Access to Rapid Transit in Greater Boston

Overview

In 1987 Boston's original Orange line was torn down and relocated to the west of its former route. In 2002 it was replaced by a bus route (the Silver line) running along the Washington Street corridor rather than the promised rapid transit line. (Marin et al, 2005)

This has resulted in public outcry, and many organizations have dubbed it environmental injustice. Without adequate access to rapid transit, the underserved populations must rely on buses or personal automobiles in order to get around which is costly, time consuming and contributes to air pollution.

This project aims to determine where underserved areas are in the Boston metropolitan region. Further, it will visualize the socio-economic characteristics of the underserved areas in order to determine which areas are particularly burdened by this lack of rapid transit

Methods:

All maps were obtained from the Massachusetts GIS website MassGIS. These maps were joined with data from the 2000 Census, retrieved from www.census.gov. All Census analyses were performed on the census tract level and classified by quintiles. In order to determine adequate access to rapid transit, 1/4 and 1/2 mile buffers were created around each subway station. The silver line was excluded from this analysis as it is a bus line rather than a rapid transit line.

Cartographer: Rowan Spivey

Course: CEE 194

Date: 07-02-2010

Data Source: MassGIS, 2000 Census

Projection: NAD 1983 State Plane MA Mainland

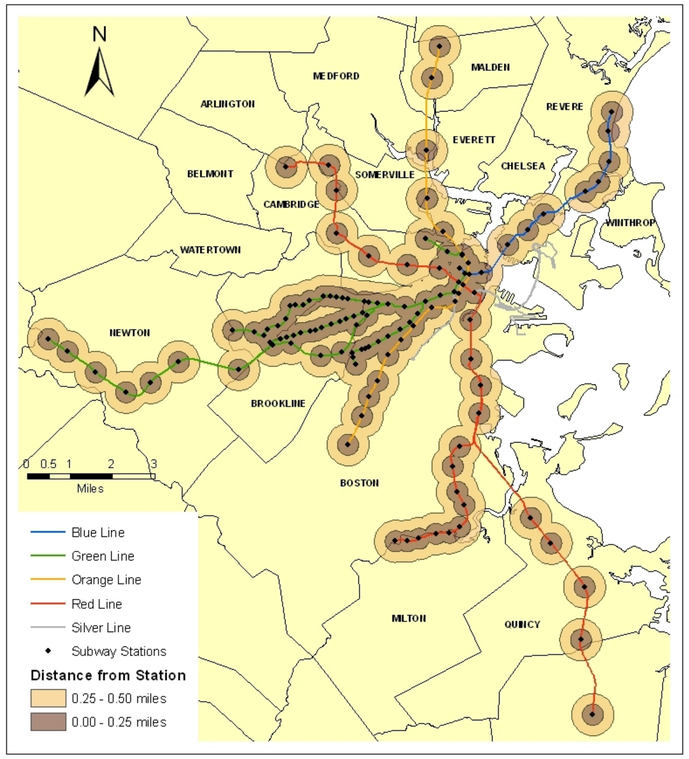

Figure 1: MBTA Subway Lines and Buffers. Buffers were created around current MBTA subway station stop at a distances of 1/4 and 1/2 mile.

Results:

The buffer analysis in Figure 1 shows four main underserved areas: one spanning Chelsea, Malden, Everett and Revere (henceforth referred to as the Chelsea area), one in Somerville and Medford (Medford area), one passing though western Boston, Cambridge and Watertown (Watertown area) and one in southern Boston (southern Boston area) The underserved areas in Chelsea and southern Boston in particular show large low income and minority populations, as well as lower median home values, indicating that the lack of access to rapid transit is a particular burden. Furthermore, these areas show high population densities, suggesting that there is enough demand.

Conclusions and Limitations:

There are four areas in the metropolitan area that are currently underserved by present rapid transit system: the Chelsea area, the Medford area, the Watertown area and the southern Boston area. Both the Chelsea area and the southern Boston area are particularly burdened by this lack of rapid transit access. The proposed Green line extension will help to fill gaps in rapid transit access in the Medford area, but Boston metropolitan area transportation planners should evaluate the possibility of installing rapid transit serving the areas in southern Boston and Chelsea. This could take many forms, including extensions of current subway lines, the addition of light rail or bus rapid transit.

