

# Using Travel Time Reliability Measures to Support Traffic Management and Operations

by

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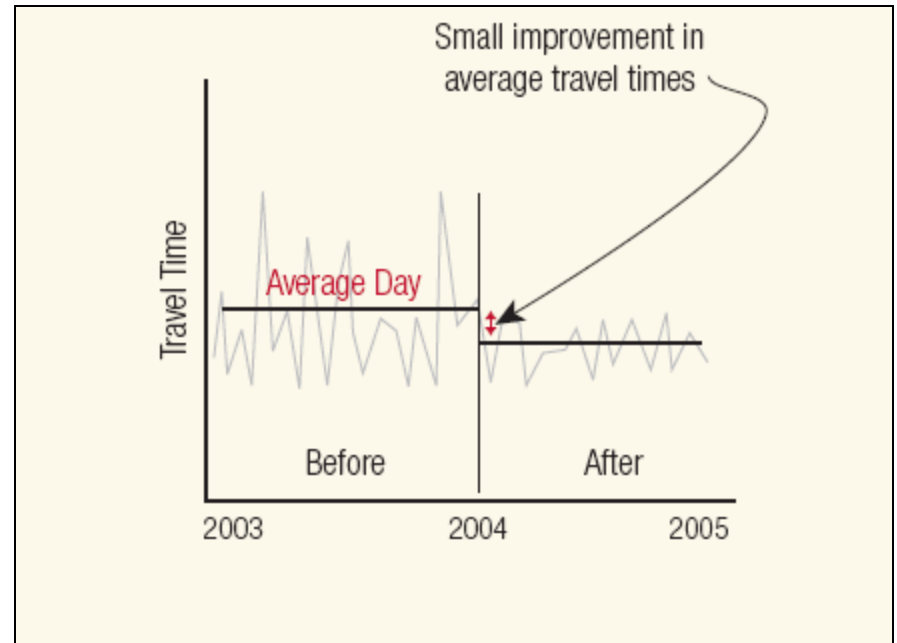
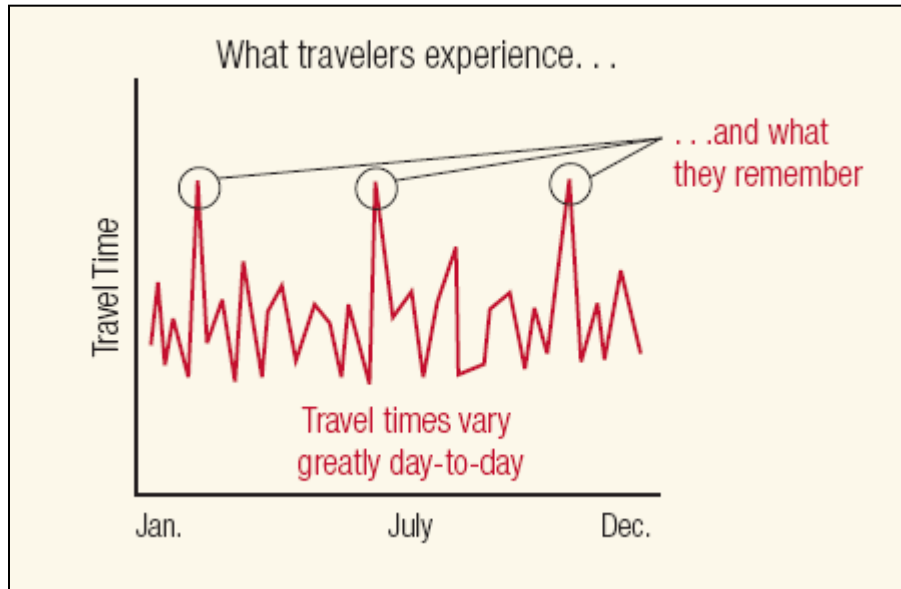
**Tao Wang, Ph.D.**

**Florida International University**

May 3, 2016

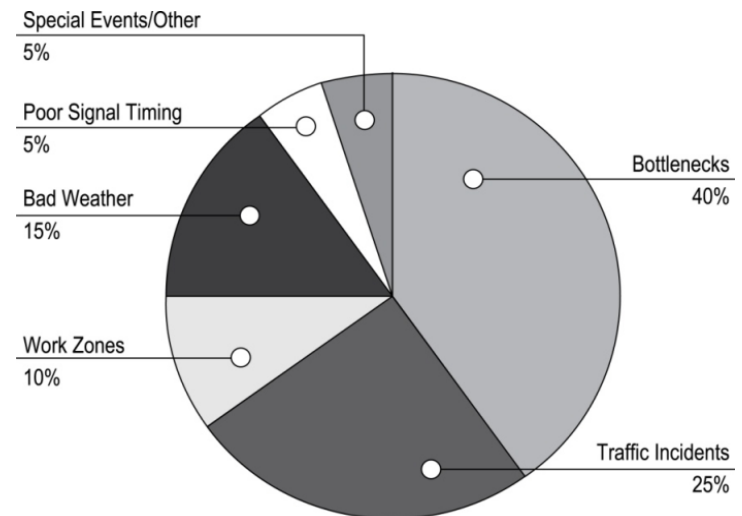


# Why Reliability is important



# Unreliability Causes

- Seven factors cause travel times to be unreliable
  - incidents, inclement weather, work zones, special events, traffic control device timing, demand fluctuations, and inadequate base capacity



# Data Requirements

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- Requires data for long period
- Tests showed that an absolute minimum of six months of data is required in areas where seasonal variation is not a major factor
- A full year of data is preferred

# ITSDCAP Functionality

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- Aggregation and cleaning of data from multiple sources
- Grouping and clustering of data
- Performance measurements and dashboard
- Real-time information sharing
- Prediction of system performance and impacts
- Decision support
- Transportation model support

# Reliability Estimation in ITSDCAP

The screenshot displays the ITSDCAP web application interface. The browser address bar shows the URL `http://localhost:2239/Default.htm`. The application title is "ITSDCAP INTELLIGENT TRANSPORTATION SYSTEM DATA CAPTURE AND PERFORMANCE MANAGEMENT".

