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Intro. to GIS for
Urban and Environmental Analysis
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Final Paper

- **Brief description of project**

I began this project with the broad goal of characterizing the neighborhoods around the current and future Somerville Community Path. The path is currently about a mile long and runs from Davis Square to Cedar St. Plans are in place to extend the path all the way to Boston, along the railroad tracks (and site of the future Green Line). I began with a simple question: how many people have access to the path now and how many will have access to the path once it is extended? To start, I wanted to do a "ped shed" – or ¼ mile buffer around the current and future path, and then determine how many residents lived within this buffer. From there, I began exploring the Census data available in order to decide what socio-demographic features might be relevant to my analysis.

This GIS analysis fit into the written component of my Field Project for the Department of Urban and Environmental Planning this spring. My project was to create a multi-media video as part of an evaluation for the Robert Wood Johnson Foundation, which funded "active living" projects in Somerville over the last 5 years, including work on the Community Path. In my GIS analysis, I hoped to spatially explore some of the themes that emerged during the interviews and discussions with pedestrians and key stakeholders.

One theme that came up repeatedly was the effect of the path on the property values surrounding it. Some viewed the path as a "gentrifying" force – others saw it as an economic benefit to the City. There appeared to be a definite split between West Somerville (perceived as more homogeneous and wealthy) where the path currently runs, and East Somerville (perceived as more diverse and lower-income) where the path will run in the future. One question I had was: is there a noticeable difference in property values surrounding the current and future path? What are the implications of this for planners?

Other common themes in our discussions about the Community Path in Somerville included: commuting to work by foot or bike, and obesity rates (especially as they pertain to minorities). Therefore, I chose to explore the percentage of people commuting by car along the path (data available at the Census Block Group level) and the percent minority along the path. I wanted to demonstrate the need to provide more walkability in areas with a higher concentration of minorities and greater percentage of car commuters.

- **Data sources**

I obtained a shapefile of the Community Walking Path from Jason Nelson, a student in the Advanced Class who did an extensive GIS analysis of the path and its surrounding areas. Additionally, I used the following layers for the bulk of my analysis:

Subject	***Source***	***Data layer name***
Population and Percent Minority	ESRI ArcData http://arcdata.esri.com/data/tiger2000/tiger_download.cfm Year: 2000	Census Block Demographics tgr25000sf1blk.dbf (joined to) tgr25017blk00.shp
Commuting	Mass GIS http://www.mass.gov/mgis/database.htm Year: 2000	Census Block Group Demographics transportation_commute_means.dbf
Property value	M: Drive > City > Somerville > MIS > Parcels2004	Somerville Parcels Parcels2004

- **List of major steps in data preparation and analysis**

The first major step was creating the access points on the path around which to do a network buffer. To do this, I needed to use the Editor toolbar to create new features. I placed points along the path where streets intersected as well on parts of the path where I knew there was a sidewalk or entrance point (Image 1).

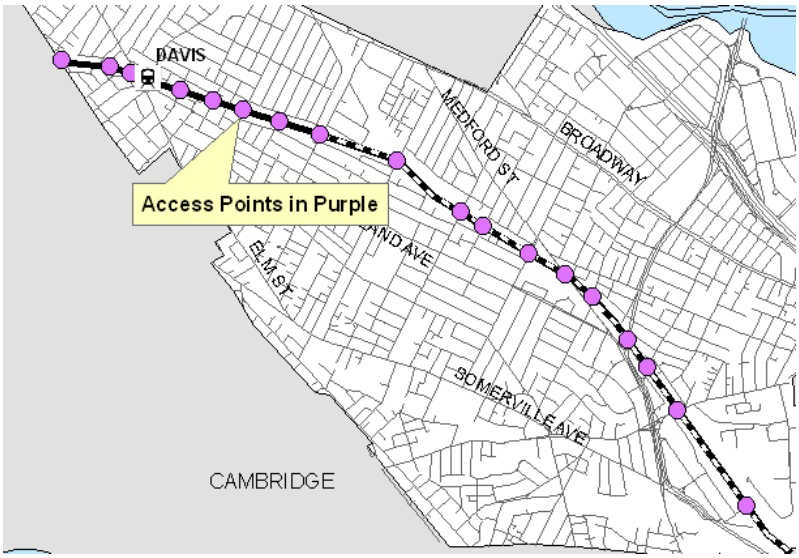

Image 1

After creating the access points, I used Network Analyst to set up a network dataset so that I could run a "service area" analysis using the access points as "facilities." This would allow me to create polygons around the access points that represented a ¼ mile travel distance on the street network (Image 2).

