

TRANSIT ROUTE [IN]EFFICIENCY IN CHICAGO AND NEW YORK CITY

Mehak Sachdeva (MS4978) | Anjali Singhvi (AS4771) | Michael Phillips (MAP2254)

NEED FOR PROJECT

As wealth gaps increase in American Cities certain lower income populations in cities will grow more vulnerable if their transportation needs are not met. We can use GIS to spatially research where the highly dense areas are that may be currently underserved by existing Subway infrastructure in cities. By identifying which residential and business zones in cities are accessible and which are being adequately served in their transportation needs, we can better indentify patterns of where to target permanent transportation infrastructure development in the future.

RESEARCH QUESTION

Are the subway networks of New York City and Chicago are equally efficient and accessible?



NEW YORK

A map of New York City's five boroughs (Manhattan, Brooklyn, Bronx, Queens, and Richmond) with a dark gray background. The city boundaries are outlined in black, and the intricate subway network is depicted in a dense web of black lines.

CHICAGO

A map of Chicago's four main city limits (Chicago, Skokie, Northbrook, and Glenview) with a dark gray background. The city boundaries are outlined in black, and the subway network is shown as a network of black lines.

SCOPE OF NETWORK ANALYSIS



NEW YORK



INCOME



RENT



CHICAGO

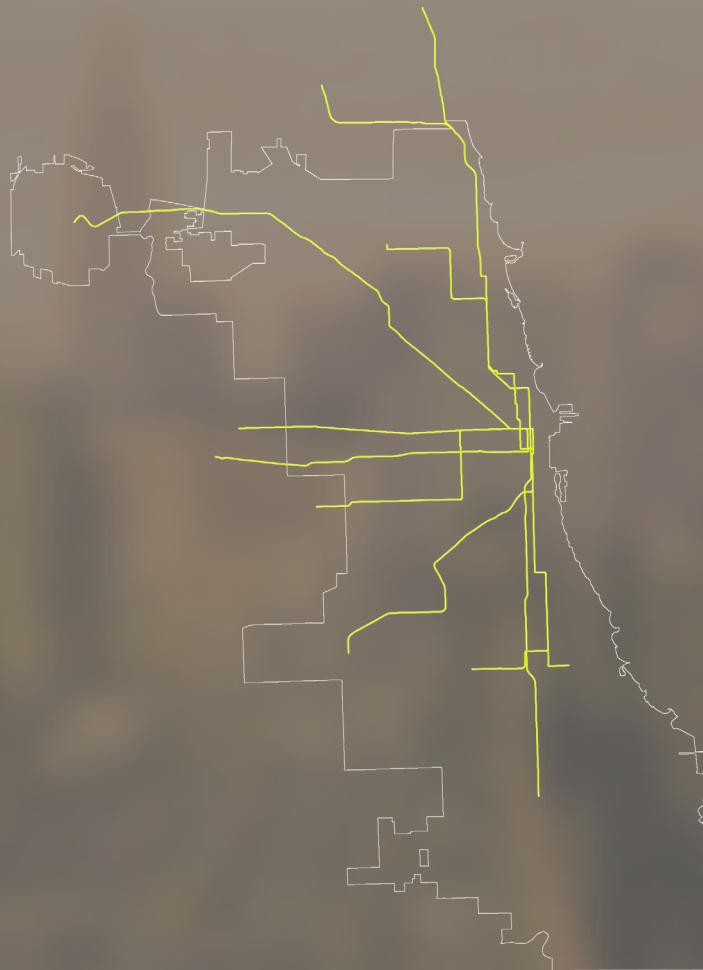


LAND USE

NULL HYPOTHESIS

SUBWAY NETWORKS
OF NEW YORK
AND CHICAGO
ARE EQUALLY ACCESSIBLE
AND NO DISCRIMINATION IN SERVICE BASED ON RENT, INCOME & LAND USE

EXISTING SUBWAY INFRASTRUCTURE



2.7 MILLION

| 2,750 PEOPLE PER
SQUARE MILE

POPULATION

MILES² / MILES²

DENSITY



8.4 MILLION

| 26,403 PEOPLE PER
SQUARE MILE



NEW YORK



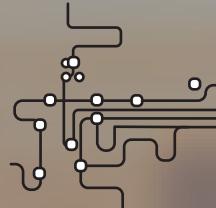
NUMBER OF
SUBWAY STATIONS
IN CITY

468



MILES OF TRACK FOR
PASSENGER SERVICE

660



NUMBER OF
SUBWAY LINES

34



SUBWAY
SERVICE HOURS

24/7



FARE PRICE

\$2.75



PASSENGERS PER
WEEK DAY

5.6M
MILLION



CHICAGO

146

102

8

24/7

\$2.25

¢75 for students

.72M
MILLION

METHODOLOGY

NORMALIZE

GET STUDY TRACTS

CENTROIDS

SERVICE AREA 1

ORIGINS AND DESTINATIONS SUBWAY STOPS

MULTI-MODAL NETWORK

SERVICE AREA 2

AREA 2 BEST ROUTE

HOT SPOT ANALYSIS

CONCLUSIONS

Normalizing population with Land area in high residential land-use zones

NEW YORK: Hot spot analysis for high commerce/business pluto data joined to census tract data

CHICAGO: Merging existing industrial corridor data with central business district data. Joining it again to census tract data

Centroids for high-density residential and commercial census tracts as origins and destination, respectively.

Network Analysis: For areas serviced in a 10 minute accessibility zone of the origins and destination

DISTANCES:

NEW YORK: 2625 feet (10 minutes) from the initial origin-destination points

CHICAGO: 1584 feet (5 minutes) from the initial origin-destination points

NEW YORK: Dataset caters to the 21 different subway lines in the city and defining Station-junctions for 21 connectivity groups

CHICAGO: Dataset caters to the 8 different subway lines in the city and defining Station-junctions for 9 connectivity groups

NEW YORK: Service Area around origin subway points for 30 min accessible buffers

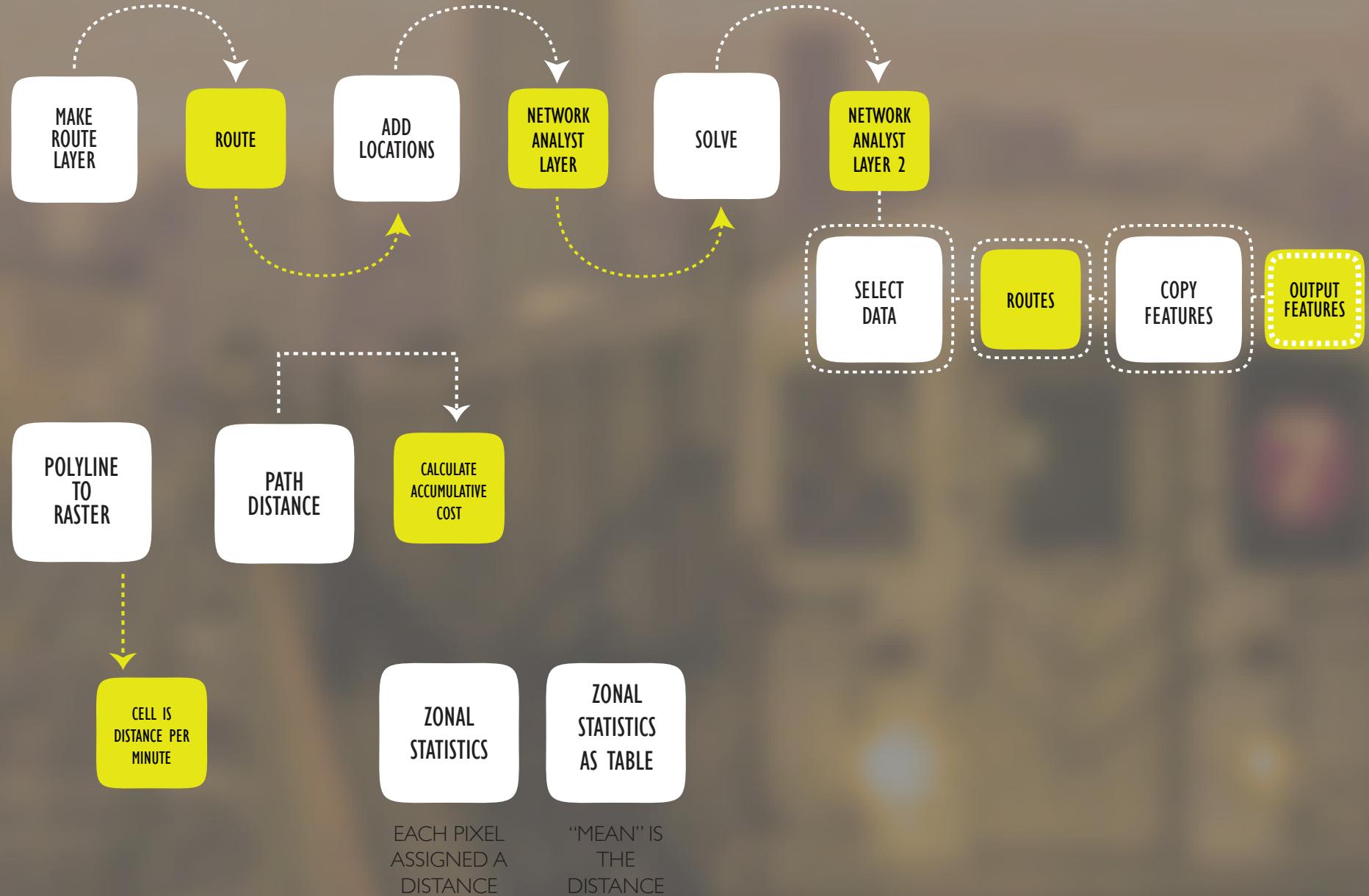
CHICAGO: Service Area around origin subway points for 15 min accessible buffers

Finding best route using network dataset for longest distance covered in 30 minutes for New York and 15 minutes for Chicago

The underserved Residential neighborhoods queried thus are studied for median income of census tracts and race distribution through census tract using hot-spot analysis to understand more about the underserved census tracts.

