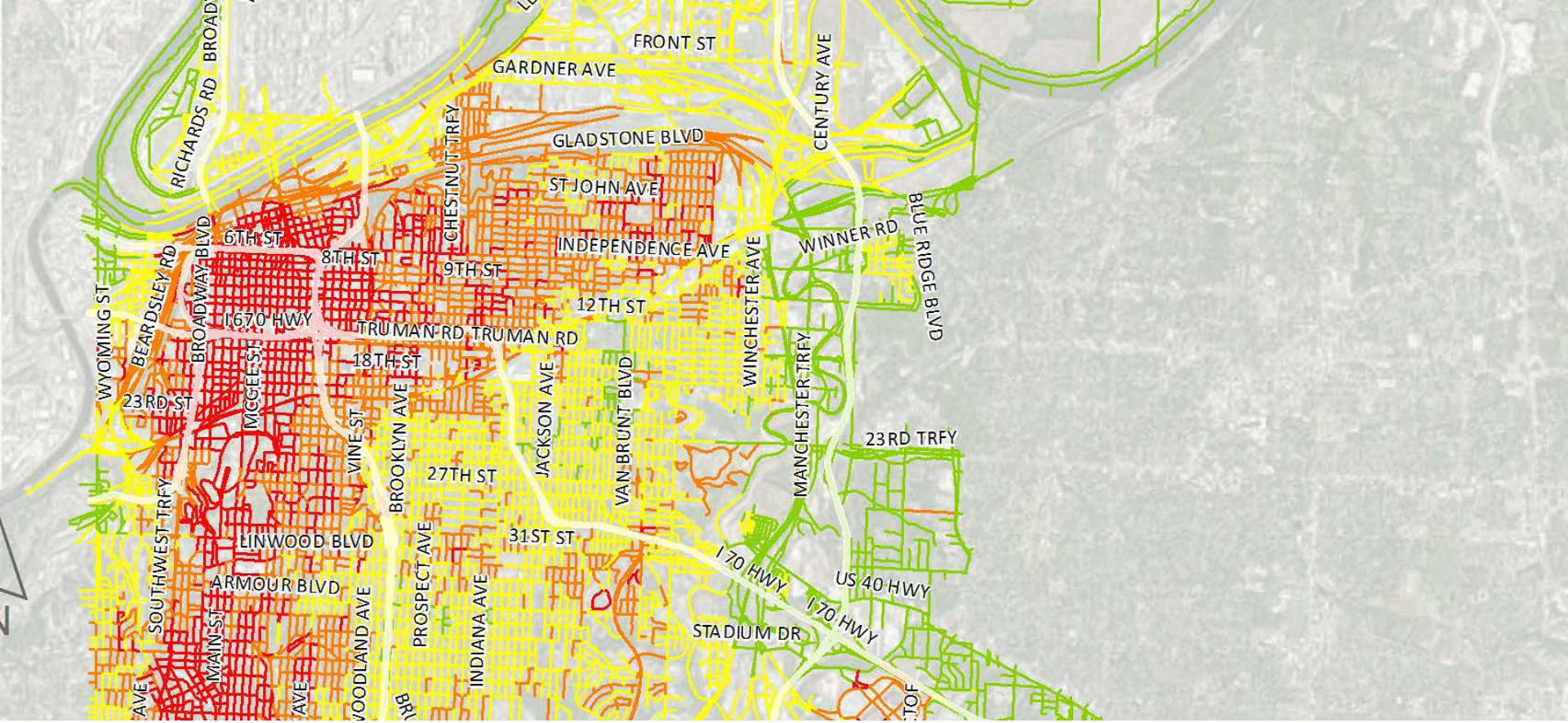
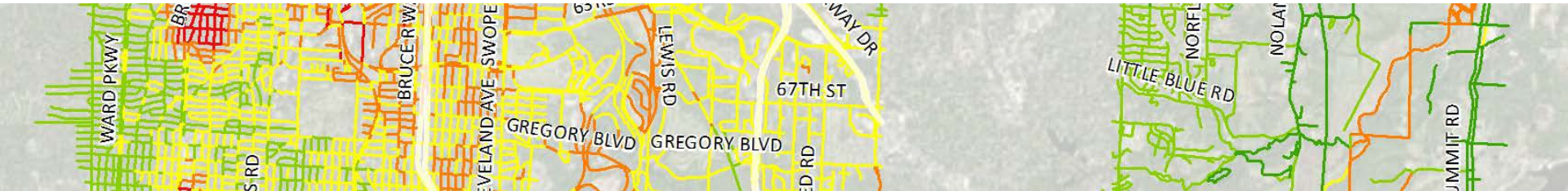


Bicycle Network Demand Analysis

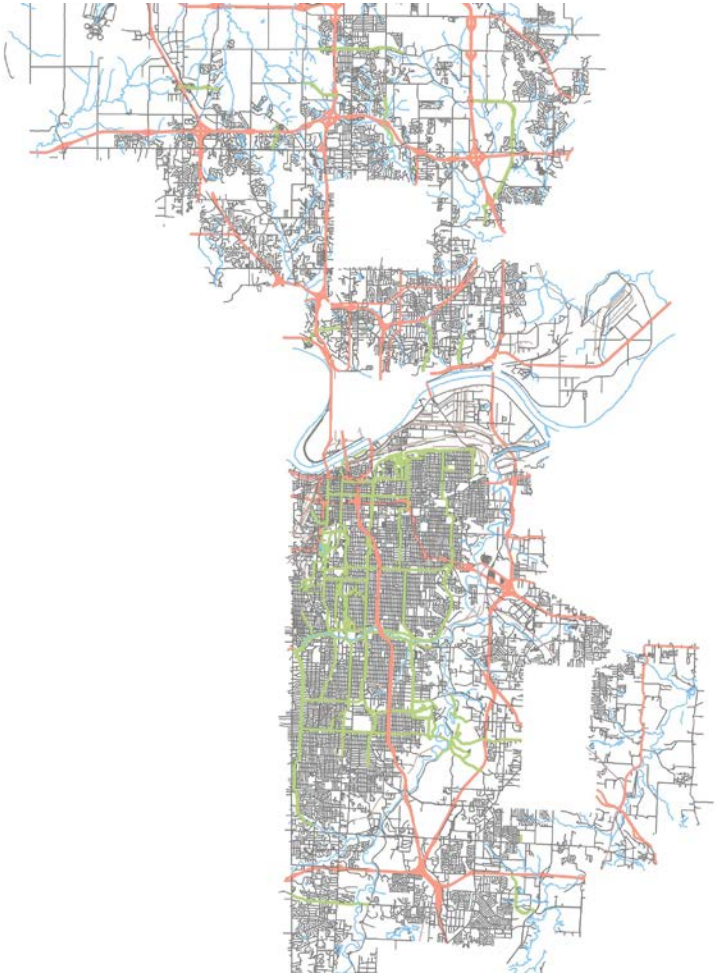
KCMO Bike Plan Technical Committee

March 28, 2016



A Complete Strategy for Bicycle Infrastructure

KCMO Street Network



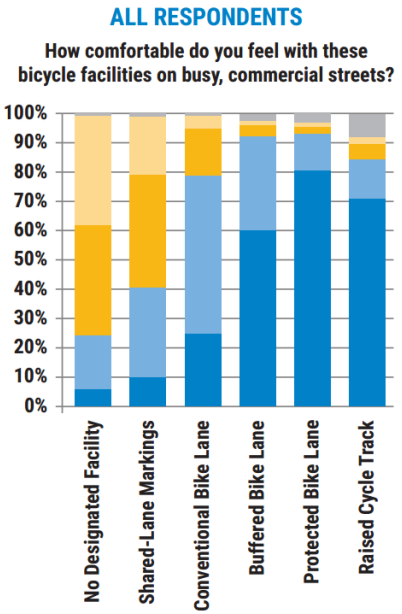
KCMO On-Street Bike Lane Network

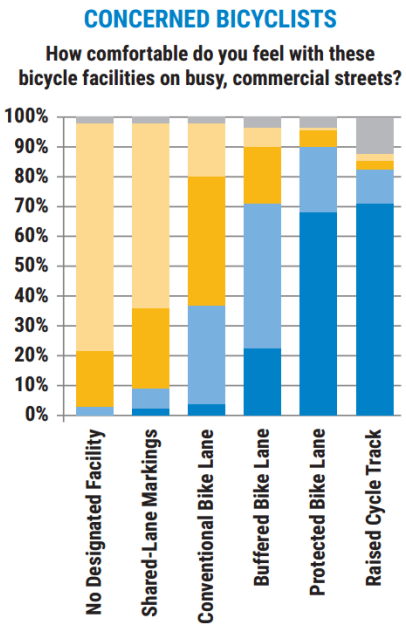
Measuring Demand

Where would people ride if it was safe and comfortable to do so?

