

Capitalizing on the Benefits of Transit Oriented Development



Dylan Coolbaugh, E-I-T
d_coolba@uncg.edu

Dr. Selima Sultana
s_sultan@uncg.edu

University of North Carolina-
Greensboro

What is TOD?



Courtesy of the City of Charlotte, County of Mecklenburg

Hypotheses

1. New systems lead to increased property values
2. Landuse types conducive to transit success will become more prevalent over time along the corridor
3. Population will grow along the transit corridor more so than in the rest of the county



Previous Uses of Index Equations

- Coleman Woodbury in 1931 looked at the trend of multi-family with relation to transit systems
 - Index ratios of:
 - Mileage of transit track in 1920/Population of city in 1920, studied against the inverse of this ratio
 - Net change in track and bus mileage/Change in population, studied against the inverse of this ratio
 - Increase in population/Net change in mileage in transit rack and bus service
 - Found that between 1921 and 1928, the percentage of families living in multi-family dwellings grew dramatically, especially those with higher population density per mile of track
- The work of Jin Kim and evaluation of the location of transit stations on land value and office rent, by way of a rent gradient equation (2006)
 - $\partial R / \partial d^2 = -(t/H(u)) * (d^2 + d^1 \cos \Theta) / u$
 - This equation was used to analyze the relationships between the CBD, land rent values, station area and station value-added area
 - This line of research identified that the further away from the CBD a station is, the more likely it will be that there are more variables effecting the land value adjacent to a station

Index Equation for Benefit Analysis of Transit Corridors

$$I = BV + BT + BD1 + BD2 + BN + BG$$

I is the variable calculated from each of the index measures

V is the measure of land value change over the time period

T is the measure of zoning change per parcel to test adherence to TOD practices

D1 is the measure of service area for the light rail stops

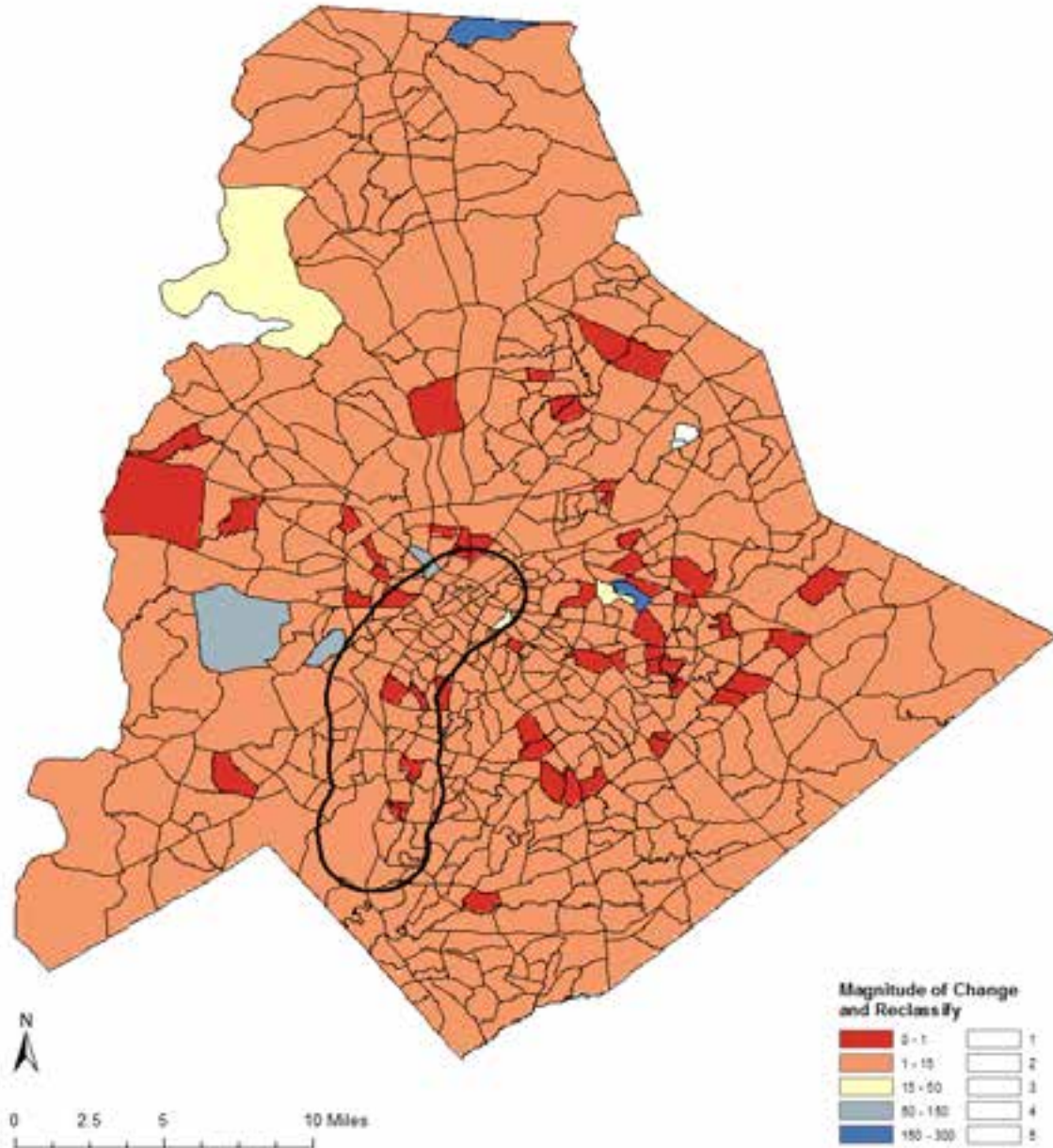
D2 is the measure of service area for bus stops, to analyze the intermediary accessibility for residents to connect with the light rail system by way of the bus system

