



Sidewalks Within the ROW in Western CT

Carl Zimmerman, PhD





Background and Goals

Today's conversation is Intended to encourage discussions about our sidewalk system and inter-municipality goals:

New transportation focus on:
Multi-modal connectivity
Complete streets



What is a Sidewalk?

MacMillian Dictionary:

An area along the side a street that has a hard surface, used by people who are walking.

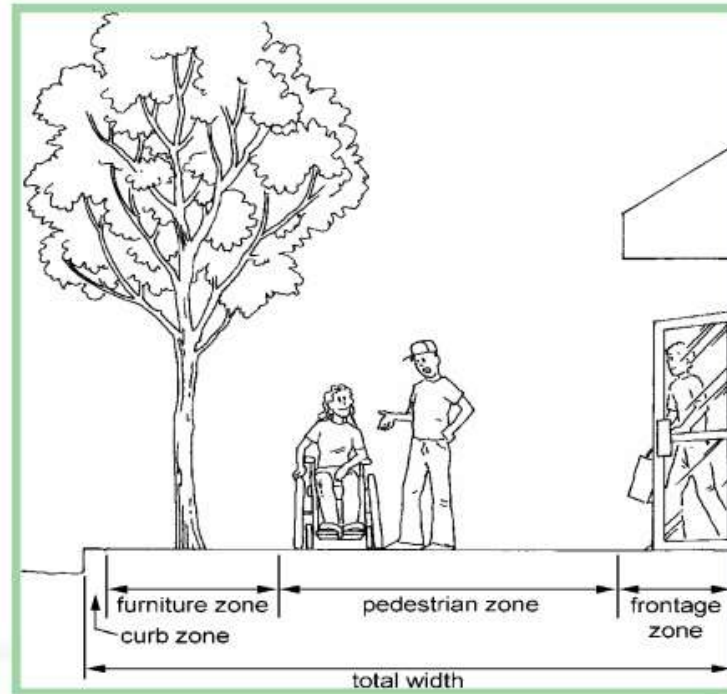


https://aqu52.files.wordpress.com/2014/02/10072_665640950144805_714482090
<http://www.punterialtimes.com/images/largepunpics/Sidewalk-Pun.jpg>

Sidewalk Zone System

⇒ The sidewalk corridor extends from the edge of roadway to the right-of-way and is divided into 4 zones

- Curb zone
- Furniture zone
- Pedestrian zone
- Frontage zone



Good Sidewalks Connect and Protect



<http://www.rieth-riley.com/assets/images/pages/curbs-and-sidewalks.jpg>

Bad Sidewalks Don't Connect

With few sidewalks, shopping center is a dead end for pedestrians

The Virginian-Pilot
Sep 13, 2007



A sidewalk into the Red Mill Commons shopping center dead-ends into parking spaces. The sidewalk prohibits easy access with a stroller or bicycle, reader Maggie Kerrigan said. (John Warren | The Virginian-Pilot)



The Virginian-Pilot

Maggie Kerrigan is feelin' the love for her neighborhood shopping center, but she says it's a one-sided relationship.

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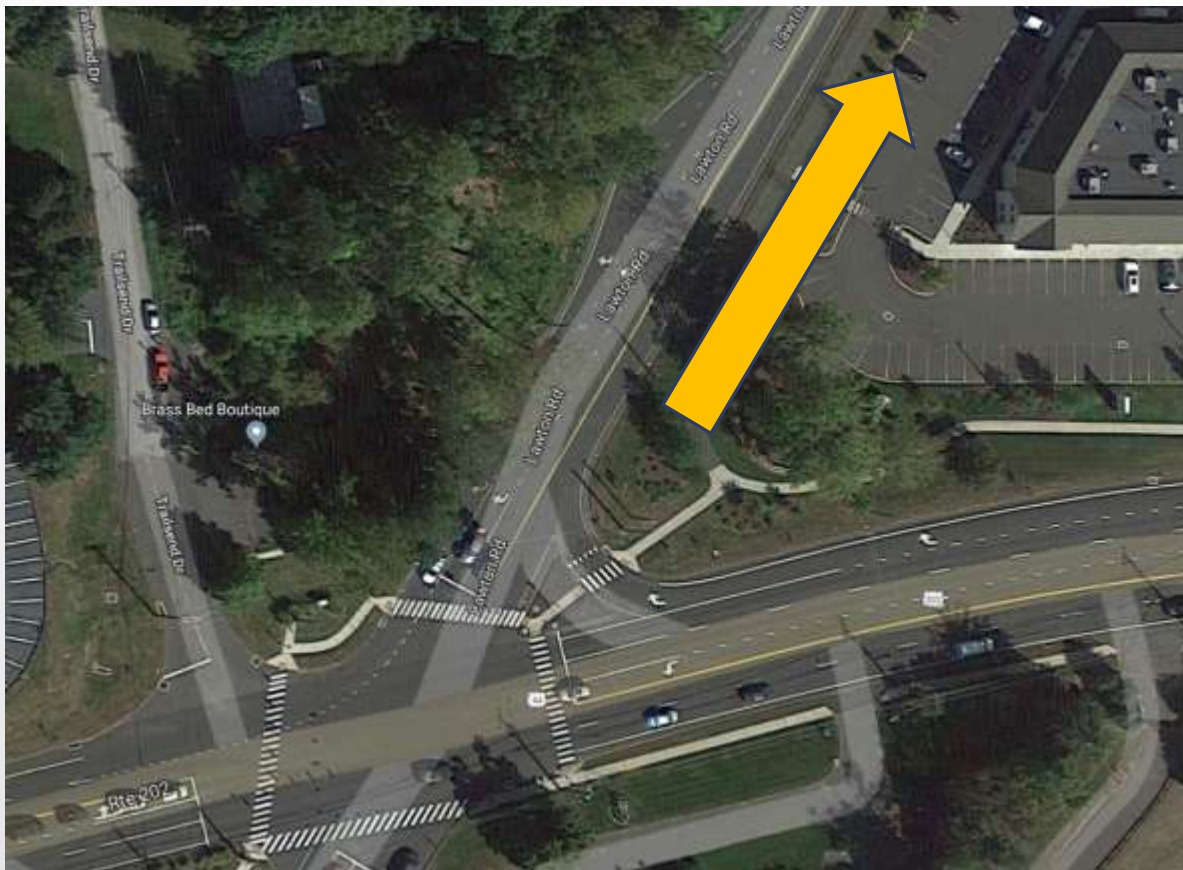
VIRGINIA

LET'S TALK



ICYMI: TOP STORIES

- 1 Former student opens high school, killing 1
- 2 Norfolk mayor gets 1 President Trump
- 3 Portsmouth council apartments downtown want more shops in



Connectivity Issues



Border of Canton and Simsbury
Relatively close to Farmington River Trail

Other Typical Problems



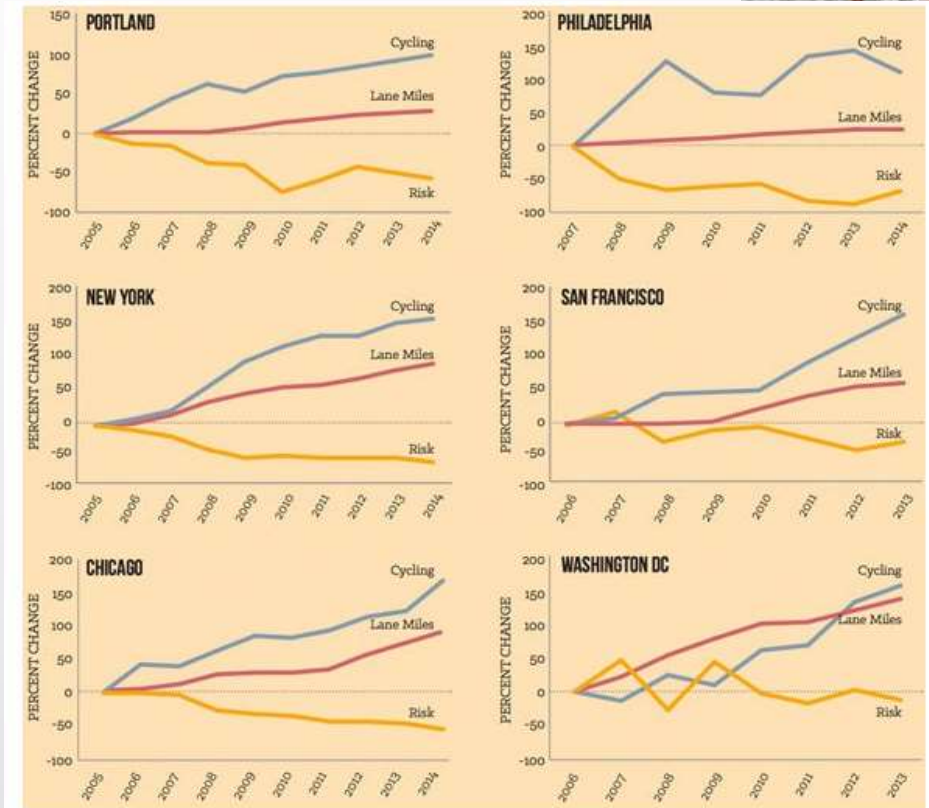
FHWA: http://www.pedbikeinfo.org/pdf/Webinar_DPS_080310_2.pdf

