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How Pedestrian-Friendly and Transit-Friendly is Your Neighborhood? The Neighborhood Transit Readiness Scorecard

NC American Planning Association Conference
September 29, 2010

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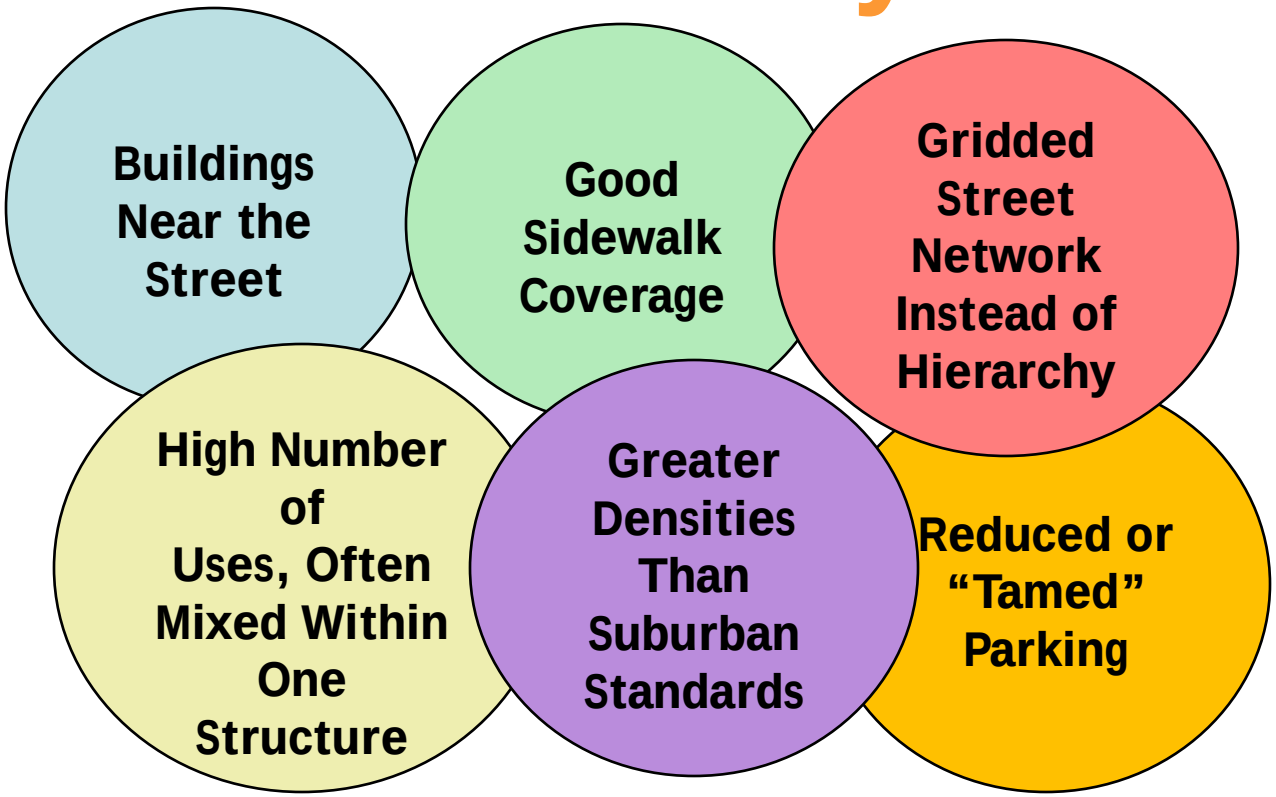
Today's Presentation

- Should you really stick around for the rest of this session?
- What do we mean when we say "urban"?
- Influence of the"3 D's"(Density, Diversity, Design) on transit usage and walking propensity
- Measuring the 3 D's: How we did it & Results
- Using the Results in Community Decision-making
- Measuring the 3 D's: How you can do it
- Discussion

Should I Stay or Should I Go?

- This session is for…
  - Anyone planning for pedestrian improvements
  - Anyone interested in assessing the amount of mixed uses in their community
  - Anyone trying to identify good locations for bus stops
  - Anyone planning for transit-oriented development

What Do We Mean By "Urban?"



Can We Measure Urbanity?

Station Area Analysis: The 3 D's

- **Density**
  - Gross housing and employment per acre
  - Primary base of ridership
- **Diversity**
  - Mix of uses
  - Measure of *convenience*, access to daily necessities
- **Design**
  - Layout of the built environment
  - Intersections, sidewalks, street widths, barriers
  - The "bones" of the neighborhood

Density

Belmont Dairy ~ 34 DU/Acre

Highland Garden Village ~ 11 DU/Acre

Twinbrook ~ 61 DU/Acre

- Metric: Activity Intensity Measure (AIM)
  - AIM = (DU + Jobs/3.2)/Acre

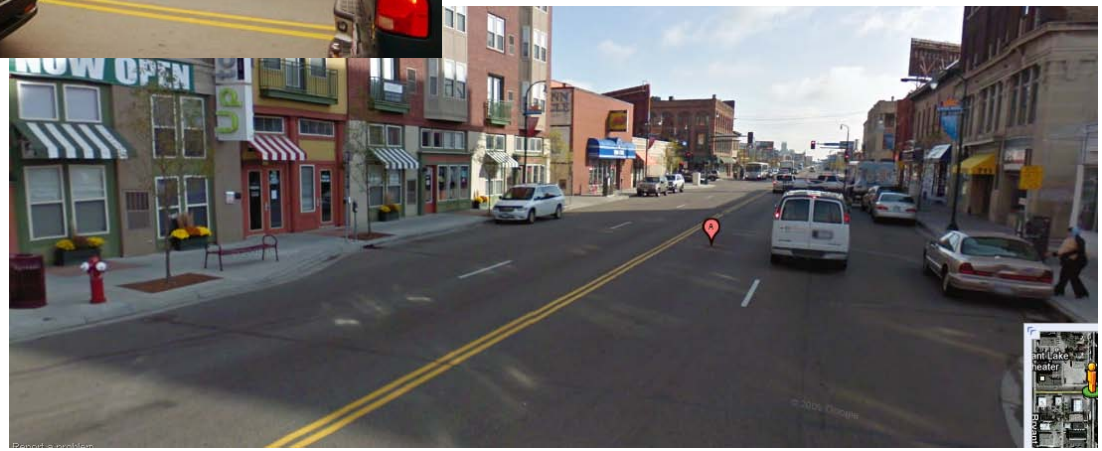
Diversity

- Metric: Walkscore.com
  - Distance to 13 Amenities
    - Grocery Stores
    - Restaurants
    - Coffee Shops
    - Bars
    - Movie Theaters
    - Schools
    - Parks
    - Libraries
    - Bookstores
    - Fitness
    - Drug Stores
    - Hardware Stores
    - Clothing & Music

