Technical Memorandum

City Sidewalk Maintenance Prioritization

Prepared by the Syracuse Metropolitan Transportation Council

For the City of Syracuse

March 2020

SMTC

SMTC

MEMORANDUM

TO: Corey Driscoll Dunham, Director of Operations, City of Syracuse

FROM: Aaron McKeon, Sr. Transportation Planner, Syracuse Metropolitan Transportation Council

DATE: March 16, 2020

RE: City Sidewalk Maintenance Prioritization

CC: James D'Agostino, Director, Syracuse Metropolitan Transportation Council

Neil Milcarek-Burke, Transportation Planner, City of Syracuse

Summary

Currently, sidewalk maintenance in the City of Syracuse is the responsibility of individual property owners. The current system has been criticized as creating frustration with City government, placing a hardship on residents, and, at times, generating ill-will between neighbors.[i] A municipal sidewalk program can ensure that, over time, the entire city sidewalk network is brought into a state of good repair.

To be most effective, a citywide sidewalk program should direct investments (repair, replacement, and new construction) to locations where they will provide the greatest benefit. The SMTC recommends basing priorities for a long-term sidewalk maintenance plan on three elements:

1.) The existing Snow Removal Pilot corridors, which represent the outcome of both analysis and public input, and the maintenance of which, assuming this pilot continues, will significantly benefit snow removal operations.
2.) Pedestrian demand, as measured in the SMTC's pedestrian demand model (PDM). This model combines data from 19 inputs to estimate which parts of the city are most likely to have high pedestrian activity.
3.) Pedestrian safety, as measured (inversely) by traffic volume. Studies show that as traffic volume increases, risks to pedestrians walking along a street also increase.

Using these factors, every sidewalk segment and street frontage lacking a sidewalk can be given a Priority Score. When the City collects data on sidewalk quality, the Priority Score can be combined or otherwise cross-referenced with quality data to generate a plan for improving and installing sidewalks over a timeframe of the City's choosing.

Background

Limitations and Assumptions

In December 2019, staff of the Syracuse Metropolitan Transportation Council (SMTC) met with City of Syracuse staff to discuss the possibility that the City would assume maintenance responsibility for all public sidewalks on city streets. City staff requested the SMTC's assistance in developing an approach to prioritizing sidewalk repair, replacement, and construction.

SMTC staff agreed to undertake this task, recognizing some limitations inherent in the agency's ability to deliver a finished project. These limitations include:

- Sidewalk quality is a critical component of a maintenance prioritization system, but no comprehensive, detailed inventory of conditions currently exists and the SMTC is not able to provide an inventory of sidewalk quality. The City of Syracuse expects to complete a sidewalk quality inventory during the summer of 2020.
- Very little data is available for most of the City's sidewalk segments. The SMTC's PDM may be the only significant piece of information for many local streets.

Additionally, the SMTC's approach to developing a prioritization methodology was based on a few assumptions, including:

- The SMTC assumes that the City will find or create a funding source that is capable of funding all necessary sidewalk repairs/replacements, citywide, within the lifespan of an average sidewalk (20 – 40 years). We assume that this funding source will be equitable.

- Sidewalks in downtown Syracuse are maintained through an agreement with the Downtown Committee, which is the city's largest business improvement district. Sidewalks in Downtown Syracuse do not need to be included in a prioritization system.
- The City will develop and maintain a system for tracking sidewalk quality and repairs/replacements over time to ensure that investments continue to be made strategically.
- The sidewalk quality inventory to be developed by the City is assumed, for the purposes of this process, to categorize every segment of surface street frontage according to the degree to which the sidewalk provides an ADA-compliant, smooth, stable, all-weather surface for walking. These categorizations will indicate priorities, such as indicating existing safety issues at specific locations, but will be generalizable to the block level. When combined with the priority ranking proposed in this memo, the quality data will establish a citywide hierarchy of sidewalk maintenance needs.

Existing Sidewalk Inventory

In 2012, the SMTC used aerial imagery to create the first digital, citywide sidewalk inventory. This inventory was developed using ArcMap geographic information systems (GIS) software and reflected the best available information at that time. It has been revised based on updated orthoimagery in subsequent years. Table 1 provides a summary of sidewalk mileage as found in the existing sidewalk inventory.

When it was developed, this inventory included a "value" field intended to gauge sidewalk quality at the block level. Since it was based on a review of aerial photos and not on data collection in the field, this data does not provide the kind of granular detail needed to guide a sidewalk maintenance program. However, this data does include an inventory of where sidewalks do and do not exist (including mileage of street frontage where no sidewalk is present).

Table 1 – Existing Citywide Sidewalk Inventory*

Category	Mileage
Existing sidewalk	555
Street frontage without sidewalk	158
Total street frontage citywide (with and without sidewalk)	**713**

**Excludes Downtown Syracuse, park roads, and other non-standard street frontages*

Prioritizing Sidewalk Investments

Overview

Walkability is an important element in every neighborhood. In Syracuse, thousands of school-aged children walk to school every day, thousands of workers walk to job sites and bus stops, and more than a quarter of all households do not have a car. While walkability is important throughout the city, a citywide sidewalk investment program cannot simultaneously improve every sidewalk in every neighborhood. A way to assign priorities is needed.

One reasonable approach is to assume that a route that sees more foot traffic is a higher priority than a route that is used only by a few people. Sidewalks on a street with no outlets might only serve the houses on that street, while a sidewalk on a busy street, such as South Salina Street, may be used by hundreds of people working in, living in, or passing through a neighborhood.

However, counts of pedestrians are scarce. Pedestrians are typically included when vehicle turning movements are counted at an intersection: each pedestrian who crosses the street at the intersection is counted (in fact, if a pedestrian crosses the street multiple times, each crossing is counted). Of the 3,590 intersections in the City of Syracuse, 322 have turning movement data available. Of these, only 158 (four percent of all intersections) have recent pedestrian count information. Because turning movement counts are most often done to help make decisions on street design or traffic signal timing changes, they are typically done on heavily-used streets. As

a result, there is no hard data on how many pedestrians use most of the streets in the city. Given the time and resources that would be needed to correct this situation through manual counting, a proxy measure for pedestrian activity is needed.

Additionally, pedestrian safety is a primary consideration, and safety is heavily influenced by the number of vehicles that use a street. A rational, data-driven approach to prioritizing sidewalk investments would be one that combined pedestrian use (or a reasonable approximation) with traffic volumes.

Of course, sidewalks on neighborhood streets have importance beyond the number of people using them: they are canvasses for sidewalk art, they are recreational space for small children, and they are where neighbors socialize with neighbors. Critically, sidewalks must provide an even surface for disabled residents, especially those in wheelchairs. A citywide approach to maintaining sidewalks should take their many uses into consideration.