Benefits/Safety in Numbers



Sidewalks reduce pedestrian crash risk by 88%

FHWA: http://www.pedbikeinfo.org/pdf/Webinar_DPS_080310_2.pdf



Cities adding bike infrastructure are seeing a “safety in numbers” — more people on bikes plus lower risk of severe or fatal injury. Graphs: NACTO

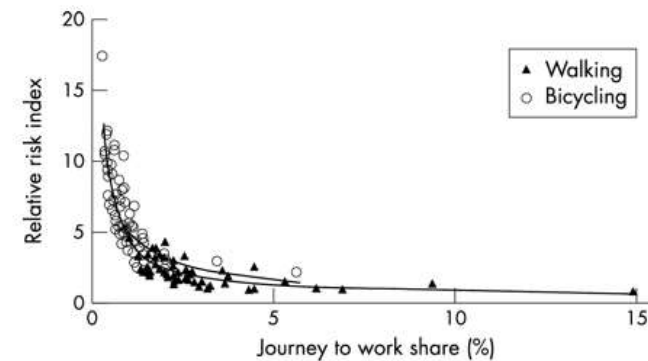
The more people bike on the streets, the safer the streets are for everyone who bikes. This phenomenon, [originally identified by researcher Peter](#)

<https://usa.streetsblog.org/2016/07/20/report-as-cities-add-bike-lanes-more-people-bike-and-biking-gets-safer/>

Safety Risk and Rate of Usage

Walking and bicycling in California cities

Per capita injury rates to pedestrians and bicyclists vary fourfold among the 68 cities, and the portion of journey to work trips made by foot and bicycle varies more than 15-fold and 20-fold (respectively). Dividing the per capita injury numbers by the fraction of work trips on foot or bicycle results in a fivefold and eightfold range of risk for a person walking or bicycling in the 68 cities. Figure 1 shows that the likelihood of an injury is not constant but decreases as walking or bicycling increases.



[Download figure](#)

[Open in new tab](#)

[Download powerpoint](#)

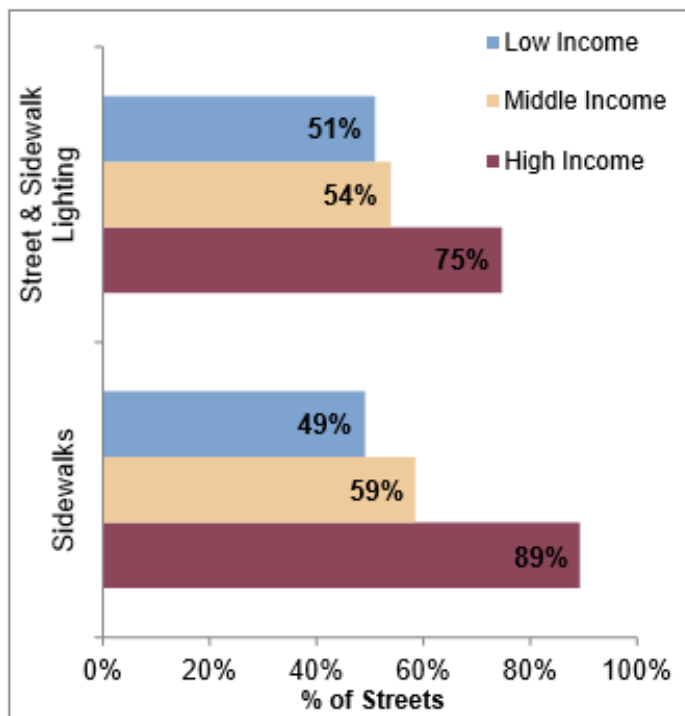
Figure 1

Walking and bicycling in 68 California cities in 2000.

Across Europe and North America, the amount of walking and bicycling varies tremendously — from 6% of all trips (USA) to 46% (the Netherlands).⁶ Yet the per capita fatal injury rate to people walking and bicycling is more or less the same in the two countries: 1.9/100 000 in the Netherlands and 2.1/100 000 in the USA.⁷ This surprising result shows that the numbers of pedestrians and bicyclists fatally injured does not vary linearly with the numbers of walkers and bicyclists.

Disparities

Availability of Sidewalks and Street and Sidewalk Lighting in Communities



Note: The following differences were significant at $p \leq 0.001$: Low-income vs. High-income; Middle-income vs. High-income.

bridging the gap

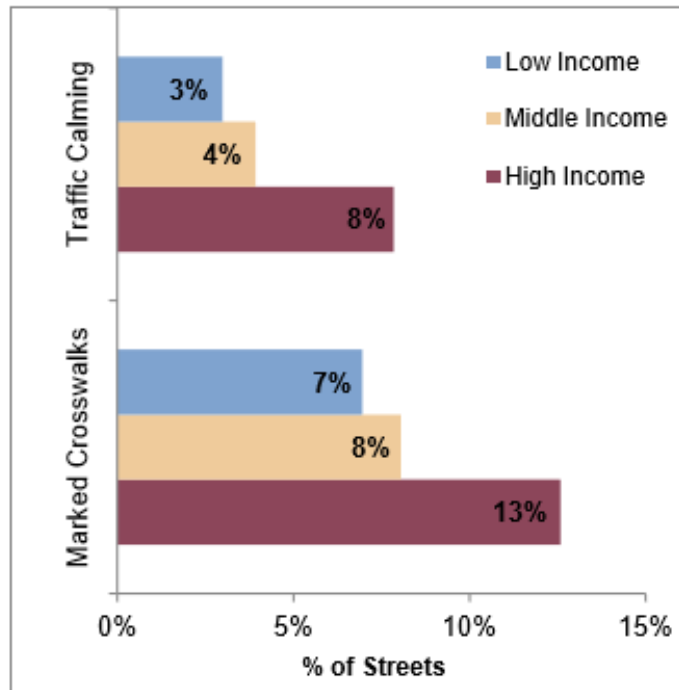
Research Informing Policies & Practices
for Healthy Youth

Research Brief
March 2012

Income Disparities in Street Features that Encourage Walking

Disparities

Availability of Traffic Calming Devices and Marked Crosswalks in Communities



Note: The following differences were significant at $p \leq 0.001$: Low-income vs. High-income; Middle-income vs. High-income.

bridging the gap

Research Informing Policies & Practices
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Research Brief
March 2012

Income Disparities in Street Features that Encourage Walking

Pedestrian Commuting is Still Not Common

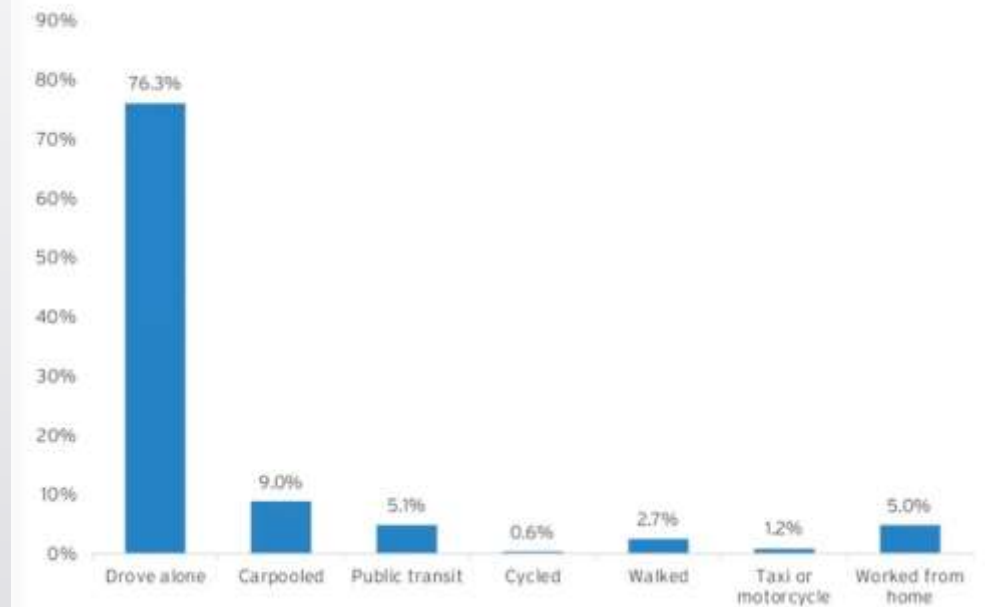


<http://www.greglindsay.org/P60/>



istock

Share of all commuters by mode, 2016



Where do Sidewalks get Built?

- Subdivision ordinances
- C & D guidelines, locations driven by:
 - population density
 - traffic,
 - prioritize safe connections to schools, shopping, and transit
- Buttermilk Farms v. Plymouth
 - (FP) Only on relevant parcel
- Driven by local factors (except trails???)



