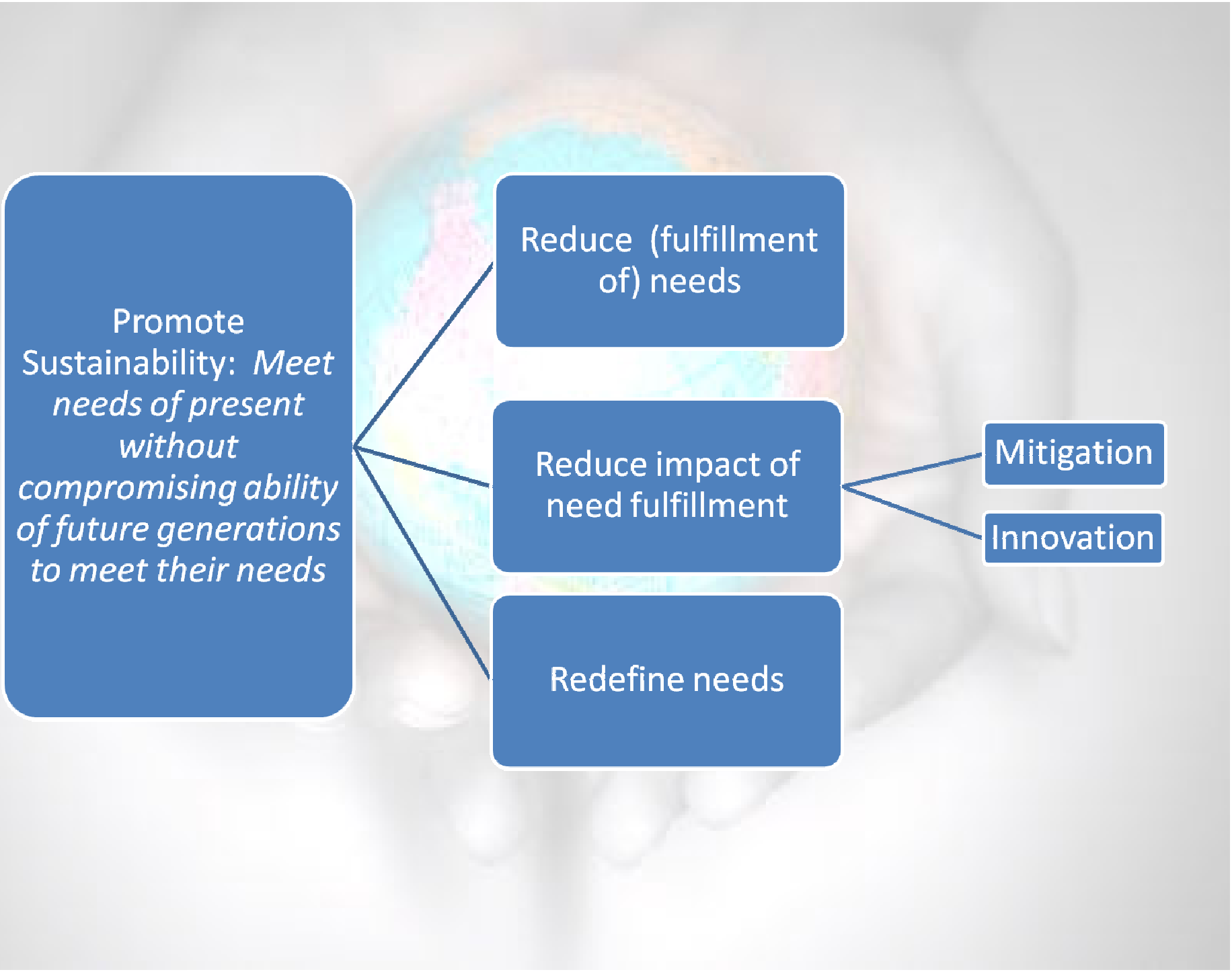
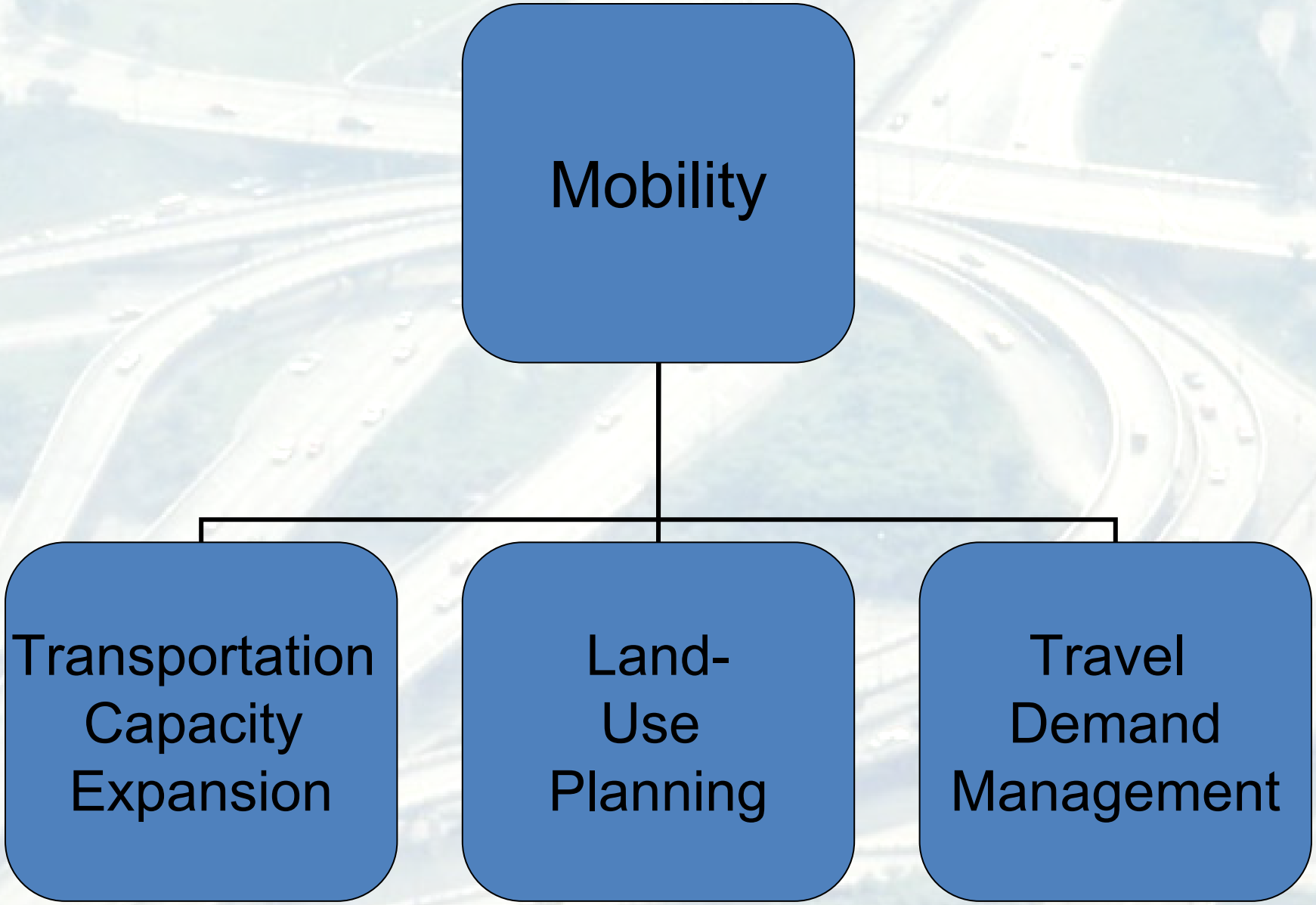
