

Use of ITS Data for Reliability and the Florida Reliability Method

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Overview

- Florida Reliability Method
- Study Design
- Quantitative Results
- Validation Using Seattle, WA data
- Data Requirements Analysis

Florida Reliability Method

● Reliability Defined

- How well conditions on the corridor satisfy travelers' expectations

● Florida Reliability Method

- Benchmarking method
- Compares the actual travel times along a corridor to some threshold that is considered acceptable
- Reliability is the percent of travel that takes no longer than this acceptable travel time

Threshold Travel Time

● What is an acceptable threshold travel time?

Expected TT (min)	Delta 5%	Delta 10%	Delta 15%	Delta 20%
10	0.5	1.0	1.5	2.0
20	1.0	2.0	3.0	4.0
30	1.5	3.0	4.5	6.0
40	2.0	4.0	6.0	8.0
50	2.5	5.0	7.5	10.0
60	3.0	6.0	9.0	12.0

Study Design

● Study Corridor

- I-4 in Orlando, FL
- 36 mile segment
- General use lanes only

● Study Period

- Weekdays
- 6 week period
- January – February 2000

● Archived Traffic Flow Data

- 70 inductive loop detectors every 0.5-mile
- Speed, volume, and lane occupancy data
- 15-minute aggregation interval

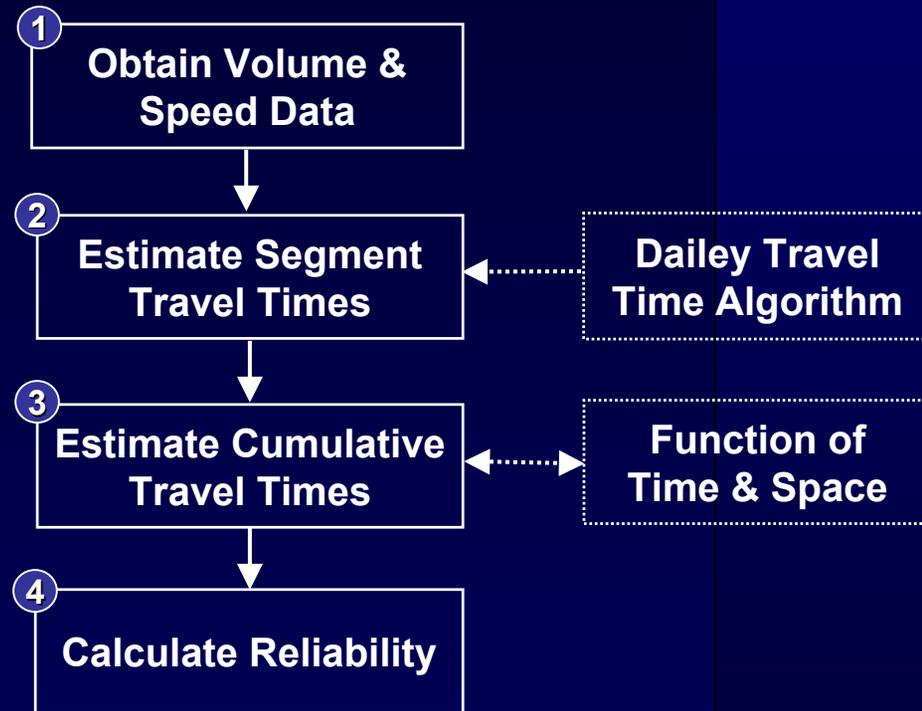


Methodology

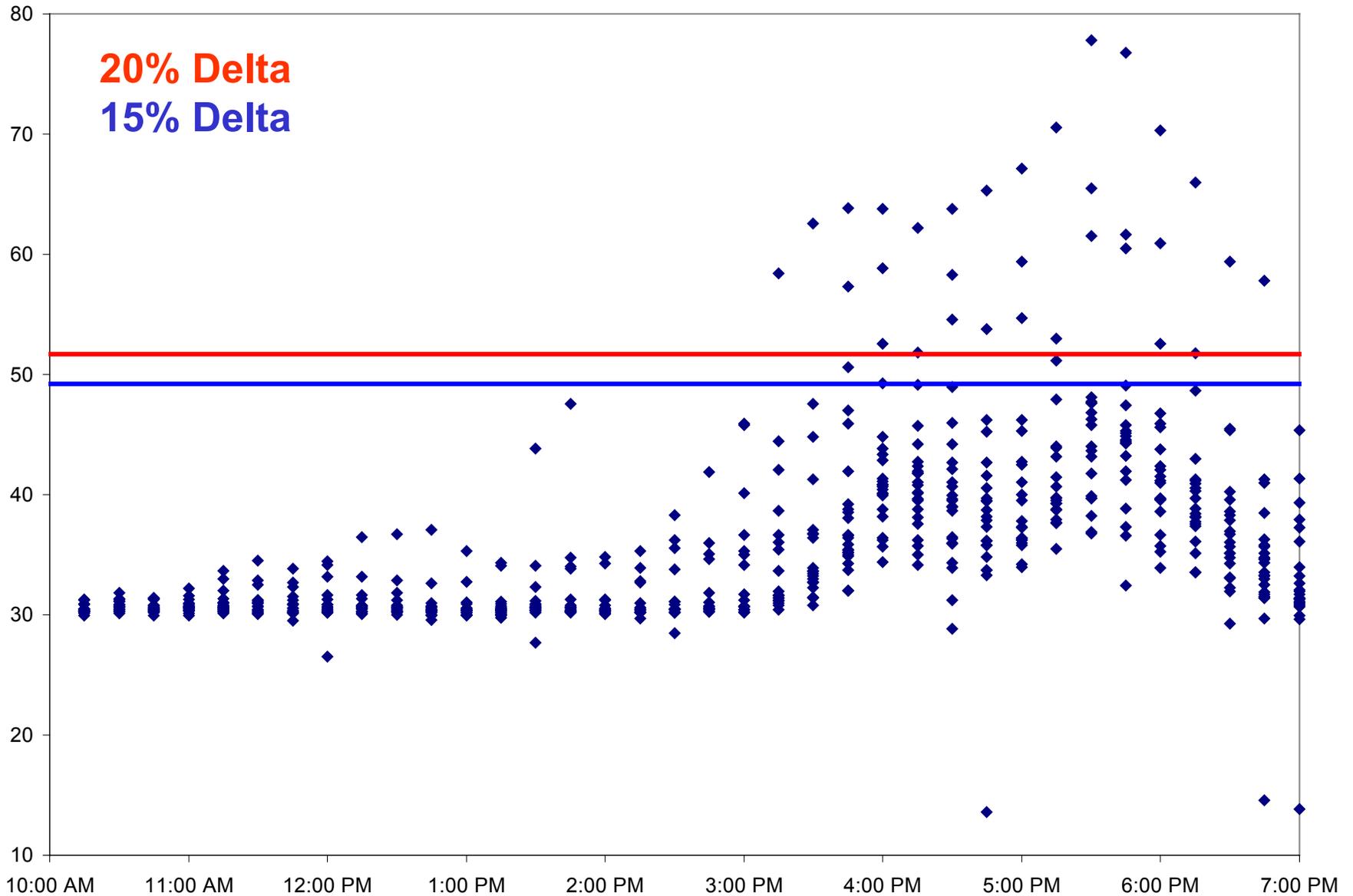
Estimated segment travel times using an algorithm developed by Dan Dailey in 1997

- Assumes travel speeds vary from one measurement location to the next
- Performs linear interpolation if a data point is missing or invalid