Health Benefits Model is Complicated

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Issue: *The Biology of Disadvantage*

Neighborhoods and health

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Features of neighborhoods or residential environments may affect health and contribute to social and race/ethnic inequalities in health. The study of neighborhood health effects has grown exponentially over the past 15 years. This chapter summarizes key work in this area with a particular focus on chronic disease outcomes (specifically obesity and related risk factors) and mental health (specifically depression and depressive symptoms). Empirical work is classified into two main eras: studies that use census proxies and studies that directly measure neighborhood attributes using a variety of approaches. Key conceptual and methodological challenges in studying neighborhood health effects are reviewed. Existing gaps in knowledge and promising new directions in the field are highlighted.

Keywords: neighborhoods; health; epidemiology

- Sidewalks encourages walking and community interactions
- Relationship between physical environment and health but mixed research conclusions

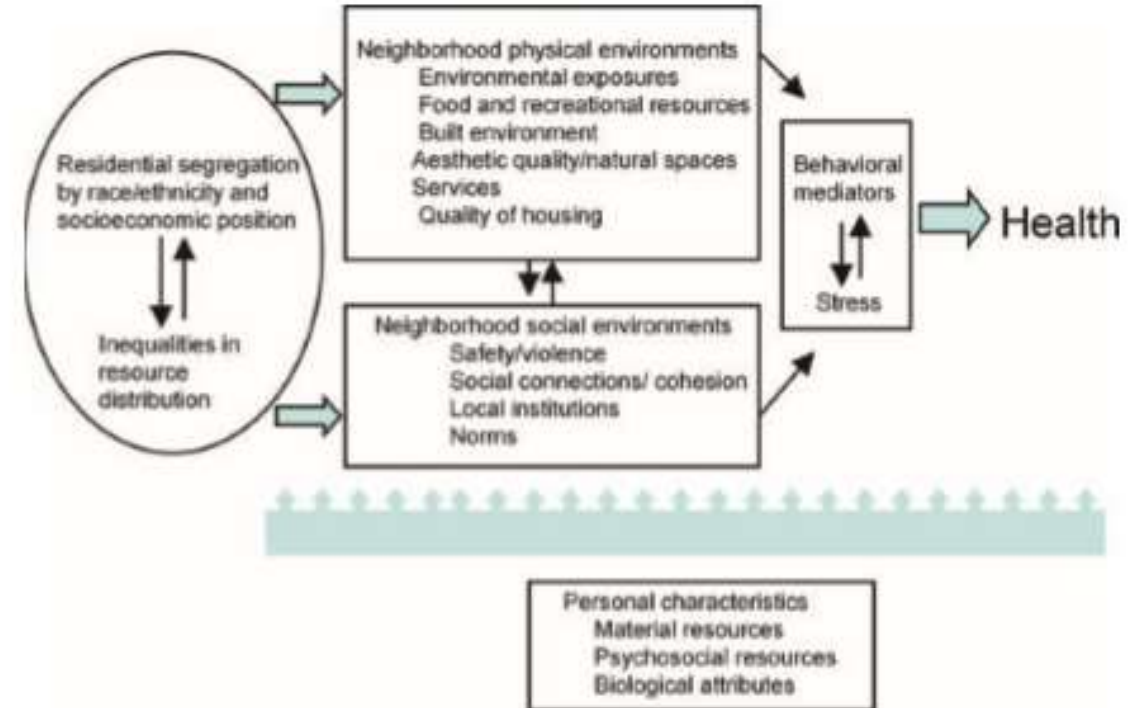
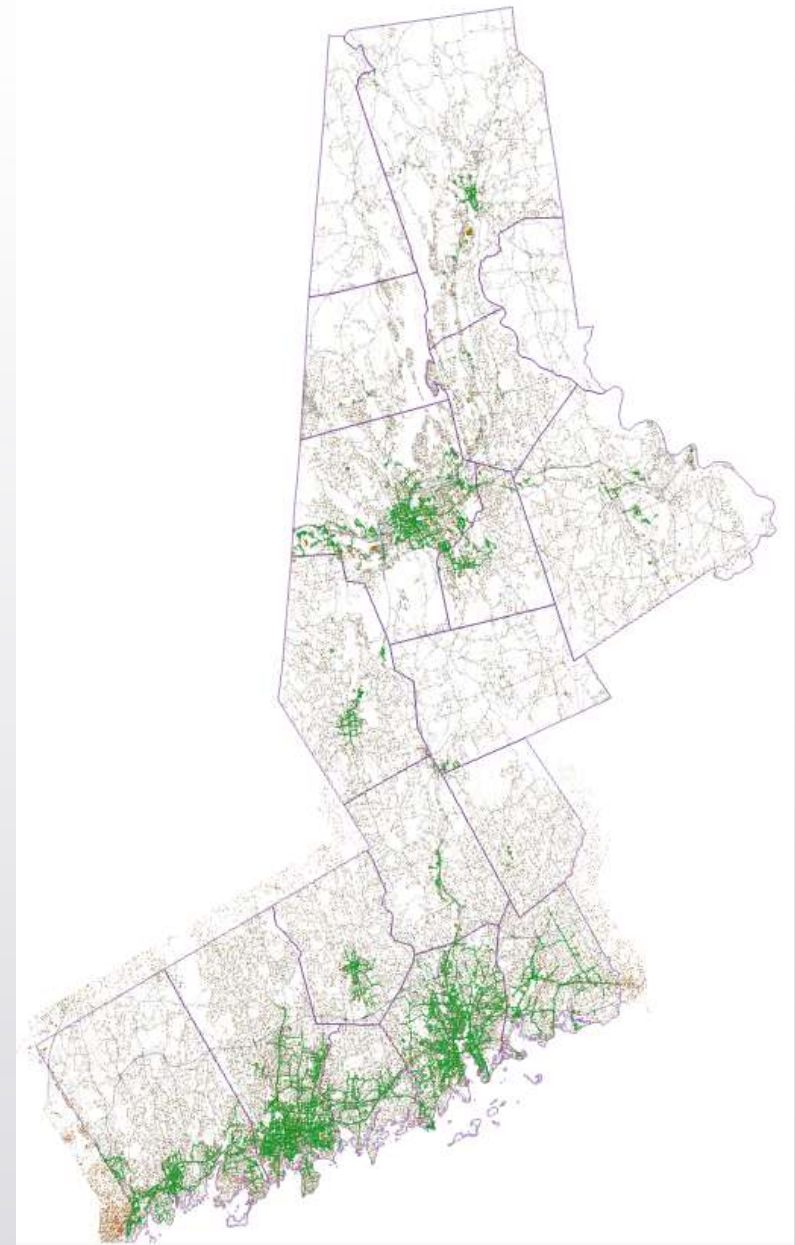


Figure 1. Schematic representation of the contributions of neighborhood environments to health inequalities.

Goals of Project

- New emphasis on Complete Streets, Multi-modal, walking and biking. Usage = quality of life.
- Where are the sidewalks in the Region and are they being built in the right places?
- What land use do they coincide with?
- Where are there gaps in connectivity?



Data and Methods

Extensive regional data set available that shows virtually IC including sidewalks in the region.

Use geospatial techniques to analyze massive data numbers (285,281 sidewalks in region)



Issues with Identifying Sidewalk Locations

- GIS data is not structure to be placed into a network (MetroCog)
- Buildings and driveways function as independent entities in the data
- Density of intersection nodes and other metrics often utilized for relative analysis of connectivity but does not tell what is happening at site level



Possible Methodologies

- Network analysis (need line network and connectivity analyses (alpha and gamma measures))
- Density of roads, nodes and links
- Pedestrian demand models or proxies using parcels (Effective Walking Area)

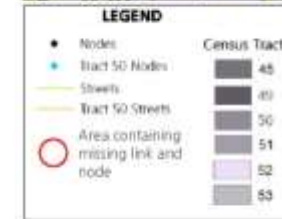
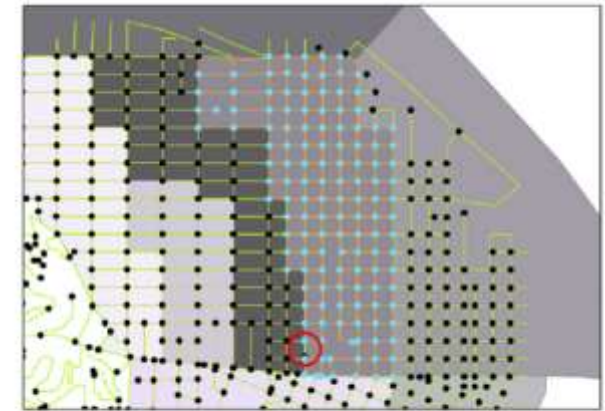


