

How Income Per Capita Affects Alternative Methods of Transportation

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Introduction

The City of Boston offers different methods of alternative transportation, ranging from the MBTA subway system, bus system, all the way to Hubway bike stops. These systems exist all over Boston, connecting different suburbs and areas together. Each area has its own varying income per capita – we ask, does every address in Boston have at least one form of alternative transportation within walking distance? If not, where is more transit needed? Does this information relate in any way to income per capita?

The Algorithm

The algorithm iterates through all addresses to determine which addresses do not have a transit stop within ~0.7 miles of the property (walking distance). We then run the k-means algorithm on their longitude and latitude coordinates in order to determine an optimal location for a new transit stop to accommodate more people.

The Data Sets

- Master Address List (taken from Property Assessment)
- Hubway Stop Locations
- MBTA Bus Stop Locations
- MBTA Subway Stops
- Income Data Per Capita (values range within 5 year span)

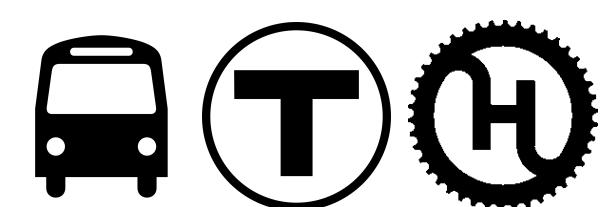


Figure 1: Addresses Without A Transit Stop Within Walking Distance

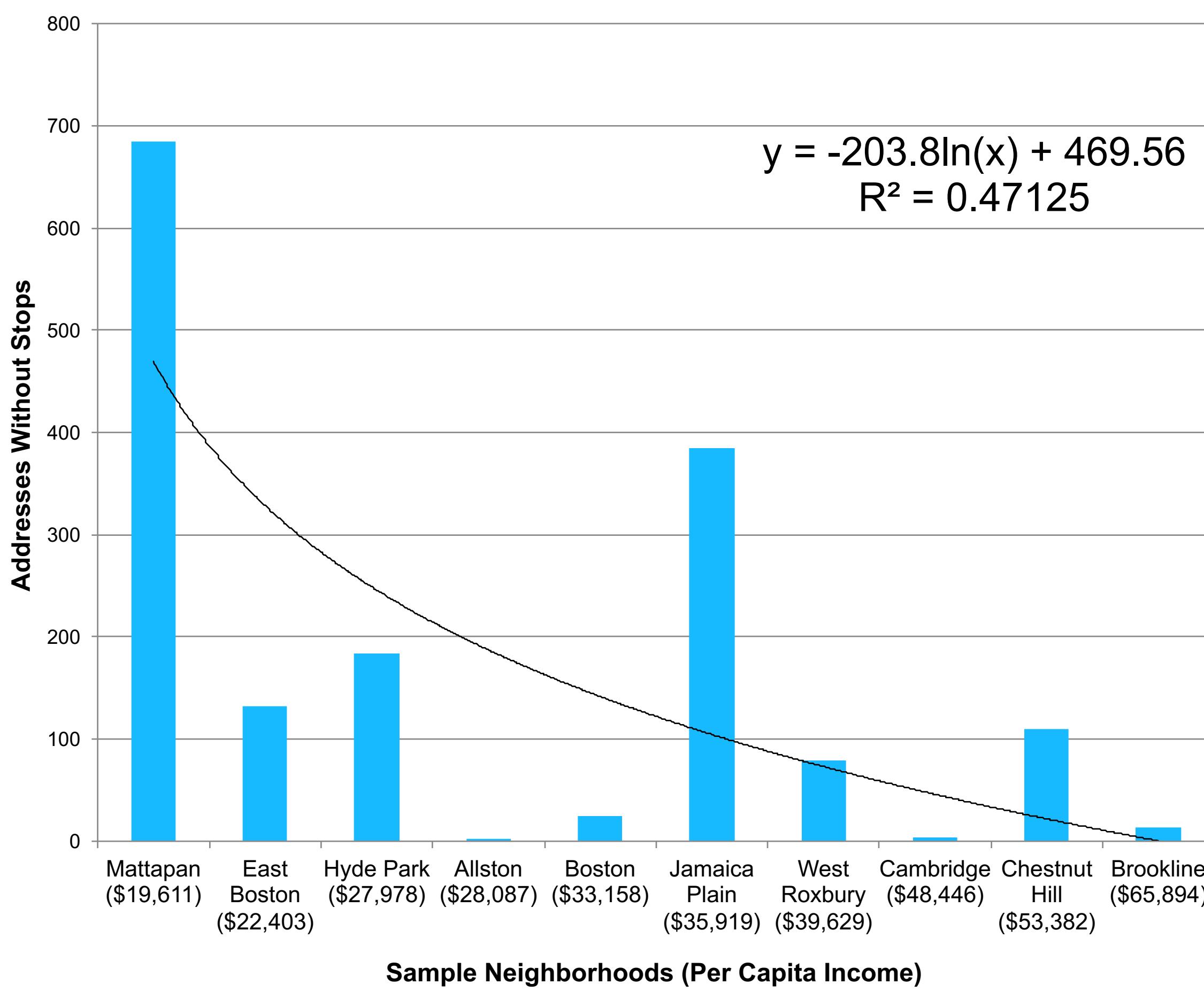
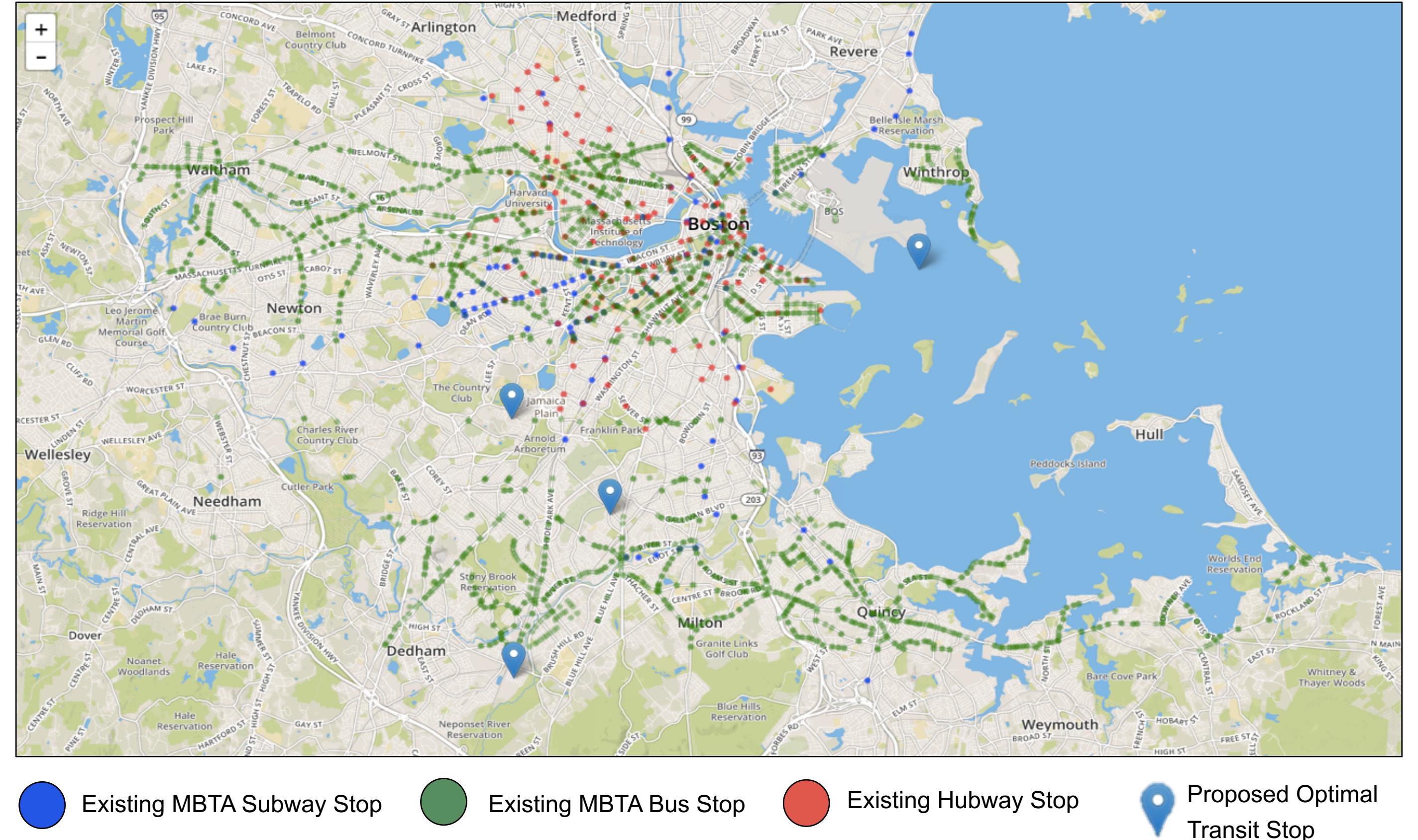


