



The Case for Using Spatiotemporal Traffic Data to Manage Planned Special Events

PSE Meeting

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To provide a case study that illustrates how ***Spatiotemporal Traffic Data*** can be used to manage Planned Special Events



Northern Region

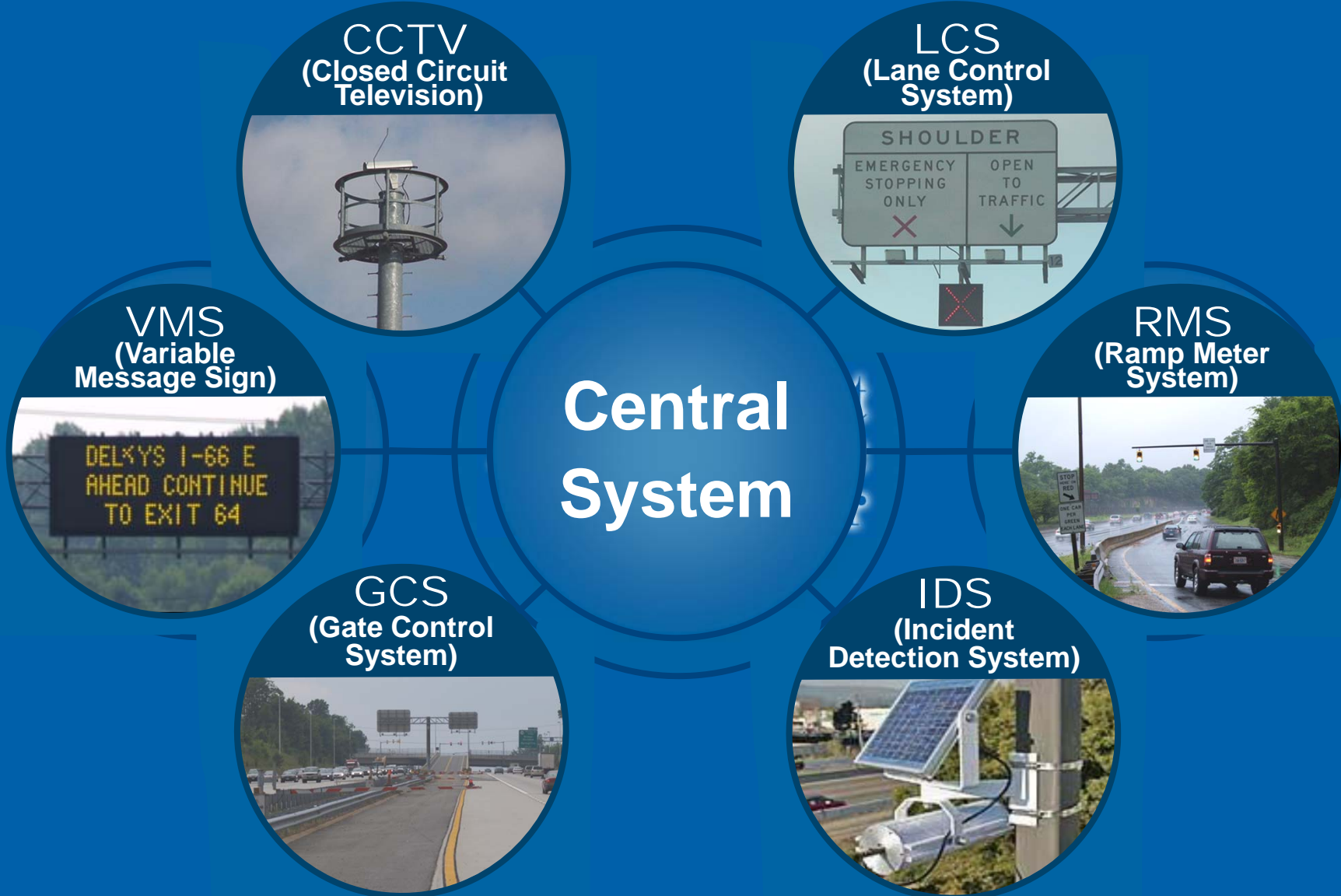
- 24-Hour Facility in Arlington, VA
- Manages 216 miles of Roadway Network
in Northern Virginia Region

**Central
System**

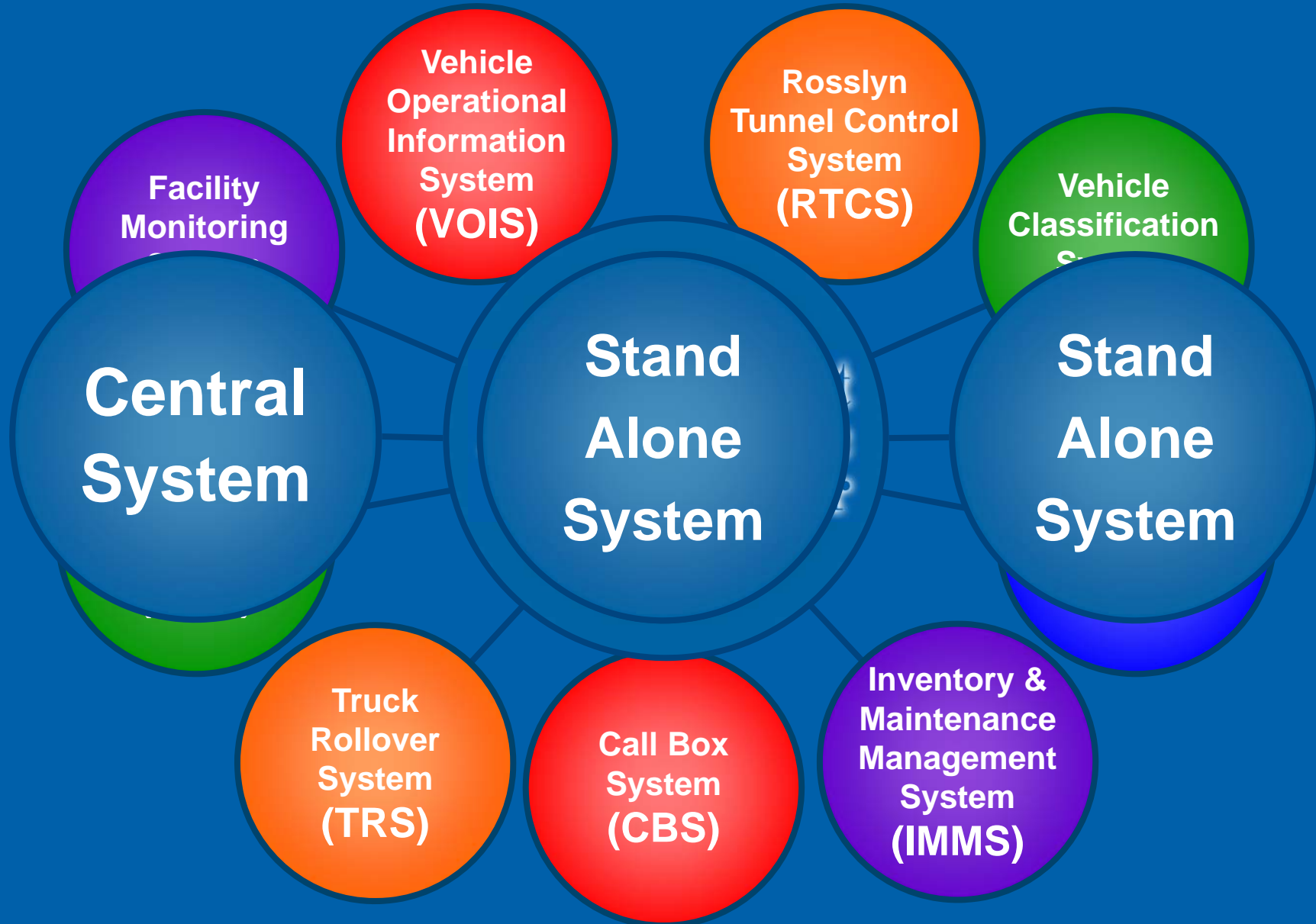


**Stand
Alone
System**

Northern Operation Region Smart Traffic Center (STC)



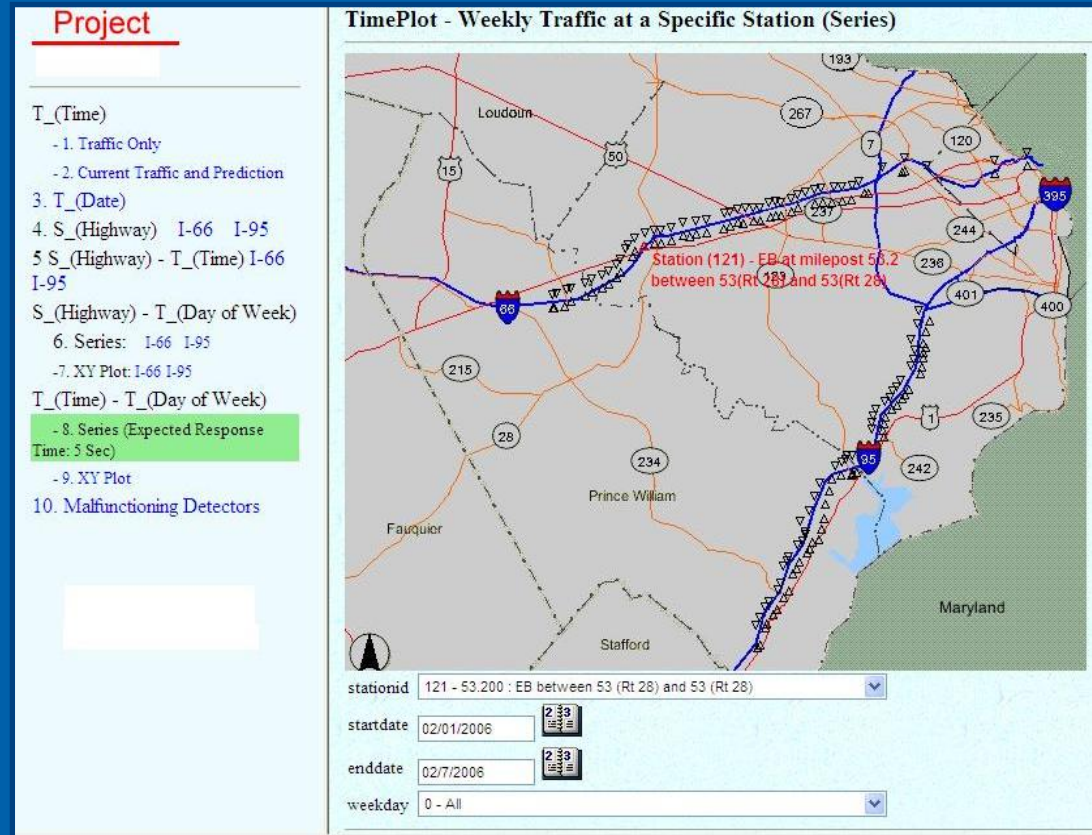
Northern Operation Region Smart Traffic Center (STC)





Advanced Interactive Traffic Visualization System (AITVS)

- High-performance critical visualization technique
- Exploring real-time / historical loop-detector data provided by VDOT
- Scale for interactive visualization
- Web-based environment
- Developed by VA Tech