N is the measure of the amount of both bus stops and LRT stations, indicating the level of choice for residents

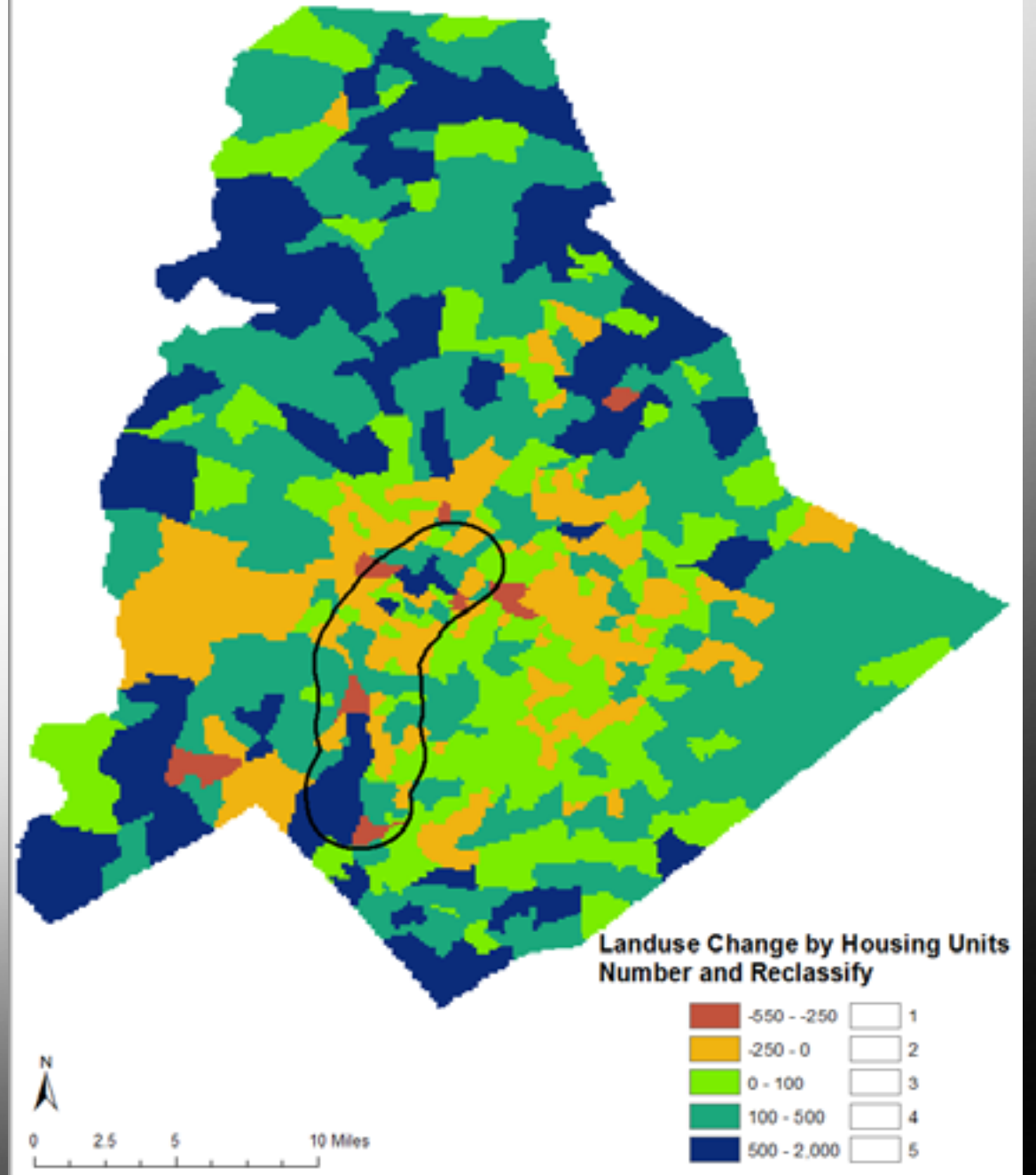
G is the measure of population growth from the Census 2000 to Census 2010