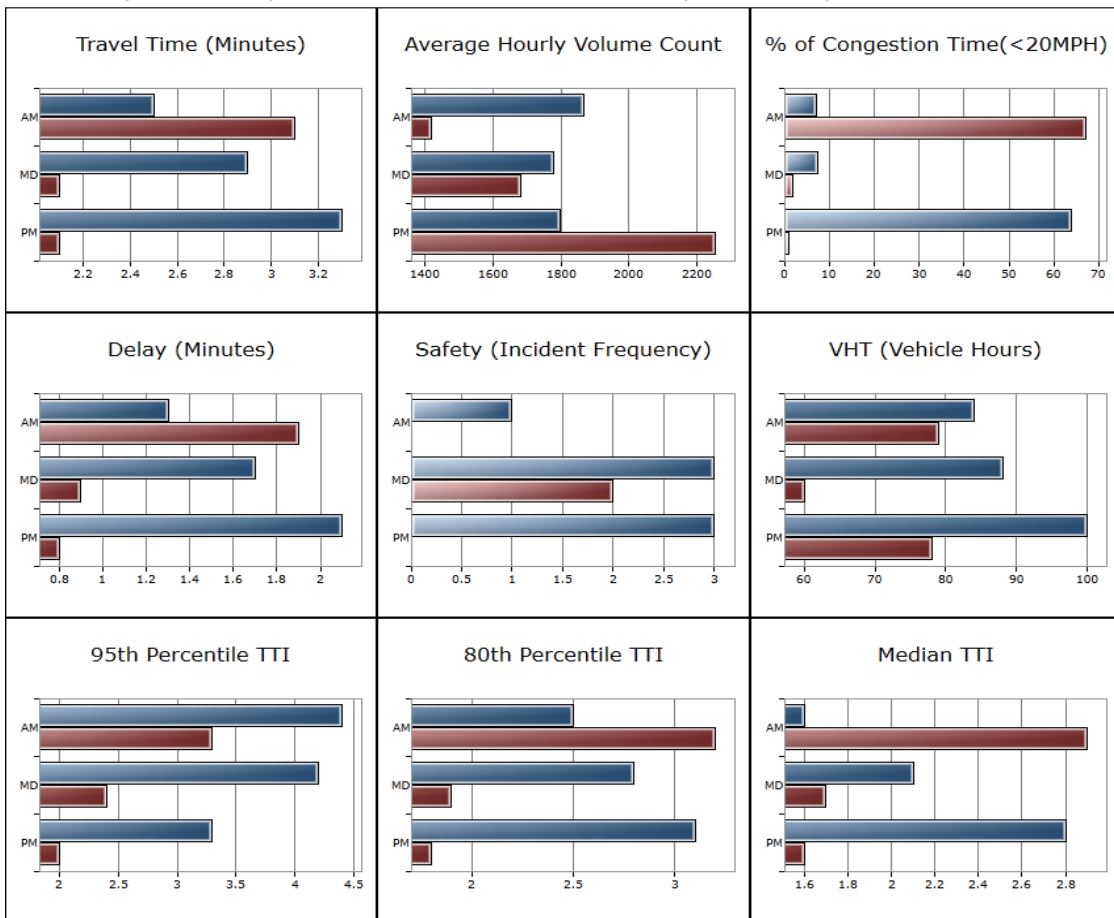
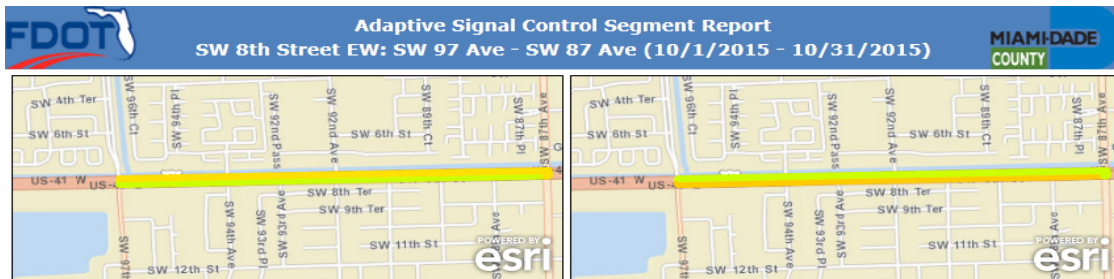
The main interface is divided into a sidebar on the left and a map area on the right. The sidebar contains the following sections:

- Real Time Decision Support** / **Offline Decision Support**
- 3. Start:** NW 62 ST
- End:** SOUTH OF NW 151 ST
- Study Period**
  - 1. Start Date: 1/1/2012, Start Time (HH:MM): 00 : 00
  - 2. End Date: 12/31/2012, End Time (HH:MM): 23 : 00
  - 3. Day of Week:  Sun  Mon  Tue  Wed  Thu  Fri  Sat
- Performance Measurement**
  - Safety
  - Environment
  - Mobility
  - Travel Time Reliability
  - CDF
  - Occurrence
  - Standard Deviation
  - Buffer Index
  - Policy Index
  - Misery Index
  - PDF
  - Severity
  - Unreliability Contribution
  - Travel Time Index
  - Failure/On-Time
  - Skew Statistics
- Intersection Operation**
- ITS Evaluation**
- Decision Support**
- Dashboard**

The map area shows a street map of Miami, Florida, with various landmarks and roads labeled. A scale bar at the bottom right indicates 2km and 1mi. The Esri logo is visible in the bottom right corner of the map area.

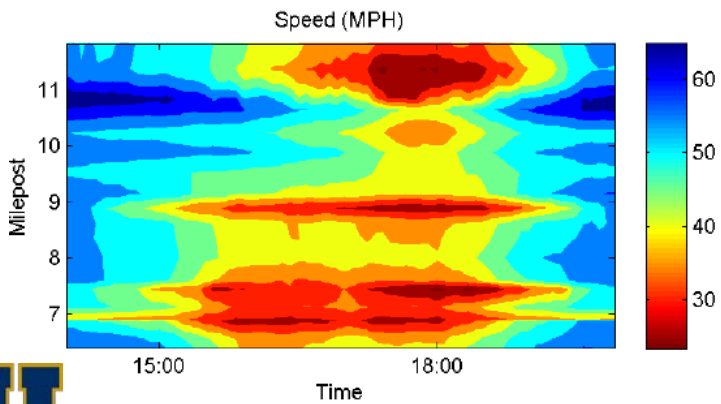
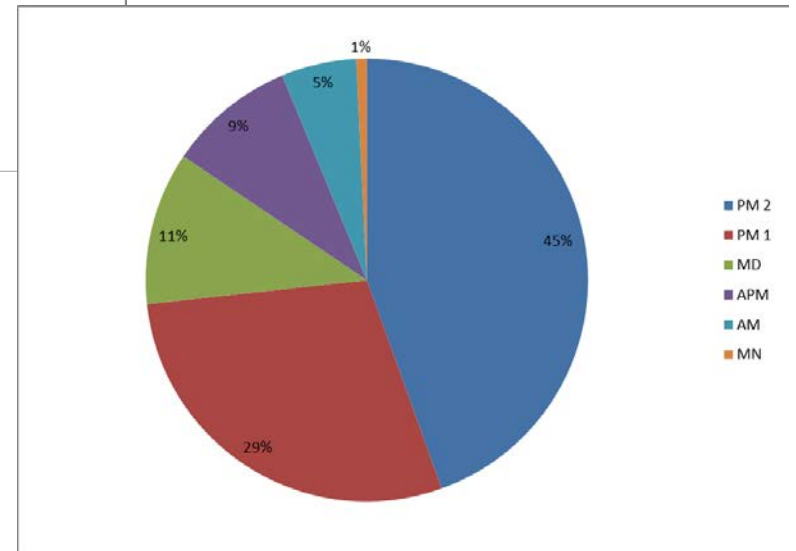
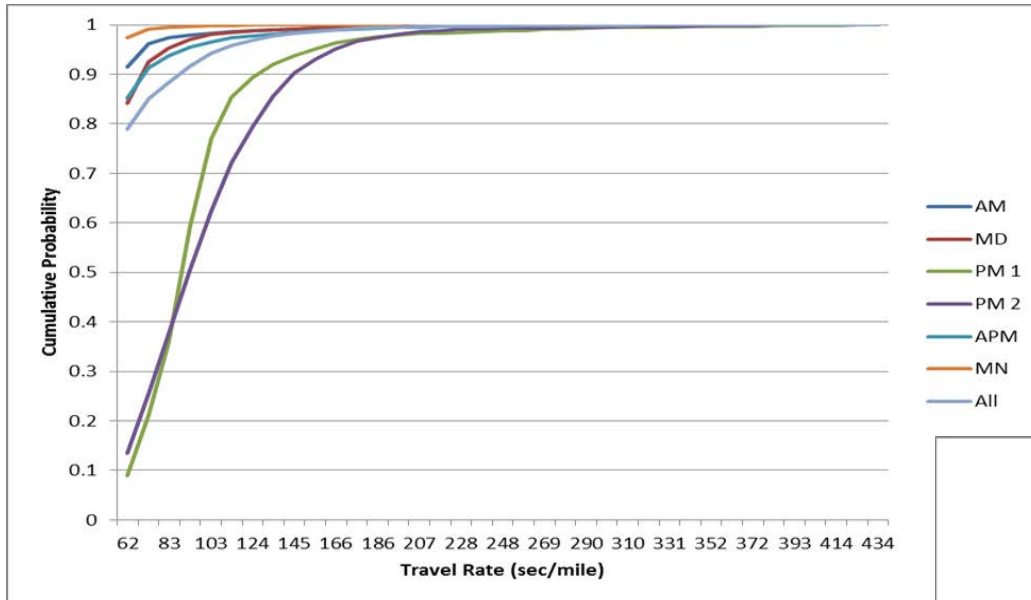
Sources: Esri, HERE, DeLorme, USGS, Intermap, Increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