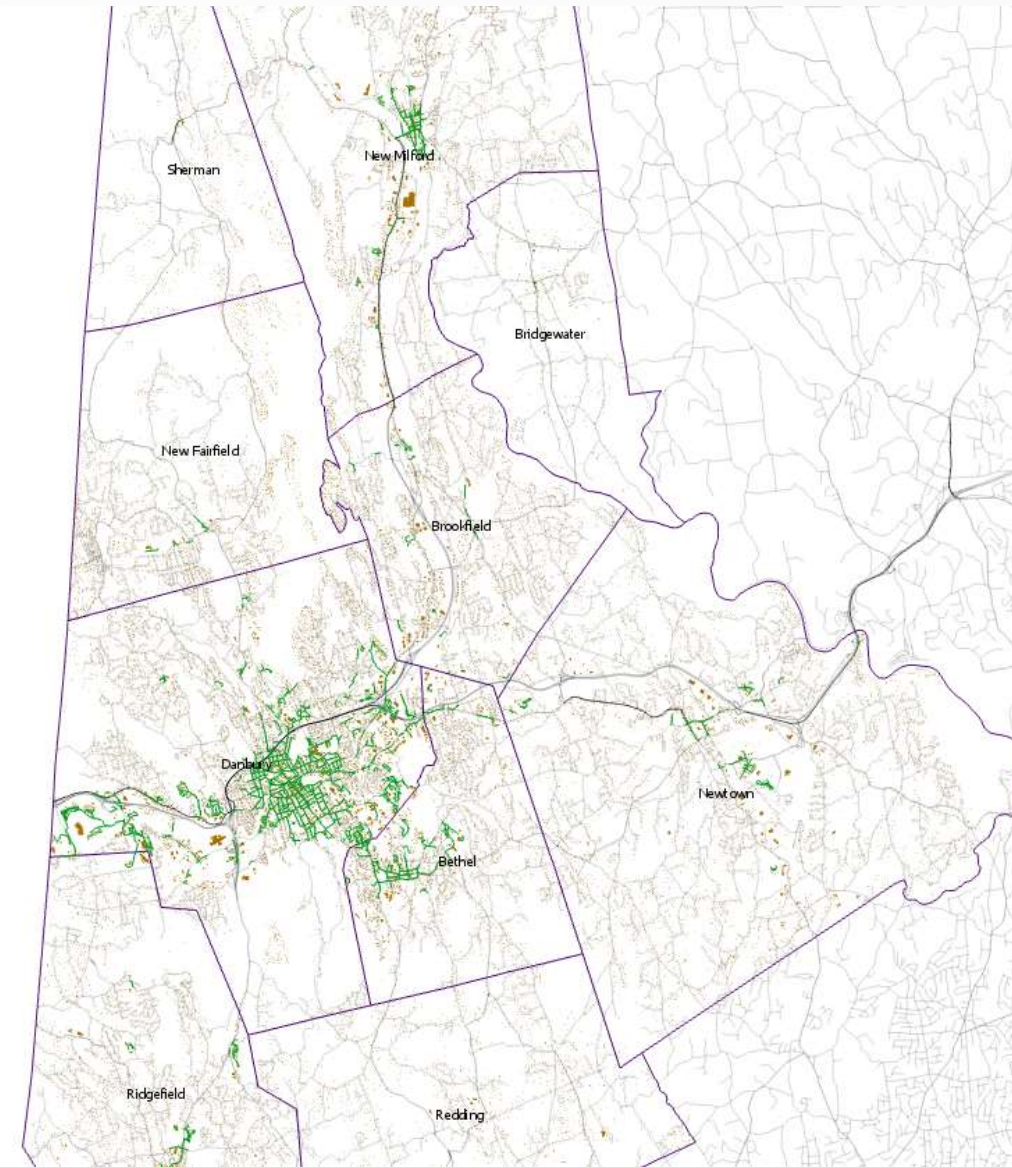
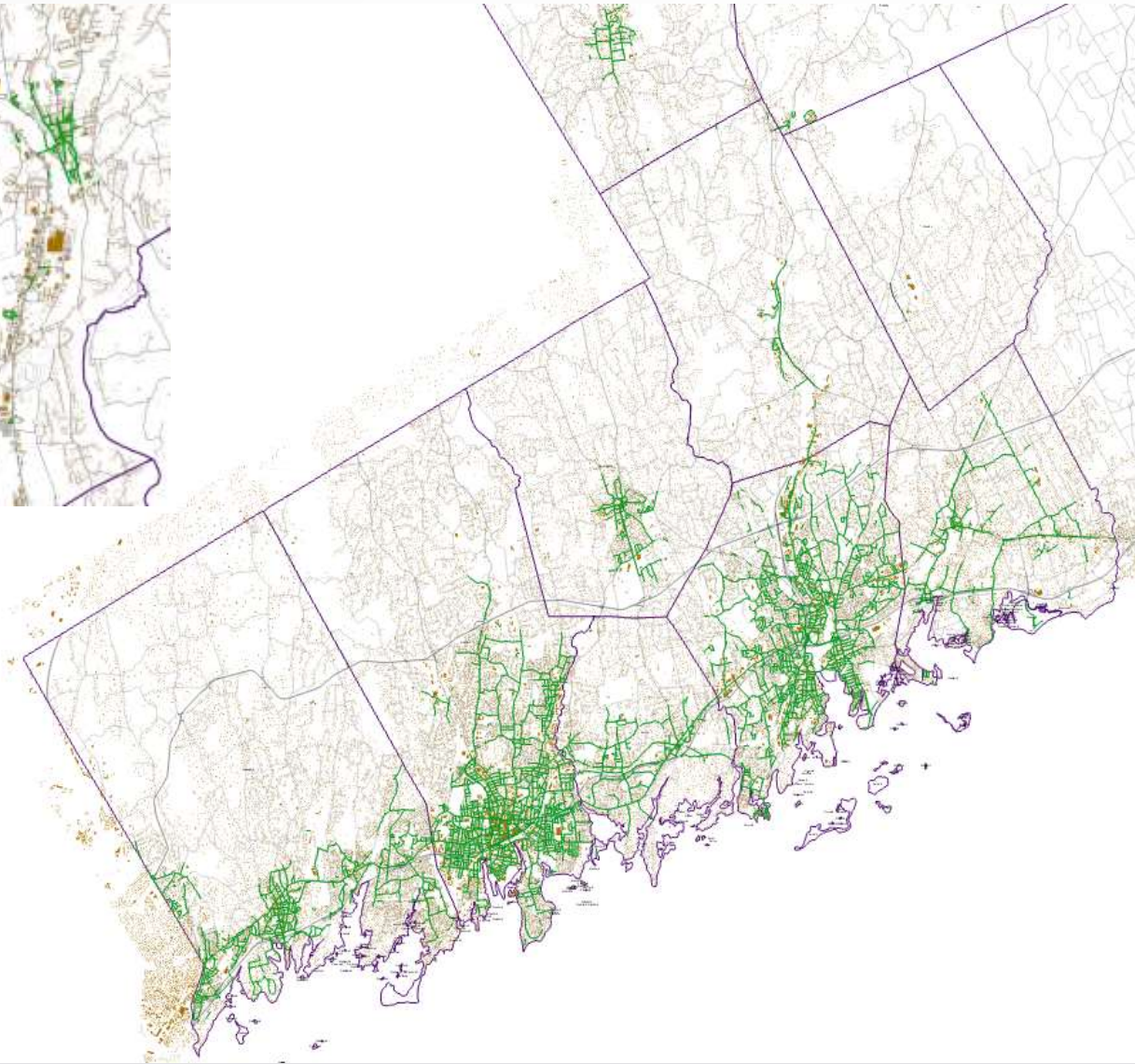
Table 3. Count of Nodes and Links for Tract 50

	GIS Count	Corrected Count	% Difference
Real Nodes	134	134	0
Dangle Nodes	3	4	33
Total Nodes	137	138	0.7
Links	237	239	0.8

Methodology

- Focus within ROW
- Analysis Issue: Deconstructed sidewalks into lines because they were polygons and not linear
- Used NN approach to identify maximum values with areas then picked a minimum value and filtered the resulting area





Results for entire region

Overall Results

	Area (sq ft)	Percent	Notes	
Area of All Sidewalks in Region	91,167,335	100%		
Area of All Sidewalks Adjacent (25') to 911 Roads in Region	22,085,901	24.2%	76% of sidewalk area is adjacent to parking lots; used in multi-family housing; ect...	
Area of Roads with 55' buffer from CL (approximation ROW)	2,158,825,827	65.2%	35% of sidewalk area is even farther away from roads	
ROW Sidewalk Area	31,095,543	1.4%		
ROW Area of Pavement	1,499,101,973	9.8%		

Sidewalk distance by town

- Use CL proxy
- Doesn't account for all gaps and dbl. sided roads
- Relative measure




TOWN	Summarized length in MILES
Norwalk	147.85326
Stamford	140.14625
Danbury	89.20422
Greenwich	72.11874
Westport	35.29359
Darien	31.05789
New Canaan	15.58988
Bethel	13.05969
Ridgefield	12.40810
New Milford	9.68723
Wilton	7.19155
Newtown	6.84085
Brookfield	2.9840
Redding	1.85458
New Fairfield	0.93498
Bridgewater	0.1645
Sherman	0.12516
Weston	0.04802

Distribution of Sidewalks by Road Type

- >The flagged areas have 17% of the ROW area compared to unflagged areas but 18x the relative amount of sidewalks.

