

Service Area Analysis of Portland's METRO Bus System

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The screenshot shows a news article from 'the ONION' website. The header includes the logo for 'the ONION' with the tagline 'America's Finest News Source'. Below the logo is a navigation bar with links for HOME, VIDEO, RADIO, SPORTS, POLITICS, WORLD, BUSINESS, SCI/TECH, and ENTER. The article is categorized under 'NATIONAL' and has the headline 'Report: 98 Percent Of U.S. Commuters Favor Public Transportation For Others'. The date is 'NOVEMBER 29, 2000 | ISSUE 36-43'. The main text begins with 'WASHINGTON, DC—A study released Monday by the American Public Transportation Association reveals that 98 percent of Americans support the use of mass transit by others.' There is an 'ENLARGE IMAGE' link next to a photograph of a busy highway with traffic. To the right of the image is a quote: '"With traffic congestion, pollution, and oil shortages all getting worse, now is the time to shift to affordable, efficient public transportation," APTA director Howard Collier said. "Fortunately, as this report shows, Americans have finally recognized the need for everyone'. On the right side of the article, there is a section titled 'ARTICLE TOOLS' with social media sharing options for Digg, Facebook, StumbleUpon, Twitter, and Reddit.

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NATIONAL

Report: 98 Percent Of U.S. Commuters Favor Public Transportation For Others

NOVEMBER 29, 2000 | ISSUE 36-43

WASHINGTON, DC—A study released Monday by the American Public Transportation Association reveals that 98 percent of Americans support the use of mass transit by others.

[ENLARGE IMAGE](#)

"With traffic congestion, pollution, and oil shortages all getting worse, now is the time to shift to affordable, efficient public transportation," APTA director Howard Collier said. "Fortunately, as this report shows, Americans have finally recognized the need for everyone

ARTICLE TOOLS

- [DIGG](#)
- [FACEBOOK](#)
- [STUMBLEUPON](#)
- [TWITTER](#)
- [REDDIT](#)

METRO Background

- 8 routes serving Portland, South Portland, Falmouth and Westbrook
- 100,000+ passengers/month, +11% 1997-2005 (GPCOG/METRO, 2006)
- Miles covered daily: almost 3,000 (GPCOG, 2006)
- Total number of stops: 489 in Portland alone (City of Portland)