# Reliability Reporting as Part of Performance Dashboard



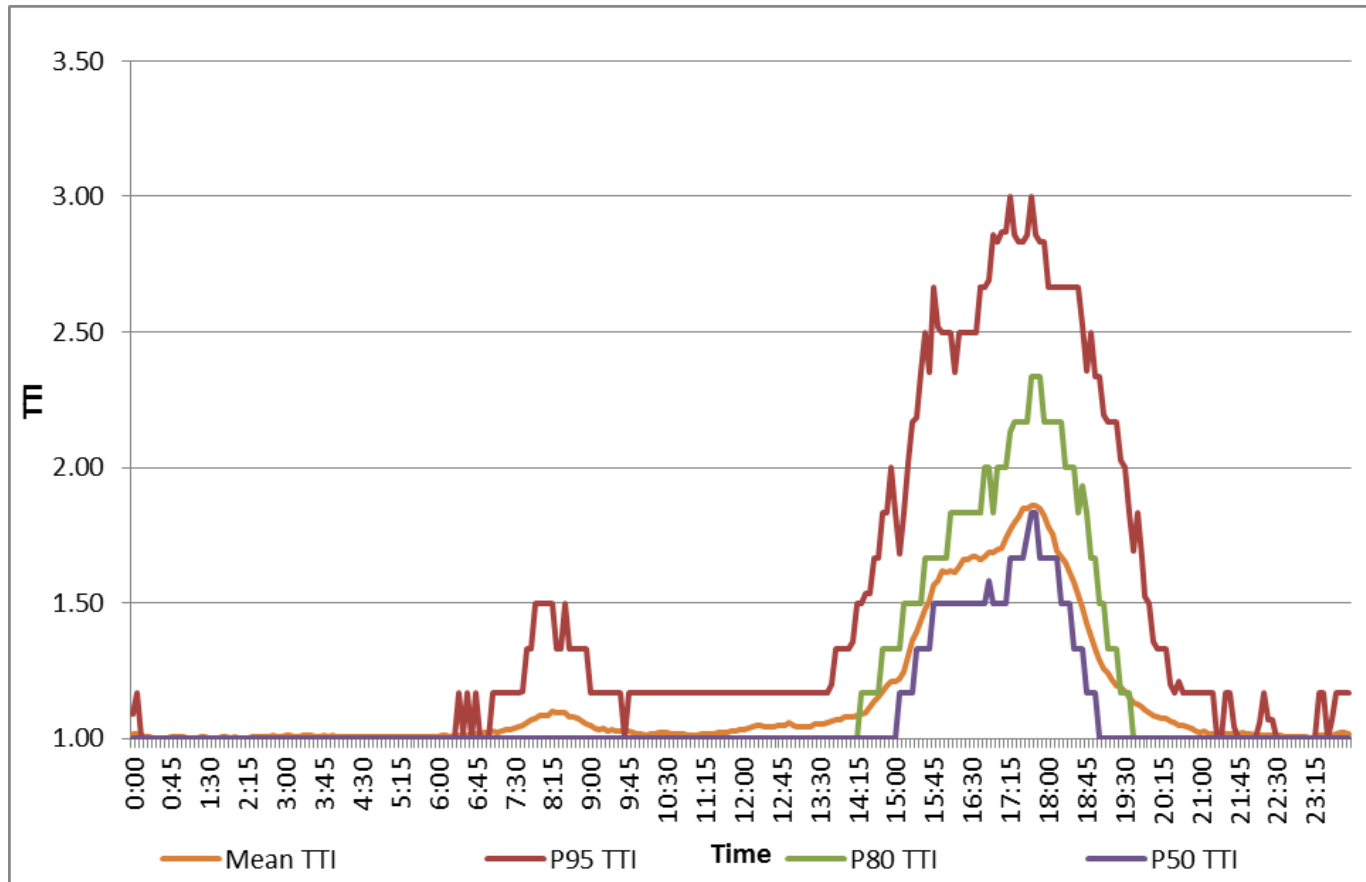
EB WB

# Contribution of Periods to Unreliability

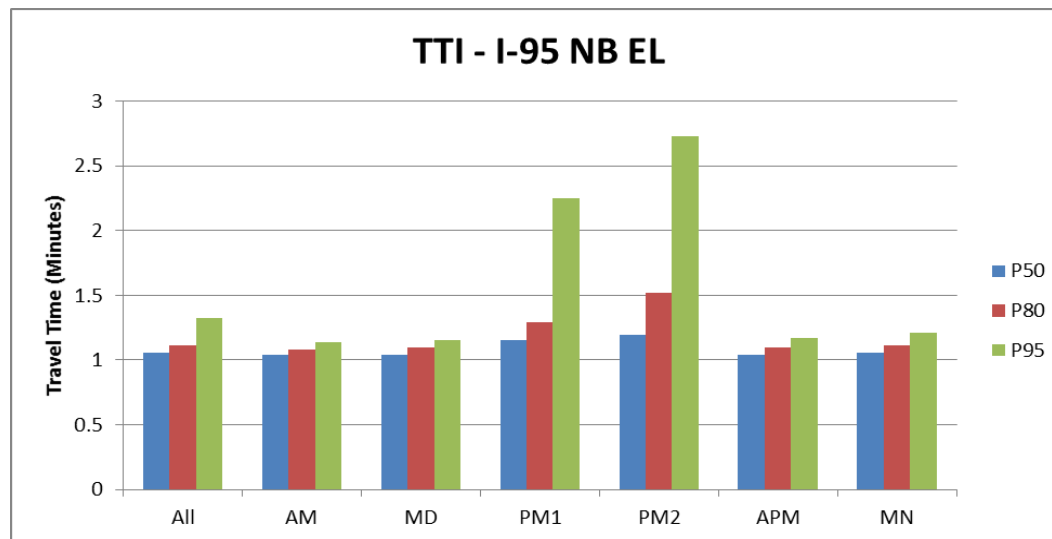
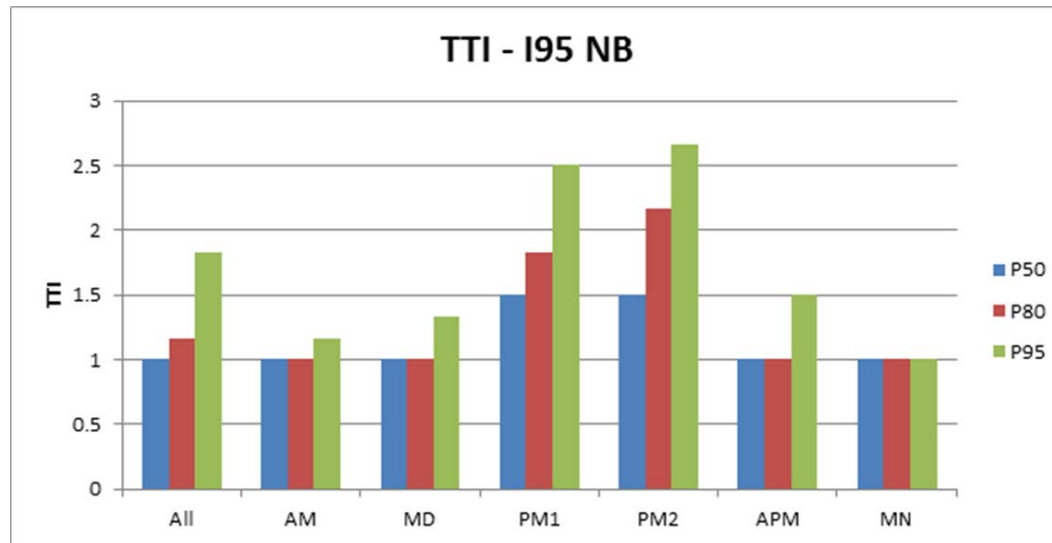




