National Performance Management Research Data Set (NPMRDS)

Quarterly Webinar - February 12, 2014

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Wisconsin TOPS Lab

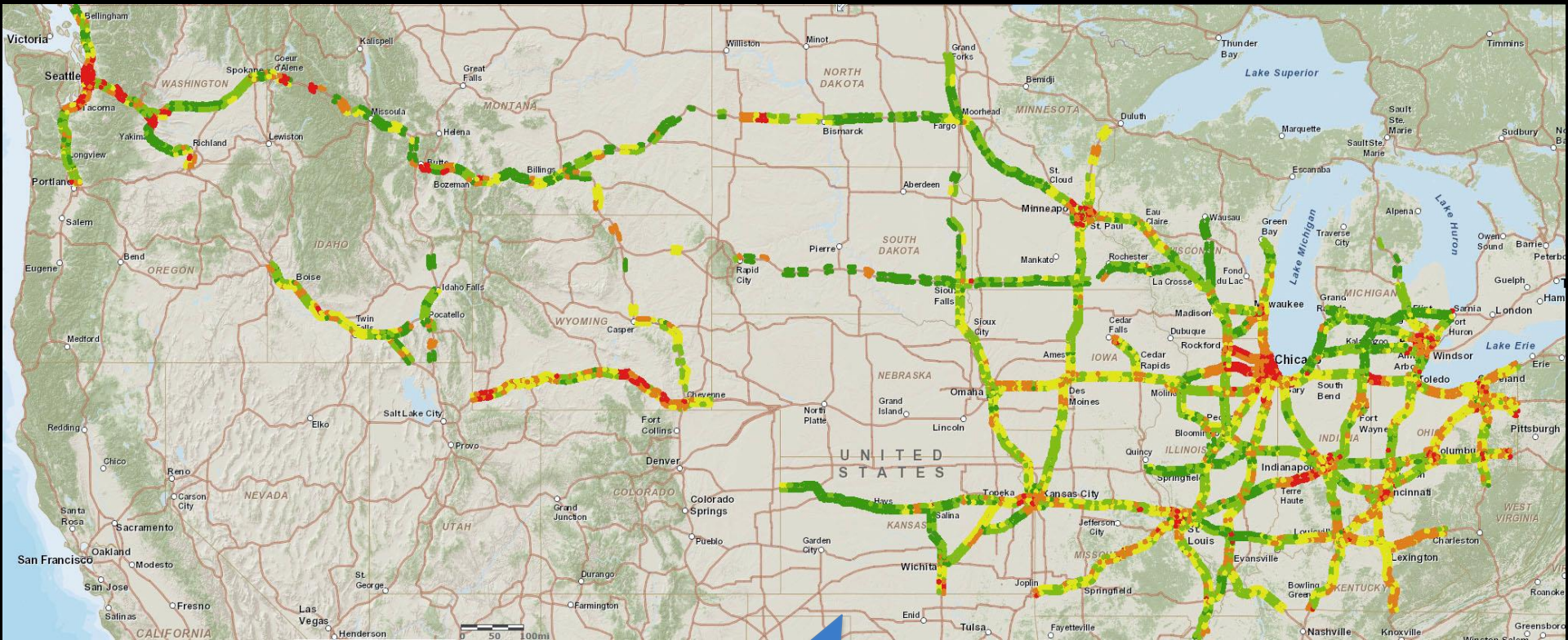WISCONSIN TRAFFIC OPERATIONS AND SAFETY LABORATORY

Overview

- Introductions and Acknowledgments

- Data Purposes and Objectives

- Accessing and Utilizing the Data

- GIS and Visualization

- Methodology and Scripting

- Questions

Multistate Operations

Interactive Map Online at
www.glrtoc.org/map/mafc_region

Incident and Event Performance

- Example shown on next two slides:
  - North/West Passage Coalition
  - I-94 in North Dakota and Minnesota
  - February 9-11, 2013 Winter Weather
  - Hundreds of miles of interstate closed 12-18 hours

Question – How best to handle this in analysis...

Observations Present in NPMRDS

ND | MN

Date & Hour < > 2/20/13 2/1/13

West < I-94 Link Location > East

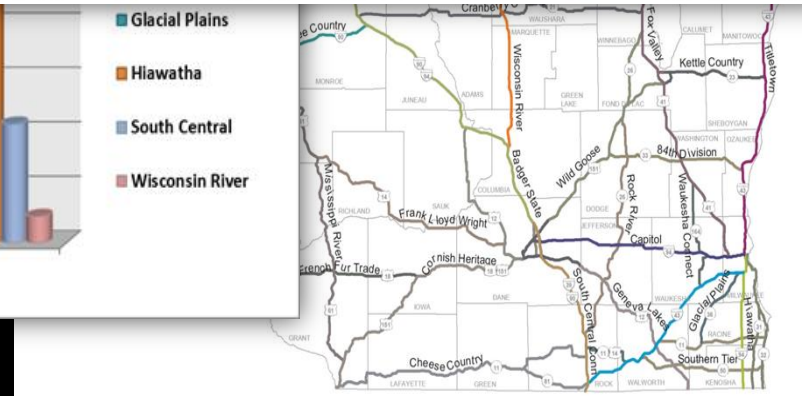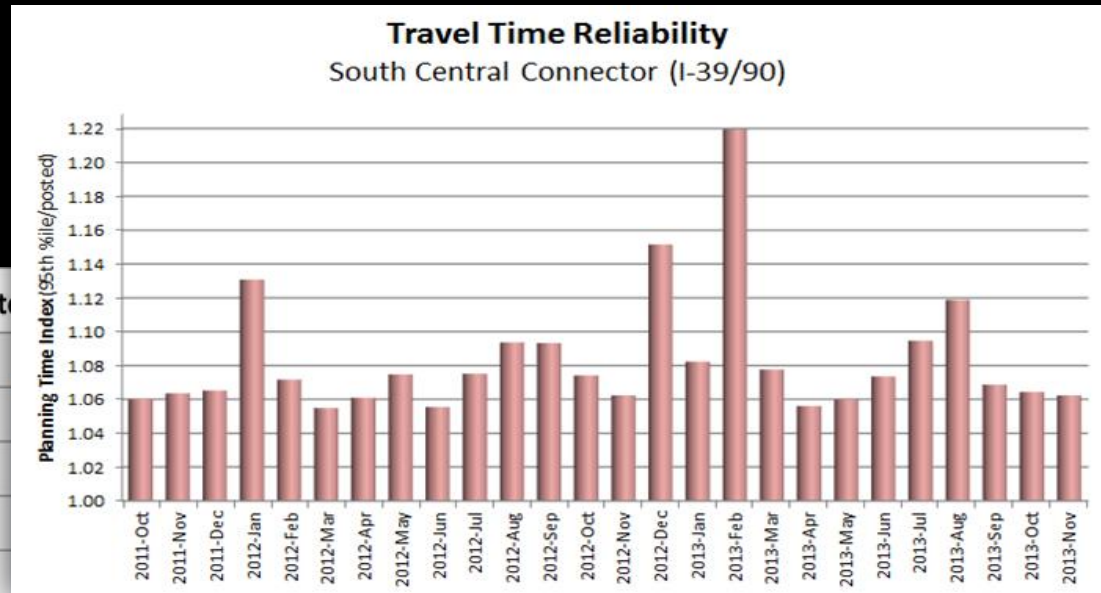# Average Speed from NPMRDS

