

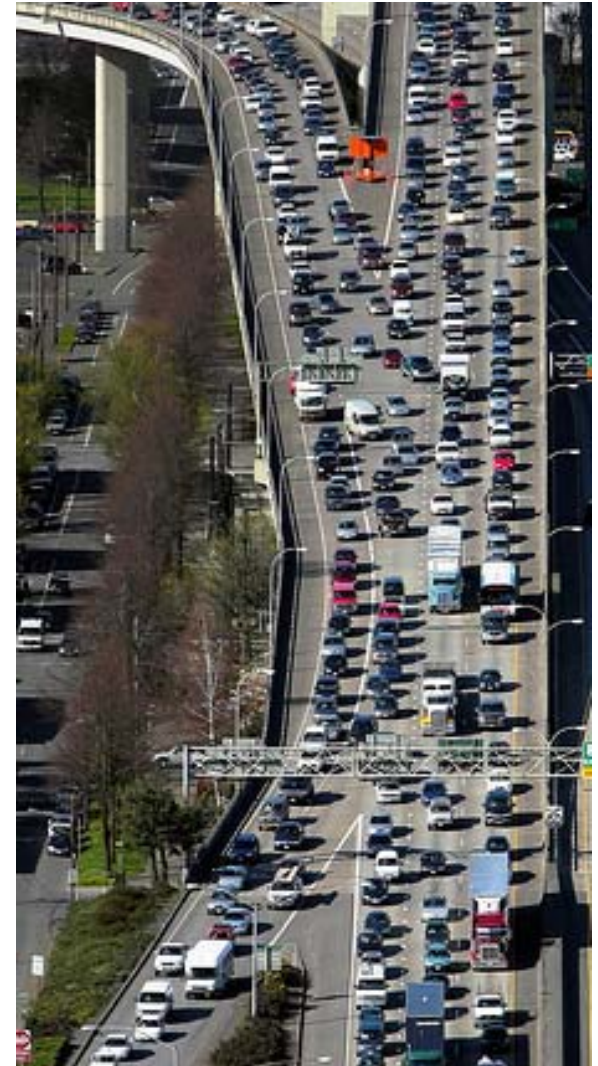


**Linking Data Mining to Travel  
Forecasting for Hours of Congestion**

**Chris Maciejewski, DKS Associates**

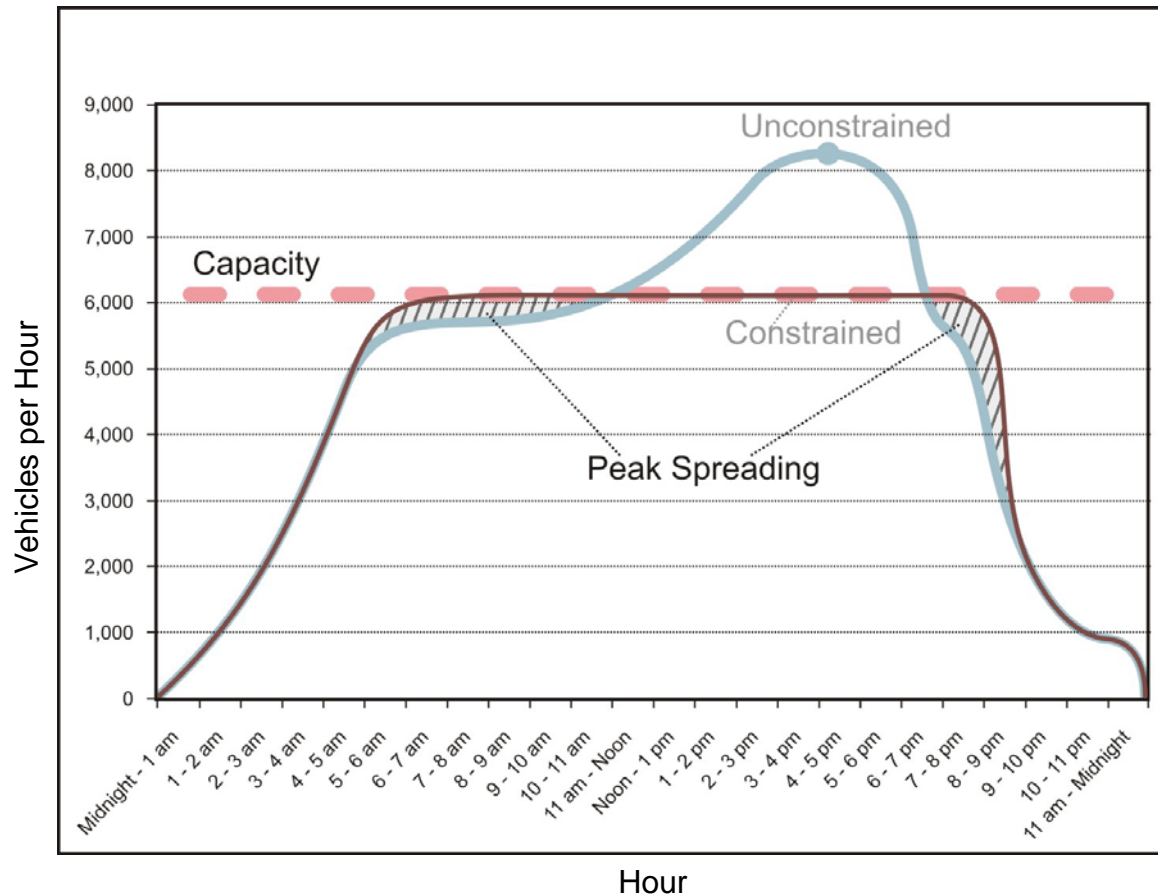
# How Can Transportation Decisions Be Made When Standards Are Not Meaningful?