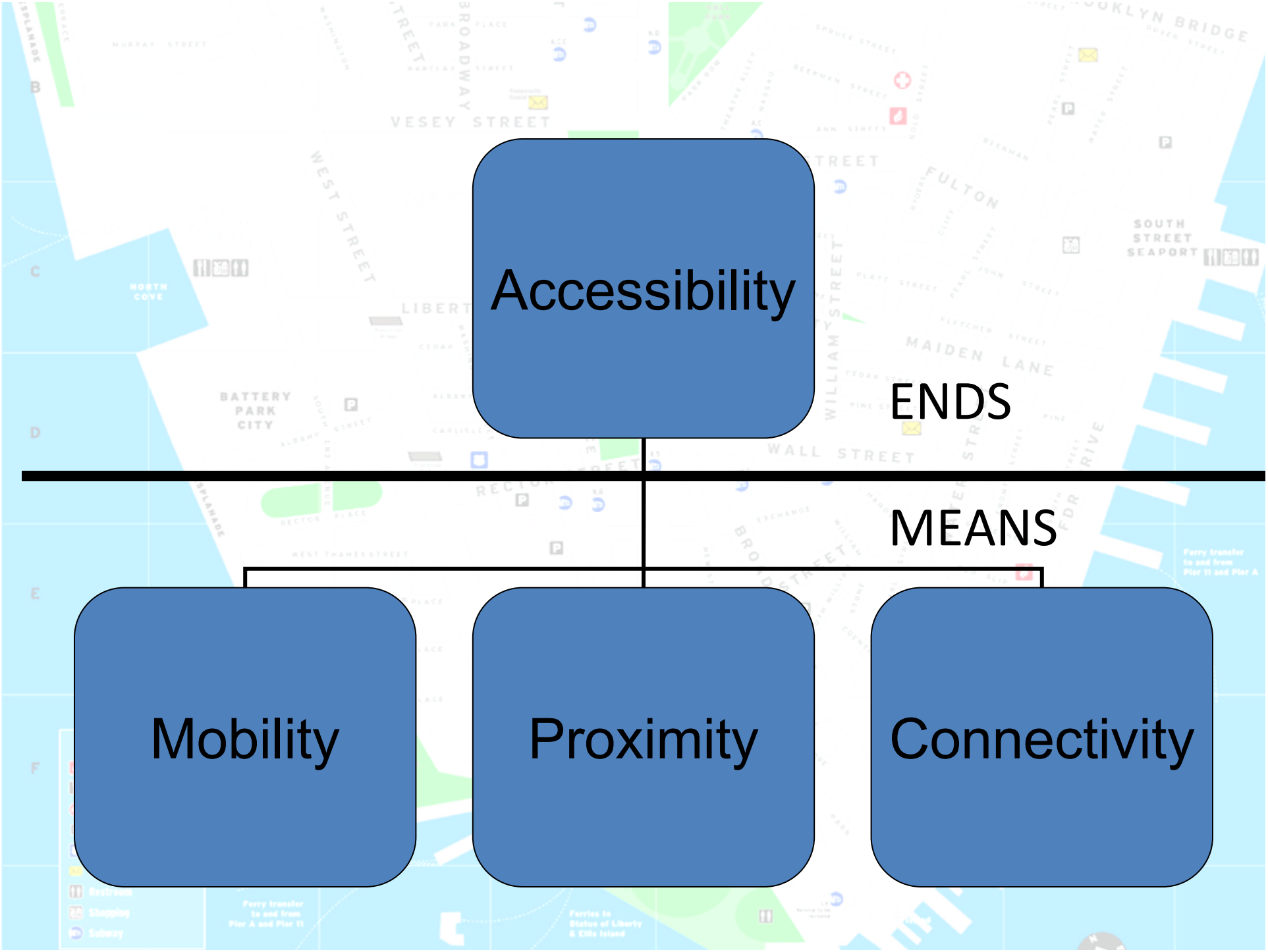
Accessibility and Sustainability in Transportation

