

# Access to Destinations: Methods, Findings, and Implications

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Measures for Transportation and Livable Communities

# Accessibility

- A measure that relates the transportation network to the pattern of activities that comprise land use.
- It measures the *ease of reaching valued destinations*.
- Accessibility “is perhaps the most important concept in defining and explaining regional form and function.” (Wachs and Kumagai 1973)

# Access to Destinations

- To improve understanding of travel on the current transportation infrastructure
- To develop measures of accessibility using travel and land use data, showing how accessibility has changed from 1995 to 2005
- Using these new tools and information, to assess how our existing transportation and land use system meets alternative policy goals



# Colleagues

- Bernadette Marion
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- Jason Junge

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# Sponsors

MnDOT

Hennepin County

# Generalizing Accessibility

- More modes
- More destinations/opportunities
- Measurement vs. models



1995



2000



2005

		<b>Jobs</b>	<b>Schools</b>	<b>Parks</b>	<b>Shopping</b>
		<b>Jobs</b>	<b>Schools</b>	<b>Parks</b>	<b>Shopping</b>
<b>Automobile</b>					
	<b>Jobs</b>	<b>Schools</b>	<b>Parks</b>	<b>Shopping</b>	
<b>Automobile</b>					
<b>Transit</b>					
<b>Bicycling</b>					
<b>Walking</b>					



# Accessibility as a performance measure

Cumulative

Clear

Comparable

Comprehensive

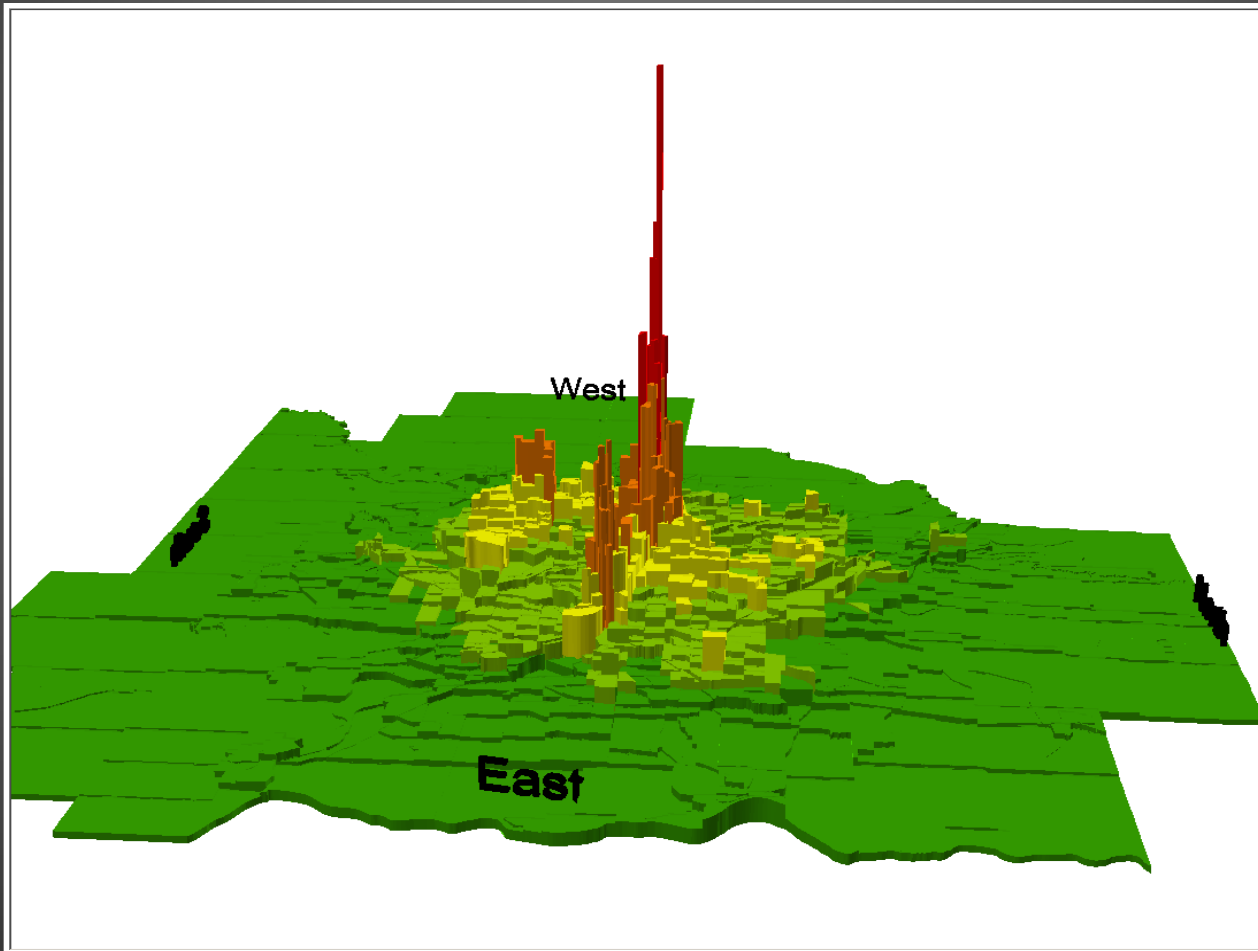
Calculable

# “Cumulative Opportunities”

•How many	jobs I can reach in	10 minutes	by car	at 7 AM
	workers	20	carpool	noon
	people	30	walking	4 pm
	stores	40	bike	midnight
	parks	50	transit	
	schools	60	truck	
	acres		scooter	
	airports		Segway	
	hospitals			
	9	6	~7	4



# *Gravity-based Measure*



# The Nuts and Bolts

# Data Sources



- Travel time information
- Number of resident workers
- Number of jobs
- Origin and destination matrix

Modeling accessibility is  
straight-forward, given a  
model.

Measuring accessibility on  
the other hand ...