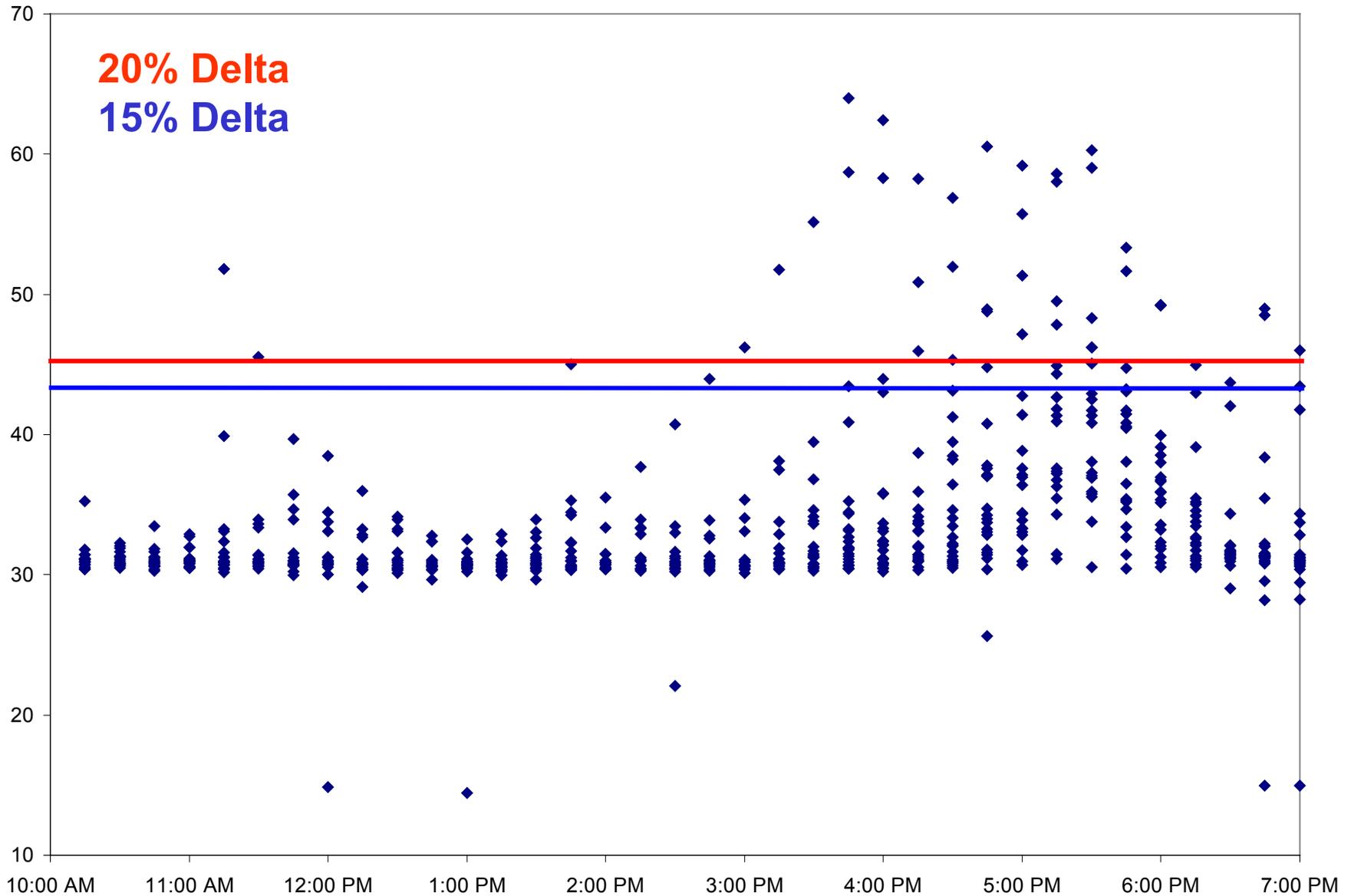
Estimated cumulative travel time along the corridor as a function of time and space



NB Travel Time Observations – I-4



SB Travel Time Observations – I-4



Quantitative Results – I-4

Delta	Reliability Component	Peak Hour (5 to 6 PM)	
		Northbound	Southbound
Delta = 15%	Expected Travel Time (min)	43.1	37.6
	Delta (min)	6.5	5.6
	Threshold Travel Time (min)	49.6	43.2
	Percent of Reliable Travel	85%	78%
Delta = 20%	Expected Travel Time (min)	43.1	37.6
	Delta (min)	8.6	7.5
	Threshold Travel Time (min)	51.8	45.1
	Percent of Reliable Travel	86%	83%

