Transit Performance and Reliability Analysis for Arterial Corridors

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Motivation

- Public transportation systems positively impact gas consumption and traffic congestion in growing cities.
- Measuring the performance and reliability of these systems helps us to improve and innovate them, encouraging a larger frequency of use and greener cities.

Objective

General: develop an evaluation tool to provide transit performance and reliability information for arterial corridors in Austin, Texas.

Specific: literature review of performance and reliability metrics and implementation of data cleaning and processing techniques using R.

## Methodology

Automatic Vehicle Location (AVL)
Tracks and records the location of the vehicle using an onboard computer and a GPS device.

Automatic Passenger Count (APC)
Laser sensor at each bus door that counts passengers as they board and alight. It also provides occupancy and dwell time at stop-level.

General Transit Feed Specification (GTFS)
Contains geographical information for all bus stops and schedule information for all bus routes/trips.
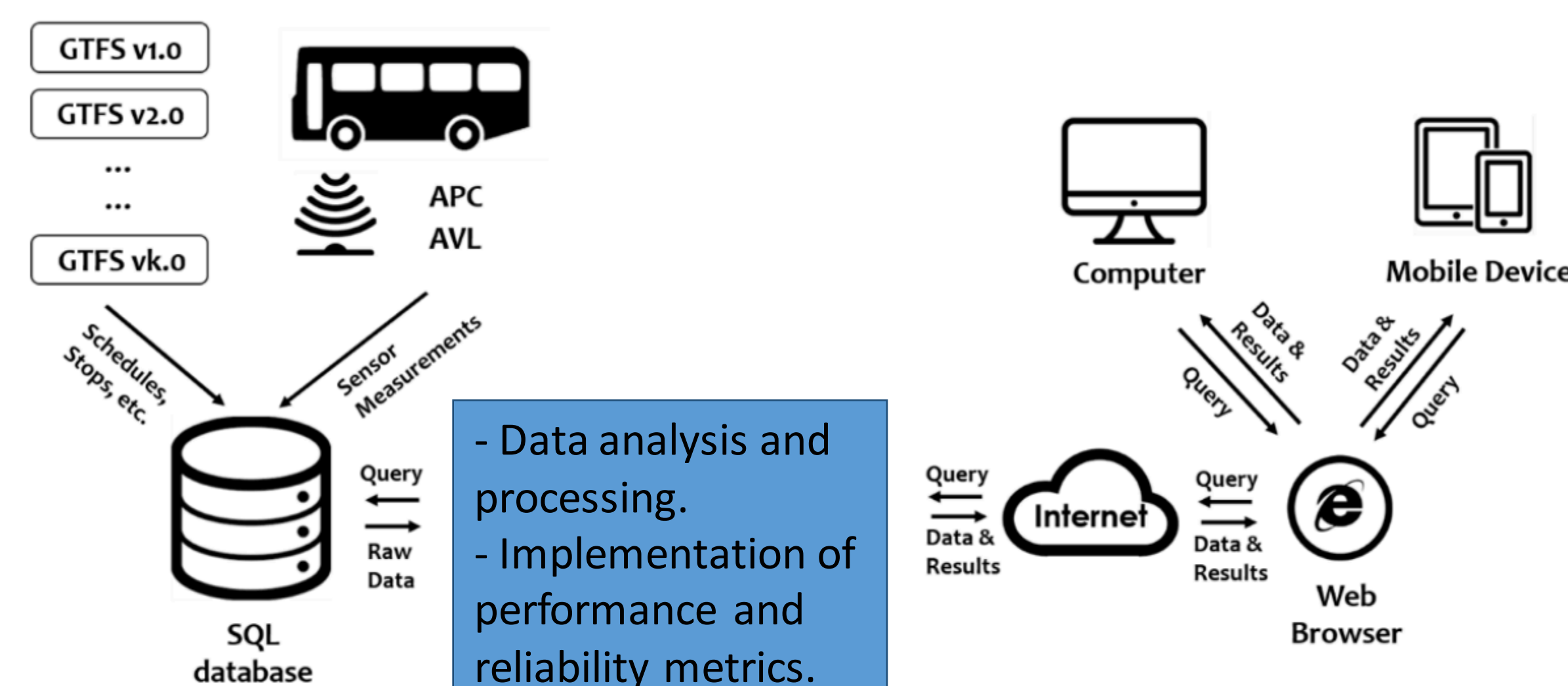
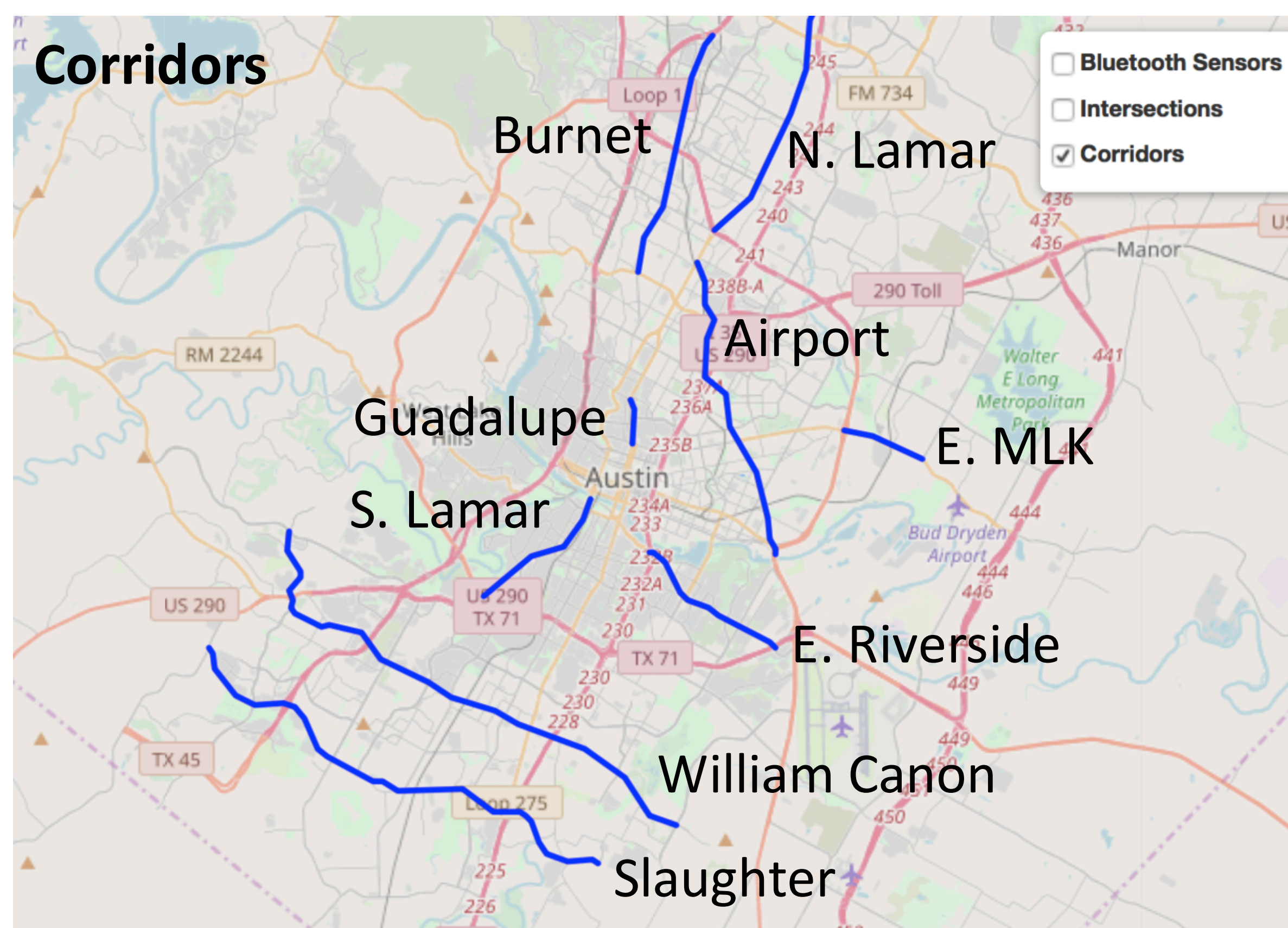## Performance and Reliability Measures

Transit Speed on Corridors: using AVL data, we used GPS points (location & time stamp) to estimate and average speed through the corridor.