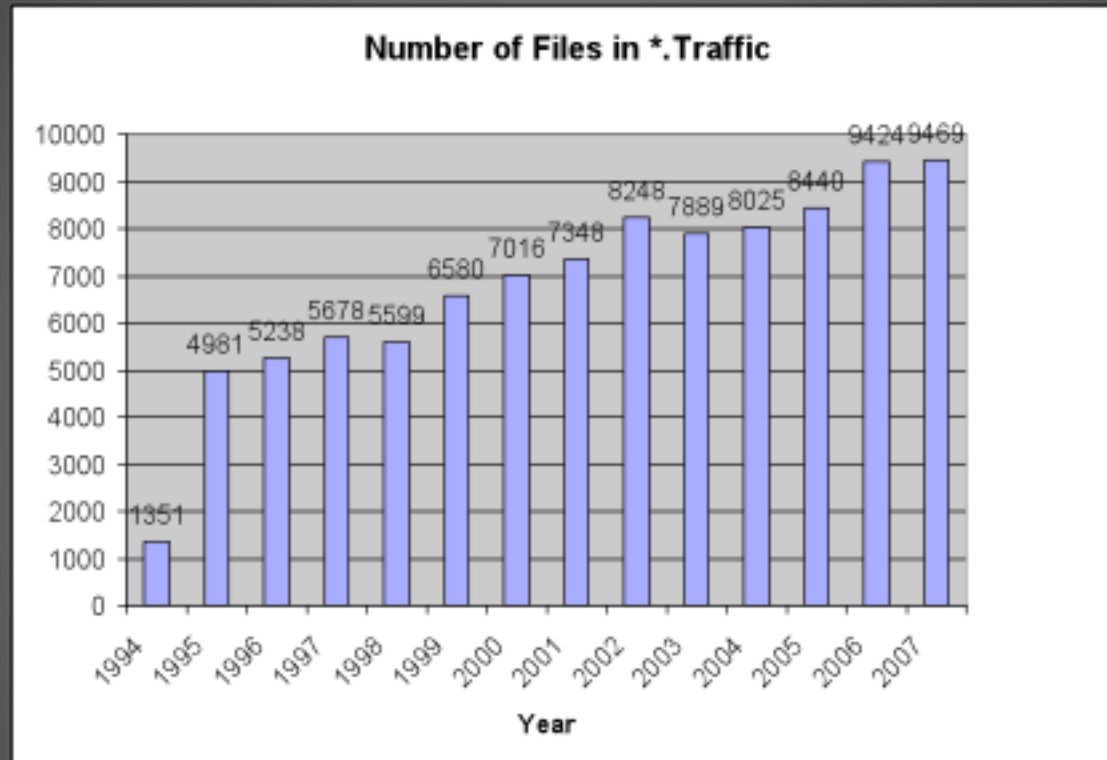
# Making Sausage





# Freeways

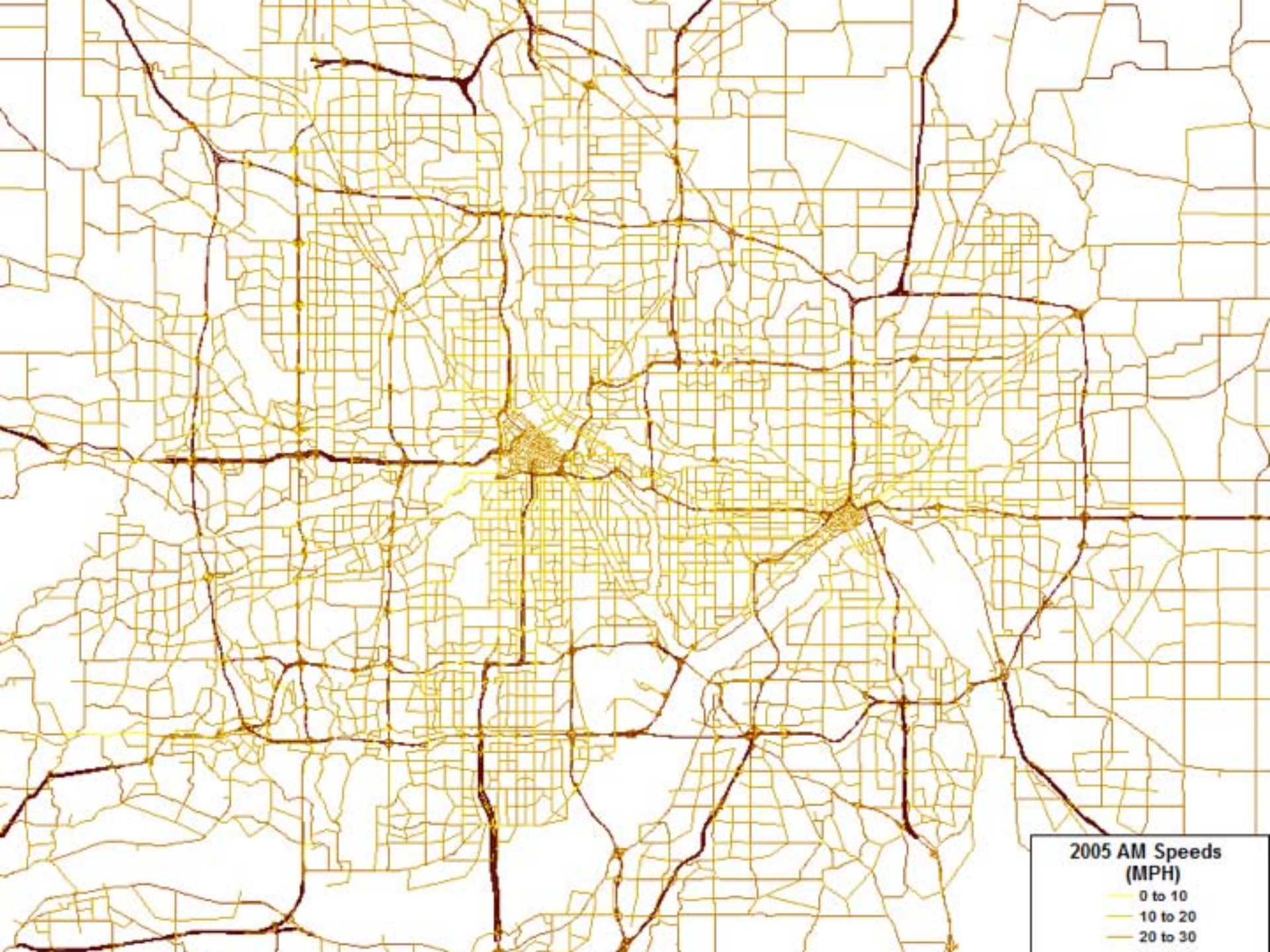
# Available Freeway Data



source: Taek Kwon

Generation of Travel Time Data for Metro Freeway Network





**2005 AM Speeds  
(MPH)**

- 0 to 10
- 10 to 20
- 20 to 30





# Arterials & Collectors

# Arterial Travel Time Estimation

Assign OD Matrix using SUE assignment



Correct Flows According to Observed Automatic Traffic Recording (ATR) station counts, where available



