

Walkability local strategy map

Description

CMAP conducted an analysis to estimate the walkability of the region based on current infrastructural conditions and access to destinations. While several measures of walkability exist, this analysis borrowed the principles promoted by Jeff Speck,¹ that walkability is achieved when four conditions are met simultaneously: the walk is useful (there is a proper reason for walking), the walk is safe and feels safe, the walk is comfortable, and the walk is interesting. Many factors, such as street network design, land development patterns, and streetscaping can be utilized to achieve walkability in these four fields. The four criteria are closely interconnected and not mutually exclusive, as they can share similar strategies that contribute to achieving the goals of multiple categories.

Inputs

The following amenities/inputs were used in the model:

Amenities data layers and scoring

Supermarkets	
Data source: Chicago State University, 2011.	
Supermarkets are defined as "full-service chains, supercenters, and local chains or independents with at least five check out lanes and a full line of groceries." Further documentation here .	
Count	Score
0	-10
1	1
2-4	3
5-6	5
7+	10

Schools	
Data source: Illinois State Board of Education, 2013.	
The total count of public and private schools within a 30-minute walk were counted.	
Count	Score
0	0
1-2	1
3-5	3
6-19	5
20+	10

¹ Speck, Jeff. *Walkable City: How Downtown Can Save America, One Step at a Time*. North Point Press: New York, 2012.

Libraries	
Data source: Illinois State Library, 2010.	
This file shows the approximate locations of public libraries in the seven counties of the CMAP region.	
Count	Score
0	0
1	1
2-9	3
10-19	5
20+	10

Dun & Bradstreet	
Data source: Dun & Bradstreet, 2015.	
Using particular NAICS codes of locations that might be more likely to be located in walkable places. <i>See appendix for full description of codes used.</i>	
Count	Score
<50	0
50-199	3
200-499	5
500-999	15
1,000+	20

Metra	
Data source: RTA, 2013.	
Received from the RTA in March 2013. Total Metra stations counted within 30-minute walk.	
Count	Score
0	0
1	3
2-6	5
7+	10

Pace	
Data source: Pace, 2015.	
IBS stops are any location the bus may stop as long as it is safe. These are the stops that are surveyed into the Pace IBS file, there might be a shelter or sign there but not necessarily.	
Count	Score
0	0
1-4	1
5+	2

CTA	
Data source: CTA, 2015.	
Downloaded from the City of Chicago Data Portal, 10 February 2015. Total number of stations within a 30-minute walk counted.	
Count	Score
0	0
1	3
2-4	7
5+	20

Transit Accessibility	
Data Source: CMAP's Access to Transit Index , 2013.	
Using the scores for Connectivity and Frequency of transit – for a total possible of 10 additional points.	
Previously assessed score	Score
0	0
1	1
2	2
3	3
4	4
5	5

Physical features analysis

Average Parcel Size	
Data source: County assessor files (Cook, 2015; DuPage, 2014; Kane, 2015; Kendall 2014; Lake, 2014; McHenry, 2016; Will, 2015).	
Smaller parcels are often associated with more variety in the landscape, which adds to interest and usefulness of the walk. Parcel points were spatially joined to Subzones (not walksheds), using an "Average" for the features (to get an average of parcel size in the subzone).	
Range (sq. ft.)	Score
0	0
<5,000	20
5,000-9,999	7
10,000+	0

Population	
Data source: CMAP calculation using 2010 Census Household information summarized to subzones, 2014.	
Having people living close to amenities is important to walkability, and population density makes for more efficient transit use.	
Households	Score
<100	0
100-499	5
500-1599	10
1600+	20
Block Length	
Data source: CMAP calculation based on Navteq streets data, 2015.	
CMAP calculated the average block length for each walkshed by first dividing all street segments using unique intersection points. These "blocks" were assigned to subzones, and the mean block length was calculated by dividing the total block length for each walkshed by the number of blocks. Average block lengths are in feet.	
Avg. Block Length (ft)	Score
<500 feet	5
500+ feet	0