B represents scale factors that will be used to apply levels of importance, percentages that will add up to 0 to 1 total

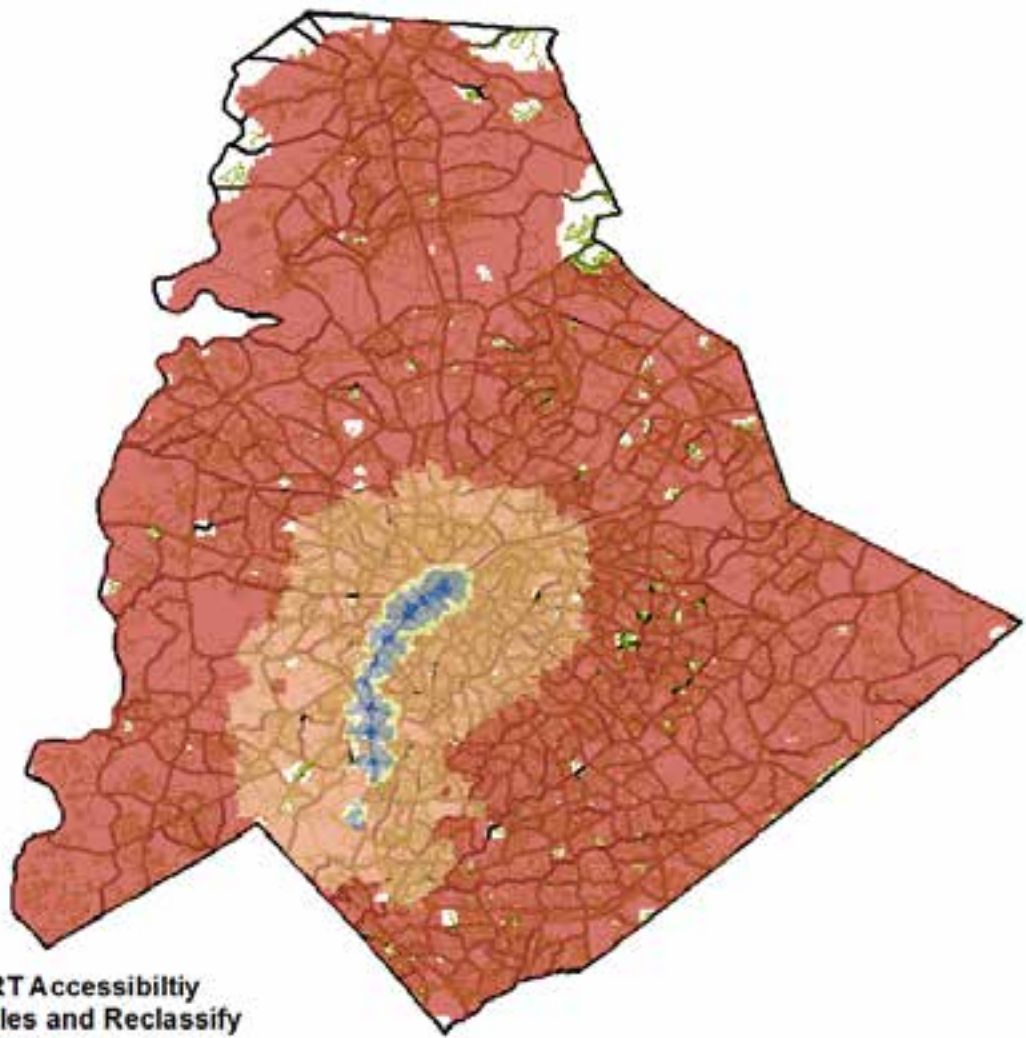
Index of Land Value Change
Mecklenburg County
2002-2012