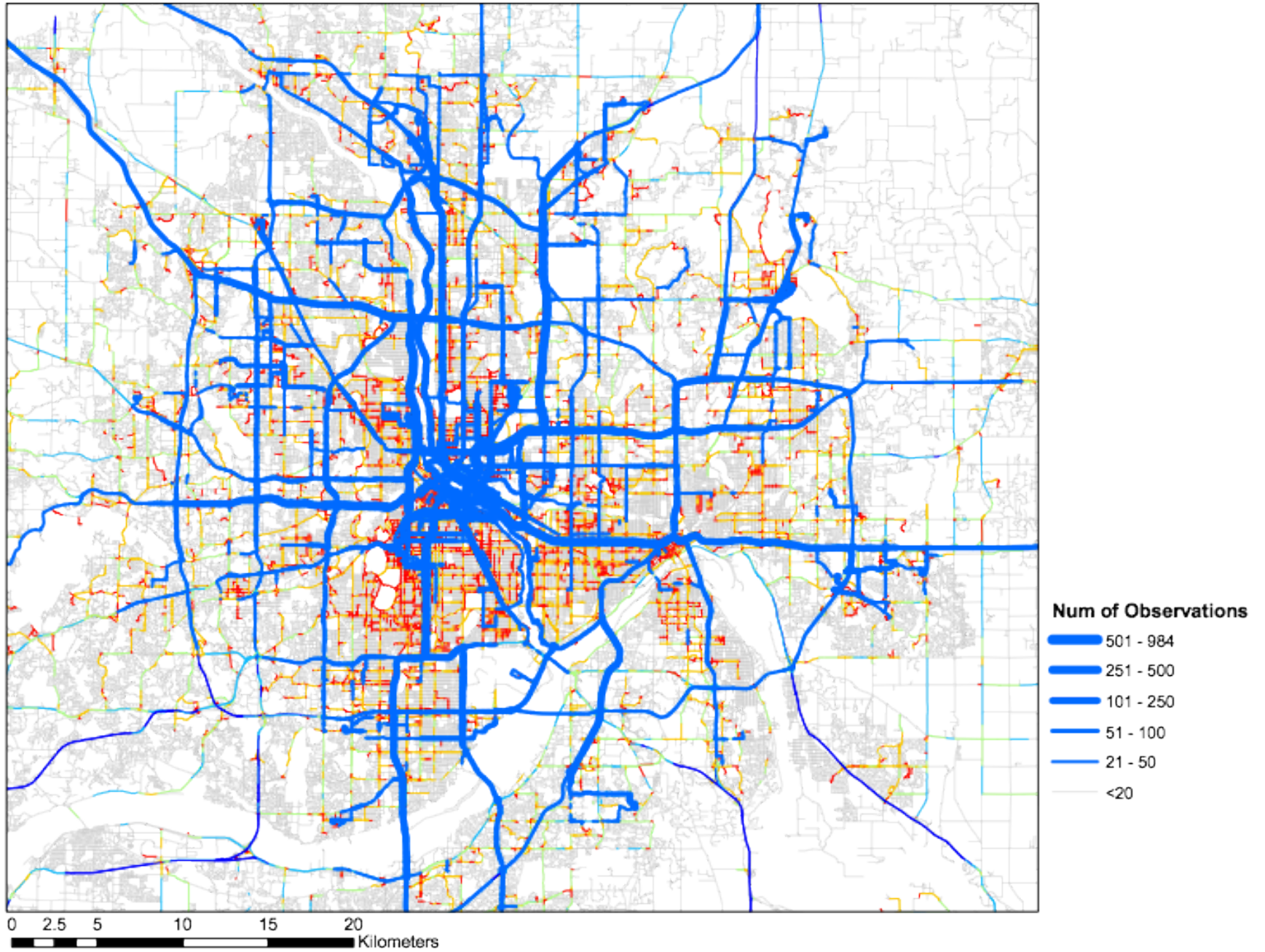
Apply correction based on covariance of links without ATR station to links with ATR.



Use link performance function to estimate travel time based on corrected flows.