Real-time Traffic Monitoring and Estimation

Temporal

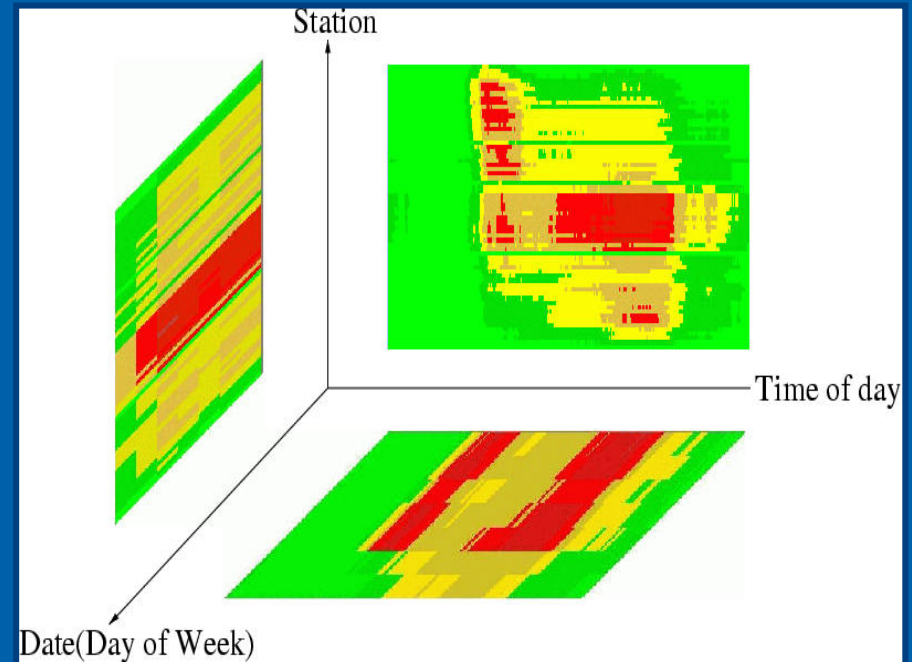
- Time plots, Date plots

Spatial

- Highway station plots

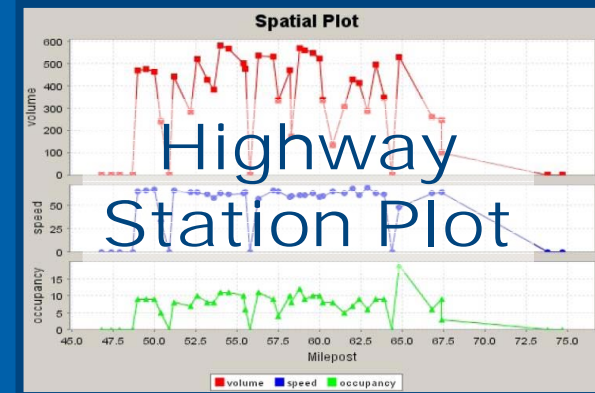
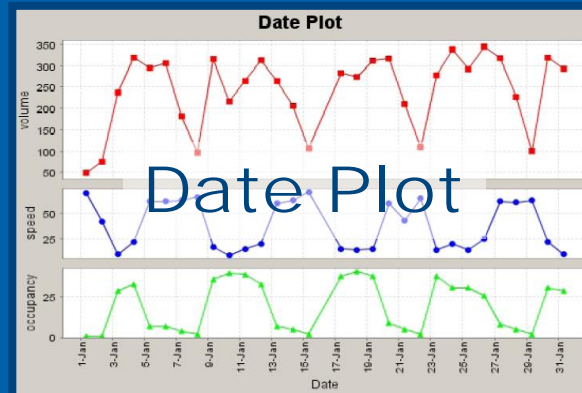
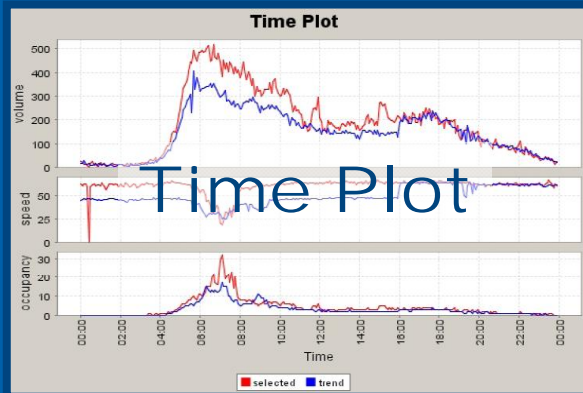
Space-time

- Time vs. day of the week plots
- Highway stations vs. day of the week plots
- Highway stations vs. time plots

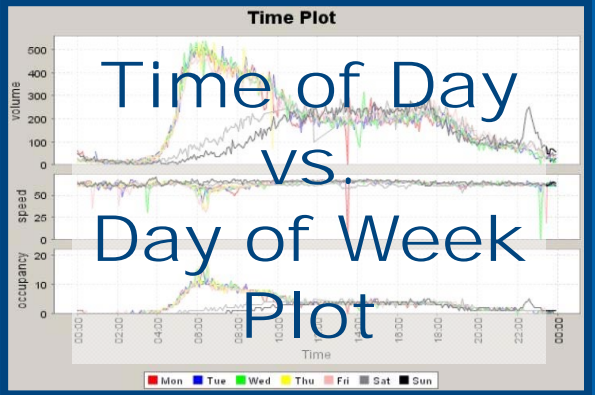
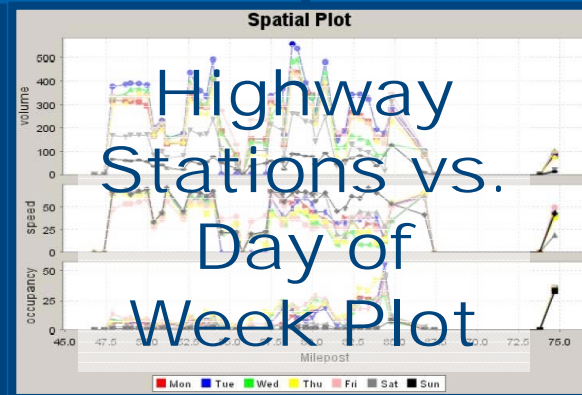
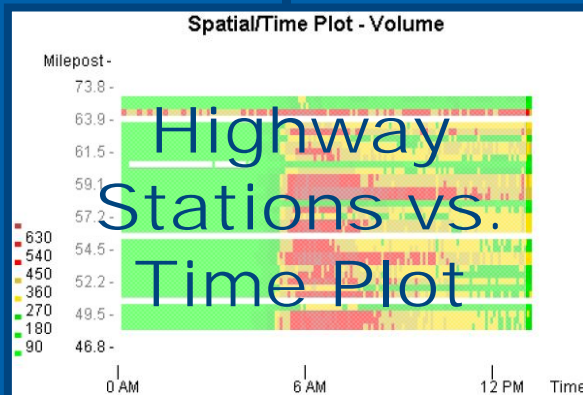




Advanced Interactive Traffic Visualization System (AITVS)



AITVS Visualization



Spatiotemporal Plots (Traffic Volumes, Vehicle Speeds and Travel Lane Occupancy) were Compiled

**Martin
Luther
King Day**

**President's
Day**

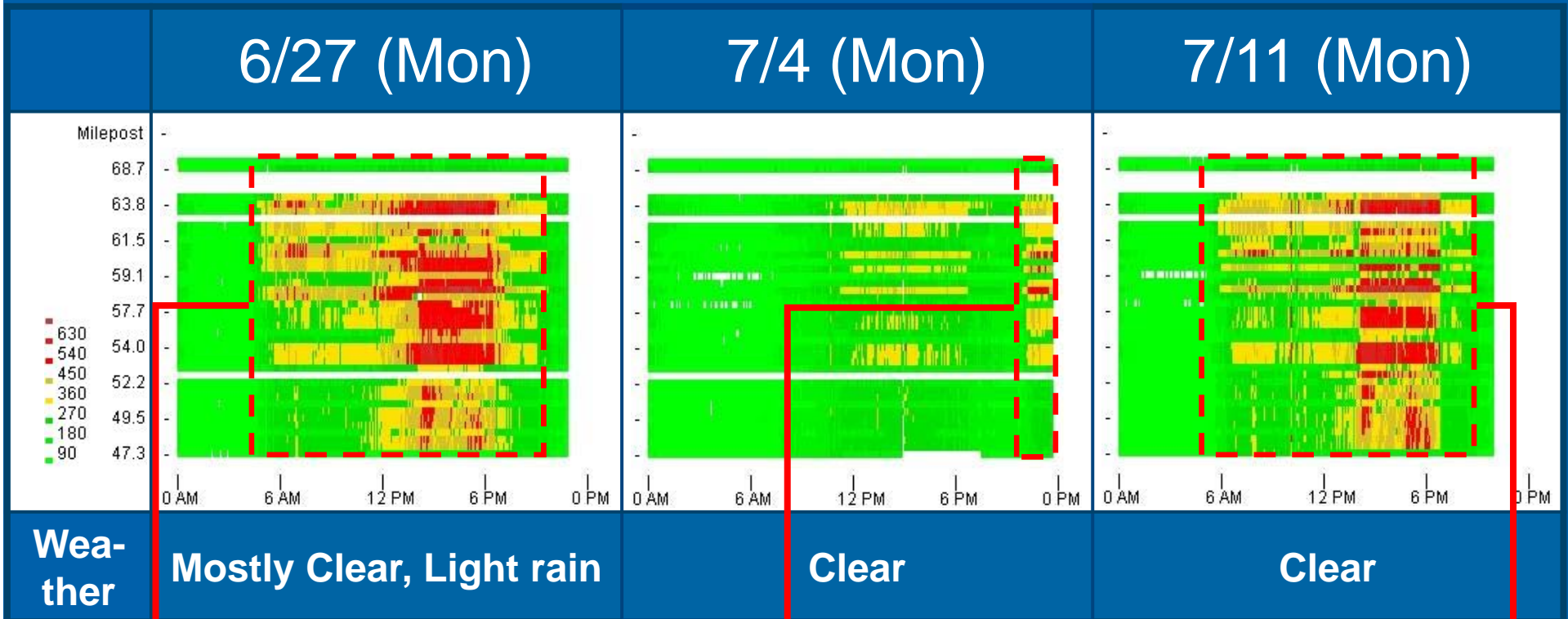
**Columbus
Day**

**Thanks-
giving
Day**

**Indepen-
dence
Day**

**Used for both Routine Studies and Holiday Traffic
Pattern Determination**

I-66 Westbound Volume Data, 2005



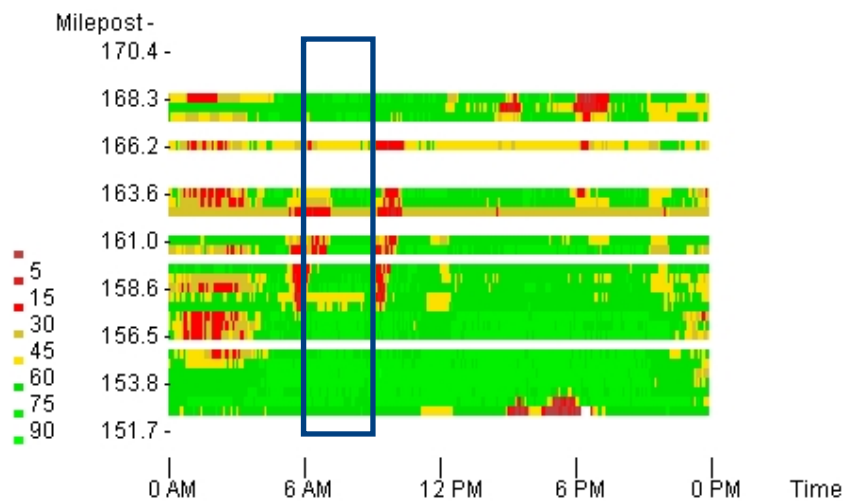
Traffic from annual National Capitol Fire works

