Memo

Lane Transit District (LTD) Pilot Project
Pedestrian Network Analysis – Site Selection Methods

Overview

The Pedestrian Network Analysis (PNA) site selection is a set of analysis methods developed by Jarrett Walker + Associates to identify sites within LTD's service area where future projects to improve pedestrian access to transit could be desirable.

These site selection methods are in large part based on a similar study conducted by TriMet in 2010. Minor modifications have been made based upon the data available in the Eugene/Springfield metro region, and reflecting comments received following a first draft analysis.

Objective

The PNA site selection methods seek to Identify focus areas where pedestrian access infrastructure improvements are likely to most effectively:

- Address the needs of seniors, people with disabilities, the economically disadvantaged, and school children;
- make existing transit customers' walking trips safer, more direct, and comfortable;
- improve pedestrian safety and comfort through design and operations;
- attract new transit and walking trips;
- leverage other public and private investments.

This includes identifying individual transit stops, and groups of nearby stops, where there is good reason to expect high transit demand and/or the pedestrian environment is likely unappealing, uncomfortable, or potentially unsafe.

To that end, each LTD transit stop has been scored using the method described below. We then used the results of this score to identify a list of areas with the highest-scoring stops, and the factors that lead to the specific high scores being encountered.

This list of 31 areas is intended to serve as the basis for a narrowing of 8 study areas for fieldwork in August 2018. The results of this fieldwork may be used to plan future pedestrian infrastructure investments made by LTD or its partners.

Key Tools

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This analysis is intended to be a first step toward more continuous assessment of pedestrian network needs as they relate to LTD's transit network. Therefore, to conduct this analysis in a repeatable and flexible manner, JWA has developed a software package for the R statistical programming language called "ltd.pna", which is used to compute the various scores assigned to stops and geographical areas.

The ltd.pna package is designed to allow the substitution of different inputs for many of the individual thematic components of the analysis, and our hope is that as its development continues, it can be easily re-implemented and updated by LTD if the agency chooses to conduct this type of analysis again in the future.

The ltd.pna package outputs tables reporting the scores assigned to stops across the various evaluation criteria, as well as two master GIS files containing all scores and composite scores for stops and demographic areas. These GIS files can be viewed in GIS and used to produce various maps.

Stop Scores

Each transit stop in LTD's service area was assigned a PNA site selection score based on the criteria outlined below[1].

Transit Demand (18 pts possible)

This category is related to factors that reflect high potential demand for public transit service. This is based on the "Transit Stops" and "Opportunities" categories in TriMet's analysis, with minor adaptations to locally available data.

A – Transit Stops (13 pts possible)

This is based on the proximity of each stop to a range of essential destinations, transfer opportunities, and current transit ridership. In addition to the variables from the TriMet analysis, we added one point for proximity to affordable housing at LTD's request.

- Combined boardings and alightings (top 25% of stops receive 2 pts)

[1] In addition to the categories outlined here, the original TriMet method also featured an area-based score based on total residential+employment density, jobs-housing balance, and street network connectivity. Based on our initial analysis done for the preliminary April draft of this memo, it was clear that this area-based score is not providing significantly more information than the stop-based scores in terms of identifying priority areas for pedestrian infrastructure investment. As a result, we have replaced that area-based analysis with a comparison of the location of high-scoring (i.e. presumably higher-demand and more deficient) stops with the locations of disadvantaged populations, as explained in the "Mapping Stop Scores" section below.

- Distance to nearest high school (25% of stops nearest to high schools receive 1 pt)
- Distance to nearest full-service grocery store (25% of stops nearest to grocery stores receive 1 pt)
- Distance to nearest preschool, middle, or elementary school (25% of stops nearest to schools receive 1 pt)
- Distance to nearest major attraction (e.g. university, hospital, stadium, major employer) (25% of stops nearest to attractors receive 1 pt)
- Distance to nearest multi-modal facility (25% of stops nearest to facilities receive 1 pt)
- Distance to nearest park (25% of stops nearest to parks receive 1 pt)
- Number of connecting transit lines (stops within 300 ft of two or more connecting transit services receive 2 pts)
- Distance to nearest affordable housing (25% of stops nearest to an affordable housing site receive 1 pt)
- Distance to nearest social service site (25% of stops nearest to services receive 1 pt)
- Distance to nearest senior housing site (25% of stops nearest to senior housing facilities receive 1 pt)

B – Opportunities (5 pts possible)

This is based on the notion that public transit should seek to serve areas where prior or ongoing investments have been made. In this case, the criteria reflect either significant demand by mobility-challenged populations (which suggests high ongoing costs of ADA paratransit), or prior investments in bus stops.