Public Input

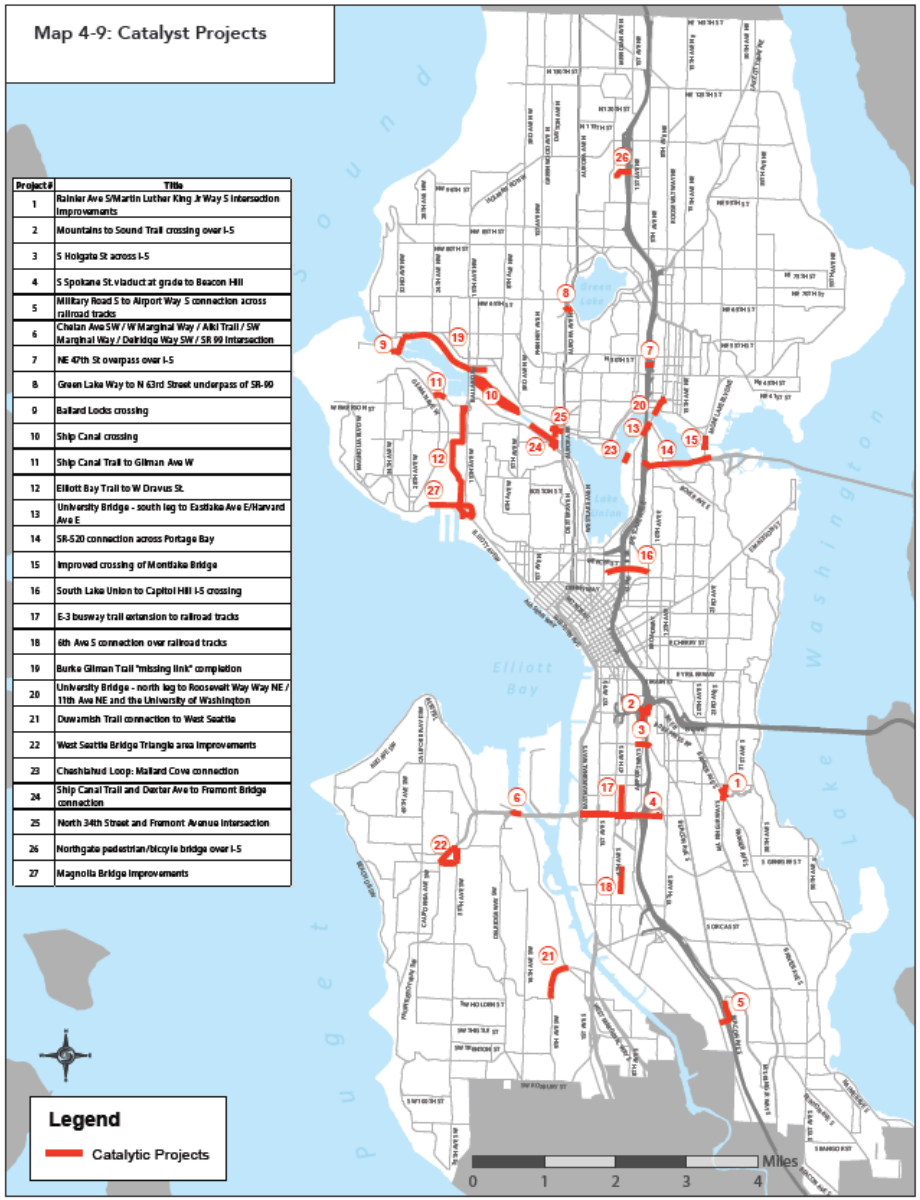
- What types of trips do people take or want to take?
- Where do people want to ride?
- What types of facilities do people prefer?
- Where are areas of concern (safety, access, etc.)?





Network Connectivity

- What routes are critical to establish an interconnected system?
- What projects bridge major gaps in the bicycle network?