Change of Landuse in Mecklenburg by Housing Units
2001-2012



LRT Accessibility in Mecklenburg County

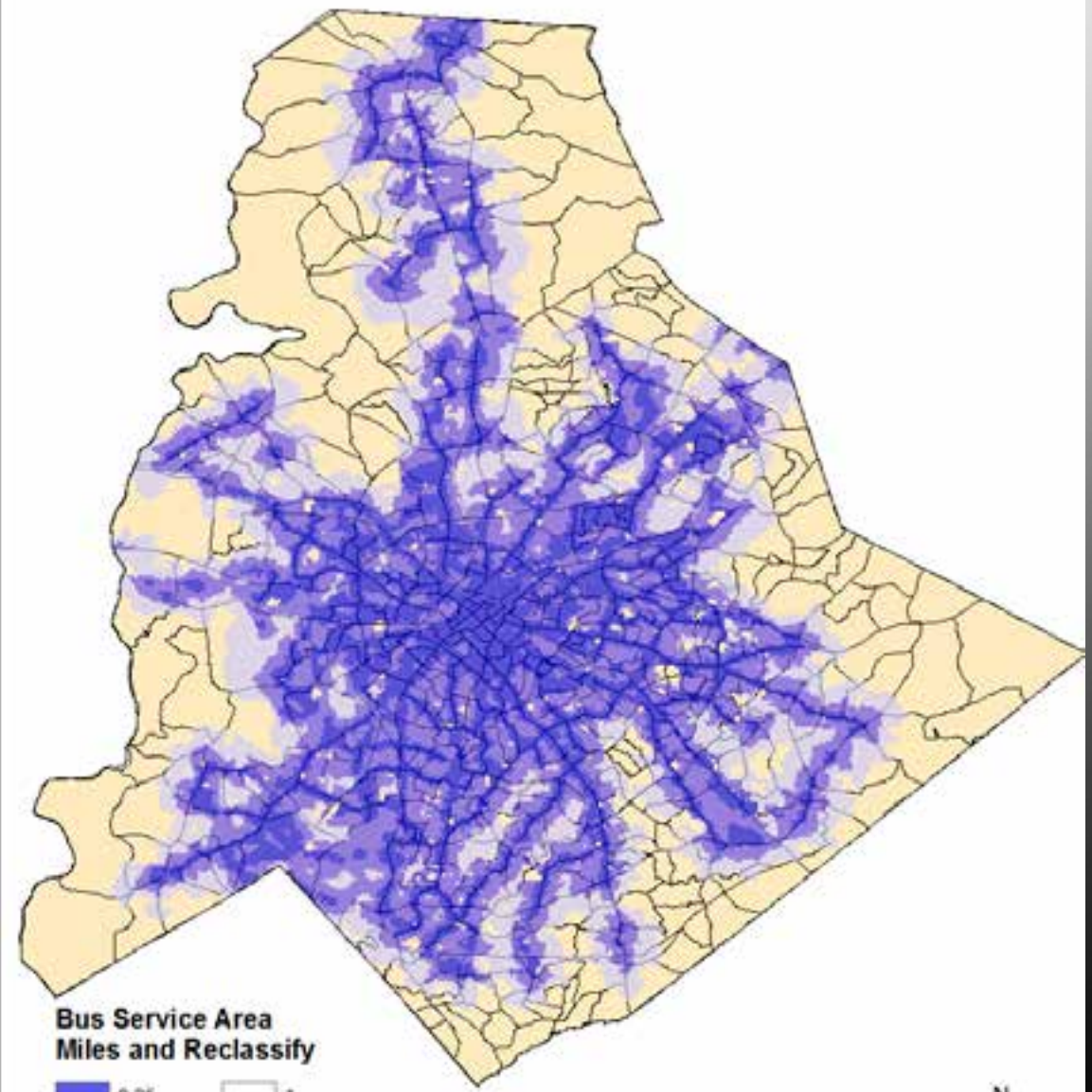


