Deadhead Minimization with a Flexible Facility Locator Tool

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Overview

1. Background
2. Process and methods
3. Case study results
4. Implications
5. Future work

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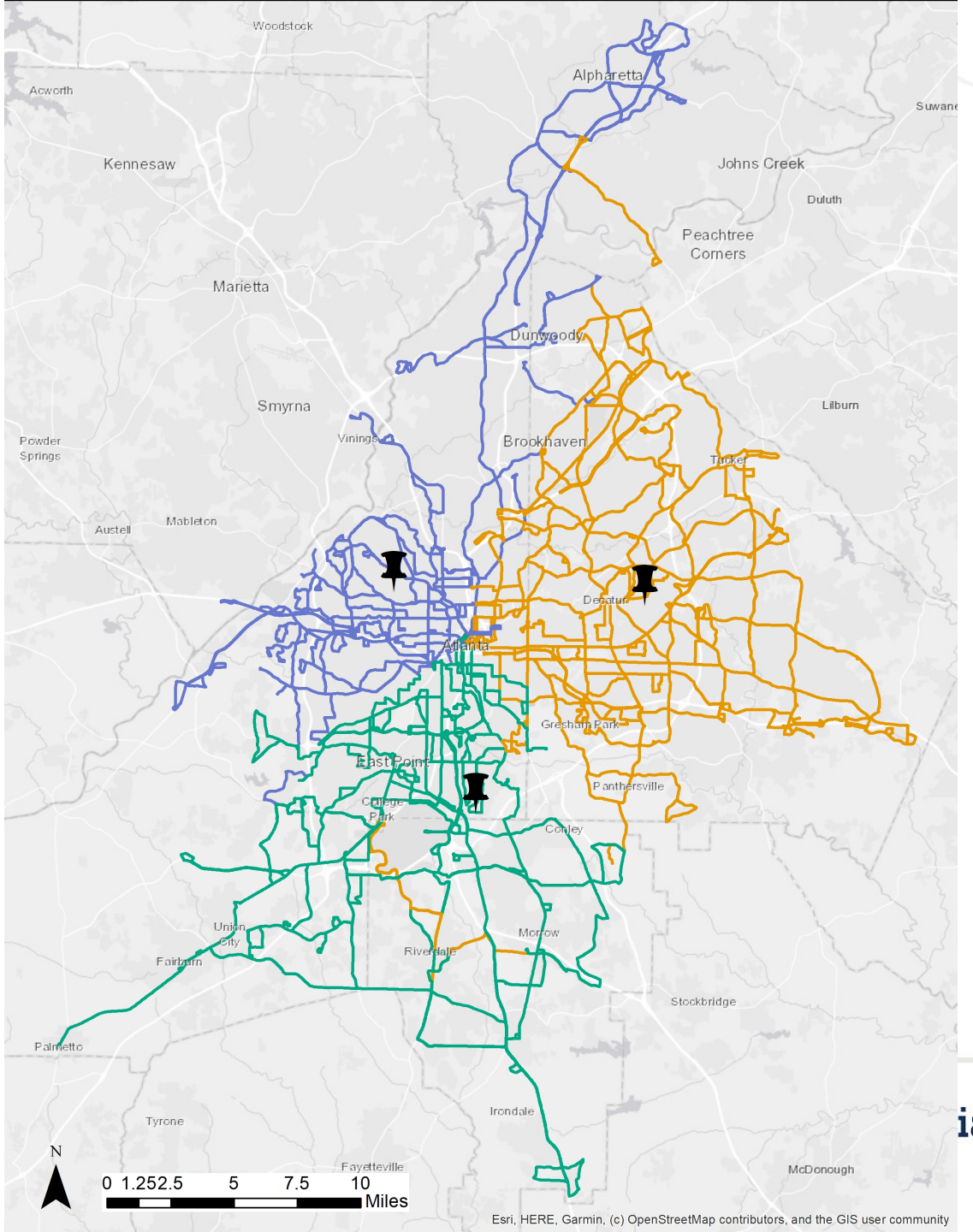
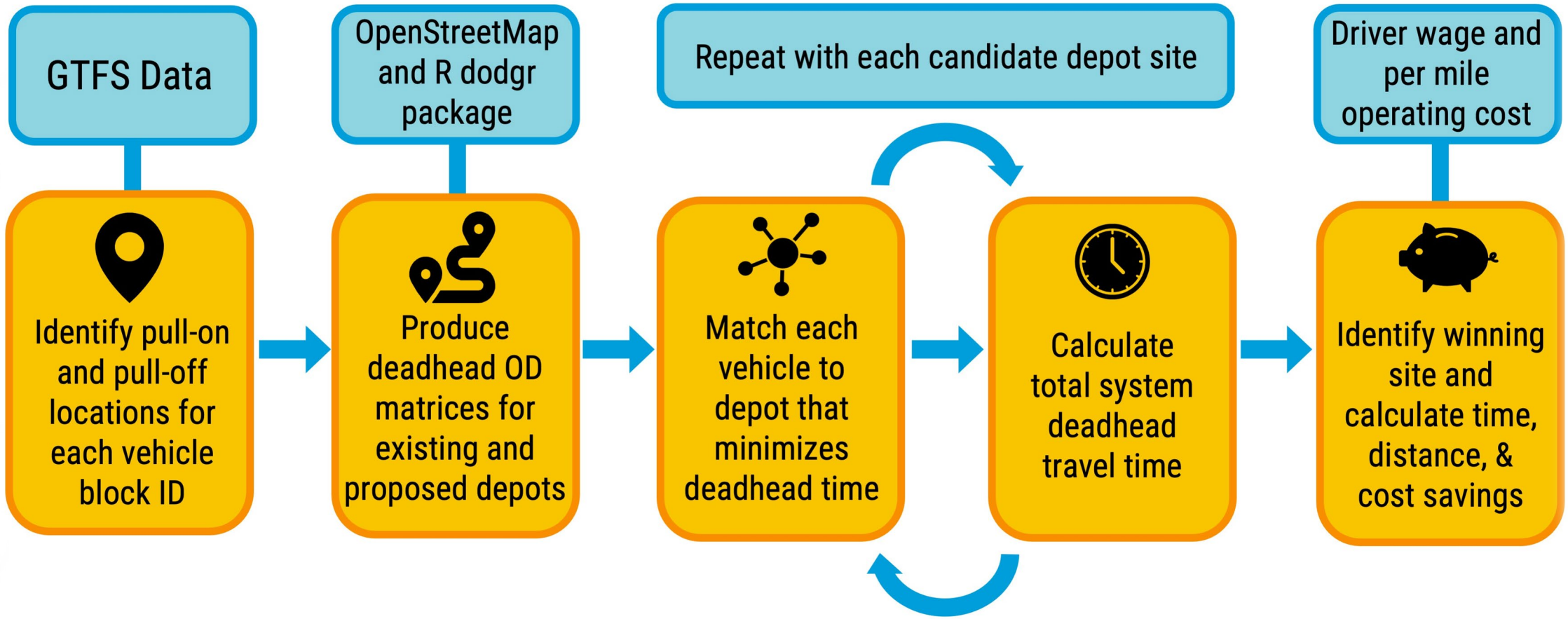
Background

