Roll out the Red Carpet: Prioritization Analysis for Dedicated Bus Infrastructure in Greater Boston

Background
Greater Boston is experiencing historic levels of congestion — causing delays, lost productivity, and excess greenhouse gas emissions as frustrated commuters sit in traffic. The MBTA’s Better Bus Project has partnered with municipalities to reclaim road space for public buses in an effort to improve commute times and reliability of bus transit. Faster, more reliable service is key to shifting car commuters to public transit, which alleviates congestion and its associated ills. This effort is motivated in part by goals set out in Go Boston 2030 to boost transit commuting by 35% and decrease commuting by driving alone by 50% by 2030. The success of recent dedicated bus lanes has bolstered support for more transit priority infrastructure across the region.

Research question: Which MBTA bus routes should be prioritized for implementation of additional miles of dedicated lanes?

Methodology

Bus routes carrying at least 4,000 daily passengers are the best candidates for driving in dedicated lanes (Vest et al 2018). The MBTA bus system has 36 such routes. The model below in Figure 4 shows how ArcMap was used to calculate the different factors of the prioritization equation. For each bus route, a ¼ mile buffer (equivalent to a 5 minute walk) was intersected with the underlying geography of population, employment, and land use diversity at the census block group level. This resulted in a weighted average for each characteristic along each bus route.

Results & Discussion

The analysis identified ten high-priority bus routes including two on the Silver Line (Figure 3). These routes represent over 84,000 daily unlinked trips with the potential to be made more reliable. The weighting scheme ranked Routes 28, 23, and 111 (high ridership routes which serve Chelsea, Dorchester, Mattapan, and Roxbury) surprisingly low. This is attributed to low surrounding employment density.

Future Research

Future research will refine these methods using bus frequency data and combine ridership at the corridor level in order to capture the full utility provided by high bus volume road segments. It will also designate a 5 minute walk buffer by network analysis rather than Euclidean distance. Further research could incorporate streetscape elements such as width, number of lanes, and presence of parking and bike lanes to determine specific intersections and road segments where dedicated lane could have an outsize influence in helping a bus navigate through car traffic.