**LRT Accessibility
Miles and Reclassify**

0.25	1
0.25 - 0.75	2
0.75 - 1	3
1 - 5	4
5 - 25	5



Accessibility of Bus Stops Across Mecklenburg County

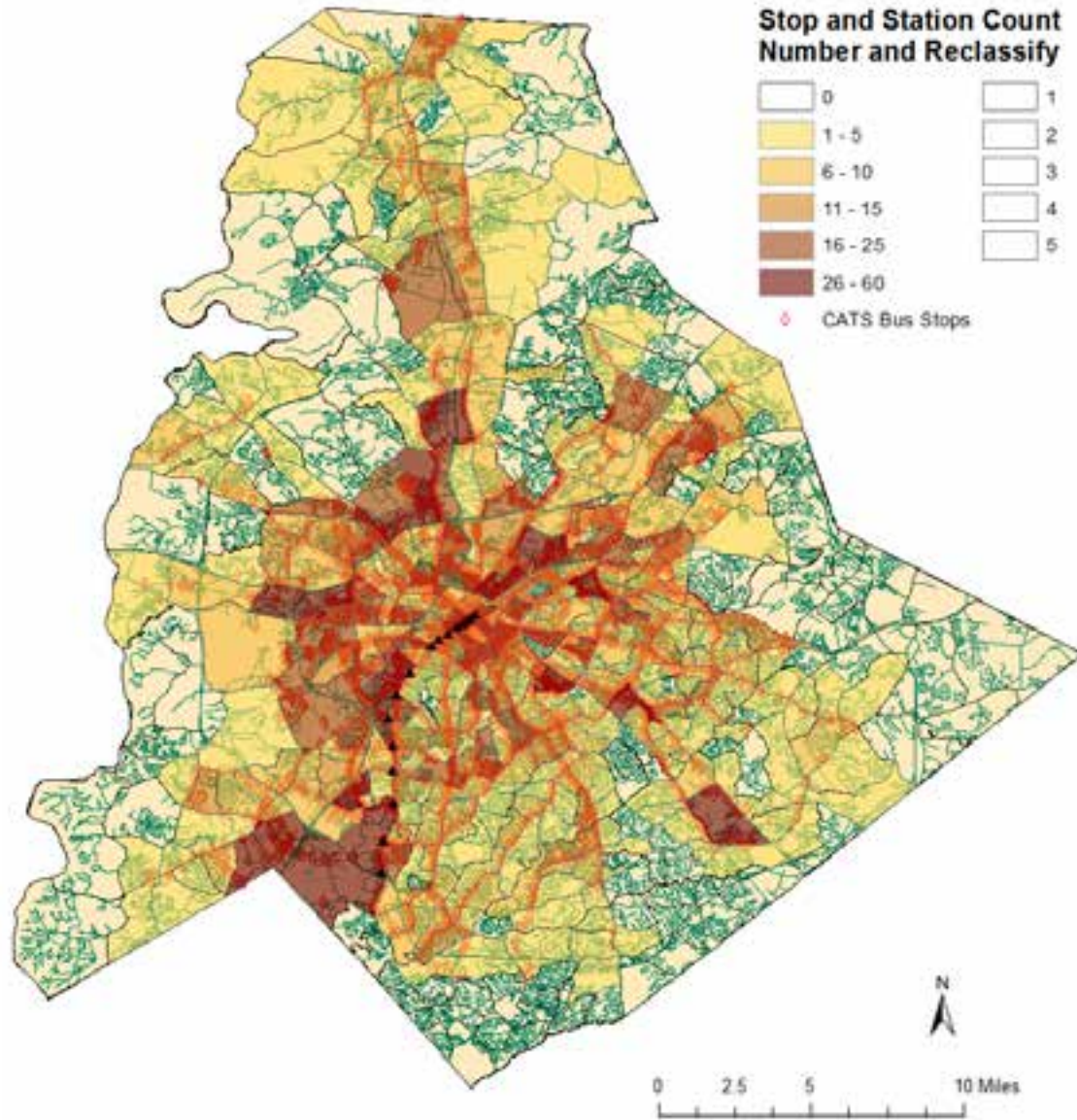


**Bus Service Area
Miles and Reclassify**

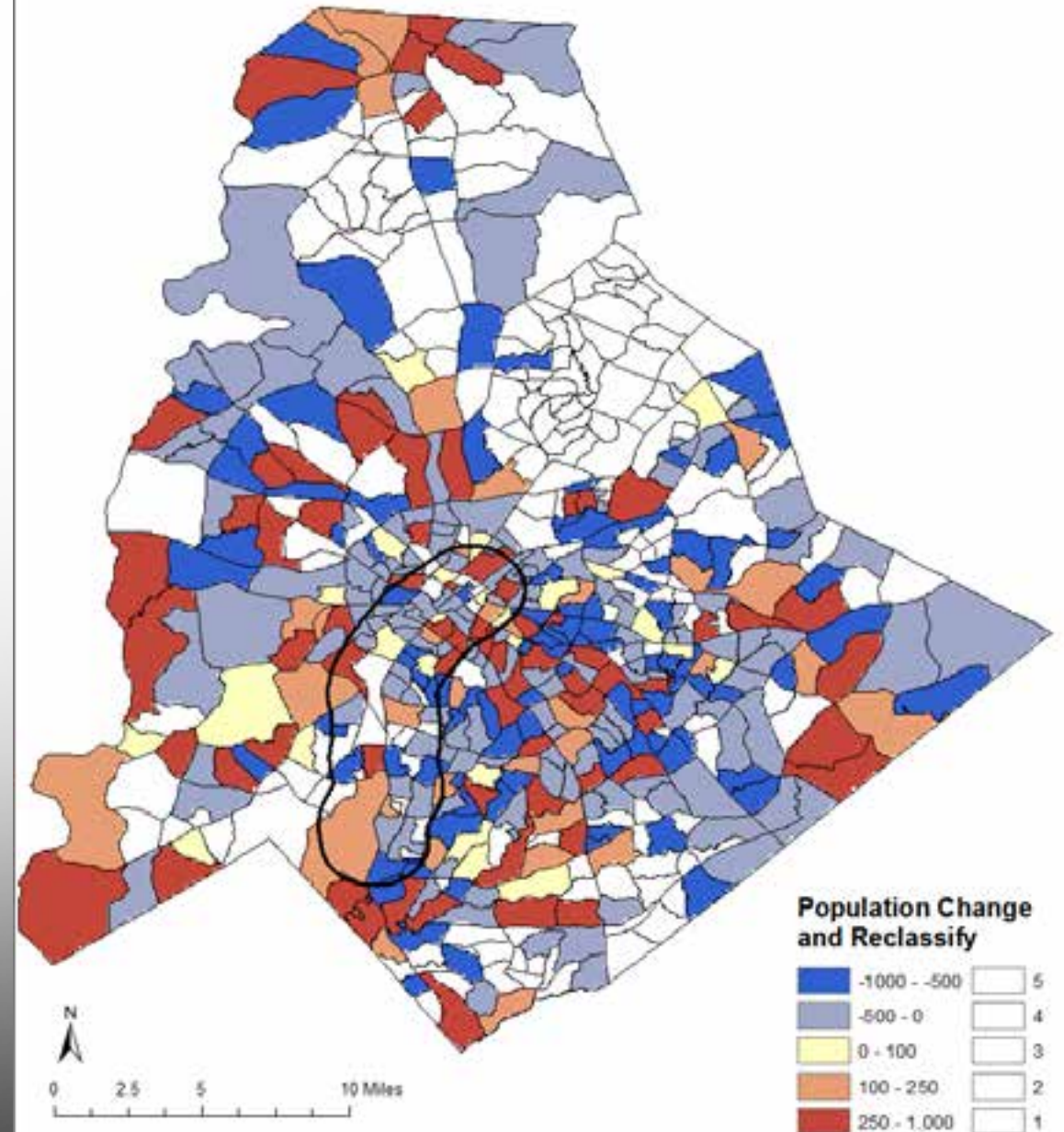
0.25	1
0.25 - 0.75	2
0.75 - 1	3
1 - 1.5	4