Sidewalk Snow Removal Pilot Program Streets

The 70 miles of sidewalk currently included in the City of Syracuse's Sidewalk Snow Removal Pilot (SRP) were selected through a combination of public participation and rigorous analysis. The SMTC helped identify sidewalks in the first year of this pilot program, primarily by looking for streets that met two criteria: relatively high traffic volumes (over 5,000 vehicles daily) and presence of a public school. Connecting neighborhoods to grocery stores was also a major consideration.

Street segments included in the SRP should be given top priority for maintenance. Extensive analysis went into identifying sidewalks for the pilot program's first year, and additions made in the program's second year were based on discussions with city residents and community leaders. Additionally, if the snow removal pilot program is to continue in the future, the fact that plows will be running along these sidewalks multiple times in a season makes them the most logical starting point for repairs and necessary replacements. Heaved sidewalk slabs can damage plows,

and vice versa. Ensuring that these sidewalks are in a state of good repair will save time and money in the long-term. The SRP corridors are a logical set of top priority streets.

Pedestrian Demand

Most neighborhood streets do not have any hard data on pedestrian activity. Many cities across the country, faced with a similar lack of hard data, use pedestrian demand models as a stand-in for pedestrian counts.

Pedestrian demand can be thought of as the degree to which people want to walk in a certain area. A simple example is a large apartment building with many school-aged children that is a block away from an elementary school. The shortest walking route between the apartments and the school is very likely to be heavily-used. Similarly, grocery stores, pharmacies, places of worship – a wide variety of destinations in the apartment building's immediate vicinity may be places that residents of the building walk to on a regular basis. If two or more of these destinations are on the same block, the odds of someone walking on that block increase.

A walkable community is one in which origins – large concentrations of homes – are near destinations, such as shopping, schools, doctors' offices, etc. A pedestrian demand model uses origins and destinations to identify places where people are inclined to walk.

The SMTC developed a pedestrian demand model for its Metropolitan Planning Area (all of Onondaga County and portions of Madison and Oswego Counties) in 2013. This model used a combination of 18 factors, such as proximity to schools, parks, and grocery stores, as well as population density, employment density and demographic characteristics, to identify places that are "walkable".

In January and February 2020, SMTC staff revised the pedestrian demand model. Because the original model was developed for a regional analysis, some elements (such as municipal buildings) were removed. Medical facilities, places of worship, and senior housing facilities were

added. Table 2 provides a breakdown of how the revised pedestrian demand model generates scores.

Like the previous version, the revised PDM uses ArcMap GIS and a weighted overlay approach. The model uses 19 GIS data layer inputs, with each layer – such as a quarter-mile buffer around all grocery stores – receiving a specific value. The entire study area is then split into "cells" (10-meter by 10-meter squares). When the values for all 19 of the layers in the model are added up for a specific cell, the total represents that cell's score on a scale of 0 to 100. Each segment of sidewalk in the city then receives an average score based on the scores of the cells through which that sidewalk segment passes.

Figures 1 - 6 show the 19 model inputs that together create the PDM score. Some of these inputs are self-explanatory, for example, the idea that a location's value in the model would increase based on proximity to key destinations. Other model inputs use Census data to identify the places in the city that have the greatest numbers of people who may need to walk to get to their destination. These are primarily drawn from the 2014 – 2018 five-year American Community Survey dataset (at the census tract level), with the exception of population density, which is drawn from 2010 Decennial Census data (as of this writing, this remains the best source for population density at the block level).

A third category of model inputs are those developed by SMTC staff specifically for the PDM, including:

- Community Core: a density model based on concentrations of a wide variety of non-residential uses, including retail businesses, restaurants, and coffee shops;
- Jobs Density: based on a proprietary dataset that maps employment data by location;
- Transit Activity Density: based on Centro's average weekday boardings and alightings for bus stops throughout the city;

- Vehicle-light Households: a demographic variable developed using Census data to identify tracts with high proportions of households that have more workers than vehicles; and
- Pedestrian/Vehicle Crash Density: based on New York State's geodatabase of crashes involving a pedestrian and a vehicle over a five-year period (2014 to 2018).

Figure 7 shows an image of the model's output as a heat map (red/warmer colors indicate greater pedestrian demand, while blue/cooler colors indicate less demand).

The pedestrian demand model includes pedestrian-vehicle collisions as an input, but it does not take into consideration whether there are existing pedestrian facilities, such as crosswalks, sidewalks, and pedestrian signals, on a given street. The model measures the degree to which homes and destinations are clustered in such a way as to make some streets and blocks more likely to be used by pedestrians than others. These model outputs can then be combined with sidewalk quality data, as well as public input, to develop a better sense of where sidewalk investments should be prioritized.

Table 2 –Pedestrian Demand Model Score Structure

DESTINATIONS	Distance from Destination				
	⅛ mile	*¼ mile*	*½ mile*	*¾ mile*	*1 mile*
Critical Destinations					
Schools	10	10	10	8	5
Grocery Stores	6	6	6	5	3
Pharmacies	6	6	6	5	3
Neighborhood Destinations					
Libraries/Community Centers	3	2	1	0	0
Post Offices	3	2	1	0	0
Parks	3	2	1	0	0
Convenience Stores	3	2	1	0	0
Medical Facilities	3	2	1	0	0
Places of Worship	3	2	1	0	0
Senior Housing	3	2	1	0	0

AREA CHARACTERISTICS				
	PERCENTILES			
	>75th	*50 - 75th*	*25th - 50th*	*<25th*
Population Density	14	10	6	0
	>85th	*60th to 85th*	*25th to 60th*	*<25th*
Community Core	14	10	5	0
Employment Density	6	4	3	0
Pedestrian/Vehicle Collisions	4	2	1	0
Transit Activity	3	2	1	0

DEMOGRAPHICS				
	PERCENTILES			
	>80th	*60th - 80th*	*40th - 60th*	*<40th*
Population over 65	2	1	0	0
Population under 18	2	1	0	0
Vehicle-Light Households	6	4	2	0
Walked to Work	6	4	2	0

Figure 1 – Pedestrian Demand Model Inputs – Critical Destinations: Schools, Grocery Stores & Pharmacies