- ▶ What does it mean when peak hour volume to capacity (v/c) ratios far exceed 1.0?
- ▶ What is the difference between a peak hour v/c ratio of 1.3 and 1.6? How much worse is congestion on the facility?
- ▶ A measure of congestion “duration” is needed to evaluate networks in this condition



# Congestion Spreading Analysis Can Provide Decision Makers Insight Into the Reality of Congestion

- ▶ If financial constraints, land use forecasts, and policies on facility sizing = severe peak hour failure, how many hours of the day are congested?



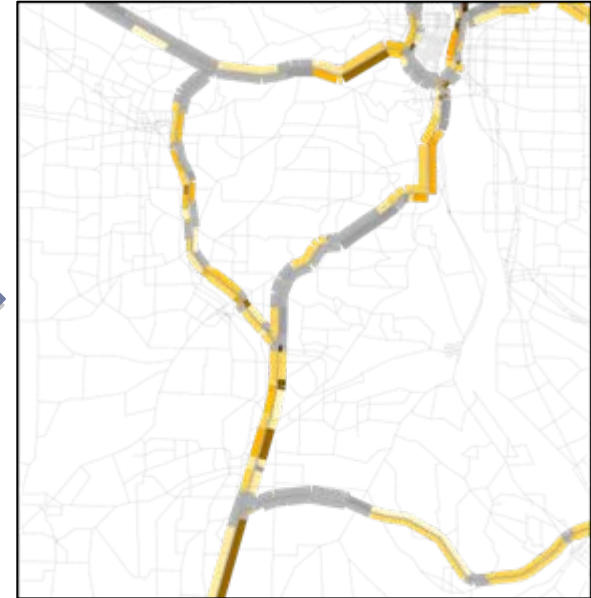
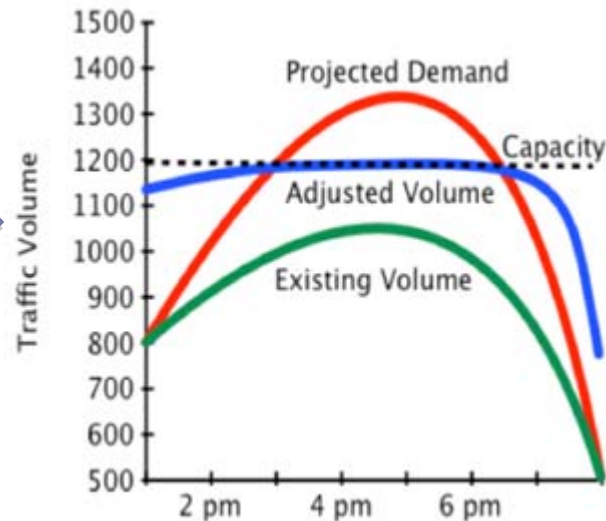


# Current Regional Travel Demand Models Are Not Built To Predict Congestion “Spreading”

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- ▶ Trips are developed for daily trip purposes
- ▶ Peak period trip tables are built with fixed time-of-day factors
  - ▶ Portland Metro Model Time Periods
    - ▶ AM Peak (7AM-9AM)
    - ▶ Midday Peak (noon-1PM)
    - ▶ PM Peak (4PM-6PM)
- ▶ Network congestion affects trip distribution, mode choice, and assignment, but excess demand is not forced into shoulder periods