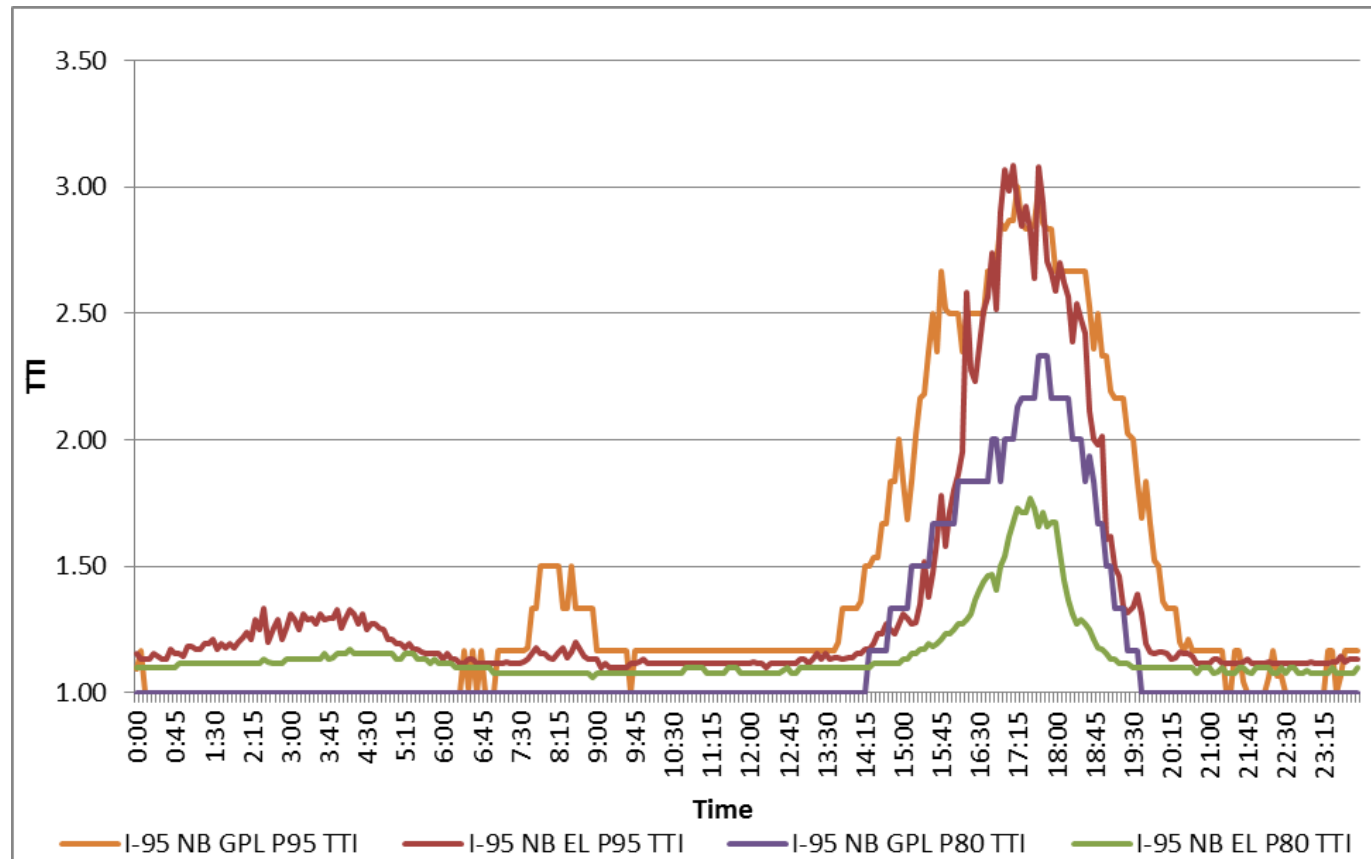
# Reliability Variation by TOD



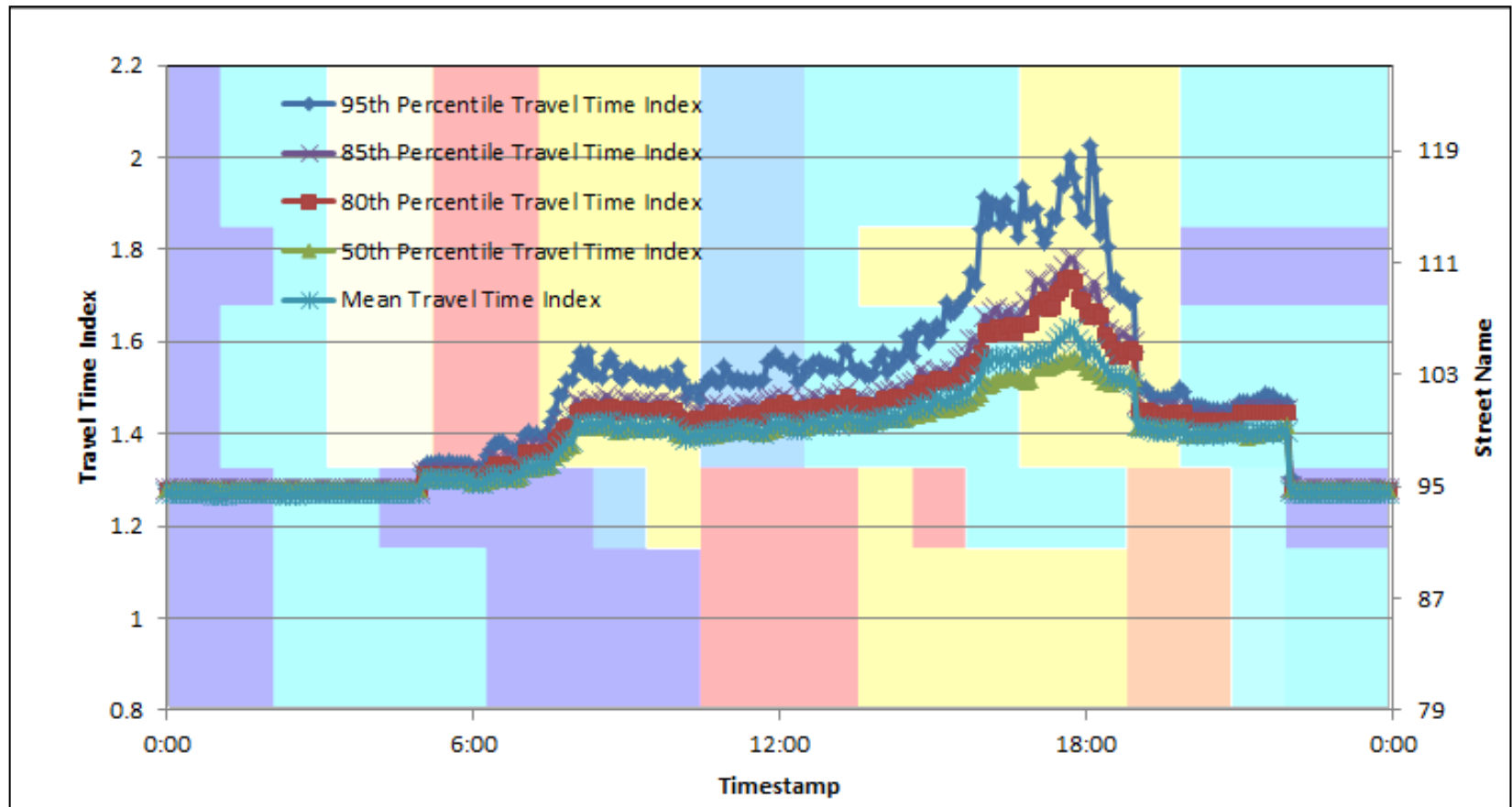