Figure 2: Existing Transit Stop Locations & Four Proposed Optimal Transit Stop Locations



Optimal Transit Stop Locations

Location 1: Millstone Rd. near Curry College in Readville. This location is the farthest from the center of Boston, and MBTA Bus Service is the closest.

Location 2: Boston Harbor. The algorithm disregarded the actual geography of the area, thus placing it in the water. The placement would make sense here, as it proposes a central location for South Boston and Winthrop addresses.

Location 3: Showa Park in Jamaica Plain. This area is primarily served by numerous bus routes, and the closest subway stop is Forest Hills.

Location 4: Almont St. in Mattapan. This location is far from the Ashmont-Mattapan high speed rail line, and no Hubway Stops are nearby.

Figure 3: Location 1 – 53 Millstone Rd. – Readville

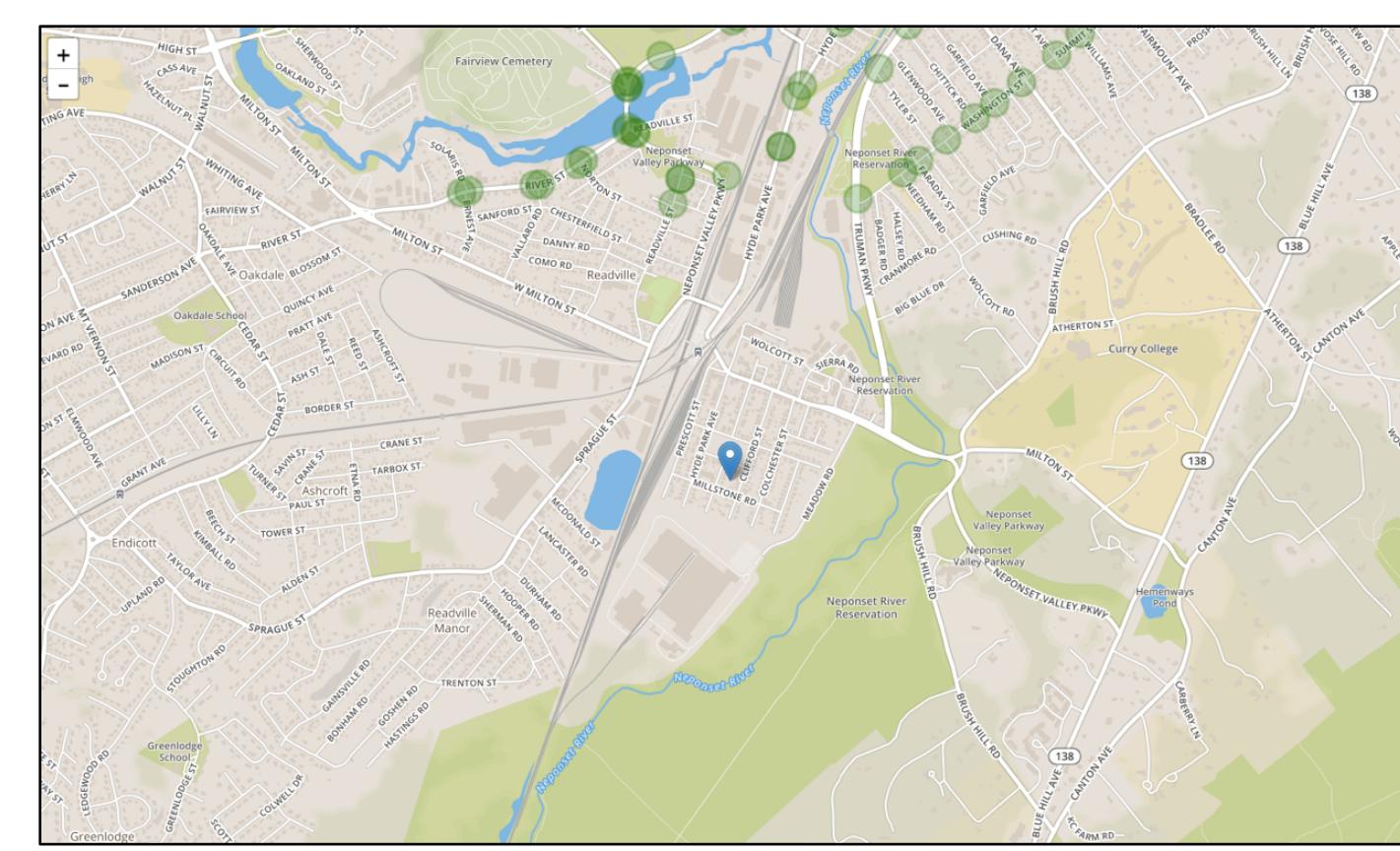


Figure 4: Location 2 – Boston Harbor

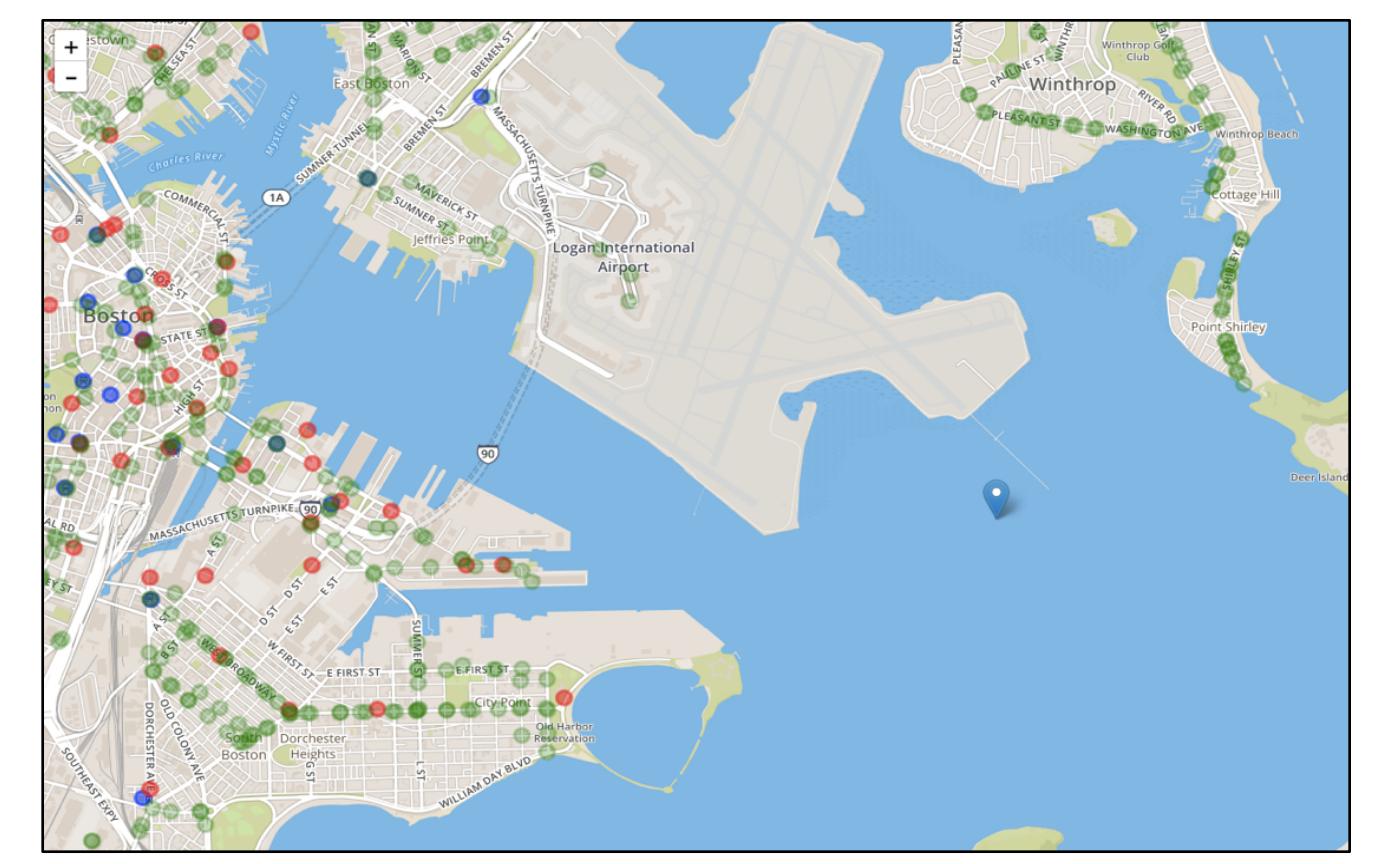


Figure 5: Location 3 – Showa Park – Jamaica Plain

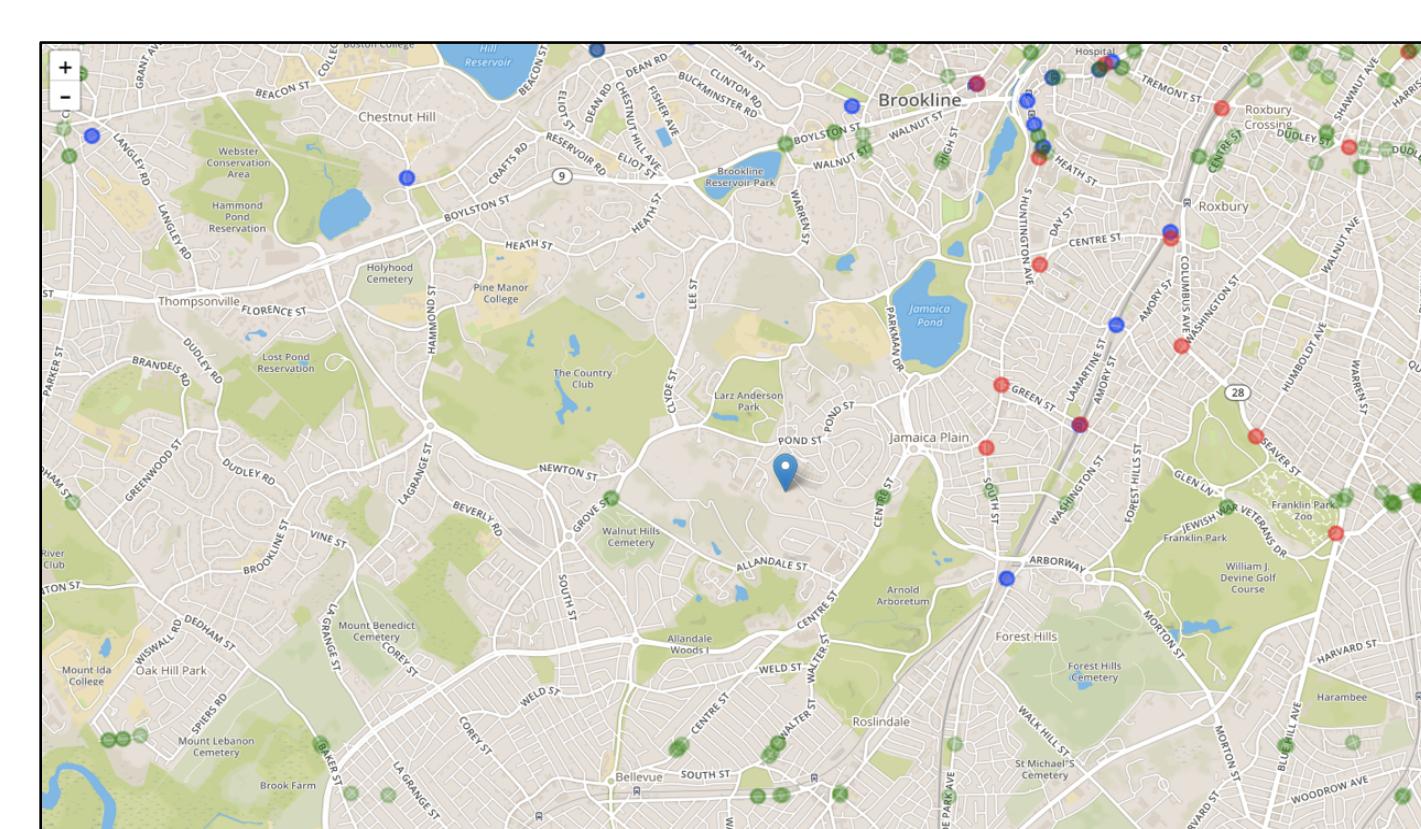


Figure 6: Location 4 – 182 Almont St. – Mattapan

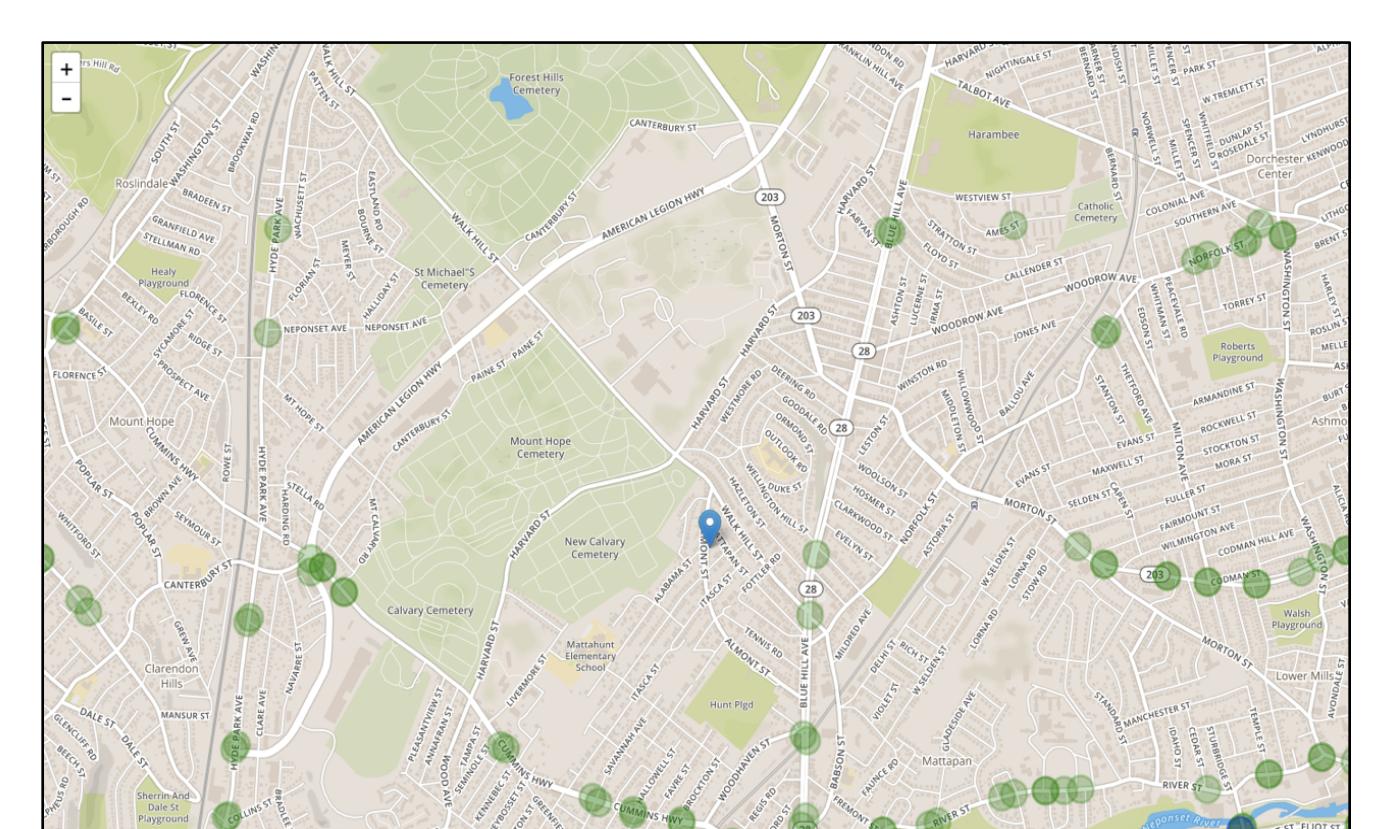