Boarding and Alighting: using APC data, we provide and average the number per stops per corridor.
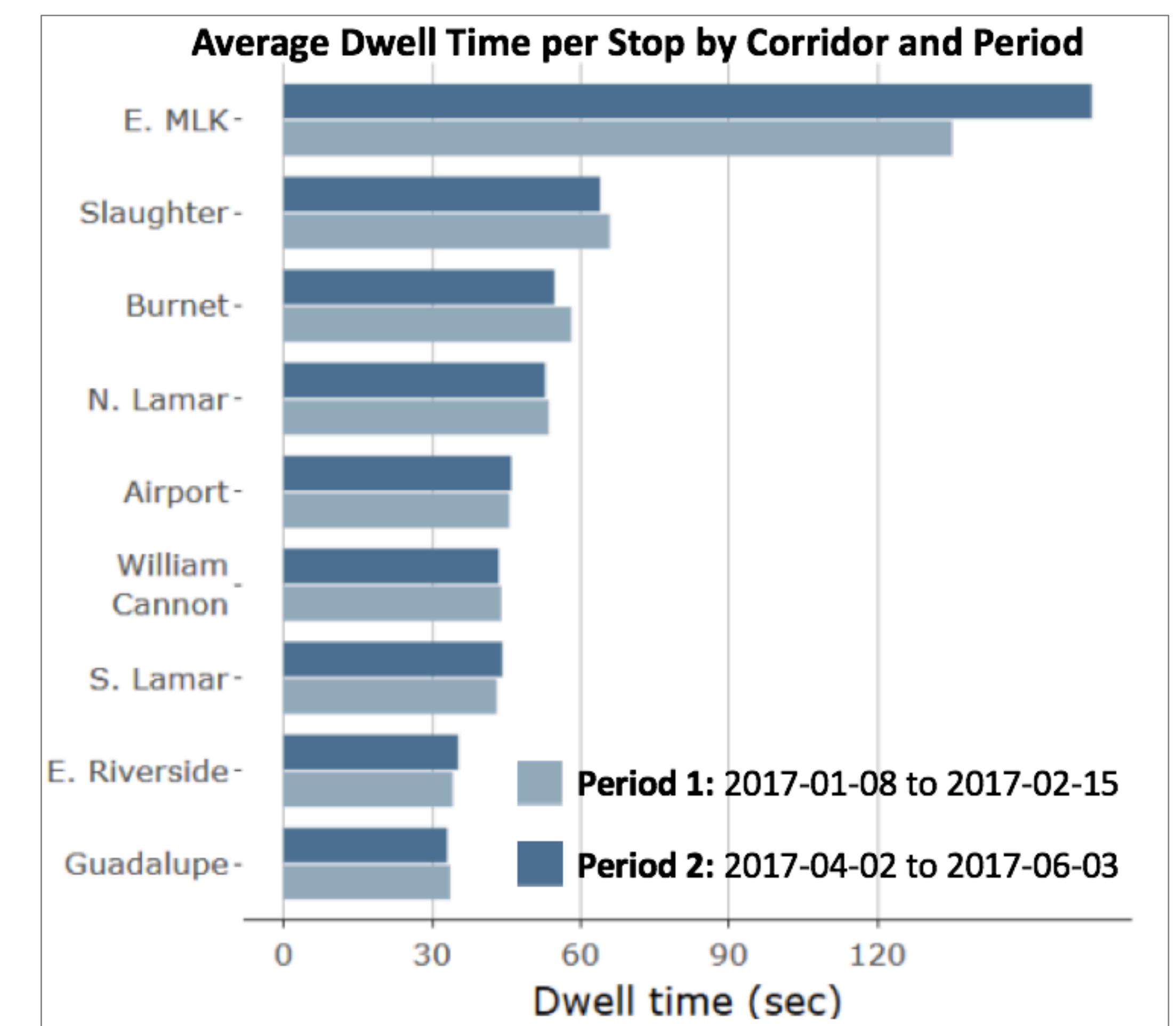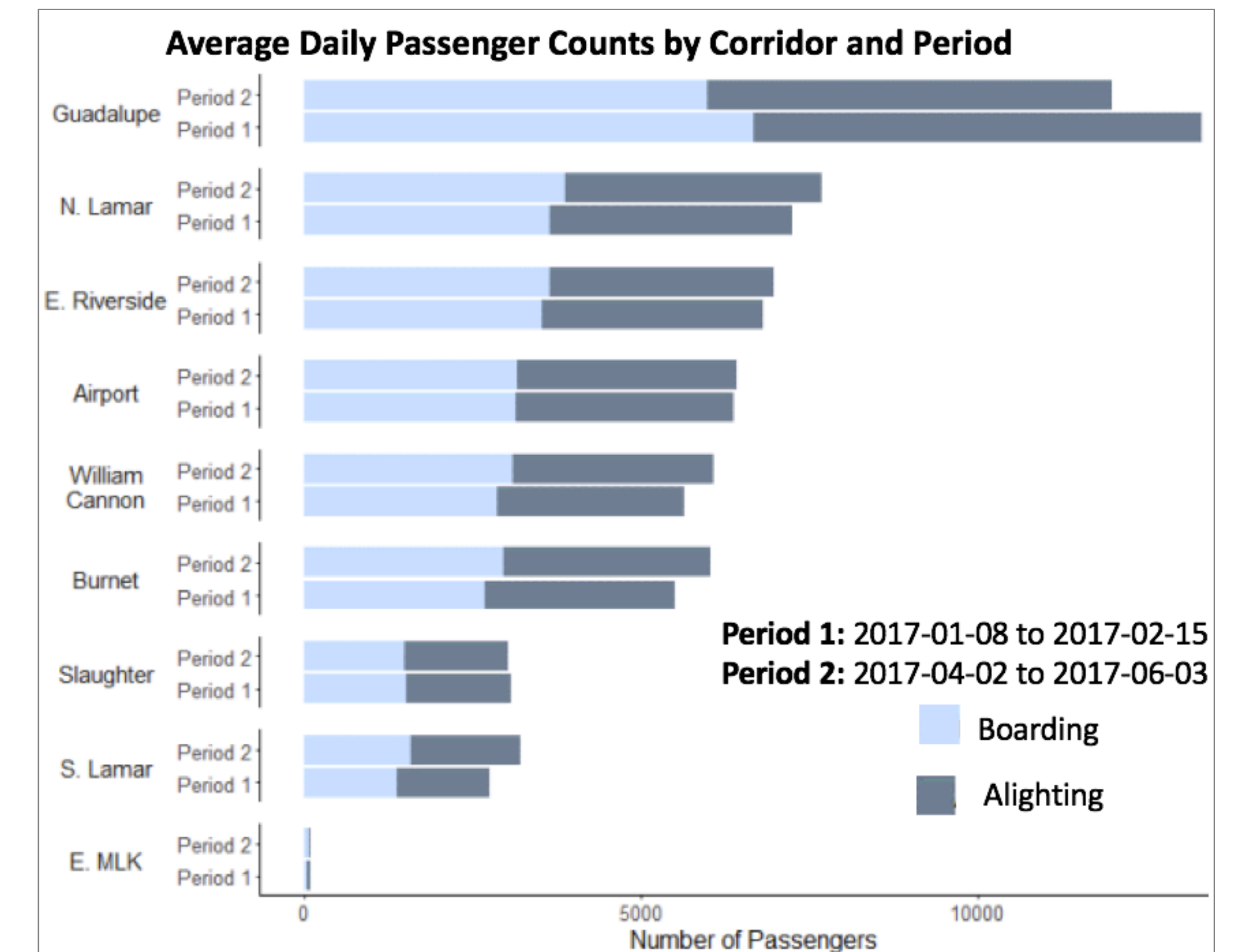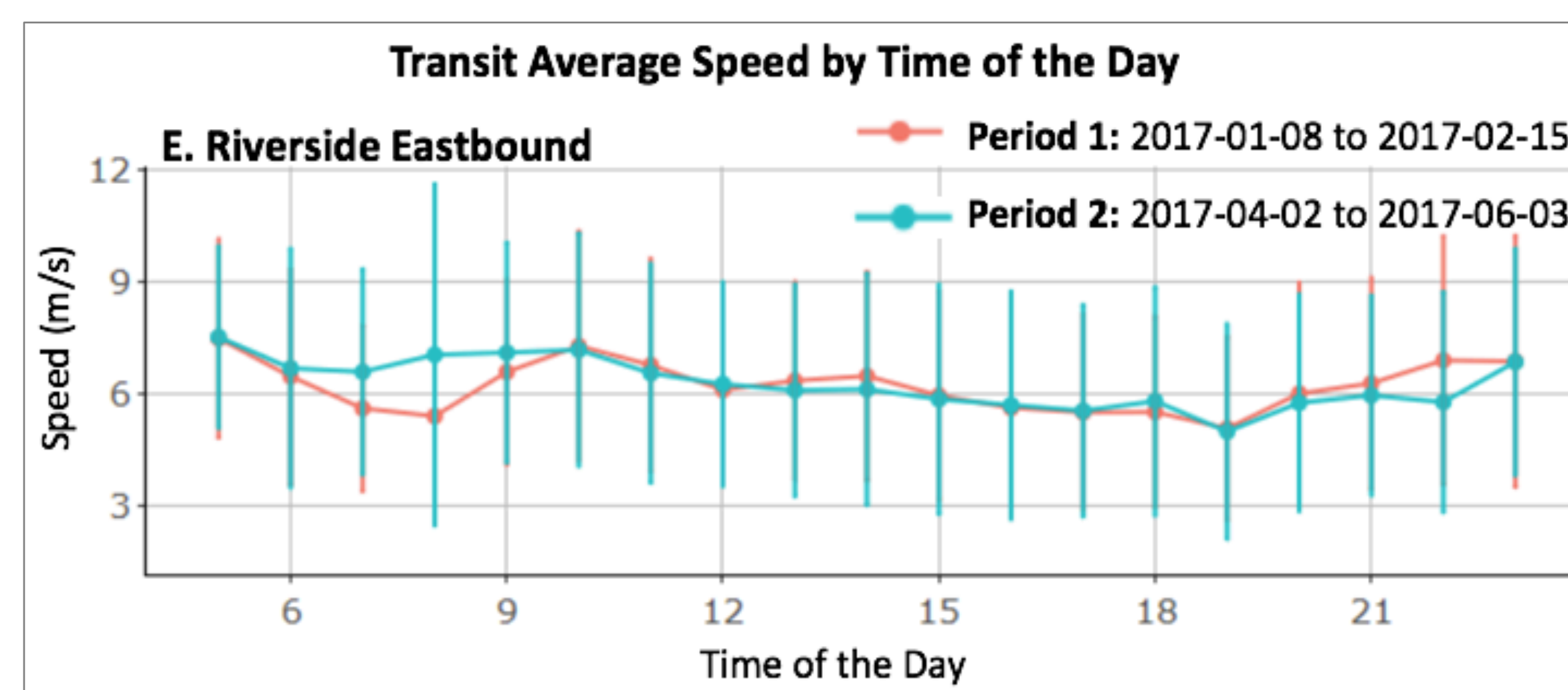
Dwell time: amount of time the vehicle spends sitting at a stop, found using APC database.

Occupancy: The number of passengers in the vehicle, found using APC database.

Results

Example of performance and reliability measures: corridor speed, average boarding and alighting, corridor dwell time.

Transit Average Speed by Time of the Day
E. Riverside Eastbound
Period 1: 2017-01-08 to 2017-02-15
Period 2: 2017-04-02 to 2017-06-03

Average Daily Passenger Counts by Corridor and Period
Period 1: 2017-01-08 to 2017-02-15
Period 2: 2017-04-02 to 2017-06-03
Boarding / Alighting

Average Dwell Time per Stop by Corridor and Period
Period 1: 2017-01-08 to 2017-02-15
Period 2: 2017-04-02 to 2017-06-03

Conclusions

- Analyzed and assessed the importance of certain reliability measures using literature reviews and data analysis in R
- Provide examples of the metrics implemented, including speed, passenger counts, and dwell time.