Eighth & Pearl, Boulder, CO: 95

Carrboro, NC: 100

W. Lake St, Minneapolis, MN: 98



Design

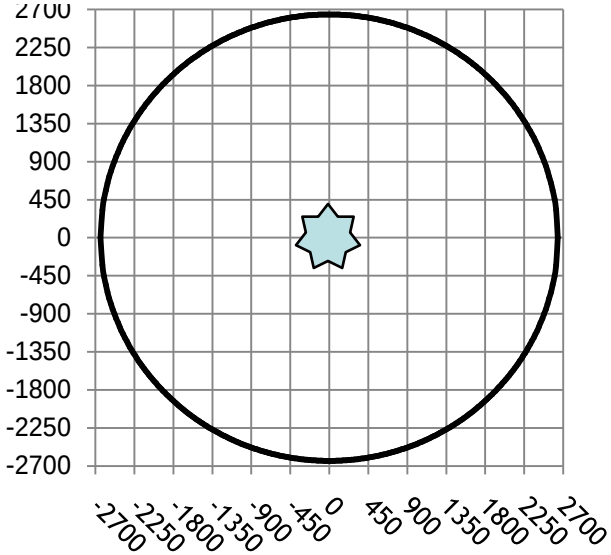
- Metric: Intersections + Sidewalk Density
  - (Intersections-Dead Ends)/mi^2
  - (Sidewalk Miles)/mi^2

Christmas Plan

Seattle, WA

IMAGES AND MAPPING COURTESY OF URBAN DESIGN 4 HEALTH

139 Intersections/mi^2
46 Sidewalk Miles/mi^2



Relative Weighting for Transit Travel

- Recent Meta-Analysis by Ewing & Cervero:
  - Density = 17%
  - Diversity = 29%
  - **Design = 55%**
    - Based on weighted average elasticities of transit usage
    - Highlights critical importance of "Good Bones"
    - Source: JAPA, 76:3, pp. 265-294

Relative Weighting for Walking

- Recent Meta-Analysis by Ewing & Cervero:
  - Density = 11%
  - Diversity = 25%
  - **Design = 64%**
    - Based on weighted average elasticities of walking
    - "Good Bones" even more important
    - Source: JAPA, 76:3, pp. 265-294

Assembling the Scorecard

- Final Score
  - Generated by obtaining grade for each metric, then calculating final GPA using ***TRANSIT*** weighting factors
  - Does NOT include other important but difficult to quantify measures:
    - Continuous urban fabric – Inter-neighborhood connectivity
    - Assessment of demographics, travel markets
    - Built environment details – streetscaping, bike paths, sidewalk conditions, lighting, crime rates, grades, congestion levels, crosswalks, etc.

Data Analysis Example – Downtown Cary

TIER 2

Aggregate Grading		Radii				Walk Time			
	Weight	1/4	1/2	3/4	1	5	10	15	20
Design Grade	55	B	C+	C-	D+	B+	B	C+	C
Diversity Grade	29	A-	B+	B	B-	A-	B+	B	B-
Density Grade	17	D	D+	D+	D	D	D+	D+	D+
	Final Grade	B-	C+	C-	D+	B	B-	C+	C

Scorecard

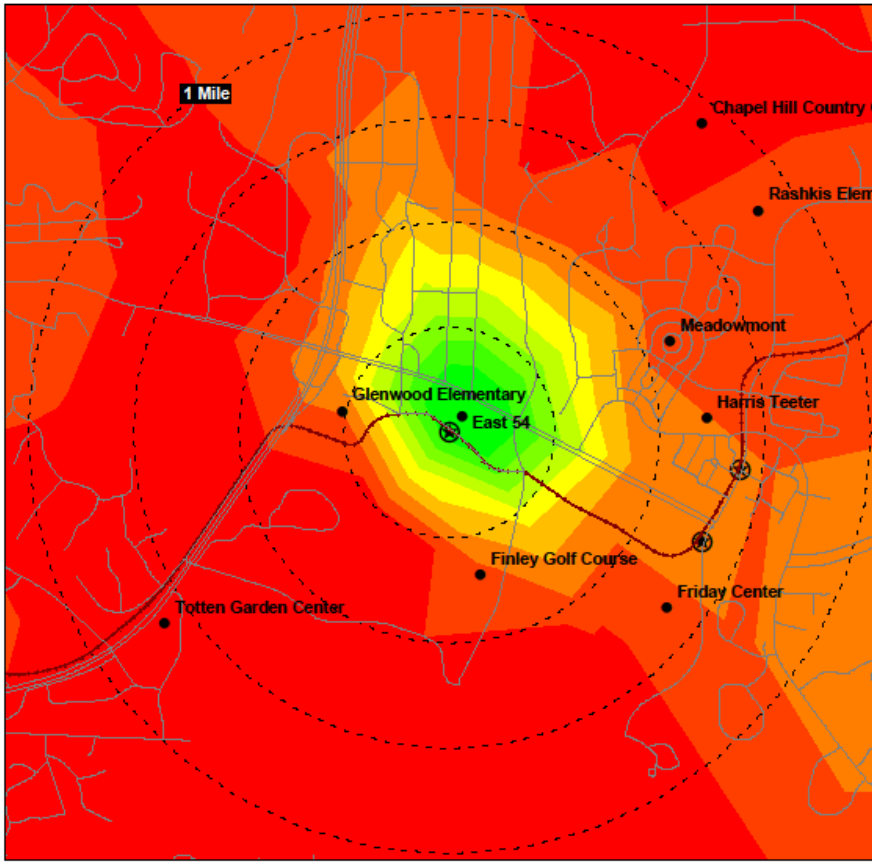
Aggregate Statistics		Radii				Walk Time			
		1/4	1/2	3/4	1	5	10	15	20
Optimal Area		0.20	0.79	1.77	3.14	0.13	0.50	1.13	2.00
Measured Area		0.20	0.79	1.77	3.14	0.16	0.61	1.30	2.22
Sidewalks Miles		3.09	7.39	13.16	21.42	2.66	6.09	10.45	16.51
Centerline Miles		3.64	14.97	30.02	49.58	3.10	12.03	23.84	37.47
Dead Ends		1	20	72	137	0	11	40	79
Intersections		26	103	209	320	25	85	173	257
Intersections + Dead Ends		27	123	281	457	25	96	213	336
Walkscore	Data Points	6	14	28	46	5	12	20	34
	Average	87	80	71	66	87	81	76	68
TAZ Data	TAZs	3	12	18	26	3	10	15	18
	Total Area	0.09	0.78	1.75	3.21	0.09	0.54	1.10	1.75
2005 SE Data	Dwelling Units	53	794	2175	4501	53	497	1295	2175
	Jobs	239	2598	3158	4137	239	2193	2824	3158
	DU/Acre	0.9	1.6	1.9	2.2	0.9	1.4	1.8	1.9
	Jobs/Acre	4.1	5.2	2.8	2.0	4.1	6.4	4.0	2.8
	AIM	2.2	3.2	2.8	2.8	2.2	3.4	3.1	2.8
2035 SE Data	Dwelling Units	61	878	2471	5159	61	522	1431	2471
	Jobs	533	4215	7104	9027	533	3418	5658	7104
	DU/Acre	1.1	1.8	2.2	2.5	1.1	1.5	2.0	2.2
	Jobs/Acre	9.2	8.5	6.3	4.4	9.2	10.0	8.0	6.3
	AIM	3.9	4.4	4.2	3.9	3.9	4.6	4.5	4.2