Intersection Density	
Data source: CMAP calculation based on Navteq streets data, 2015.	
CMAP calculated the intersection density by counting the number of unique intersection points in each walkshed and dividing by the area (square miles) of each walkshed. Only 4-way intersections were counted to focus on connectivity.	
Intersections/sq. mile	Score
<40	0
40-70	10
>70	20

Block size	
Data source: CMAP calculation based on Navteq streets data, 2015.	
CMAP calculated the average block size for each walkshed by using the street network to create polygon "blocks" and assigning each block to a walkshed. The mean block size was calculated by dividing the sum of the block sizes for each walkshed by the number of blocks. Average block sizes are in acres.	
Average block size (acres)	Score
<1	0
1-9	10
10+	0

Jobs	
Data source: CMAP 2010 subzone-level employment estimates (2014)	
Job locations that also had residential units are critical because if you can't live there, you are unlikely to be able to safely walk there. This analysis only counted subzones with 100 households or more, and then looked at the number of jobs in that subzone.	
Range / Count	Score
<200	0
200+	10

Tree Cover in developed areas	
Data source: CMAP calculation of University of Vermont's Urban Tree Canopy layer	
Ratio of tree canopy to roadway density for subzones that have at least 1 mile of roadway.	
Range / Count	Score
0-1500	0
1500-3000	1
3000+	2

For subzones with at least 1 mile of roadway, CMAP calculated the ratio of average tree canopy coverage to roadway density. First we selected subzones with at least one mile of roadway, then we calculated the density of roads in the subzone (not just mileage because some subzones are smaller than others). Then we calculated a score for the ratio of average tree canopy coverage to road density.

Penalties

Low Population	
Data source: CMAP calculation using 2010 Census Household information summarized to subzones, 2014.	
Having people living close to amenities is important to walkability, and population density makes for more efficient transit use. If very few people are there, walkability is unrealistic.	
Range / Count	Score
<5	-30
5+	0

Fatal bike and ped crashes	
Data source: IDOT, 2010-2014.	
The crash rate for serious and fatal crashes does not weigh fatal crashes more heavily, so this is an added penalty if there are fatal crashes within the subzone (not the walkshed).	
Range	Score
0	0
1	-2
2+	-5

Serious and fatal bike and ped crashes
Data source: IDOT, 2010-2014.
While all crashes will only point to places where more people walk and bike, a pattern of serious and fatal crashes can indicate areas with high-speed roadways, less comfortable conditions, and less safe streets. Areas with more pedestrians and bikers are going to have more crashes overall, so the crash rate is calculated with consideration of population. Subzones were analyzed in population groups, and it was determined that a population of 1,000 or more constituted the more developed parts of the region and was used to score crashes. See appendix for population by subzone.

Crashes	Score if Pop <1,000	Score if Pop >1,000
1	-1.5	0
2	-2	-0.5
3	-2.5	-1
4	-3	-1.5
5	-3.5	-2
6	-4	-2.5
7	-4.5	-3
8	-5	-3.5
9	-5.5	-4
10	-6	-4.5

Methodology

CMAA developed a measure of amenities and other characteristics that contribute to a location's overall walkability, with the best data available. Using a 30-minute walkshed from points throughout the region (subzone centroids), the number of amenities reachable on foot were counted and assigned scores, and the physical attributes (such as block length, intersection density, population and employment density) were measured and scored for each subzone. The total points from amenities and characteristics were added, and penalties were assigned for areas with fewer than five households and multiple fatal bicycle or pedestrian crashes.

Amenity measured	Highest possible score	Lowest possible score
Supermarkets	10	-10
Libraries	10	0
Schools	10	0
Metra stations	10	0
Pace bus stops	2	0
CTA stations	20	0
Dun & Bradstreet points	20	0
Transit Access Score (frequency and connectivity)	10	0
Totals amenities	92	-10
Other characteristics		
Average parcel size	20	0
Tree canopy coverage	3	0
Block length	5	0
4-way Intersection density	20	0
Block size	10	0
Number of Households	20	0
Number of Jobs	10	0
Serious and Fatal Crashes	0	-6
Fatality penalty	0	-5
<5 households penalty	0	-30
Totals characteristics	88	-41
Total possible	180	-51