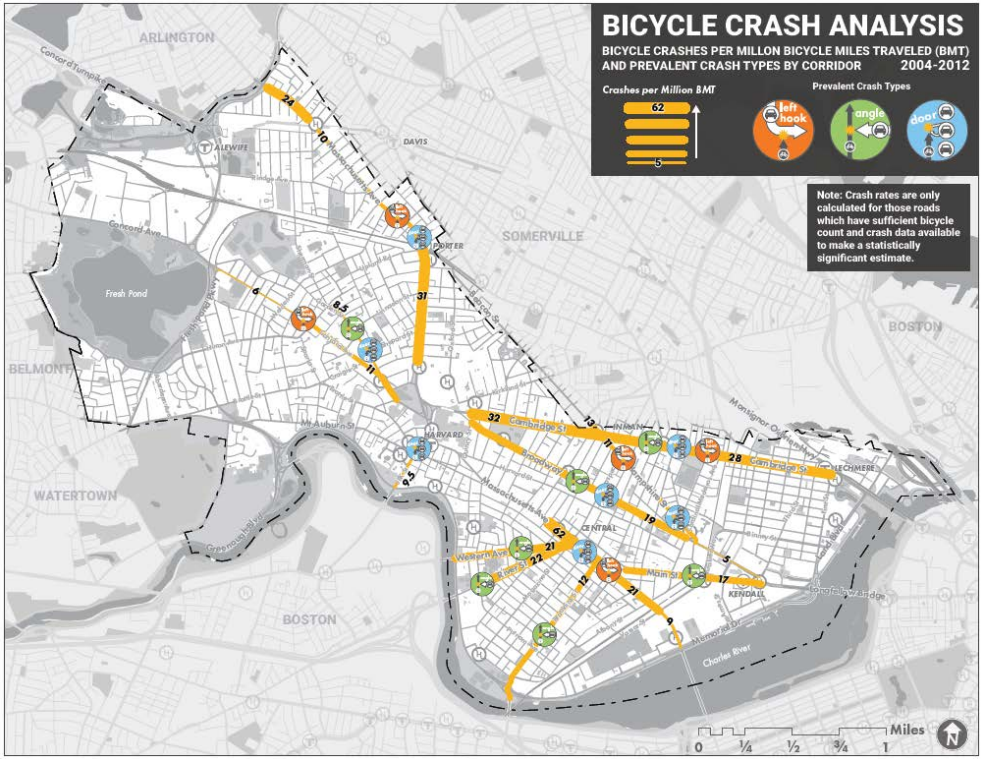


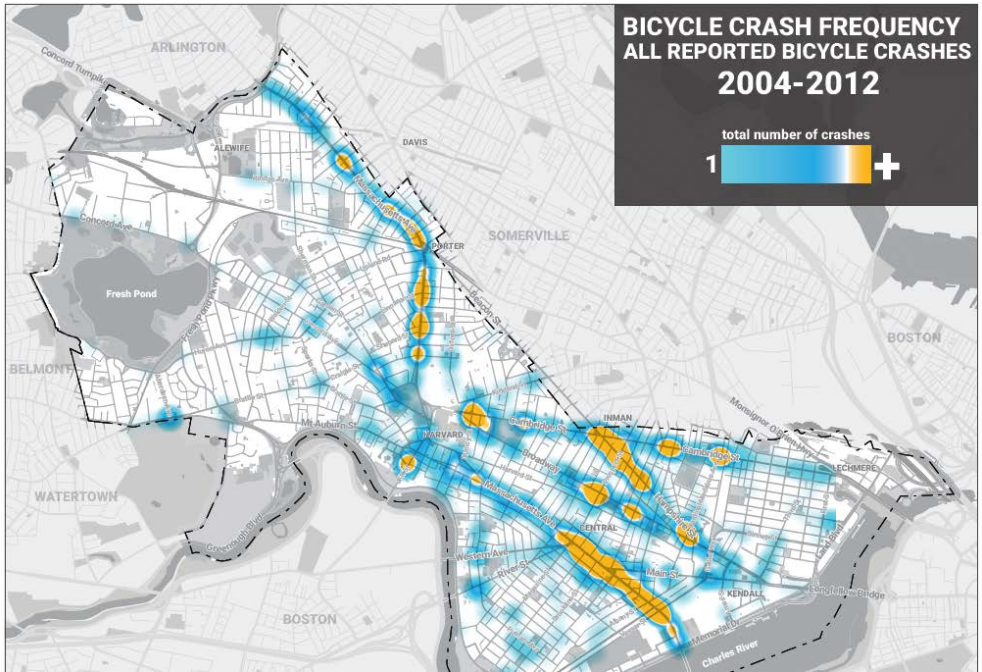
Map 4-9: Catalyst Projects

Project #	Title
1	Rainier Ave S/Martin Luther King Jr Way S Intersection Improvements
2	Mountains to Sound Trail crossing over I-5
3	S Holgate St across I-5
4	S Spokane St viaduct at grade to Beacon Hill
5	Military Road S to Airport Way S connection across railroad tracks
6	Chelan Ave SW / W Marginal Way / Alki Trail / SW Marginal Way / Delridge Way SW / SR 99 Intersection
7	NE 47th St overpass over I-5
8	Green Lake Way to N 63rd Street underpass of SR-99
9	Ballard Locks crossing
10	Ship Canal crossing
11	Ship Canal Trail to Gilman Ave W
12	Elliott Bay Trail to W Dravus St.
13	University Bridge - south leg to Eastlake Ave E/Harvard Ave E
14	SR-520 connection across Portage Bay
15	Improved crossing of Montlake Bridge
16	South Lake Union to Capitol Hill I-5 crossing
17	E-3 busway trail extension to railroad tracks
18	6th Ave S connection over railroad tracks
19	Burke Gilman Trail "missing link" completion
20	University Bridge - north leg to Roosevelt Way Way NE / 11th Ave NE and the University of Washington
21	Duwamish Trail connection to West Seattle
22	West Seattle Bridge Triangle area improvements
23	Chasblahud Loop: Mallard Cove connection
24	Ship Canal Trail and Dexter Ave to Fremont Bridge connection
25	North 34th Street and Fremont Avenue Intersection
26	Northgate pedestrian/bicycle bridge over I-5
27	Magnolia Bridge Improvements

Safety and Collisions

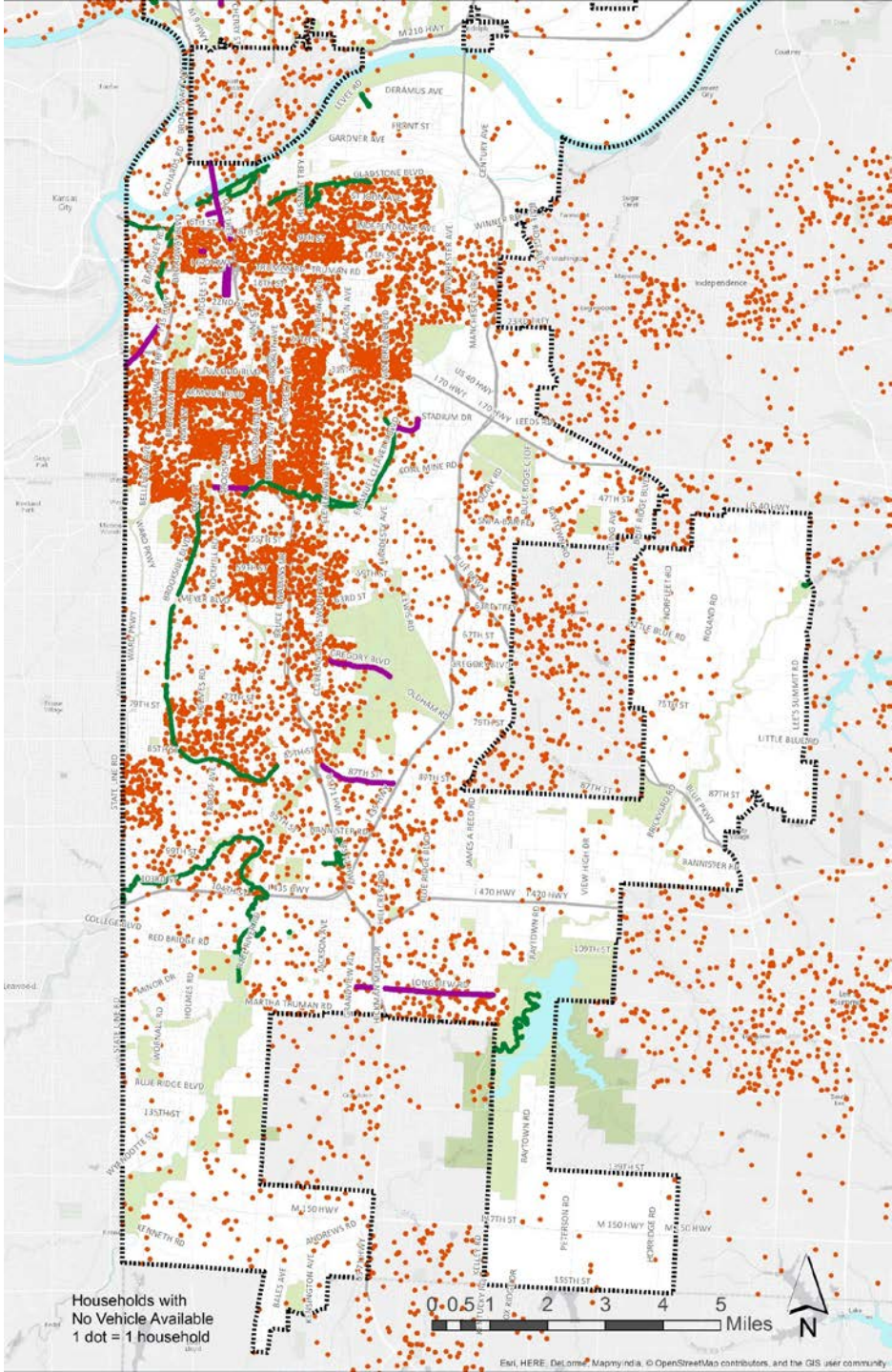
- Areas with high frequency of crashes
- Areas with high frequency of crashes per bicycle miles travelled
- Crash types at problem locations
- Street type
- Existing bicycle facilities
- Posted and observed vehicle speeds





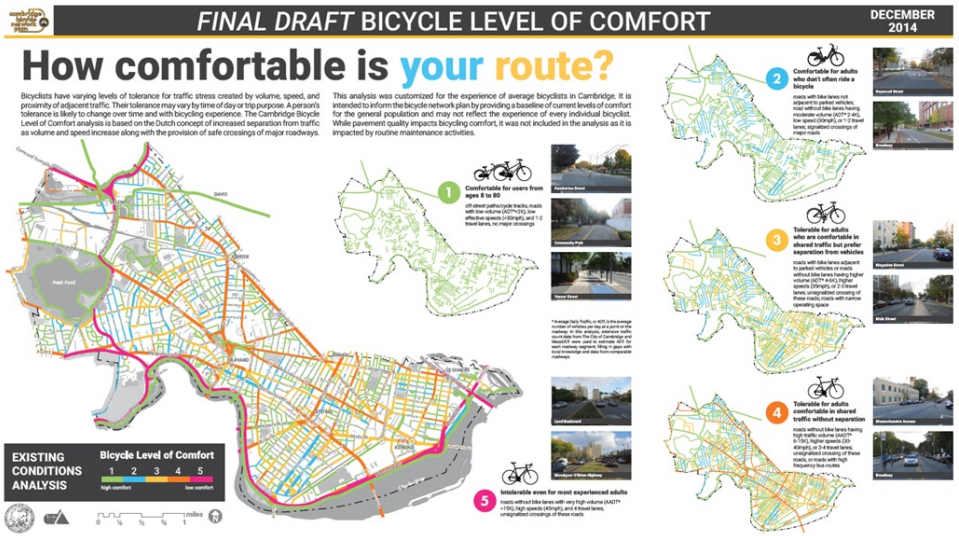
Equity

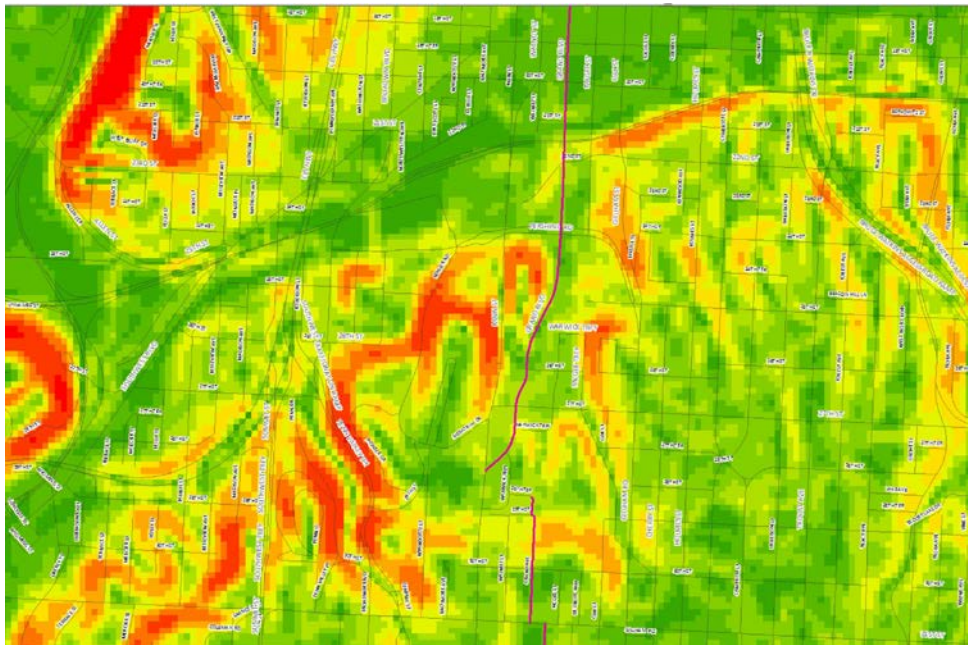
- Areas with high concentrations of carless households
- Areas with limited transit service
- Areas with high concentrations of poverty
- Areas with high average commute length/time



