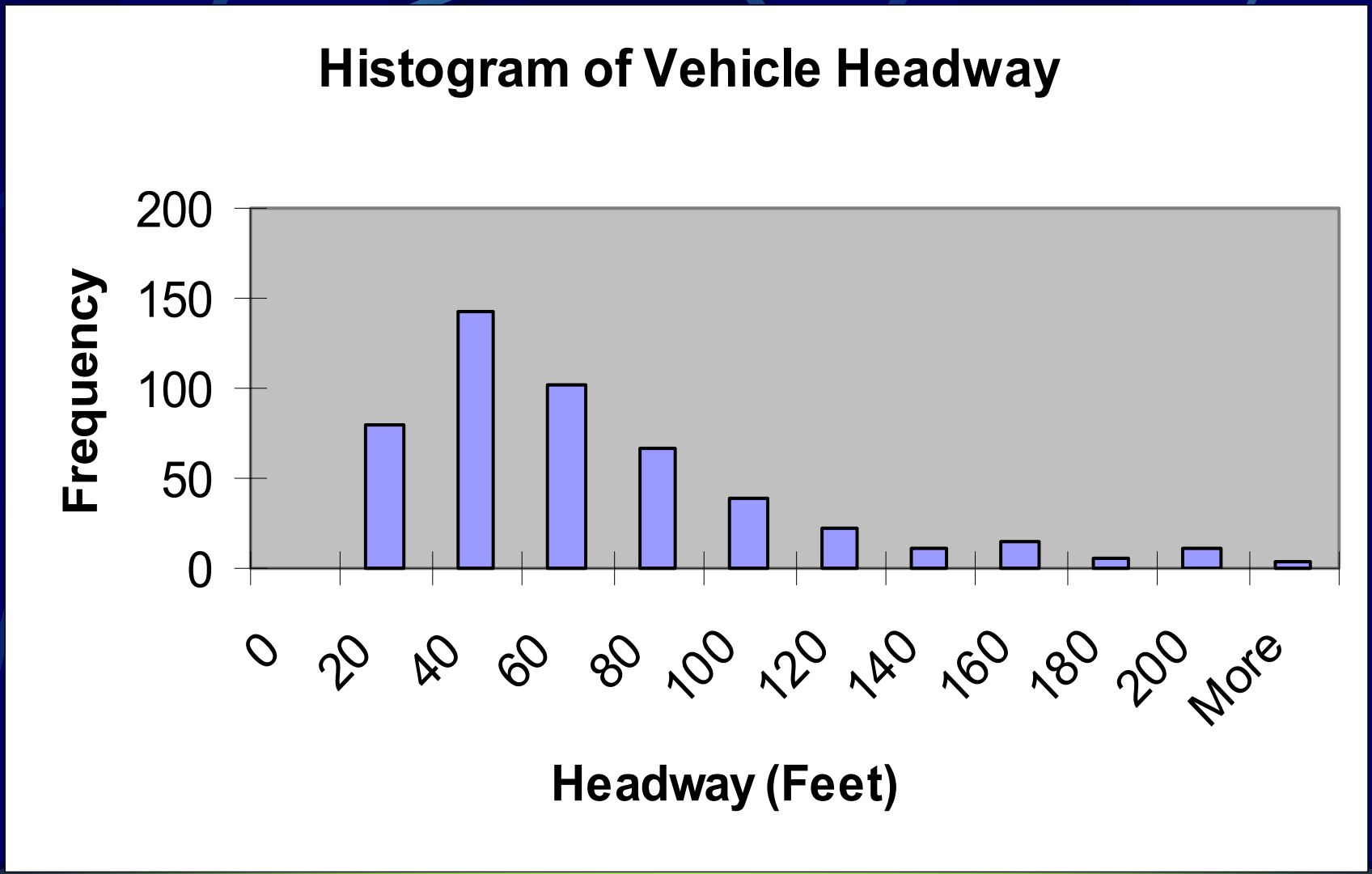

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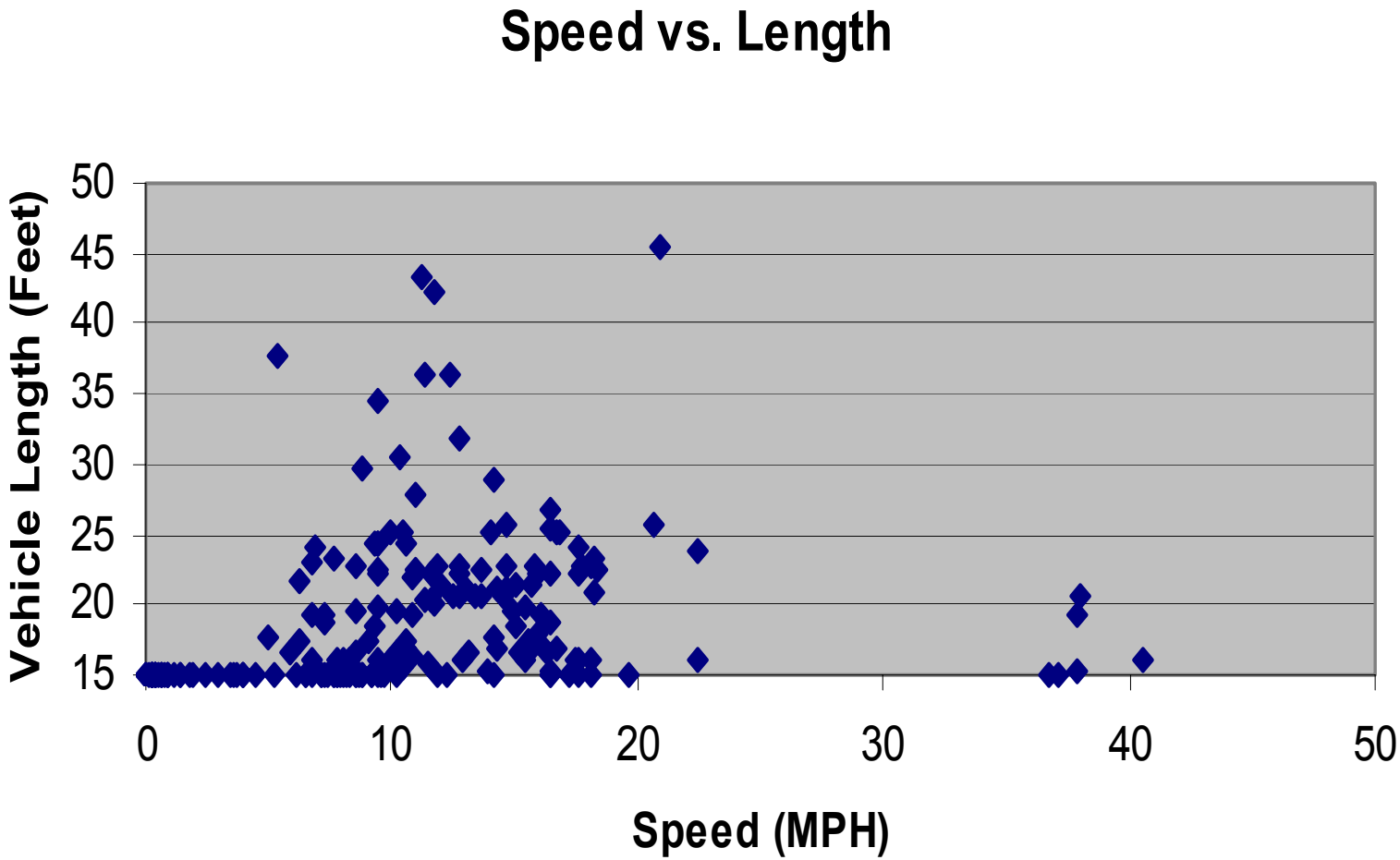


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# Presented by *dts*

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