HOW FAST IS RAPID?

EXAMINING BUS SERVICE IN LOS ANGELES

Lewis Center Award Winner for Innovative use of Spatial Analysis and GIS in Policy Analysis

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INTRODUCTION

Urban buses are often slow and unreliable, creating travel uncertainty and inconvenience for passengers riding the bus and making the service unattractive for potential users. In response to feedback from bus riders indicating dissatisfaction with local and limited-stop buses, the Los Angeles County Metropolitan Transportation Authority (Metro) created a pilot Metro Rapid system that sought to improve operating speed and consistency, leading to reduced passenger wait times. Since the introduction of the pilot in 2000, the program has become permanent and grown from two to 21 lines, serving much of the Metro service area.

This project analyzed the speed and reliability provided by Metro Rapid and Metro Local buses along three corridors in Los Angeles to determine the differences in service provided. The analysis also identified locations along each corridor where advance treatments (queue jumpers, off board fare collection, etc.) can help improve bus service.

RESEARCH QUESTIONS:

1. What is the speed and reliability differences in Metro Local and Metro Rapid bus service along three corridors in Los Angeles?

2. Which locations along each corridor suffer from the slowest and most inconsistent service, and could most benefit from advanced bus treatments?

METHODOLOGY

This project analyzed automatic vehicle location (AVL) data for three Metro Rapid lines:

- **704 (Santa Monica and Sunset Boulevards)**
- **750 (Ventura Boulevard); and**
- **754 (Vermont Avenue)**

The local routes on these corridors were also analyzed. AVL data shows the position of a bus at a given time. Each data point contains the bus route, vehicle latitude and longitude, vehicle ID and time stamp. Speed for each data point was calculated using the following formula:

$$\frac{Location_n - Location_{n-1}}{Time_n - Time_{n-1}}$$

The analysis looked at data from five days (February 6 and 9-12, 2-15) during the AM and PM rush hour periods (6:30 to 9:30 AM and 4:00 to 7:00 PM, respectively).

FINDINGS

Service quality varied greatly based on time, direction of travel and location. However, several patterns emerged from the results:

- **Metro Rapid** has faster average speeds on **94%** of segments

- **Metro Local** had more *reliable* speeds on **53%** of segments

- **750:** poorest service on *the eastern portion* of the route for eastbound service and in *the central portion* of the route for westbound service

- **754:** poorest service on *the central and northern portions* of the route for both northbound and southbound service

- **704:** poorest service on *the eastern and central portions* of the route for both eastbound and westbound service

RECOMMENDATIONS & NEXT STEPS

1. Prioritize bus treatments in areas with the slowest speeds and least reliable service

2. Conduct additional analysis of problem segments at individual intersections to further determine source of delays

3. Perform regression analyses comparing speed and reliability:

   a. Between local and rapid service
   b. With number of stops in each segment
   c. With number of traffic signals in each segment

REFERENCES: LA Metro Bus Speeds (labusmap.com), U.S. Census Bureau

Metro Rapid 704 - Speed and Variability (PM Westbound)

Average Speed (MPH)
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20+

Variability of Speed (STDev/Average Speed)
High / Medium / Low
High: StDev is 100% of Average Speed
Medium: StDev is 67% of Average Speed
Low: StDev is 33% of Average Speed

Note: Some buses idle between Westwood Blvd. and Interstate 405 resulting in higher variability and lower speeds for this segment.

Metro Rapid 750 - Speed and Variability (PM Westbound)

Average Speed (MPH)
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20+

Variability of Speed (STDev/Average Speed)
High / Medium / Low
High: StDev is 100% of Average Speed
Medium: StDev is 67% of Average Speed
Low: StDev is 33% of Average Speed

Note: Some buses idle at the east end of the route, resulting in higher variability and lower speeds for this segment.

Metro Rapid 754 - Speed and Variability (PM Southbound)

Average Speed (MPH)
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20+

Variability of Speed (STDev/Average Speed)
High / Medium / Low
High: StDev is 100% of Average Speed
Medium: StDev is 67% of Average Speed
Low: StDev is 33% of Average Speed

Note: Buses idle at both ends of the route, resulting in higher variability and lower speeds for this segment.