Feasibility for High Level of Comfort

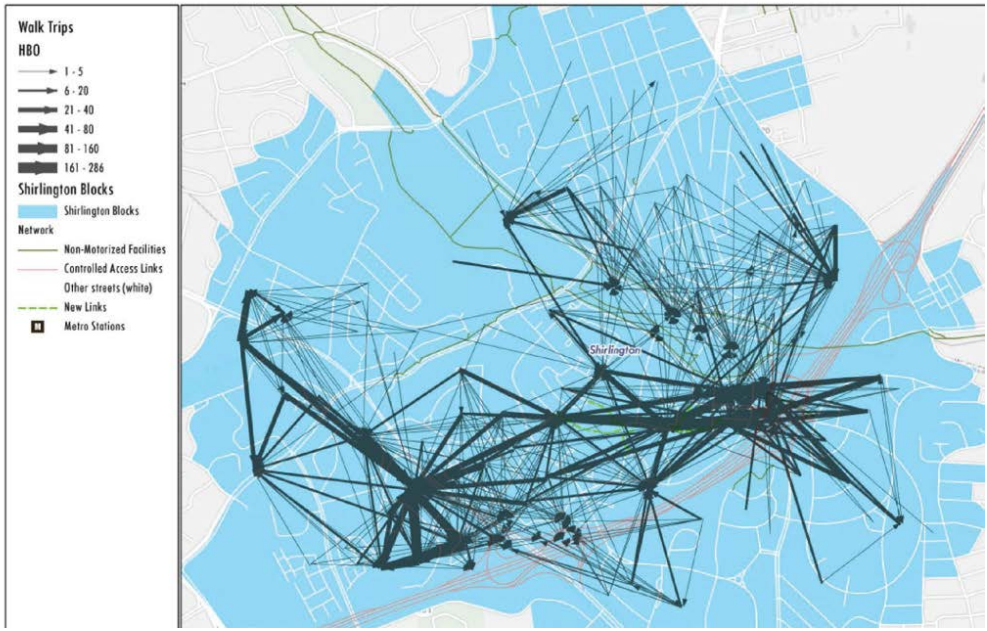
- Topography
- Major barriers (highways, railroads)
- Opportunities for a direct route
- Traffic speed
- Available space for facilities





Measuring Demand

- Latent Demand Analysis - Where would people would ride bicycles if facilities made it convenient and comfortable to do so?
- Not intended as a trip projection tool
- Traditional travel demand models don't account for circulation network, street, or built environment that are minor for car trips but very important for cyclists.
- Observations can't be a direct proxy for latent demand because they already internalize physical barriers and constraints that impact a cyclist's decisions.



Measuring Demand

- GIS-based analysis using City and Census data
- Citywide bicycle observations could be use to calibrate based on statistically significant factors that relate to observed behavior
- Without observation data, we used the most complete national research available to make assumptions about how and where people would ride.

NCHRP

REPORT 770

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

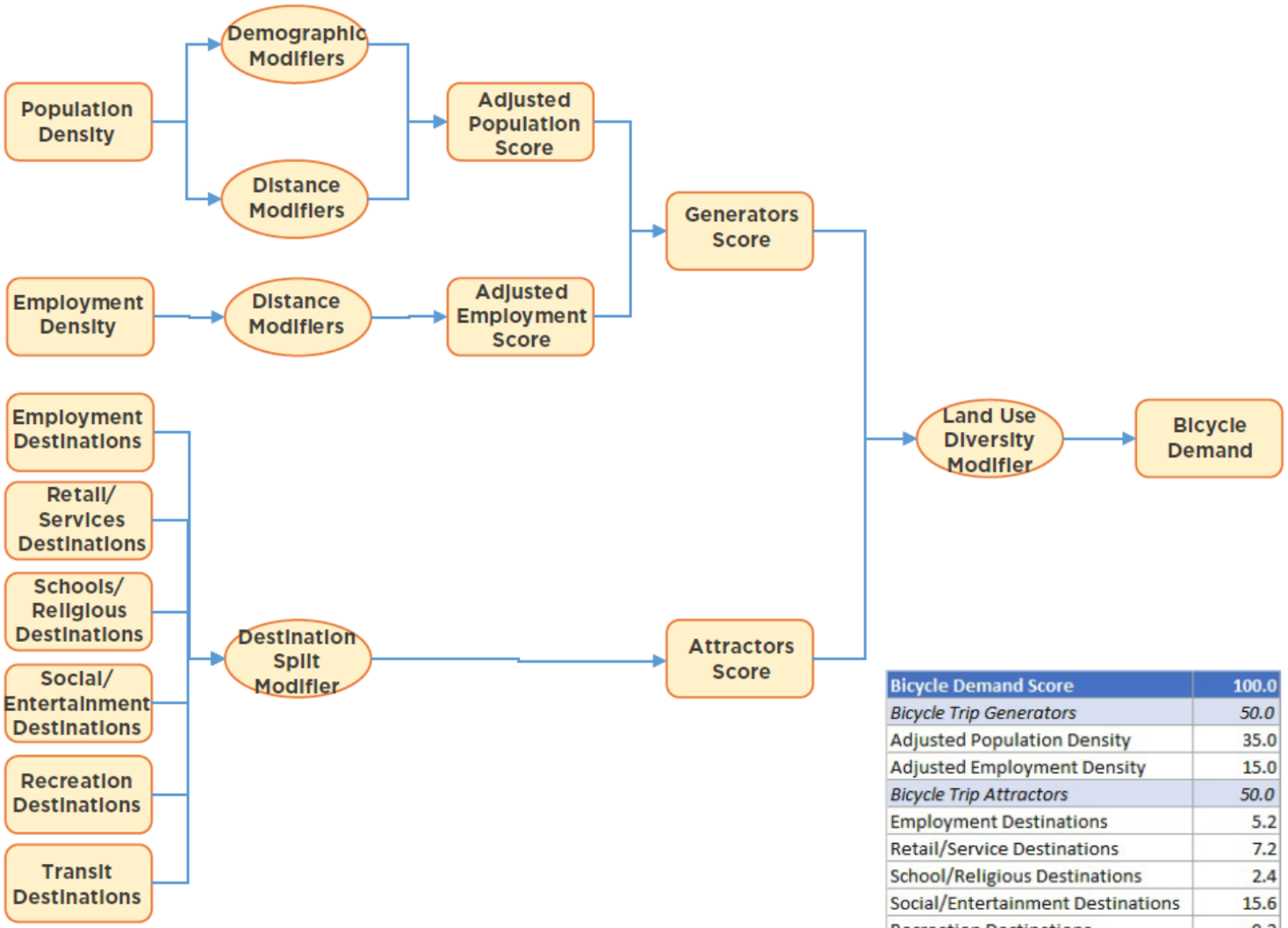
Estimating Bicycling and Walking for Planning and Project Development: A Guidebook

National Household Travel Survey

Understanding How People Get from Place to Place

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

Demand Analysis Model



Bicycle Demand Score	100.0
Bicycle Trip Generators	*50.0*
Adjusted Population Density	35.0
Adjusted Employment Density	15.0
Bicycle Trip Attractors	*50.0*
Employment Destinations	5.2
Retail/Service Destinations	7.2
School/Religious Destinations	2.4
Social/Entertainment Destinations	15.6
Recreation Destinations	9.2
Transit Destinations	10.4

Research on Cycling

- National data helped to inform the weights and factors applied to this demand analysis
- Demographic profiles of cycling use were combined with local census data to modify trip generation likelihood

Figure 2-2. Walk trips by travel time (2007/08 MWCOG Regional Travel Survey).