Figure 7: Distance Information for Proposed Optimal Transit Stop Locations

Optimal Stop Locations	Closest Existing Transit Stop	Distance (miles)
Location 1	Bus Stop: Readville St @ Norton St.	0.63 miles
Location 2	Bus Stop: Tafts Ave @ Mugford St. (Winthrop)	1.18 miles
Location 3	Bus Stop: Centre St opp Rambler Rd. (Jamaica Plain)	0.43 miles
Location 4	Bus Stop: Blue Hill Ave @ Fessenden St. (Mattapan)	0.25 miles

Distance From Existing Stops

The distance from already existing stops varies from a quarter of a mile to almost 1.2 miles. In all instances, a bus route is the closest to the Proposed Optimal Transit Stops. This makes sense, as the bus routes cover more ground and serve more areas farther away from the downtown area. However, this does not indicate anything about usage, population density, or the destinations/connection opportunities for the bus routes.

Conclusion

From our algorithm, we can conclude that not all homes in Boston have access to alternative forms of transportation within walking distance. Although there is little meaningful correlation between income and lack of accessible public transit—perhaps explained by distance from Boston—we are still able to determine where to place four optimal locations for stops.

Future Work

The next steps would expand on the definition of “alternative forms of transportation.” There are other options to vehicular transportation than the ones we selected, a major one being the MBTA Commuter Rail, which could reduce the number of properties without alternative transportation. After including other methods, a future step would be to determine which types of transit stops should be placed at said locations. This would entail looking at the surrounding area, distances from other transit stops, and other external factors.