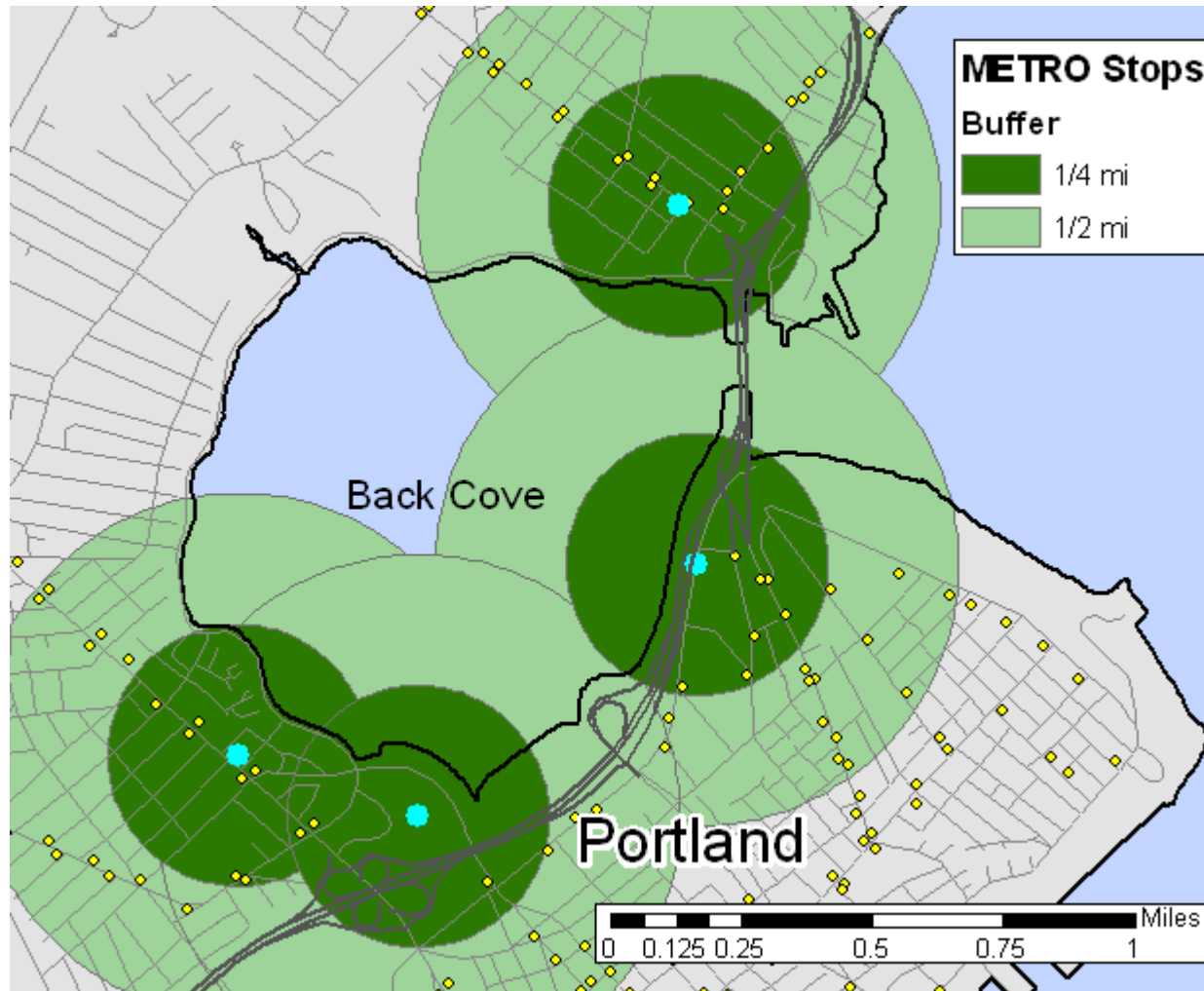
Project Specifications

- Determine the areas of the city served within $\frac{1}{4}$ mile (roughly five minutes' walk) of each bus stop along with some corresponding demographics
- Identify potential new areas for service

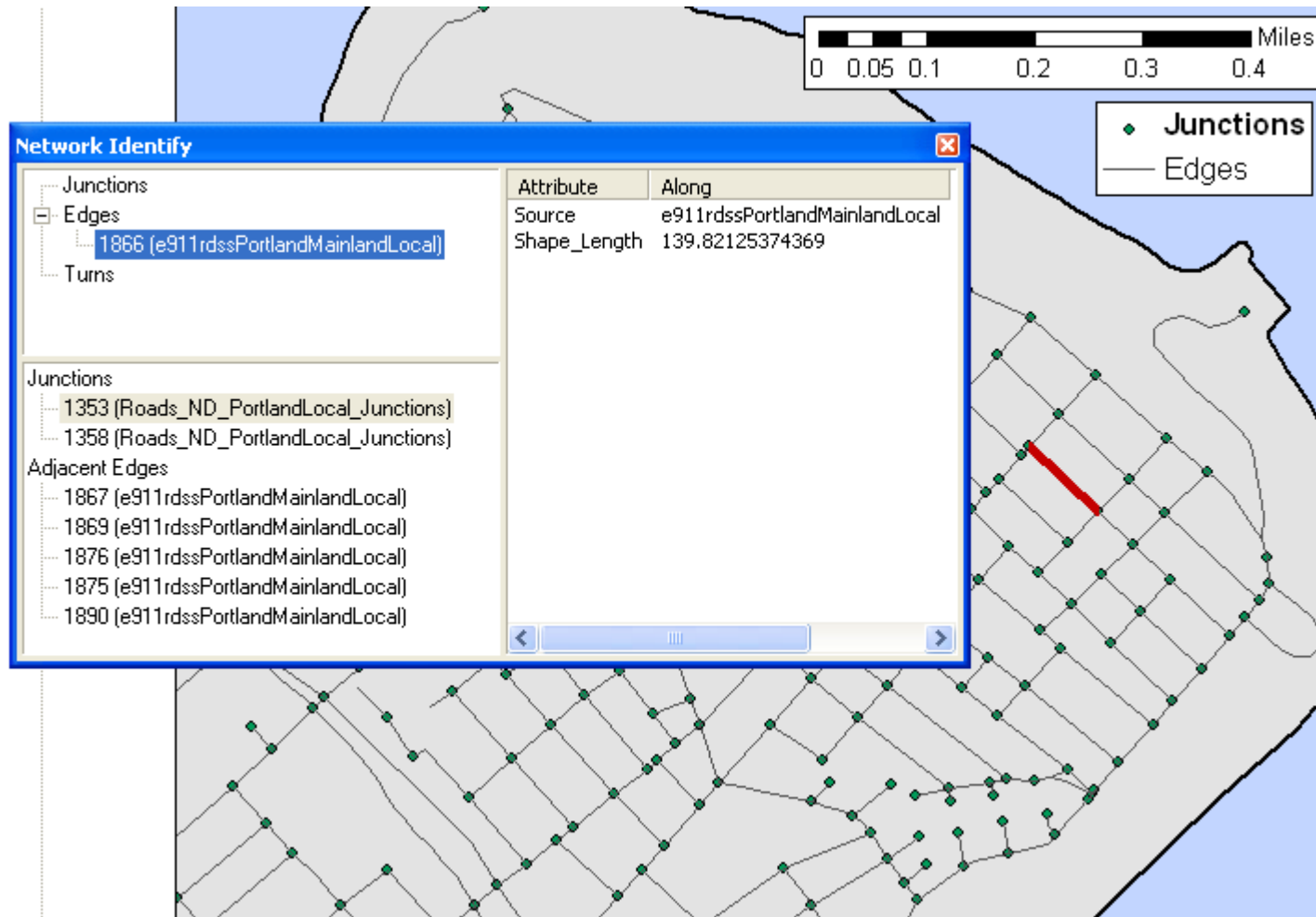
Data

- Building footprints, parcels, Census block geometry (City of Portland)
- METRO stops and routes (GPCOG)
- E911 roads, Additional Census data (MEGIS, US Census Bureau CTPP)