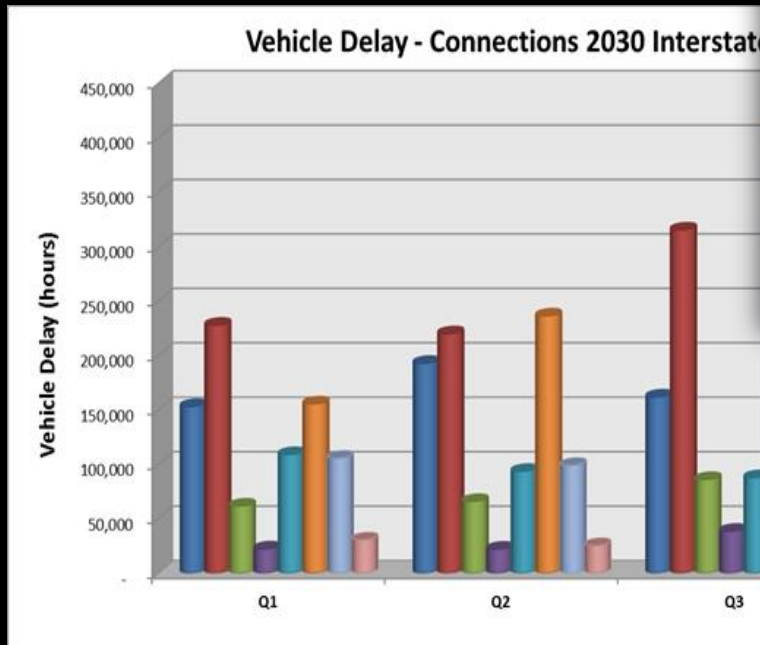West   <   I-94 Link Location   >   East

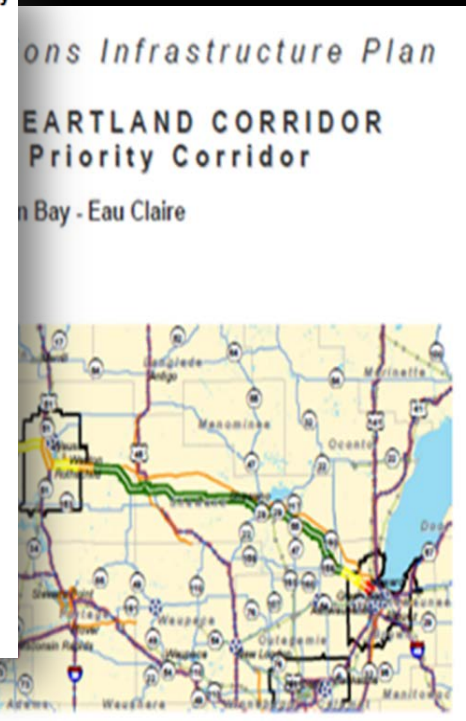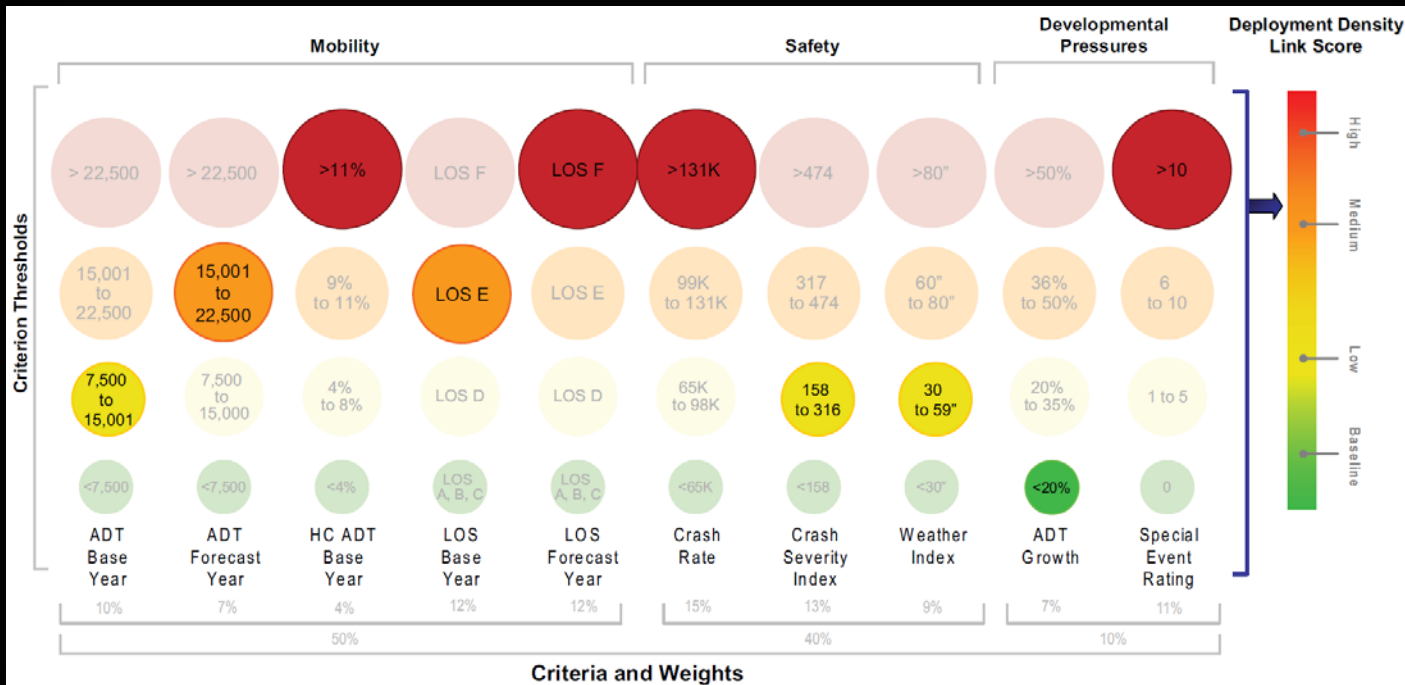2/1/13   <   Date & Hour   >   2/20/13