# Reliability of EL vs. GPL



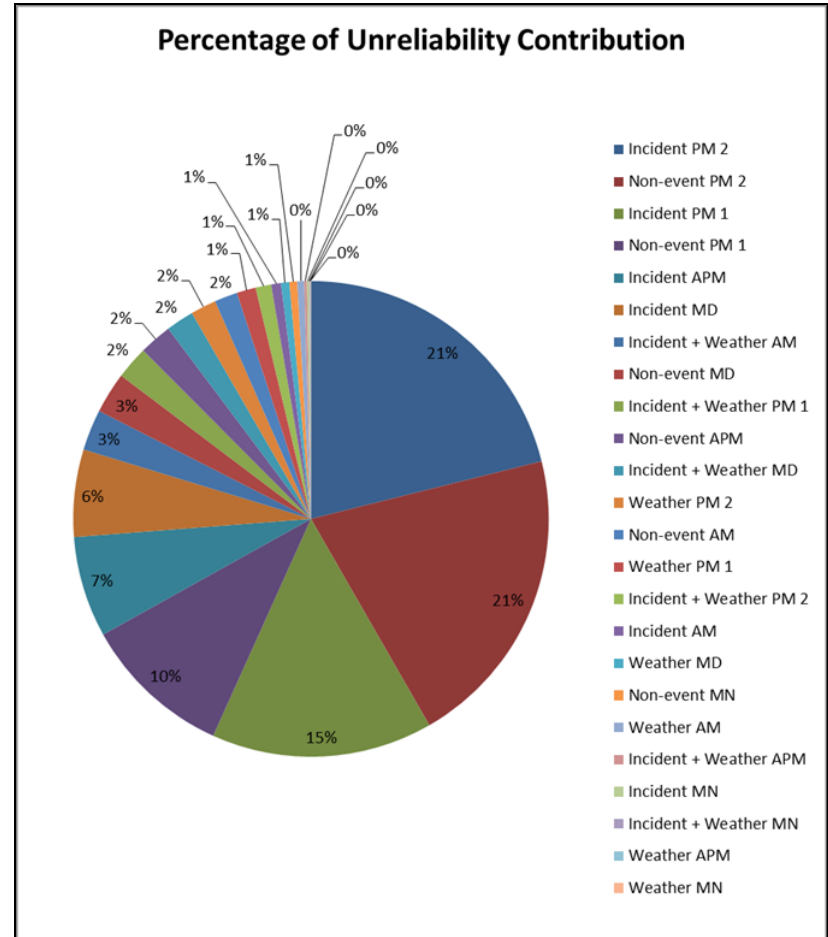
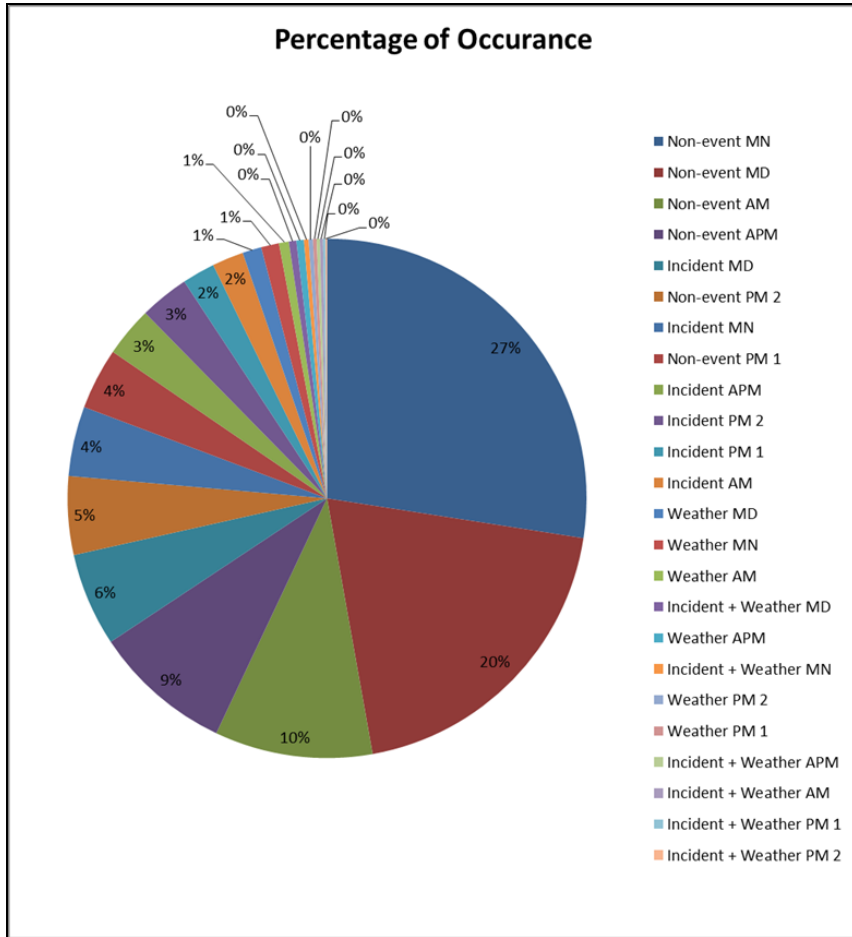
# Reliability by TOD – GPL vs. EL