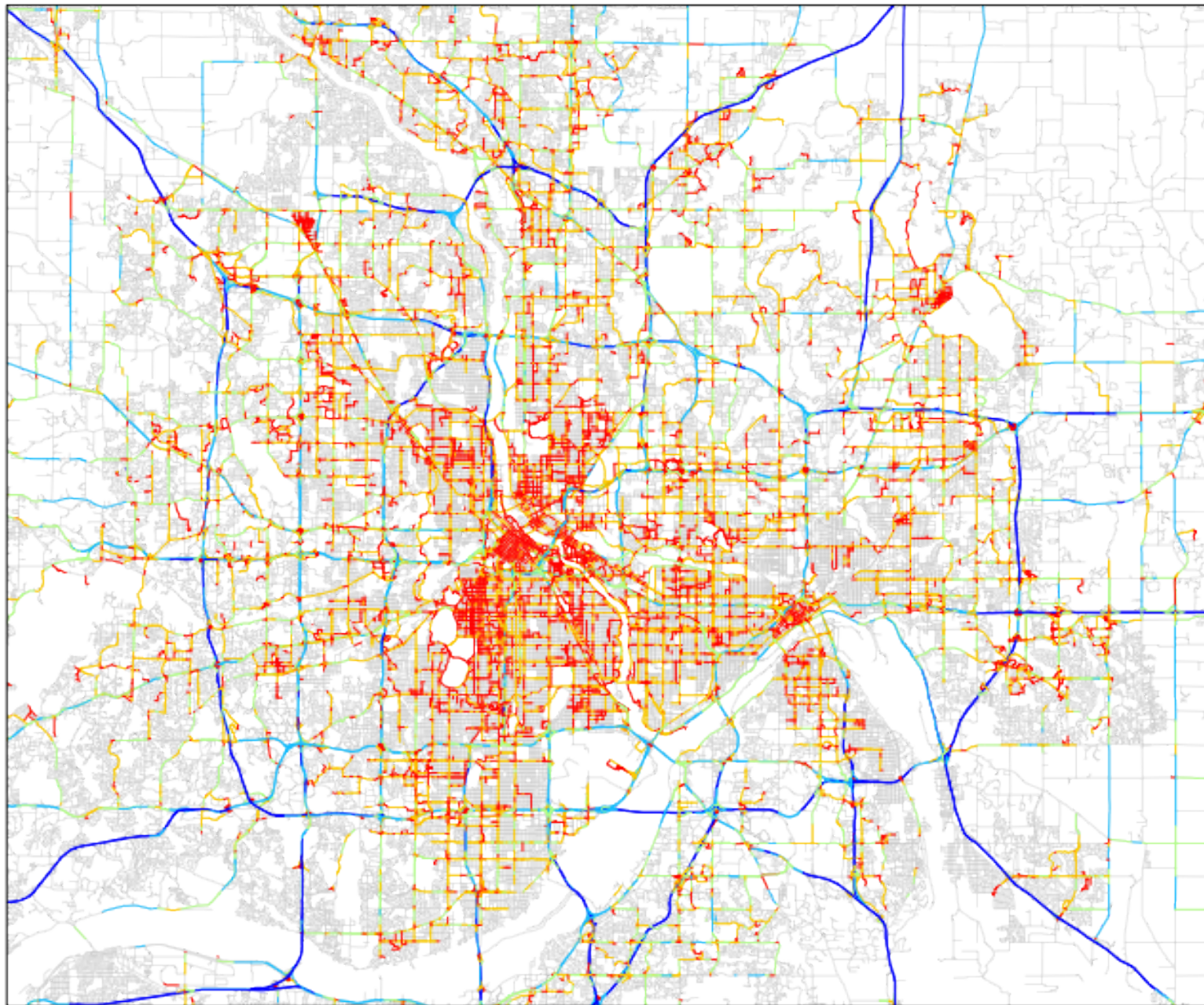
In the future, travel speed  
will be easier to obtain.

# Number of Samples Derived from GPS Data





# Mean Speed Estimated from GPS Data

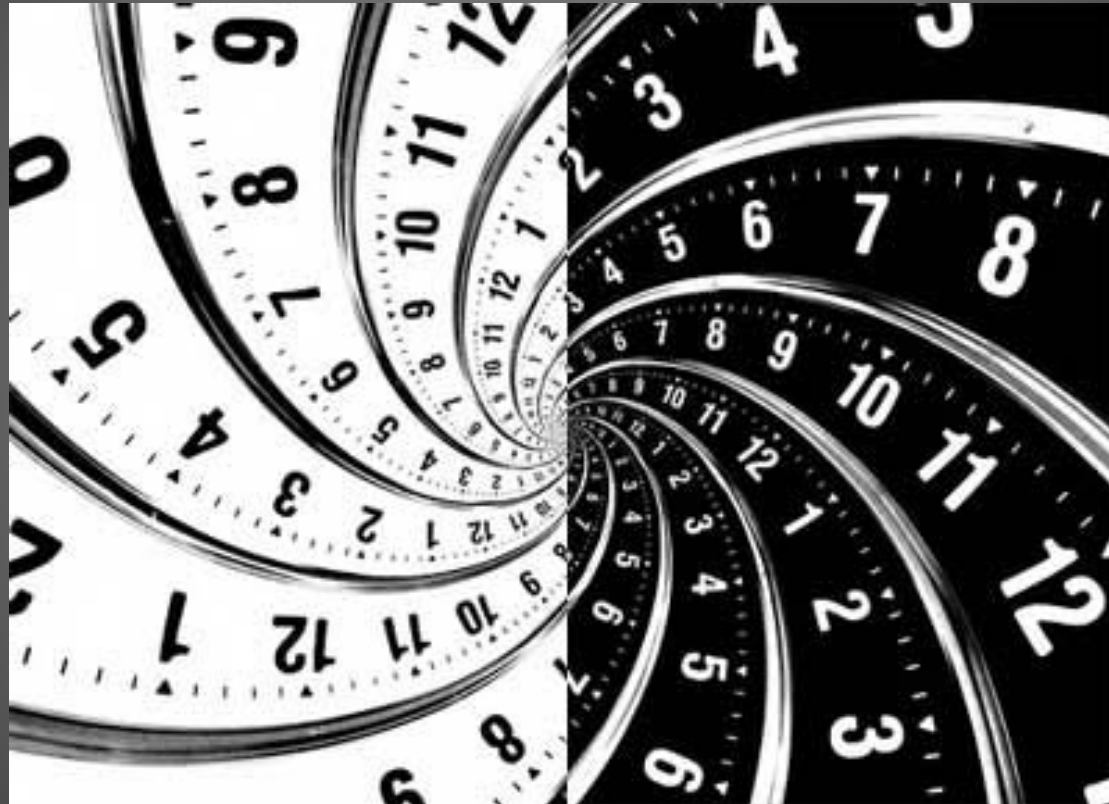


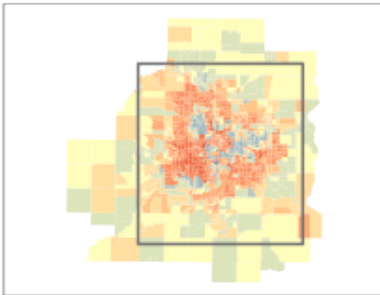
## Mean Speed (km/h)