Drawing conclusions and comparative analysis between both cities

POTENTIALS OF MODELING FOR COST ANALYSIS



FINDING EMPLOYMENT ZONES IN NEW YORK

HOT-SPOT ANALYSIS TO ANALYSE MAJOR EMPLOYMENT ZONES

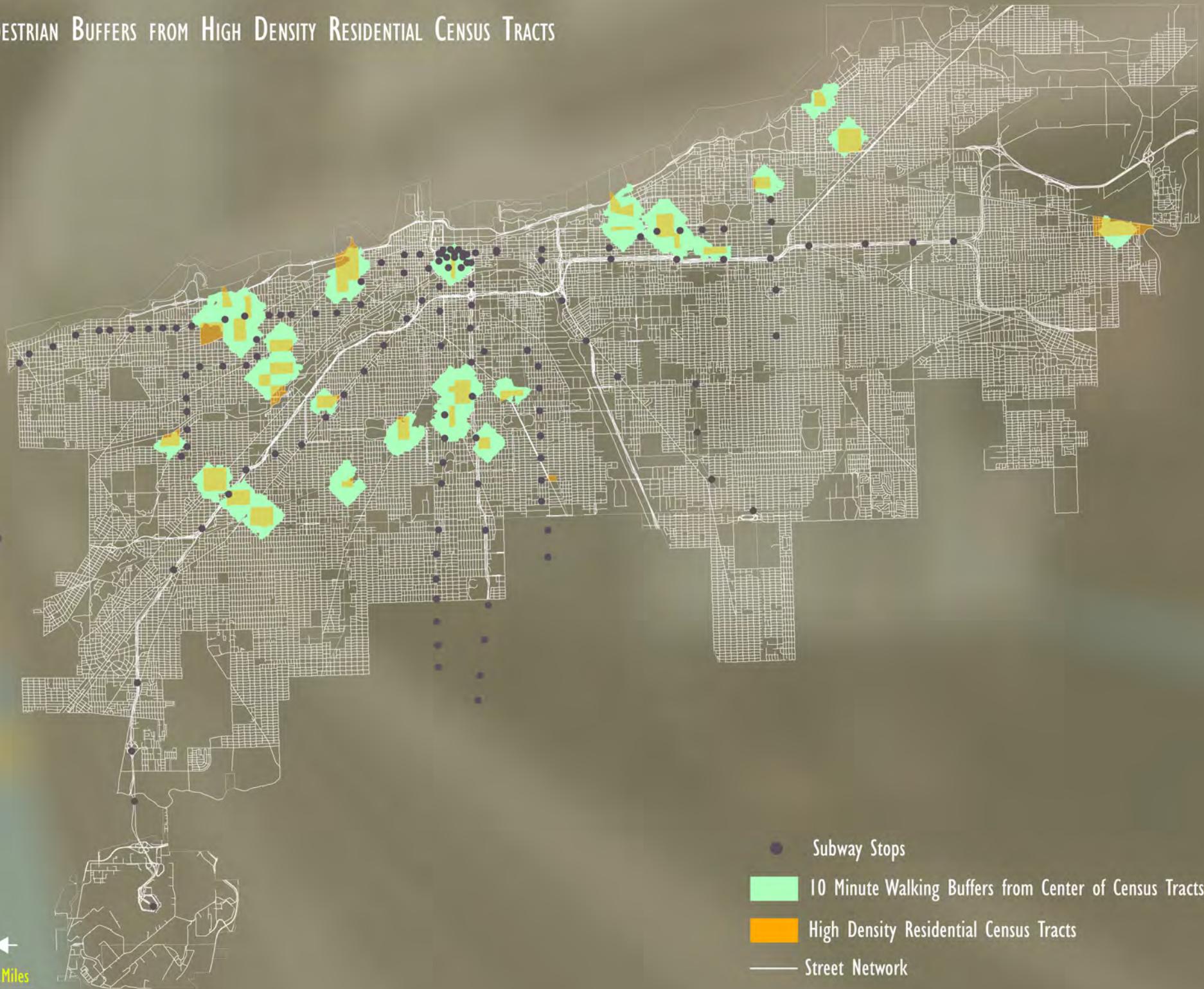


WHAT CAN PEDESTRIANS REACH IN 10 MINS
FROM HIGHLY RESIDENTIAL AREAS

10 MINUTE PEDESTRIAN BUFFERS FROM HIGH DENSITY RESIDENTIAL CENSUS TRACTS



10 MINUTE PEDESTRIAN BUFFERS FROM HIGH DENSITY RESIDENTIAL CENSUS TRACTS

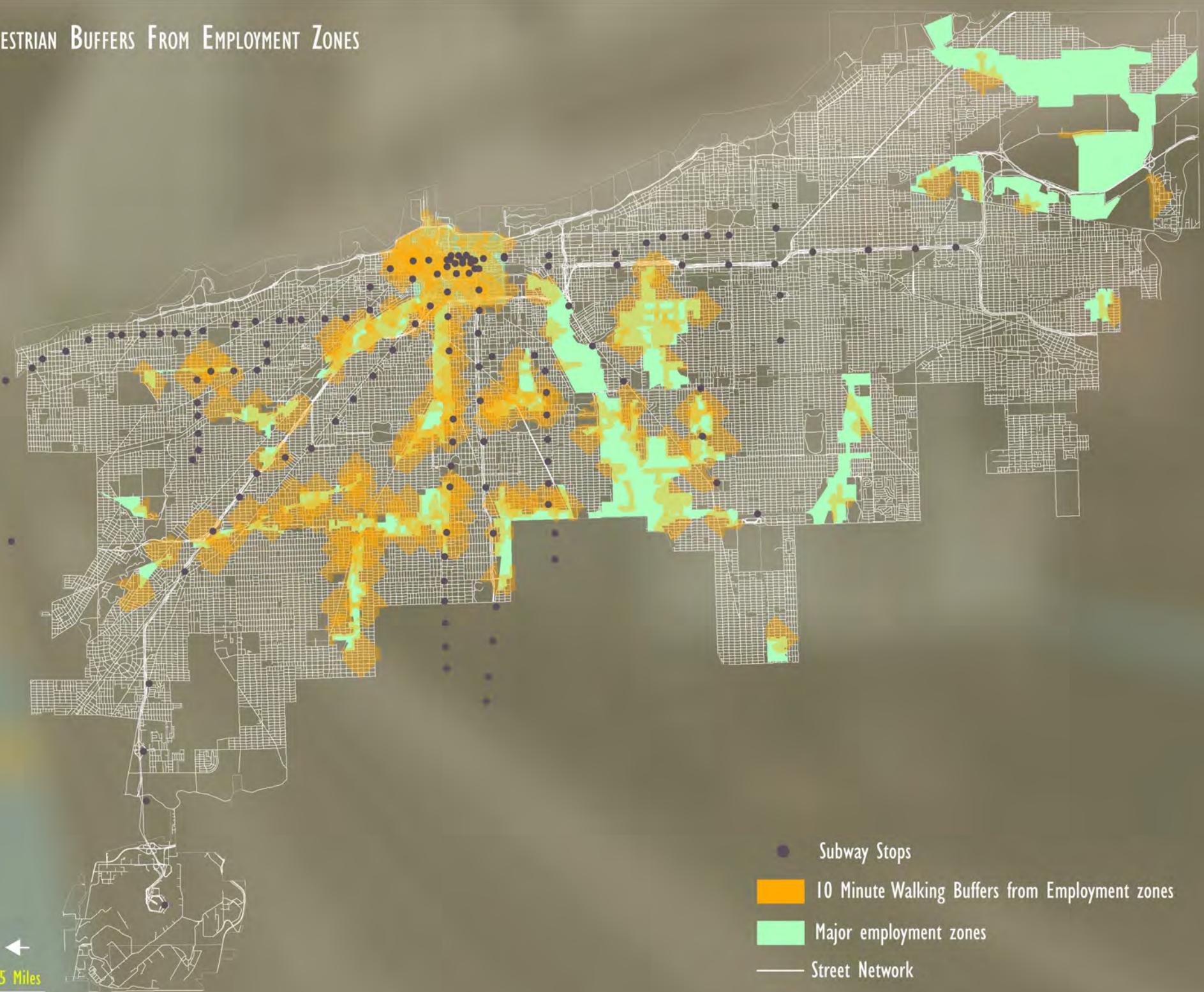


WHAT CAN PEDESTRIANS REACH IN 10 MINS
FROM BUSINESS & COMMERCIAL AREAS

10 MINUTE PEDESTRIAN BUFFERS FROM HIGH DENSITY COMMERCIAL/BUSINESS CENSUS TRACTS



10 MINUTE PEDESTRIAN BUFFERS FROM EMPLOYMENT ZONES



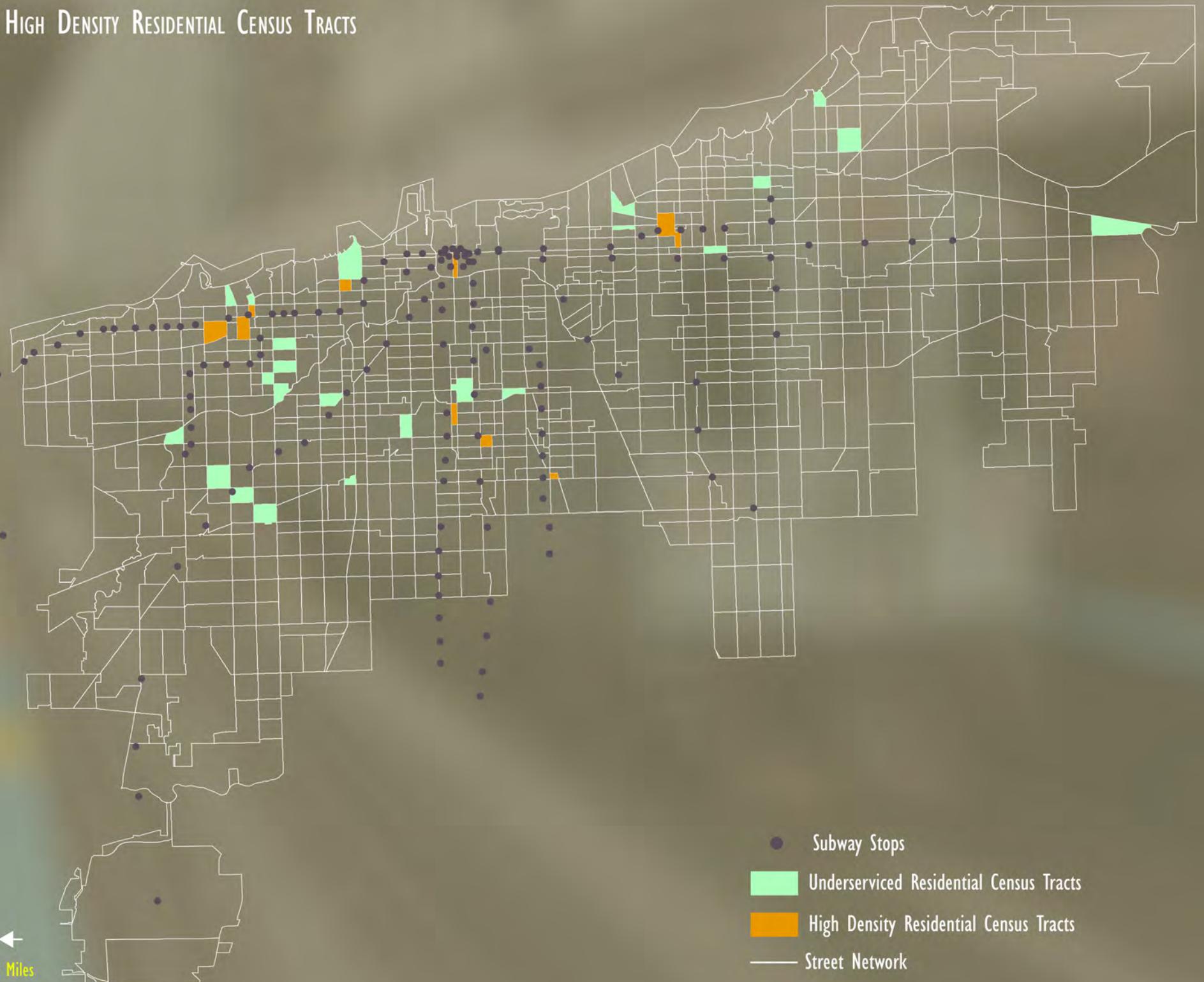
WHICH HIGHLY RESIDENTIAL AREAS
ARE UNDERSERVED?