Analysis of the Numbers of Stations or Stops
Near Block Groups



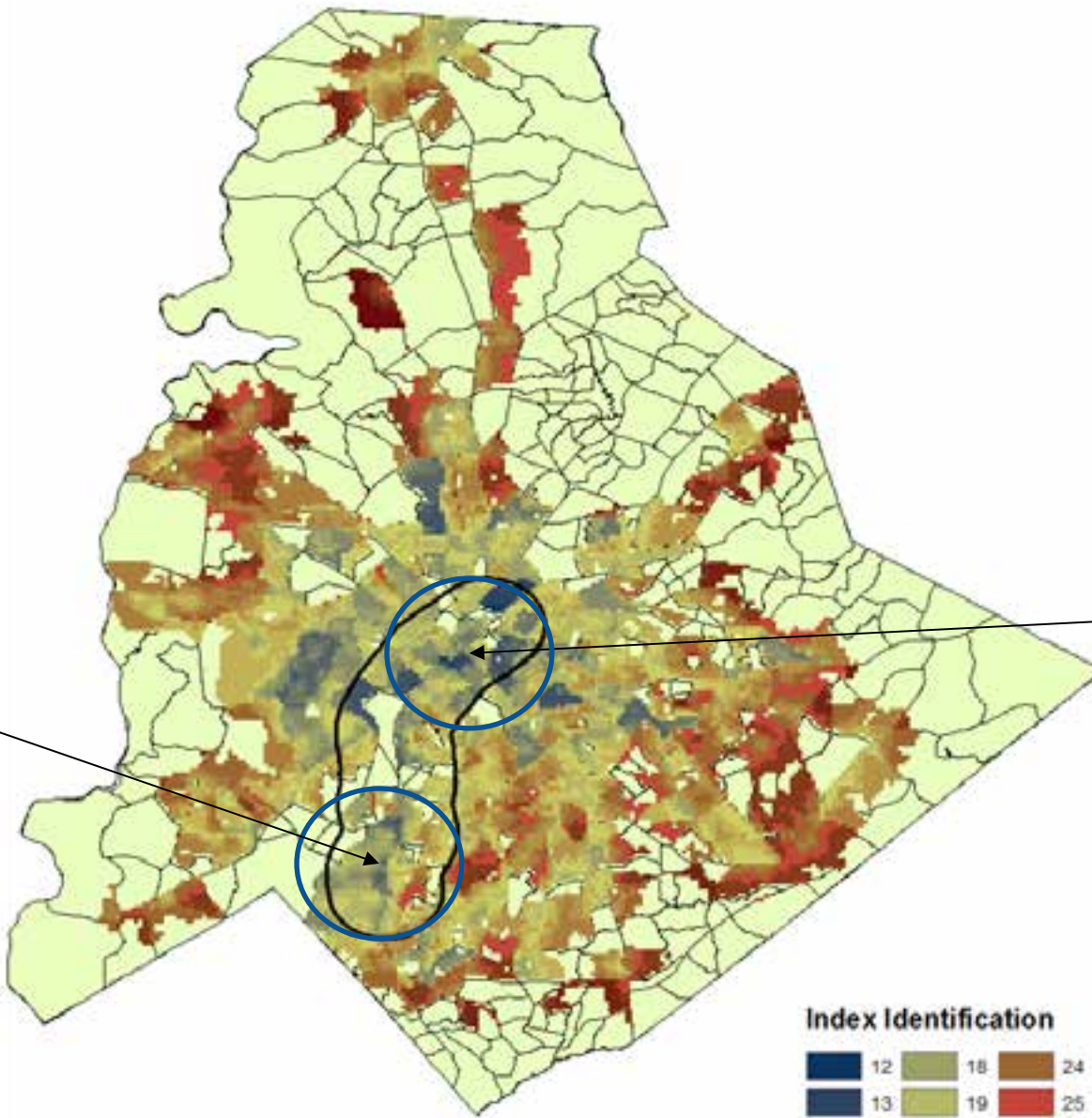
Change in Population
Mecklenburg County
2000-2010



Calculation of Index Value

Much higher housing density developed in this area

Charlotte Uptown



Index Identification

12	18	24
13	19	25
14	20	26
15	21	27
16	22	28
17	23	



Conclusion

- Based on research, these factors are important and, on their own, indicate that there were changes supportive of the likelihood that TOD was implemented
- Property values increased exorbitantly over the decade period in the location of Charlotte's Uptown, as well as population increases along areas of the Lynx line South of Uptown
- According to the presented reclassifications, there are several sections along the light rail corridor that display low index values, indicative of planning strongly in accordance with TOD practices
- The unsurprising result is that there are large sections in Uptown, while the surprising result is that segments on the South end of the line buffer exhibit these same results

Future Plans For This Line of Research

- Include job numbers, as well as employment requirement variability
- Find a way to include an index for median household income
- If possible, use the data at the parcel level, to increase the spatial resolution and individual variability characteristic
- Including an index of crime values is another aspect of my past research experiences that I intend to include in the future index equation, especially to focus on how higher accessibility can influence crime hot spots

Questions?

