Impact of Arterial Bus Rapid Transit on Traffic and Users

What Was the Need?

Bus rapid transit (BRT) entails dedicated lanes for buses and off-board payment for users who purchase fares before boarding the bus. In recent years, arterial BRT (ABRT) has developed as an alternative for metropolitan areas that lack roadway width for dedicated lanes. ABRT uses off-board payment but not dedicated lanes; instead, it uses existing roadway arterials and limited stops, offering a fast and efficient commute for users.

In 2016, the A Line opened on the Snelling Avenue corridor in Minneapolis-St. Paul, the area’s first ABRT line. It quickly gained popularity among transit customers as an alternative to local bus service, complementing the Twin Cities’ light rail system and commuter rail service from the suburbs.

Because the A Line operates within existing lanes of traffic and does not feature pullouts at its stops, it could slow corridor traffic when buses stop to load and unload. A preimplementation study of the corridor and A Line service suggested that traffic impacts would be minimal. The A Line’s actual impact on traffic, however, had not been determined, and user perceptions had not been assessed.

What Was Our Goal?

MnDOT sought to examine the traffic impacts of the A Line in its first year of deployment, and to identify and quantify the A Line’s appeal to riders, including the service’s strengths and weaknesses, and how the transit experience of the A Line compares to local service. In addition, MnDOT needed to assess the characteristics of the service that could be used in new ABRT lines in the Twin Cities.

What Did We Do?

Researchers employed two strategies to evaluate A Line performance. First, the team conducted a traffic and transit capacity study. Investigators analyzed bus system data for ABRT and regular bus service capacity. In August 2017, researchers deployed four cameras each at two intersections: Snelling and University north of Interstate 94 (I-94), and Snelling and Dayton, south of the Interstate. Cameras collected video data for weeks before the 12-day Minnesota State Fair, which is held at the fairgrounds on Snelling Avenue, and additional video during the fair through its conclusion in September. Researchers analyzed recordings of four signal cycles before and after bus arrival at the intersections for traffic queues and volume.

Next, investigators studied the results of a 2016 Metro Transit survey of passengers on the A Line and four parallel standard bus lines. The study compared transit usage data from 2016 and 2017, before and after the A Line opened. The research team surveyed A Line passengers, station area residents, business workers and owners, automobile users, bicyclists and pedestrians. Team members also reviewed a recent study of Minneapolis-area real estate developers on transit facilities and options.
What Did We Learn?
Video and data analyses revealed that the A Line increased overall transit capacity, and the time its buses spent not moving while passengers were loading and unloading during a green traffic signal had no significant impact on intersection queue length or traffic flow at the two intersections—during and outside State Fair dates. The A Line carries more riders than the local bus along the same route, and the greatest rider turnover occurs at the Snelling and University station, which connects with light rail service. Surveys identified the five attributes most important to satisfactory transit service: easy fare payment format, hours of operation, complaint resolution, personal safety while riding and courteous transit drivers. A Line users were more satisfied with ABRT than with local bus service, and showed no significant difference in satisfaction with the A Line compared to express buses, light rail and commuter rail. For most individual service attributes such as payment procedures, travel time, shelter cleanliness, and route and bus signage, the A Line performed better than local buses, the same as light rail but not as well as commuter rail. Nonuser surveys indicated a positive perception of the ABRT, but mixed impact on pedestrian and bicycling activities and little impact on reducing preferences for using automobiles instead of transit.

What’s Next?
To improve A Line service, transit managers should focus on operating hours, the on-board safety of riders, reliability and total travel time. Researchers noted that rider satisfaction does not consider costs associated with improved service and recommended that future ABRT plans weigh improvements in the five key attributes of transit service against costs in planning new lines. The study findings and recommendations will be used in planning future ABRT lines.