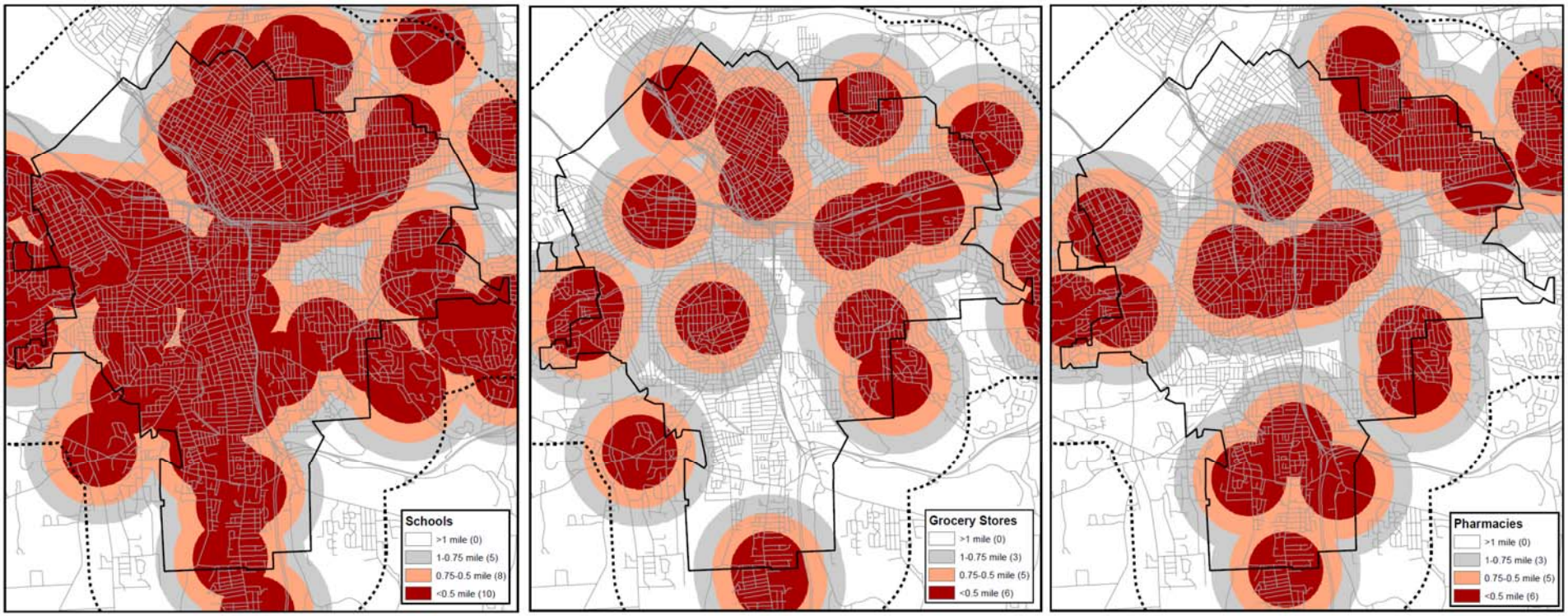


Figure 2 – Pedestrian Demand Model Inputs – Neighborhood Destinations: Parks, Post Offices, Places of Worship, and Senior Housing

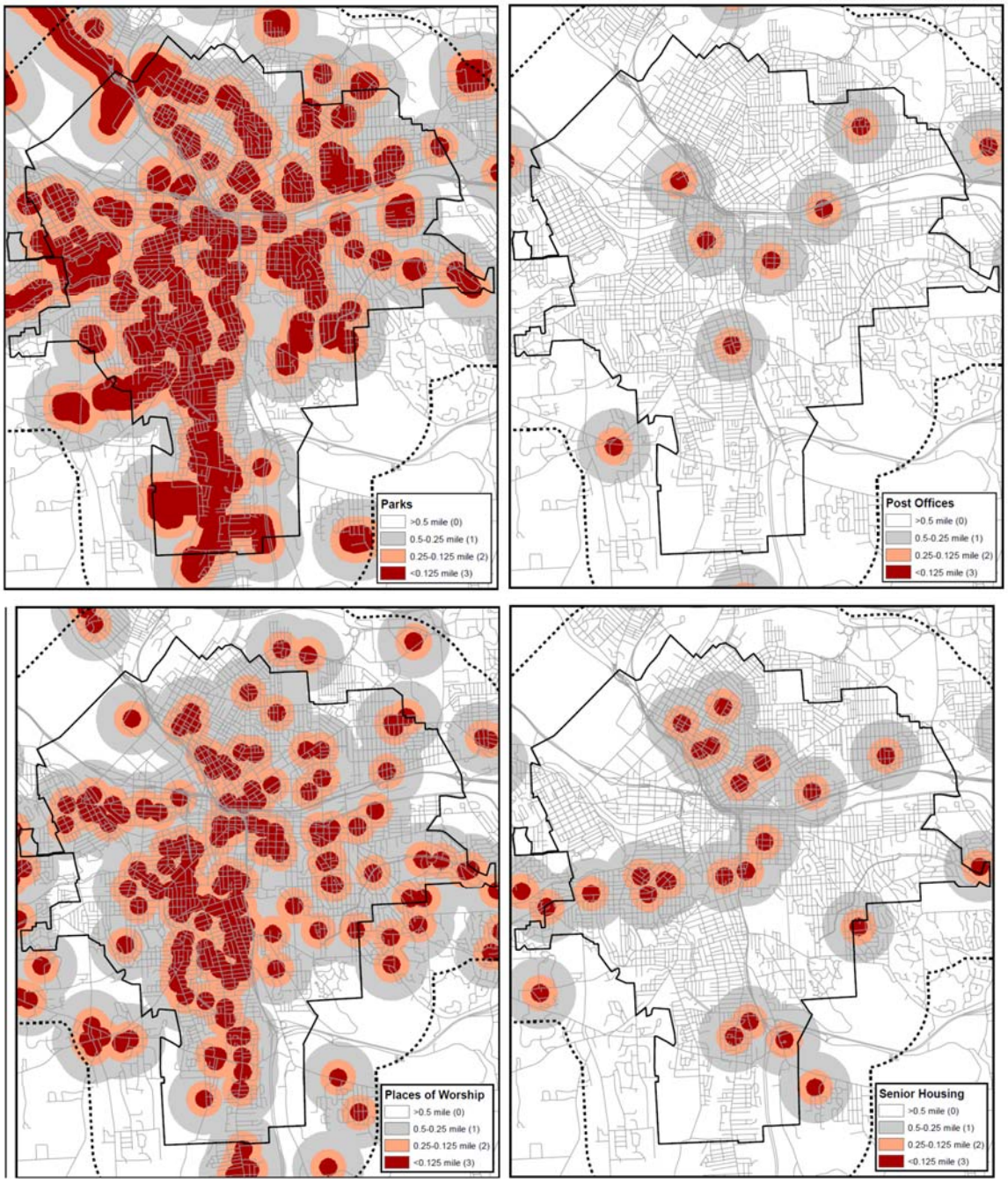


Figure 3 – Pedestrian Demand Model Inputs – Neighborhood Destinations: Libraries & Community Centers, Convenience Stores, and Medical Facilities