ND | MN

Wisconsin DOT

- **Mobility Performance Measures**
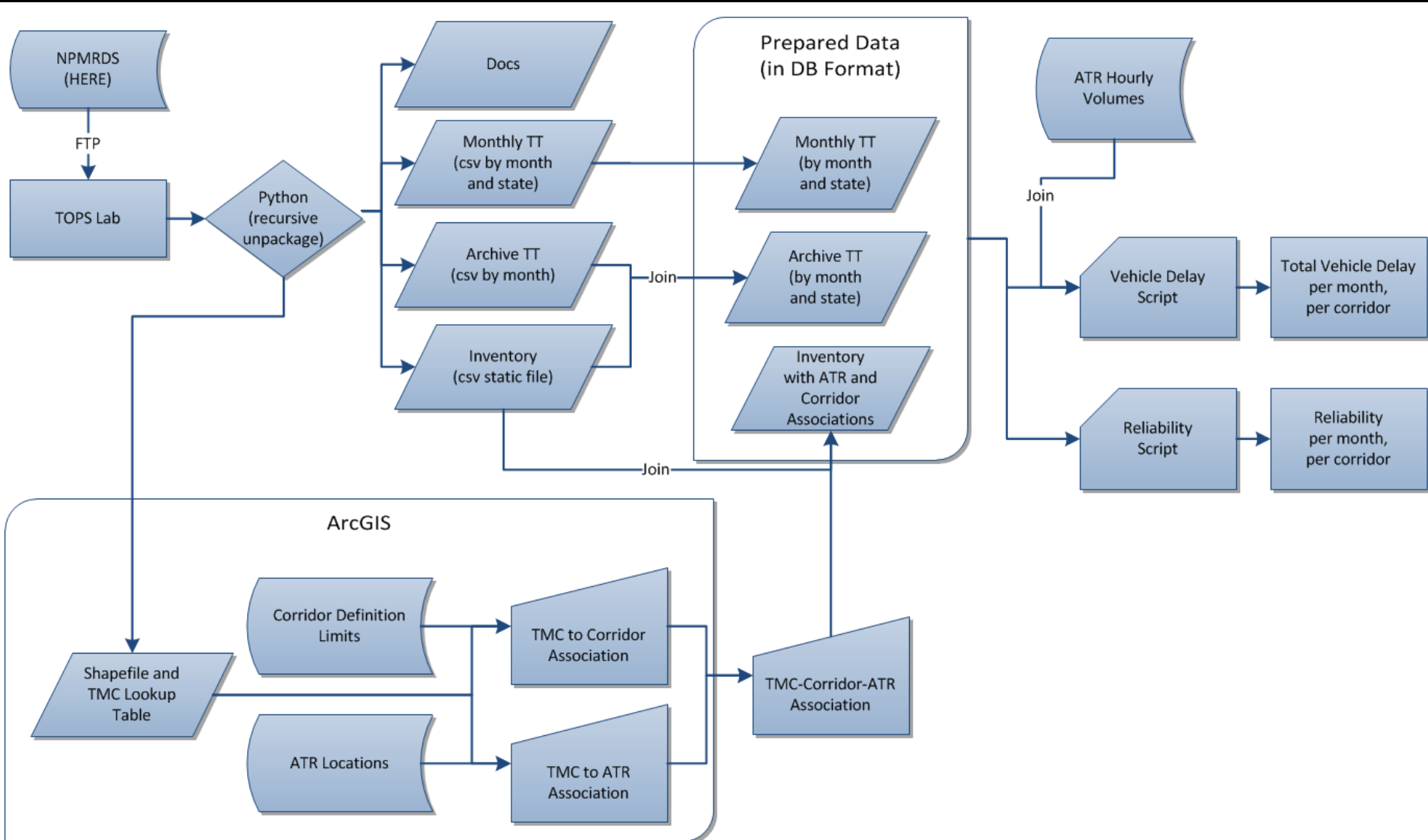 - Vehicle Delay
  - Reliability

Wisconsin DOT

- Planning Processes
  - Traffic Operations Infrastructure Plan (TOIP)
  - Reliability Valuation
  - Merging with WisDOT GIS and data