Measures of Effectiveness	Optimal Value	Radii				Walk Time			
		1/4	1/2	3/4	1	5	10	15	20
Sidewalk Miles/mi^2	Optimal ≈ 46	16	9	7	7	21	12	9	8
Centerline Miles/mi^2	Optimal ≈ 23	19	19	17	16	25	24	21	19
Intersections/mi^2	Optimal ≈ 139	132	131	118	102	200	170	154	129
(Intersections - Dead Ends)/mi^2	Optimal ≈ 139	127	106	78	58	200	148	118	89
Intersections/(Intersections + Dead Ends)	Optimal ≈ 1	0.96	0.84	0.74	0.70	1.00	0.89	0.81	0.76
AIM (2005)	Optimal ≈ 45/24/16.5	2.2	3.2	2.8	2.8	2.2	3.4	3.1	2.8
AIM (2035)	Optimal ≈ 45/24/16.5	3.9	4.4	4.2	3.9	3.9	4.6	4.5	4.2

Tier 2 - Density

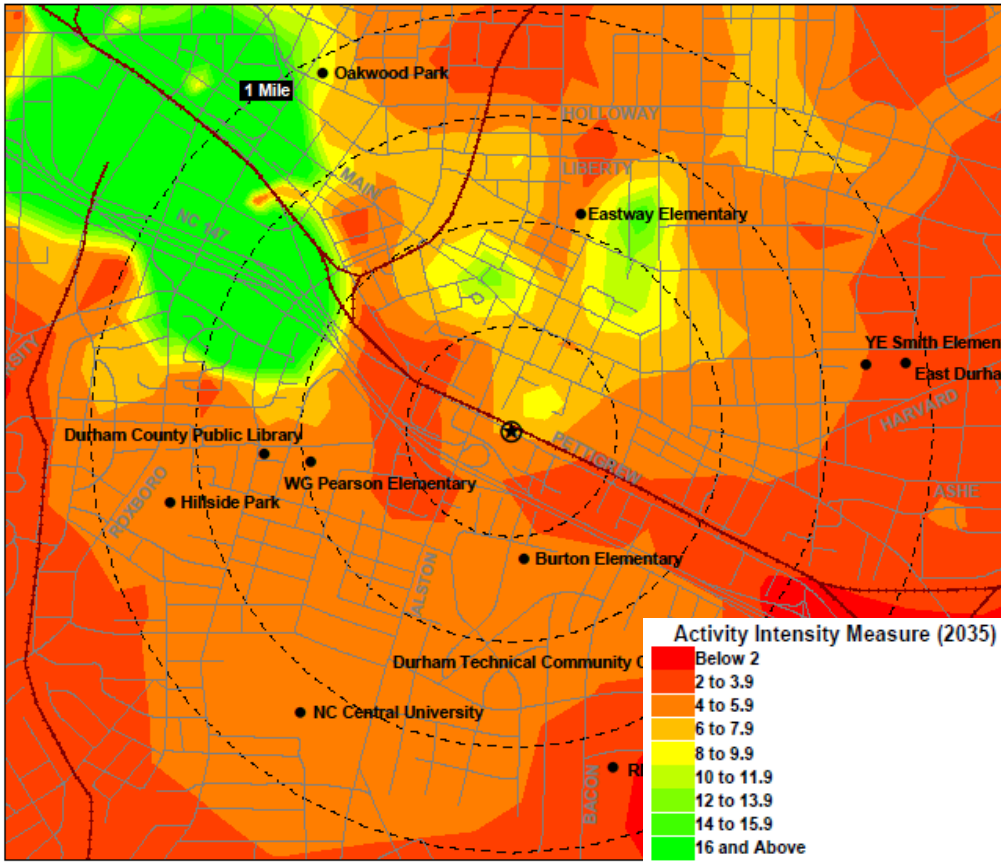
East 54

- Density Grade: D-
  - 2035 AIM = 2.5
  - DU = 249; Jobs = 1,075



Alston Avenue

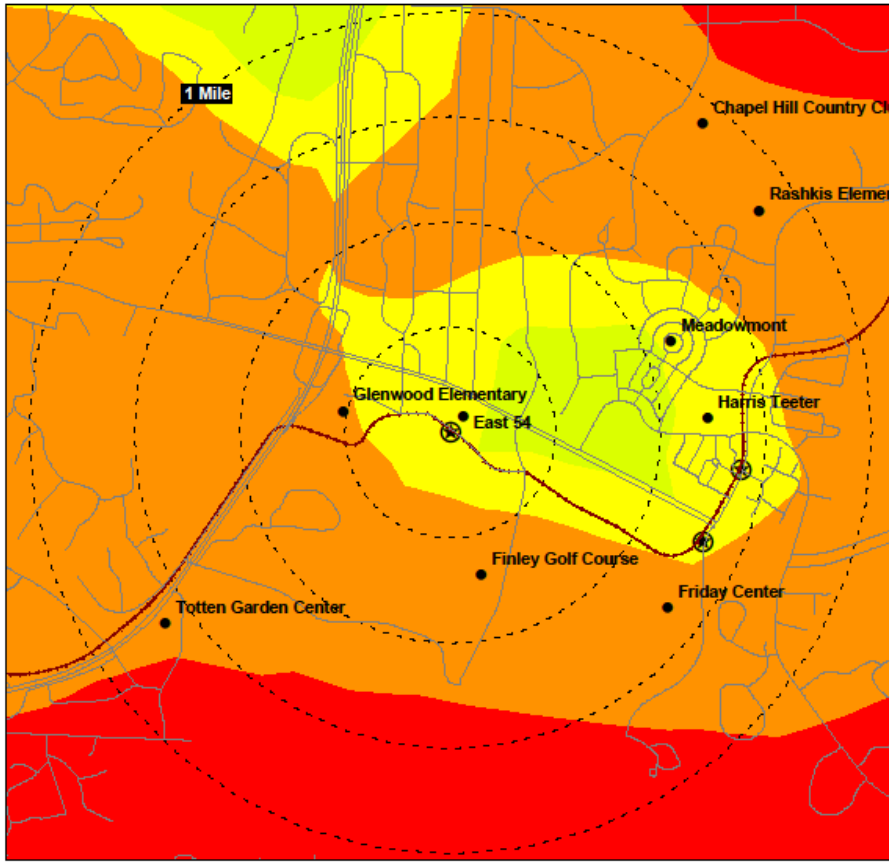
- Density Grade: C-
  - 2035 AIM = 5.8
  - DU = 2,398; Jobs = 2,469



Tier 2 - Diversity

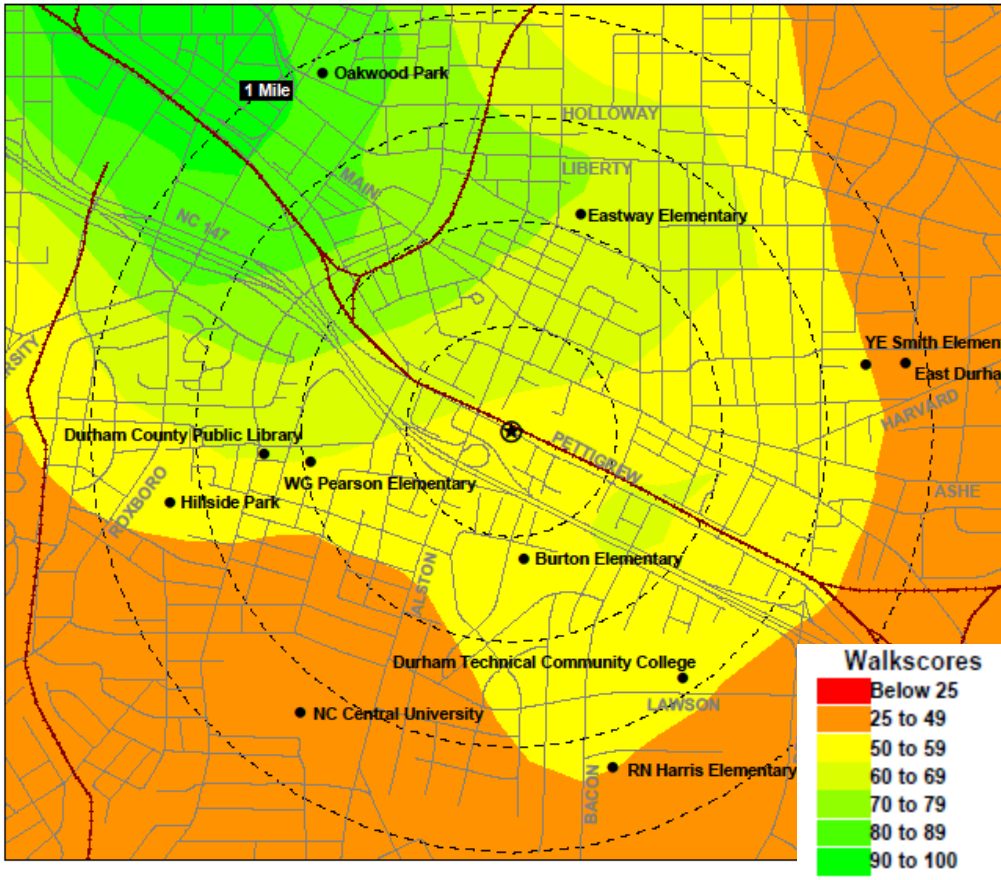
East 54

- Diversity Grade: C
  - Avg. Walkscore = 51



Alston Avenue

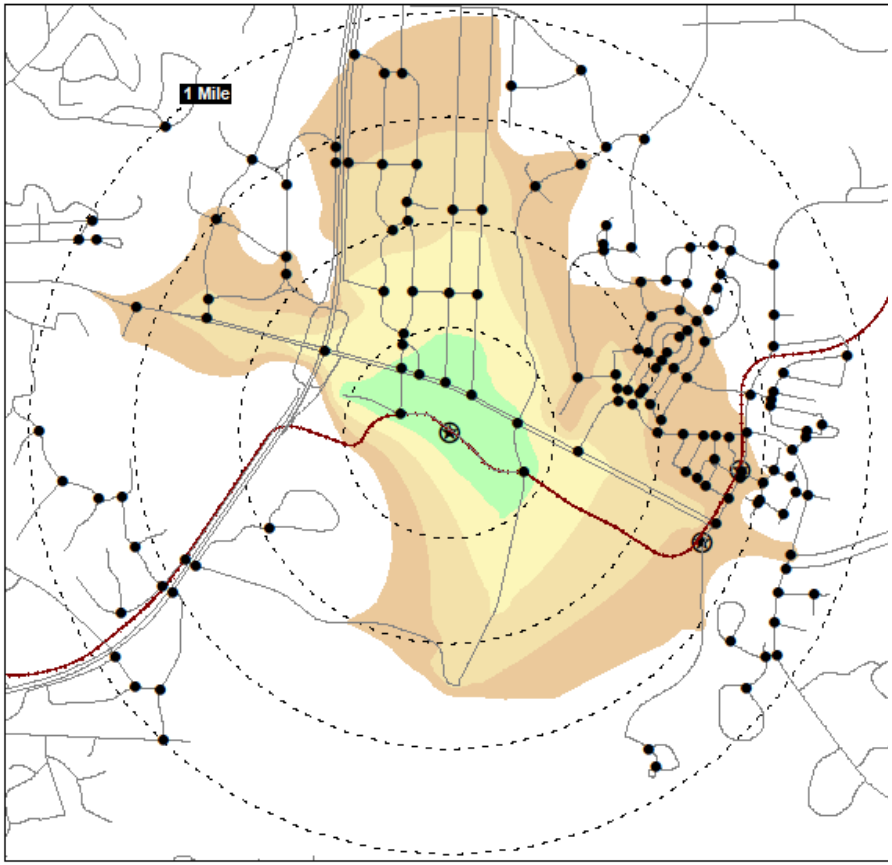
- Diversity Grade: C+
  - Avg. Walkscore = 62