- 3 - 40
- 41 - 60
- 61 - 80
- 81 - 100
- 101 - 117

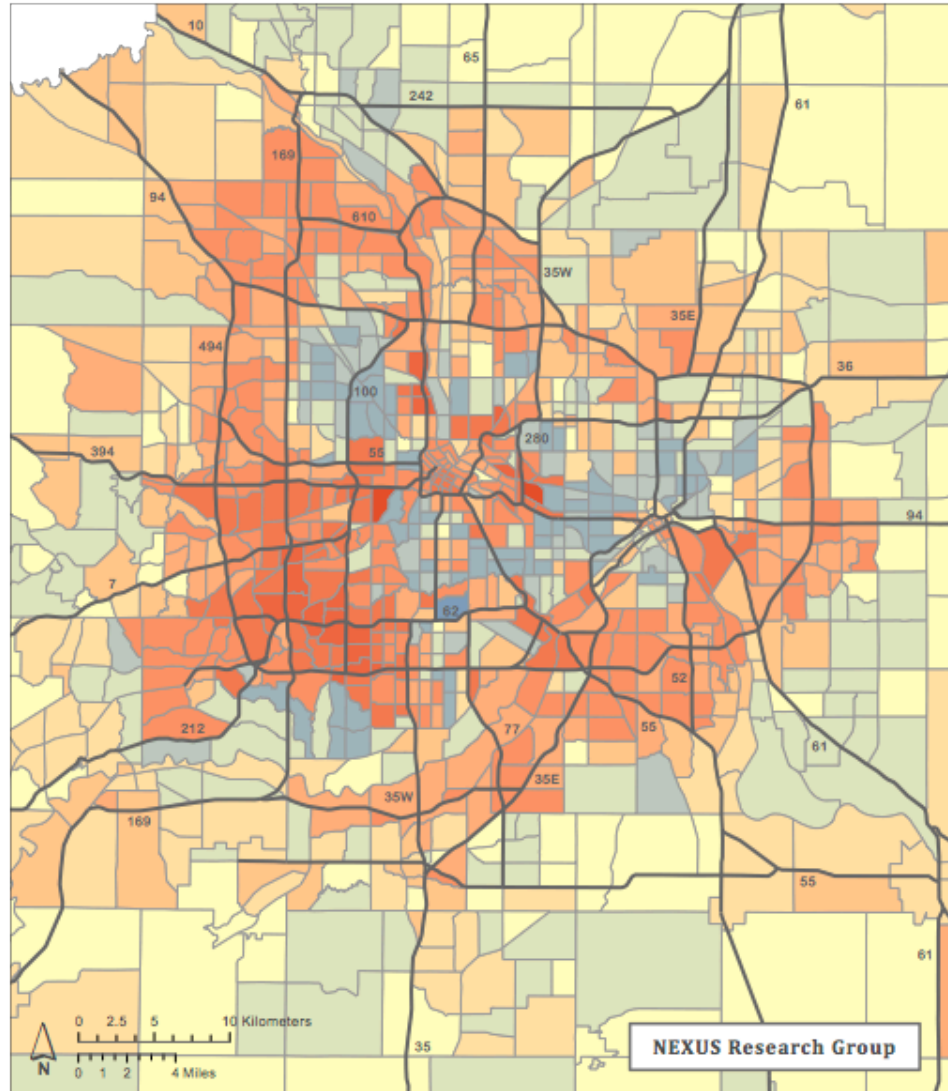
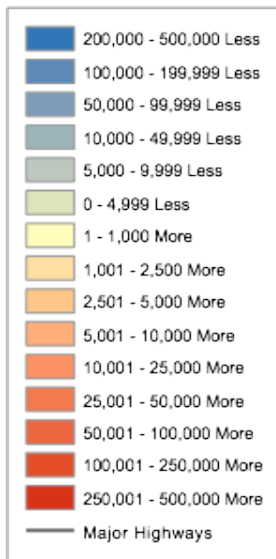
0 2.5 5 10 15 20  
Kilometers

# Temporally: Is Accessibility Increasing or Decreasing Over Time?



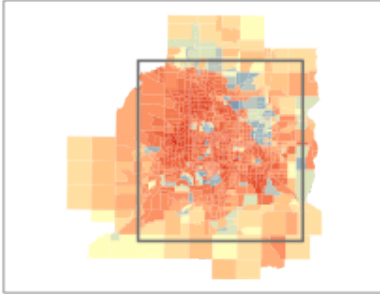


**Change in Number of Jobs Accessible  
from Origin Traffic Analysis Zone (TAZ)  
between Years 1995 and 2005:  
Travel Time within 10 Minutes  
by Auto during AM Peak  
Twin Cities, Minnesota**