Similar Traffic Pattern on normal Monday

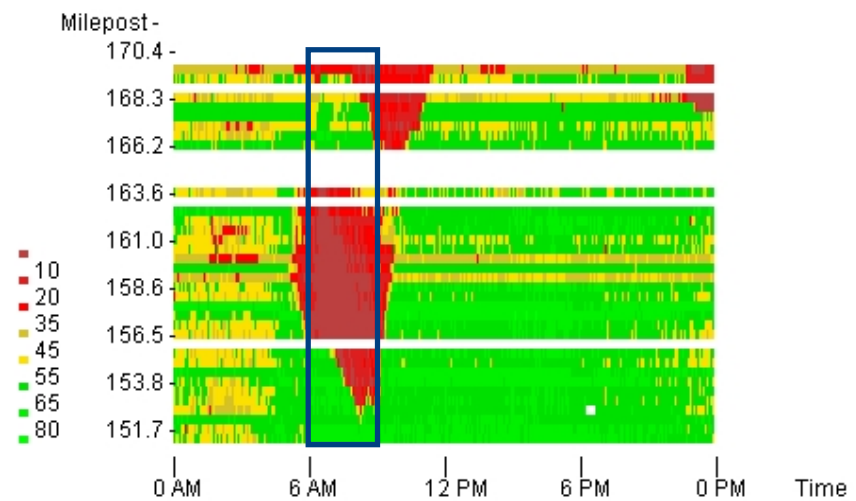
Real-time Traffic Monitoring and Estimation

- HOV monitoring required by SAFETEA-LU
- Non-HOV monitoring

Spatial/Time Plot - Avg Speed Hov

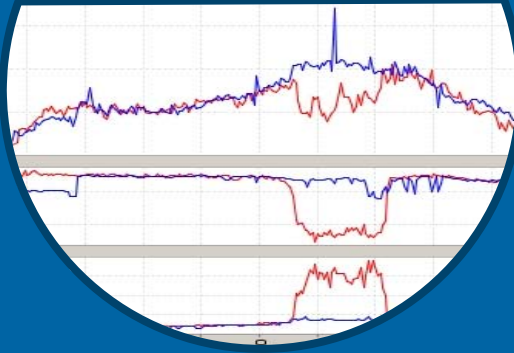


Spatial/Time Plot - Avg Speed Non-Hov

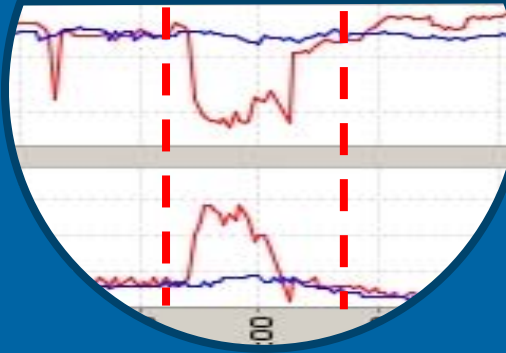


Potential Benefits of Using Spatiotemporal Traffic Data

Trend
Detection



Abnormality
Detection



Making
Decisions

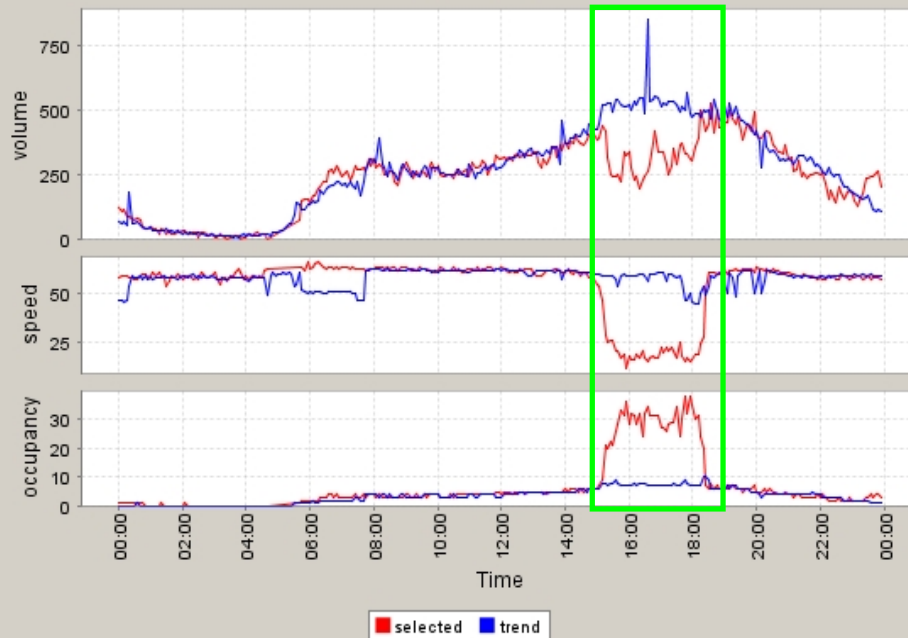


- VMS, Ramp Metering, LCS, HOV, Variable Speed

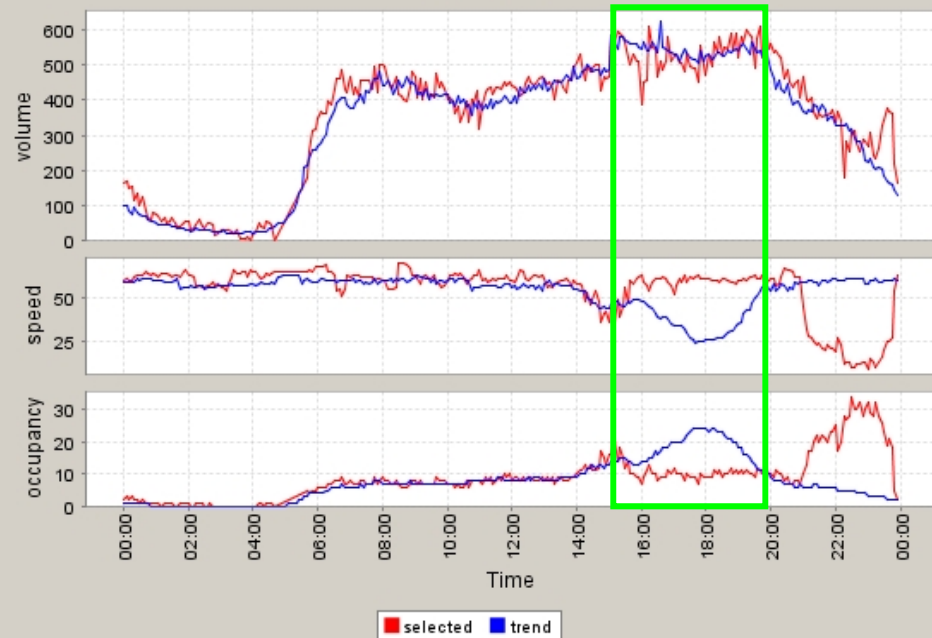
Milepost: 56.3
(between Rt. 50 and Rt. 7100)

Milepost: 60.8
(between Nutley St and Chain Bridge Rd)

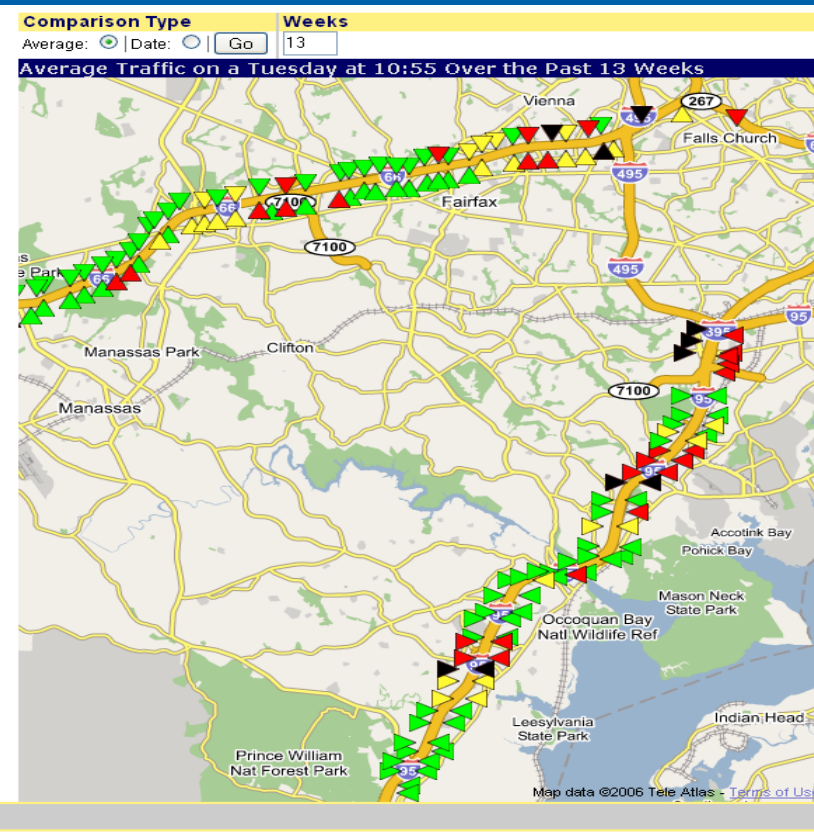
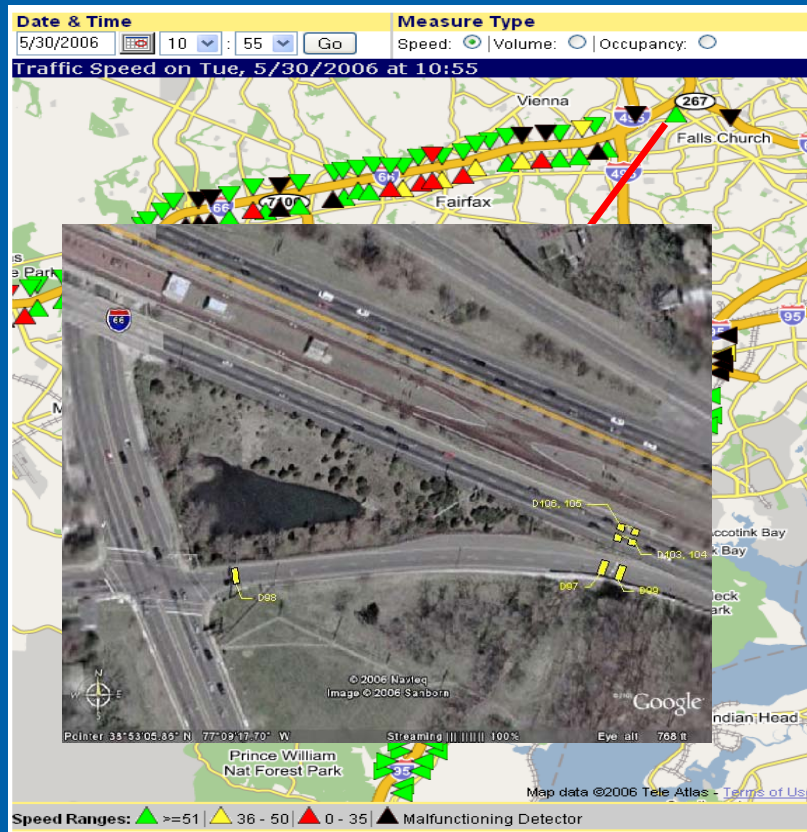
Time Plot