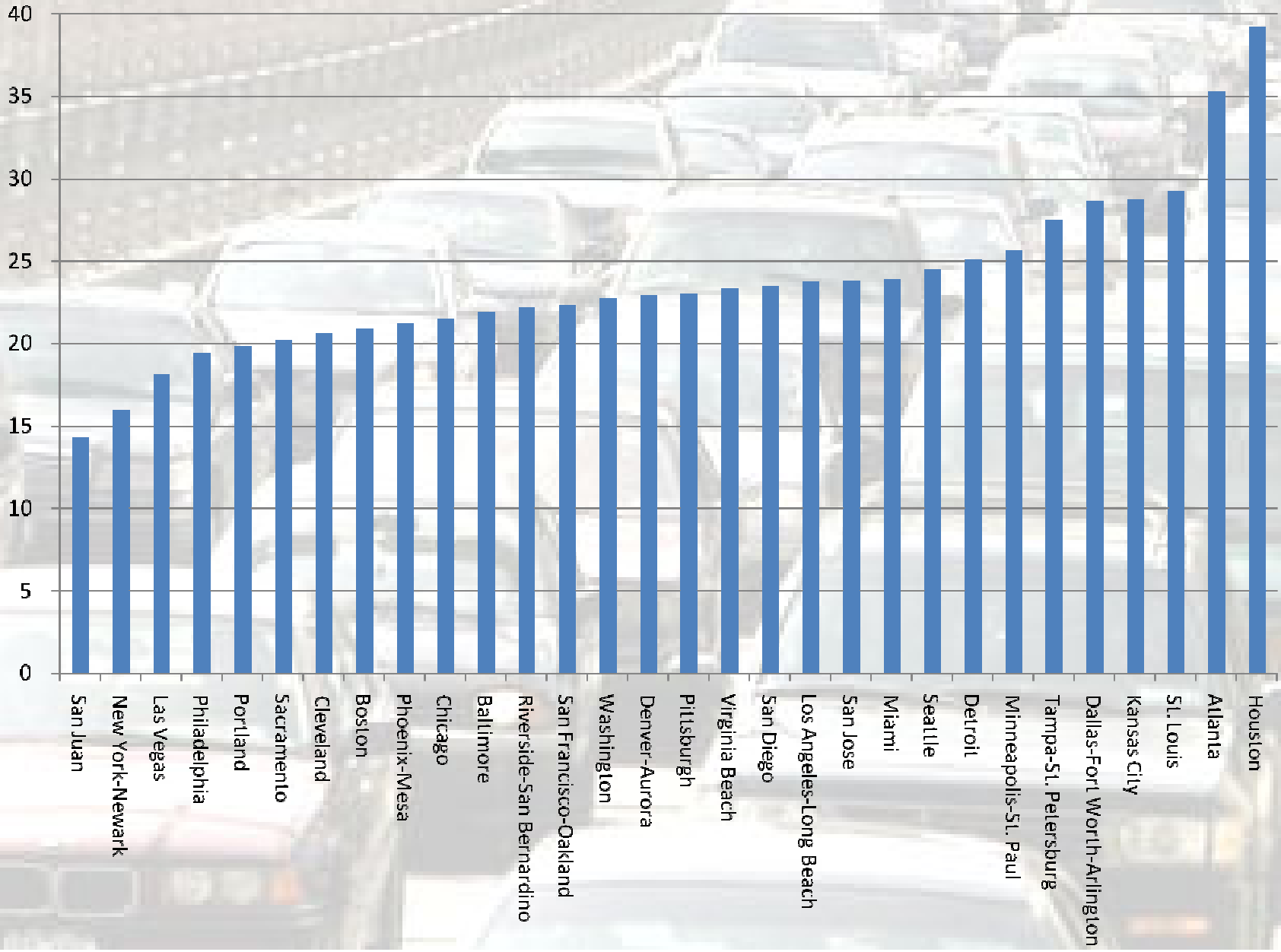
Jonathan Levine


Promote Sustainability: *Meet needs of present without compromising ability of future generations to meet their needs*
Reduce (fulfillment of) needs
Reduce impact of need fulfillment
Redefine needs
Mitigation
Innovation


Mobility
Transportation Capacity Expansion
Land-Use Planning
Travel Demand Management