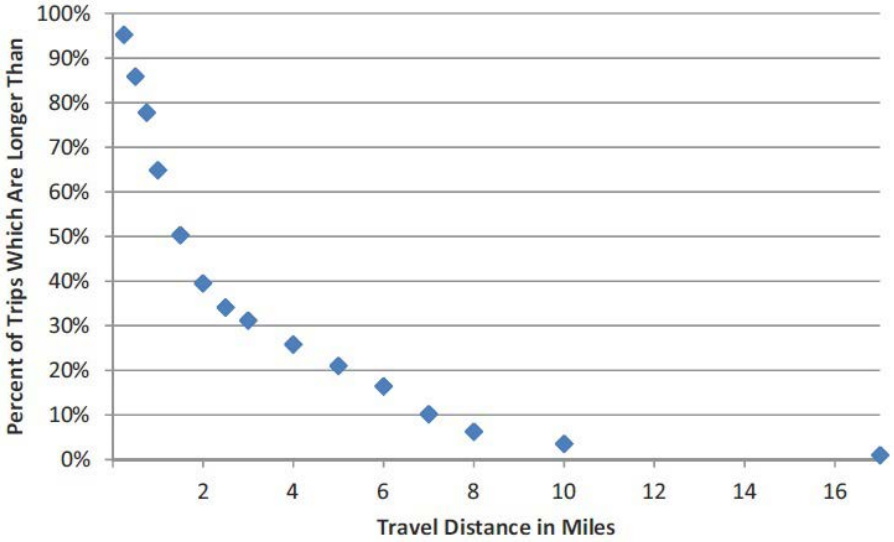
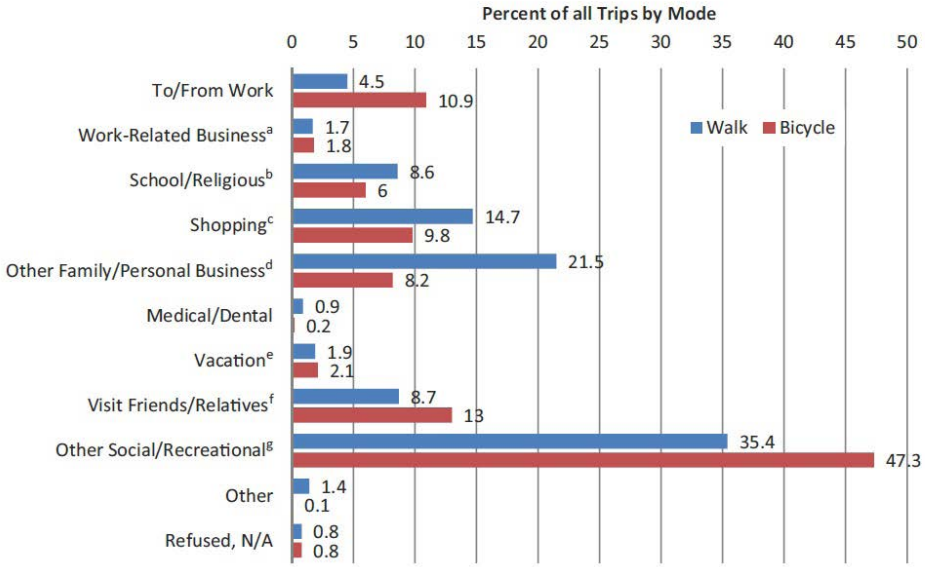


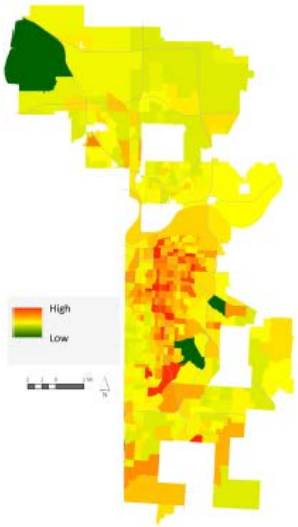
Figure 2-3. Bicycle trips by distance (2007/08 MWCOG Regional Travel Survey).



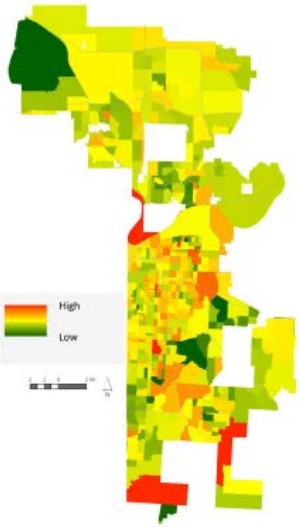
Demographic Modifiers

- Areas in red have a demographic profile with the strongest positive correlation to bicycle trips.

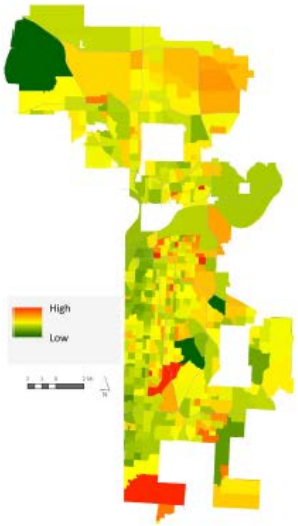
DEMOGRAPHIC MODIFIER: CARLESS HOUSEHOLDS