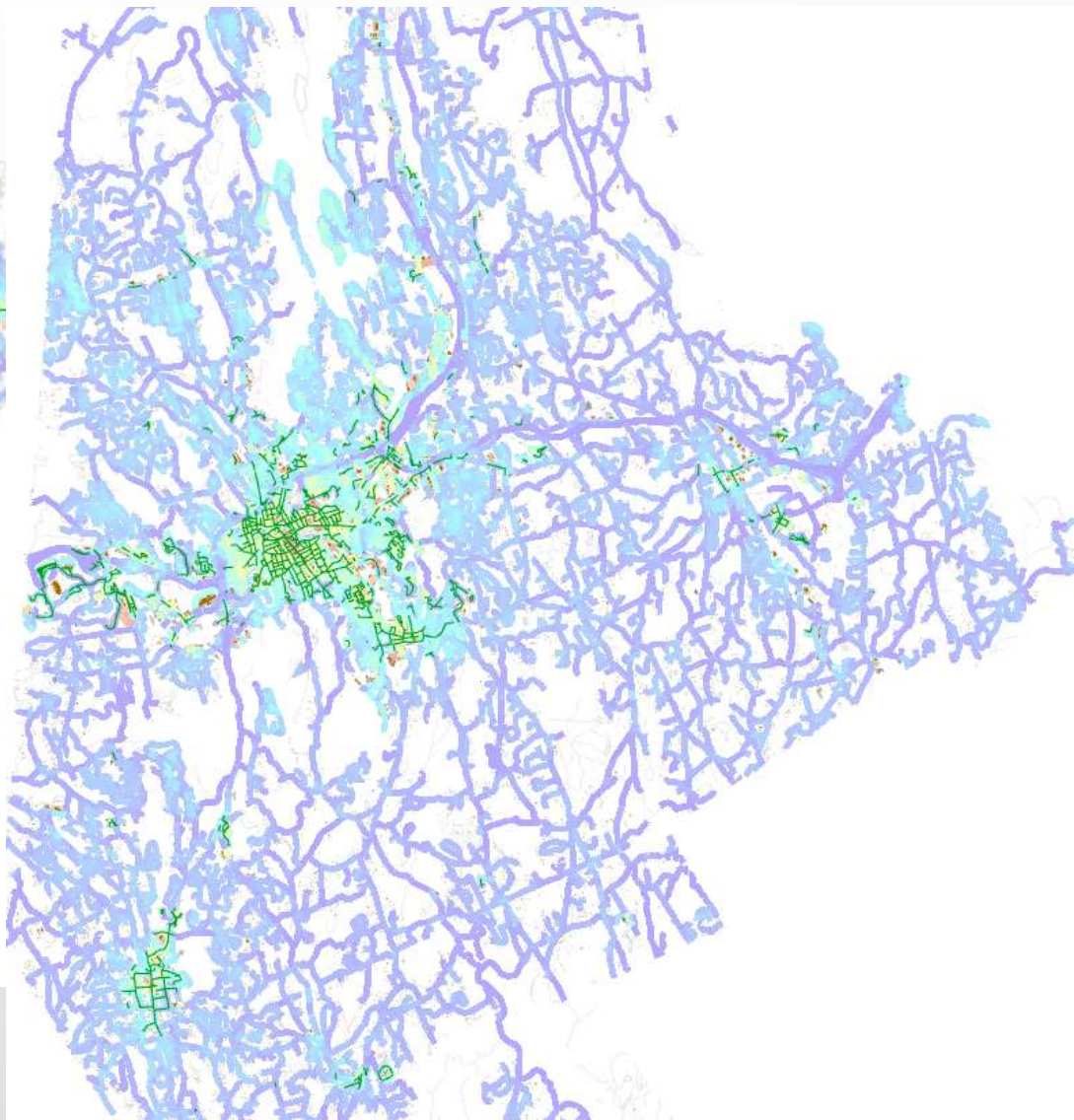
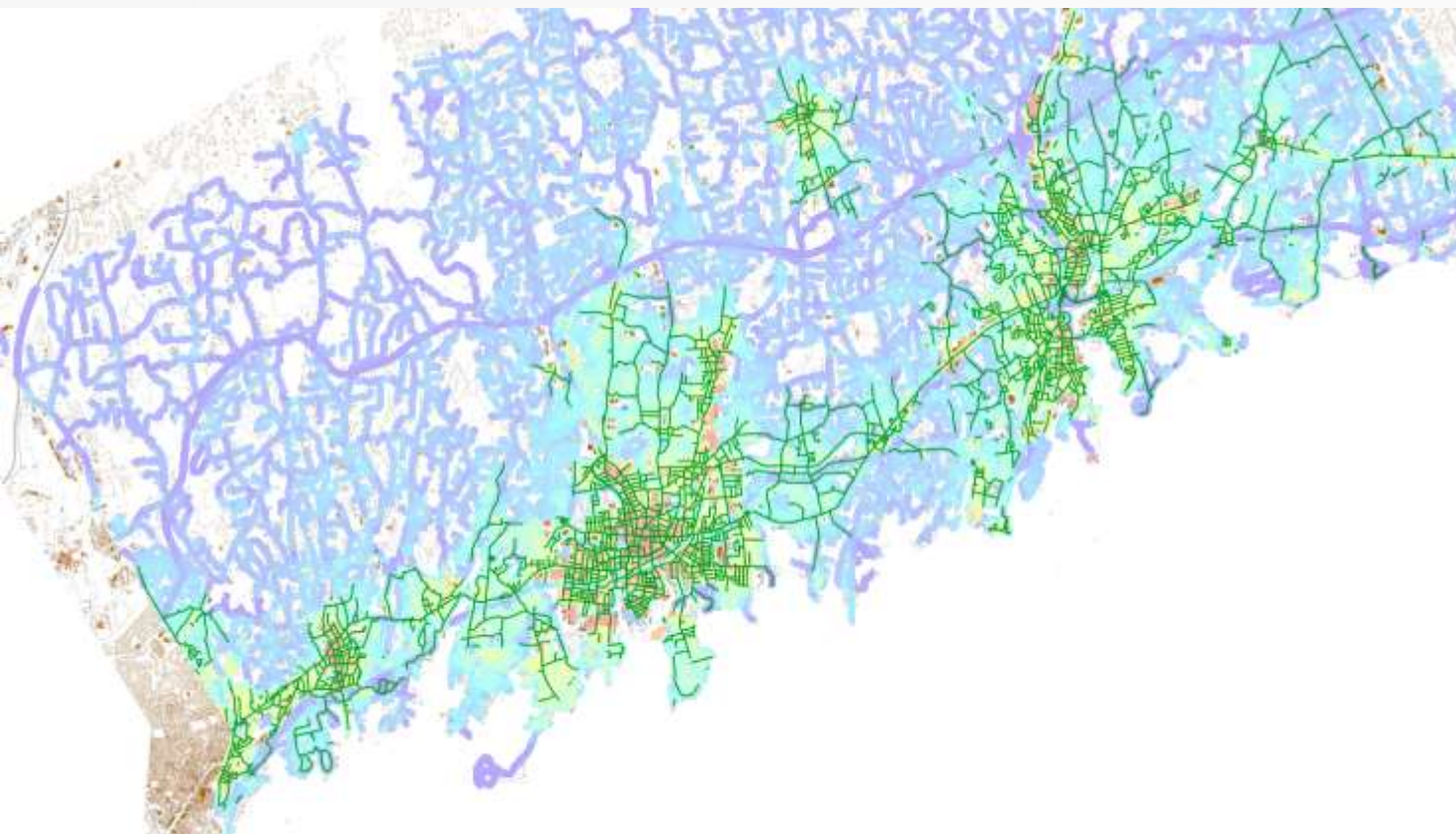
CT 911 w/ 55' Buffer and Flagged Area					
ACC	Area	Sidewalk	Ratio	Percent	
(1) Interstate	6,529,260	78,976	1.21%	0.3%	
(2) Intermuni Highways	4,201,532	185,637	4.42%	0.8%	
(3) State Highways	38,736,685	3,159,382	8.16%	13.5%	
(4) City/county/local	46,215,354	4,379,675	9.48%	18.8%	
(5) Neighborhood	203,924,077	15,535,647	7.62%	66.6%	
Total	299,606,908	23,339,317	7.79%	100.0%	
Non-flagged Areas					
ACC	Area	Sidewalk	Ratio	Percent	
(1) Interstate	52,513,891	2,929	0.01%	0.0%	
(2) Intermuni Highways	23,642,631	25,051	0.11%	0.3%	
(3) State Highways	119,918,273	240,505	0.20%	3.2%	
(4) City/county/local	88,835,472	338,762	0.38%	4.6%	
(5) Neighborhood	1,436,827,123	6,794,637	0.47%	91.8%	
Total	1,721,737,390	7,401,884	0.43%	100.0%	