Accessibility
ENDS
MEANS
Mobility
Proximity
Connectivity

Daily Vehicle Miles Traveled per Capita by U.S. Metropolitan Area, 2002



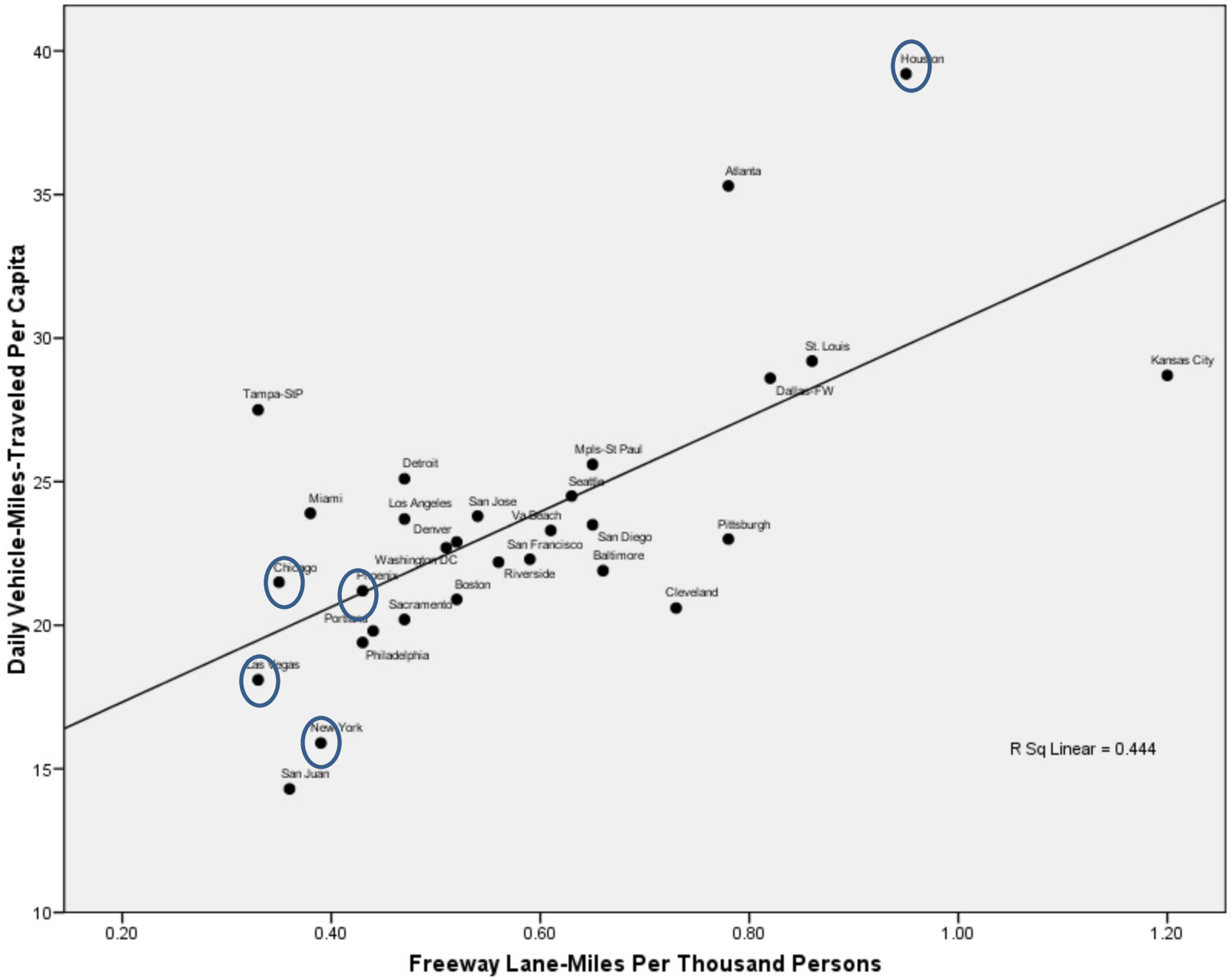
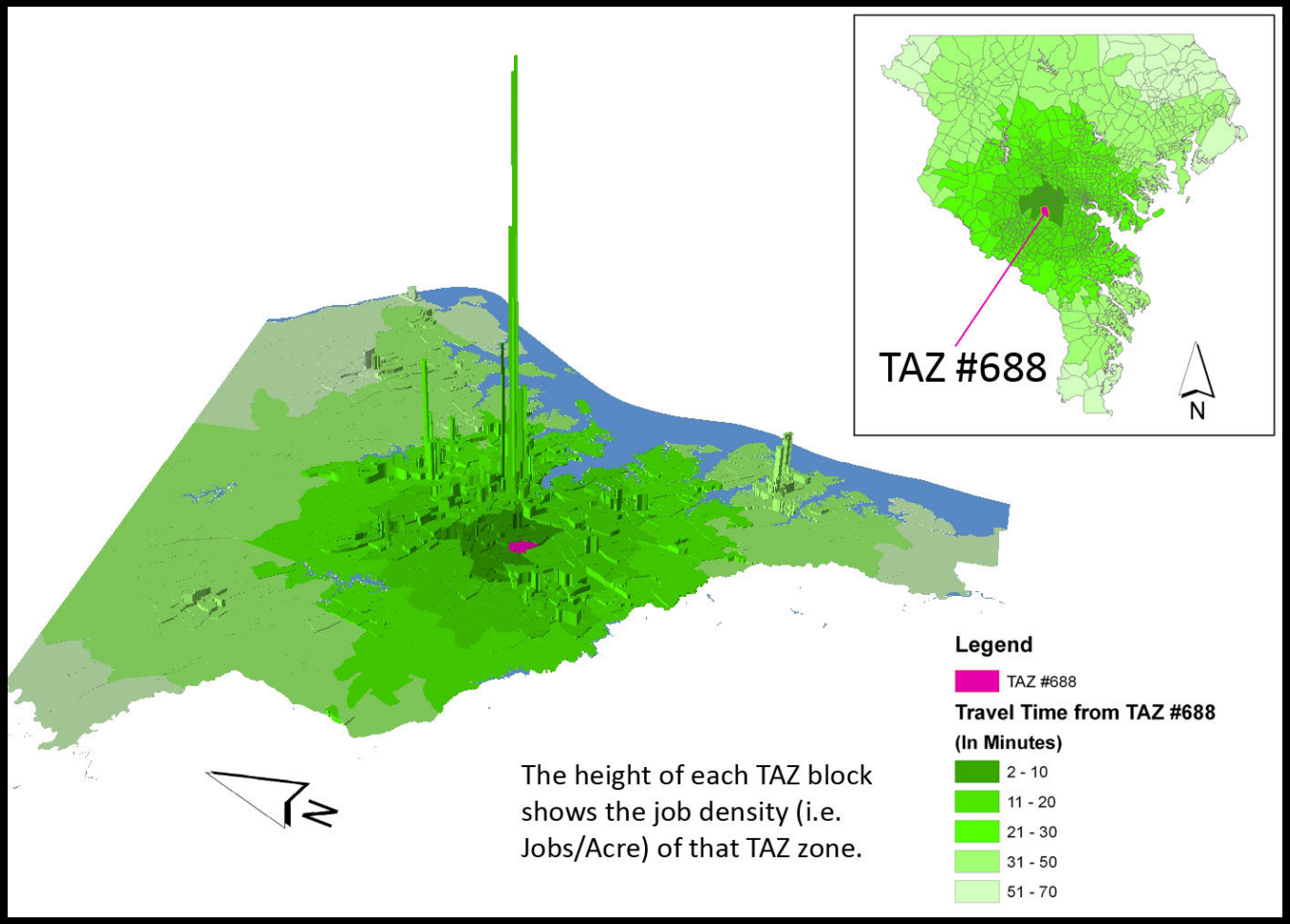
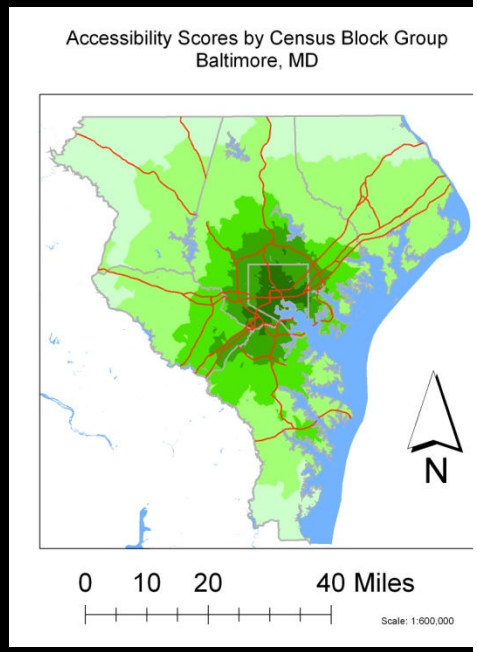

Daily Vehicle-Miles-Traveled Per Capita
Freeway Lane-Miles Per Thousand Persons
40
35
30
25
20
15
10
0.20
0.40
0.60
0.80
1.00
1.20
Houston
Atlanta
St. Louis
Kansas City
Dallas-FW
Tampa-StP
Mpls-St Paul
Detroit
Seattle
Miami
Los Angeles
San Jose
Va Beach
Pittsburgh
Denver
San Diego
San Francisco
Baltimore
Washington DC
Riverside
Chicago
Phoenix
Boston
Cleveland
Sacramento
Portland
Philadelphia
Las Vegas
New York
San Juan
R Sq Linear = 0.444