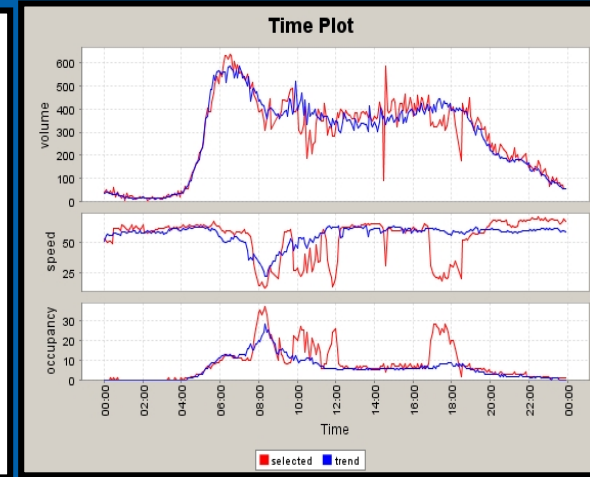
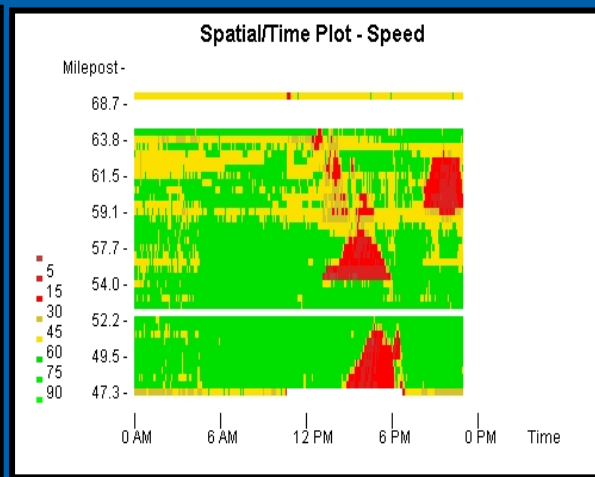
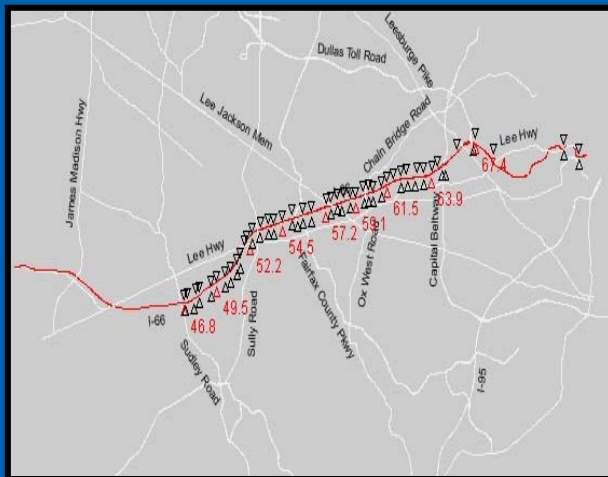
Time Plot



- GIS data for controller and detection
- Graphical representation



- Weekly (User defined)
- HOV
- Recurring & Non-recurring congestion
- Detector availability
- Validate real time performance



AITVS

Real-time Traffic Data

Traffic
Volume

Vehicle
Speed

Travel
Lane
Occupancy

Comparison

Historical
Traffic
Data

Identification of Congestion Information

Location

Direction

Duration

**Monitor “CHOKES POINTS”
Where Drivers Divert
From Freeway to Arterials**



**Basis for Future Special Event
Traffic Signal Timing Plan
Development for Major Arterials**



**Determine When the Freeway
Lane Control System (LCS)
should be Activated**



Importing Real-Time Data into Simulation Models

To Predict and Manage Queue Lengths on the Freeway System

Monitoring Real-Time Traffic Conditions on Entire Freeway System

Including the Mainline, On- and Off-Ramps

Determining HOV Peak Periods

To Facilitate Adjustments in Operational Hours

Calculating Average Congestion Duration

Based on Travel Lane Occupancy Data

Data Categorization and VISSIM/VISUM Online Modeling Programs

- Data integration for all sections of freeway system
- Recurring & Non-recurring congestion
- Time, duration, direction, lane, and type...
- Quantify congestion
- Scenario analysis (What if)

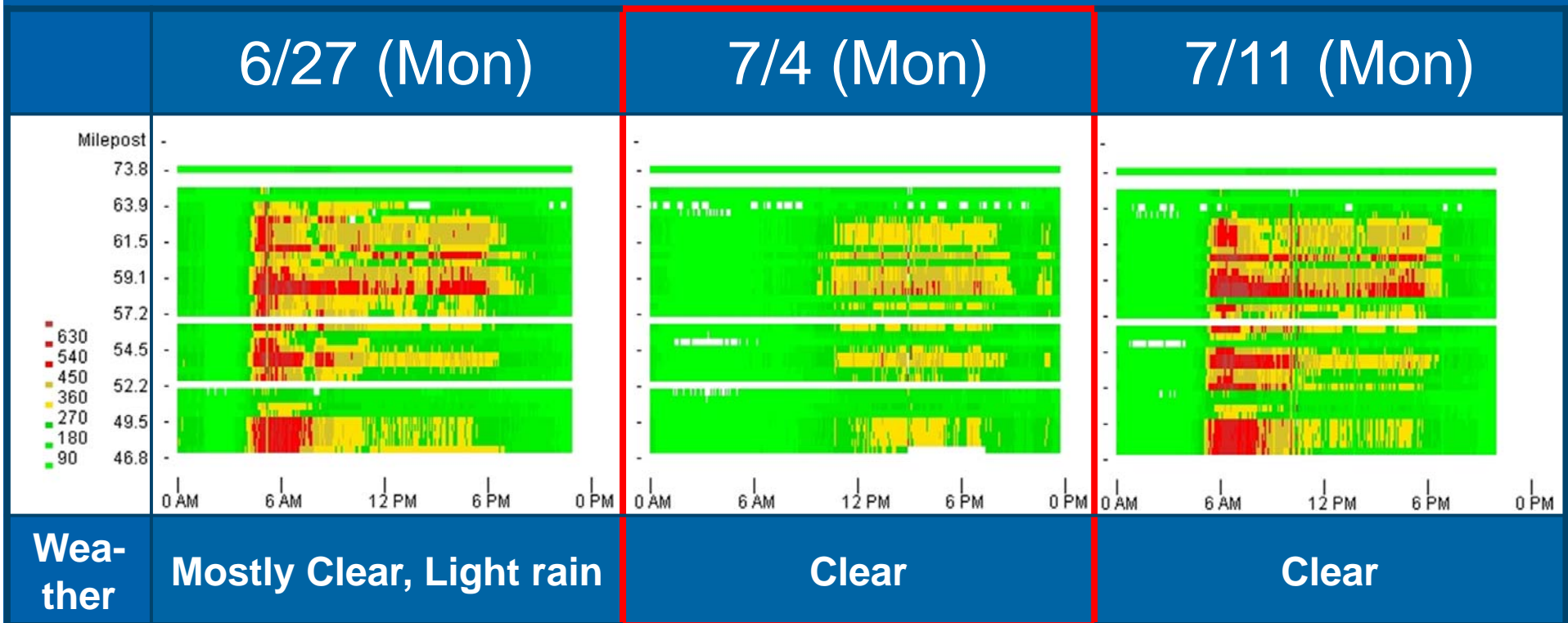
Data Categorization and VISSIM/VISUM Online Modeling Programs