Straight-Line Buffer



Building the Network Dataset



Solving the Service Area

Settings

Impedance: Shape_Length (Meters)

Default Breaks: 400 800

Direction:

- Away From Facility
- Towards Facility

Allow U-Turns: Everywhere

Ignore Invalid Locations

Layer Properties

Line Generation Accumulation Network Locations

General Layers Source Analysis Settings Polygon Generation

Generate Polygons

Polygon Type

- Generalized
- Detailed
- Trim Polygons
100
Meters

Multiple Facilities Options

- Overlapping
Create polygons for each facility. These polygons may overlap.
- Not Overlapping
Allocate polygons to the closest facility.
- Merge by break value
Join polygons of multiple facilities having the same break values.

Overlap Type

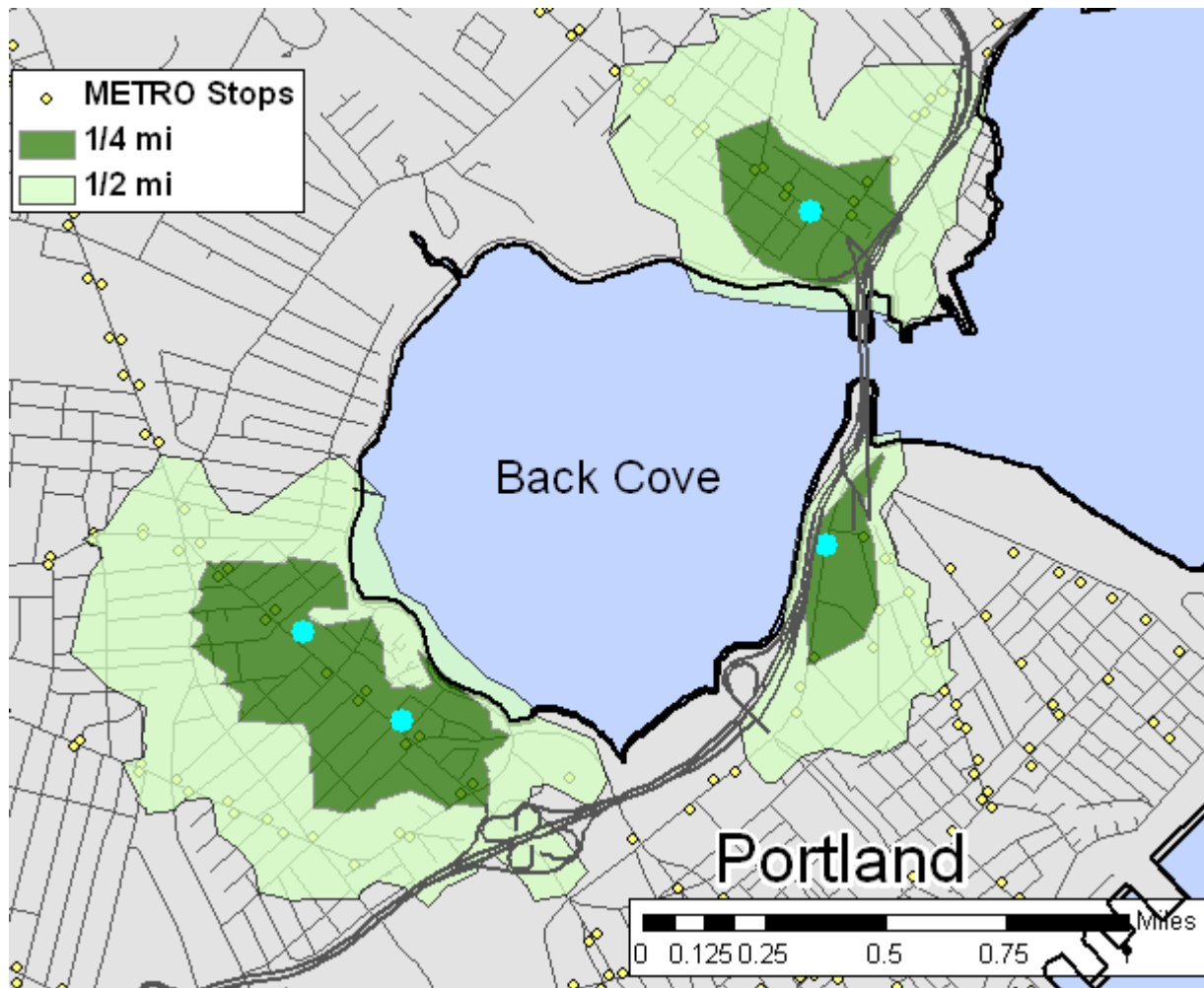
- Rings
Do not include the area of the smaller breaks. Create the polygons going between consecutive breaks.
- Disks
Create the polygons going from the facility to the break.