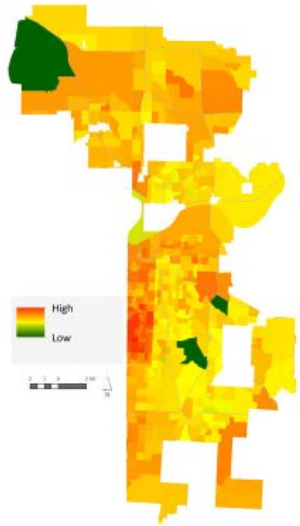
DEMOGRAPHIC MODIFIER: INCOME



DEMOGRAPHIC MODIFIER: AGE

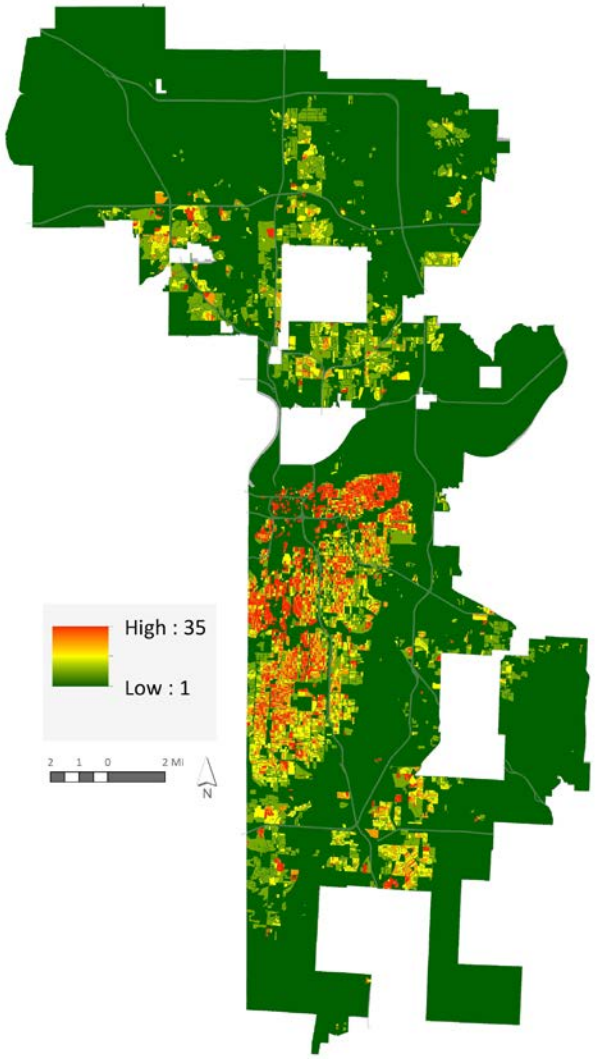


DEMOGRAPHIC MODIFIER: EDUCATION

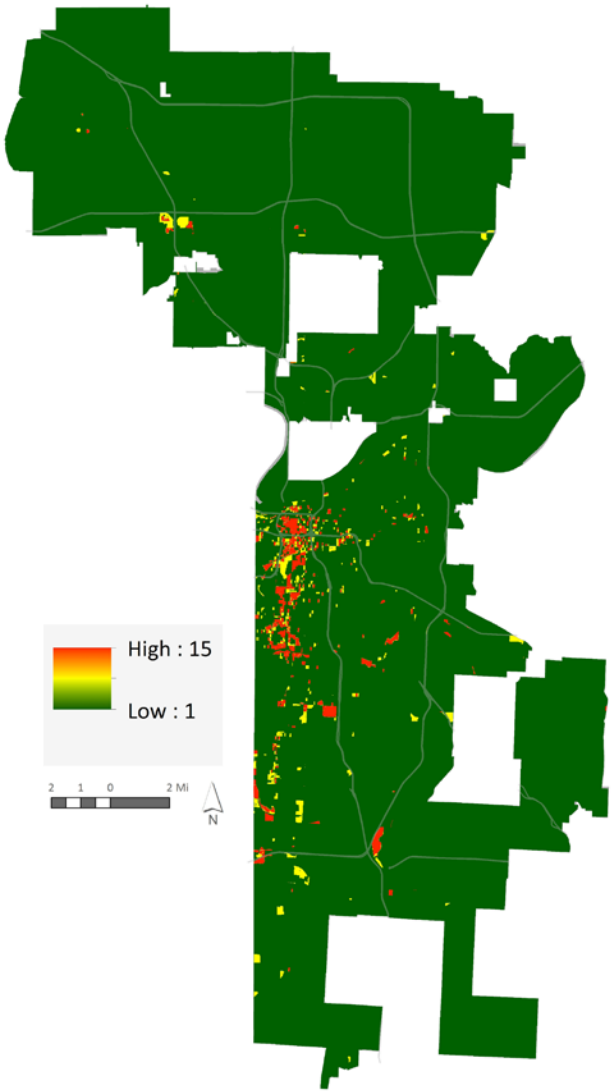


Adjusted Population and Employment Density

Adjusted population density

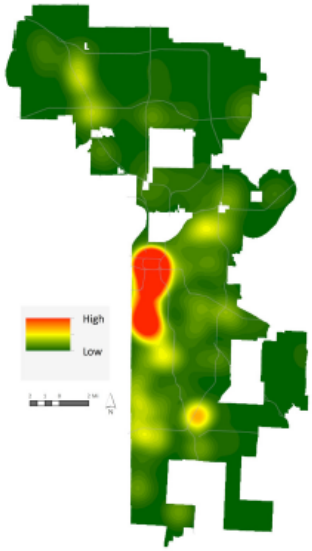


Adjusted employment density

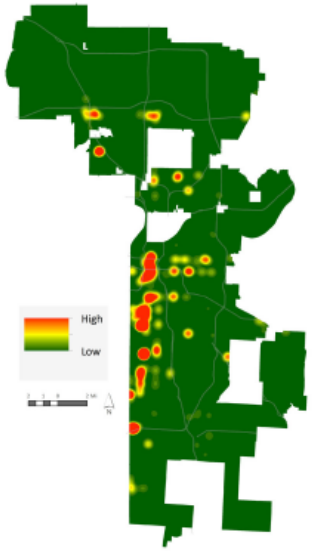


Bicycle Trip Attractors

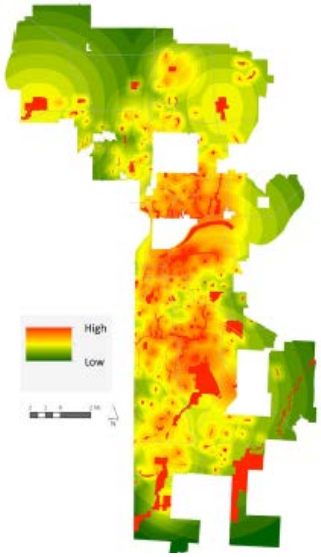
EMPLOYMENT DESTINATIONS



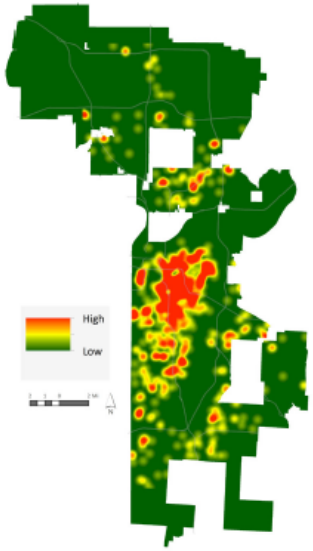
RETAIL/SERVICE DESTINATIONS



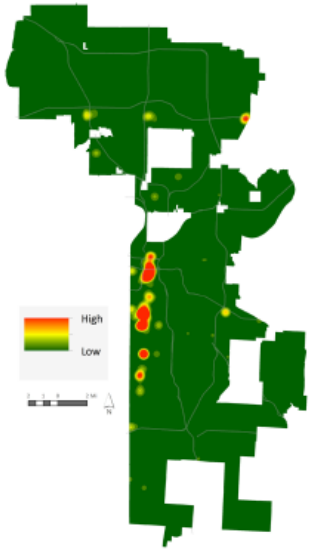
RECREATION DESTINATIONS



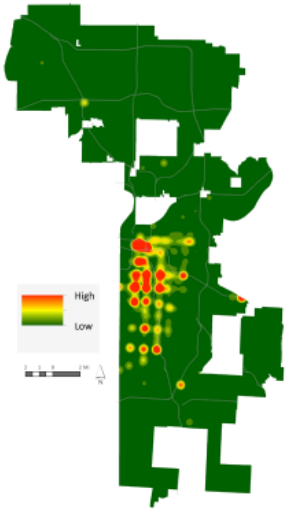
SCHOOL/RELIGIOUS DESTINATIONS



SOCIAL/ENTERTAINMENT DESTINATIONS

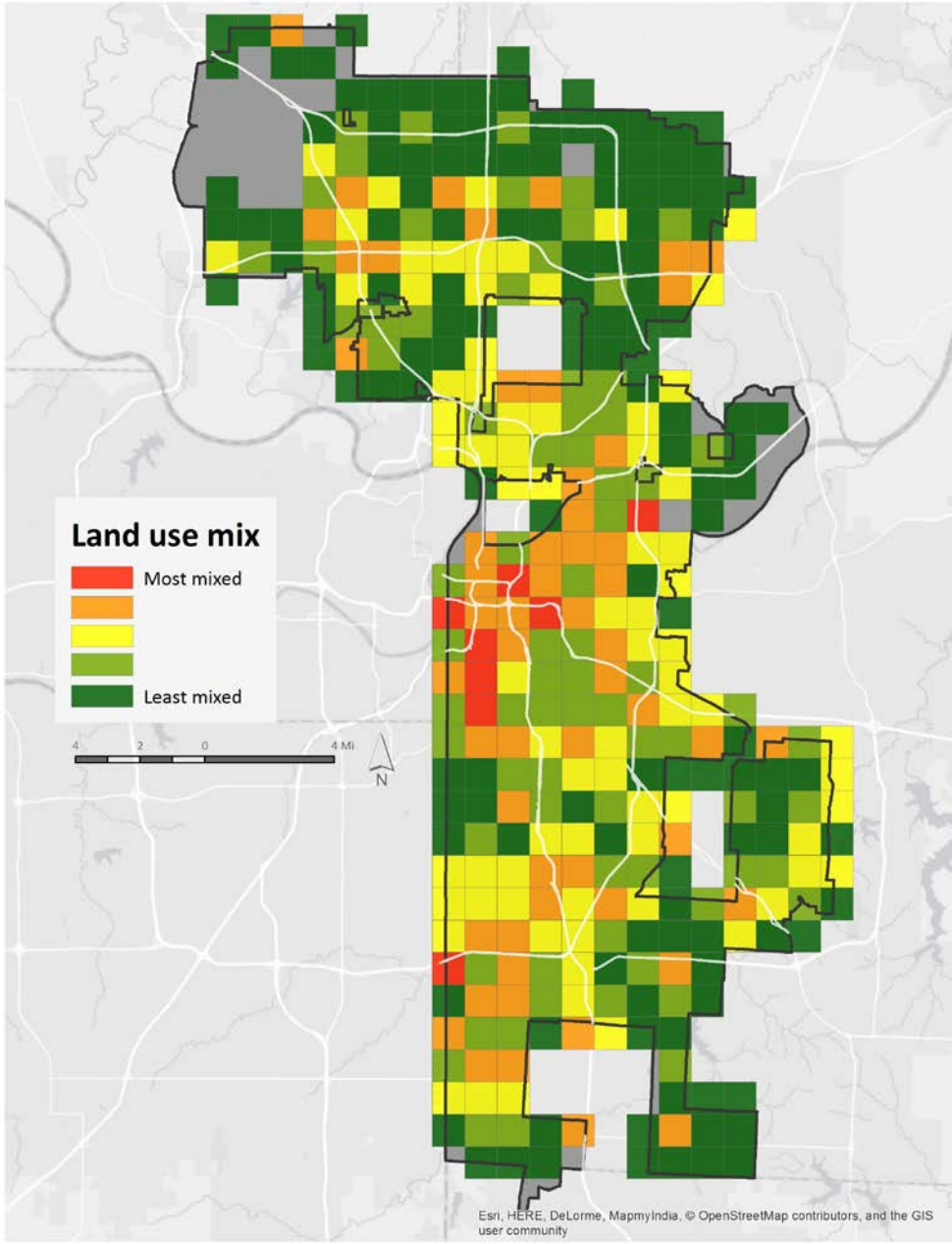


TRANSIT DESTINATIONS



Land Use Diversity Modifier

- Research shows a positive correlation between mix of uses and bicycle trips.