# Hours of Congestion (HOC) Approach: Data Mining to Build a Travel Demand Model Post-Processing Tool



## ▶ Data Mining Sources

- ▶ PORTAL Data (Database of Freeway Loop Detectors) – 4 yrs of data
- ▶ ATR Data (Database of Permanent Count Recorders) – 4 yrs of data
- ▶ Roadway Tube Counts (Sample Daily Hourly Profiles) – 100+ data points
- ▶ Bus GPS Records (Database of Corridor Travel Speed) – 6 weeks of data

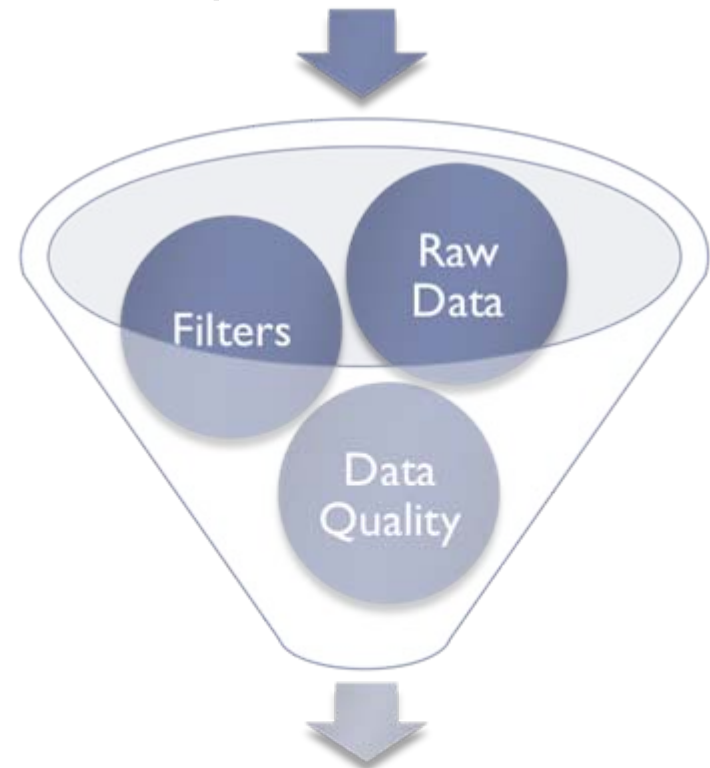
# Data Mining Must Include Data Cleaning

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## ▶ Data Screening Process

- ▶ Identify Locations of Interest
- ▶ Filter to General Purpose Lanes
- ▶ Remove weekends and holidays
- ▶ Review data quality diagnostics and filter out “suspect” data