UNDER-SERVED RESIDENTIAL CENSUS TRACTS



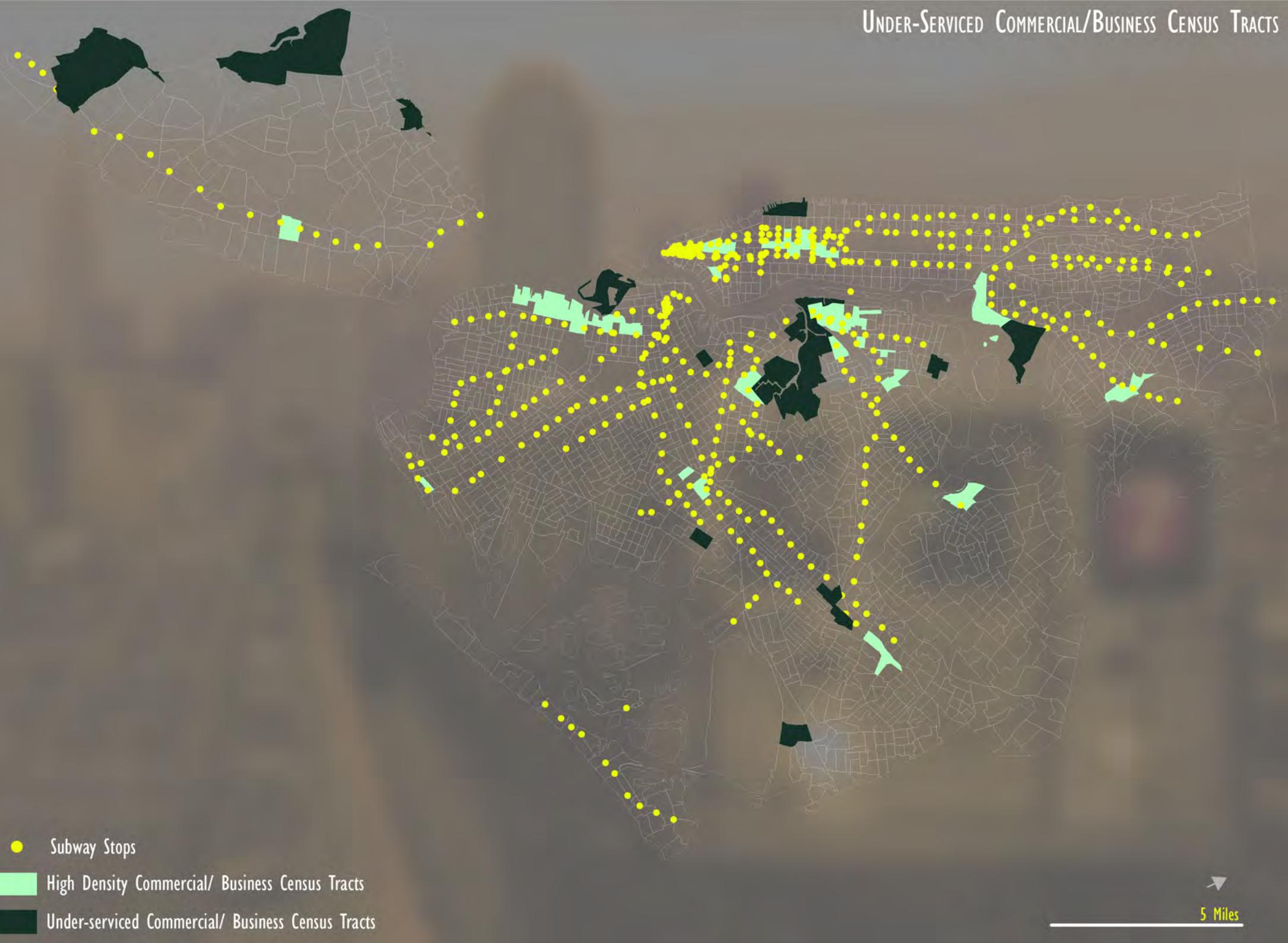
5 Miles

UNDERSERVED AND HIGH DENSITY RESIDENTIAL CENSUS TRACTS

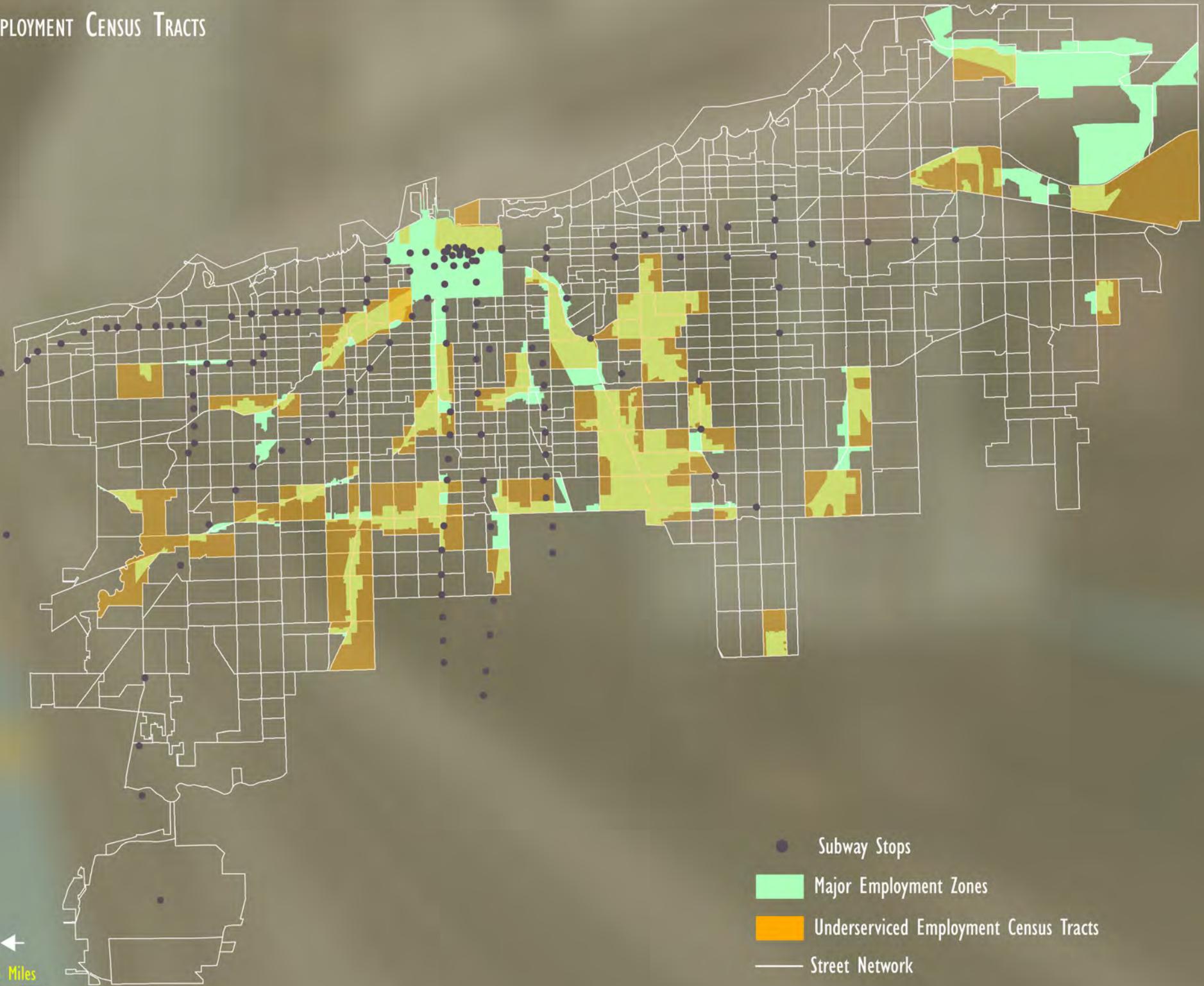


WHICH HIGHLY COMMERCIAL AREAS
ARE UNDERSERVED?