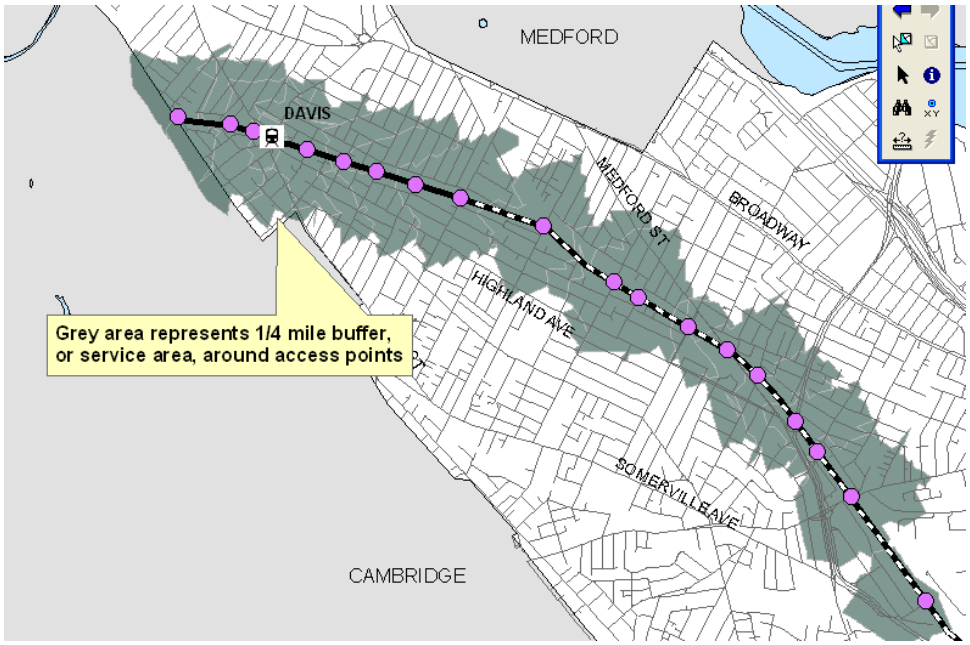

Image 2

For my poster, I created a network buffer around both the current and future path, which I used to illustrate the areas served by the walking path.

I could then use this network buffer layer to further analyze the demographic information of the neighborhoods around the path. For instance, I used the "select by location" feature to select all the Census blocks whose centroid was inside of the network polygon layer (Image 3). I could then use these selected blocks to determine the population and percent minority along the path.

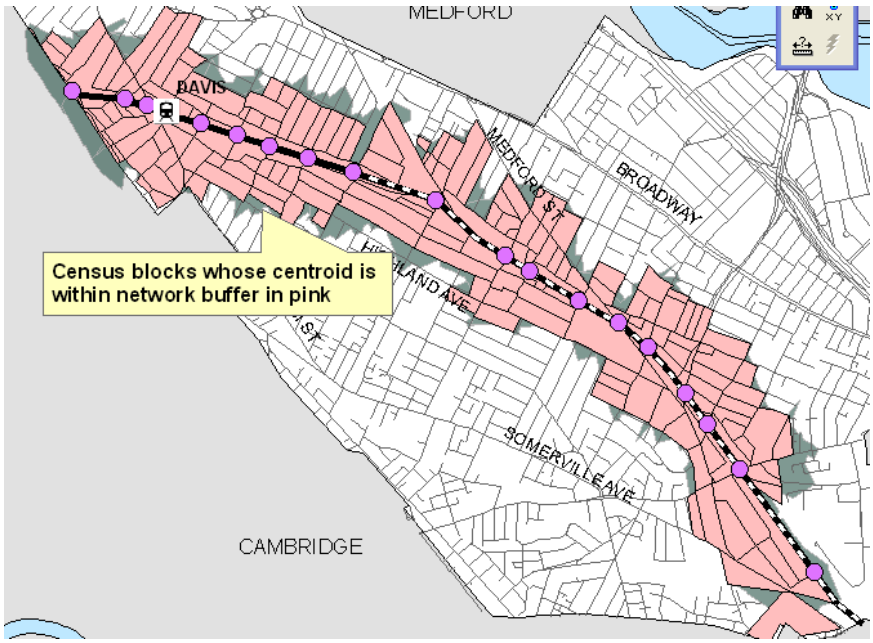

Image 3

For the analysis at the block group level, I did not use select by location, rather I used the path network buffer as a guide to hand select the block groups I wanted to use in my analysis. I did this because the block groups were much larger and none of the select by location options seemed appropriate. Once selected, I made these block groups into a separate layer so that I could analyze the commuting methods of the population around the path (Image 4).