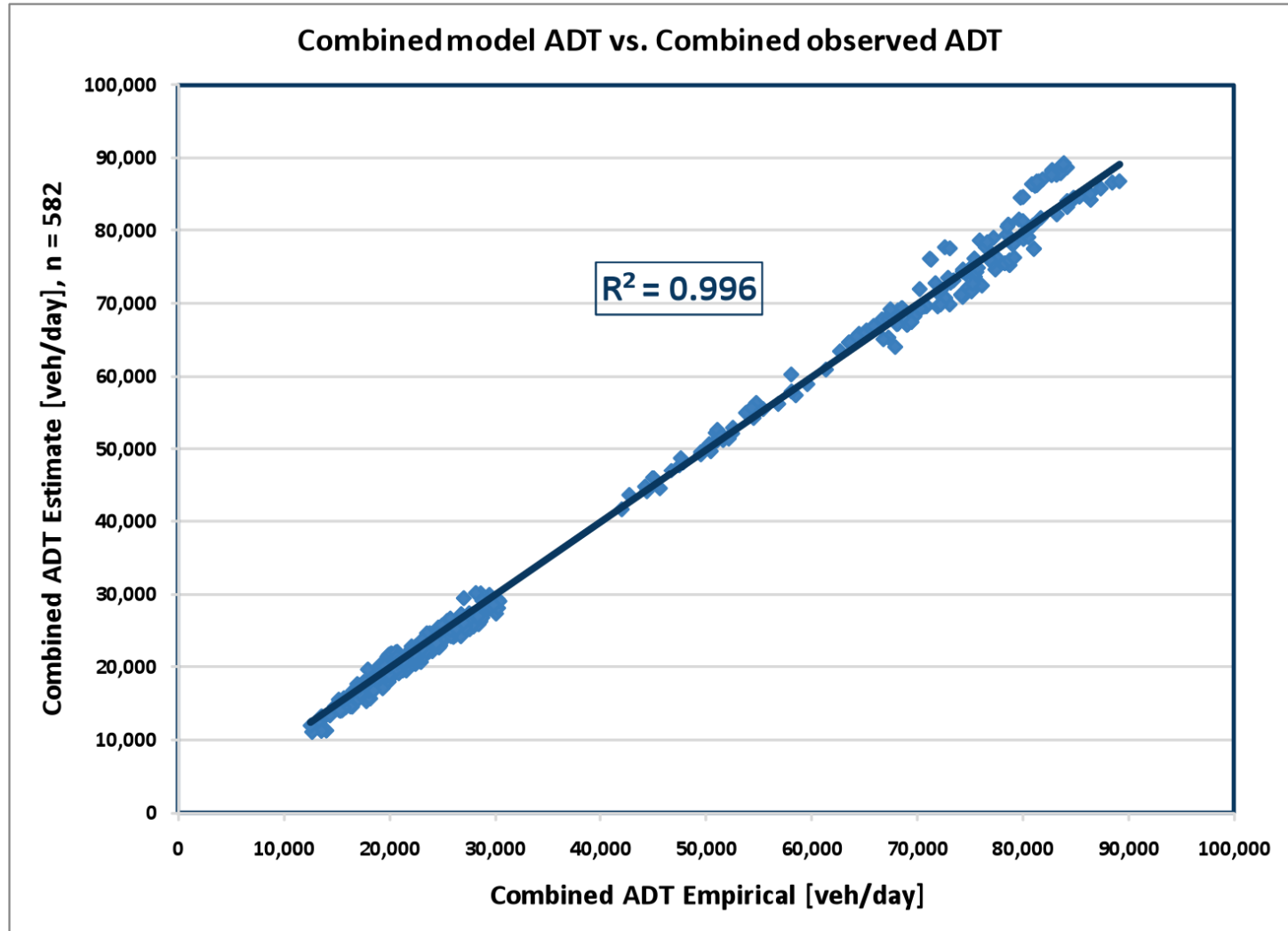
665 Loop Detector Locations



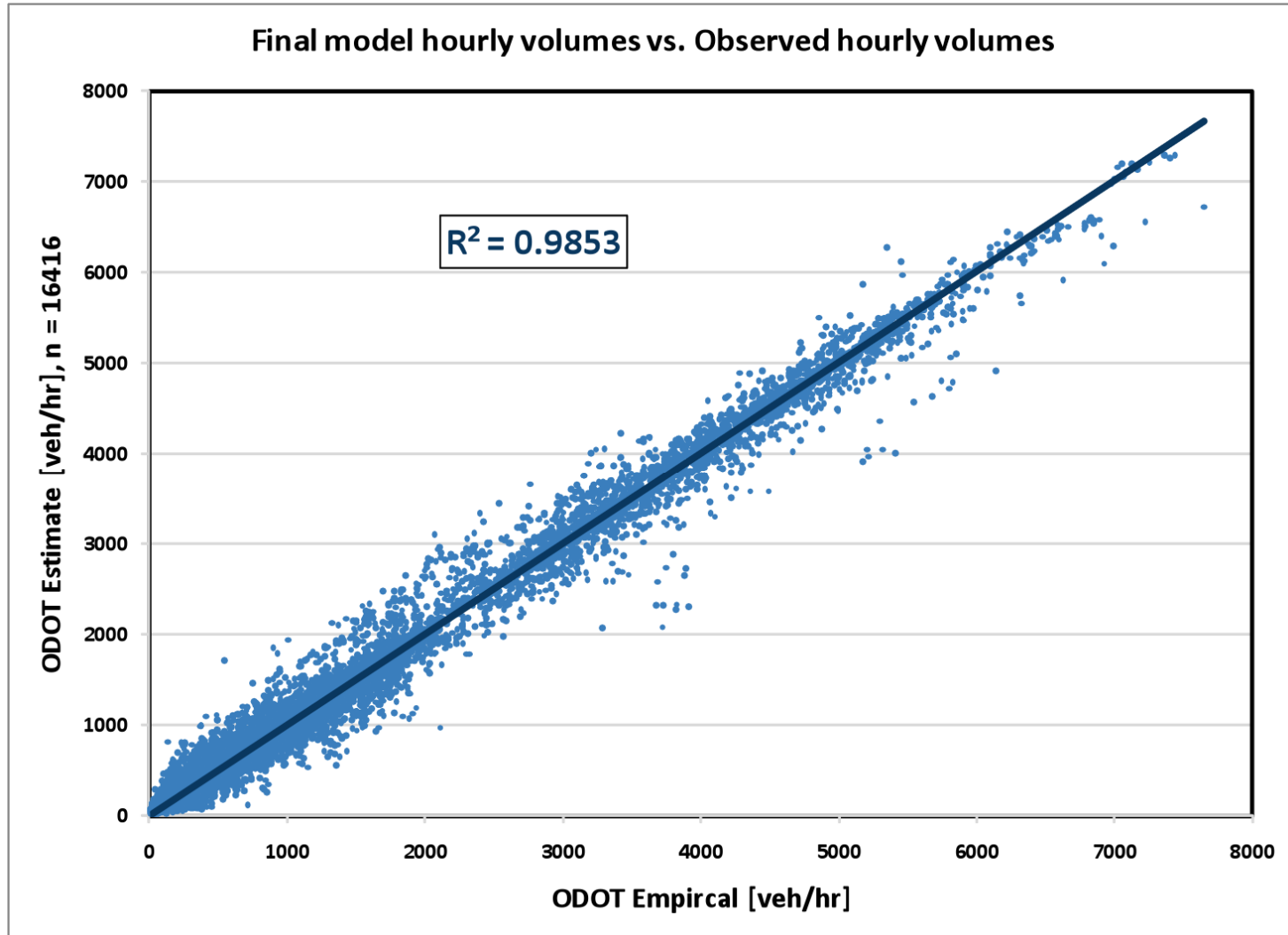
455 Valid Detectors

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# Step #1: Can Daily Traffic Volume Be Predicted With Peak Period Data Points?