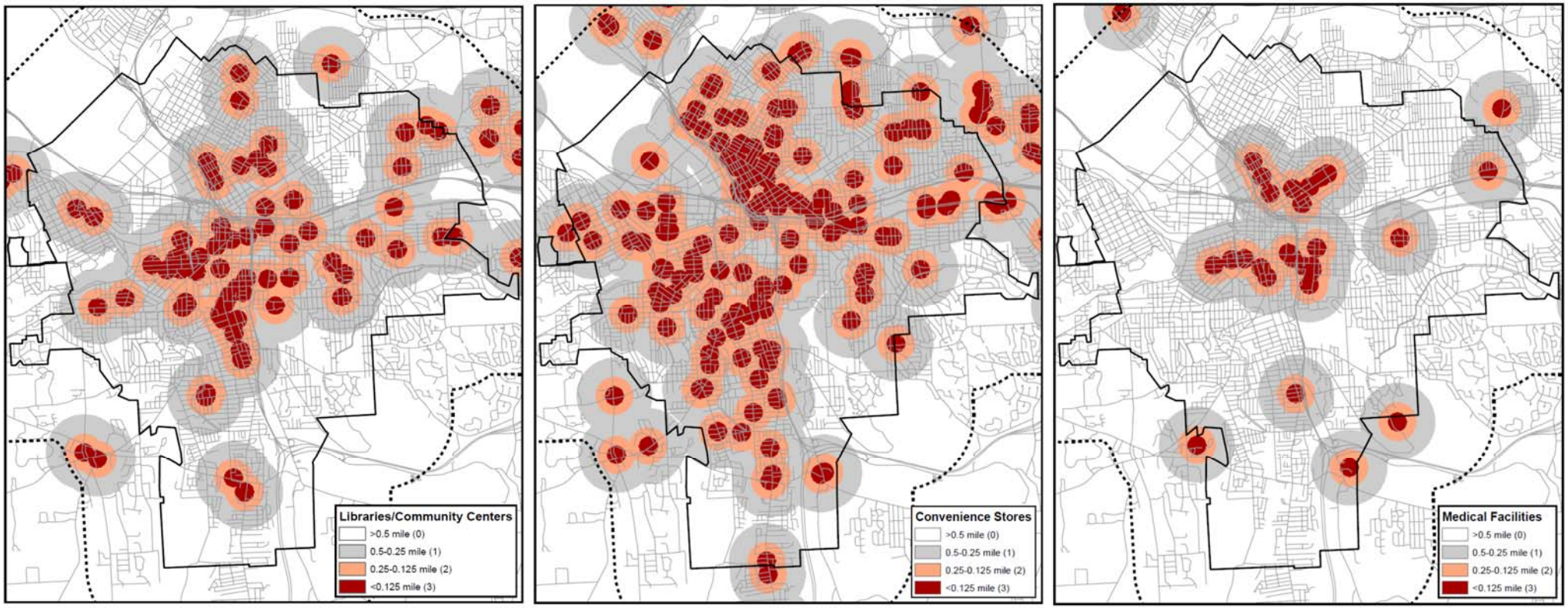


Figure 4 – Pedestrian Demand Model Inputs – Population Density, Community Core, and Jobs Density

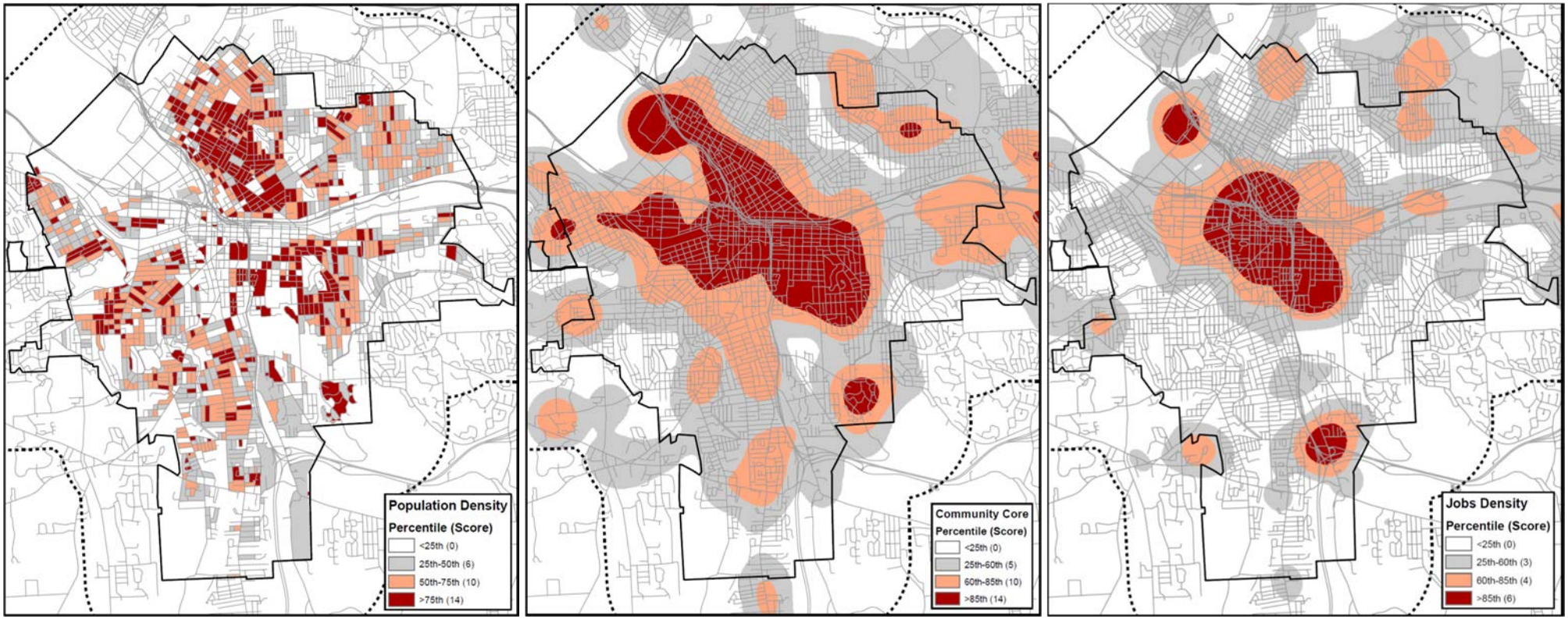


Figure 5 – Pedestrian Demand Model Inputs – Pedestrian/Vehicle Crash Density, Transit Activity Density, and Age over 65