Validation Using Seattle, WA Data

Study Corridor

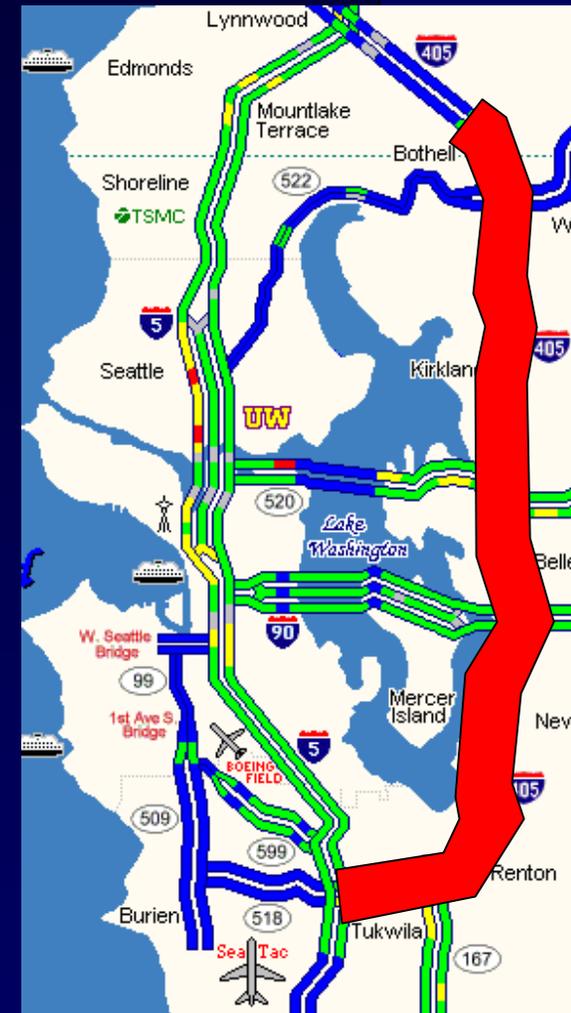
- I-405 in Seattle, WA
- 23 mile segment
- General use lanes only

Archived Traffic Flow Data

- Inductive loop detectors every 0.5-mile
- Speed, volume, and lane occupancy data
- 5-minute aggregation interval