Distribution of Sidewalks by Speed Limit

Neighborhood roads represent the vast majority of sidewalks

CT 911 w/ 55' Buffer and Flagged Area					
Speed	Area	Sidewalk	Ratio	Percent	Weighted
1	63,817	1,731	2.71%	0.0%	0.00%
15	8,127,943	485,428	5.97%	2.1%	0.12%
20	166,018	85	0.05%	0.0%	0.00%
25	208,426,578	16,392,197	7.86%	70.3%	5.53%
35	66,668,296	5,783,080	8.67%	24.8%	2.15%
45	10,023,778	537,234	5.36%	2.3%	0.12%
50	39,983	816	2.04%	0.0%	0.00%
55	1,424,854	43,399	3.05%	0.2%	0.01%
65	6,123,274	66,209	1.08%	0.3%	0.00%
Total	301,064,541	23,310,179	7.74%	100.0%	7.74%
CT 911 w/ 55' Buffer and Non-flagged Area					
Area	Area	Sidewalk	%	% of Total	Weighted
1	1,120,135	8,740	0.78%	0.1%	0.00%
15	51,715,724	641,760	1.24%	8.6%	0.11%
20	2,399,641	22,136	0.92%	0.3%	0.00%
25	1,402,268,084	6,239,777	0.44%	83.9%	0.37%
35	176,467,416	488,914	0.28%	6.6%	0.02%
45	31,149,719	28,804	0.09%	0.4%	0.00%
50	59,429	58	0.10%	0.0%	0.00%
55	8,904,241	2,017	0.02%	0.0%	0.00%
65	57,881,800	3,199	0.01%	0.0%	0.00%
Total	1,731,966,189	7,435,405	0.43%	100.0%	0.43%

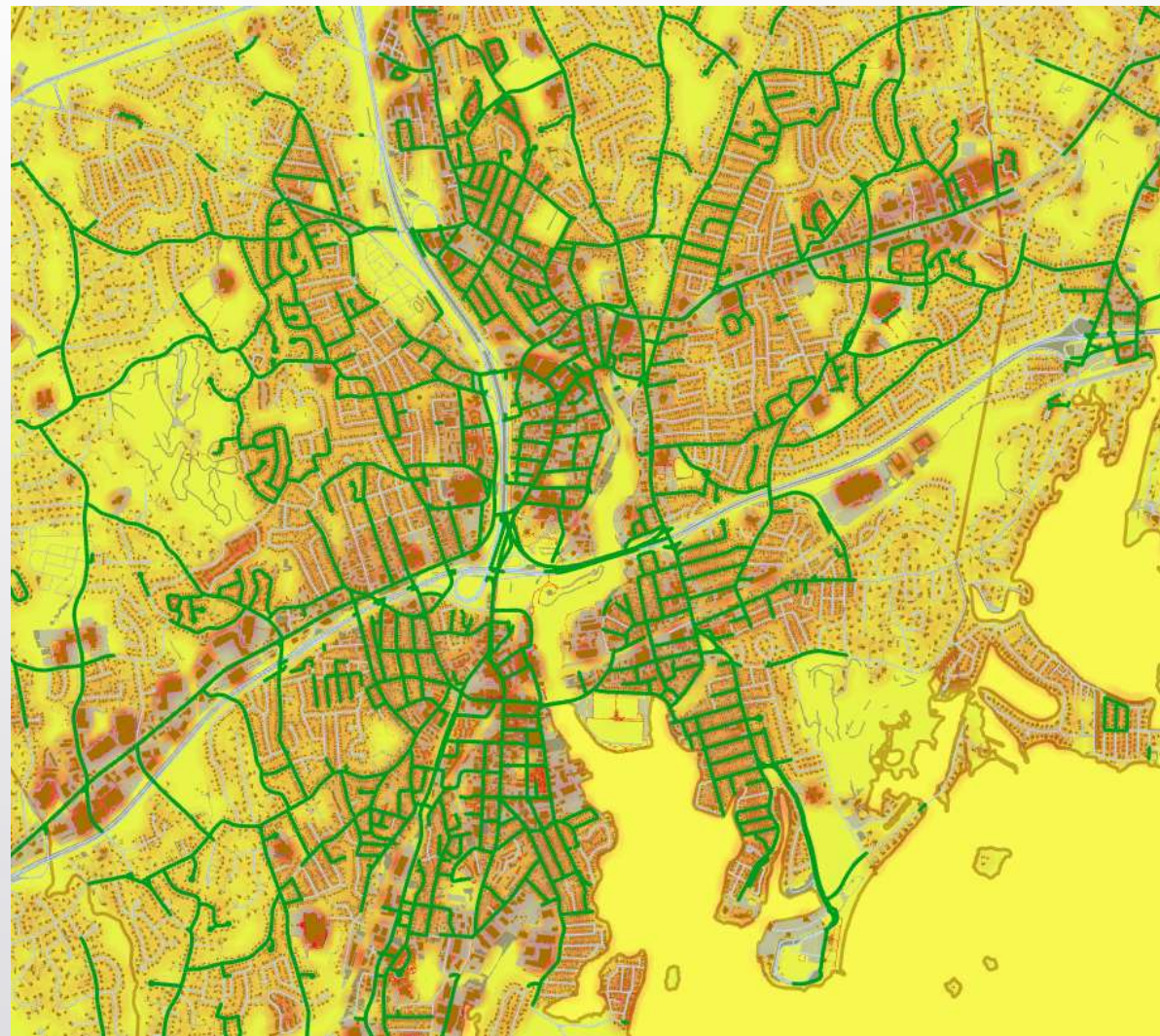


Housing Density and Sidewalks

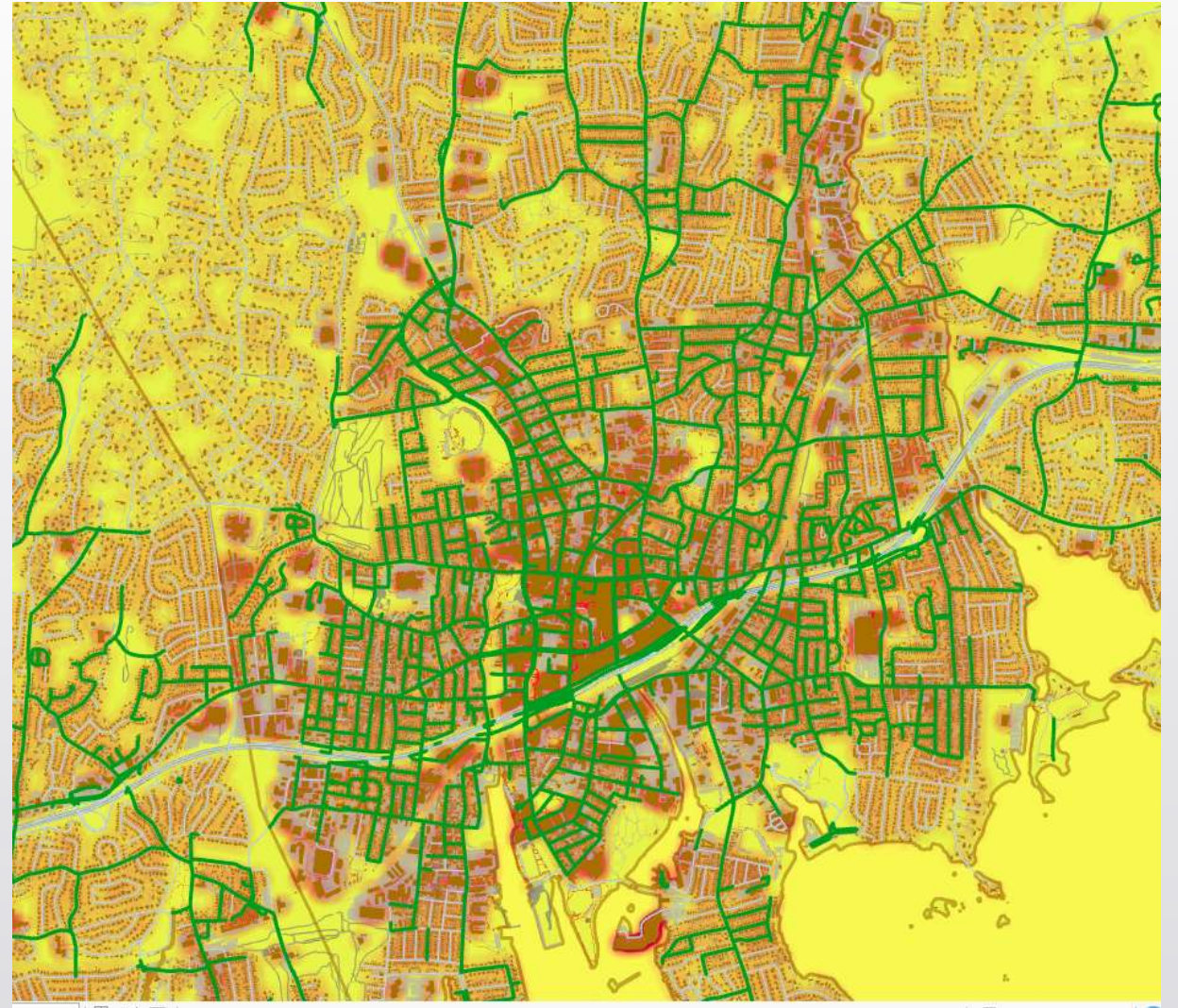
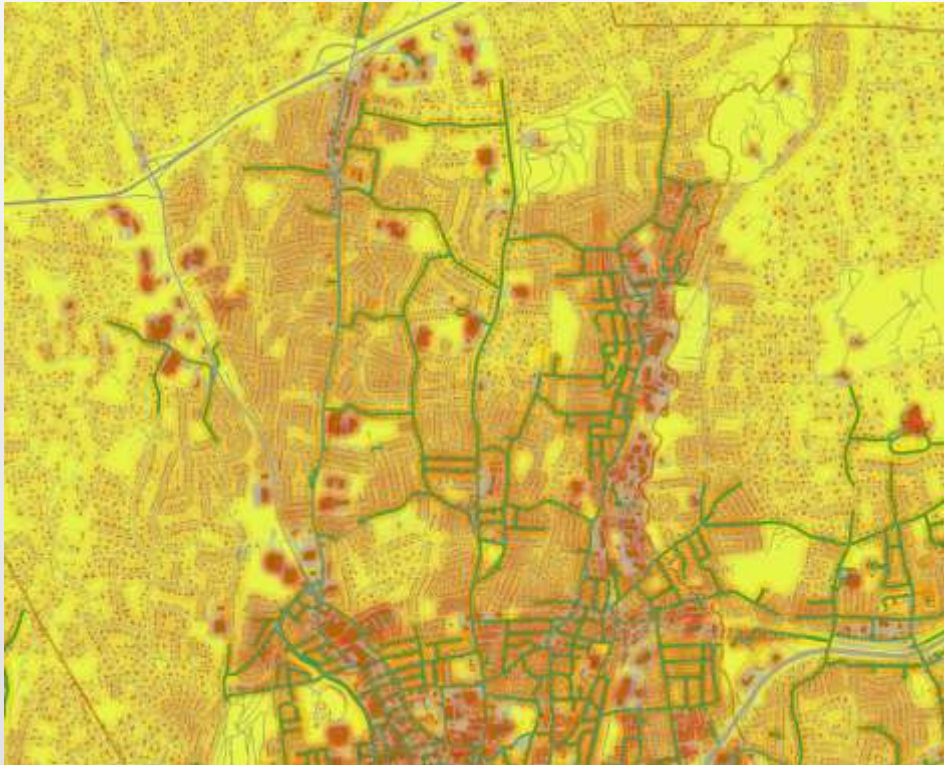
Danbury Detail