30-minute walkshed & amenities model

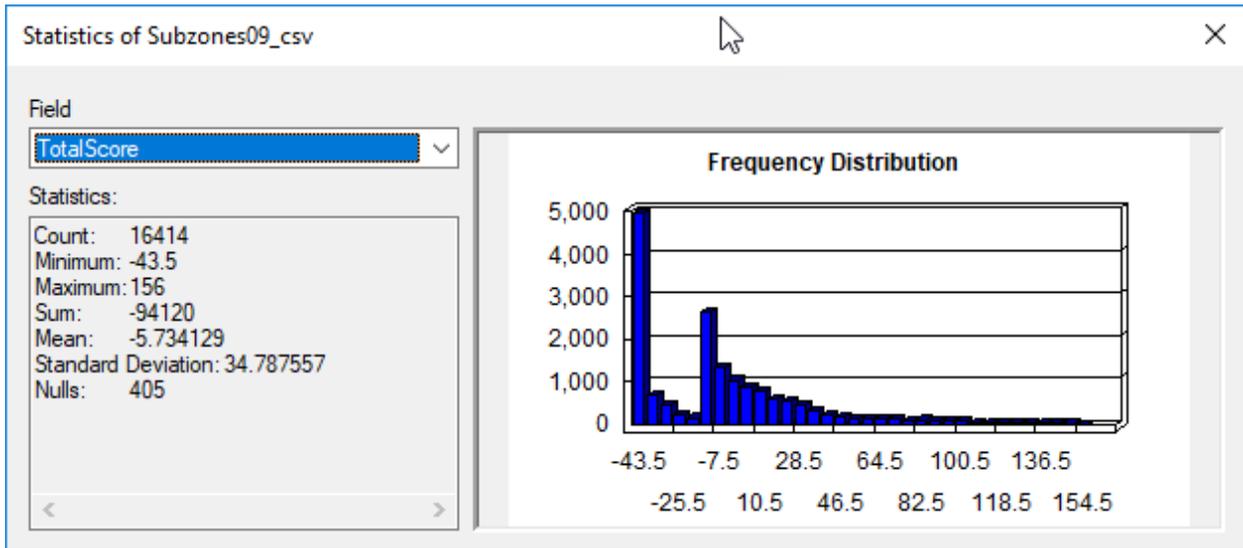
RTA provided CMAA with a 30-minute walkshed file surrounding each subzone centroid. The walkshed uses streets files as the walking paths, regardless of whether or not sidewalks are present. From that file, Noel Peterson created a convex hull polygon, the walkshed polygon which formed the starting point for the model.

The walkshed polygon is spatially joined with the amenities (data inputs). A field is added that calculates the number of points that intersect the walkshed, then that field is joined back to the subzone file. Amenities measured include: supermarkets, libraries, schools, Metra stations, Pace bus stations, CTA stations, and selected points of interest from Dun & Bradstreet.