Tier 2 - Design

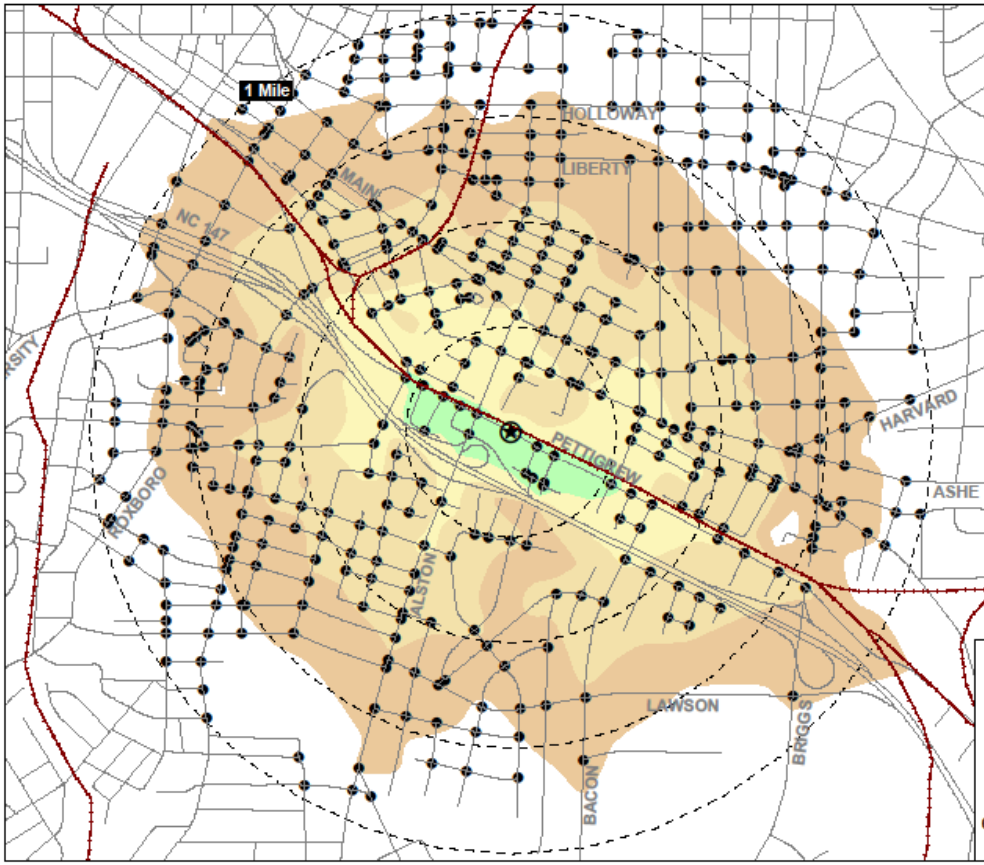
East 54

- Design Grade: D-
  - 31 Intersections/mi^2
  - 8 Sidewalk Miles/mi^2



Alston Avenue

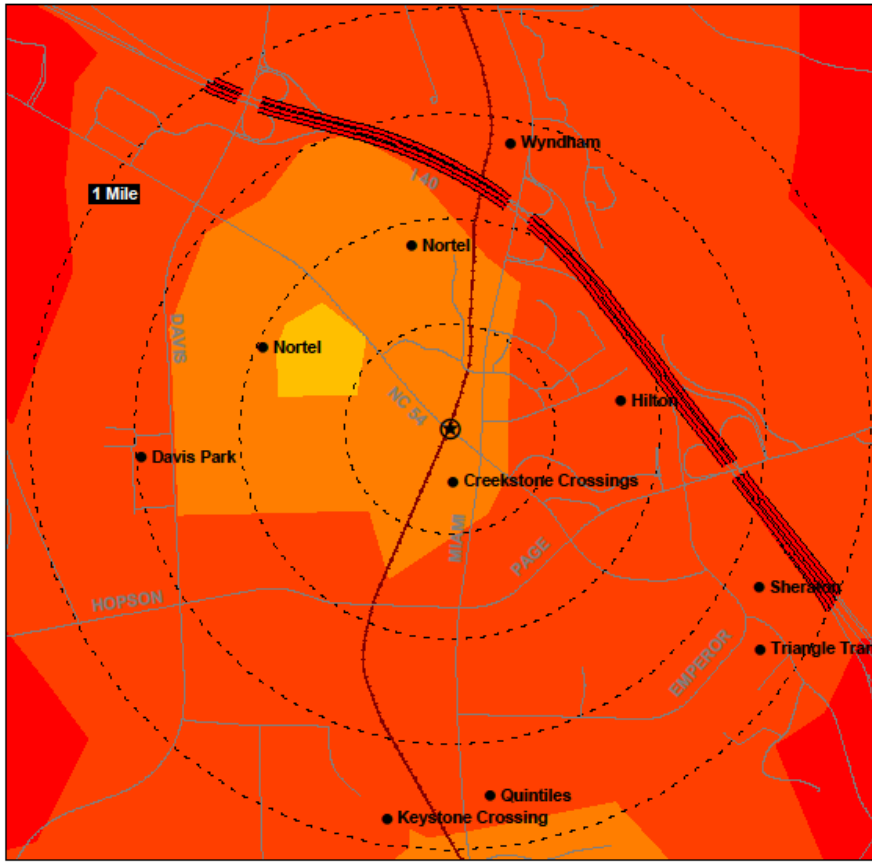
- Design Grade: B-
  - 122 Intersections/mi^2
  - 14 Sidewalk Miles/mi^2