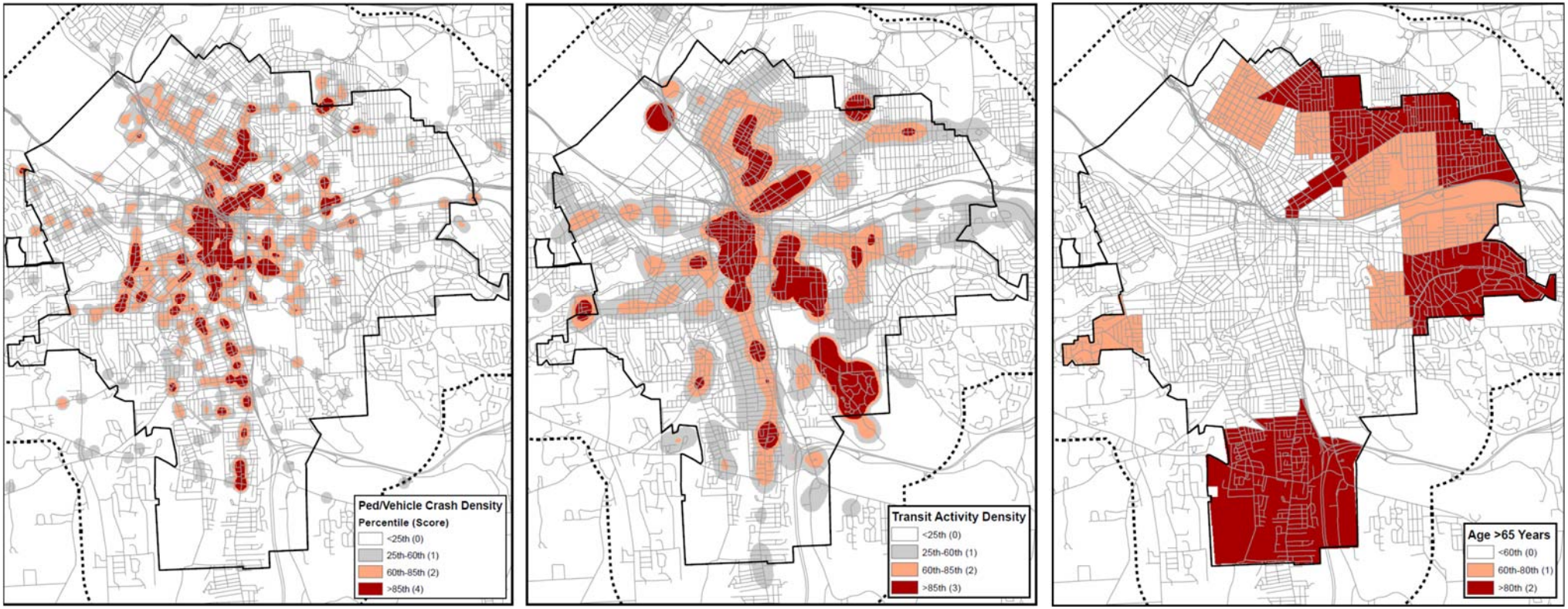


Figure 6 – Pedestrian Demand Model Inputs – Age under 18 years, Number of People Walking to Work, and Vehicle-Light Households

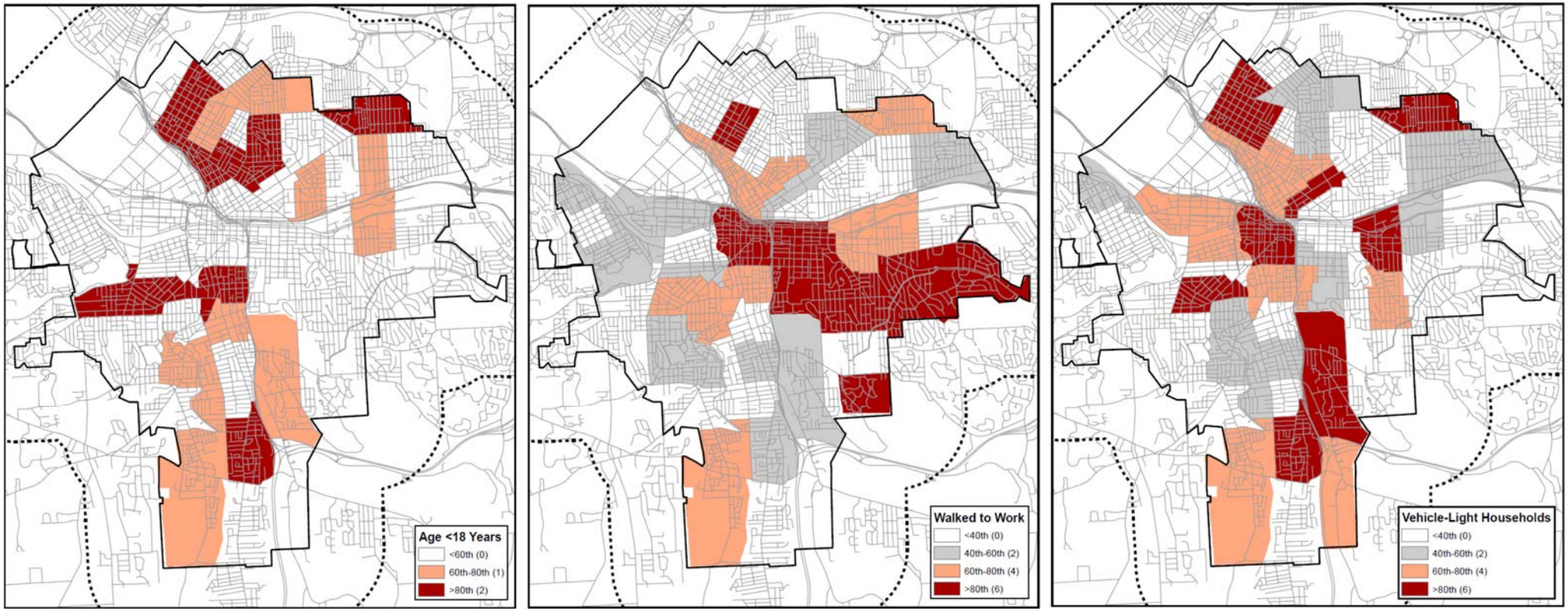
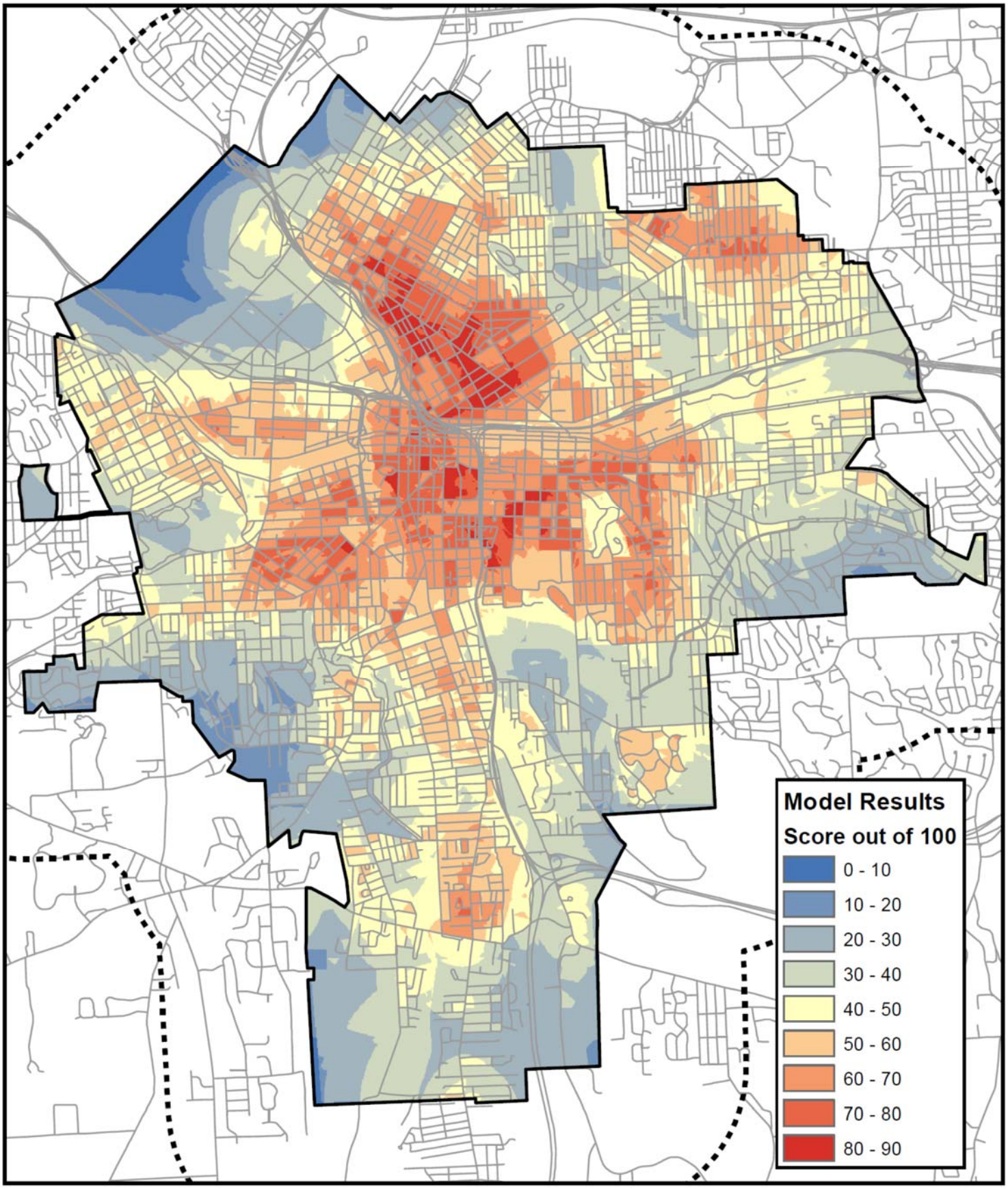