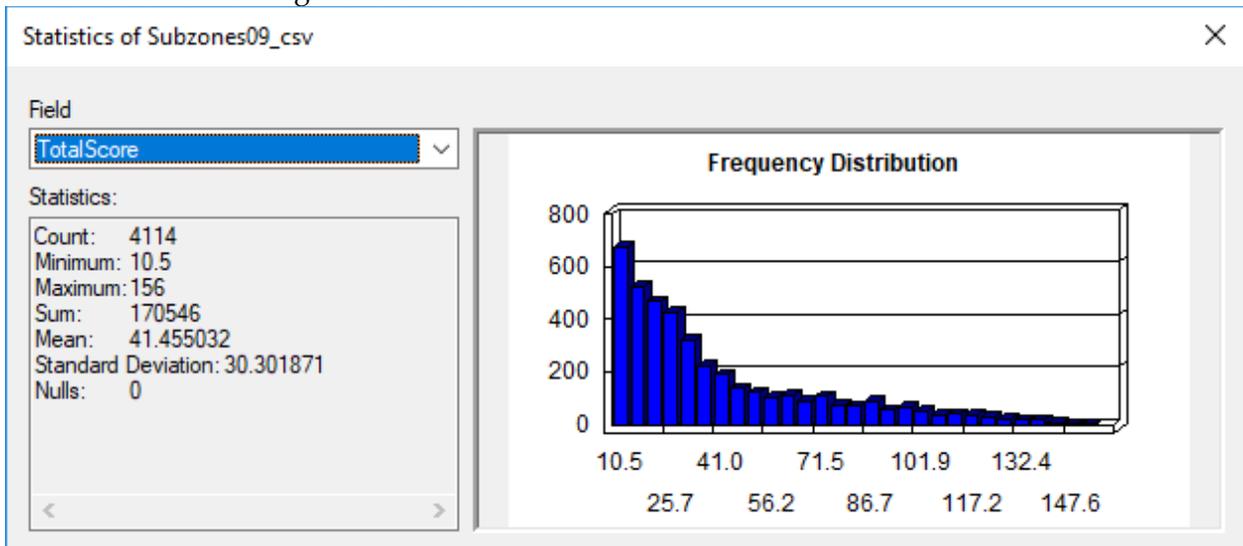
Total score calculation

Exported all scoring features for analysis in Excel; added to get a combined score.

- Top score: 156. Lowest score: -43.5
- Distribution of total scores:



Distribution of values greater than 10:



Classifying scores

The lowest score is -43.5 and the highest score is 156. The following breakdowns were used for the rankings:

-44 to 0	Very low walkability
1-20	Low walkability
21-50	Moderate walkability
51-100	High walkability
101-156	Very high walkability

Contacts

Contact [Lindsay Bayley](#) with any questions about this Local Strategy Map.