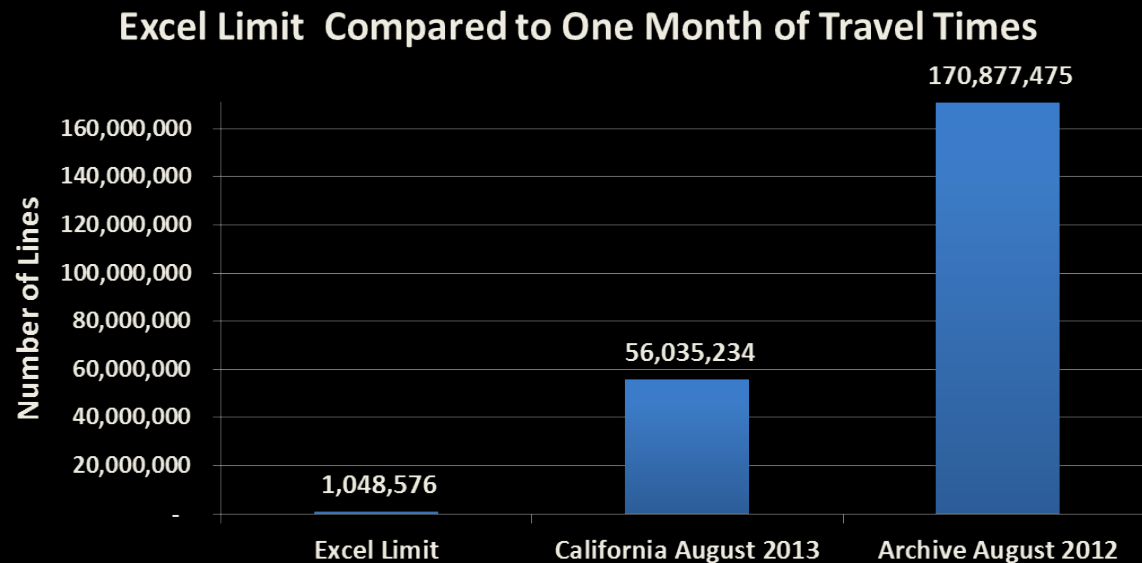# Performance Measure Process Overview

Accessing NPMRDS

- Suggest FTP
- File Structure
  - 2012q3, 2013q2, etc.
    - americas
      - additional_content_americas
        - ... static files, archive, monthly updates, shapefile (2013q2)
    - documentation_tools
      - documentation
        - ... technical references, availability dates, points of interest (poi), etc.

Utilizing NPMRDS

- Hardware, software, and skill set requirements
  - Don't try to open CSVs in Excel

Excel Limit Compared to One Month of Travel Times

	Number of Lines
Excel Limit	1,048,576
California August 2013	56,035,234
Archive August 2012	170,877,475

  - Access has 2 GB per table limit, also quickly exceeded
  - Requires database and scripting resources
 - If mapping, requires GIS expertise

Integration with GIS

- Single spatial dataset provided with NPMRDS
  - NHS_NPMRDS_Shape_file_HERE_QX_YYYY
- Covers the entire US
- Composed of individual, unique "links" (road segments)
- LINKs are not TMCs – must use the lookup table to assign TMCs to the GIS data
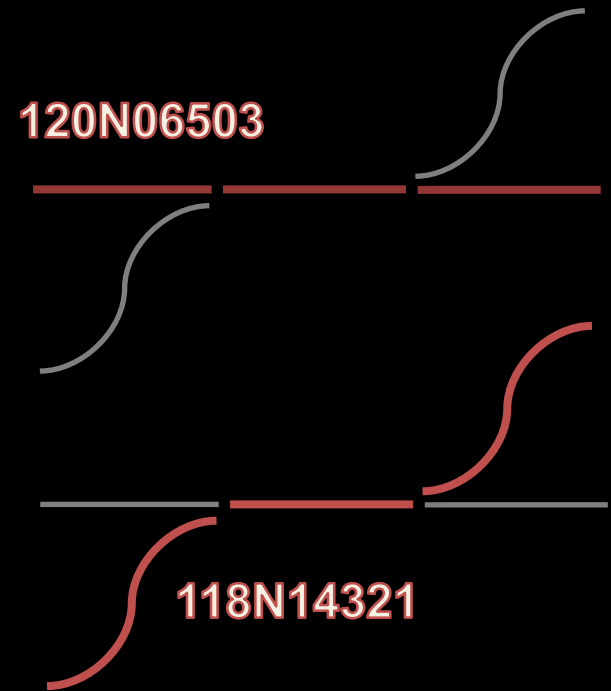 - NPMRDS_TMC_LUT_YYYYQX.dbf

Visualizing TMCs in GIS

- The relationship of the SHAPEFILE to the LOOKUP TABLE is MANY:MANY
  - **ONE** LINK can reference **MANY** TMCs (up to 8?)
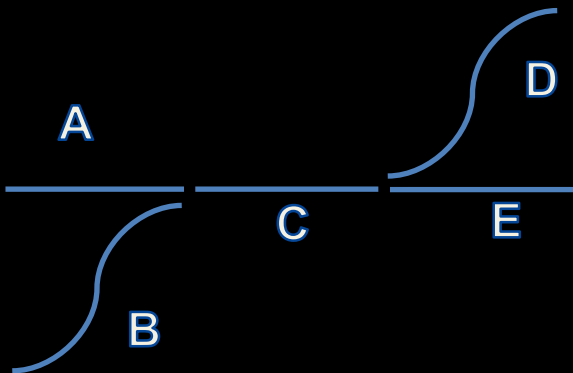 - **ONE** TMC can reference **MANY** links
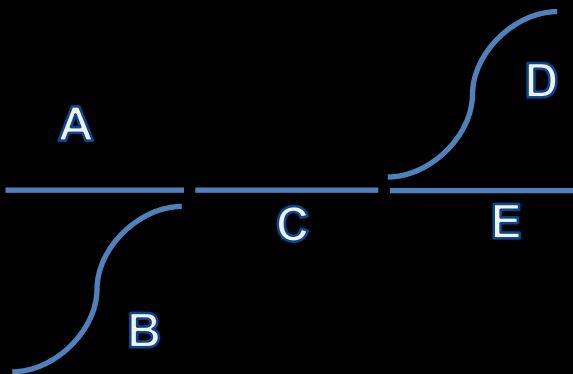
| LINK	TMC
A	120N06503
C	120N06503
E	120N06503
B	118N14321
C	118N14321
D	118N14321