Figure 7 – Pedestrian Demand Model Results



Traffic Volume

The number of vehicles on a road can make a significant difference to pedestrians' sense of comfort and safety while walking on or near the road. While there is no rule or regulation in New York State that defines a "low volume" or "high volume" street, daily traffic volumes (also known as annual average daily traffic, or AADT) below 2,500 vehicles are often considered fairly pedestrian friendly. A volume of 2,500 vehicles a day translates into fewer than 200 vehicles per hour for most of the day, or fewer than three vehicles per minute – leaving plenty of street crossing opportunities for pedestrians. In at least one US city, marked crosswalks are not required when volumes are at 2,500 AADT or lower because of the number of available gaps in traffic.[ii]

As traffic volumes increase, the danger to pedestrians also increases. A 2002 FHWA study found that traffic volume is a major risk factor for pedestrians walking along roads. Specifically, the report states that "the increase from 280 vehicles to 290 vehicles per hour … increased the likelihood that a location was a crash site by 1.3 percent."[iii] Research also indicates that arterials are generally more dangerous for pedestrians than local streets. While arterials make up only ten percent of the nation's highway mileage,[iv] a 2018 insurance industry analysis reported that more than half of all pedestrian fatalities occurred on arterials.[v]

For the purposes of prioritizing sidewalk maintenance, traffic volume should be a major consideration. Safe, accessible sidewalks that invite pedestrian use are critical along routes that carry high numbers of vehicles, and even more so along busy roads that also attract large numbers of pedestrians.

As with pedestrian counts, traffic volume data is limited. There is no traffic volume data for most city streets – particularly neighborhood streets. Based on the data that is available, it is likely that most neighborhood streets have very low volumes. Local, neighborhood streets primarily serve the residents on those streets. The process of assigning functional class to streets takes

things like volume, road length, and road function into consideration.[vi] In the absence of volume data, functional class can be used as a guide for a street's activity level. For the purposes of ranking facilities, local streets would be considered to have very low traffic volumes. Collectors would be considered to have low volumes (in most cases, under 2,500 vehicles). Arterials can have a wide range of traffic volumes, but for the purposes of this analysis would be assumed to have between 2,500 and 5,000 vehicles daily.

Additional Data Layers

K–12 Schools

The only sidewalk maintenance prioritization guidance in the City of Syracuse's Comprehensive Plan is: "Prioritize City infrastructure improvements such as sidewalk repairs, green infrastructure, and traffic safety upgrades around schools."[vii] For many students, sidewalks are the primary means of transportation to school. In the City of Syracuse, students in kindergarten through 8th grade can take a bus to school if they live more than a mile from their school. High school students can take a bus if they live more than a mile-and-a-half from their school. Students who are not eligible for busing must find their own way to school, and often this means walking.

Schools are the highest-weighted destinations in the SMTC's pedestrian demand model: streets within a half-mile of a school are weighted heavily in the model. Schools on high-volume streets were also the focus for the development of the SRP routes.

Schools were not the sole consideration in developing a maintenance prioritization plan, however, because sidewalks are used for many more purposes than school transportation. The PDM assigns schools more points than any other destination in the model. But the model is designed to promote parts of the city that have a mix of uses, and, as a result, neighborhoods that are largely residential tend to get lower scores. In some cases, this means that sidewalks on a relatively busy street that are also near a school are not prioritized.

Known/Anticipated Projects

In addition to traffic volume and pedestrian demand, a sidewalk prioritization decision-making methodology should take into consideration known or anticipated projects that will likely involve removing and replacing sidewalks. The I-81 project is anticipated to involve major roadway reconstruction on streets throughout the city: investing in sidewalks now, only to have them demolished as part of the I-81 project would be counterproductive. Other major projects that could include sidewalk reconstruction include Blueprint 15 and the Empire State Trail.

Rather than incorporate this data into a priority score, it should be stored as information with sidewalk segments that could be affected by upcoming projects and taken into consideration on a case-by-case basis as sidewalk quality issues emerge on those sidewalks. This data collection and tracking effort cannot simply be a snapshot based on current information: it must continue over time.