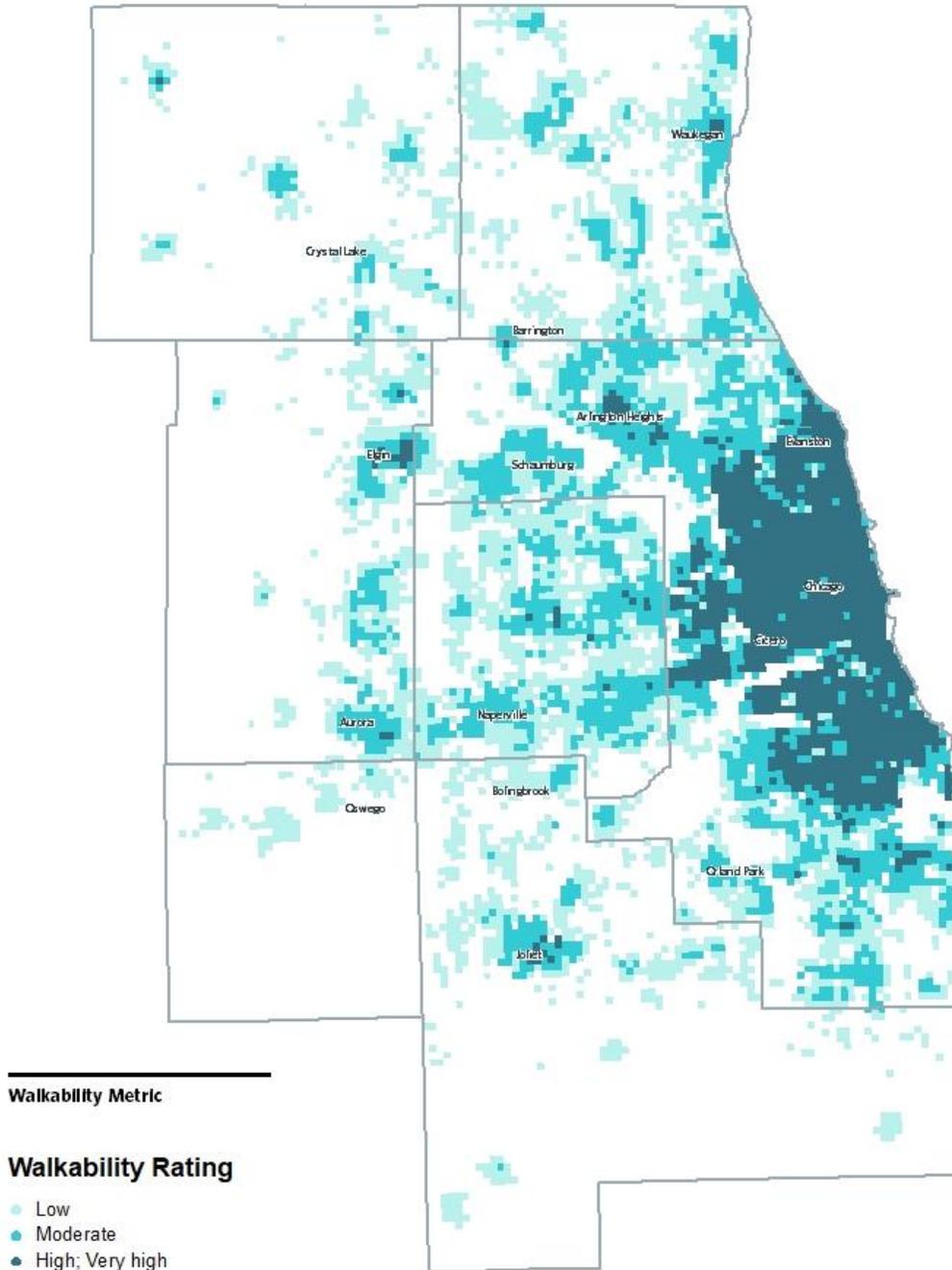
Field Descriptions

#	Field	Description
1	subzone09	the unique ID for subzones
2	NTAScore	A total score for walkability minus the Transit Access score
3	WalkabilityRating	The 5 groups of walkability scores from Very low to Very high
4	MarketScore	the score for proximity to grocery stores
5	LibScore	the score for proximity to libraries
6	SchoolsScore	the score for proximity to schools
7	MetraScore	the score for proximity to Metra stations
8	PaceScore	the score for proximity to Pace bus stops
9	CTAScore	the score for proximity to CTA stations
10	DnBScore	the score for proximity to select points in D & B
11	Amenities	total score for fields (2) through (10)
12	ParcelScore	score based on average parcel size
13	EmpScore	score for total number of jobs
14	B_LENGLscore	score based on average block length
15	INT_DENSscore	score based on density of 4-way intersections
16	B_SIZEscore	score based on average block size
17	HHPen2	penalty for low population
18	HHscore2	score for total number of households
19	TreeScore	the score for tree coverage to road density
20	FatalPen	score based on bicyclist and pedestrian fatalities
21	SerFatalScore	score based on serious and fatal crashes and population
	TransitAccess	A CMAP-generated score for frequency and connectivity of transit (excludes proximity)
22	Character	Total score for fields (12) through (21)
23	TotalScore	sum of AmenityScore and CharacterScore
24	Shape_Length	An ESRI-generated field that calculates the length of the subzone in feet
25	Shape_Area	An ESRI-generated field that calculates the area of the subzone in sq. feet