- High paratransit activity (top 25% of stops nearest to address w/ > 500 RideSource requests receive 2 pts)
- Vehicle ramp deployments (top 25% of stops receive 1 pt)
- Recent bus stop improvements (stops with at least one of the following amenities were assigned a score: bench, shelter, Simme_seat, or lighting receive 2 pts)

Infrastructure Deficiencies (8 pts possible)

This category is reflected to factors that make approaching or using a transit stop on foot unattractive, uncomfortable, or potentially unsafe. There are two key differences with TriMet's analysis in this category. First, we have added a criterion for the presence of a signalized crossing within 250 feet of the transit stop. Secondly, due to a lack of immediately available data, we used the functional classification of streets as a proxy for traffic volumes.

- Distance to a street without sidewalks (all stops without a sidewalk within a 50 ft radius receive 2 pts)
- Located on or very near a street with high traffic volumes (all stops located within 200ft of a street classified as a "major arterial" receive 1 pt)
- Located on a street with high posted speeds (all stops located within 200ft of a road segment with posted speed limit above 35 mph receive 2 pts)
- Located near a pedestrian crash site (all stops within 500 ft of a pedestrian crash from 2007-2016 receive 2 pts)
- Located more than 250 feet from a signalized crossing (all stops located more than 250 ft from any type of signal – full, half, HAWK, or rapid-flashing beacon – receive 1 pt)

Full Composite Score (24 pts possible)

The full quantitative analysis sums each of the above stop composite scores. The maximum score recorded for any stop in the current iteration of the analysis was 20. Of the two stops that has a composite score of 20, one was located at the downtown Eugene transit center. The other was the southbound stop along Coburg Rd. just north of Cal Young Rd., in front of the Sheldon Plaza shopping center.

Mapping Stop Scores

Highest-Scoring Stops and Heatmaps

The results of this analysis are shown in the maps on the following pages, respectively showing:

- Transit stops with an infrastructure deficiency higher than 5 (out of 8, i.e. 72 stops or 6% of all stops).
- Transit stops with a demand-based score higher than 9 (out of 18, i.e. 120 stops or 10% of all stops)
- Transit stops with a combined score higher than 13 (out of 25, i.e. 63 stops or 5% of all stops).

Each map also shows a "heat" layer that shows where multiple relatively high-scoring stops are located near each other. Note, however, that the "heat" is provided mostly for context; in some cases, an area may receive a high score just because many stops are located within a short distance of each other, even if none of the stops are particularly deficient[2].

[2] Note also that we excluded bays located at Eugene Station and Springfield Station from this analysis. Despite the fact that these may be the most improved stops in the network, and that they are located in the areas with the most pedestrian improvements in the region, these were receiving high scores for a variety of reasons that do not apply elsewhere, e.g.: very high score on the demand-based indicators due to central location, high number of nearby pedestrian crashes due to high pedestrian volume in central locations, off-street stops in the middle of the station being located more than 250 feet from a signal etc.

High-Scoring Stops vs. Equity Demographics

We have also mapped the highest scoring stops against key demographics measures of social disadvantage from the Choices Report including:

- Density of Households in Poverty
- Density of Households with Zero Vehicles
- Density of Minority Households
- Density of Seniors

Listing Priority Areas

Criteria for Distinguishing Priority Areas

Having calculated the PNA site selection score for all 1200+ LTD transit stops, we used this to create a list of over 30 priority areas for fieldwork. To achieve this, we did the following:

- Sorted stops by the composite score, selecting only those with scores of 14 and above.
- Researched the location of this list of stops, and assigned them areas, to the extent that many high-scoring stops are clustered very near each other.
    - In this stage, we excluded any stops that had infrastructure deficiency scores of 3 or lower, as these tended to reflect locations with high demand in central areas that have generally good infrastructure.
- Numbered the designated areas according to the highest score in each cluster.
    - For example, many stops received high scores on Coburg Road near Cal Young Road. These were all grouped in the "Coburg Road" area, which was designated priority area no. 1 because one of these stops has the highest score of all (21).
- Completed the list by sorting stops by the infrastructure deficiency score only, selecting stops with infrastructure deficiency scores of 7 and 8, and any remaining stops with an infrastructure deficiency of 6, where the transit demand score was at least 5.