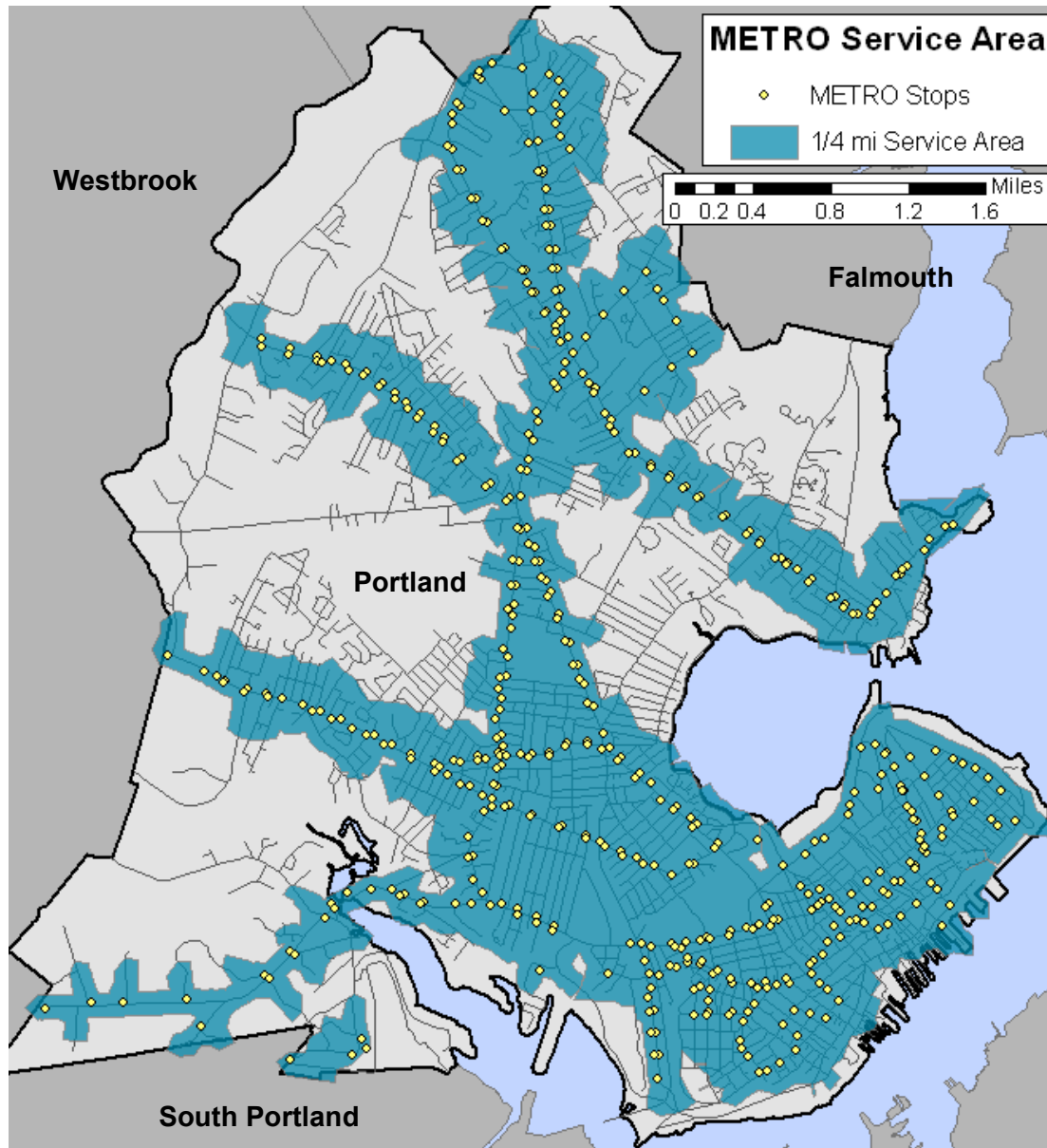
Excluded Sources

- e911rdsPortlandMainlan...

OK Cancel Apply

Network Service Area





Service Area Analysis of Portland's METRO Bus System

Select by Location

Select By Location [?] [X]

Lets you select features from one or more layers based on where they are located in relation to the features in another layer.

I want to:

select features from [dropdown]
the following layer(s):

- METRO Stops
- Buildings
- Service Area
 - Facilities
 - Barriers
 - Lines
 - Polygons
- Roads_ND_PortlandLocal_Junctions
- metrostops
- e911rdsPortlandMainlandLocal
- METRO Stops

Only show selectable layers in this list

that:

are completely within [dropdown]
the features in this layer:

[checked] Polygons

Use selected features (0 features selected)

Apply a buffer to the features in Polygons

of: [0.000000] Meters [dropdown]