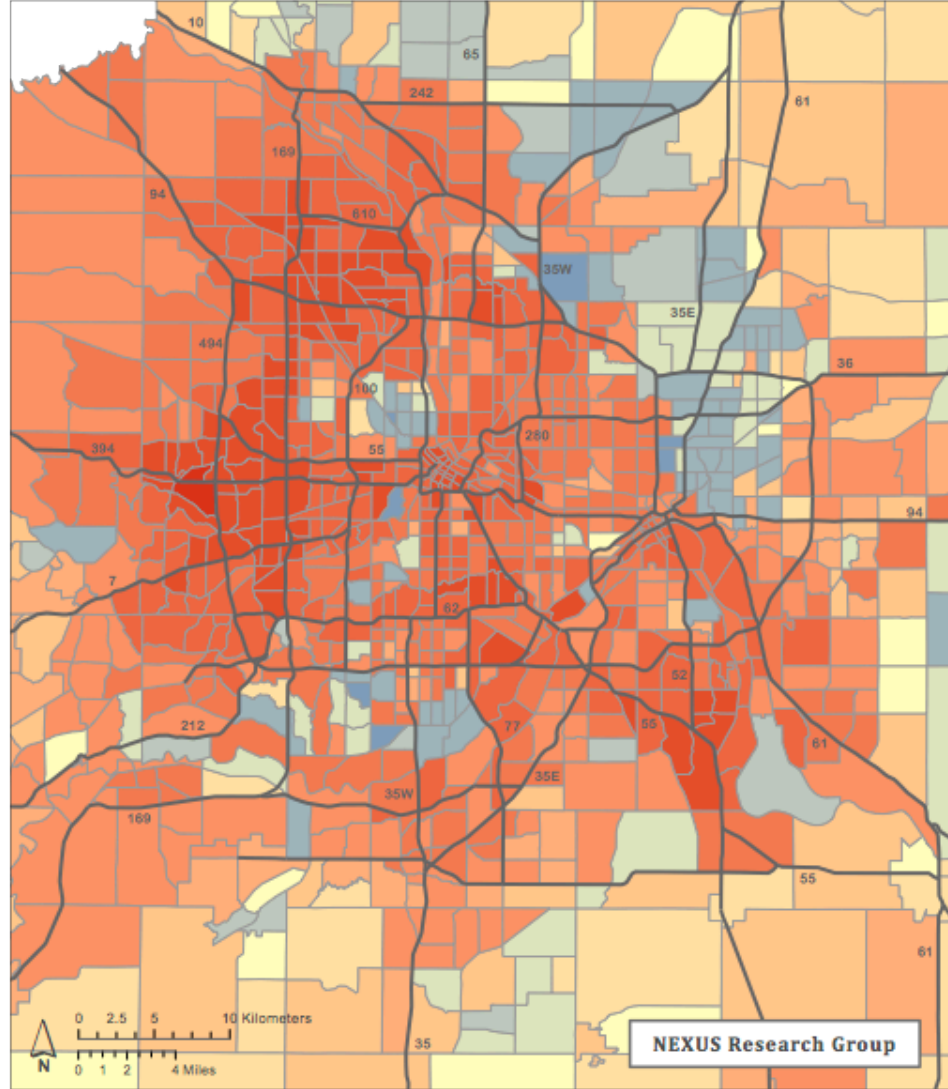
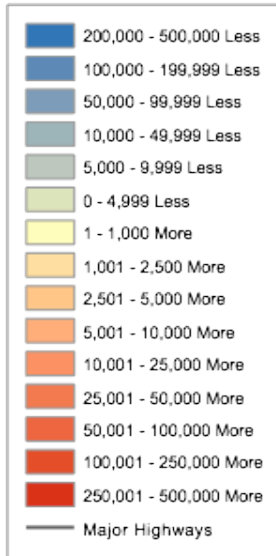


Zone Structure Displayed: Traffic Analysis Zone Boundaries  
 Primary Data Sources: MNDOT, Twin Cities Metropolitan Council,  
 US Census Bureau - 1990 & 2000 CTPP and SF1 Files; 2005 LEHD Files



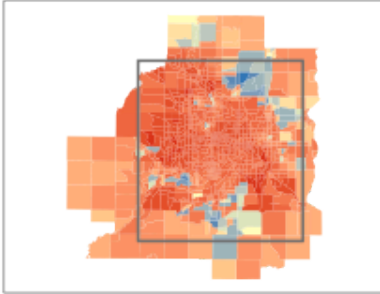


**Change in Number of Jobs Accessible  
from Origin Traffic Analysis Zone (TAZ)  
between Years 1995 and 2005:  
Travel Time within 20 Minutes  
by Auto during AM Peak  
Twin Cities, Minnesota**

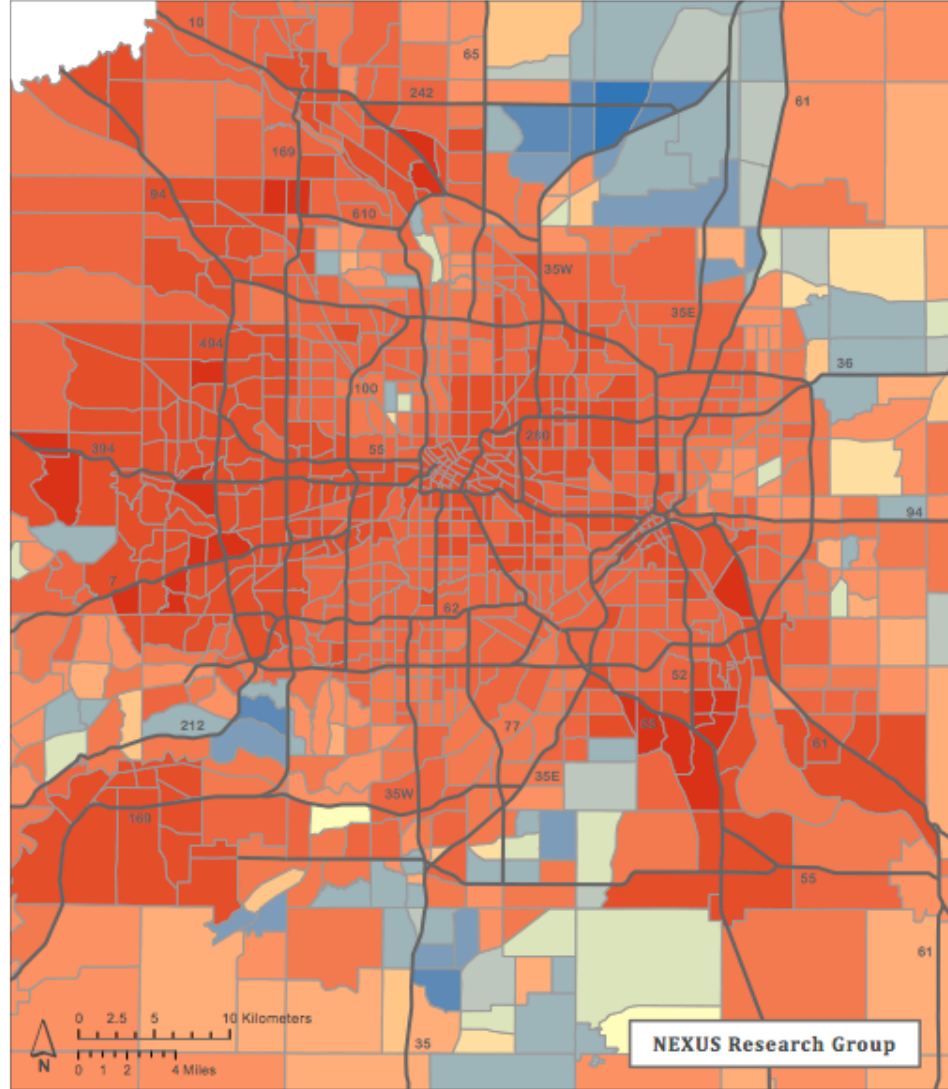
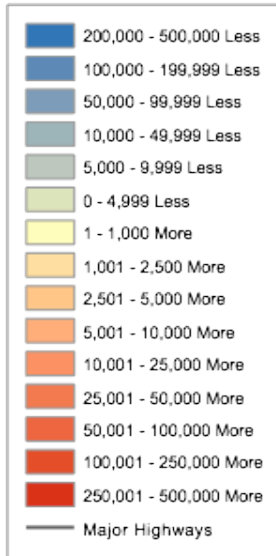