Outside the Metro Area

The vast majority of high-scoring stops in this analysis are located in the Eugene/Springfield metro area. However, several outlying communities make the list, including:

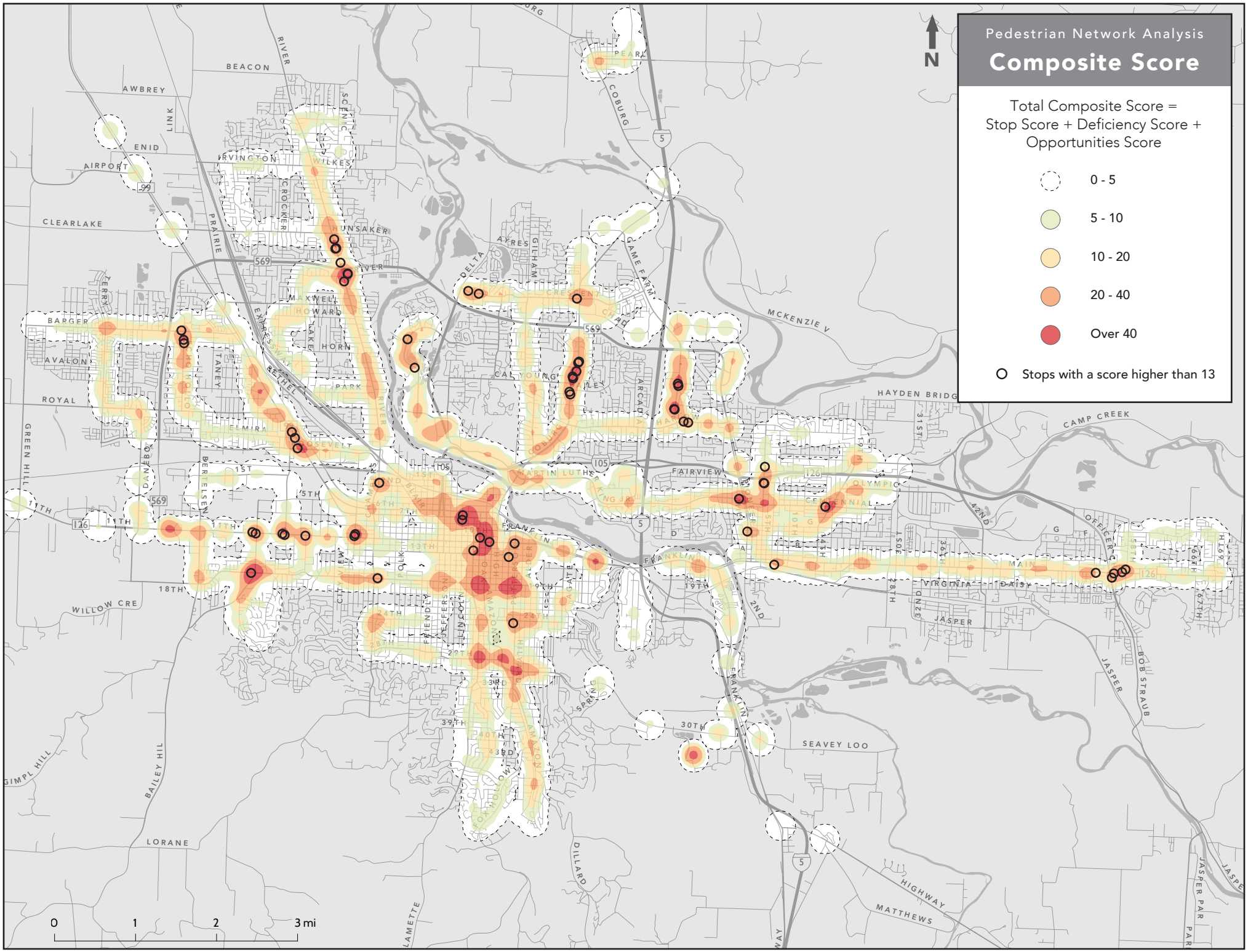
- No. 17: Lowell, where bus stop 09011 (Moss St & Shore Dr) has a composite score of 15.
- No. 18: Junction City, where bus stop 09008 (W 8th Ave & Holly Ln) has a composite score of 14.
- No. 21: Cottage Grove, where stops 09801 (Hwy 99 & Geer Ave) and 09803 (N 9th St & Gibbs Ave) have infrastructure deficiency scores of 8 and five other stops have infrastructure scores of 6 and 7.
- No. 24: Veneta, where bus stop 09002 (Territorial Hwy & Jack Kelly Dr) had an infrastructure deficiency score of 7.

In the cases of Cottage Grove and Veneta, whose presence on the list depends entirely on the infrastructure deficiency score, it is worth noting that infrastructure deficiency scores outside the metro area are not comparable to score inside the metro area.

This is due to a lack of data on sidewalks and signalized crossings in the analysis. As a result, the infrastructure deficiency score for almost all bus stops in outlying communities automatically includes 2 points for "no sidewalks" and 1 point for "no signalized crossings"[3]. As a result, without further validation, scores of 7 or 8 could be equivalent to a 4 or 5 in the metro area. For the stops concerned:

- Cottage Grove, 09801, Hwy 99 & Geer Ave: sidewalks present, but nearest protected crossing is over 800 feet away, i.e. "real" infrastructure deficiency score of 6.
- Cottage Grove, 09803, N 9th St & Gibbs Ave: sidewalks present and protected crossing within 500 feet, i.e. "real" infrastructure deficiency score of 5.
- Veneta, 09002, Territorial Hwy & Jack Kelly Dr: sidewalks present, protected crossing just under 500 feet away, i.e. "real" infrastructure deficiency score of 4. However, the most logically desirable crossing (directly across Territorial Highway to a shopping center on Luther Lane) is unprotected.