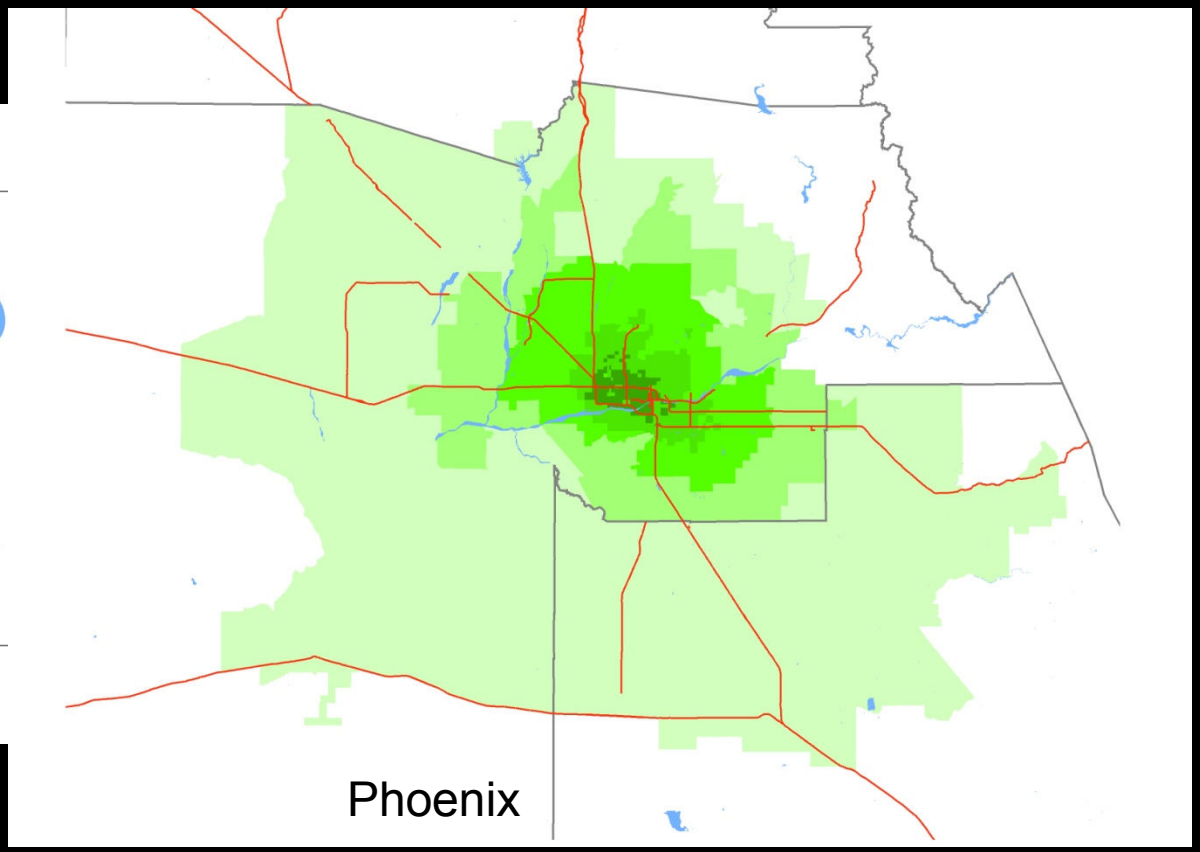
Illustration of Accessibility Concept

Baltimore Travel Analysis Zones (TAZ)