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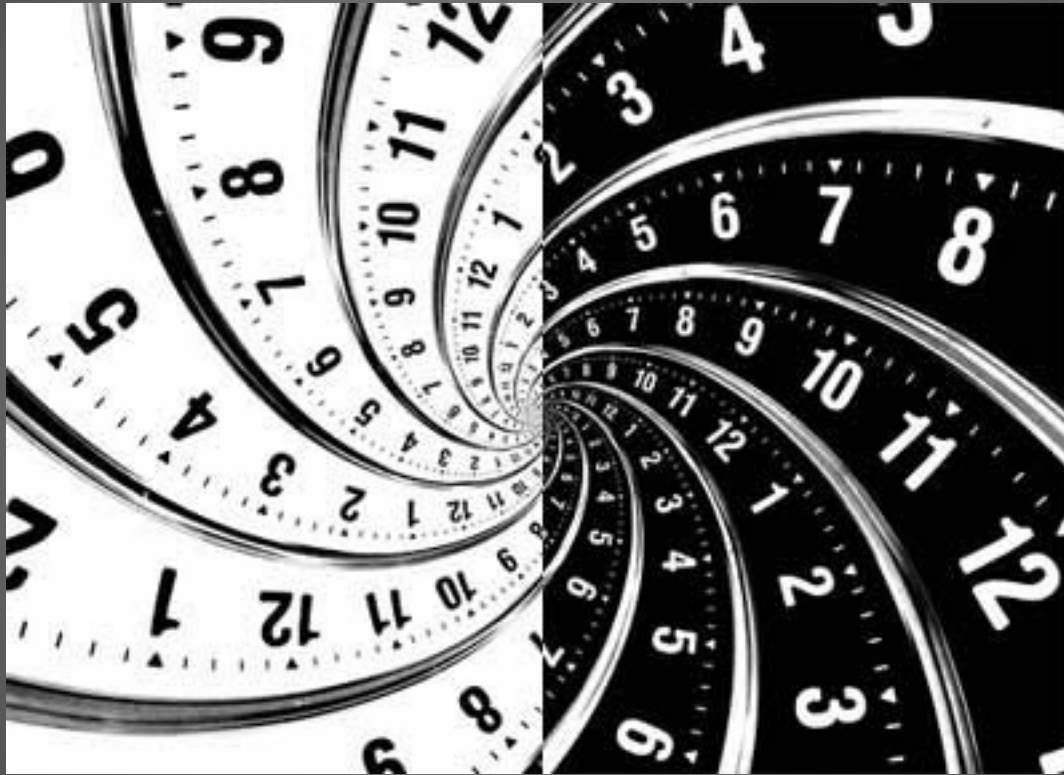


**Change in Number of Jobs Accessible  
from Origin Traffic Analysis Zone (TAZ)  
between Years 1995 and 2005:  
Travel Time within 30 Minutes  
by Auto during AM Peak  
Twin Cities, Minnesota**



Zone Structure Displayed: Traffic Analysis Zone Boundaries  
 Primary Data Sources: MNDOT, Twin Cities Metropolitan Council,  
 US Census Bureau - 1990 & 2000 CTPP and SF1 Files; 2005 LEHD Files