# Reliability Utilization in DS on Arterials

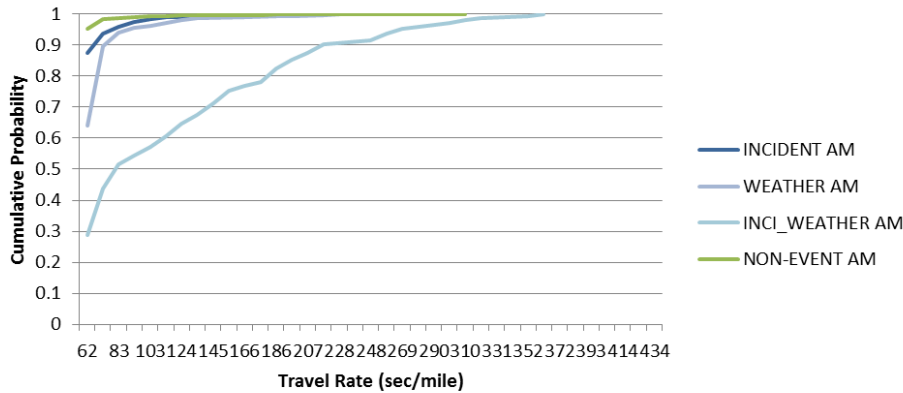


# Percentage Contribution of Factors

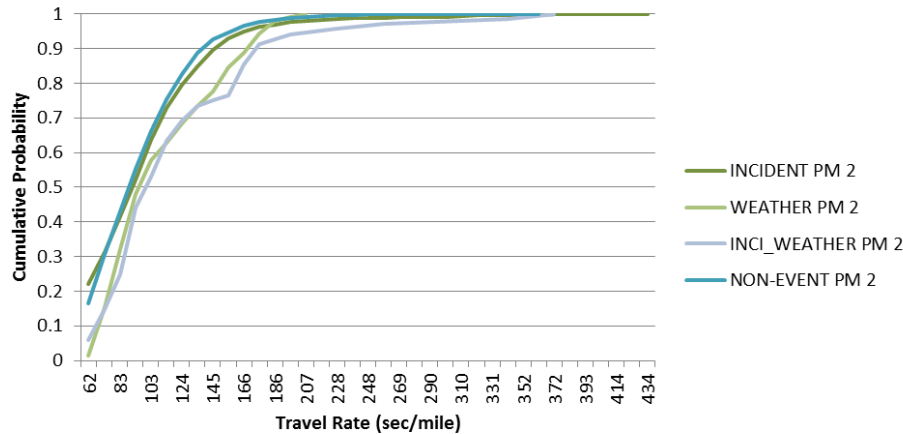


# Reliability by Regime

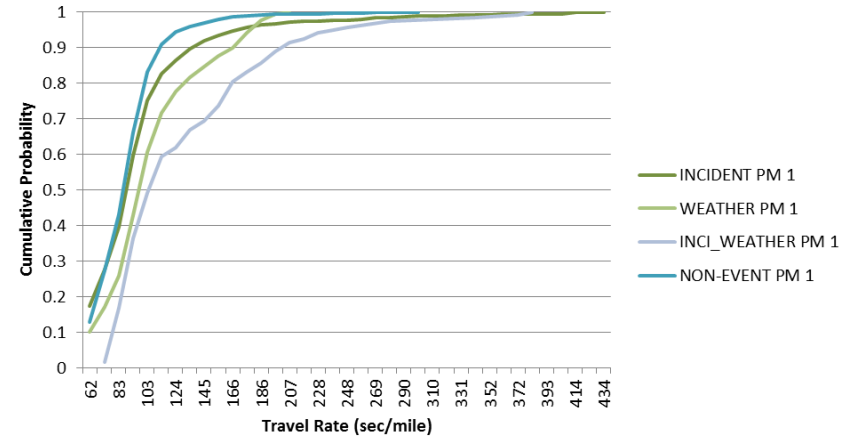
CDF by Regimes for I-95 NB GPL



CDF by Regimes for I-95 NB

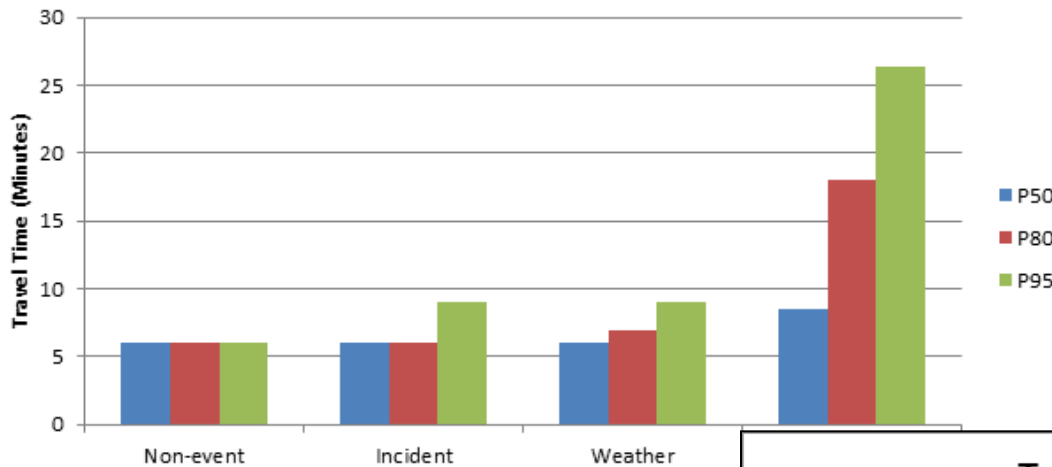