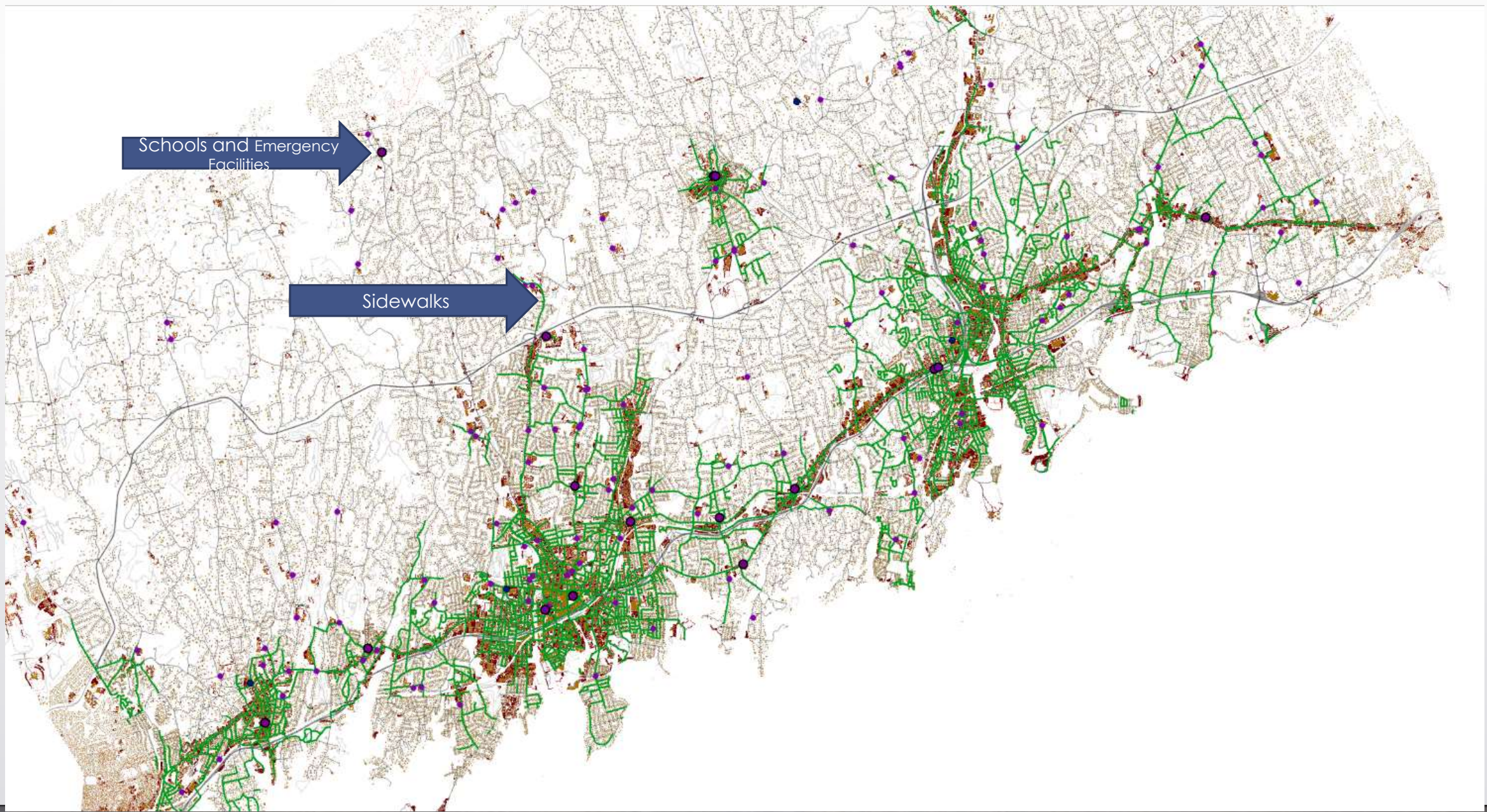


Norwalk Detail

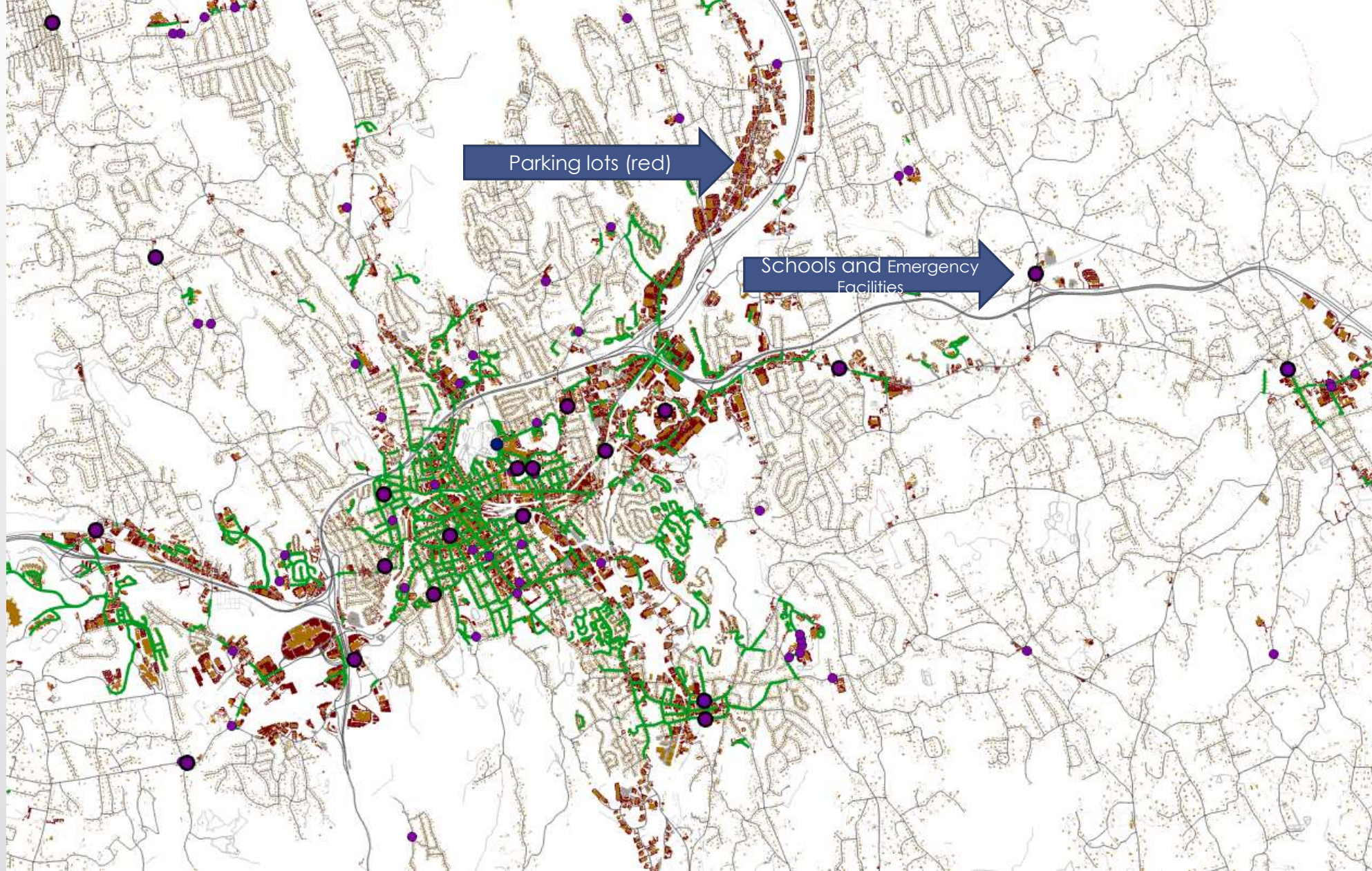


Stamford Detail





Pedestrian Attractors and Sidewalks

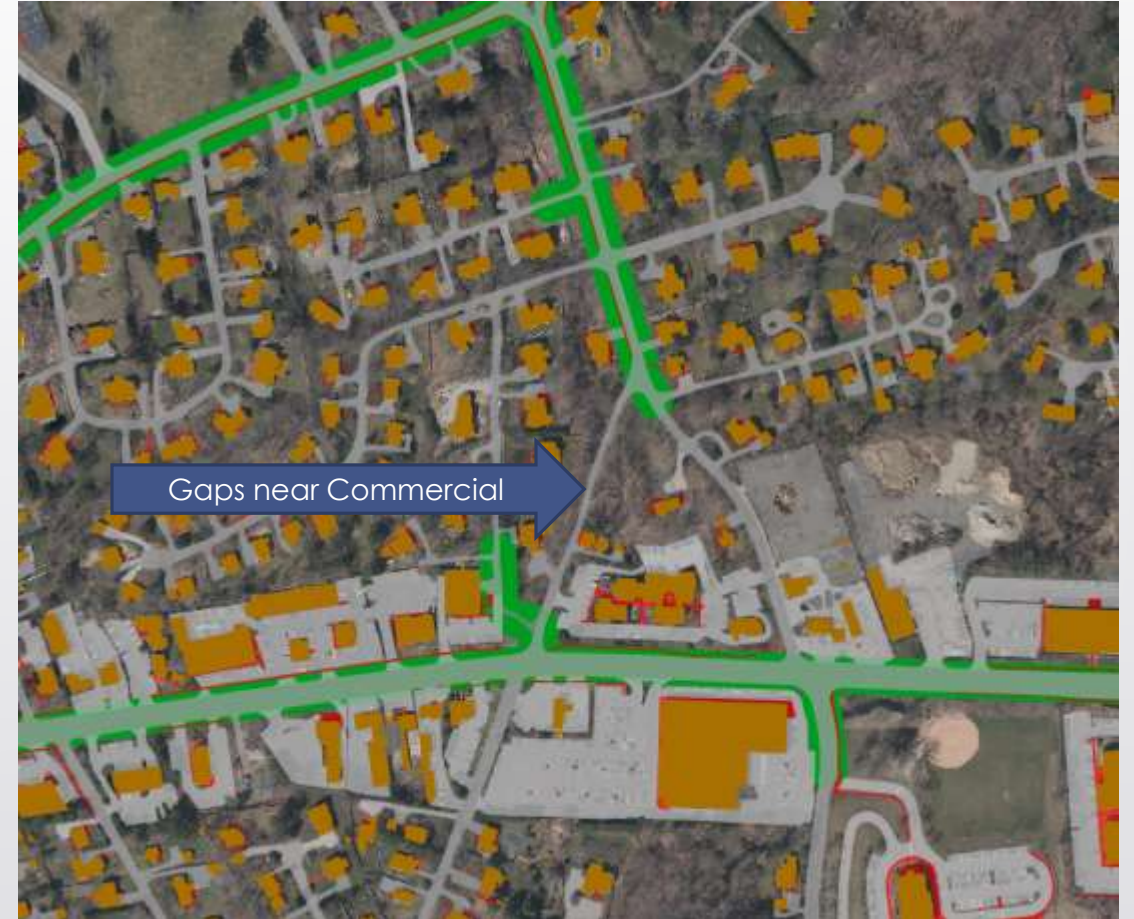


