Measuring Bus Access Methodology

Starting with our roads layer in ArcGIS, we selected only road segments with fixed-route transit service. We created a layer for each transit route. Then, using our published bus schedules, we assigned a frequency for each road segment along each route, then combined them, giving us the total number of buses a day on each road segment. We also created a column for the number of different routes that use each segment.

Given the mix of small urban, suburban, and rural land types in our area, we defined "frequent" service as at least one weekday bus for every half hour, "somewhat frequent" service as at least a bus every hour, and "infrequent" service as less than a bus an hour. Our buses run for about 15 hours/day (roughly 6AM to 9PM), so we labeled any road segment with 30 or more buses/day as "frequent," 15-29 buses as "somewhat frequent," and 1-14 buses as "infrequent." A weakness to this method is that buses may be grouped instead of spread throughout the day. In the future we would like to develop a more sophisticated frequency measure that accounts for the distribution of bus arrivals.

We then created a half mile road network buffer along all roads with transit. Using a structures layer with assigned population estimates (calculated simply by dividing 2010 census block population among the block's buildings), we selected all the structures within this buffer and used that selection to estimate the population within a half mile of a bus route. We repeated that analysis for all the segments marked "frequent," "somewhat frequent," and "infrequent" to estimate the population with access to each level of service. This method is likely to slightly underestimate the number of people with frequent and somewhat frequent service, since it does not take into account people who could access lower-frequency segments at multiple locations (ex. if 10 buses a day pass by a block east of you and 10 a block west of you, you will be considered to have infrequent service even though you could access 20 buses). An informal review indicated that this is rare – most people who could access a bus at multiple points are in urban areas with frequent service. It may be more of an issue with estimating the number of routes a person has access to. Accounting for this issue is a goal for future iterations of this analysis.