A
C
E
D
B

120N06503

118N14321

Visualizing TMCs in GIS

- This can be challenging to represent in ArcGIS
- To accurately represent TMCs, link "C" should appear twice (because it represents TWO TMCs)

LINK	TMC
A	120N06503
C	120N06503
E	120N06503
B	118N14321
C	118N14321
D	118N14321

120N06503

118N14321
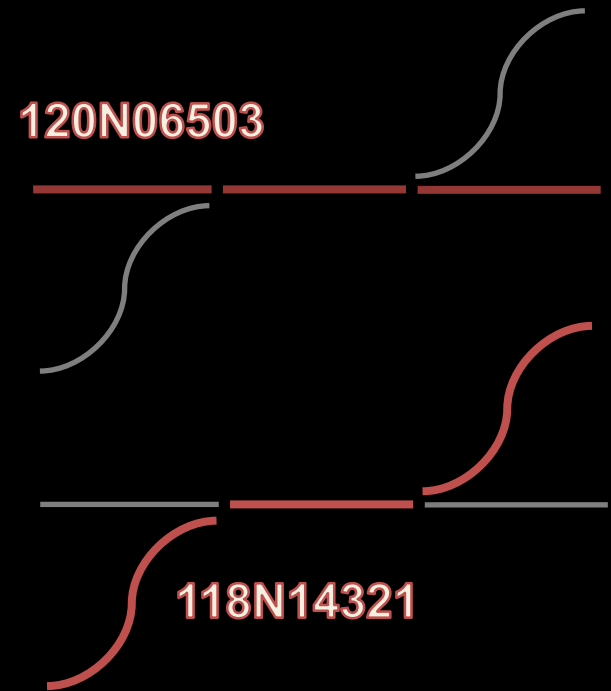
Visualizing TMCs in GIS

- Our solution is to manage the spatial data in a relational database system using spatial types
  - PRO – very flexible
  - CON – Spatial View table is huge (1,792,650 => 2,609,048)

Link Feature Class

LINK	GEO
A	shp
B	shp
C	shp
D	shp
E	shp

Lookup Table

LINK	TMC
A	120N06503
B	118N14321
C	120N06503
C	118N14321
D	118N14321
E	120N06503

Spatial View

LINK	TMC	GEO
A	120N06503	shp
C	120N06503	shp
E	120N06503	shp
B	118N14321	shp
C	118N14321	shp
D	118N14321	shp

Displaying Road Direction

- Want to show different directions at all scales (no overlap)
- The <u>lookup table</u> has a field called DIR (so does the shapefile – DIR_TRAVEL, but that's different!)
- Values are T or F
  - (could be B, but only found one instance of this in the entire data set)
- Indicates **Direction of Travel** *along the link* with respect to the reference node (the SOUTHERN end of the link, or WESTERN end if it's an E-W line)
  - T = Direction of travel TOWARDS reference node
  - F = Direction of travel FROM reference node

Direction of Travel

From Reference Node

Towards Reference Node
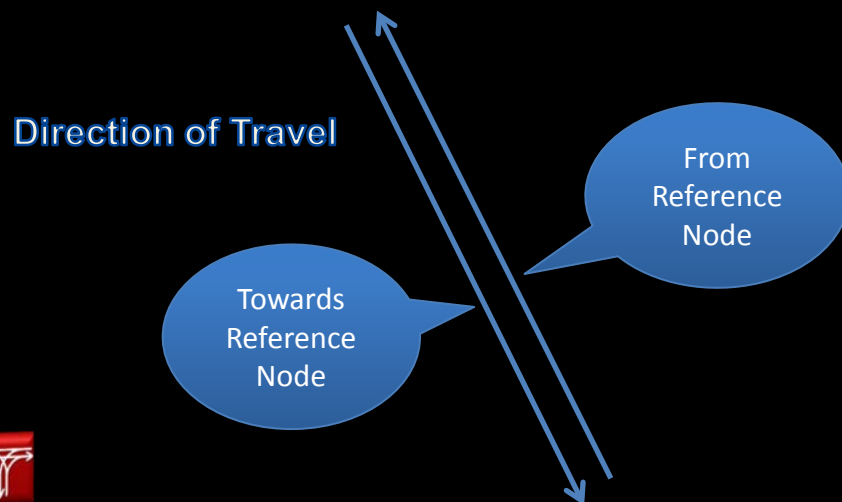
Sometimes the geometry of roadways are shown offset (e.g. divided interstate highways), other times geometry will be coincident (e.g. non-divided US highway)
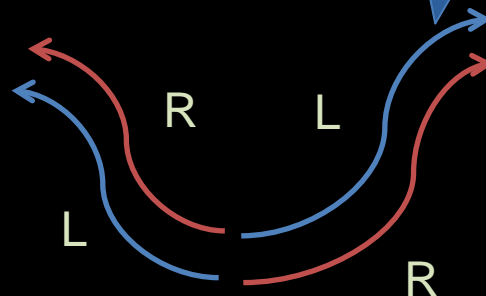
Displaying Road Direction

- Offset the line to the RIGHT or LEFT depending on the DIR value
  - FROM -> RIGHT
  - TO -> LEFT

to

from
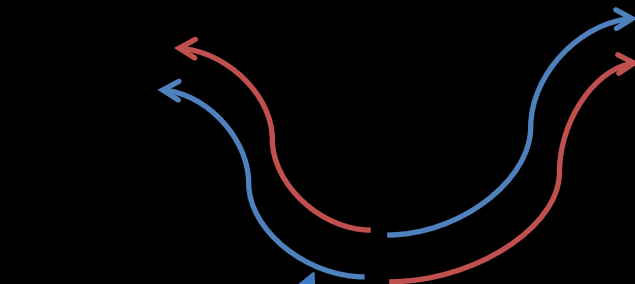
Color indicates direction of travel, arrows show geometry direction