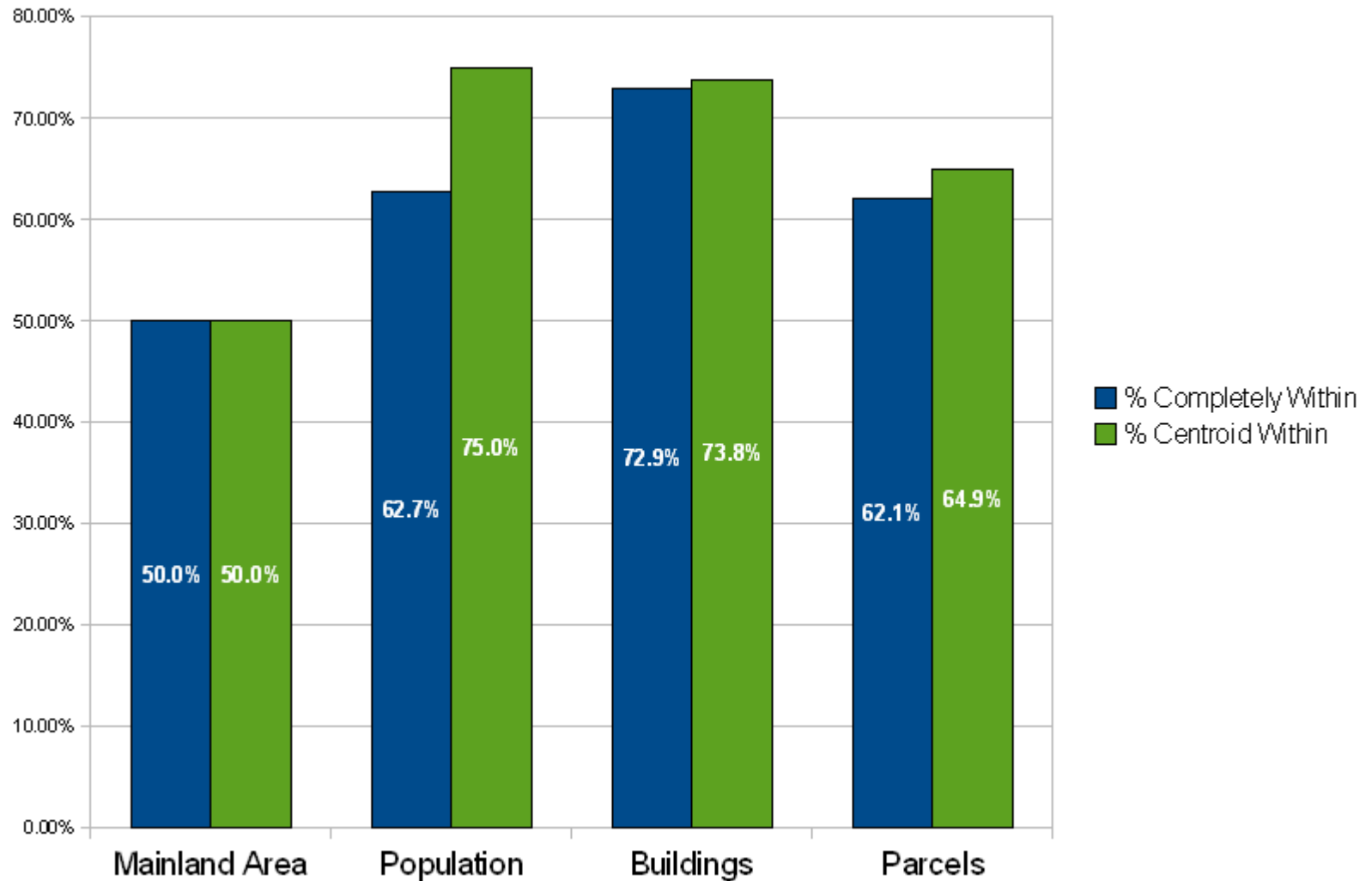
Help OK Apply Close

Buildings in 1/4 mi Service Area

- METRO Stops
- Buildings
- 1/4 mi Service Area

0 0.125 0.25 0.5 0.75 1 Miles

Coverage of METRO 1/4 mi Service Area



Need Index (Yao, 2007)

$$NI(i) = .085x_1 + .087x_2 + .465x_3 + .038x_4 - .066x_5 + .046x_6$$

Figures from metro Atlanta

(i) = traffic analysis zone (TAZ)