NAICS codes used for Dun & Bradstreet points

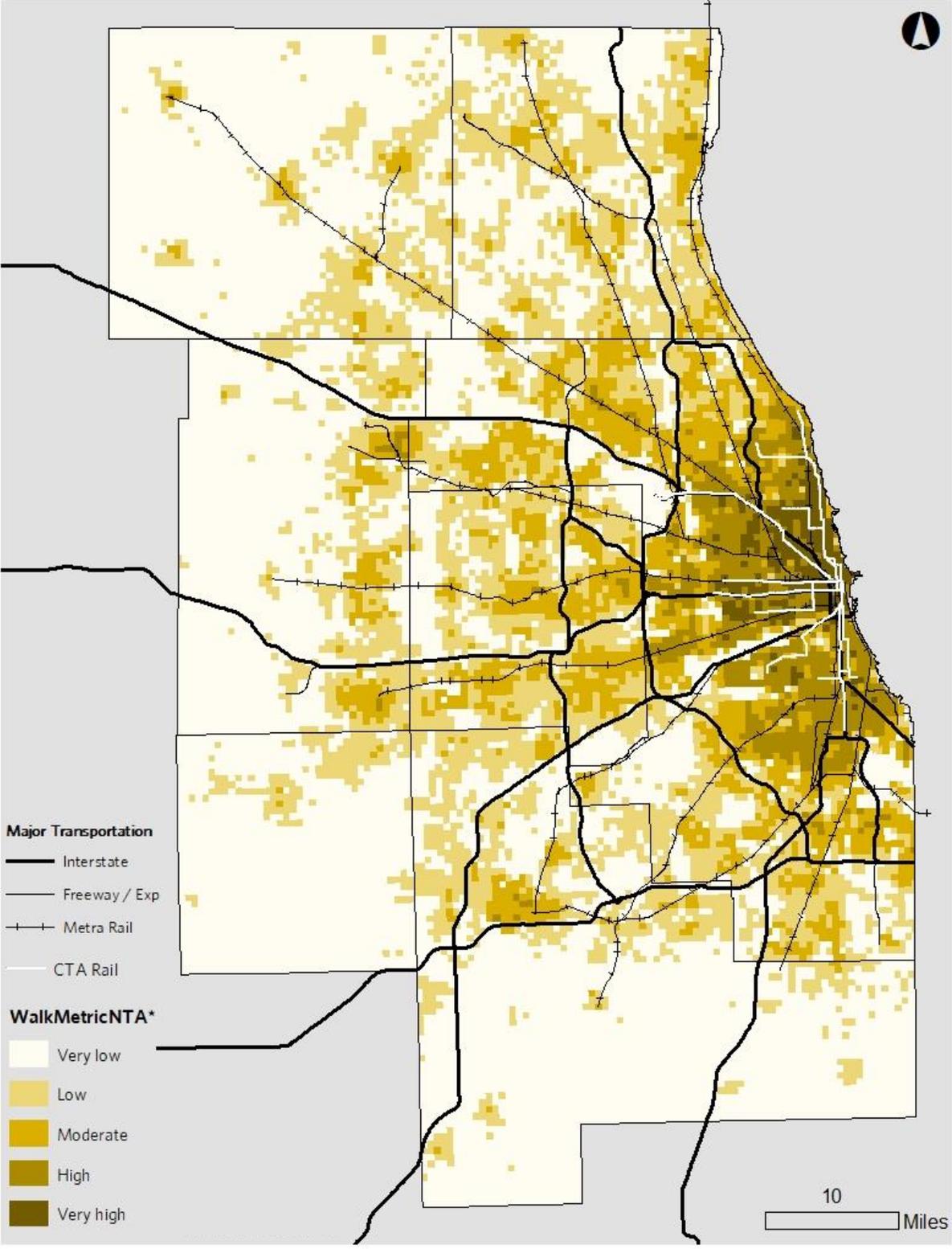
- [92](#) Public Administration
- [712](#) Museums, Historical Sites, and Similar Institutions
- [4452](#) Specialty Food Stores
- [4531](#) Florists
- [7115](#) Independent Artists, Writers, and Performers
- [7224](#) Drinking Places (Alcoholic Beverages)
- [44511](#) Supermarkets and Other Grocery (except Convenience) Stores
- [44611](#) Pharmacies and Drug Stores
- [44815](#) Clothing Accessories Stores
- [44819](#) Other Clothing Stores
- [45392](#) Art Dealers
- [453998](#) All Other Miscellaneous Store Retailers (except Tobacco Stores)
- [71111](#) Theater Companies and Dinner Theaters
- [71112](#) Dance Companies
- [81232](#) Dry cleaning and Laundry Services (except Coin-Operated)
- [71113](#) Musical Groups and Artists
- [722511](#) Full-Service Restaurants
- [722515](#) Snack and Nonalcoholic Beverage Bars
- [451211](#) Book Stores

Regional Walkability scores (3 breaks)