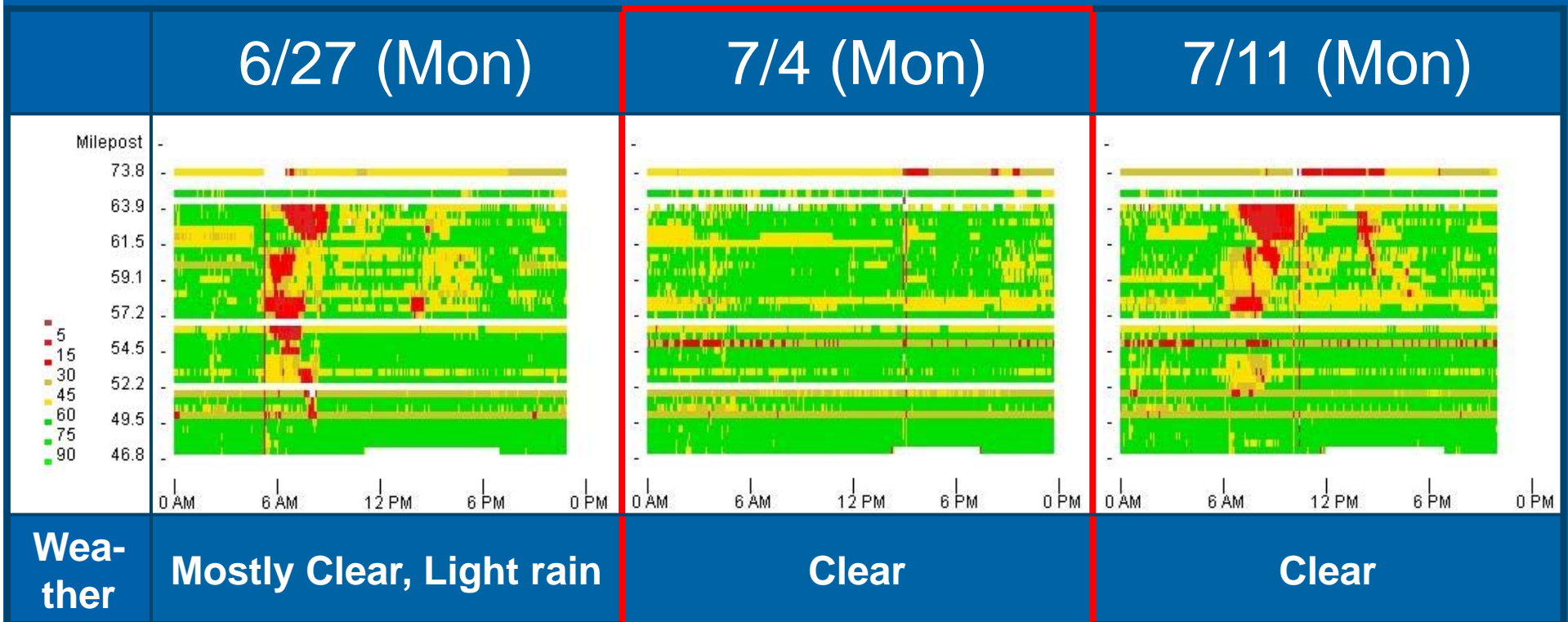
Sample VISSIM file - Route 66

July 4th Data

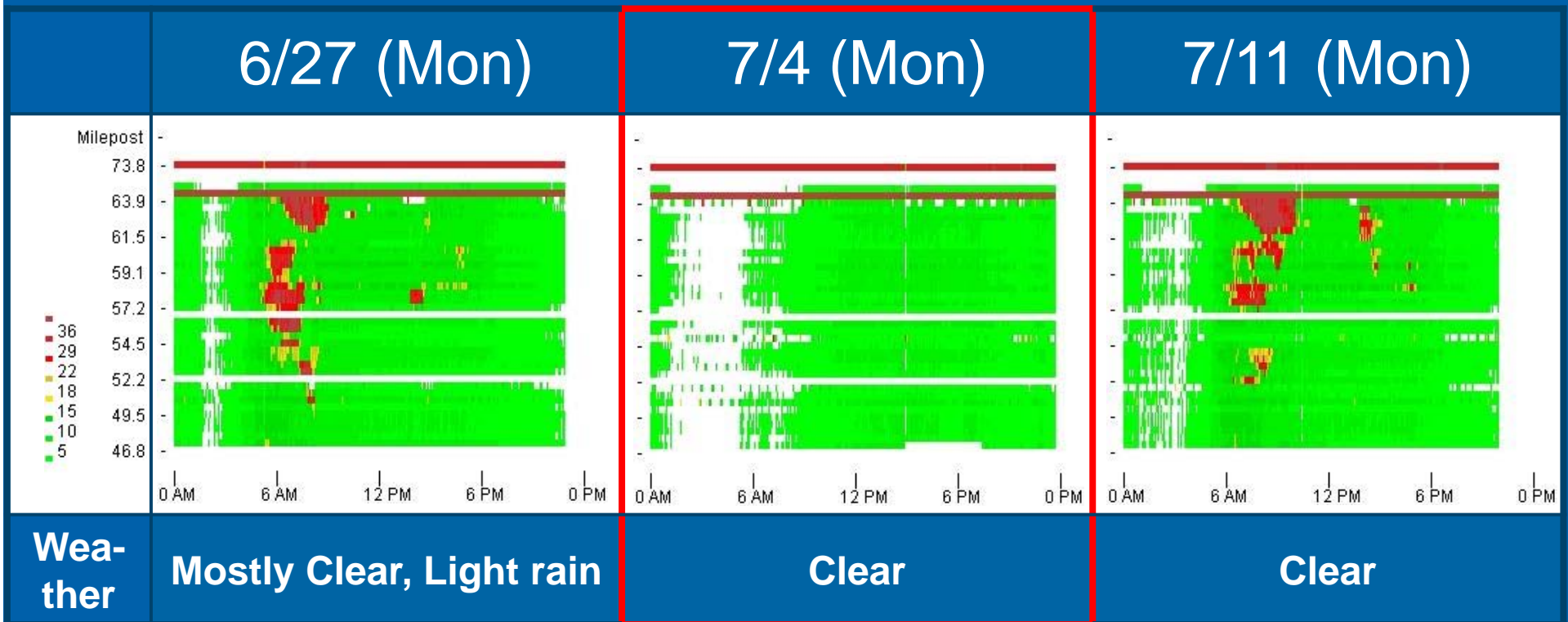
I-66 Eastbound Volume Data, 2005



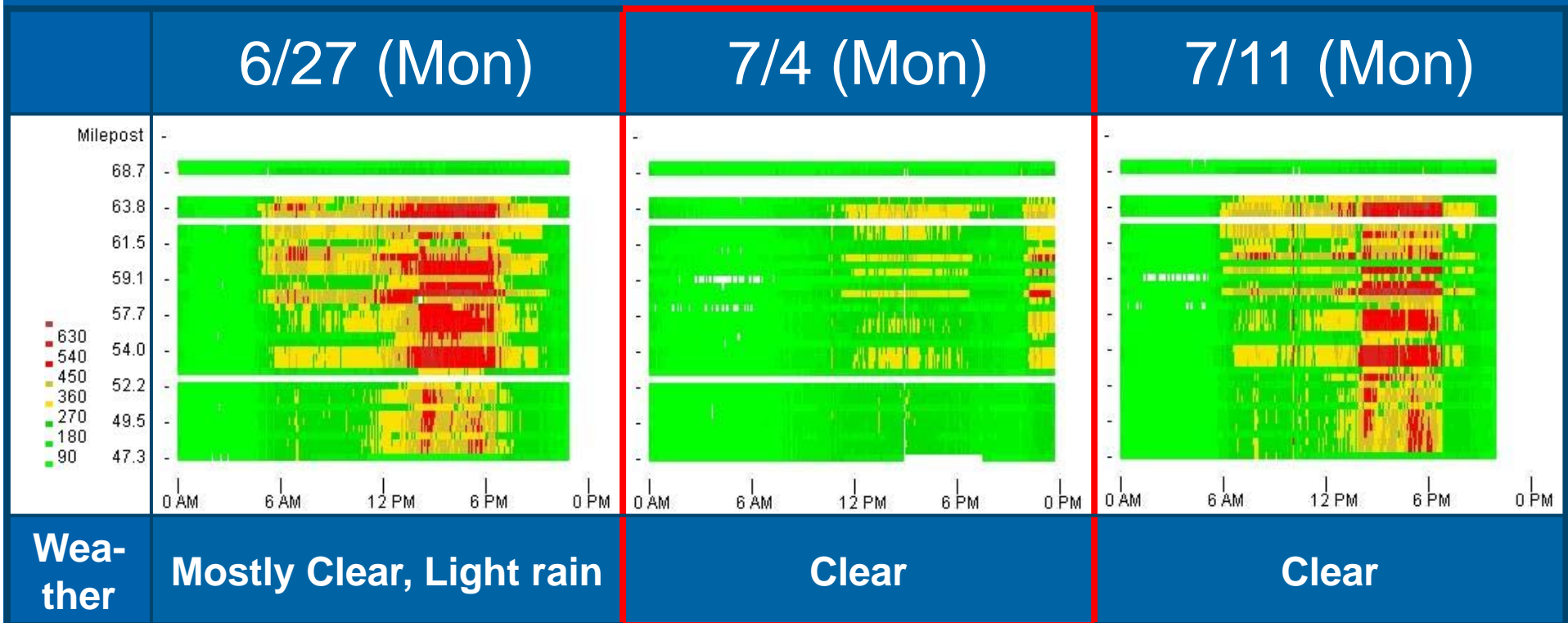
I-66 Eastbound Speed Data, 2005



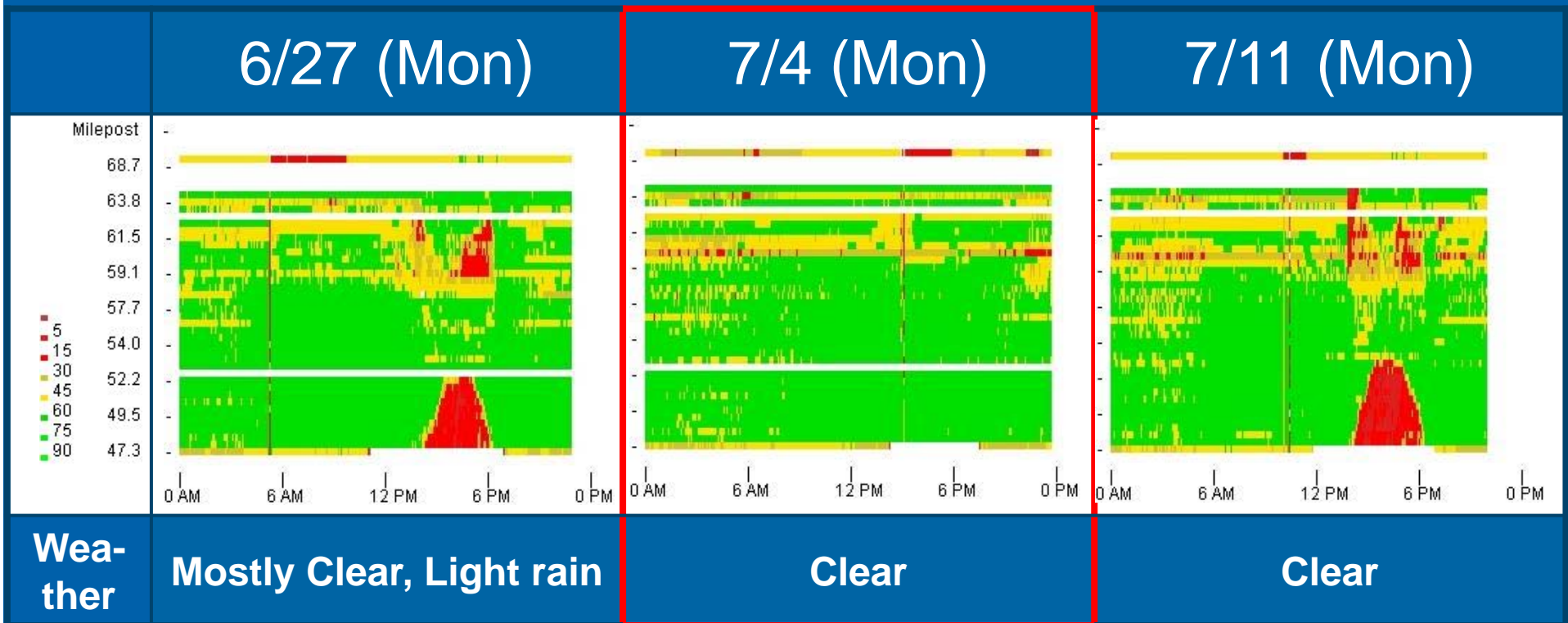
I-66 Eastbound Occupancy Data, 2005



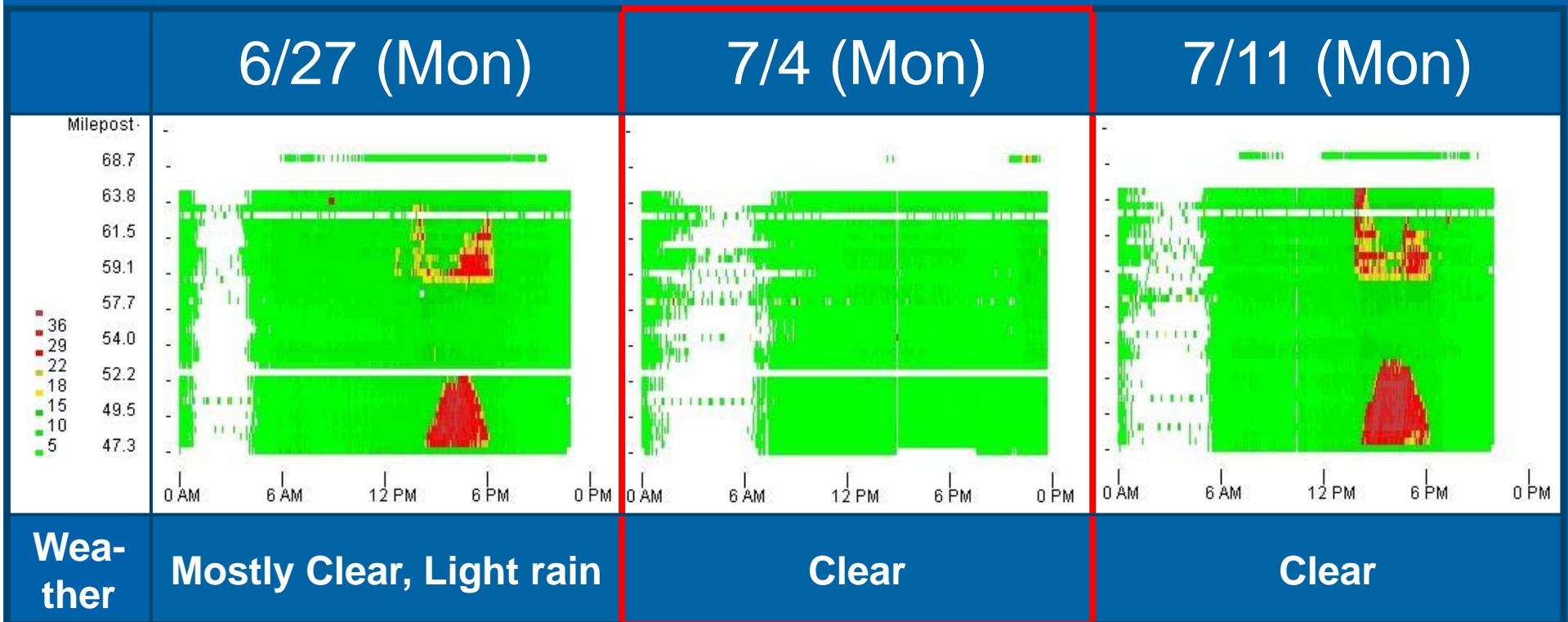