X1 = % of workers below poverty line

X2 = % of workers from 100 – 150% of poverty line

X3 = % of workers with 0 vehicles available

X4 = % of workers with 1 vehicle available

X5 = employment rate

X6 = population density

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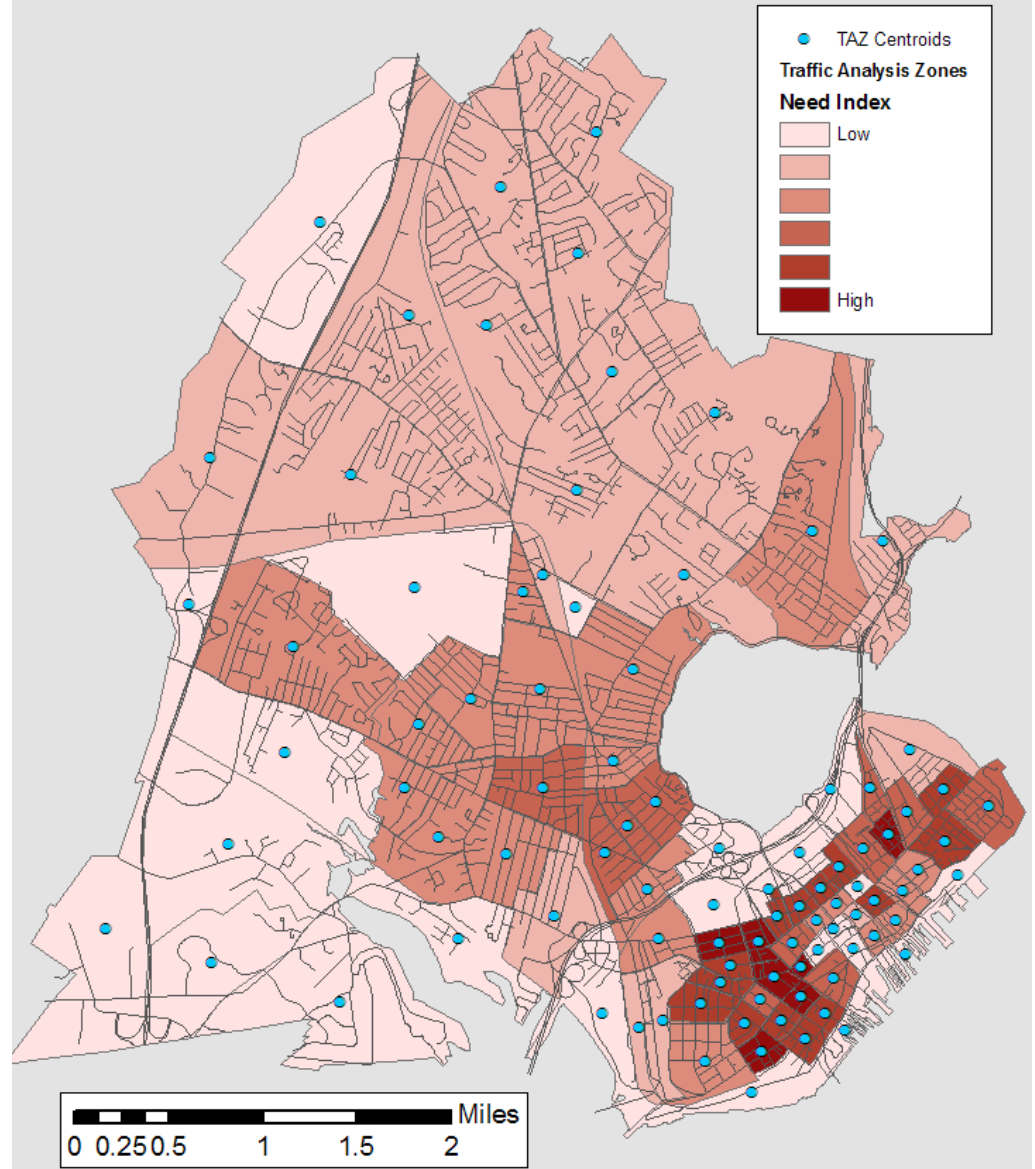
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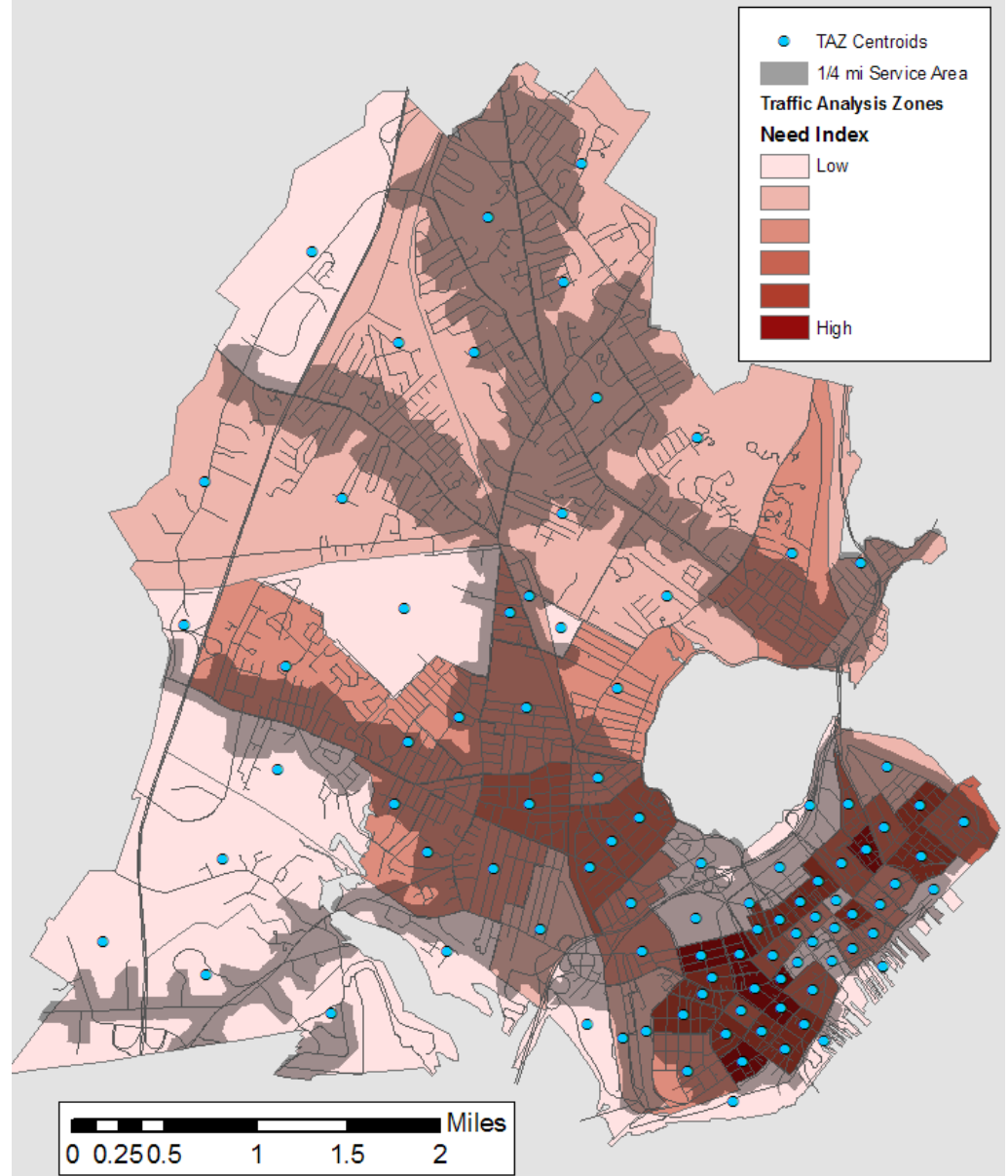
Traffic Analysis Zones