UNDER-SERVED COMMERCIAL/BUSINESS CENSUS TRACTS



UNDERSERVED EMPLOYMENT CENSUS TRACTS

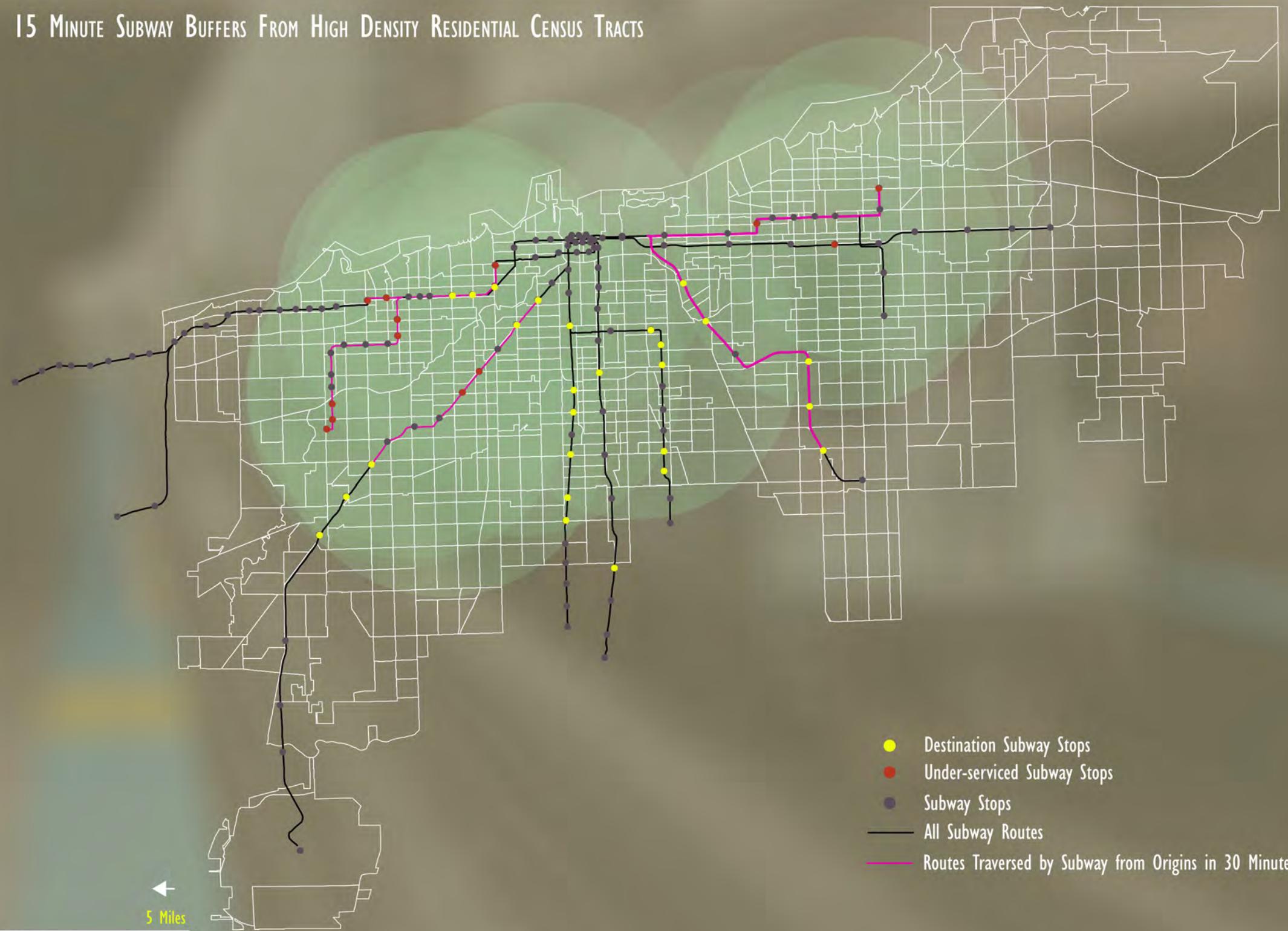


SUBWAY BUFFERS FROM HIGHLY RESIDENTIAL AREAS

30 MINUTE SUBWAY BUFFERS FROM HIGH DENSITY RESIDENTIAL CENSUS TRACTS

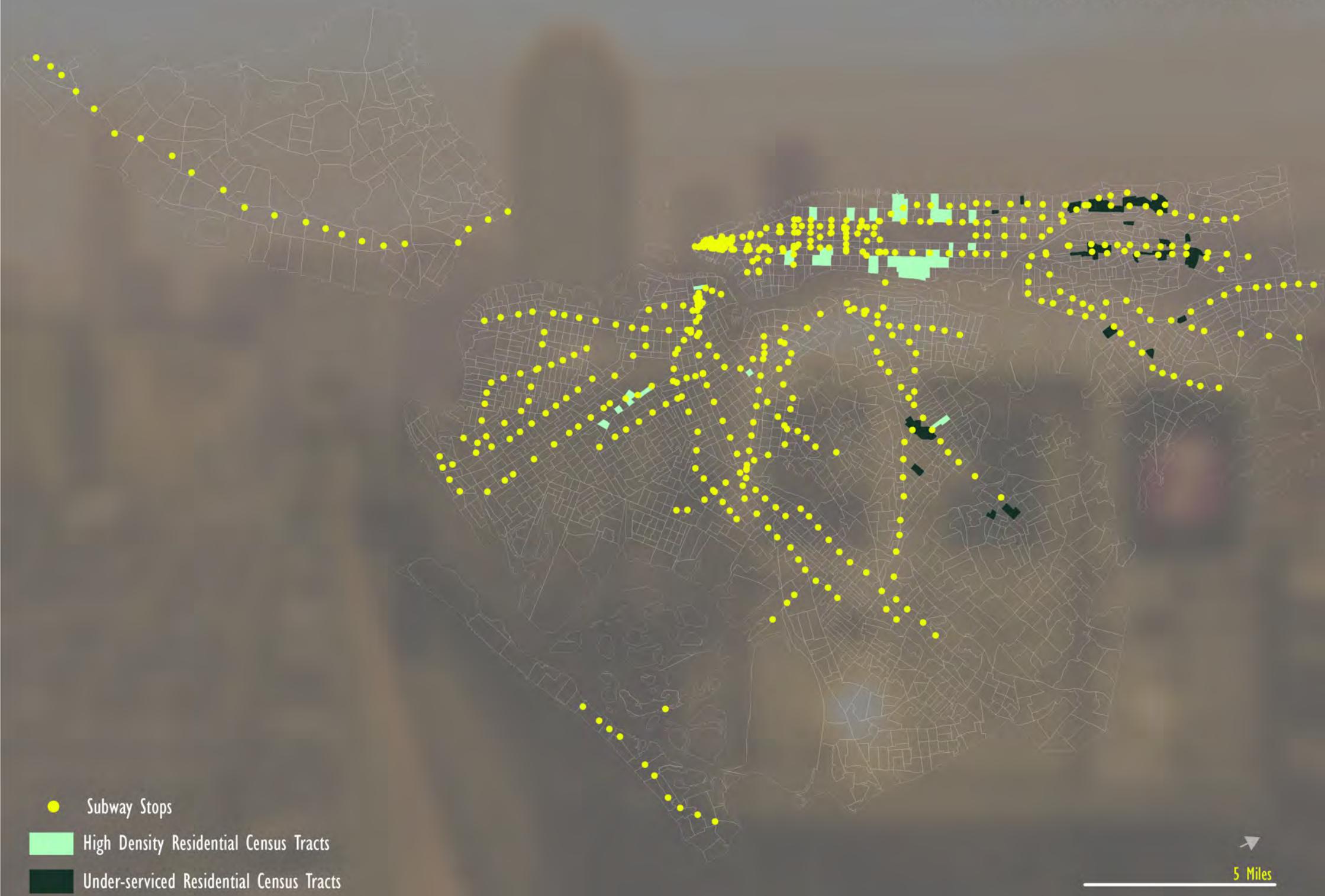


15 MINUTE SUBWAY BUFFERS FROM HIGH DENSITY RESIDENTIAL CENSUS TRACTS