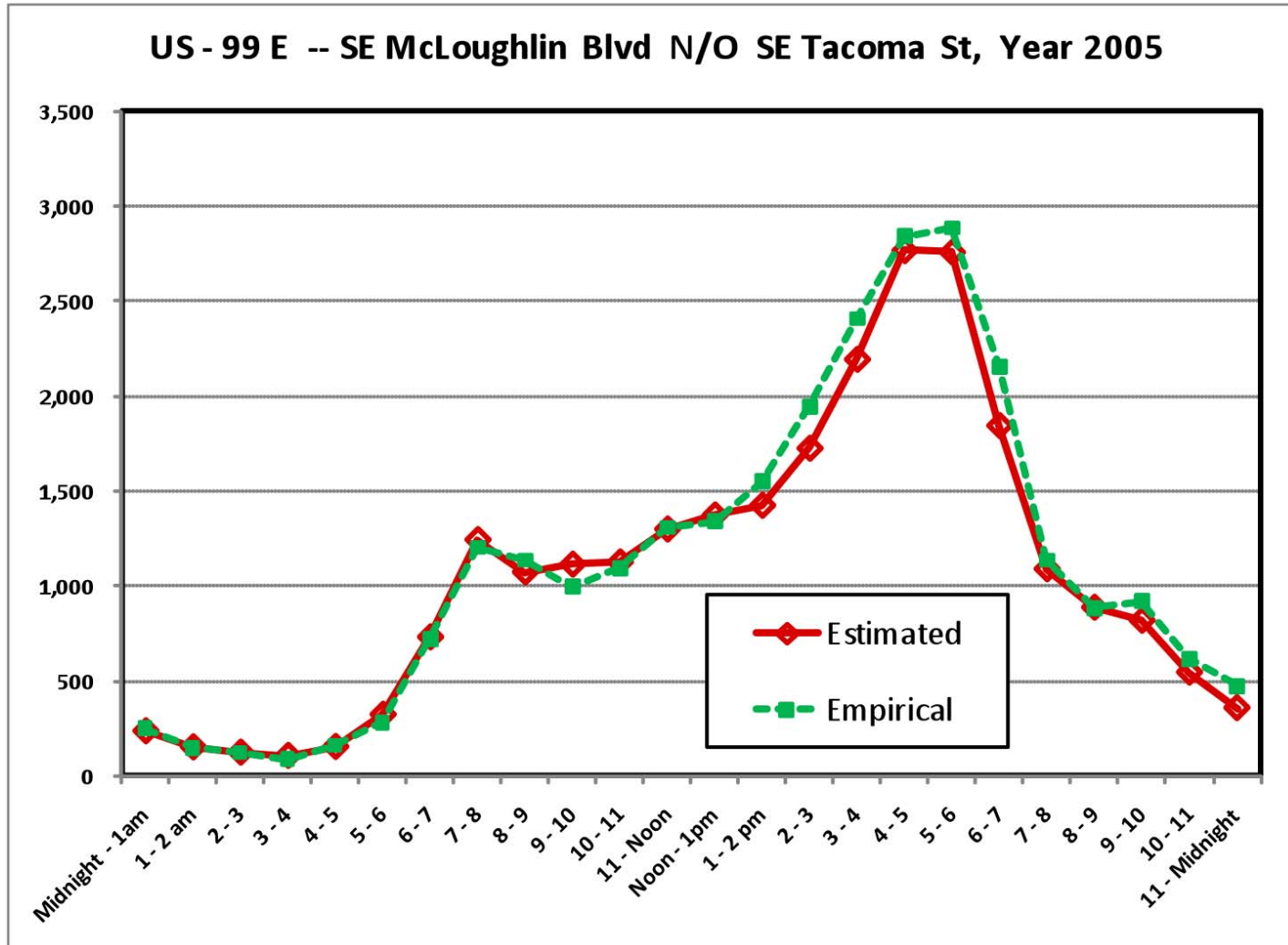


# Step 1: Can hourly traffic volume be Predicted With Daily and Peak Period Data Points?

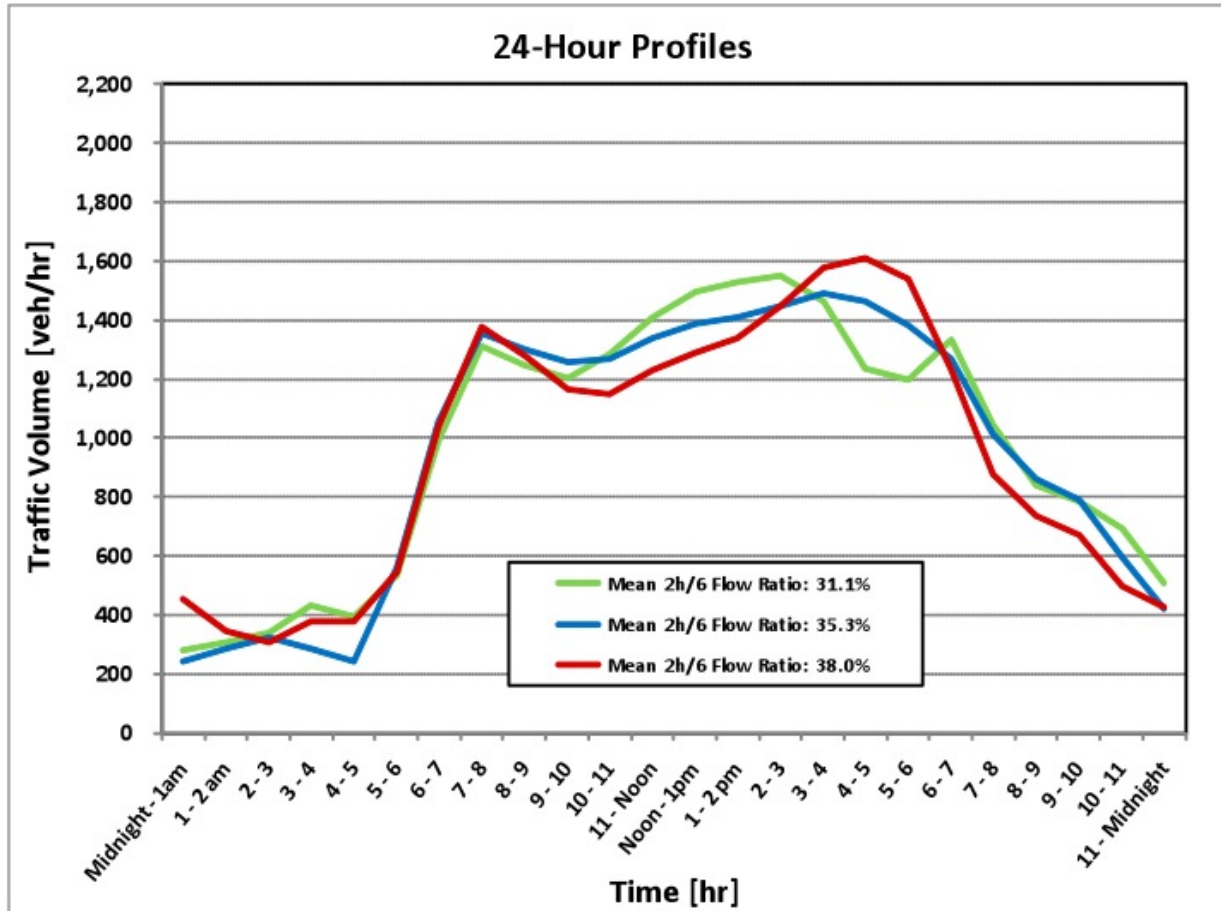