This analysis can be used as the beginning of a more detailed and rigorous analysis of transit access in the Boston area. As others have discovered, a buffer analysis tends to over estimate the areas with access to transit. (Lei and Church, and Biba et al) Additionally, further analysis of bus and commuter rail access, as well as current average commute times may help to paint a clearer picture of transit access in Boston.

References:
Biba, S. Curtin, K.M. and G Manca. A New Method for Determining the Population with Walking Access to Transit. International Journal of Geographic Information Science. Vol 24, Mar-Apr 2010, 347-364
Lei, T.L. and R.T. Church. Mapping Transit-based Access: Integrating GIS Routes and Schedules. International Journal of Geographic Information Science. Vol. 24, Jan-Feb 2010, 283-304
Malin, Jeremy, Sierra Club and Robert Terrell. MBTA's Silver Line: Taxpayers Get Less for More. A Sierra Club Report, Spring 2005.

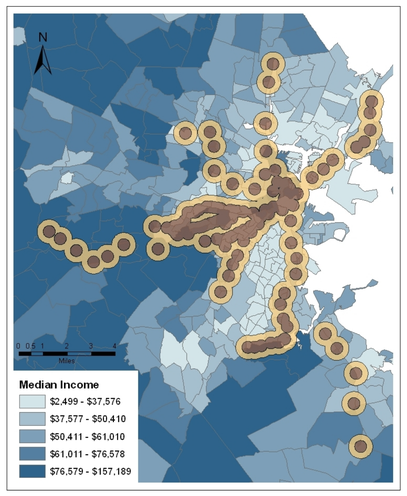

Figure 2: Median Household Income

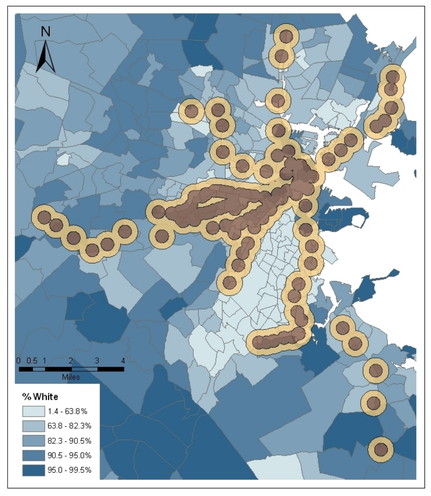

Figure 3: Percent White Population

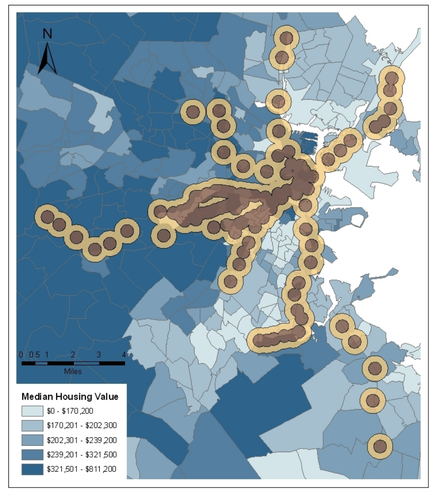

Figure 4: Median House Value

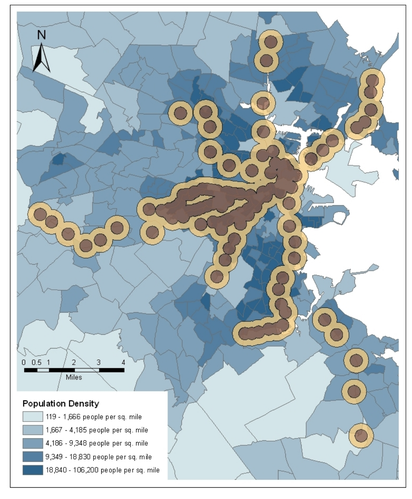

Figure 5: Population Density