[3] The only exception is Creswell, where we did have sidewalk data but did not have crossings.



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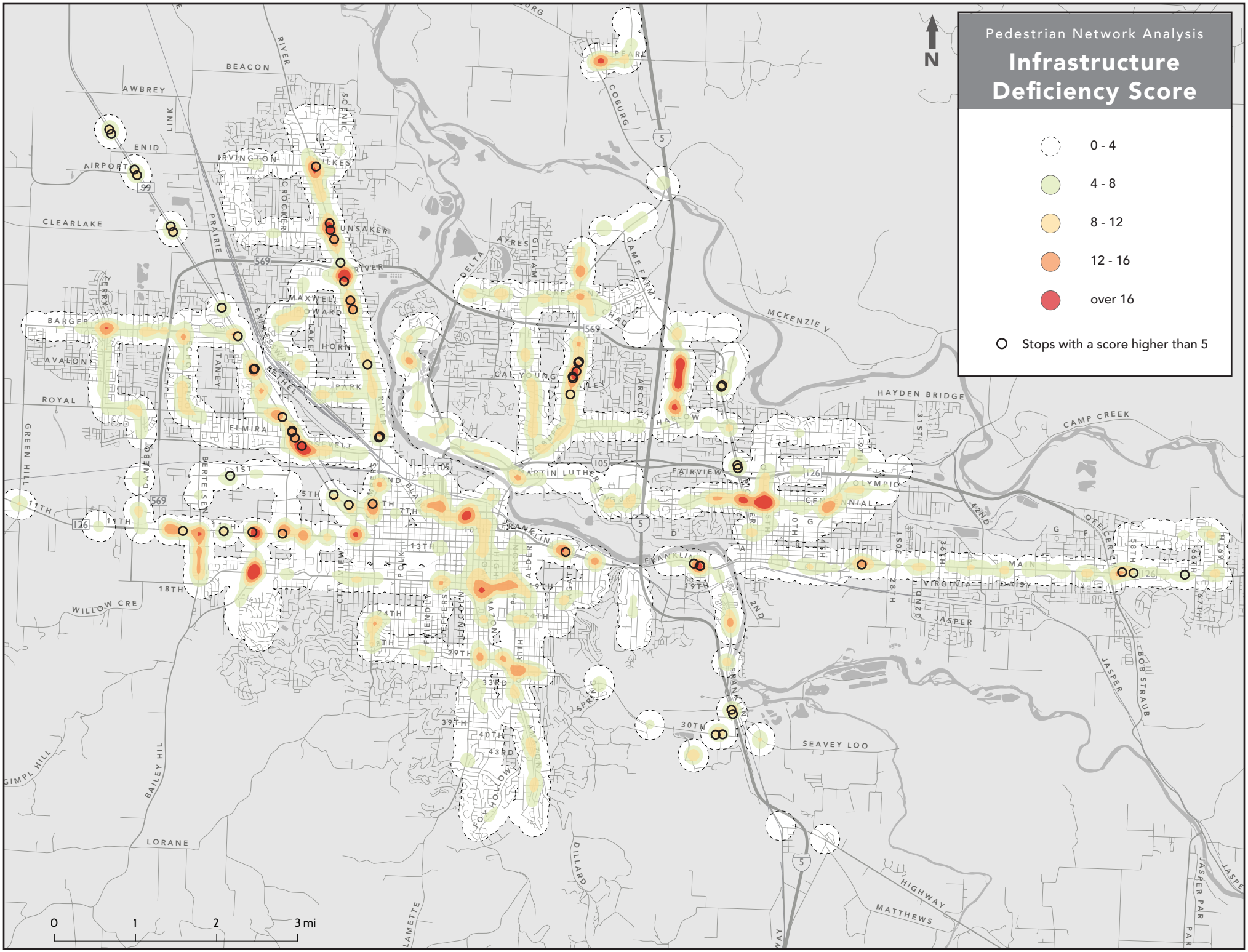