I-66 Westbound Volume Data, 2005



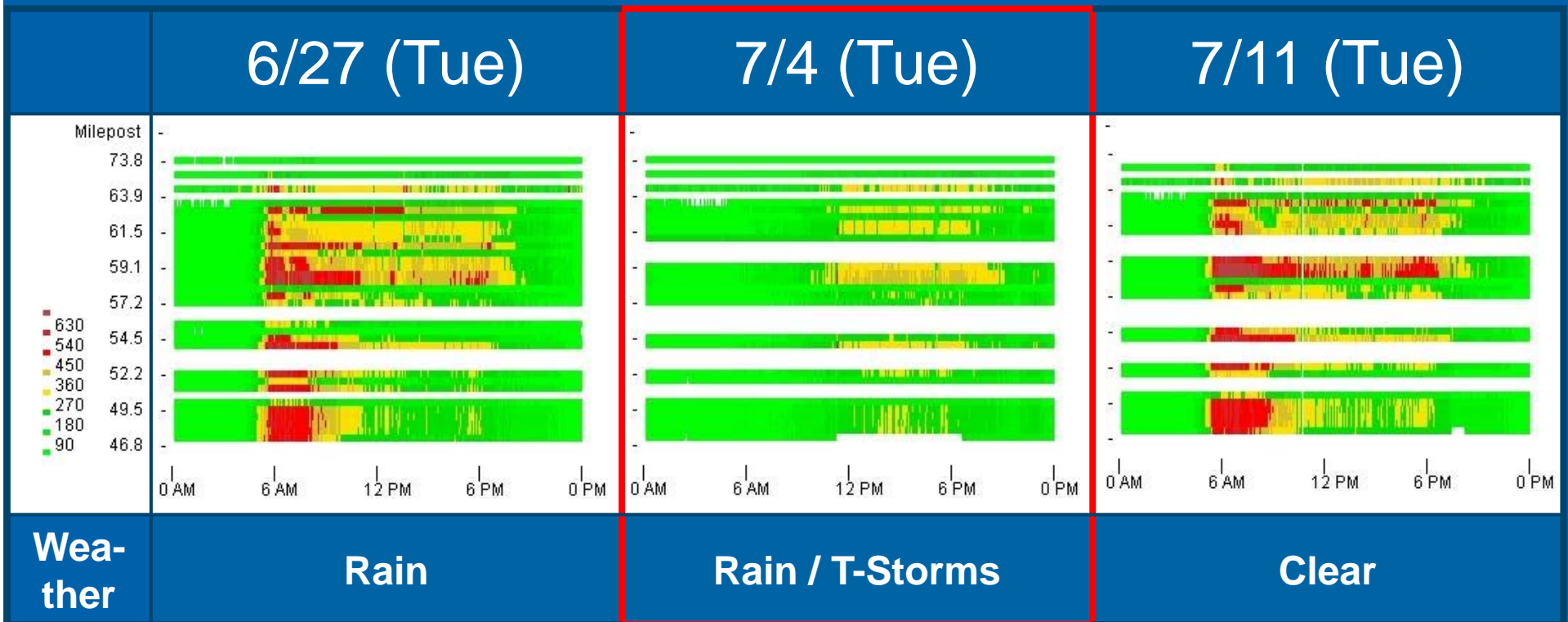
I-66 Westbound Speed Data, 2005



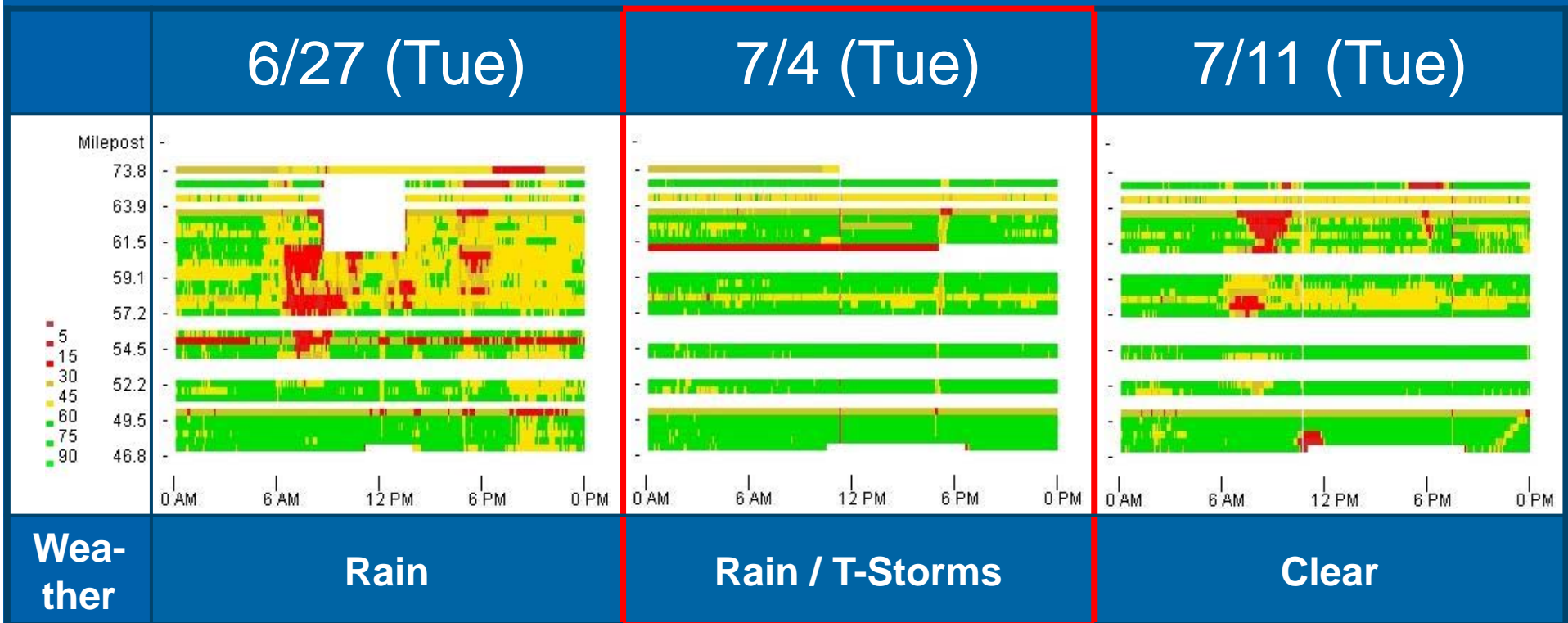
I-66 Westbound Occupancy Data, 2005



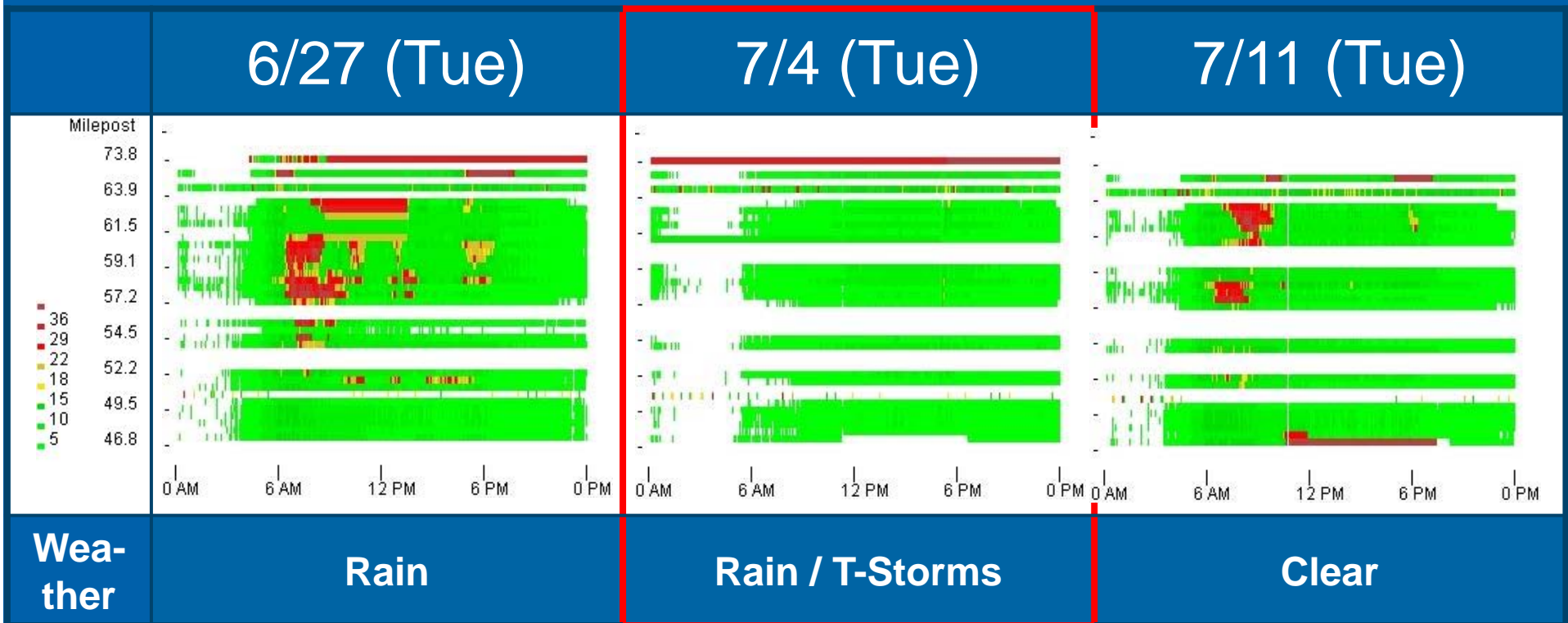
I-66 Eastbound Volume Data, 2006



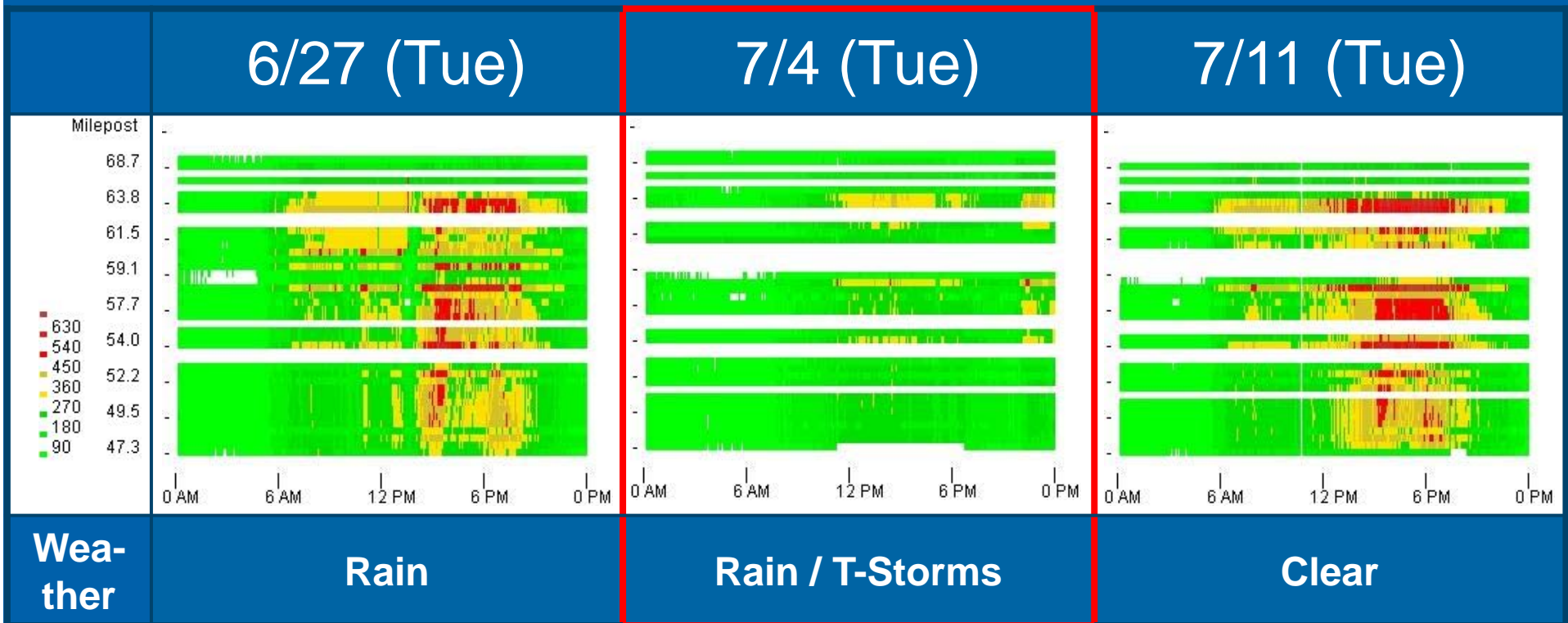
I-66 Eastbound Speed Data, 2006



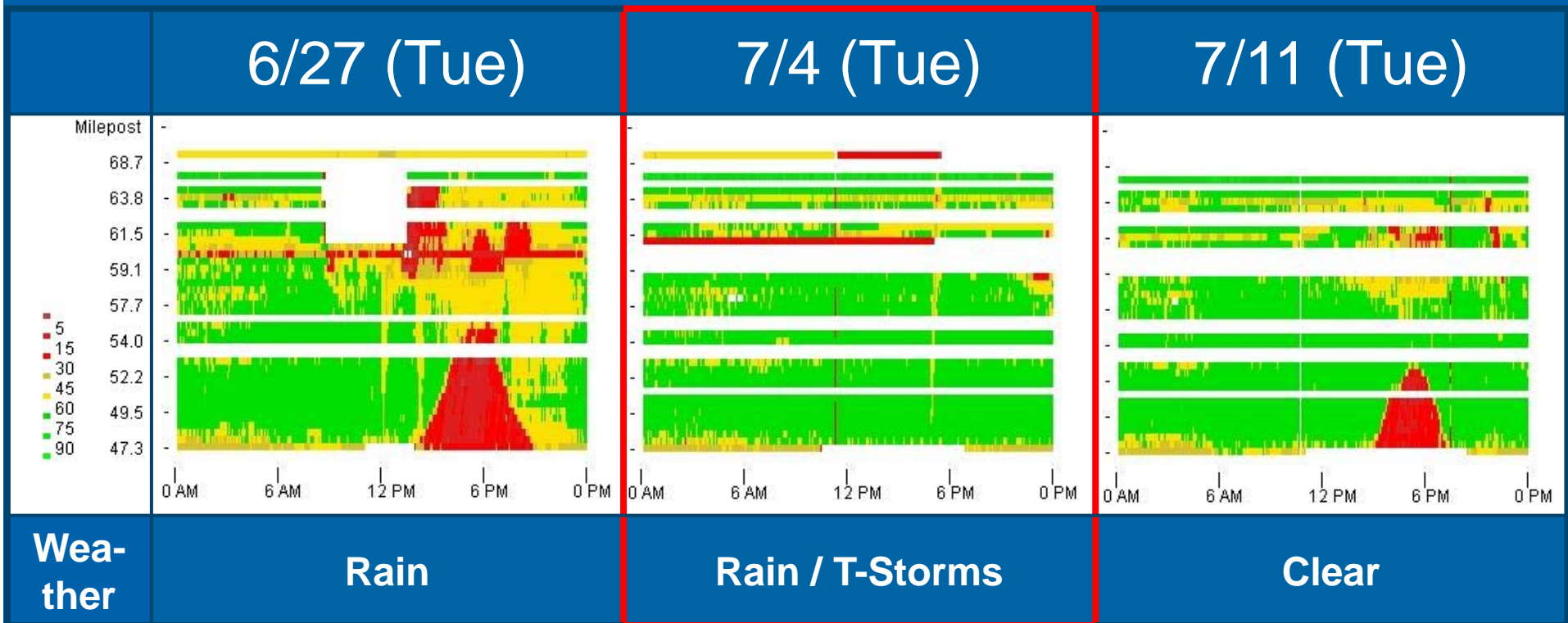