Tier 3 - Density

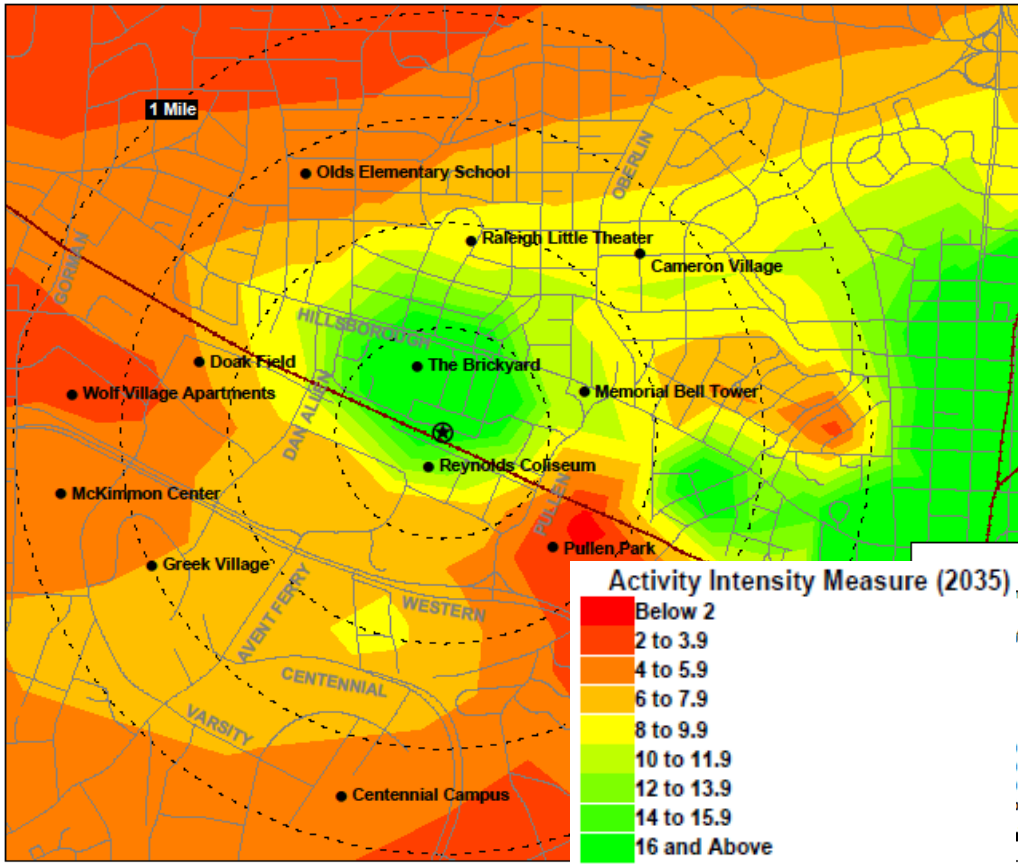
TMC

- Density Grade: D+
  - 2035 AIM = 6.7
  - DU = 1,738; Jobs = 4,080



NC State

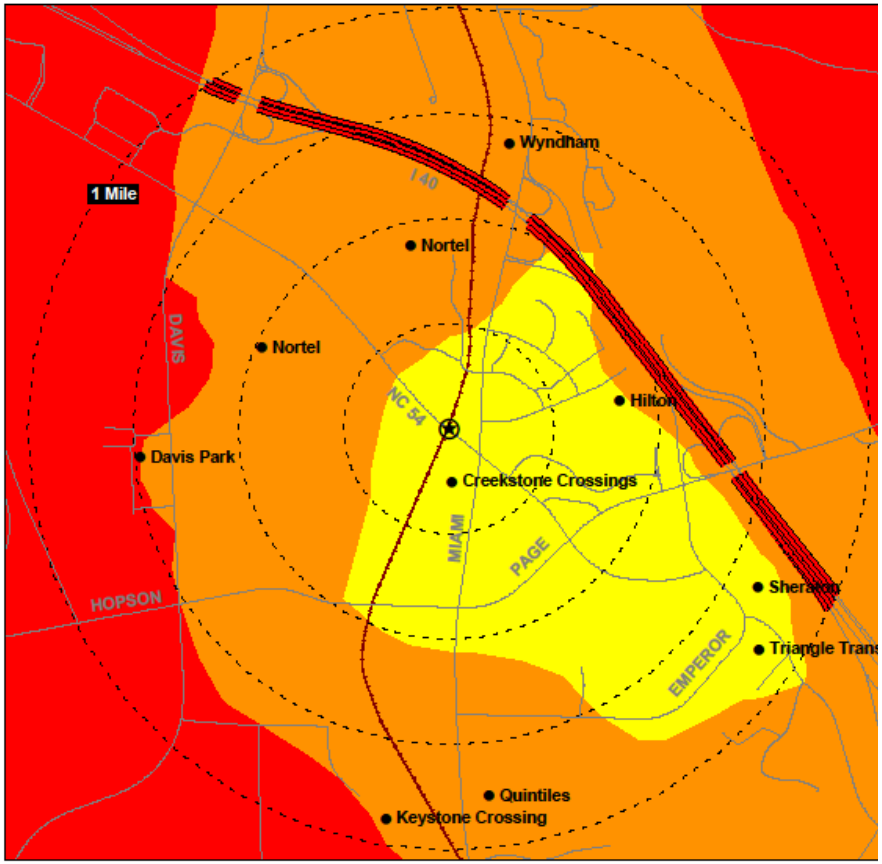
- Density Grade: C
  - 2035 AIM = 10.6
  - DU = 895; Jobs = 14,320