- For MARTA
  - Buses currently stored in 3 depots
    - Many routes start and end service north of these depots
    - Increased deadhead time and costs
- At large
  - Capability limited to certain commercial software
    - Giro's HASTUS and Minibus
  - Skill barrier to enact solutions seen in literature



Analysis Process



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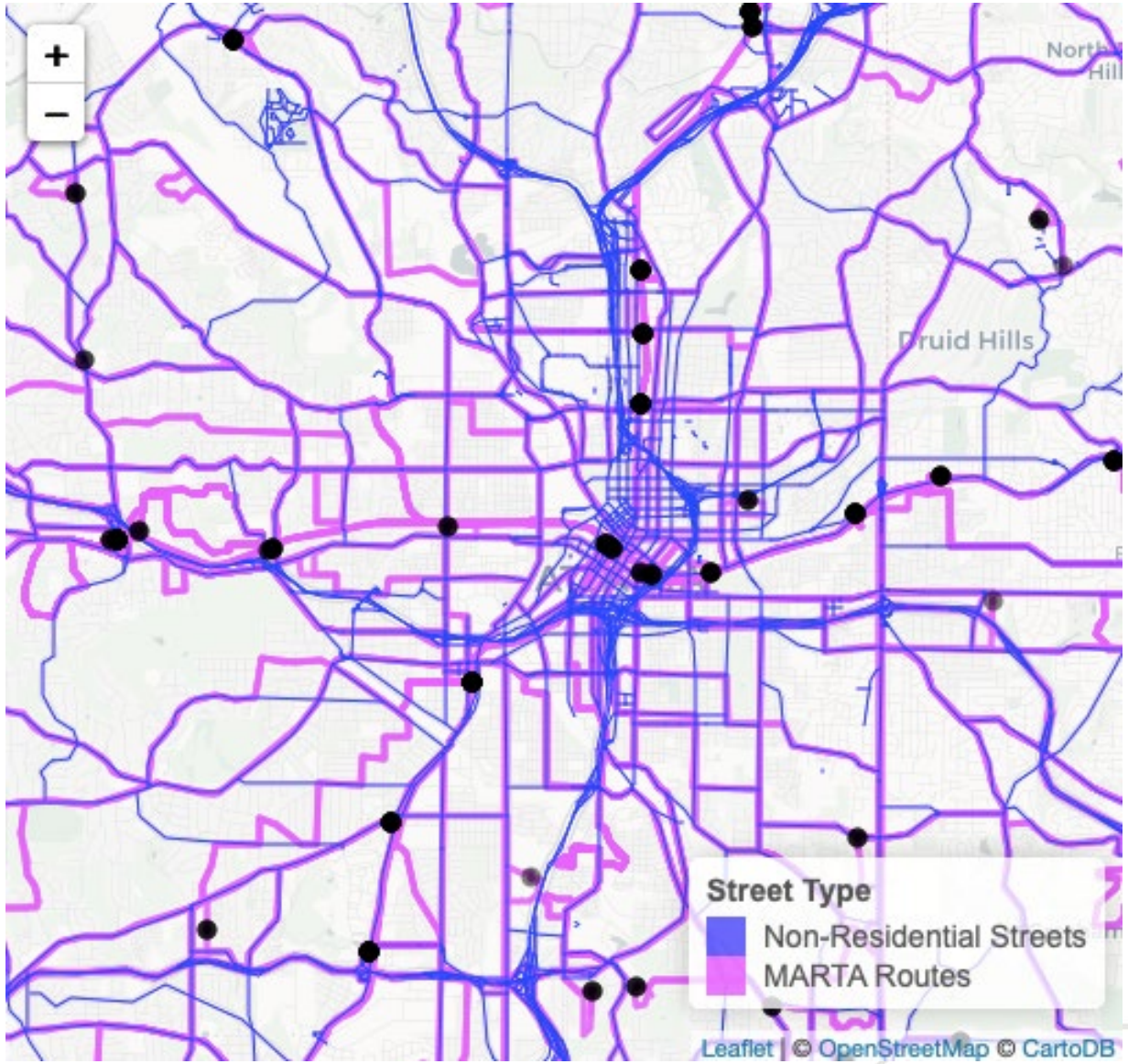
Data

Data

- GTFS
- OpenStreetMap
- Current facility locations

Assumptions

- Candidate sites
- Hourly costs
- Per mile operating cost
- Street network reduction