# Temporally: Is Accessibility Increasing or Decreasing Over Time?



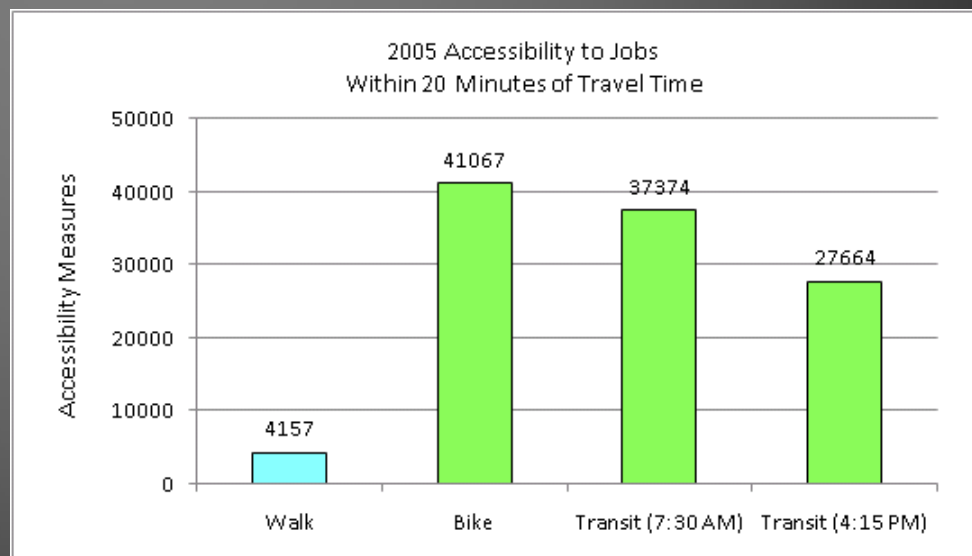
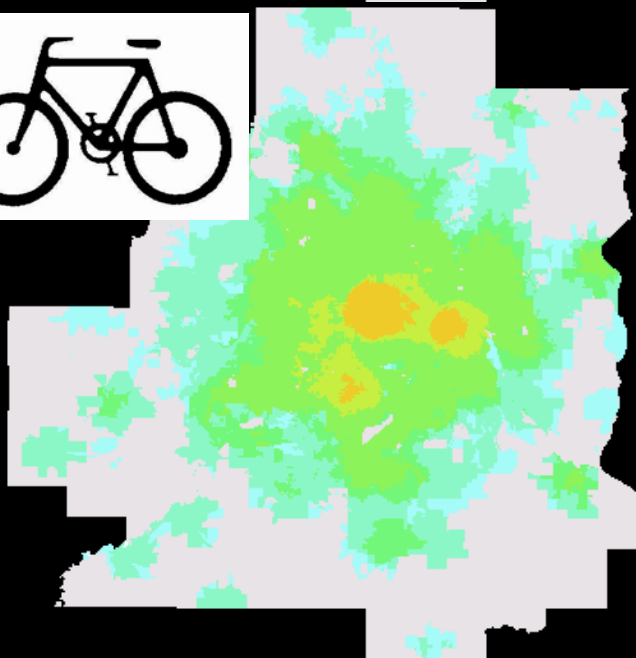
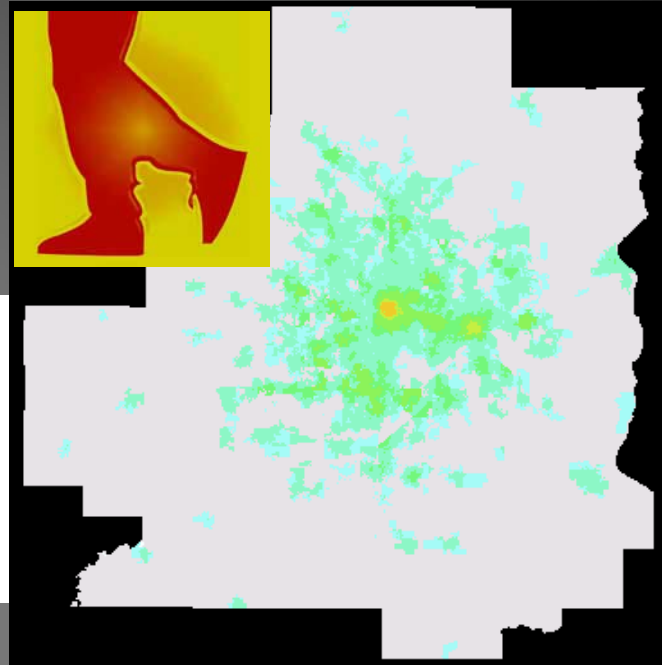
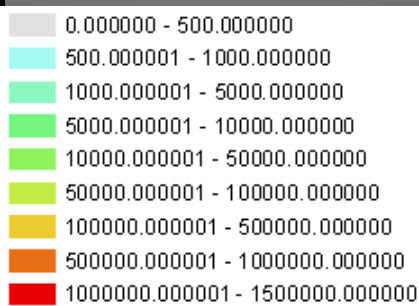
Yes! - For short trips it may be decreasing (congestion is more important than land use), but for longer trips it is definitely increasing (land use outweighs congestion).

# Modally: How does auto compare with transit



Notice the colors and values here and compare with the next slide

# 2005 Access to Jobs



# Policy implications

# Accessibility **versus** Congestion

- TTI Twin Cities estimated Delay per passenger during AM peak
  - 19 hours (1990)
  - 43 hours (2000)
- Yet, accessibility to residents from downtown Minneapolis up about 15% between 1990 and 2000.

# Some alternative goals:

- Maximizing overall regional accessibility.
- Maximizing accessibility for those who are least advantaged.
- Ensuring choices.
- Other ...



Access is a publicly (or socially) provided benefit to private landowners

- Can this value be captured to finance infrastructure which creates access?





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# Value Capture for Transportation Finance: Technical Research Report

Final Report

CTS 09-18

June 2009

# Access to Destinations research project

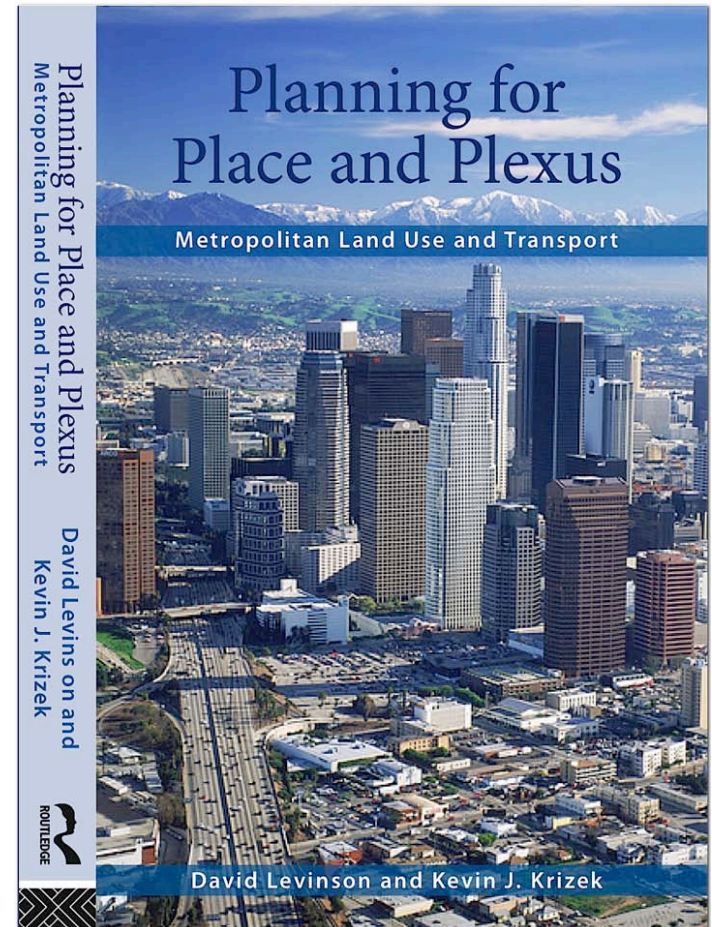
- More information

<http://cts.umn.edu/access-study>

<http://nexus.umn.edu>

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Questions /  
Comments?