Tier 3 - Diversity

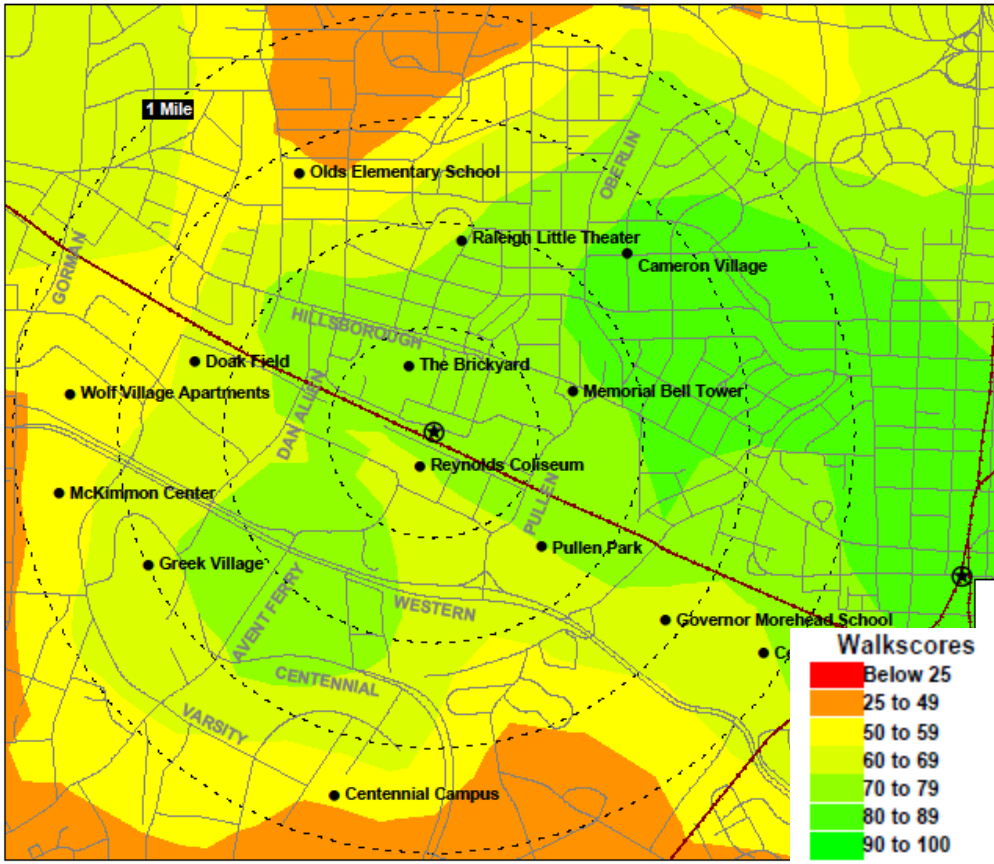
TMC

- Diversity Grade: C
  - Avg. Walkscore = 53



NC State

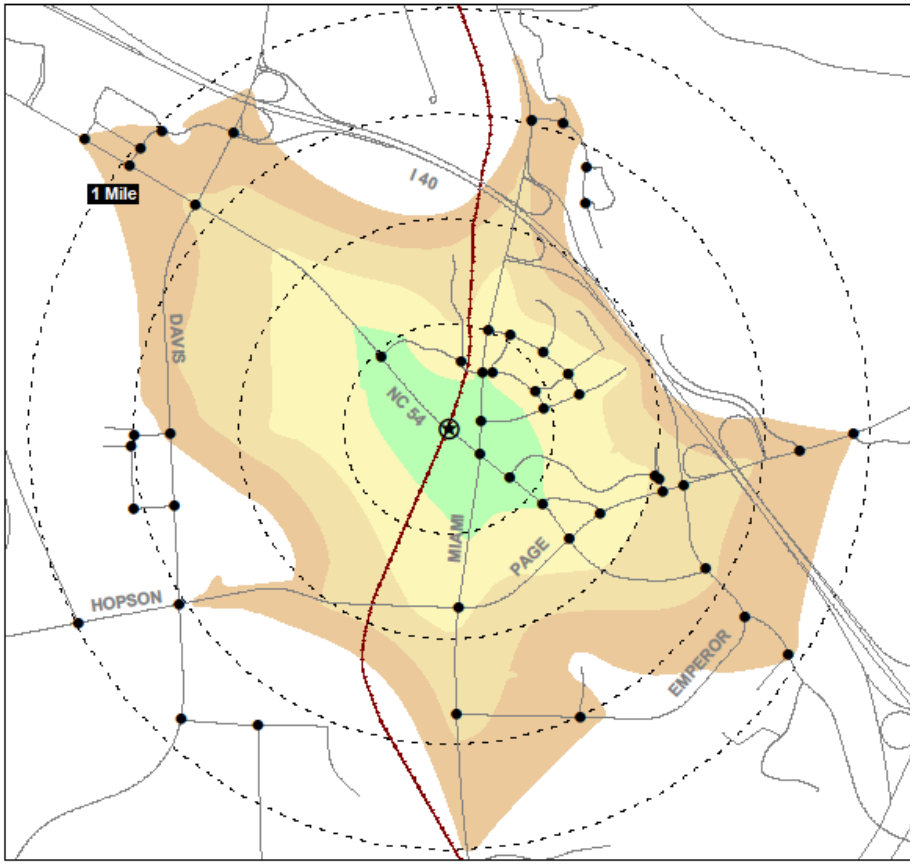
- Diversity Grade: B
  - Avg. Walkscore = 74