Job Accessibility by Car
Baltimore and Phoenix





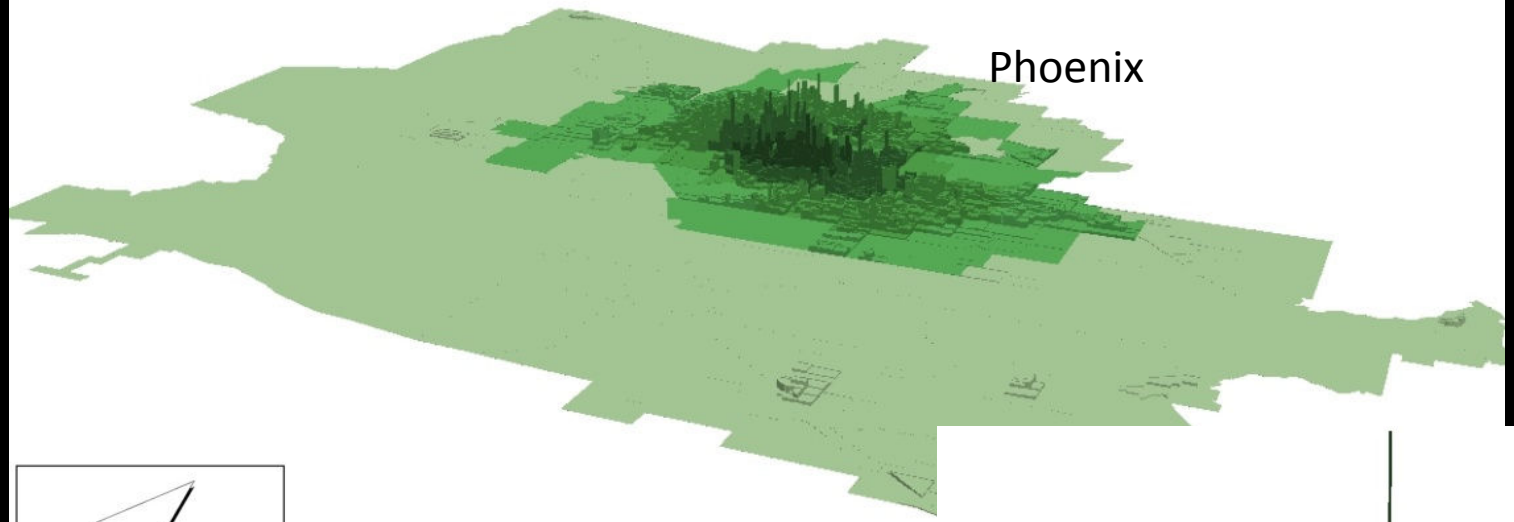
Legend

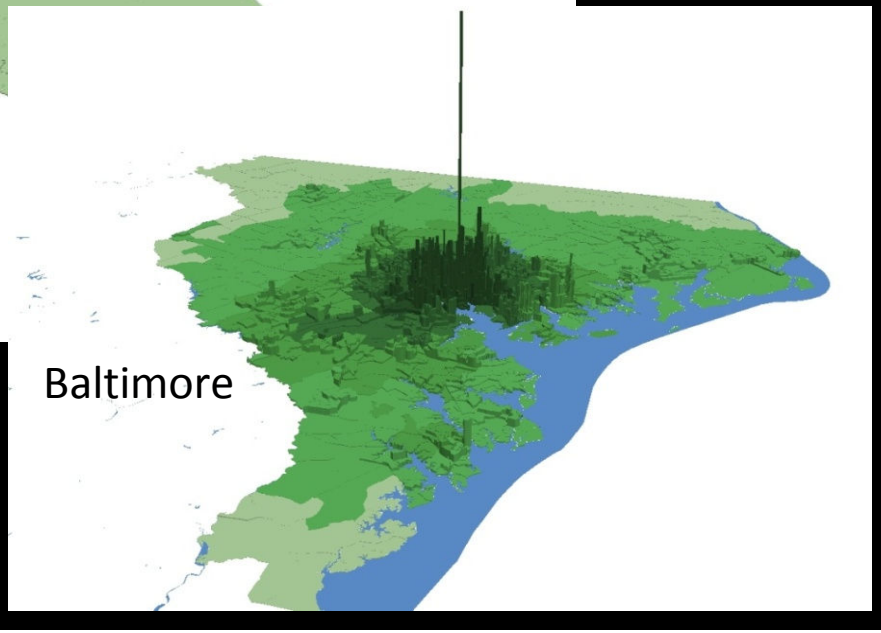
- Interstates
- Water Area
- County Boundaries

Accessibility Indicators

- 0 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 150,000
- 150,001 - 300,000
- 300,001 - 555,832

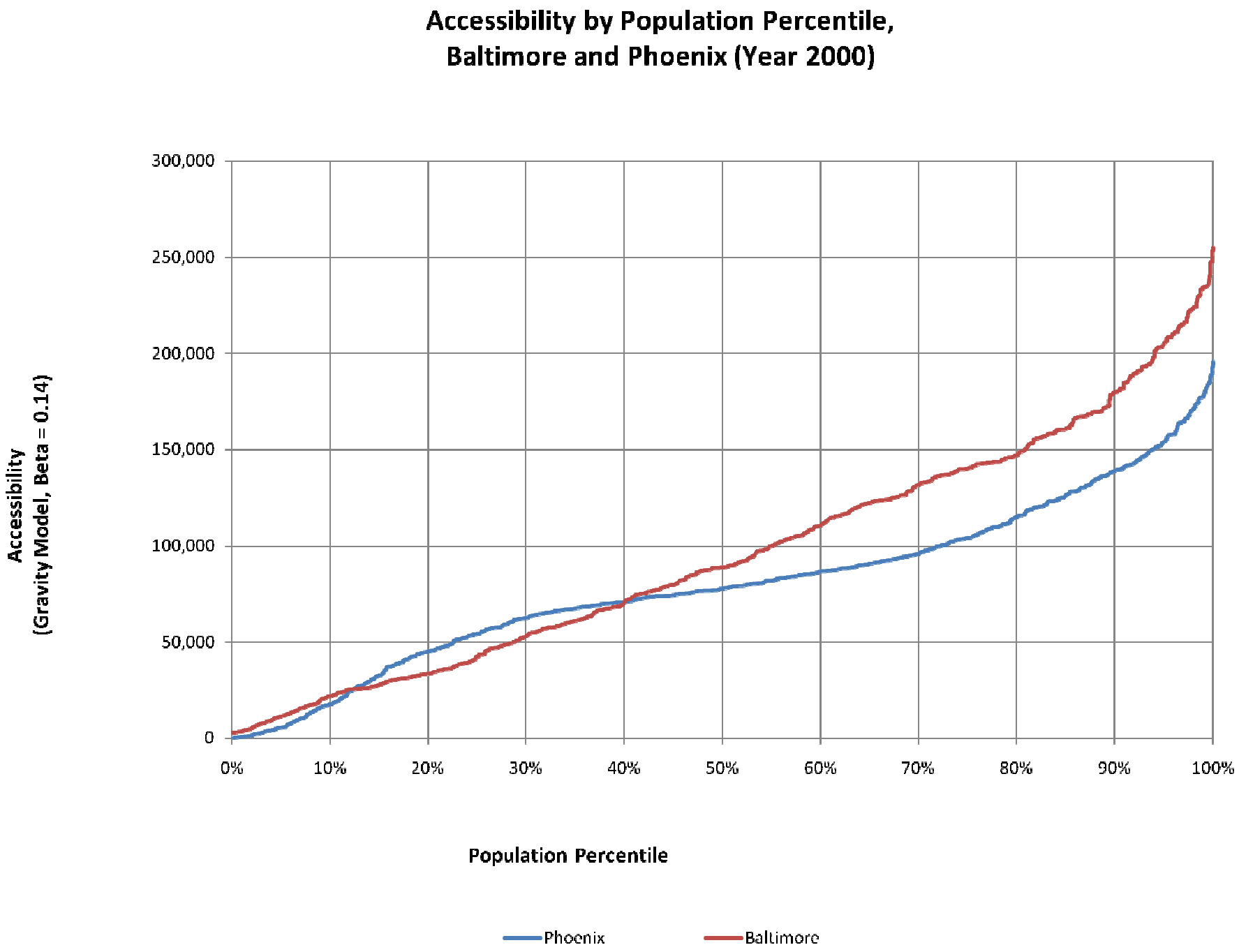
Accessibility and Population Density by Census Block Group, Phoenix and Baltimore (2000)