Sidewalk Priority Score

A simple but effective way to bring different kinds of data together to support decision-making is to give each piece of data a score and combine the scores. In the case of developing sidewalk priorities, pedestrian demand and traffic volume were each broken into categories, with each category receiving a score on a scale of 0 to 5. Adding these scores together produces a Priority Score, on a scale of 0 to 10. Snow Removal Pilot streets receive an additional 10 points, generating a scale of 0 to 20. Table 3 summarizes how PDM outputs and traffic volume ranges were classified and assigned scores. Table 4 shows this data another way: the combinations of inputs that produce a given Priority Score (between 1 and 10). Figure 8 shows these scores applied to city sidewalks citywide, and Figures 9 through 12 present this data for each of the city's four quadrants.

When sidewalk quality data is collected, the Priority Score can be used to prioritize critical repairs and replacements on the highest scoring sidewalk segments first.

Table 3 – Final Prioritization Model Inputs

Data Layer	Category	Score
Pedestrian Demand Model Score		
> 57.0	High	5
≥ 43.5 & < 57.0	Medium	3
≥ 0 & < 43.5	Low	1
Traffic Volume (AADT)		
≥ 15,000	High	5
≥ 10,000 & < 15,000		4
≥ 5,000 & < 10,000	Medium	3
≥ 2,500 & < 5,000 OR Arterials w/no available traffic volume		2
≥400 & < 2,500 OR Collectors w/no available traffic volume	Low	1
<400 or Local Road	Very Low	0
Snow Removal Pilot Street?	Yes	10
	No	0

Table 4 – Priority Scores and Model Inputs

Priority Score	Pedestrian Demand Model Category	Traffic Volume (AADT)
1	Low	< 400 or Local Road
2	Low	≥ 400 & < 2,500
3	Medium	< 400 or Local Road
4	Low	≥ 5,000 & < 10,000
5	Medium	≥ 2,500 & < 5,000
	High	< 400 or Local Road
6	Low	≥ 15,000
	Medium	≥ 5,000 & < 10,000
	High	≥ 400 & < 2,500
7	Medium	≥ 10,000 & < 15,000
	High	≥ 2,500 & < 5,000
8	Medium	≥ 15,000
	High	≥ 5,000 & < 10,000
9	High	≥ 10,000 & < 15,000
10	High	≥ 15,000
11 – 20	Snow Removal Pilot Streets	

Figure 8 – Sidewalk Maintenance Prioritization

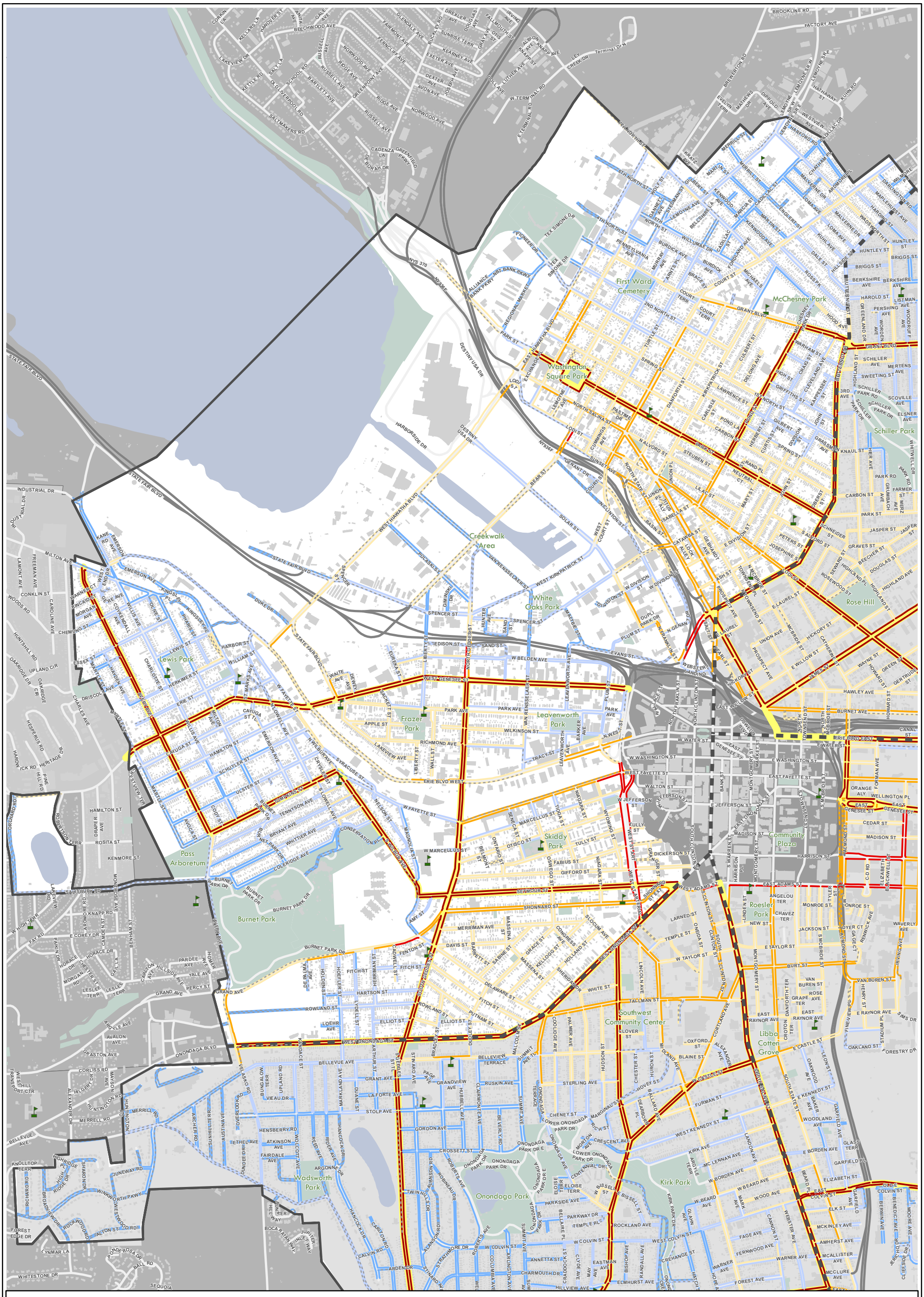
City of Syracuse

34” x 44” map attached to memo

Sidewalk Maintenance Prioritization

City of Syracuse - Northwest Quadrant

Figure 9



Please note that the "Schools" file was obtained from various data sources and may be incomplete or inconsistent with a list of currently-operating SCSD schools.

This DRAFT map is for planinng purposes only. The SMTC does not guarantee the accuracy or completeness of this map. Draft date 2/26/2020.

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* Includes pedestrian demand model scores (5 max), AADT (5 max), and snow removal routes (10). Downtown sidewalks were removed.

Figure 10

Sidewalk Maintenance Prioritization

City of Syracuse - Northeast Quadrant

Please note that the "Schools" file was obtained from various data sources and may be incomplete or inconsistent with a list of currently-operating SCSD schools.

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0 0.125 0.25 0.5 0.75 1 Miles

Total Score*

- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 20
- Snow Removal Pilot Program Routes

- Syracuse Quadrants
- K-12 Schools
- Water Feature
- Parks
- Downtown

N

* Includes pedestrian demand model scores (5 max), AADT (5 max), and snow removal routes (10). Downtown sidewalks were removed.