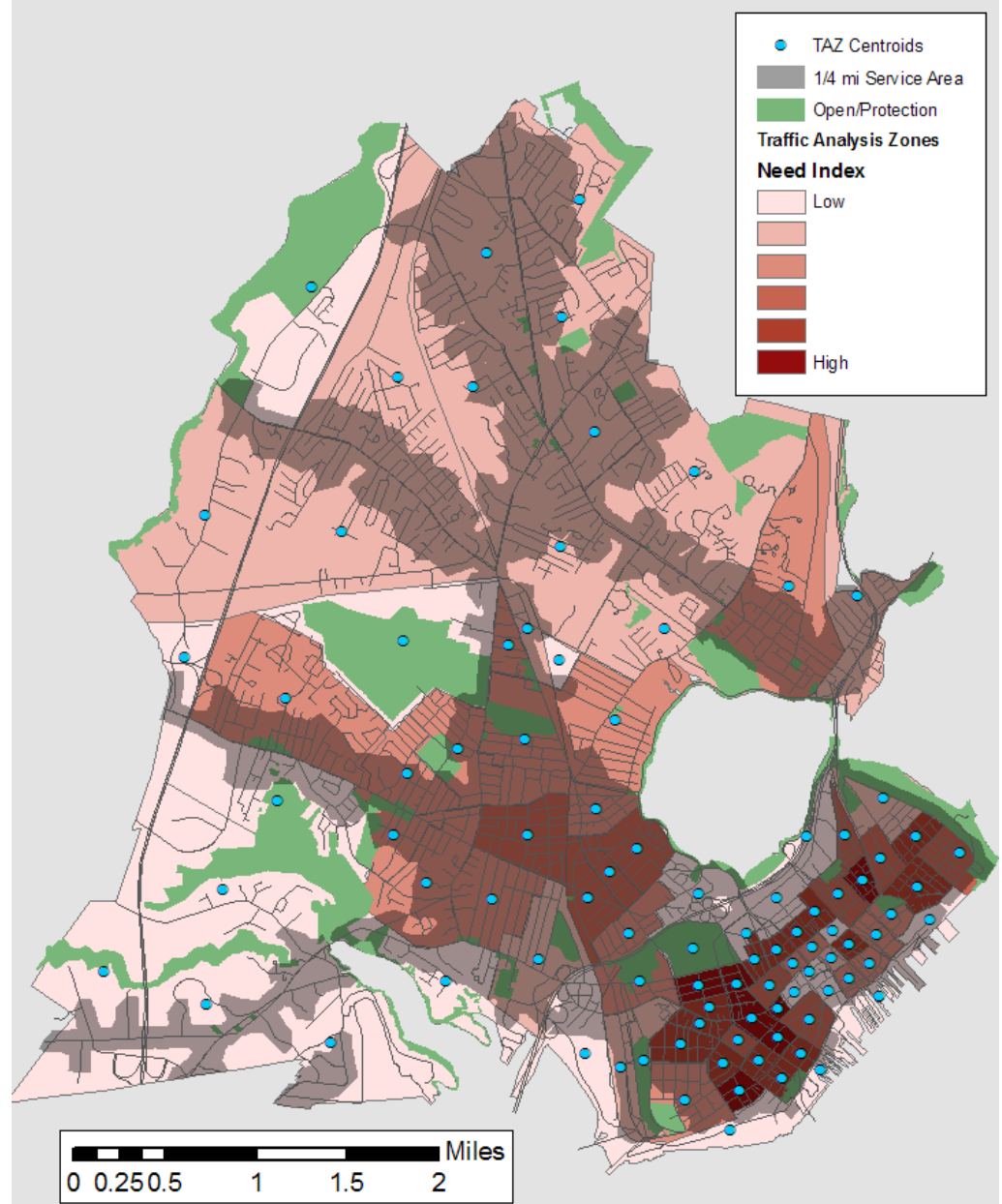
Need Index



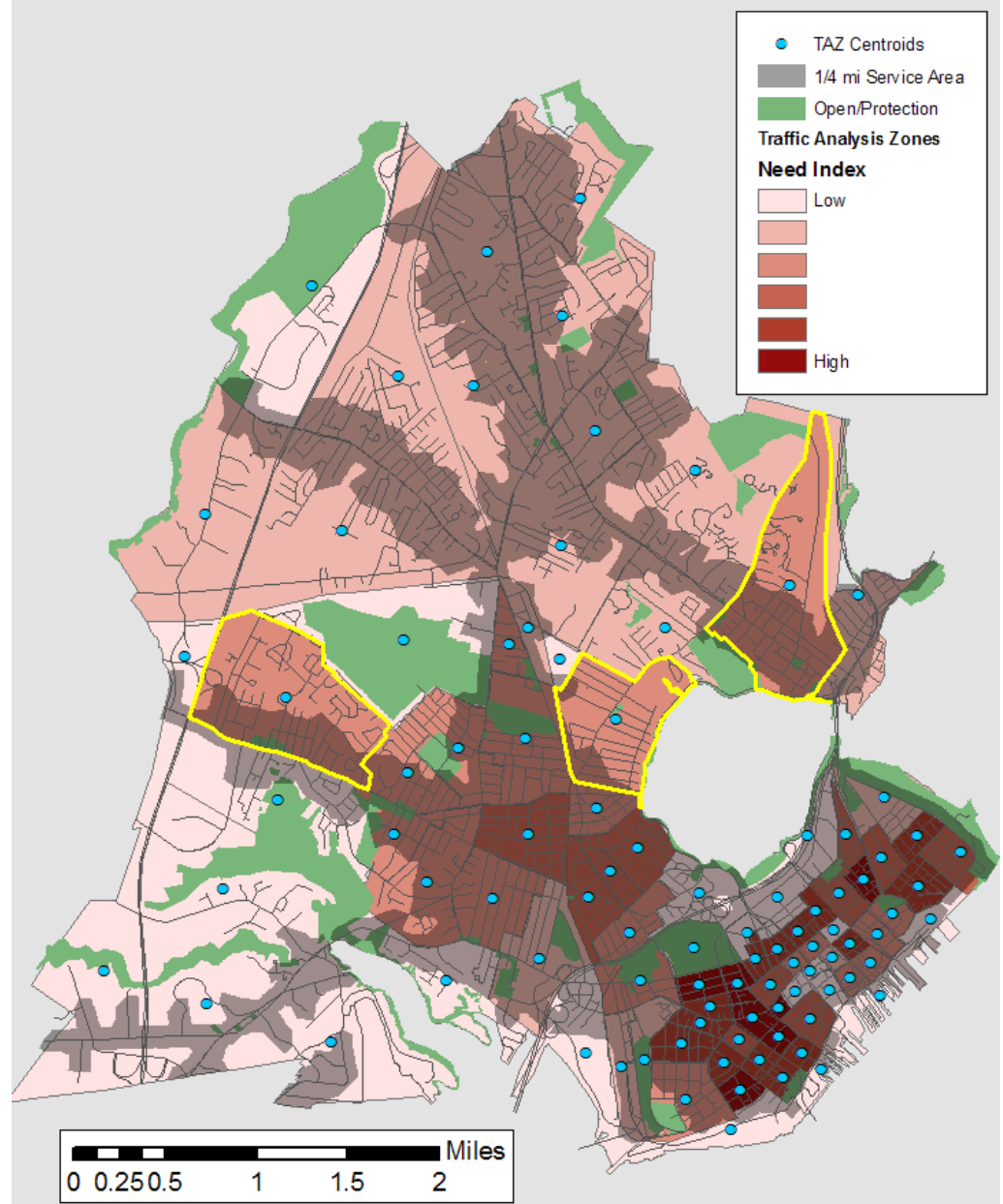
Need Index



Need Index



Need Index



Enhancements

- Look beyond city borders
- Refine Need Index/calculate NI coefficients for Portland
- Examine impact of island populations
- Exclude areas where people don't walk (water, 295)
- Improve footpath/parking lot coverage

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Acknowledgments

- Matthew Bampton, Abe Dailey, Tom Devine, Mike Esty, Sandy Fussell, Valerie Jones, Andrea Small, Michele Tranes, Vinton Valentine, USM GIS
- Ben Ouellette, City of Portland
- Matti Gurney & Steve Linnell, GPCOG