Symbolize linework by offseting FROM lines RIGHT and TO lines LEFT
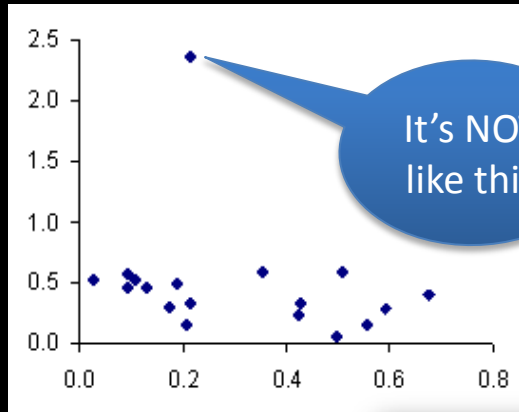
R L

L R

Allows you to see BOTH lines at all scales

If you are trying to symbolize with a performance measure, you may need to add TWO layers, one for the FROM and one for the TWO
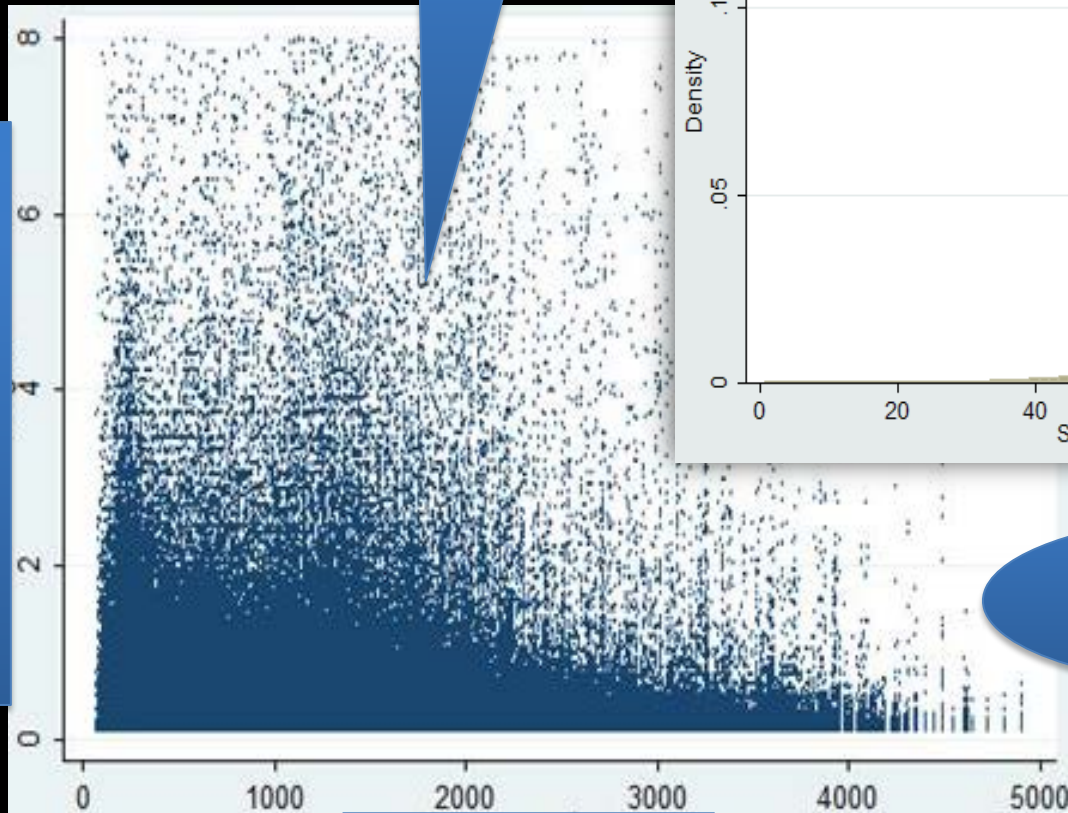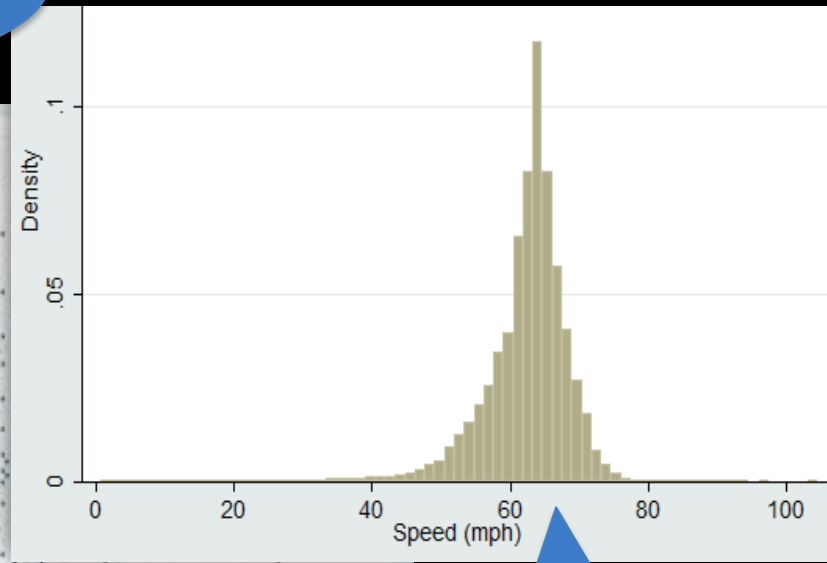
Handling Outliers