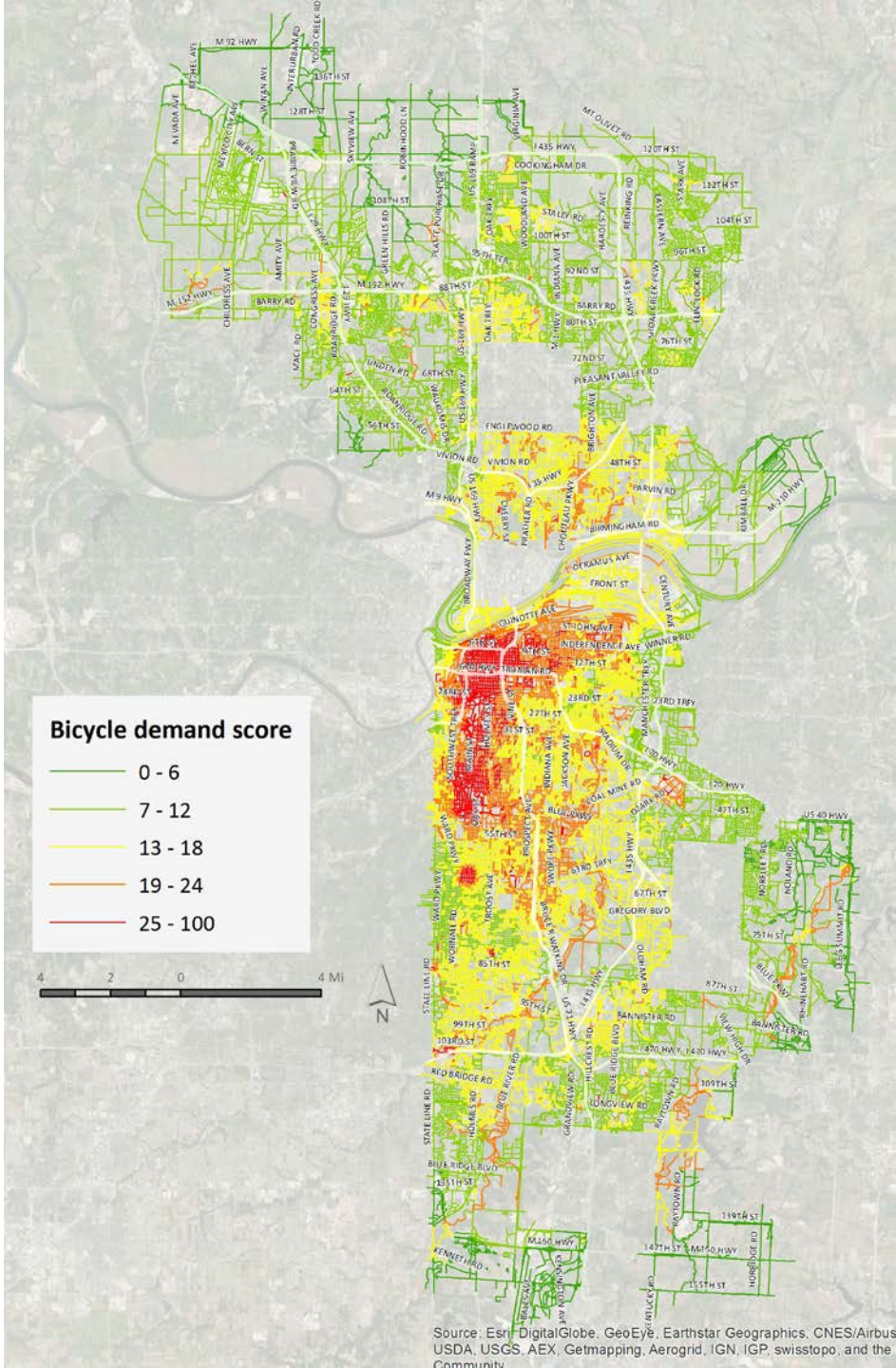


Findings

- Highest demand: Downtown, Westport, and the Plaza. High demand also exists in corridors connecting these nodes, as well as large portions of the historic northeast.

- Pockets of high demand follow parkways through developed areas of the east side and northland.

- Generally, high demand areas are those with a combination of many potential destinations, high population densities, and a diverse mix of uses.



Findings

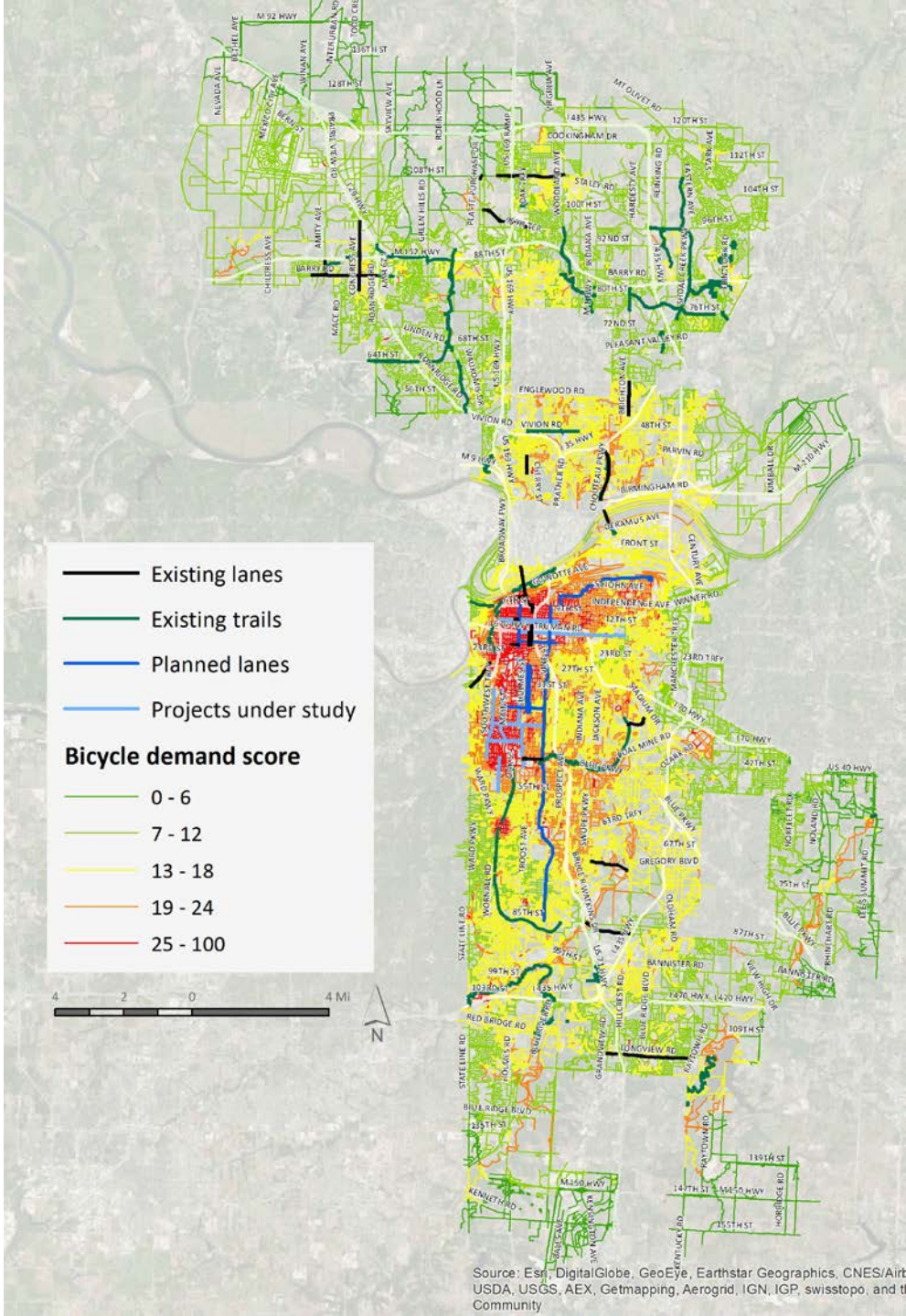
- Many streets with bicycle lanes are located in areas with low to moderate demand.