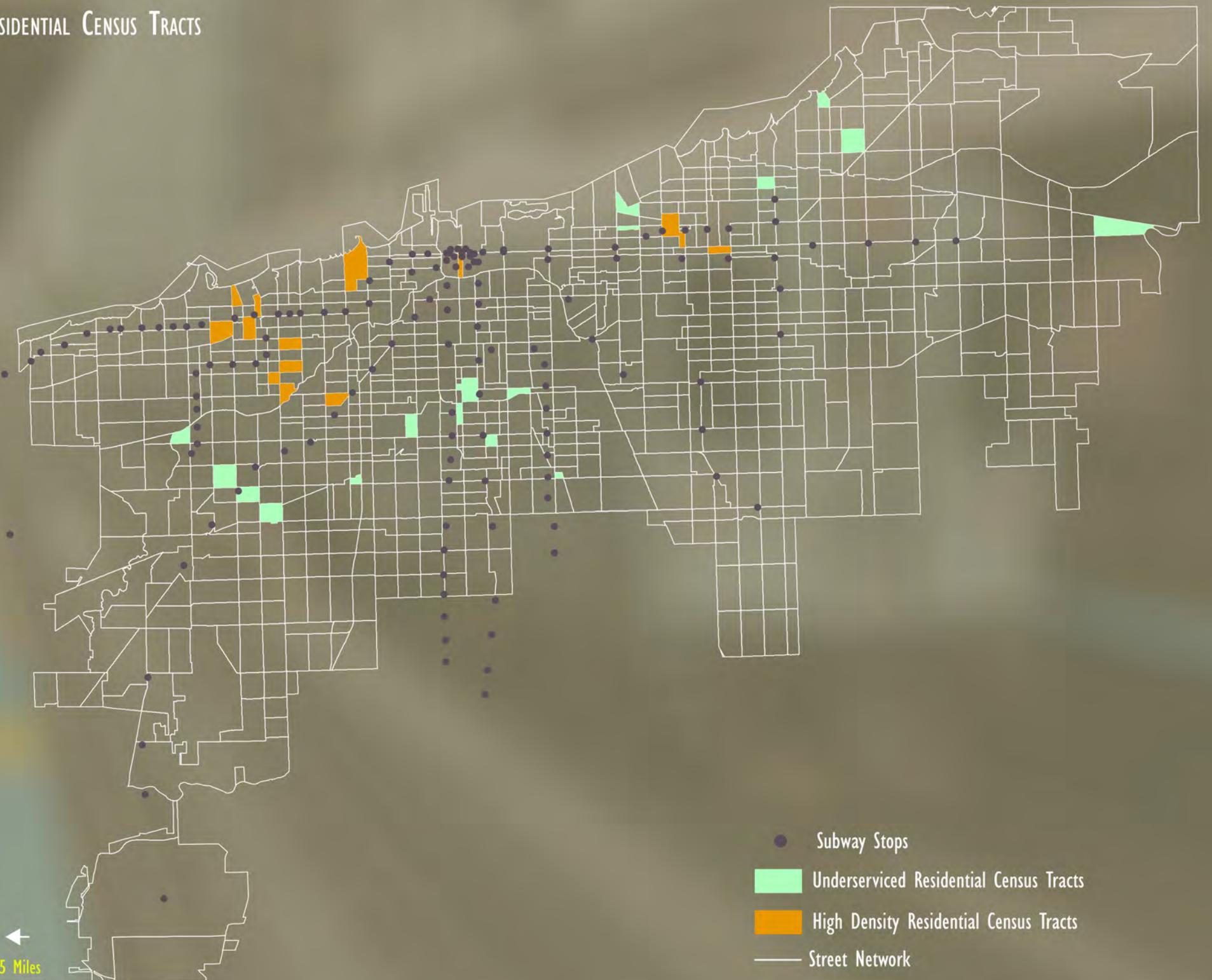
UNDERSERVED RESIDENTIAL AREAS

UNDER-SERVED RESIDENTIAL CENSUS TRACTS





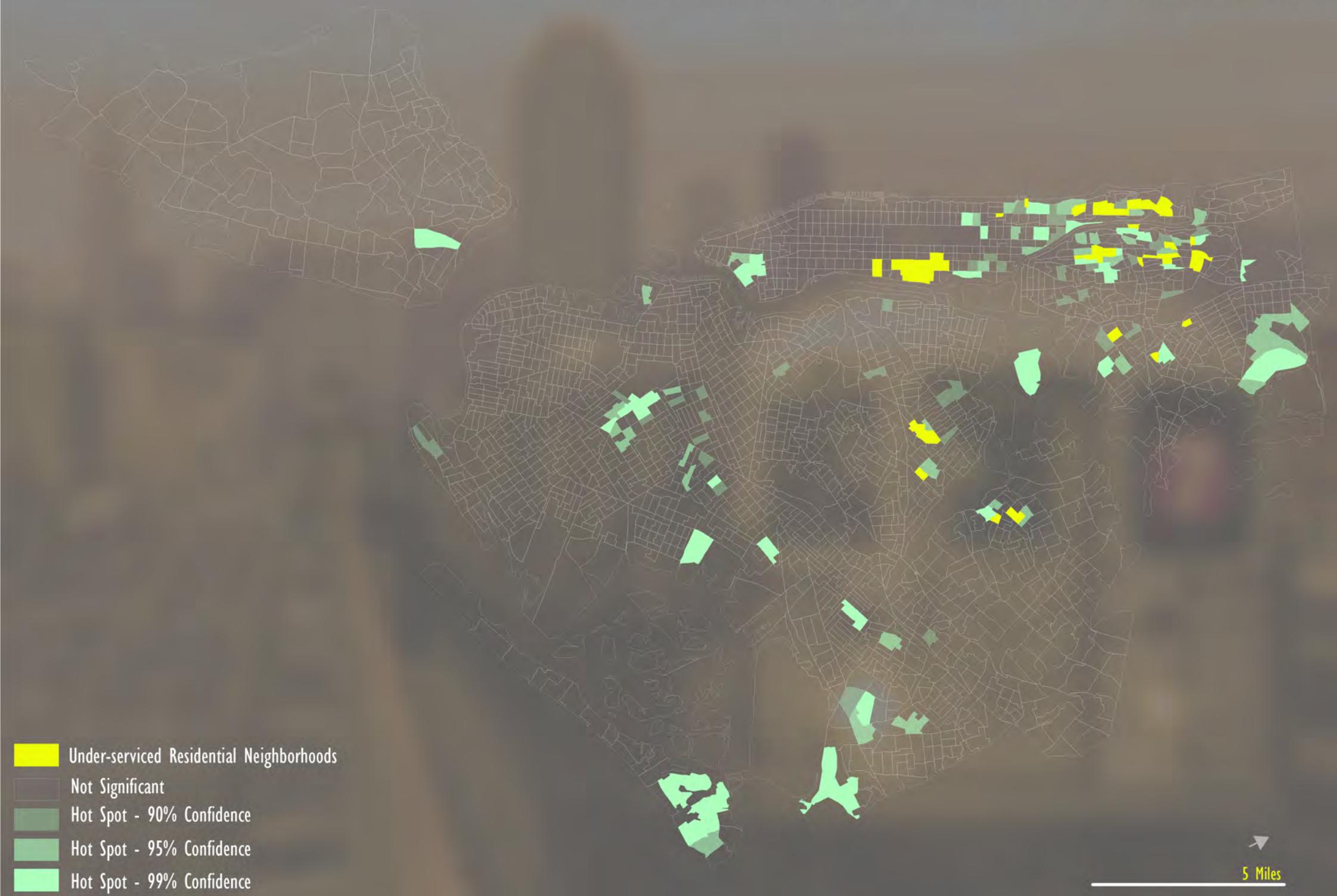
UNDERSERVED RESIDENTIAL CENSUS TRACTS



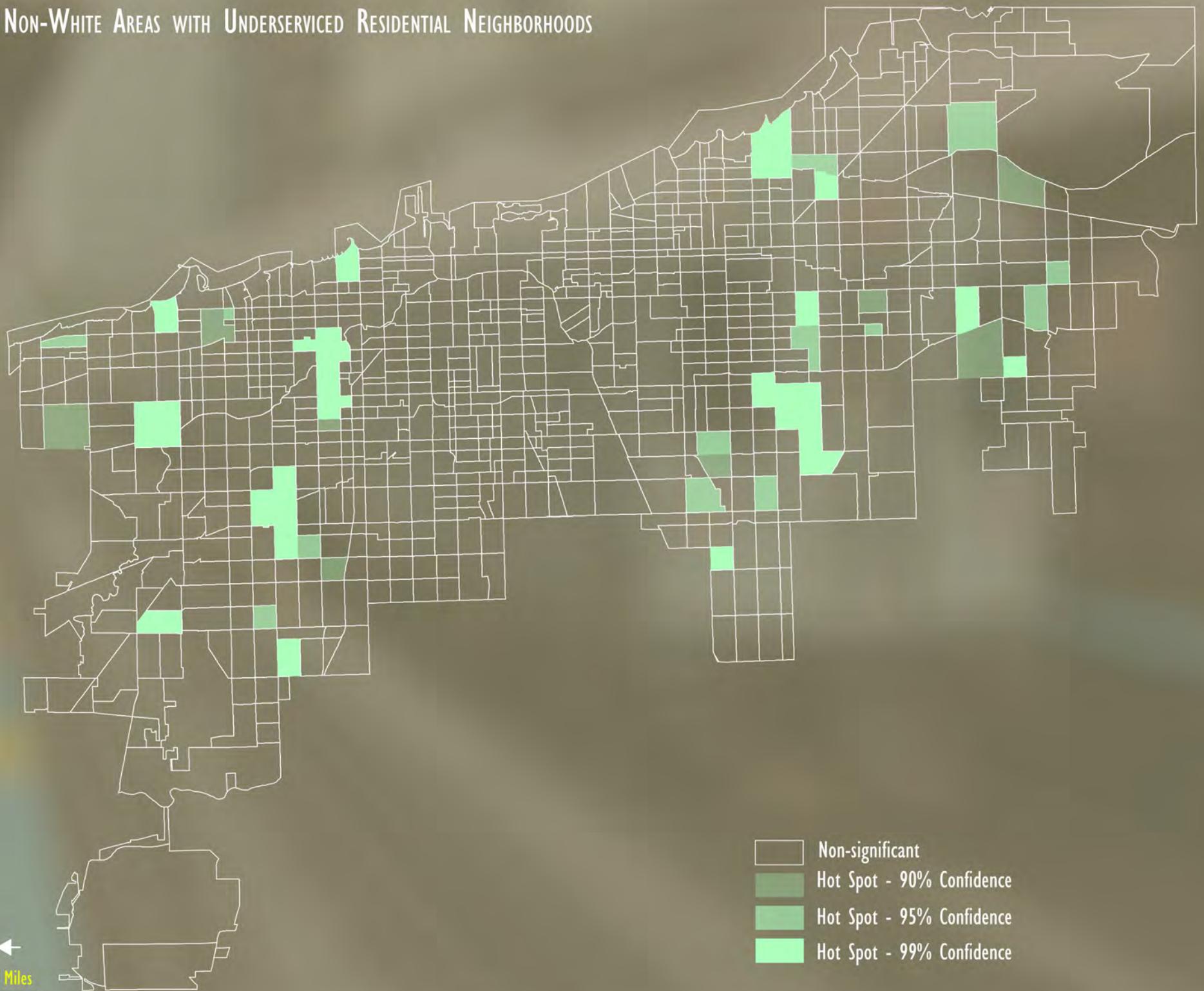
UNDERSERVED RESIDENTIAL AREAS +
HIGHLY NON-WHITE AREAS