I-66 Eastbound Occupancy Data, 2006



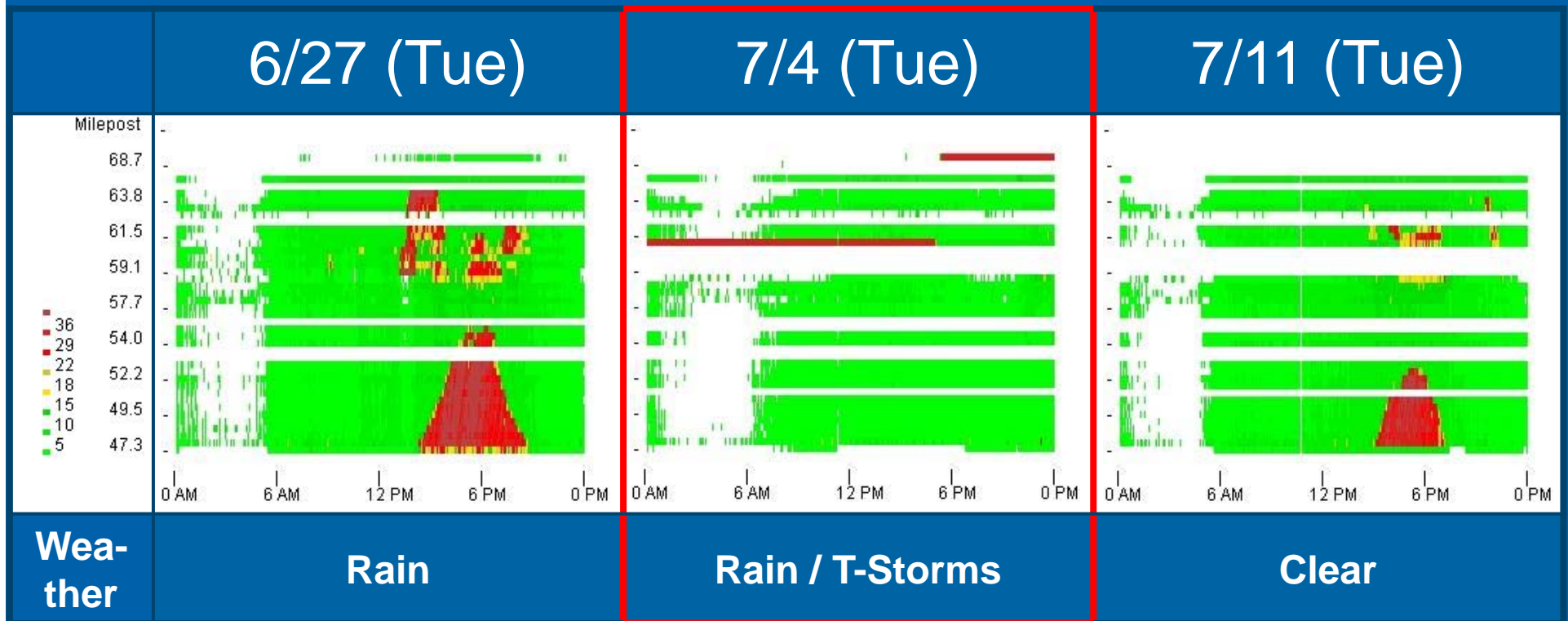
I-66 Westbound Volume Data, 2006



I-66 Westbound Speed Data, 2006



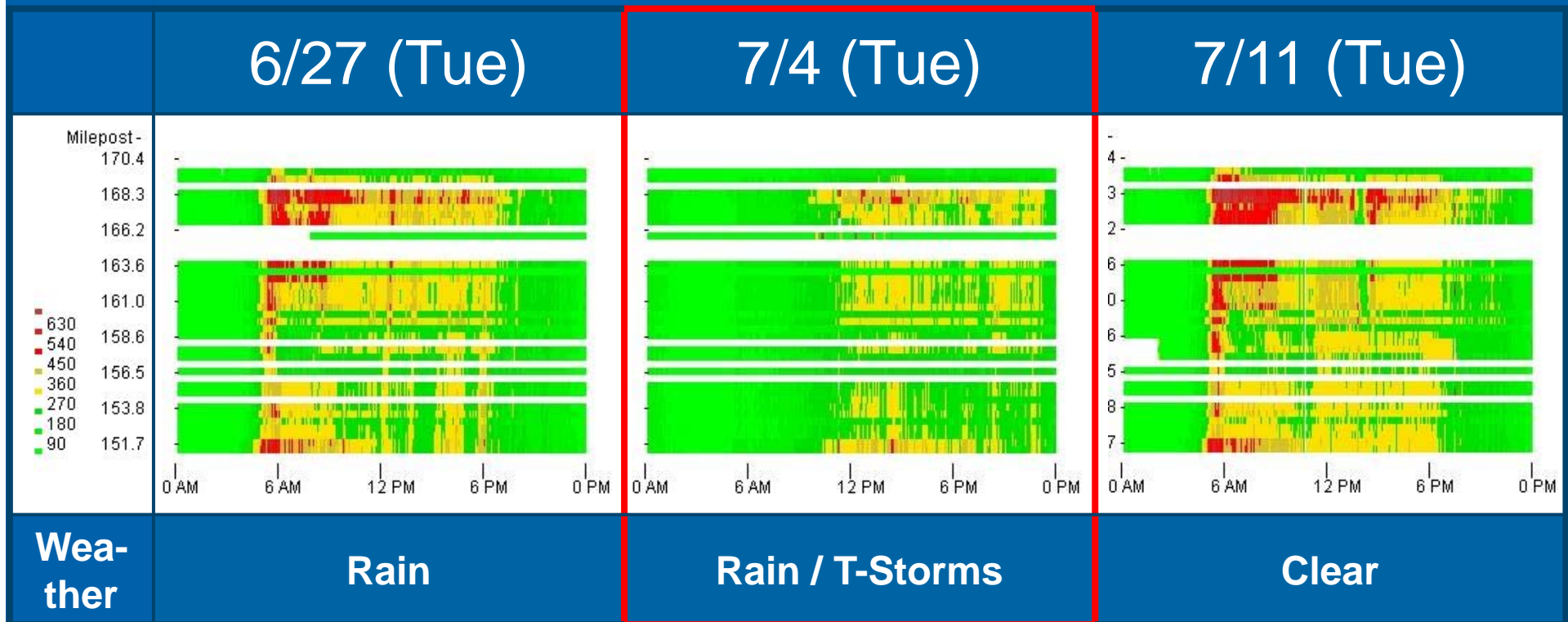
I-66 Westbound Occupancy Data, 2006



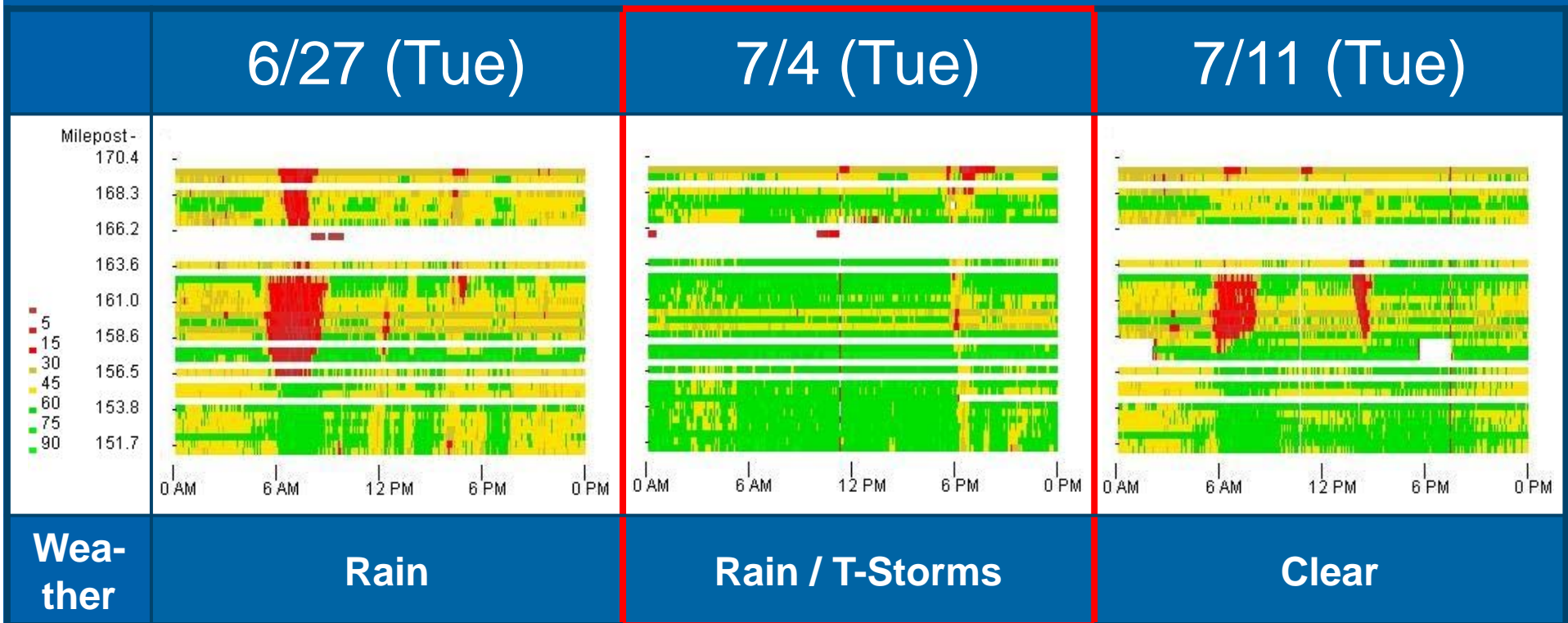


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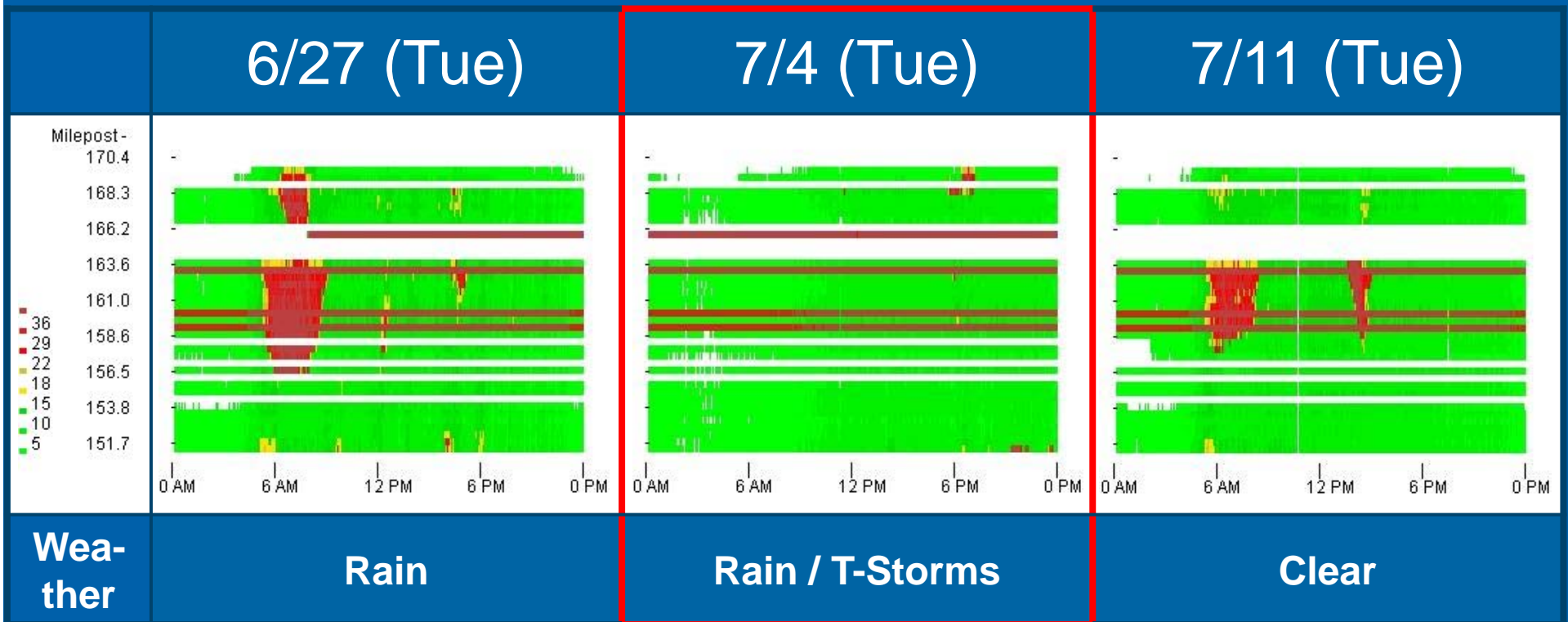
