Massachusetts Bay Transit Authority (MBTA) Service Area Analysis
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Introduction
The following is a service area analysis and comparison of both land use types and population density statistics around the MBTA transit nodes. A comparison is made between two primary study areas: 1) Buffers consisting of ½ mile radii around the MBTA transit nodes, and 2) Rings consisting of area outside ½ mile but within 1 ½ miles of the MBTA transit nodes. This unique analysis facilitates a greater understanding of differences between these distinct study areas - making the tailoring of transit operations, integration of ICT with existing land use, and connections with a greater number of transit riders possible.

Data Layers

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Land Use</td>
<td>Land use types and population density</td>
<td>MassGIS</td>
</tr>
<tr>
<td>Physical Resources</td>
<td>Physical resources of the area</td>
<td>MassGIS</td>
</tr>
<tr>
<td>Land Poly 100 ft</td>
<td>Land polygons within 100 feet of MBTA transit nodes</td>
<td>MassGIS</td>
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</tbody>
</table>
| Mass GIS \
Census_2000\nCensus2000blockgroups_poly 500 ft | Land polygons within 500 feet of MBTA transit nodes | MassGIS                                      |

Methodology
Approach 1: Land use within ½ mile of the transit nodes
Approach 1 applies a map of the Boston Metro Region with MBTA transit nodes and land use from MassGIS (See Data Layers). Land use was clipped to ½ mile buffer zones created around the MBTA nodes and symbology was imported to these buffer zones (See Figure 1).

Approach 2: Land use outside ½ mile but within 1 ½ miles of the transit nodes
For purposes of a comparison, Approach 2 applies 1 ½ mile buffer zones, while removing the selected land use within the ½ mile buffer zones in the approach above (See Figure 2).

Approach 3: Population density within ½ mile of the transit nodes
Approach 3 applies a select by location query to find population density blockgroups with the MBTA transit nodes as a focal point (centroid). Exporting this data created a population density information layer within the ½ mile buffer zones (See Figure 3).

Approach 4: Population density outside ½ mile but within 1 ½ miles of the transit nodes
Conversely, a population density information layer was created for 1 ½ mile buffer zones and the population density within ½ mile of the transit nodes was removed (See Figure 4).

Results 1: Land use within ½ mile of the transit nodes
The summary table below shows total acreage recalculated by land use types within the ½ mile buffer zones. Particularly of interest, forest land use comprises a total of 609 acres, while residential -12,262 acres and commercial - 4,043 acres.

Results 2: Land use outside ½ mile but within 1 ½ miles of the transit nodes
The summary table above and to the right shows total acreage recalculated by land use types outside ½ mile but within 1 ½ miles of the transit nodes. Among the significant differences in land use are in forested land, comprising of 4,448 acres and residential of 24,633 acres. Additionally, commercial land use is actually less than in the ½ mile buffer zones, comprising of only 3,134 acres.

Results 3 and 4: Population Density Comparison
Creating a new field of sample population per square mile, below are population density statistics for the two study areas, results for 3 and 4 respectively.

Conclusions
The analysis above shows that there are in fact significant differences between land use in the two study areas. Not much farther than ½ mile from the transit stations, the landscape changes from that of commercial land to that of residential and forested land use. Network connectivity through the integration of ICT at transit stations would be all the more important in reaching out and connecting families of transit riders in more residential and forested areas.

Equally important to note are the limitations of data sources in this study, the most recent of which is MassGIS based on the 2000 Census. Utilizing a centroid method, furthermore, prevents the double counting of blockgroups, however, since the data layers are accurate only between 300 and 500 ft, this leaves a small margin of possible error. Finally, the choice was made to apply the dissolve option in this analysis—treating the buffers as a single feature resulting in total land use and population density, rather than acreage and statistics for each individual transit station.