# Result: A Tool That Can Estimate and Graphically Display Hourly Profiles



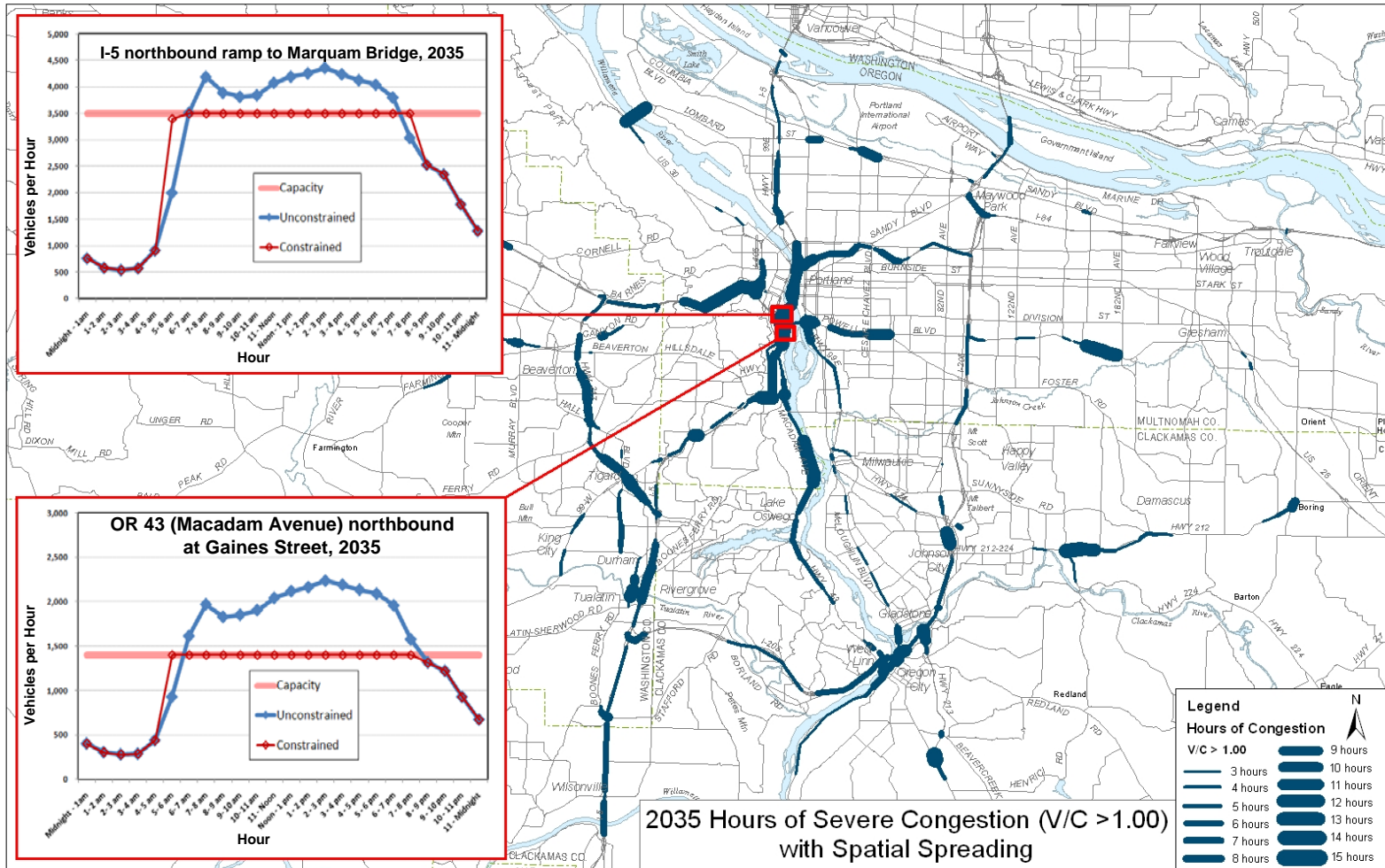
# Step #3: Accounting For Peak “Spreading”