CDF by Regimes for I-95 NB GPL

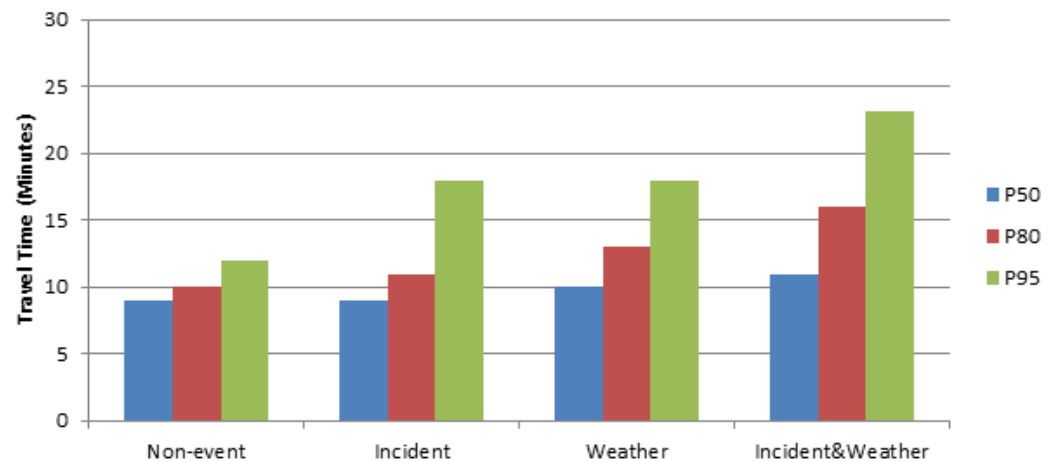


# Contributing Factors Comparison

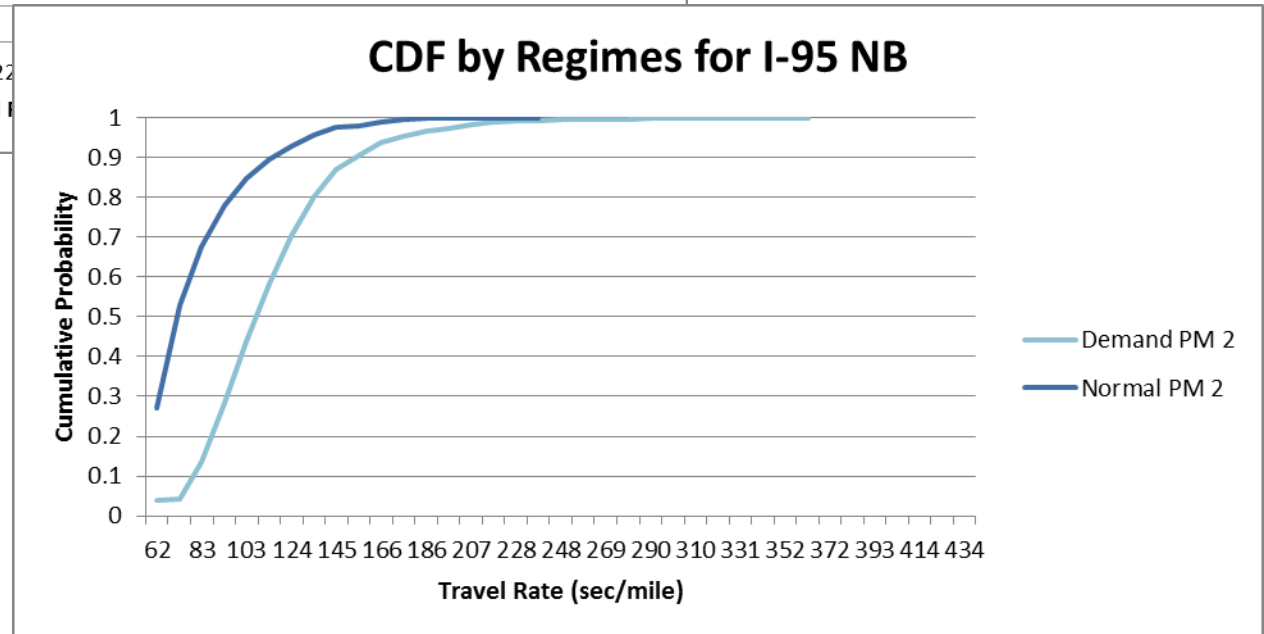
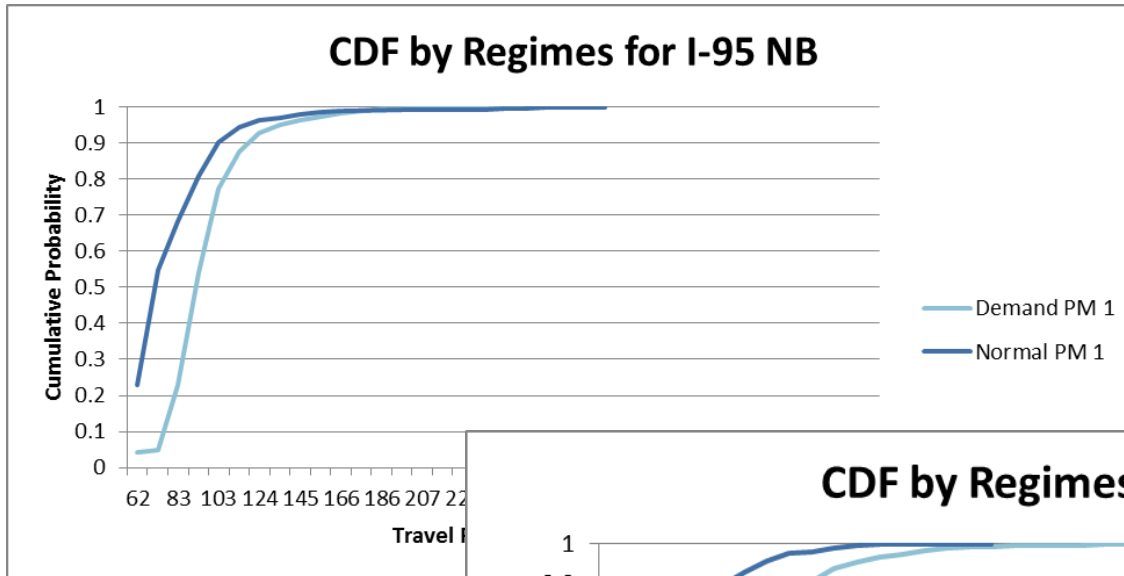
## Travel Time - I-95 NB GPL AM



## Travel Time - I-95 NB GPL PM 1

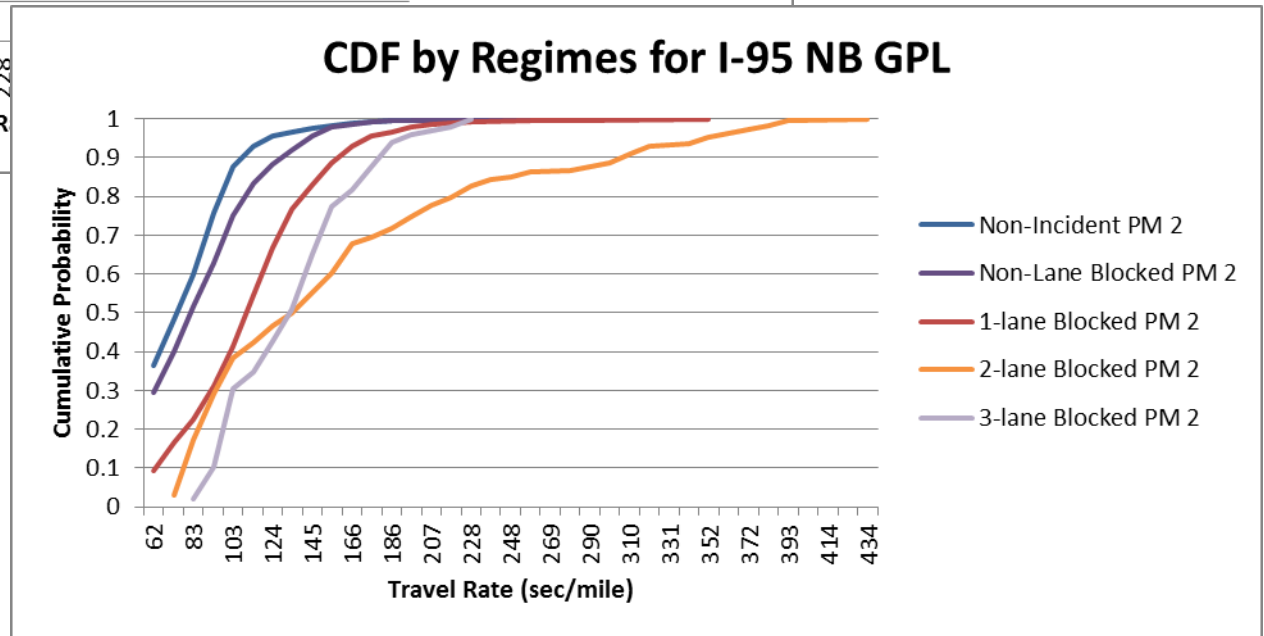
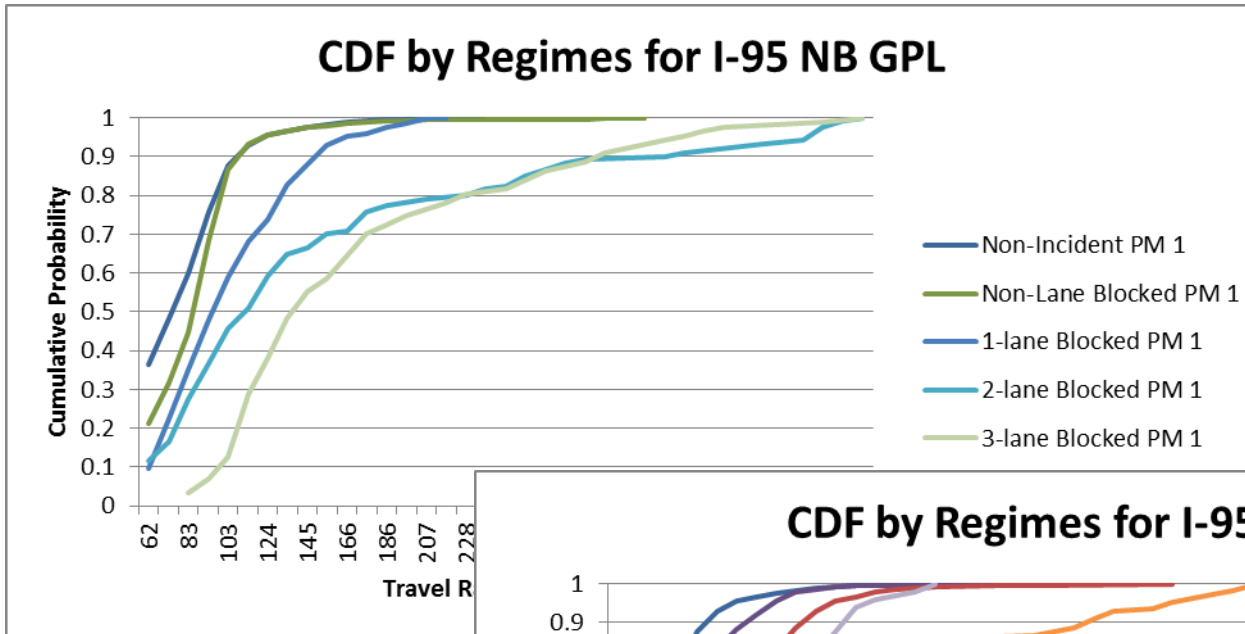