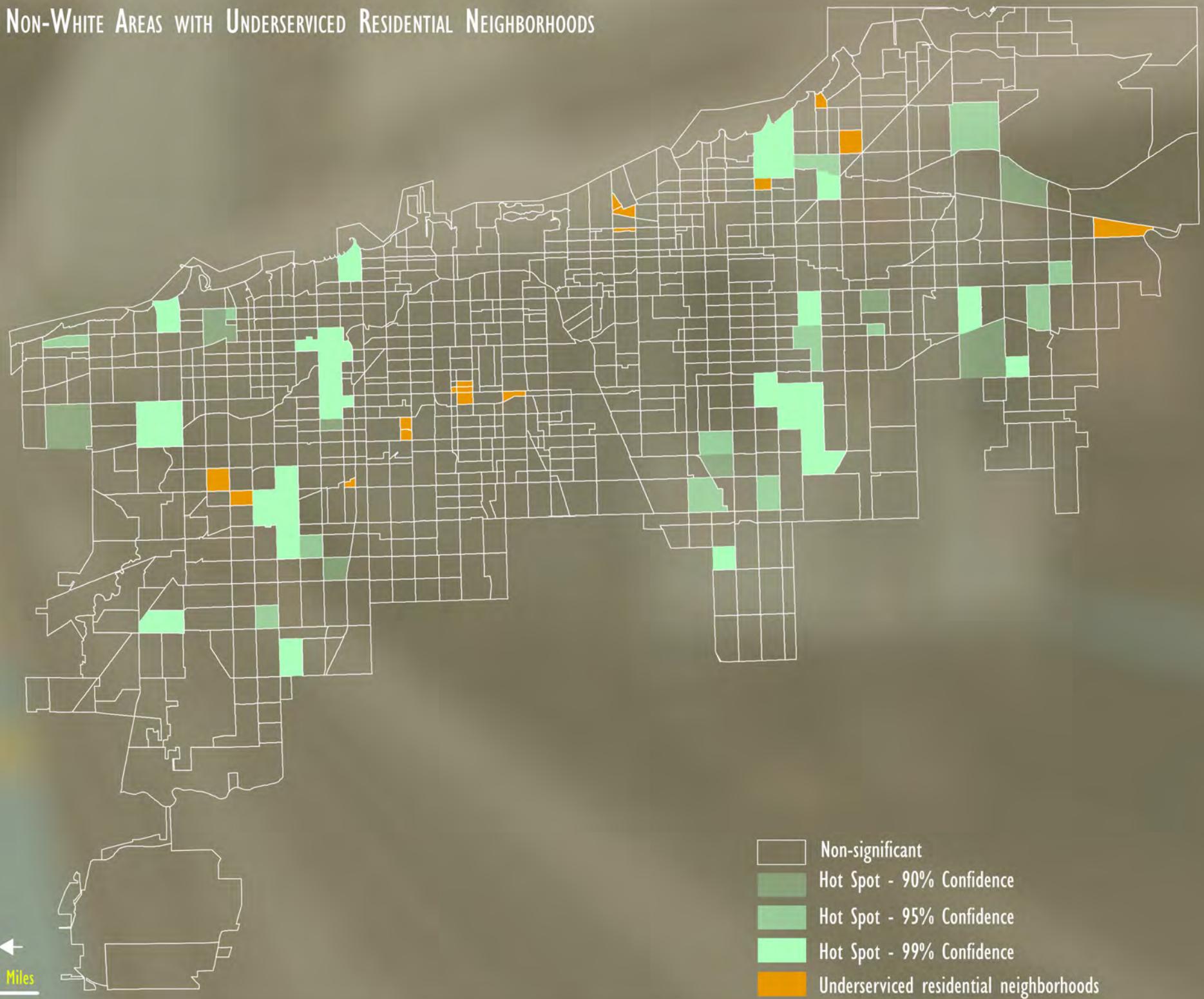
OVERLAPPING HIGH NON-WHITE AREAS WITH UNDERSERVED RESIDENTIAL NEIGHBORHOODS



OVERLAPPING HIGH NON-WHITE AREAS WITH UNDERSERVED RESIDENTIAL NEIGHBORHOODS



OVERLAPPING HIGH NON-WHITE AREAS WITH UNDERSERVED RESIDENTIAL NEIGHBORHOODS





NEIGHBORHOOD
HOT SPOT

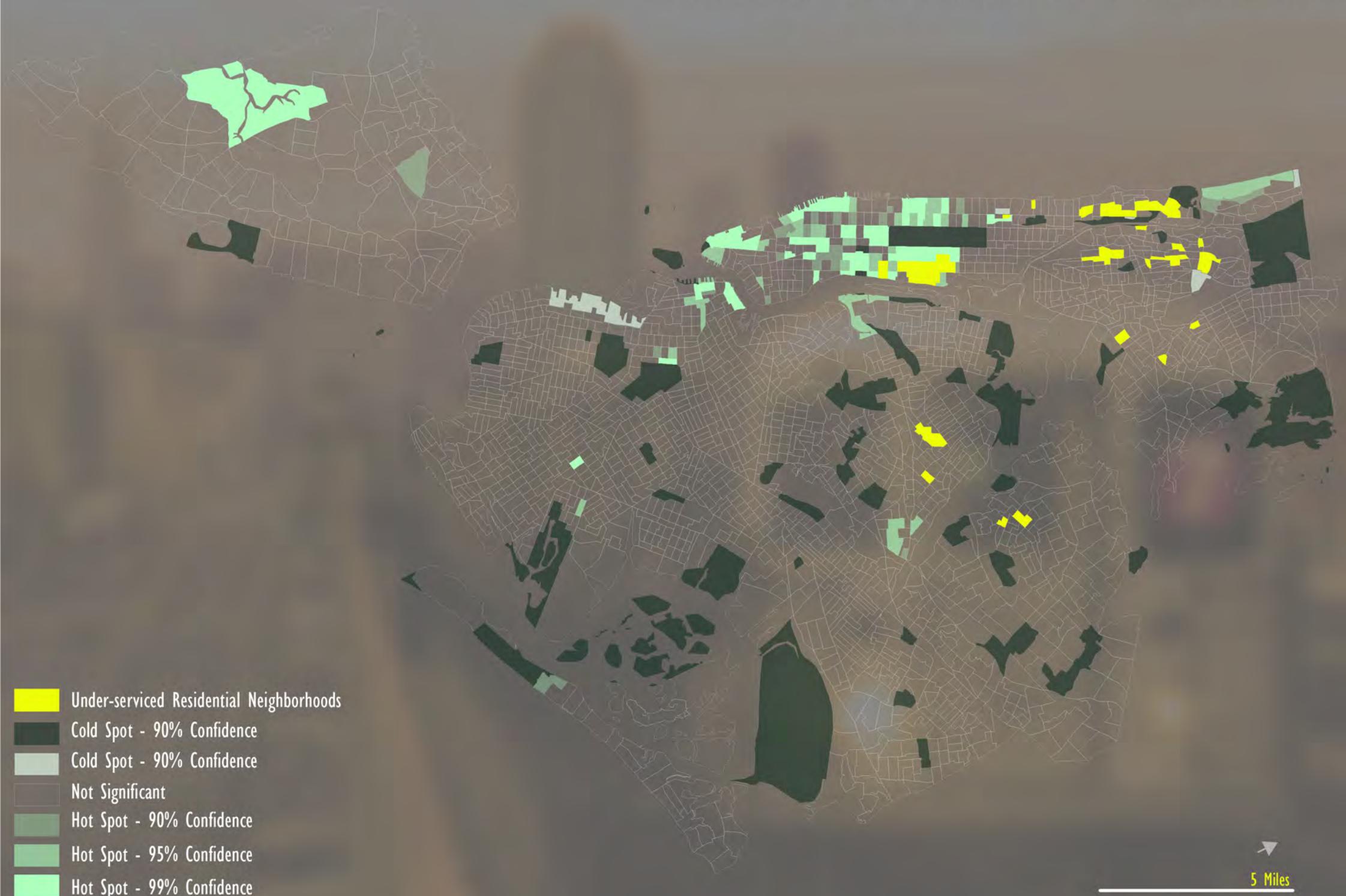
ANALYSIS