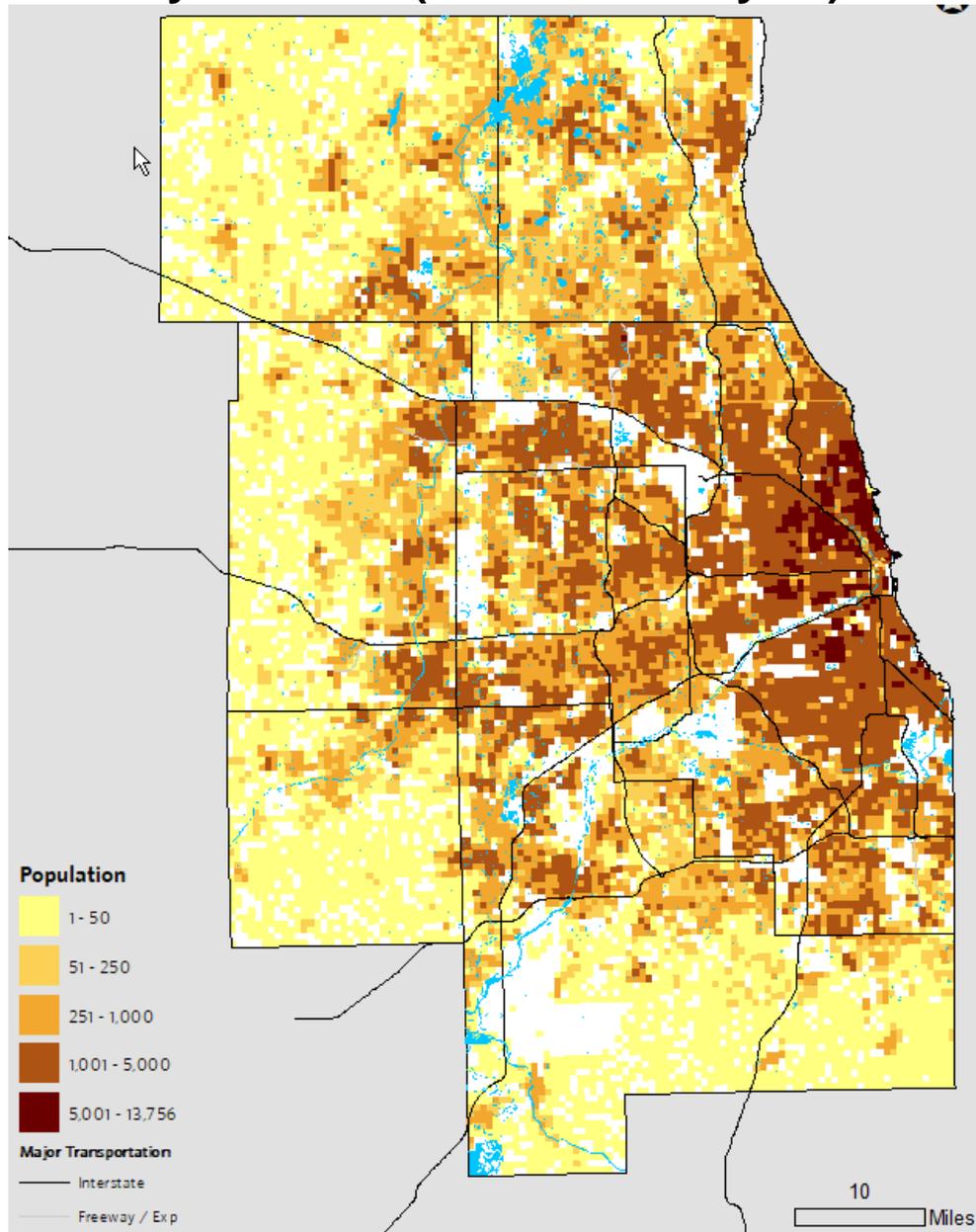


Source: CMAR, 2017.

Walkability scores, excluding Transit Access data



Population by subzone (for crash analysis)



There is a maximum of 10 serious/ fatal crashes per subzone. Population of subzones ranges from 0 to 13,756. Some subzones have crashes and no residential population, which makes an assessment of crashes per population impossible for those. Some subzones have the same number of crashes as residents (2 and 1), and others have extremely low population, which skews the crash per population analysis further. So we grouped the subzones into sets by population and analyzed the crash rate. Over 6 million people live in the subzones with 1,000 people or more – indicated by brown and dark brown on the map. This was considered an appropriate break for distinguishing between the more populated areas and the less populated areas. Crash rates are scored and additional 1.5 points if the crash occurs in a less populated subzone.