# Impact of Demand Variations

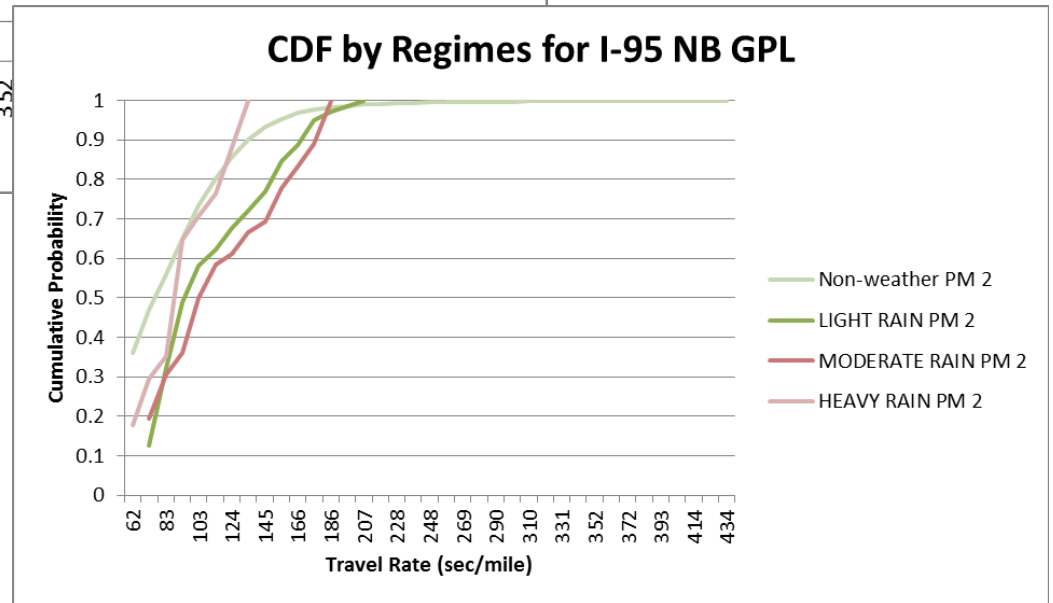
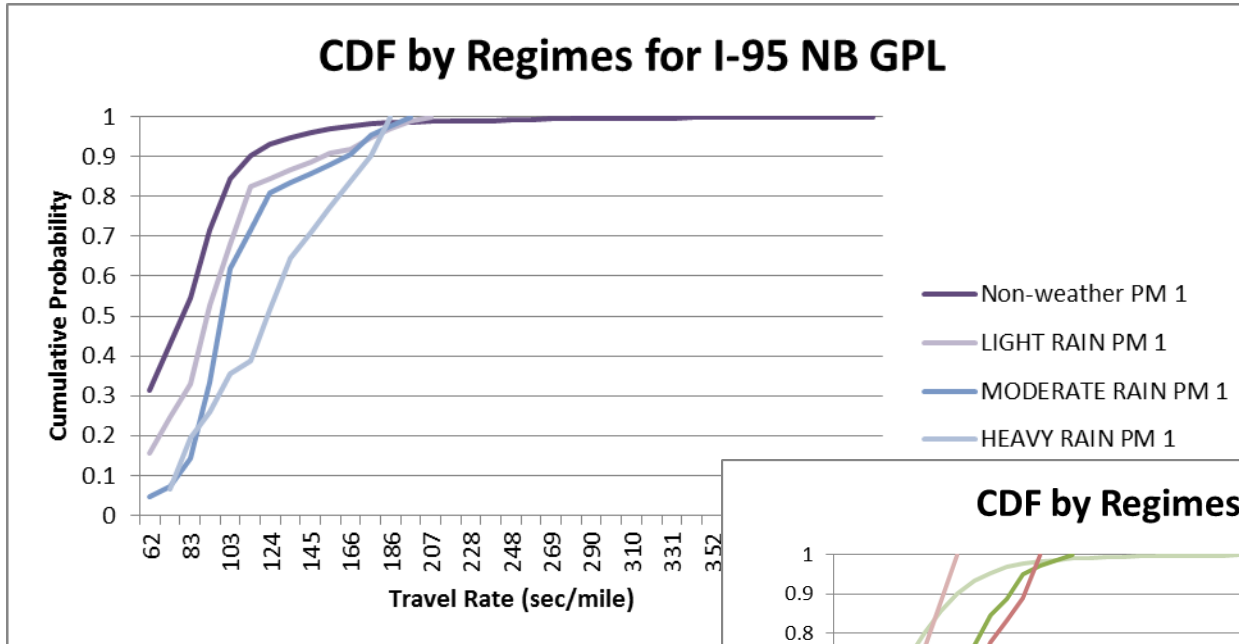




# Incident Severity Impact



# Weather Severity Impacts



# Summary

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- Reliability can be a very useful measure to assess system performance and select strategies to improve system performance
- Simple reporting of a reliability measure for a corridor is not sufficient
- Need detailed analysis of variation by TOD, different measures, contributing factors, and associated impacts