MEDIAN INCOME CENSUS TRACTS

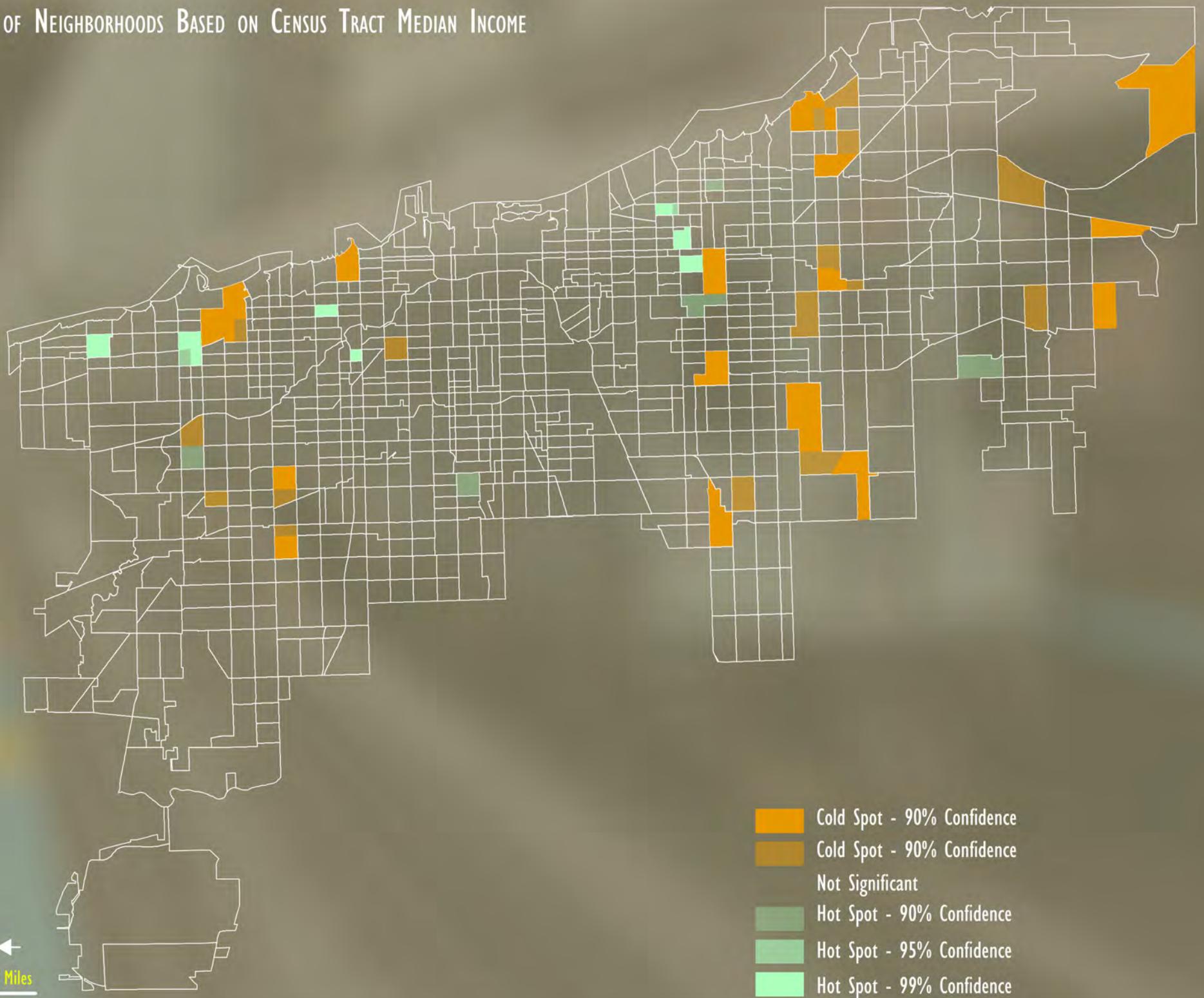
HOT-SPOT ANALYSIS OF NEIGHBORHOODS BASED ON CENSUS TRACT MEDIAN INCOME



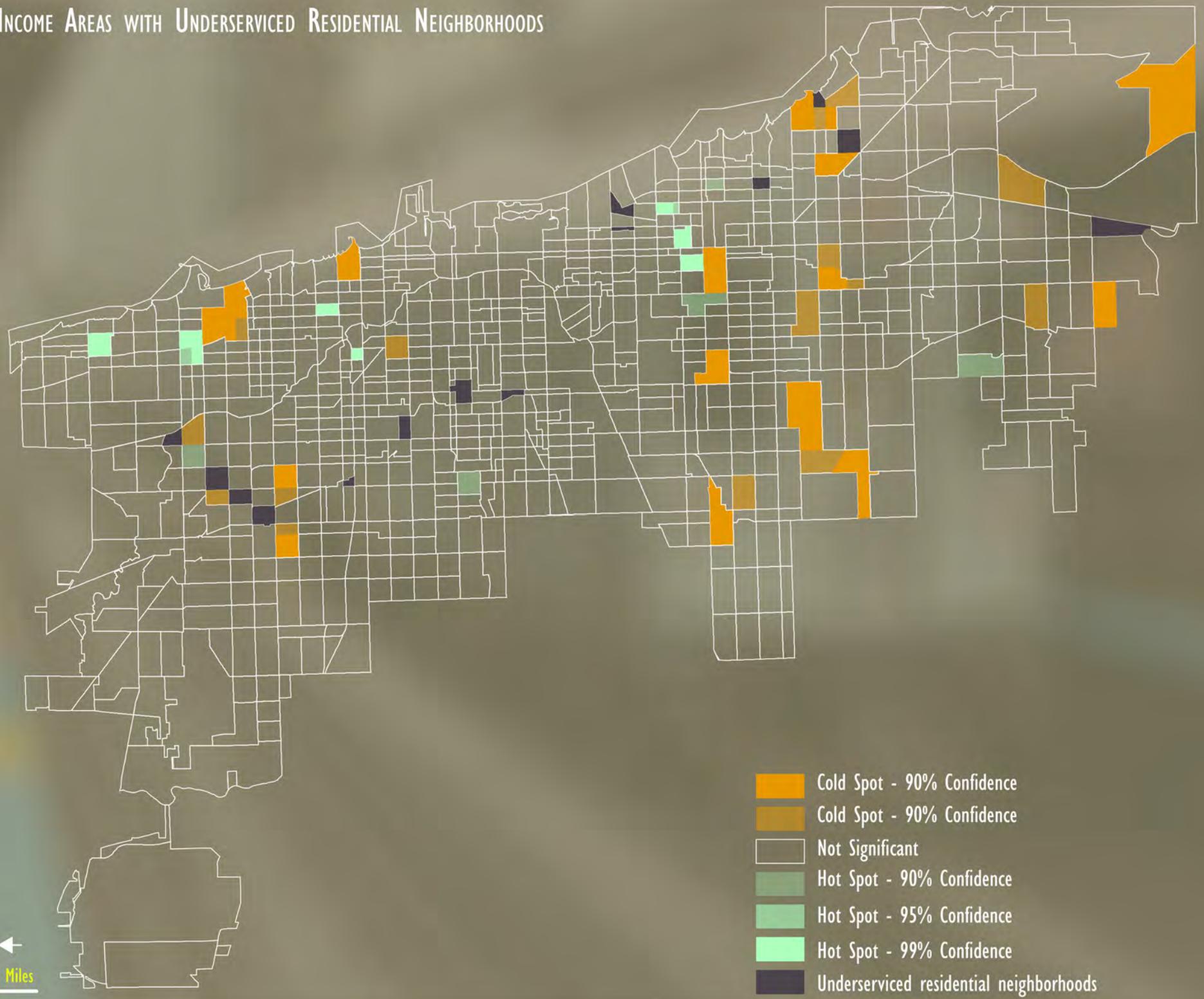
OVERLAPPING LOW-INCOME AREAS WITH UNDERSERVED RESIDENTIAL NEIGHBORHOODS



HOT-SPOT ANALYSIS OF NEIGHBORHOODS BASED ON CENSUS TRACT MEDIAN INCOME