Missing Observations

Wyoming Interstates
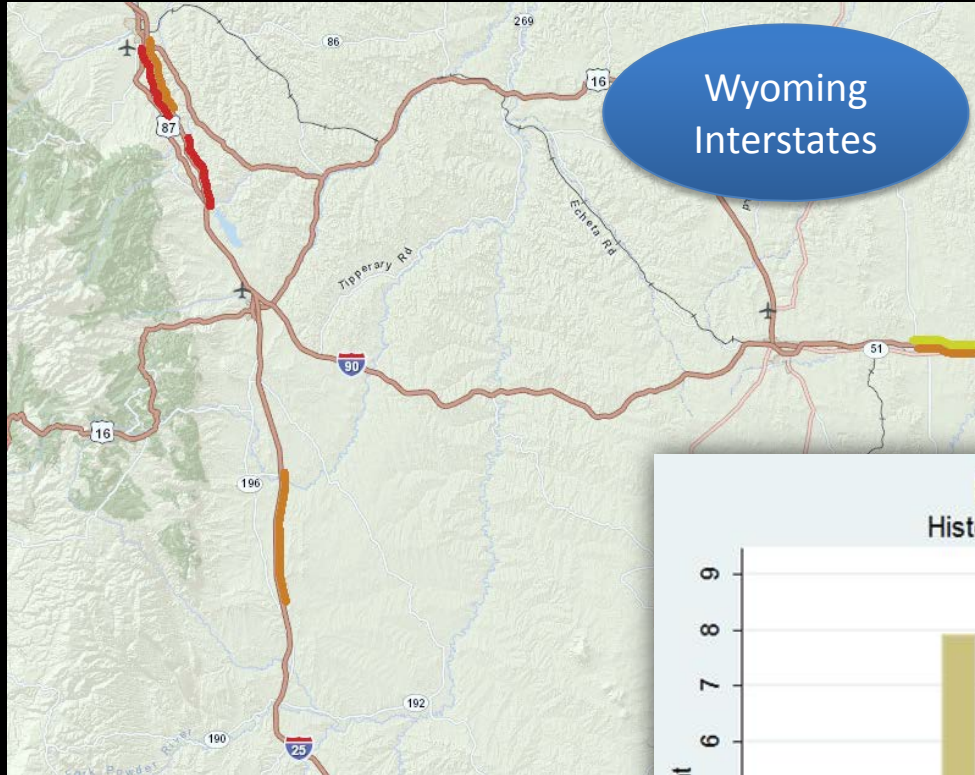
- Assumptions
- Imputation vs parameterization
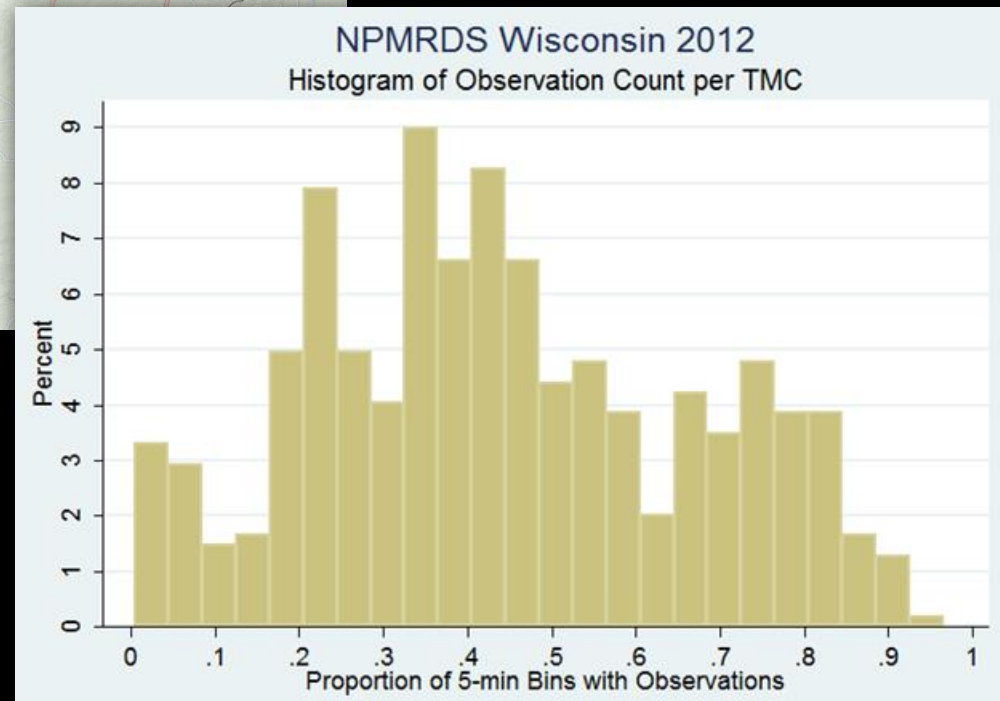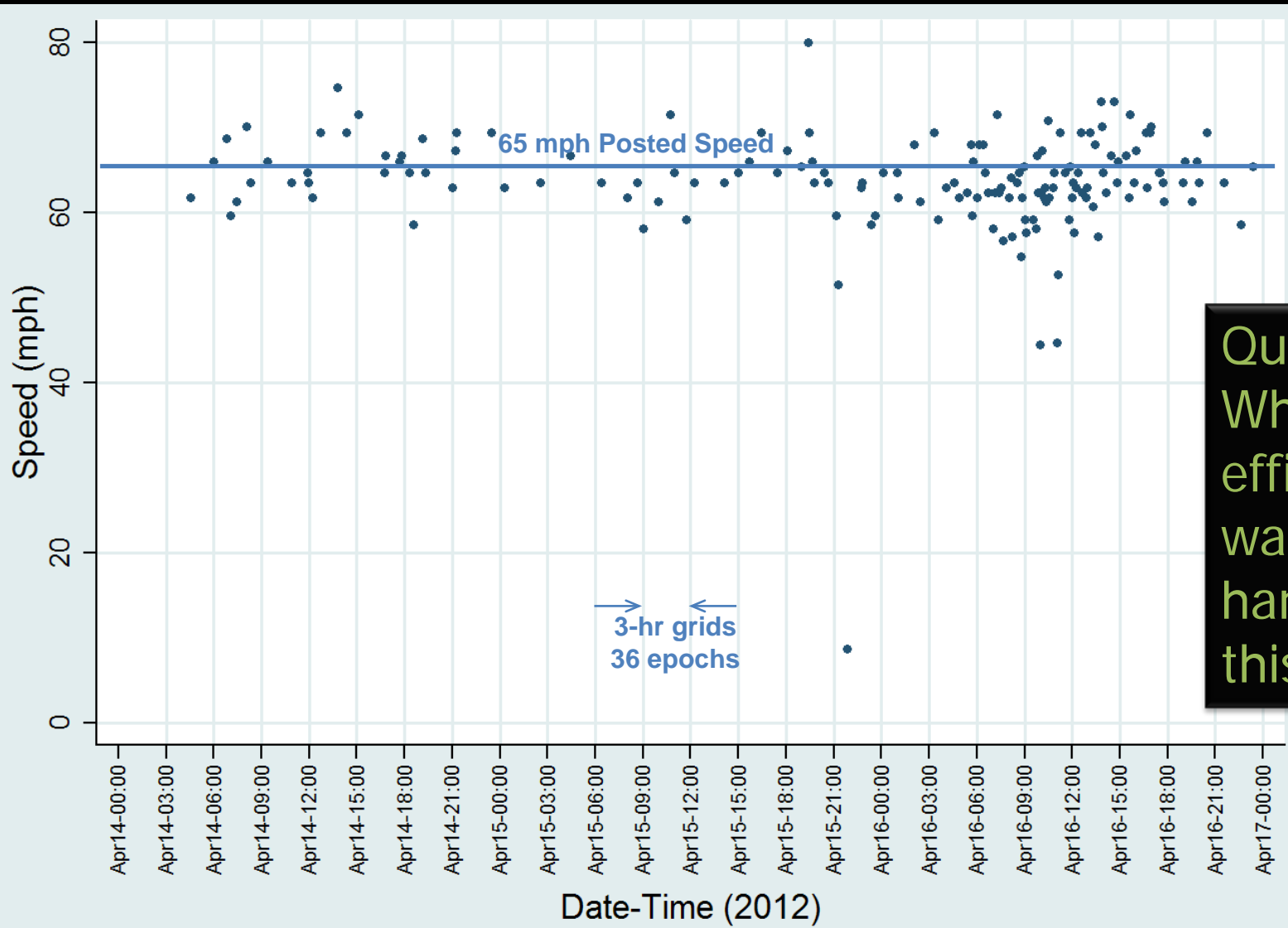
Missing Observations

