Project 2: Light Rail Service Station Analysis

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Introduction

Recent population growth in Hillsborough County, Florida, has increased the use of public infrastructure. This is most noticeable on roads and highways, where traffic has become more frequent and severe. The strain on residents and their travel needs can also affect the environment through additional pollution and land change to accommodate highway widenings and new road projects. Rather than prioritizing road projects that promote reliance on single-passenger car use, Hillsborough County should prioritize more public transportation options to reduce carbon emissions and give residents more ways to get around.

One option to jumpstart public transportation initiatives is to adapt underused railways into light rail transit (LRT). LRT can provide additional travel options for commuters while freeing up space on major thoroughfares. Hillsborough is well-positioned for an LRT service due to its existing rail network that leads to a central hub in the City of Tampa, which connects with other municipalities. To begin developing the planning process for an LRT service, I used ArcGIS Pro's network analysis tools to identify service areas near railroads and assess commuter neighborhood access. Network analysis tools can benefit this topic because they can simulate more accurate travel infrastructure and distances than typical GIS tools, improving estimates of who would have access to LRT.

Using property addresses near railroad lines (Hillsborough County, 2024a), I created eight potential LRT stations based on their proximity to commuter neighborhoods and used a county road dataset (Hillsborough County, 2024b) to provide travel distances from them. For each station, a 0.5-mile pedestrian and 5-mile park-and-ride service area was created to guide access analysis. These service areas were then used to summarize population data (SWFWMD, 2024) to estimate how many people would have access to LRT. Population data were joined to the network polygons to help map and judge access across the county (fig. 1). Afterward, the service polygons were used with ArcGIS Business Analysis to create demographic summaries surrounding stations for both the pedestrian and park-and-ride zones.

Cartographic Model

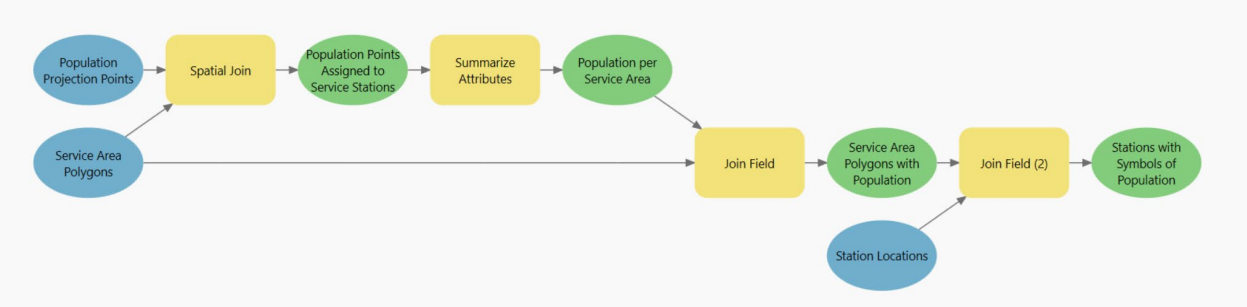

Figure 1 – Cartographic model of service area analysis

Results and Discussion

The resulting service areas show both pedestrian and park-and-ride locations created by the network analysis. Station locations are spread throughout the county, with multiple stations within Tampa, Brandon, and Apollo Beach. Depending on station proximity, service locations either extended the full 5-mile designation of a park and ride service or bordered other service areas, limiting outreach. Restriction barriers were also implemented to better direct service areas away from non-residential areas. Buffers were also used to prevent bridge crossings to a station, as bridges represent potential traffic areas due to limited access.

For most park-and-ride service areas, the five-mile designations reached their limit. In more densely populated locations, like the Fowler, South Albany, or Brandon Boulevard stations, fewer restrictions allowed the full extent to be included. Others with drawn restrictions or bordering other service areas also included a lot of space within. The most unique service areas extend from the Union Station and U.S. 41 locations. Union Station is contained by three other service areas, leaving limited opportunity to cover nearby locations. These service areas and borders almost follow a distinction between different neighborhoods within the city. Downtown Tampa and Tampa Heights share the same service area, while Ybor, South Tampa, and Seminole Heights each have their own. The U.S. 41 station is much different from the others. Its service area is very irregular compared to the geometric shapes of the others. Because of a lack of a grid system and lower-density development, the service area does not incorporate as large a population as the others.

For populations within each service area, there are some variations. Population sizes within service areas range from 16,923 individuals to 104,003. Service areas with fewer restrictions and closer to urban population centers appear to have the largest populations. The largest population within a service area is located at the Fowler Ave station. It serves residential and commercial areas and incorporates the University of South Florida's student population. A light rail station in this area would provide

transportation to a large portion of the county, reducing the need to travel by highway and potentially reducing traffic and environmental impact.

References

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