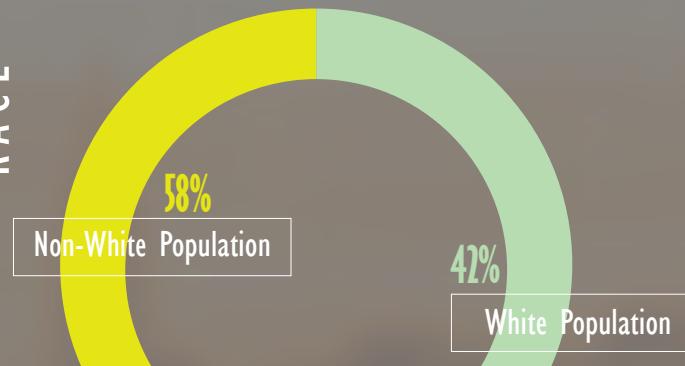
OVERLAPPING LOW-INCOME AREAS WITH UNDERSERVED RESIDENTIAL NEIGHBORHOODS



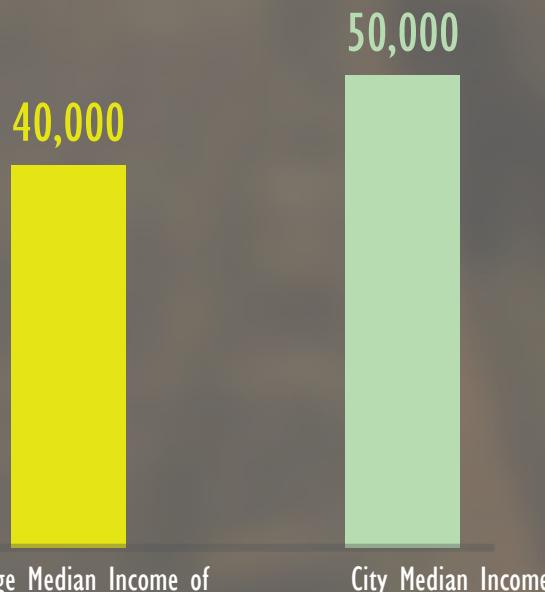
PUTTING IT TOGETHER

UNDERSERVED RESIDENTIAL NEIGHBORHOODS DEMOGRAPHICS

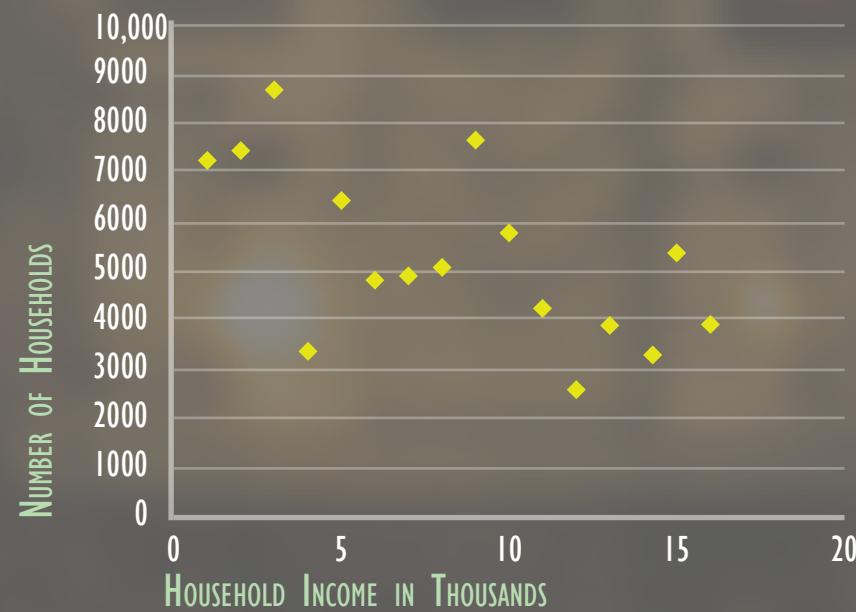
RACE



INCOME



NUMBER OF HOUSEHOLDS



HOUSEHOLD INCOME IN THOUSANDS