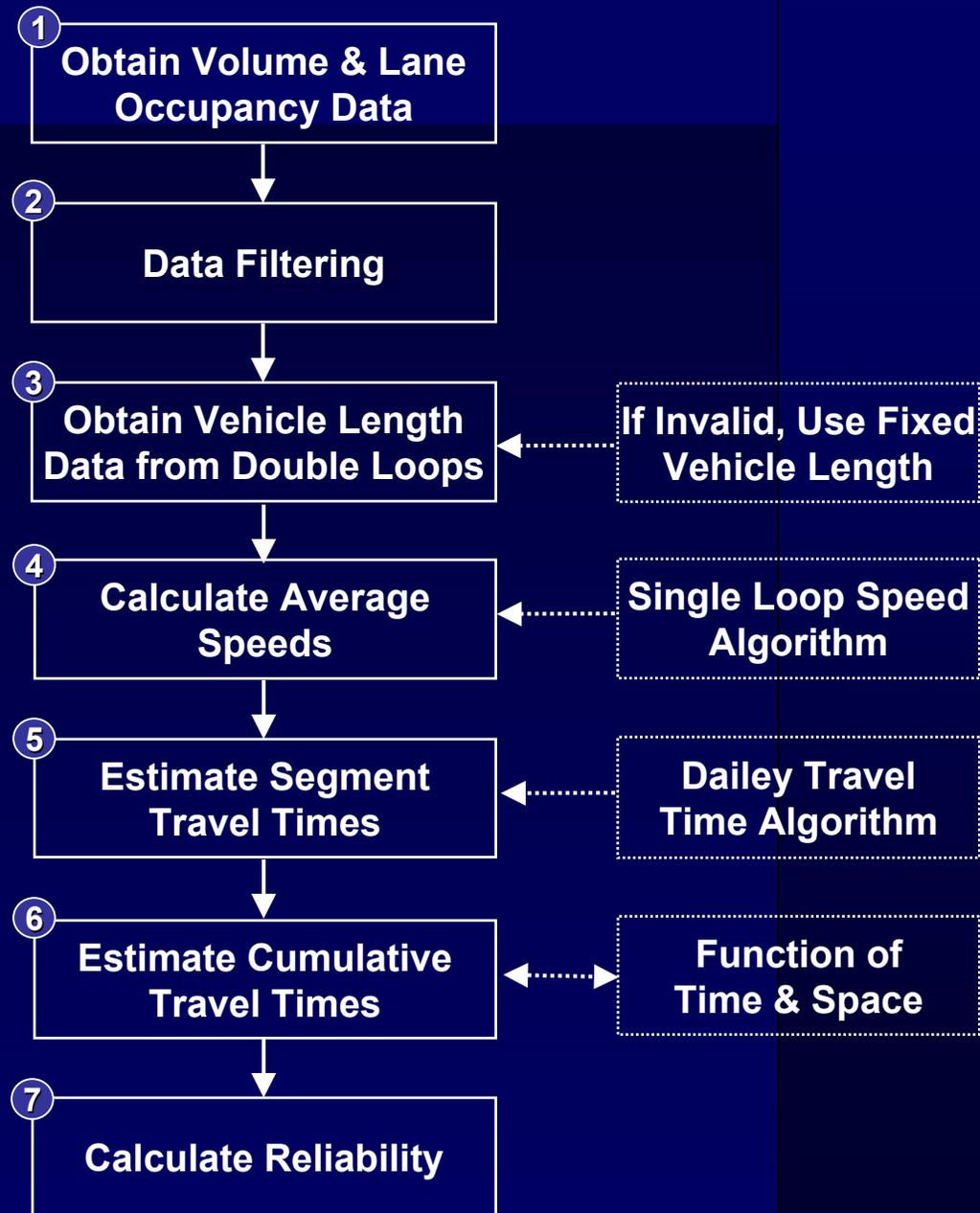
Study Period

- 12 week period
- August, September, October 1999

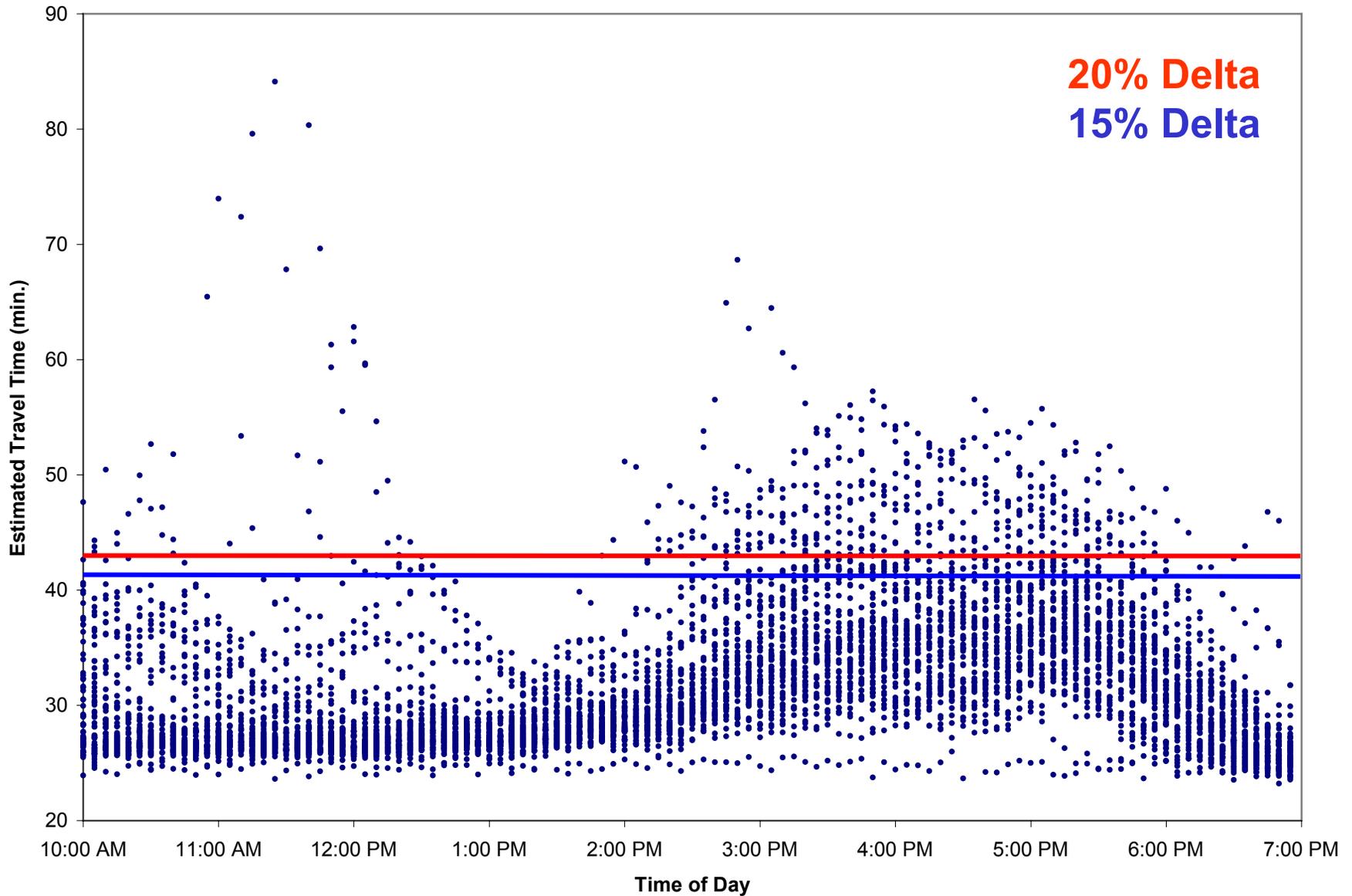


Methodology – I-405

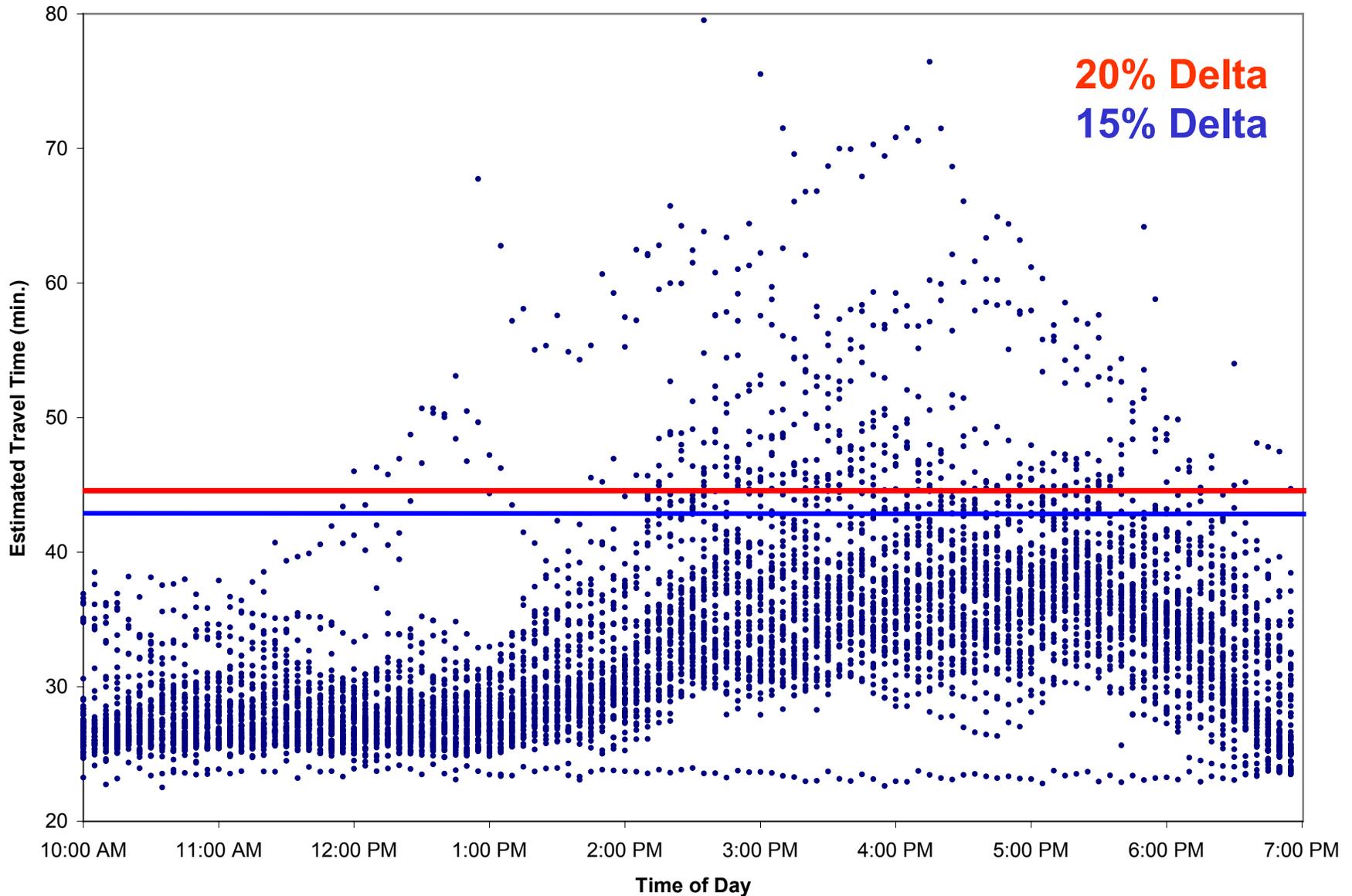
- Data quality using double loops was poor
- Estimated average speed using volume, average vehicle length, and lane occupancy
 - Average vehicle length data was obtained from double loops
 - Vehicle length was variable rather than constant



NB Travel Time Observations – I-405



SB Travel Time Observations – I-405



Quantitative Results – I-405

Delta	Reliability Component	Peak Hour (5 to 6 PM)	
		Northbound	Southbound
Delta = 15%	Expected Travel Time (min)	39.9	39.2
	Delta (min)	6.0	5.9