Questions

- Without doing the work that data providers do to provide clean data sets, nor utilizing a sophisticated dashboard,
  - What is an efficient approach for agencies?
  - Is this a viable source for Performance Management?
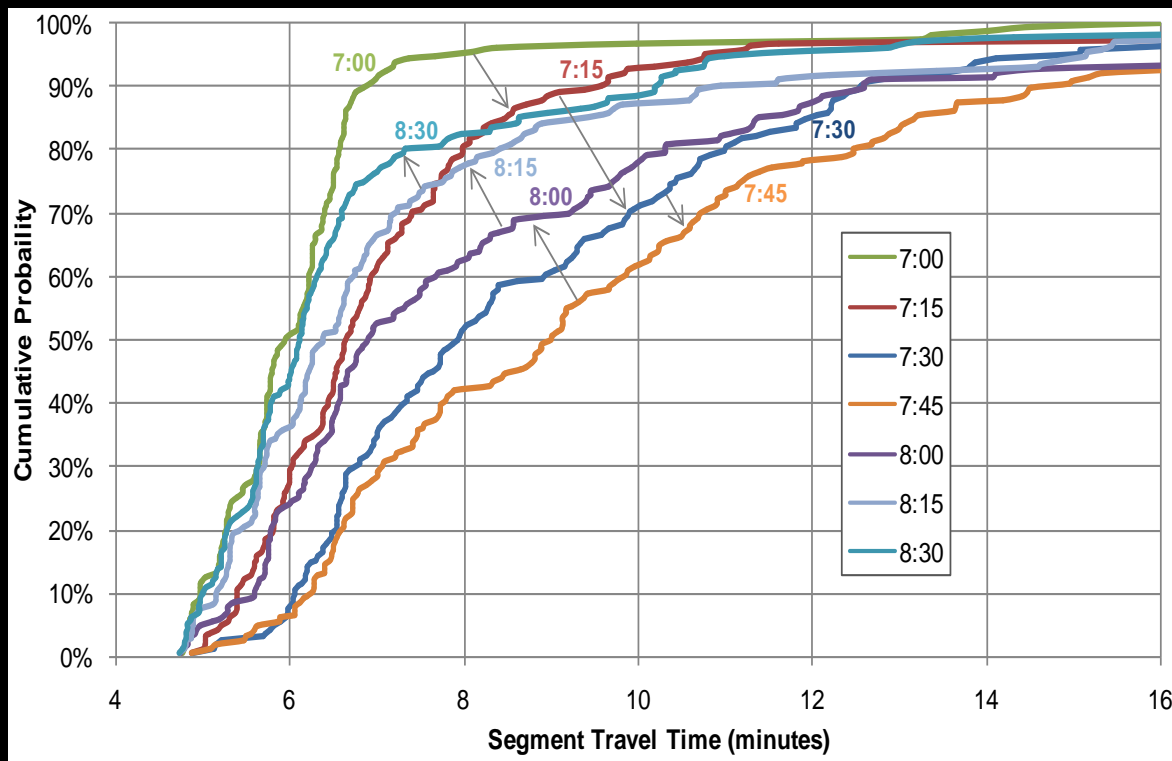
Thank You

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