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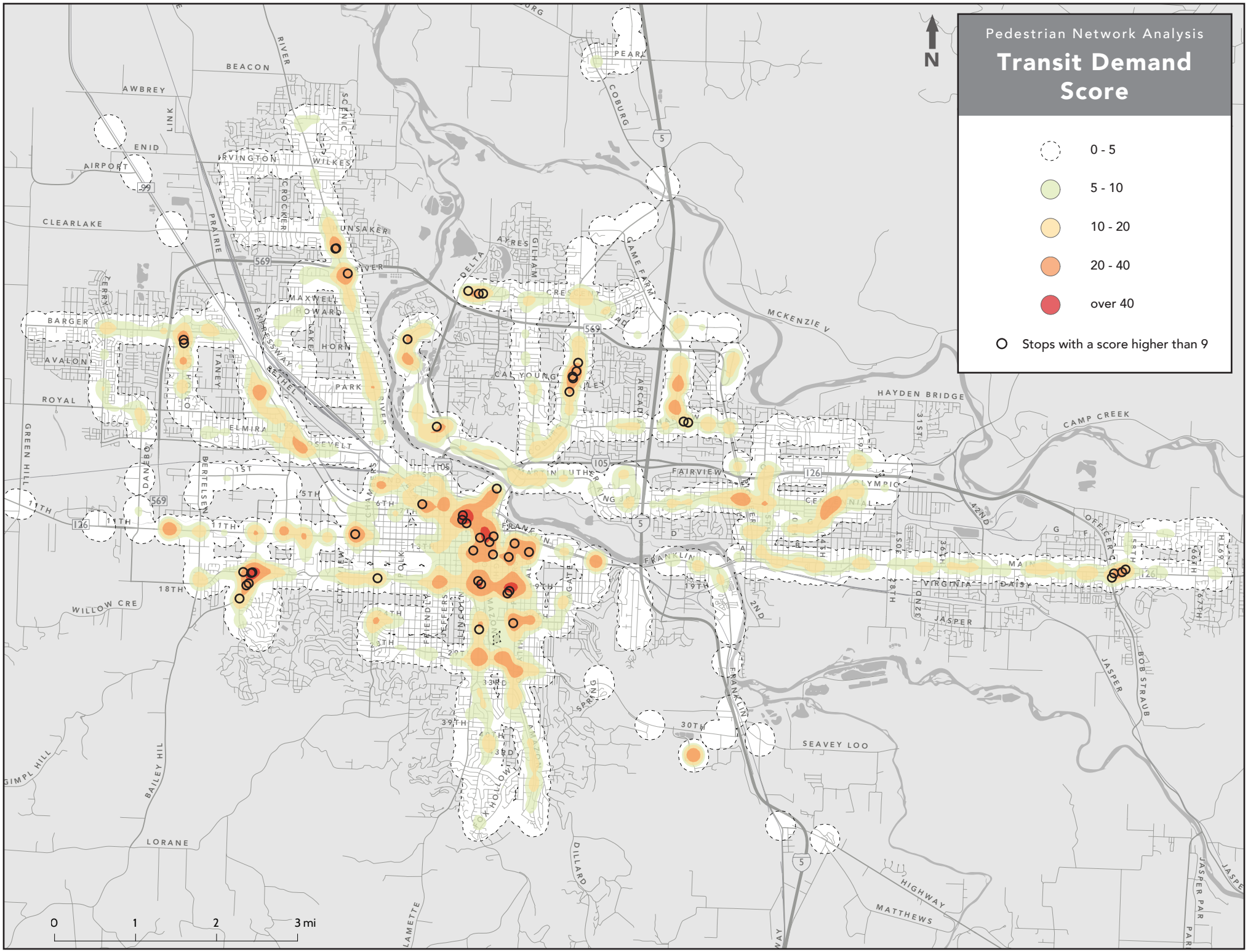