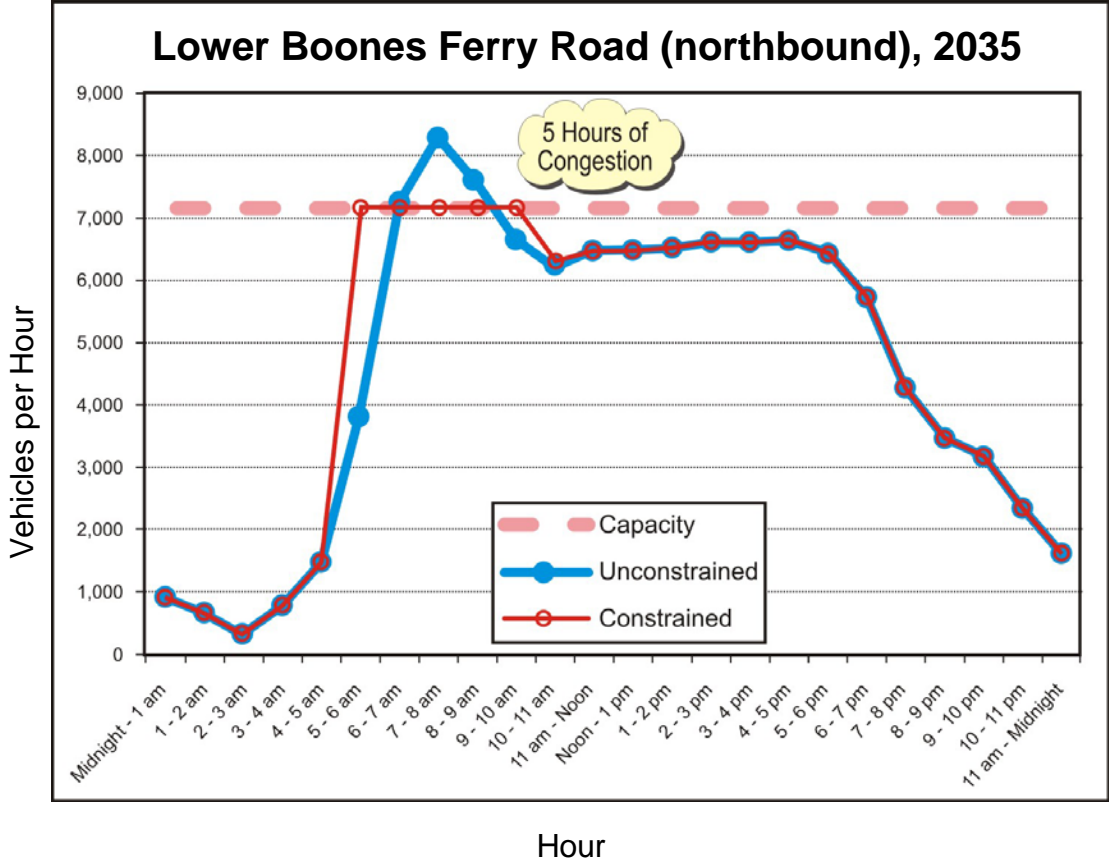
**Table 4: PM Peak Spreading Factors**

2 – 3 PM	3 – 4 PM	4 – 5 PM	5 – 6 PM	6 – 7 PM	7 – 8 PM
16.0%	17.4%	25.0%	20.1%	16.0%	5.0%

# Final Estimation Tool: Duration of Congestions Adds a New Dimension to Congestion Discussions



# The Hours of Congestion Tool Helps Identify and Assess Locations for Operations Improvements



# Hours of Congestion Provides a Comparison to Known Nationwide Severely Congested Corridors

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Location	Corridor	Year	Hours of Congestion per Weekday
Portland, OR	I-5 south of Columbia River	2009	4 to 5
<b>Portland, OR</b>	<b>I-5 between I-405 and I-84</b>	<b>2035</b>	<b>12 to 14</b>
New York, NY	I-95	2009	15
Chicago, IL	I-90/I-94	2009	14
Los Angeles, CA	US-101	2009	14

Source 2009 Data: INRIX National Traffic Scorecard 2009 Annual Report

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# Utilizing Data Mining to Enhance Travel Forecasts Improves Regional Transportation Discussions

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- ▶ Hours of Congestion provides a duration measure for congested urban networks
  - ▶ Hours of Congestion adds a new dimension to understanding key regional bottlenecks
  - ▶ Hours of Congestion helps identify and assess locations for operations improvements
  - ▶ Hours of Congestion provides a comparison to known nationwide severely congested corridors
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