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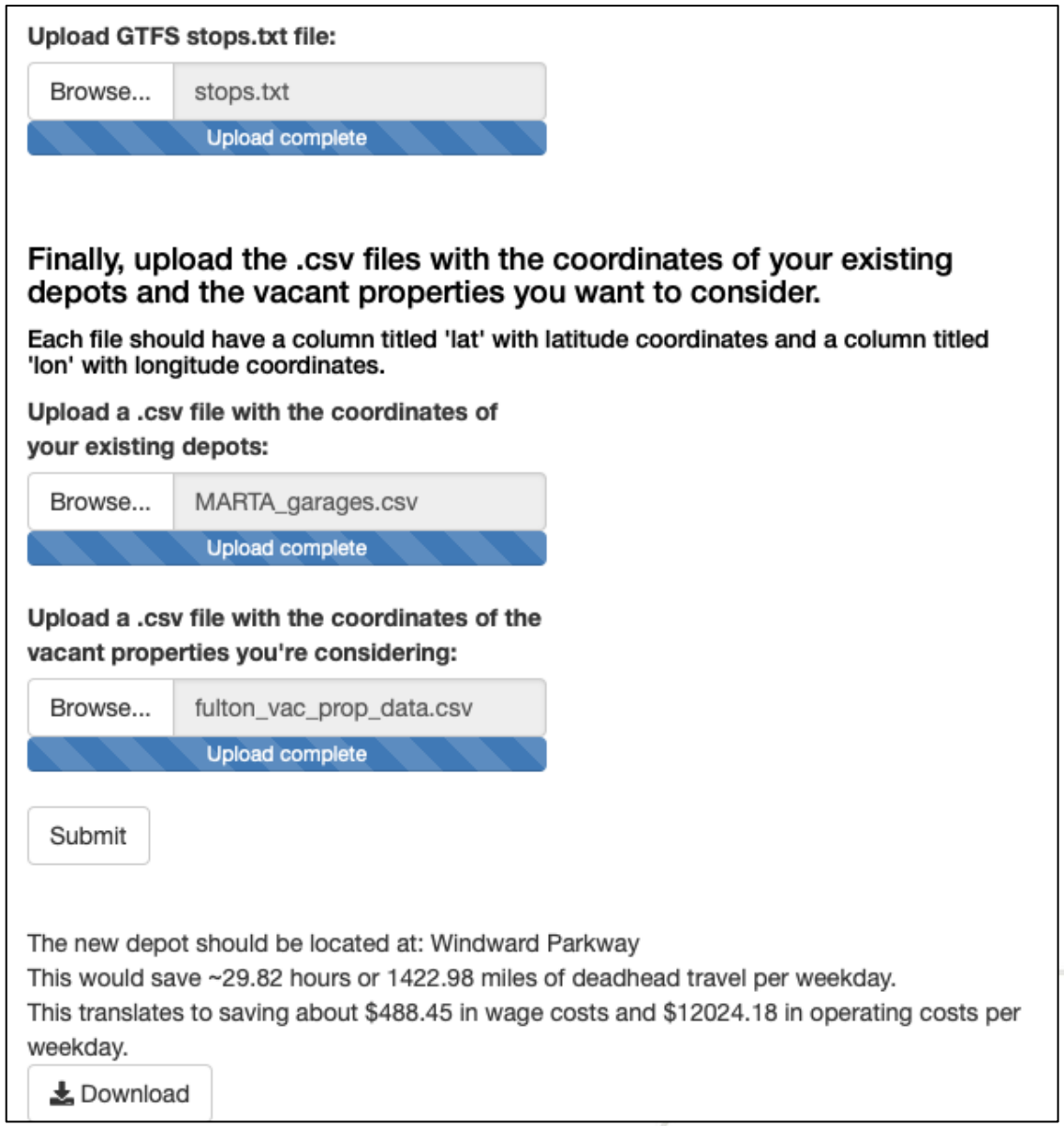