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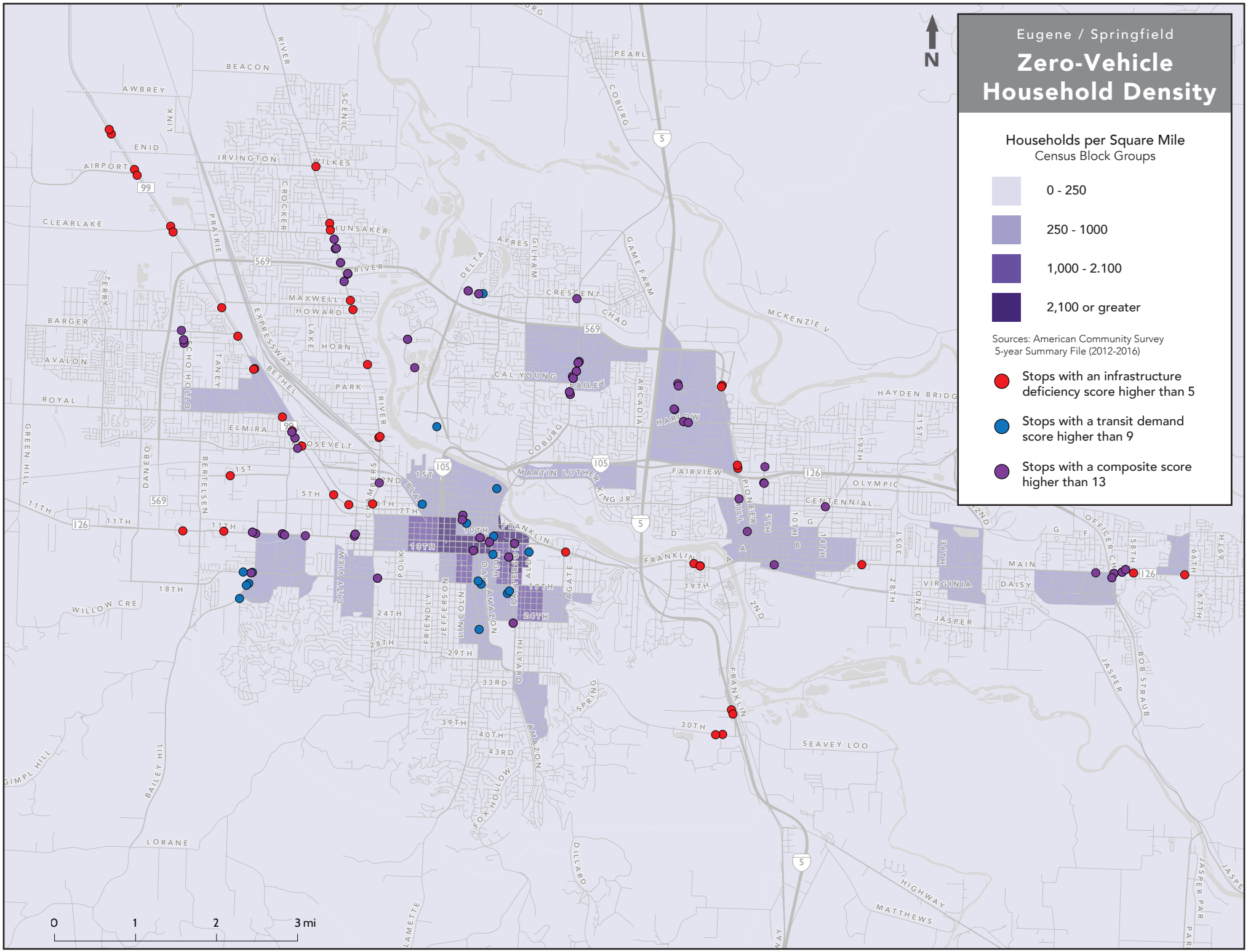

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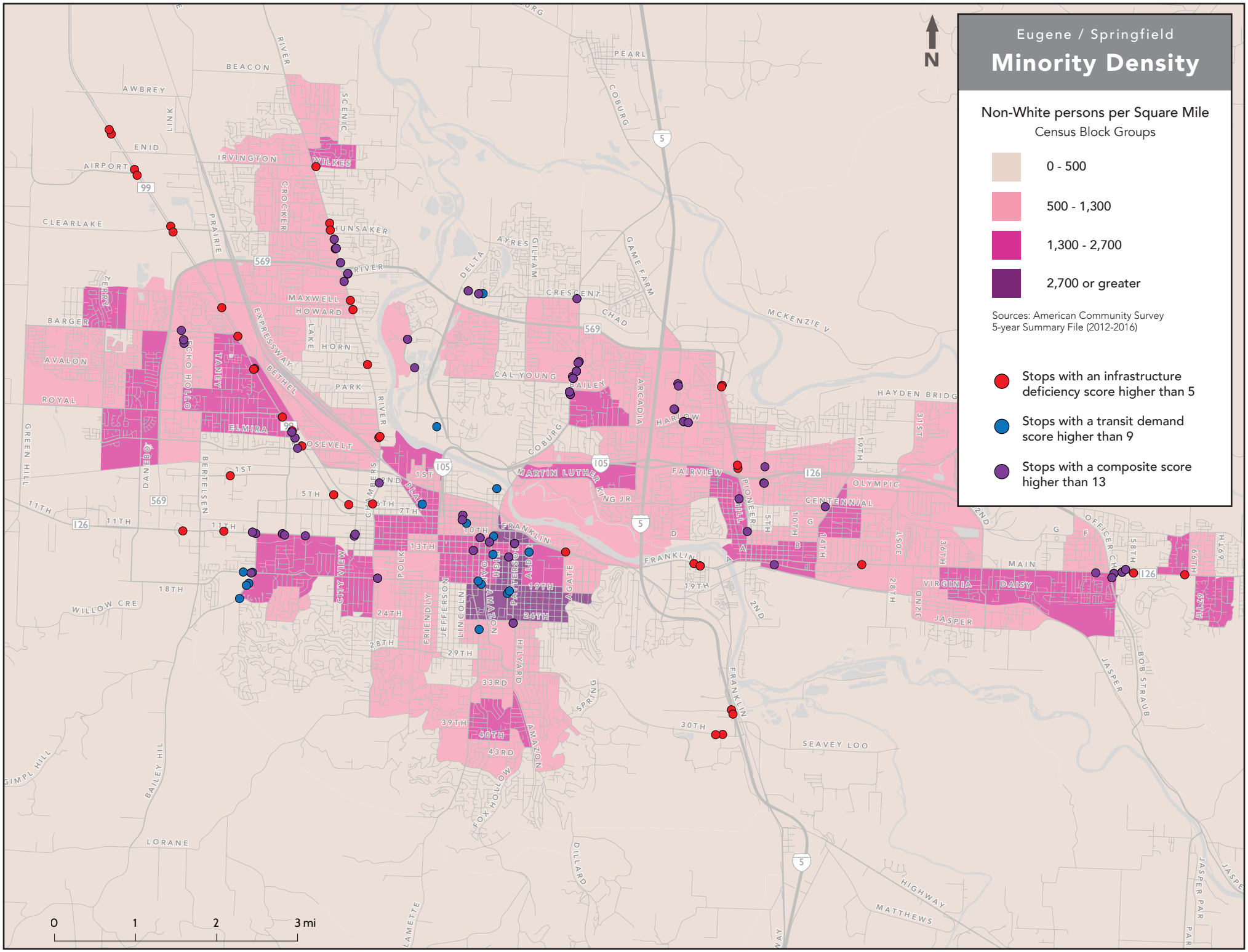