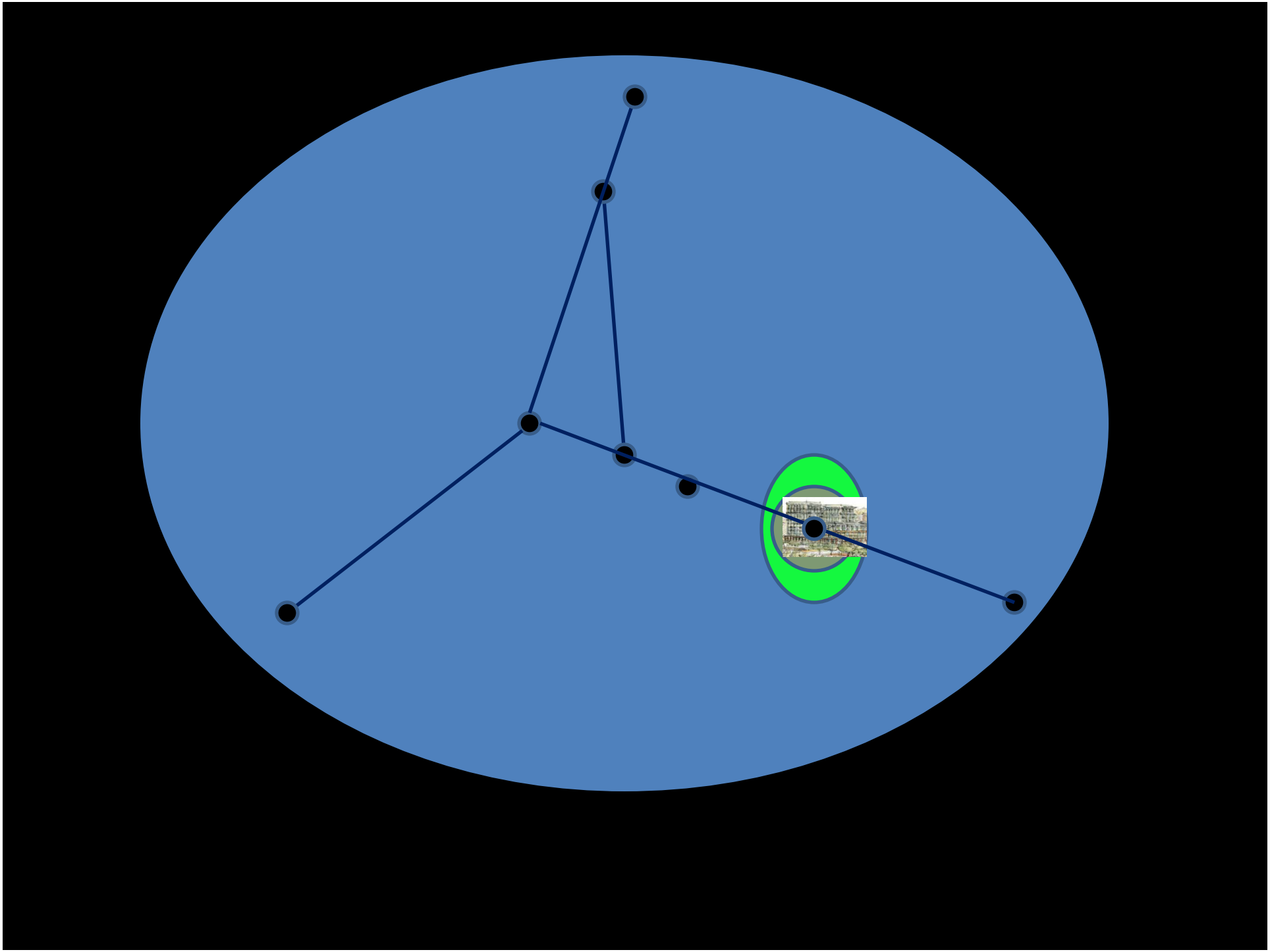


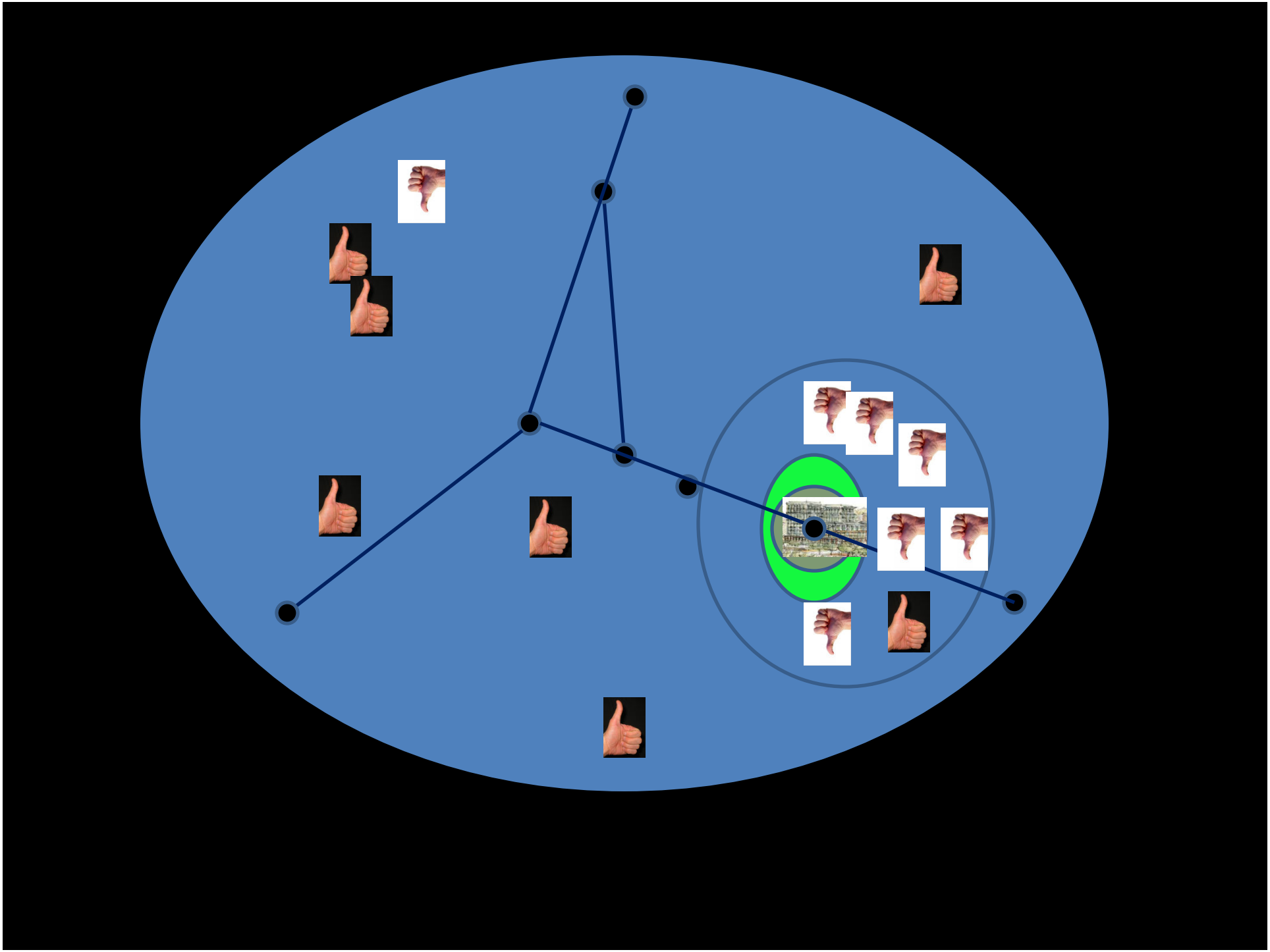
Accessibility Indicators

- 0 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 150,000
- 150,001 - 300,000
- 300,001 - highest
- Water Area