I-95 Northbound Volume Data, 2006



I-95 Northbound Speed Data, 2006



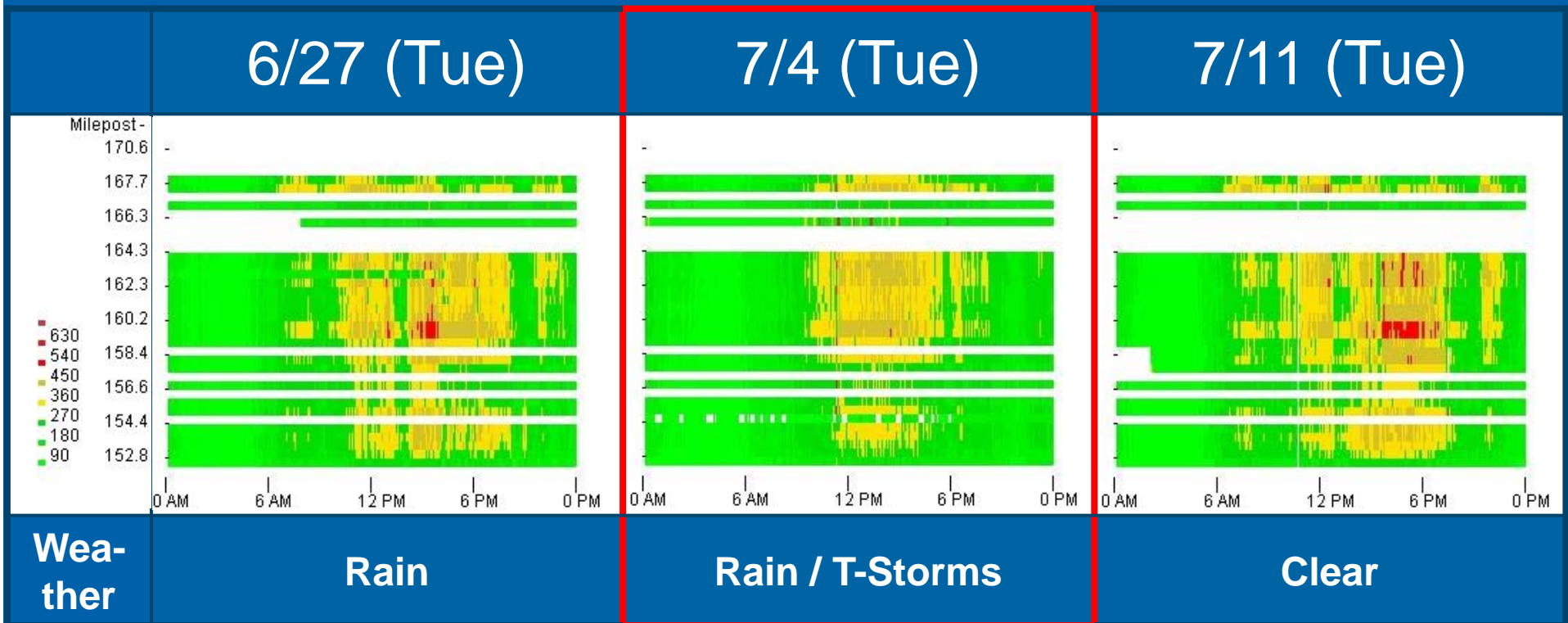
I-95 Northbound Occupancy Data, 2006



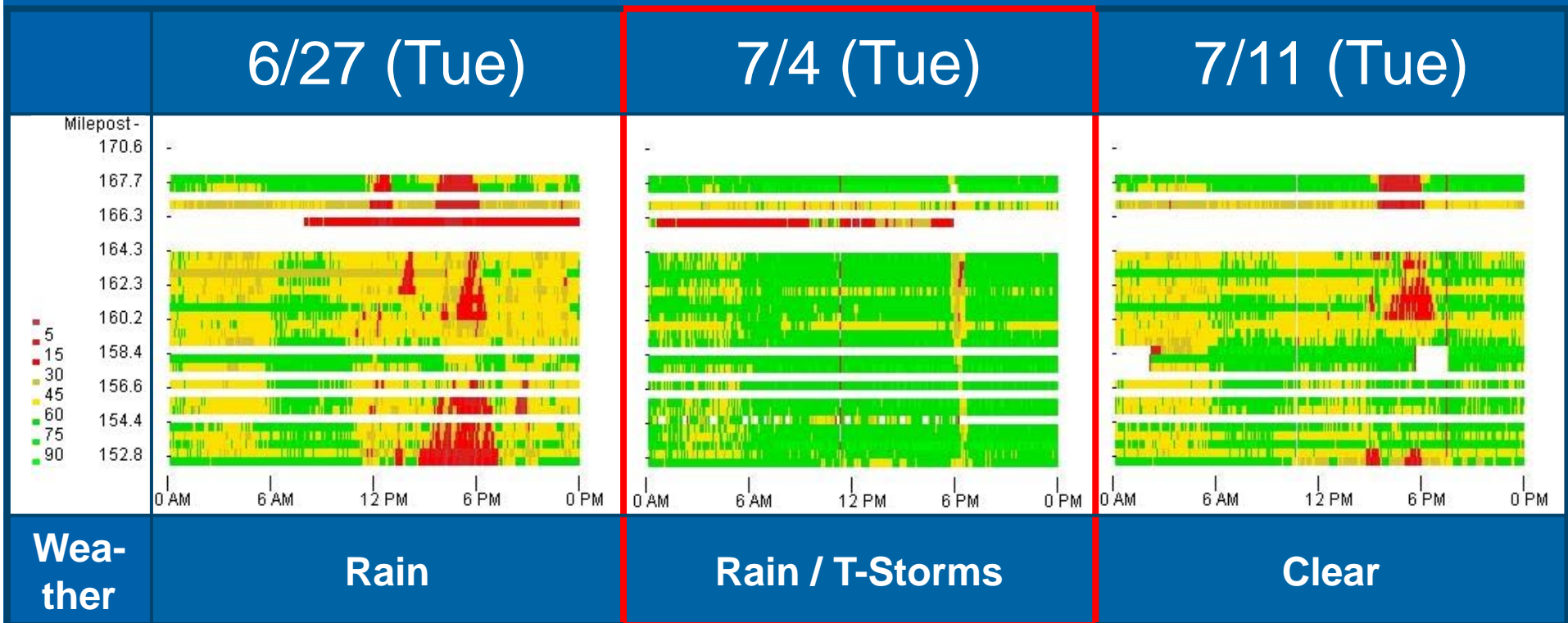


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I-95 Southbound Volume Data, 2006



I-95 Southbound Speed Data, 2006



I-95 Southbound Occupancy Data, 2006