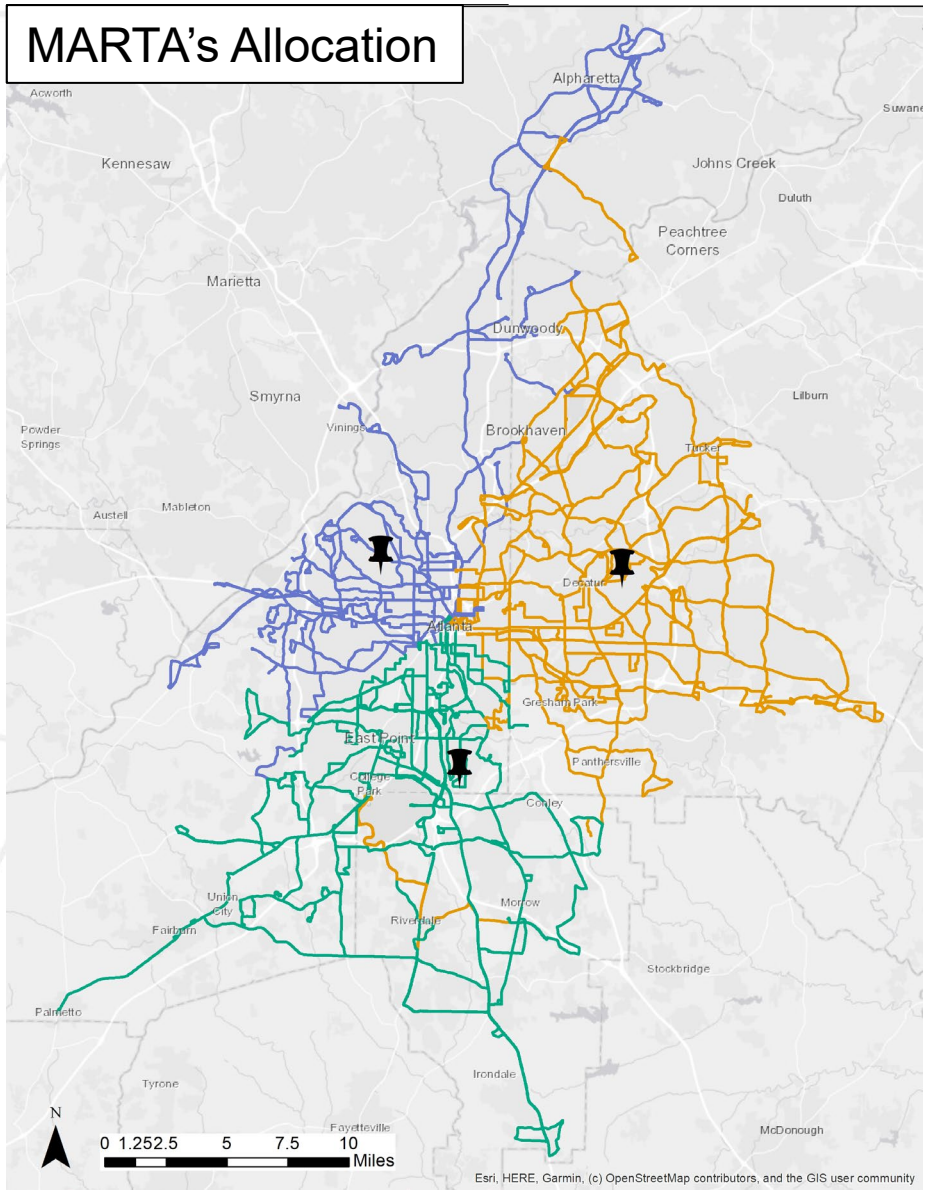
User Interface