	Threshold Travel Time (min)	45.9	45.1
	Percent of Reliable Travel	85%	86%
Delta = 20%	Expected Travel Time (min)	39.9	39.2
	Delta (min)	8.0	7.8
	Threshold Travel Time (min)	47.9	47.1
	Percent of Reliable Travel	90%	90%

Data Requirements

- Used Seattle, WA data
 - More robust data set
- Analysis of Variance Tests
 - Aggregation intervals
 - 5-minute
 - 15-minute
 - Sample sizes
 - 1 week
 - 6 weeks
 - 12 weeks (3 months)

Data Requirements

● Observations

- 1 week is too short
- No significant difference between 6 week and 12 week sample sizes
- No significant difference between 5 minute and 15 minute aggregation intervals

Conclusions

- Optimum data collection period is 6 weeks using data collected at 5-minute intervals
- Data collected over 4 weeks at 15-minute intervals is the minimum recommended to provide an adequate sample size
- Archived traffic flow data provides an efficient resource to meet these data requirements
- Manual data collection effort is expensive and requires extensive resources

Conclusions

- Reliability should be measured for one peak hour rather than the peak period
 - Allows comparison between facilities
 - Enables annual monitoring of reliability
- Time interval for aggregating data should be less than the travel time through the corridor under free-flow conditions
- Preference surveys should be conducted to determine threshold travel time

Questions?