Tier 3 - Design

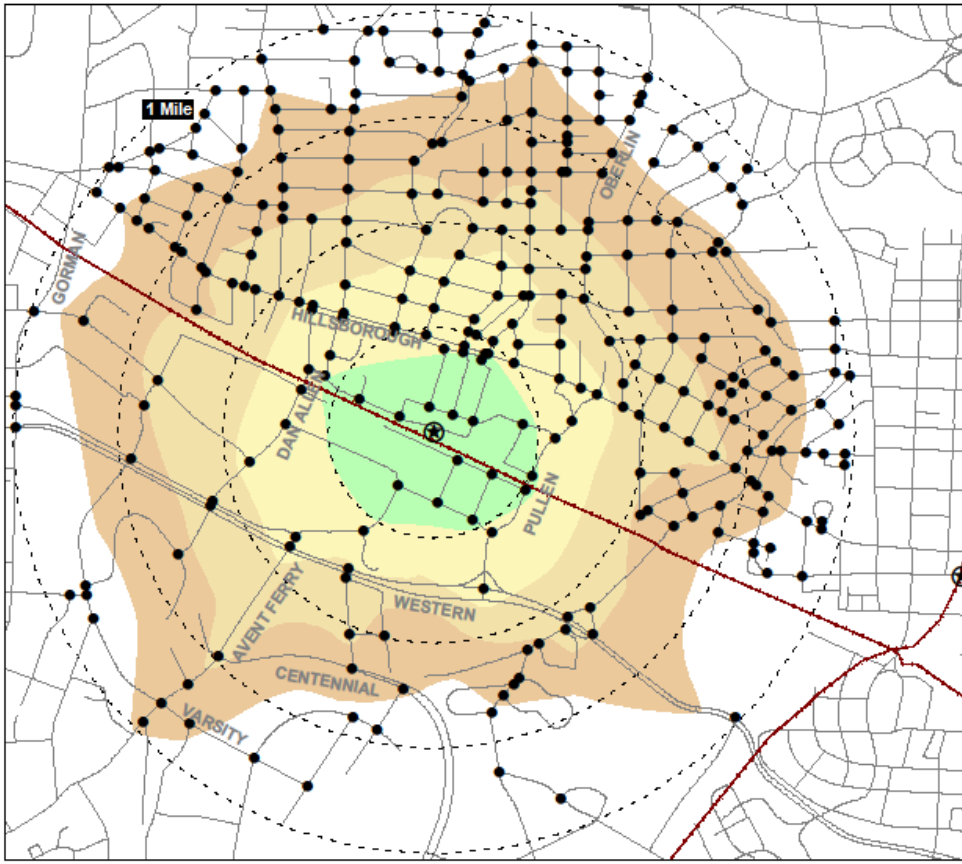
TMC

- Design Grade: F
  - 15 Intersections/mi^2
  - 3 Sidewalk Miles/mi^2



NC State

- Design Grade: B-
  - 89 Intersections/mi^2
  - 23 Sidewalk Miles/mi^2



Scorecard

- Full Analysis
  - 27 Total Stations on "Primary Corridor"
  - Full Mile Radius
  - 6 Total Maps, 2 Detailed Analysis Reports
- Score Only
  - 15 Stations of Interest
  - Half-Mile Analysis only
  - 3 Total Maps
- 42 Total Stations:

	Design	Diversity	Density	Grade
A's	4	6	0	3
B's	5	7	4	2
C's	6	20	10	10
D's	13	7	27	18
F's	14	2	1	9

Additional Stations

- Carolina North
- Downtown Apex
- Downtown Carrboro
- Downtown Chapel Hill
- Downtown Morrisville
- Downtown Raleigh (Core)
- Glover Road
- McCrimmon Parkway
- NC Central University
- NERC
- Park West Village
- RDU
- Southern Village
- Veridea
- Wake Med (New Bern)

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Scorecard - Tiers 3 & 4

Station	Activity Level	Design	Walkscore	AIM	Grade	GPA
Downtown Raleigh (Core)	4	A+	A-	B+	A-	4.0
Downtown Raleigh (Boylan Wye)	4	A+	A-	B-	A-	3.9
Government Center	4	A	A-	B	A-	3.7
Downtown Durham	4	A-	A-	C	B+	3.4
Duke Medical Center	4	D+	C+	C-	C-	1.7
UNC Hospital	4	D+	C	D	D+	1.5
Wake Med (New Bern)	4	D	D+	D+	D	1.2

Station	Activity Level	Design	Walkscore	AIM	Grade	GPA
Downtown Chapel Hill	3	B-	A-	B-	B-	3.0
NC State University	3	B-	B	C	C+	2.7
NC Central University	3	B	C-	D	C	2.3
Downtown Carrboro	3	C-	A-	C-	C	2.2
Ninth Street	3	C	B	D+	C	2.2
Spring Forest	3	D	B+	D	D+	1.7
Friday Center	3	C-	C-	D-	D+	1.5
South Square	3	D-	B	D+	D+	1.4
New Hope Church	3	D-	B	D+	D+	1.4
Patterson Place	3	D-	C	D+	D	1.2
NERC	3	D-	D	D+	D-	0.9
Triangle Metro Center	3	F	C	D+	D-	0.8
Carolina North	3	F	D-	D	F	0.4
North RTP	3	F	D-	D-	F	0.3
Veridea	3	F	F	D-	F	0.1

Now What? Possible Scorecard Uses

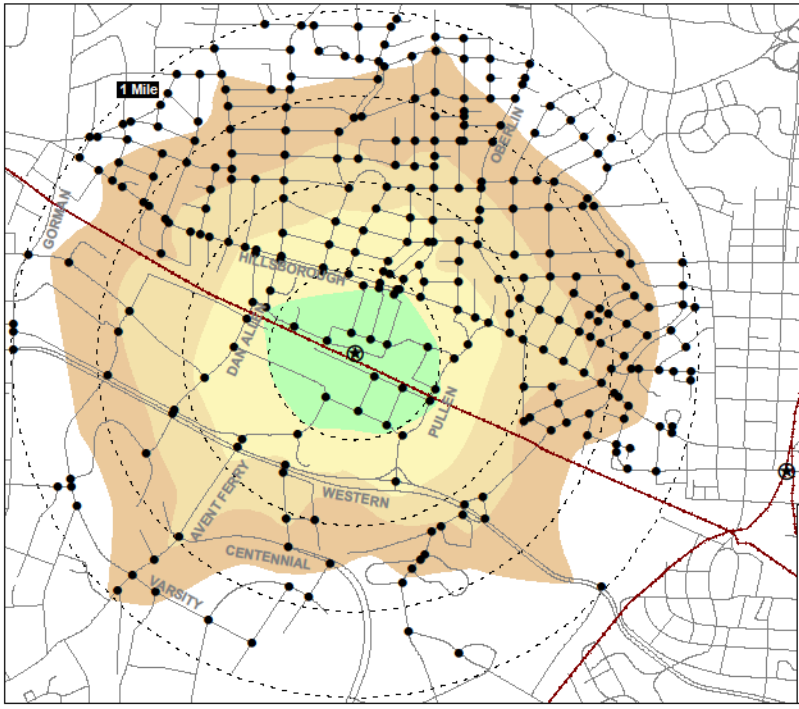
- **Deficiency Analysis**
  - Finding breaks/barriers in pedestrian networks
  - Locating under-performing areas zoned for mixed-use
- **Travel Forecasting**
  - Providing additional tools to support traditional transit ridership forecasts
- **Education**
  - Explaining differences between development intensities, variations in land use mix, urban design to policymakers
  - Identifying potential transit markets

How You Can Do This

- **Data Needs: Density**
  - Jobs/Population by some geography: Census Block, Block Group, Tract, TAZ
  - Source: Census 2000, Regional/Local Datasets
- **Data Needs: Diversity**
  - Walkscores geocoded as points
  - Source: walkscore.com, your GIS system
- **Data Needs: Design**
  - Intersections in GIS
  - Sidewalk coverage shapefiles

Scorecard: What's Next?

- Further exploration with new light rail installations
- Dealing with the other D's:
  - Destination Access
  - Demand Management
  - Distance to Transit



Implications for Planners

- **With Design by far the most powerful of 3 D's…**
  - Maximizing transit system usage or pedestrian activity may mean concentrating investments in places where design is ALREADY high-performing or can be "healed" for a reasonable level of public/private investment
- **With Diversity Twice as Powerful as Density**
  - Consider replacing single-use commercial districts with mixed-use districts in development codes
- **The Bottom Line**
  - You can rezone for different uses
  - You can permit more density through redevelopment
  - But get the streets right THE FIRST TIME

Thank You!

Questions & Discussion