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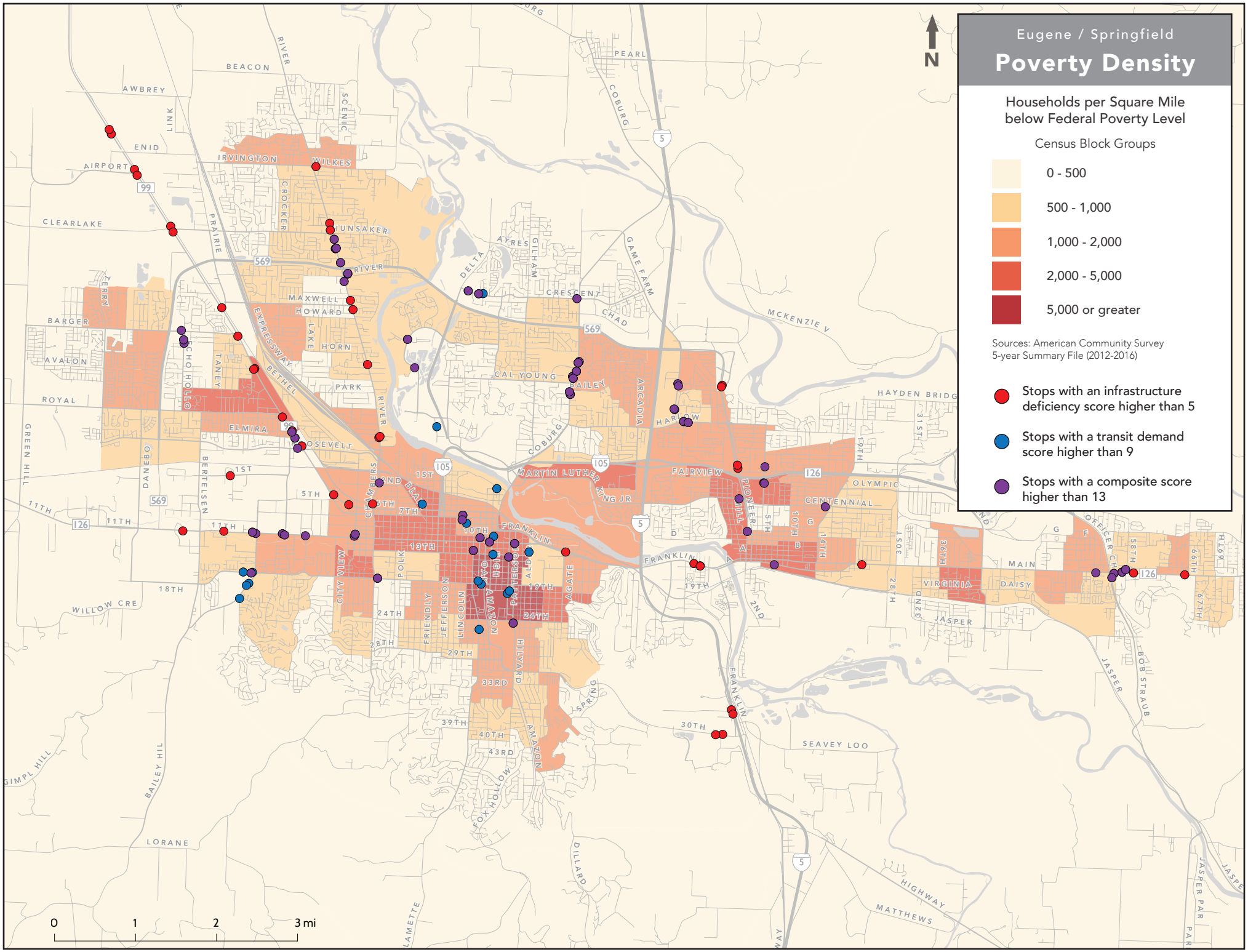