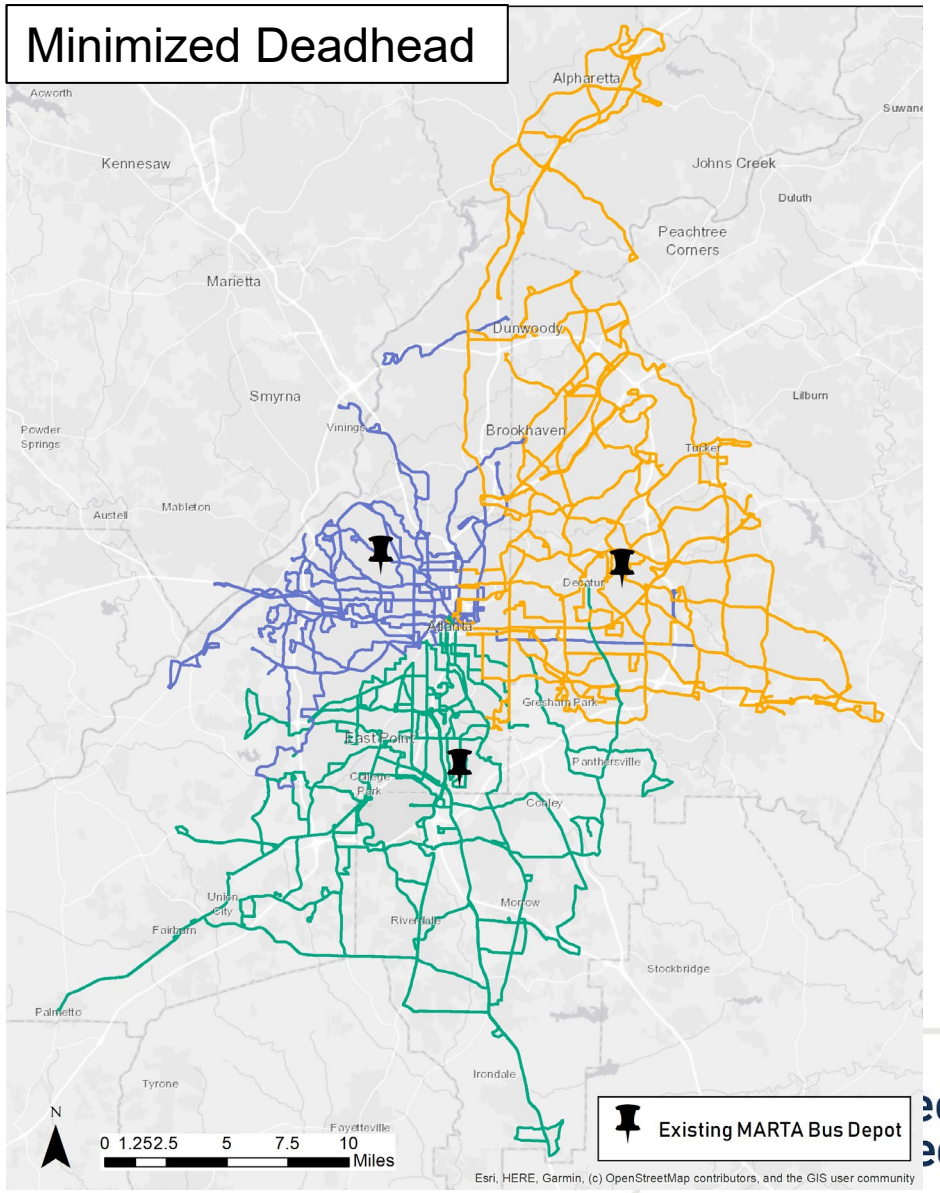


Model Assumptions: Current Depots

MARTA's Allocation

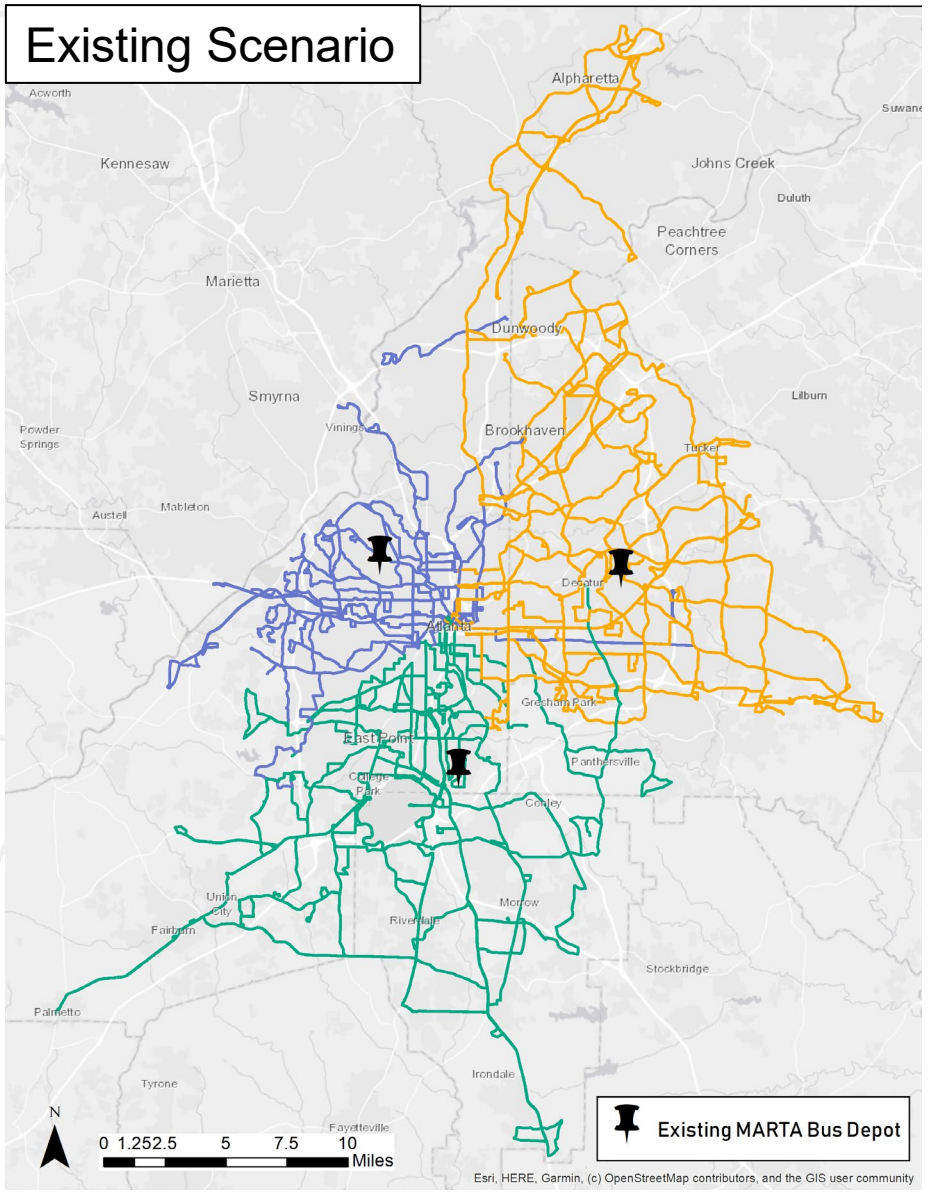


Minimized Deadhead

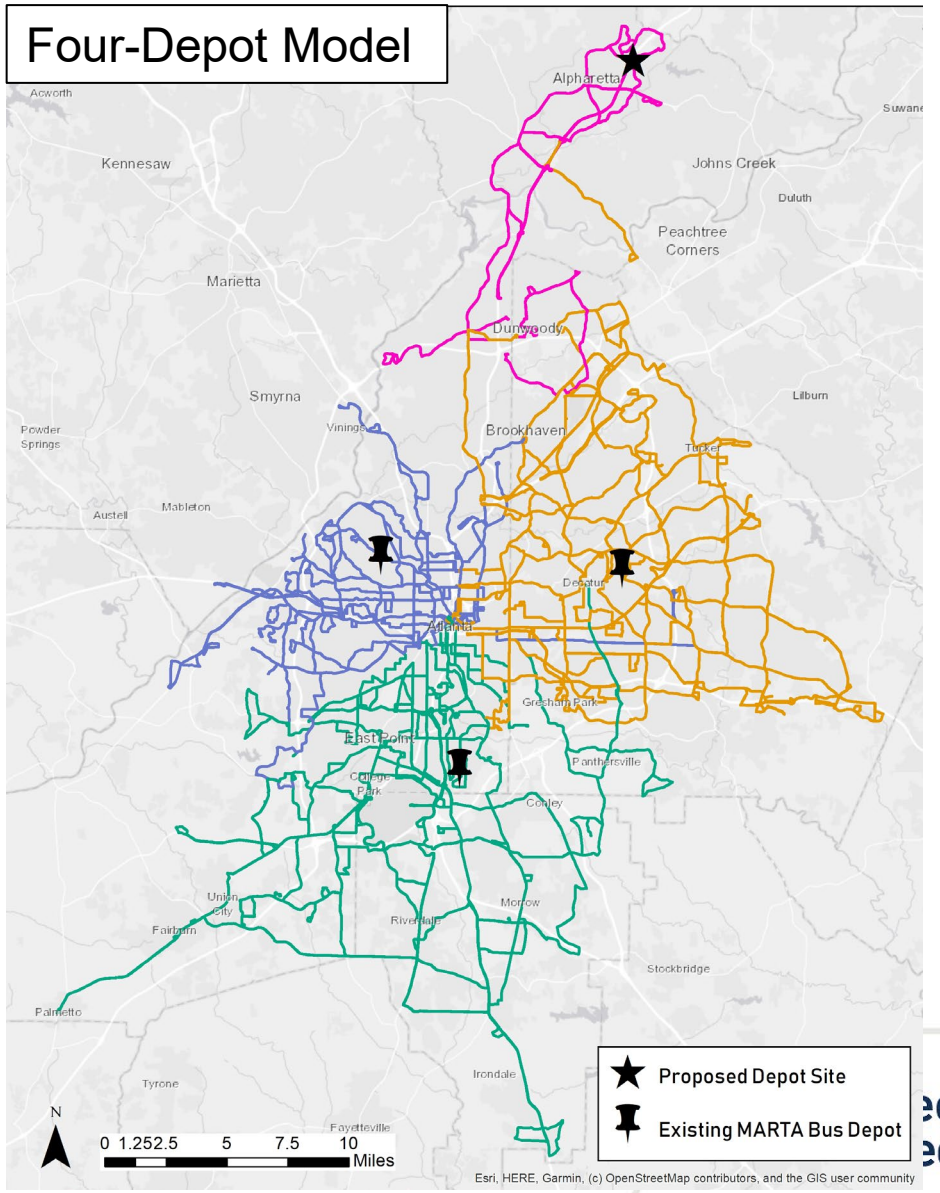


Results

Existing Scenario



Four-Depot Model



Results

Without Residential Roads

- Winward Park & Ride
  - 67 vehicles reassigned
  - 29.74 deadhead hours saved
  - Saves ~$12,000/day based on assumptions

With Residential Roads

- 11343 Alpharetta Hwy
  - 68 vehicles reassigned
  - 29.34 deadhead hours saved
  - Saves ~$12,000/day based on assumptions

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Implications

- Successes:
  - Open-source and adaptable
  - Inputs can be updated over time
  - No coding knowledge required from the user
- Collaboration through GitHub
- Potential for transit agencies
- Potential for researchers

Future work

- Facility vehicle capacity
- Emissions and environmental considerations
- Connect different fuel types and maintenance needs
- Consider battery range and charging station locations
- Turn penalties
- Integrated address geocoding

Photo: Kristain Baty, https://flic.kr/p/hTKGrr

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More information

- Todd, Kara, Freyja Brandel-Tanis, Daniel Arias, and Kari Edison Watkins. “Deadhead Minimization with a Flexible Facility Locator Tool.” Transportation Research Record, (September 2021). https://doi.org/10.1177/03611981211044455.

- https://github.com/karagtodd/depot_locator

- https://freyjabt.me

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