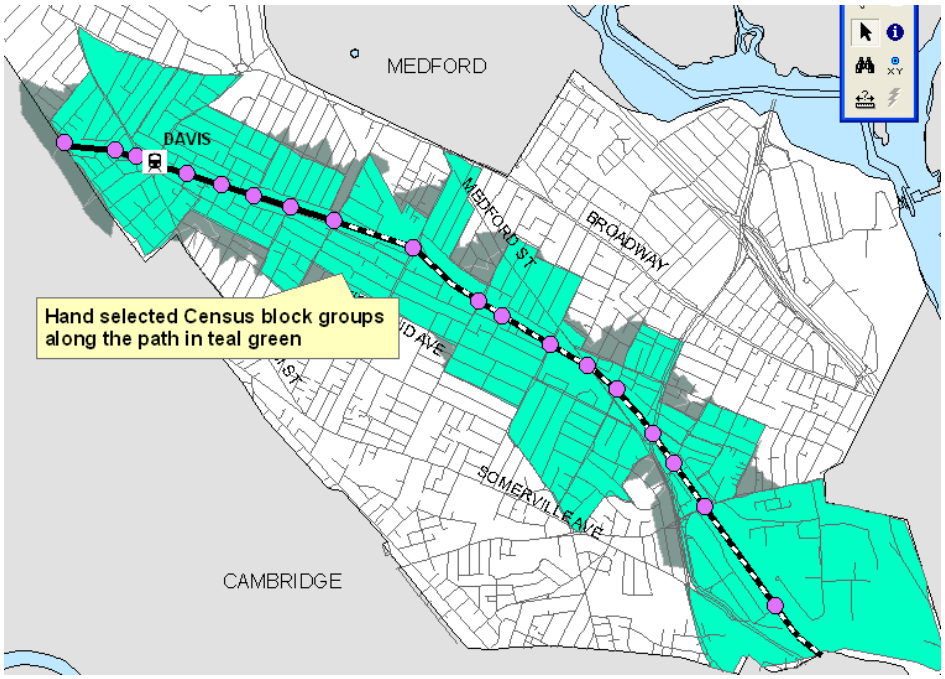

Image 4

Lastly, I used the select by location feature again to select all of the parcels from the Somerville Parcels2004 layer that were within the network polygon buffer. I then sorted the parcels by total assessed value to illustrate the property values along the current and future path (Image 5).

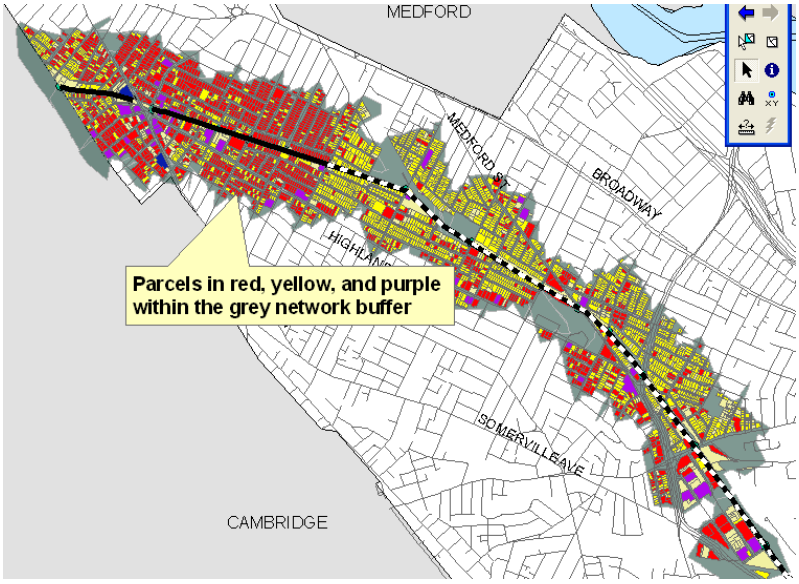

Image 5

- **Difficulties encountered, successful work-arounds, warnings, etc. (in relation to data sources, methods, computer issues)**

I encountered difficulty around creating a perfect network buffer in Network Analyst. If I had more time, I would have tried to thoroughly examine why network analyst wasn't working properly. For example, some of the access points I created along the path were not directly placed on a street – the point represented a sidewalk or staircase that led to the path, not an intersection. Network Analyst did not seem to recognize these points the same way it did a point on an intersection. A buffer would be created around the point – but it would be incomplete – it would not be a full ¼ mile. To circumvent this problem, I edited the street file by creating a line that joined up with the point. I labeled this segment a "sidewalk" in the attribute table of the street file. Every time I edited the street file, I would have to recreate the network data set.

Because I was cautious of the results of my network buffer, I may not have used it to its fullest potential in my analysis. I instead opted to concentrate on the Census information, and even hand selected the block groups I wanted to use because it did not seem to make sense to use the network buffer for this.

- **Concluding thoughts**

In conclusion, I wish I had more time to run an in depth analysis. I concentrated only on the data I felt was most immediately relevant to my Field Project. I would have liked to further explore the Census information and include an analysis of employers along the path, which was a goal at the beginning. Examining health data, where available, in the areas surrounding the path would also have been very interesting.

I thought that the property value map was the most captivating. It really illustrated a potential problem for Somerville, in terms of the "gentrifying effect" of the new subway and walking path projects. Identifying existing and potential sites for affordable housing would be a very interesting follow up analysis.

Overall, I think I took a simple approach that served my purposes. The demographic split between East and West Somerville is made more apparent using GIS data, and I think the maps illustrate the need for planners to take these factors into consideration when developing an area.