Pedestrian Attractors and Sidewalks

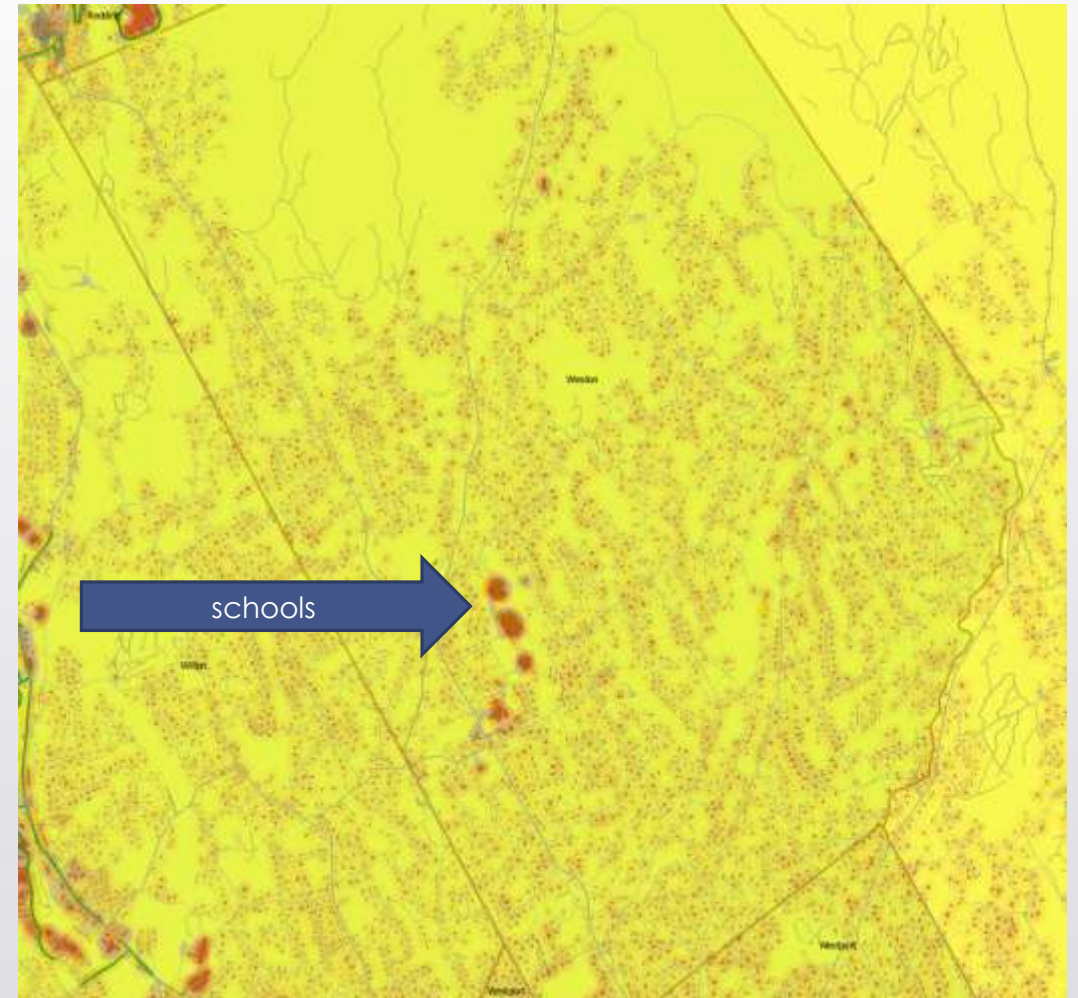
Opportunities



Opportunities



Opportunities



Comments and Questions???

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- GIS data set is available