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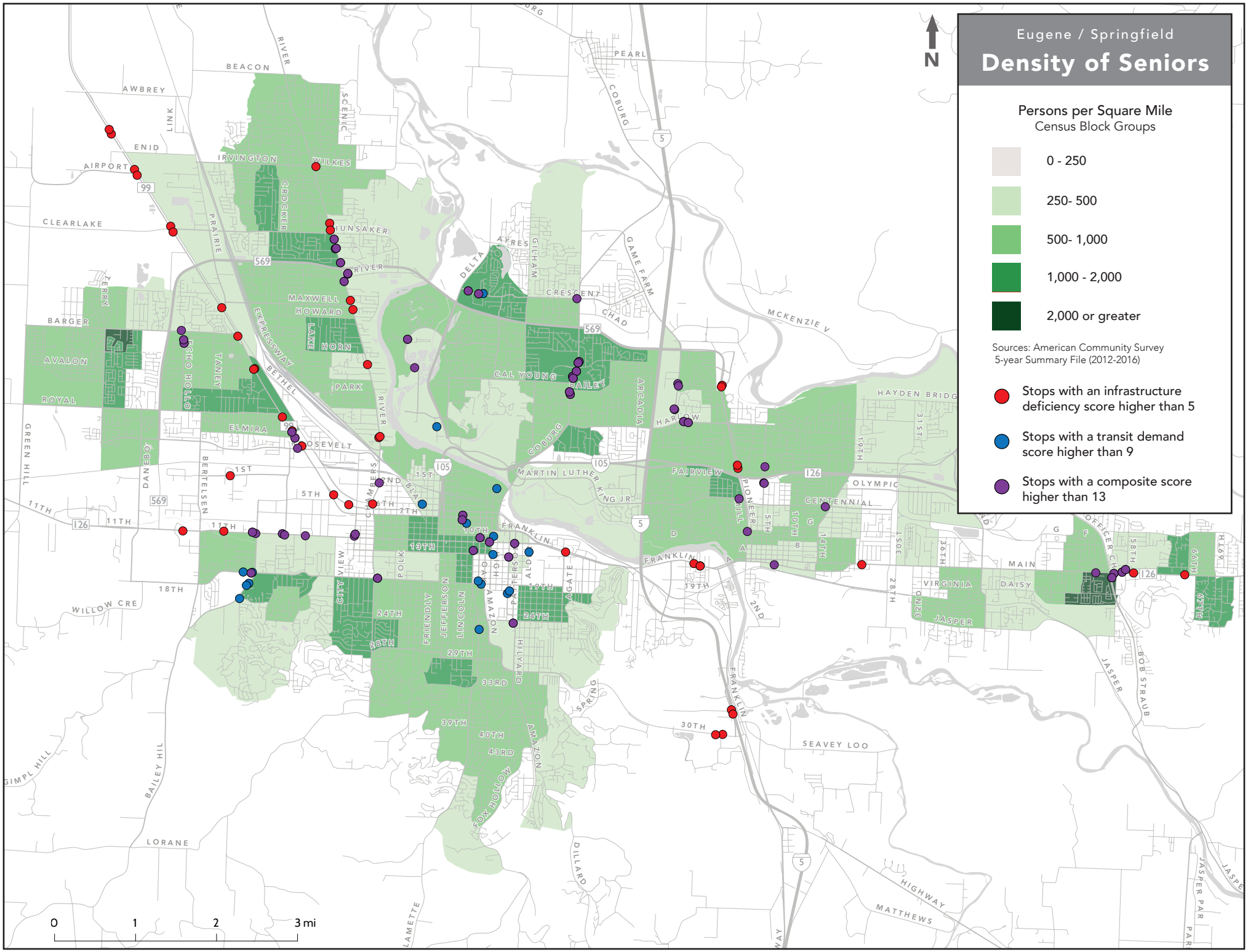
Eugene / Springfield
Density of Seniors
N
Persons per Square Mile
Census Block Groups
0 - 250
250- 500
500- 1,000
1,000 - 2,000
2,000 or greater
Sources: American Community Survey
5-year Summary File (2012-2016)
Stops with an infrastructure deficiency score higher than 5
Stops with a transit demand score higher than 9
Stops with a composite score higher than 13
0
1
2
3 mi
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