Accessibility by Population Percentile,
Baltimore and Phoenix (Year 2000)
Accessibility
(Gravity Model, Beta = 0.14)
300,000
250,000
200,000
150,000
100,000
50,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Population Percentile
Phoenix
Baltimore


1. BikeShare Station
2. Taxi Hotline
3. Bike Lockers
4. 511 Bathurst, 509 Harbourfront Streetcars
5. Bike Rack
6. Drink Machine
To Carshare Car, One Block North
ATLANTIC AVENUE
LIBERTY VILLAGE
Wireless Hotspot
Pedestrian Walkway
Parking Lot
MANITOBA DRIVE
To 29 Dufferin Bus (with bike racks on board)
FOOD BUILDING
HORSE BARN
NOVA SCOTIA AVENUE
EXHIBITION PLACE





Oregon Transportation Planning Rule

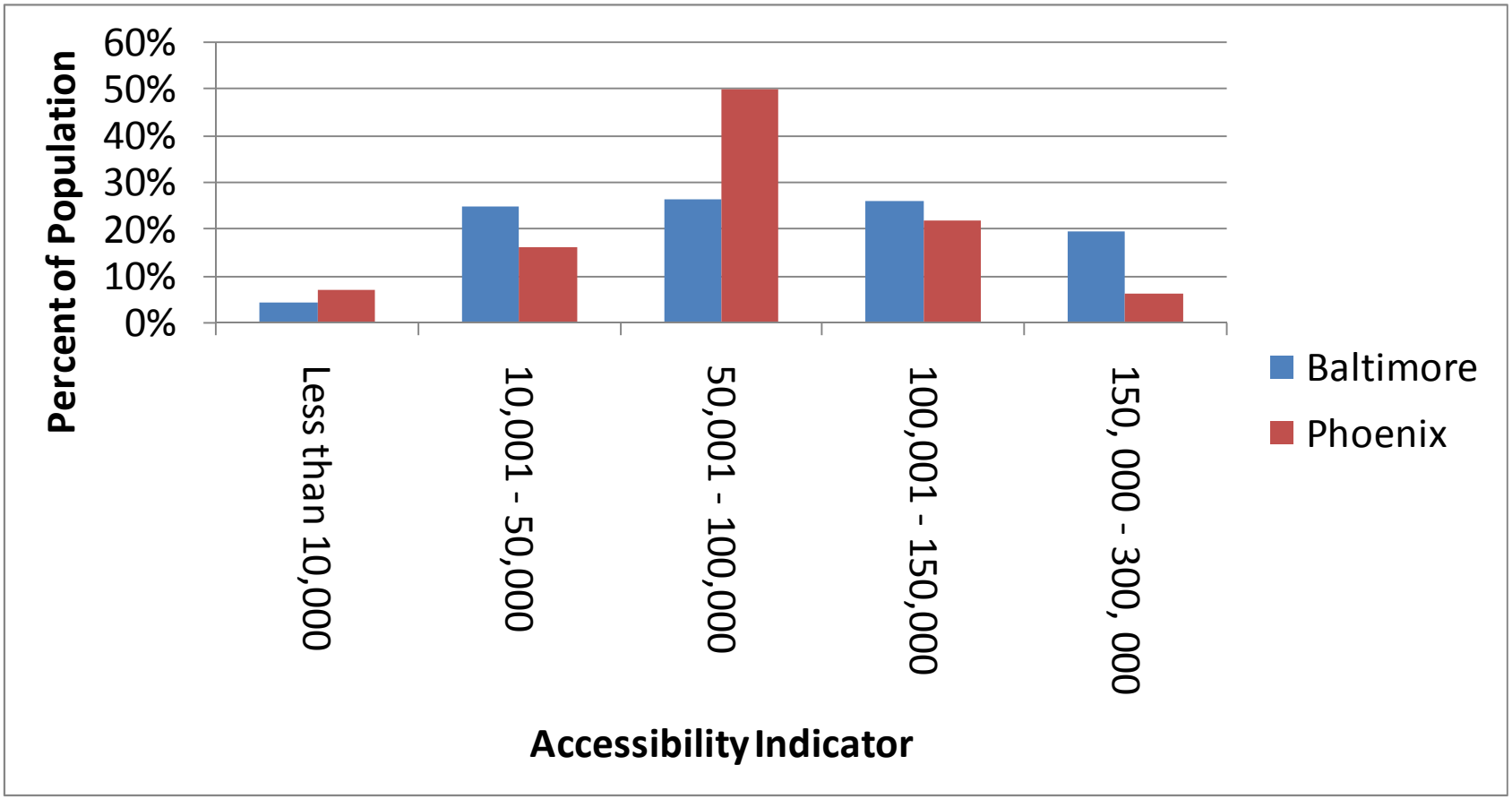
"…local governments shall adopt land use and subdivision regulations to reduce reliance on the automobile which … allow transit-oriented developments (TODs) on lands along transit routes…

The railroads collapsed because they thought they were in the railroad business, when really they were in the transportation business.

Theodore Levitt, "Marketing Myopia", *Harvard Business Review* 38 (July-August 1960), 45-57, at 45.

Extras

Population Distribution by Accessibility Indicator, Baltimore, and Phoenix



Hansen Accessibility Measure

$$A_i = \sum_j O_j f(C_{ij})$$

Where,

C_{ij} refers to travel impedance (e.g. travel time between zone *i* and *j*);

$F(C_{ij})=\exp(-\beta*C_{ij})$, an exponential function of C_{ij}; β is the parameter;

O_j refers to all opportunities O (numbers of Jobs in this study) at zone *j*;

A_i is a measure of accessibility at zone *i* to all opportunities O at zone *j*;