- Existing bike lanes on Emmanuel Cleaver, Chouteau Pkwy, and Charlotte/Holmes are located in higher demand areas.

- Planned improvements throughout the urban core are poised to serve areas of high demand much better, but key areas of need remain:

  - North-south route connecting Downtown, Westport, Plaza,

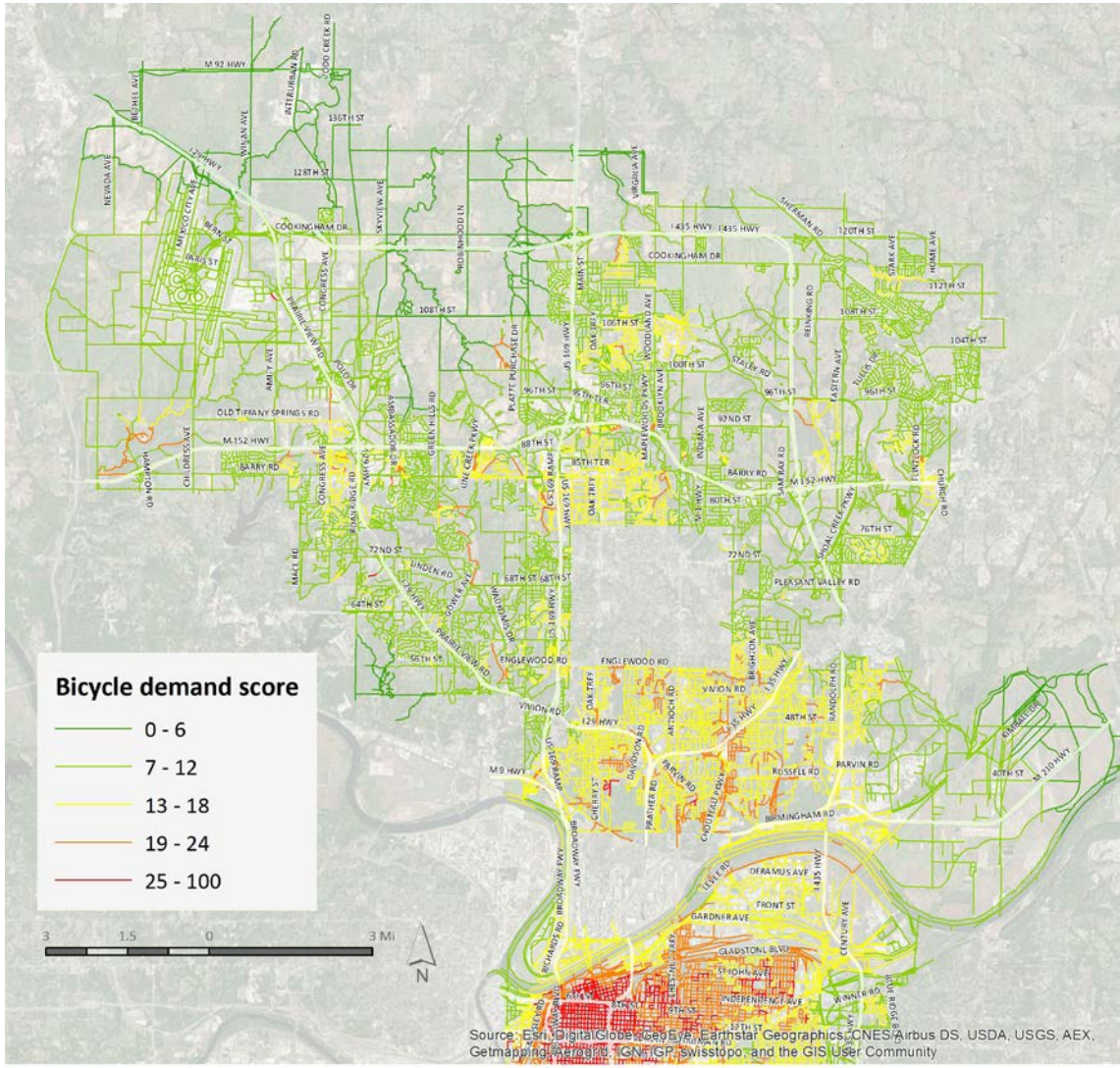
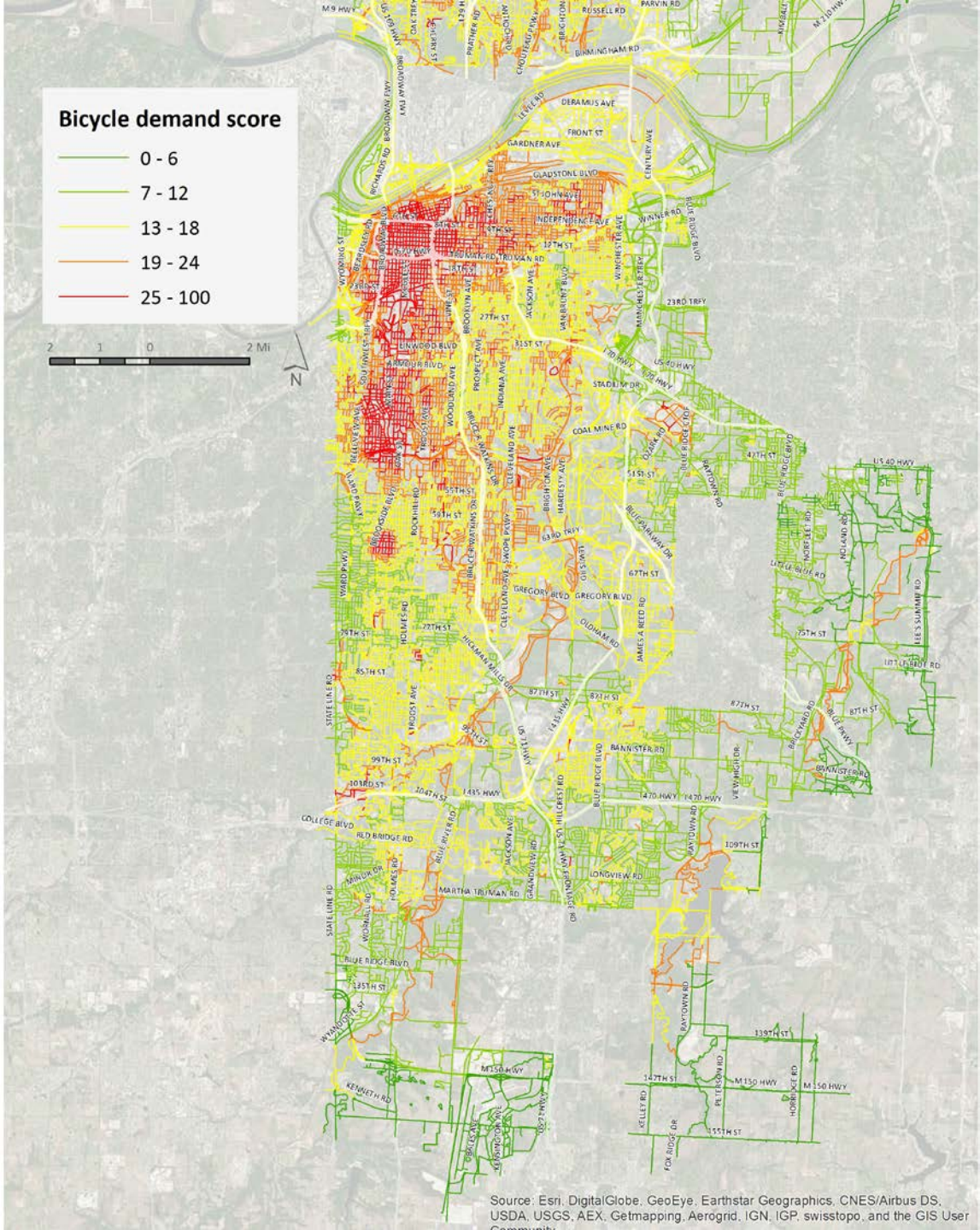
  - Route serving densest parts of Northeast.



Making the Model Better

- Gather local data!
  - Calibrations based on local observations
- Measurement of regional and inter-community demand
- Incorporation of generators and attractors outside of City limits
- Revised model weights and factors based on evolving understanding of future bicycle travel patterns.

High Bicycle Demand North



High Bicycle Demand South