Sidewalk Maintenance Prioritization

City of Syracuse - Southeast Quadrant

Figure 11

Total Score*

- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 20
- Snow Removal Pilot Program Routes

- Syracuse Quadrants
- K-12 Schools
- Water Feature
- Parks
- Downtown

N

* Includes pedestrian demand model scores (5 max), AADT (5 max), and snow removal routes (10). Downtown sidewalks were removed.

Please note that the "Schools" file was obtained from various data sources and may be incomplete or inconsistent with a list of currently-operating SCSD schools.

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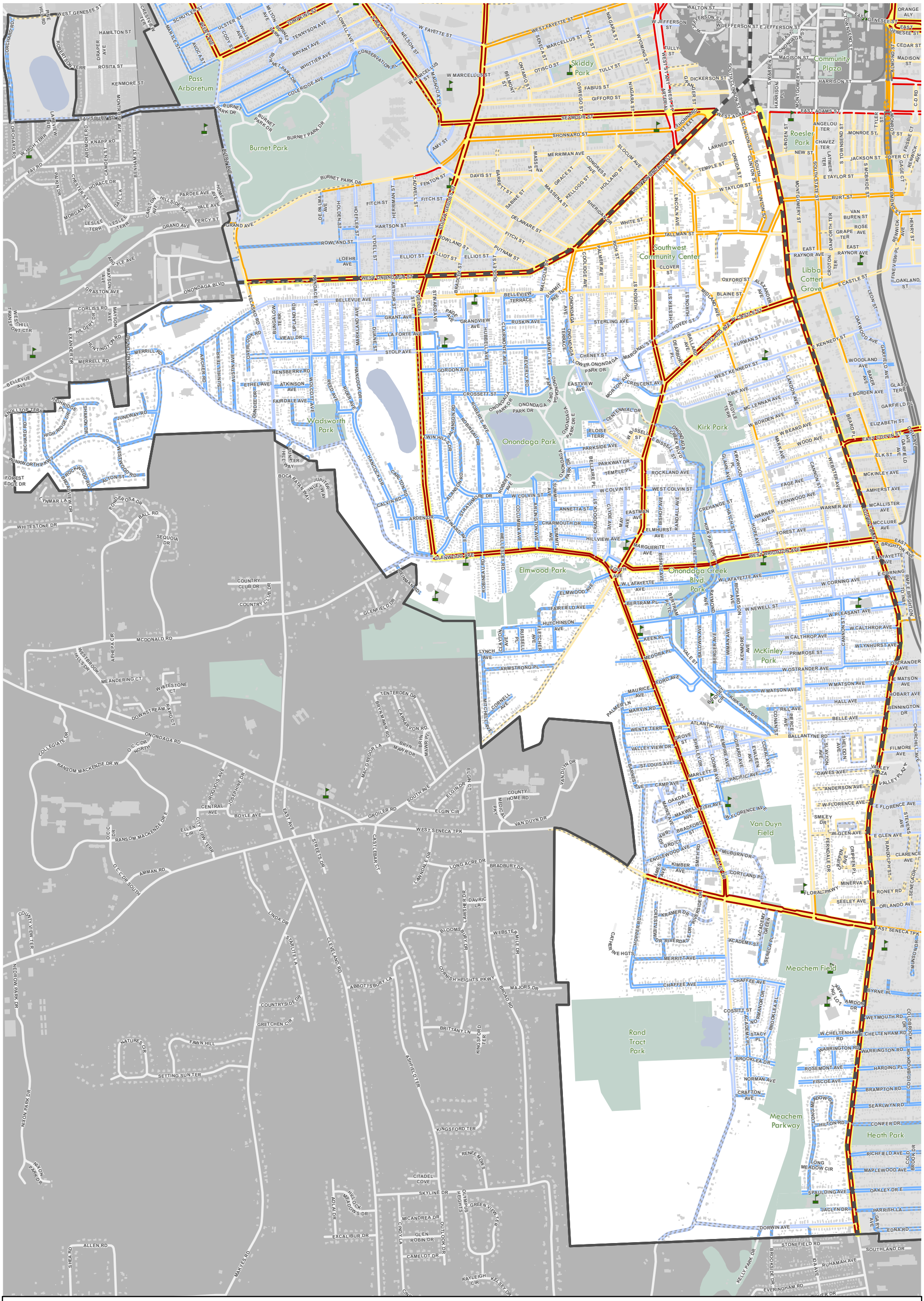
SMTC

0 0.125 0.25 0.5 0.75 1 Miles



Sidewalk Maintenance Prioritization

City of Syracuse - Southwest Quadrant

Figure 12

Total Score*

- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 20
- Snow Removal Pilot Program Routes

- Syracuse Quadrants
- K-12 Schools
- Water Feature
- Parks
- Downtown

N

* Includes pedestrian demand model scores (5 max), AADT (5 max), and snow removal routes (10). Downtown sidewalks were removed.

Please note that the "Schools" file was obtained from various data sources and may be incomplete or inconsistent with a list of currently-operating SCSD schools.

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SMTC

0 0.125 0.25 0.5 0.75 1 Miles

Table 5 summarizes sidewalk mileage by Priority Score and city quadrant. Most sidewalks score in the 3- to 6-point range, reflecting the fact that most streets in the city have volumes under 10,000 AADT. Very few miles of sidewalk that are not in the Snow Removal Pilot program have both high traffic volumes (10,000 AADT or higher) and high pedestrian demand.

Table 5 – Priority Score Categories by Sidewalk Mileage in City Quadrants

Priority Score	Sidewalk Mileage by Quadrant				Total Mileage
	Northeast	Northwest	Southeast	Southwest	
1-2	26.1	15.3	40.9	40.8	**123.2**
3-4	45.0	52.7	31.6	35.0	**164.4**
5-6	42.9	56.2	47.0	18.6	**164.8**
7-8	3.4	10.4	11.2	4.0	**29.0**
9-10	0.9	1.8	1.4	0.1	**4.2**
11-20*	17.3	18.0	17.7	16.6	**69.5**
Total	**135.5**	**154.6**	**149.7**	**115.1**	**554.9**

**Only sidewalks on Snow Removal Pilot streets have scores in this range.*

Table 6 summarizes street frontages that do not have sidewalks (based on the SMTC's inventory) by Priority Score and city quadrant. Of the nearly 160 miles of street frontage missing sidewalks, only six miles have Priority Scores over six points, suggesting a (relatively) manageable set of high-priority new sidewalk projects.

Table 6 – Priority Score Categories by Sidewalk Mileage in City Quadrants for Street Frontages Missing Sidewalks

Priority Score	Sidewalk Mileage by Quadrant				Total Mileage
	Northeast	Northwest	Southeast	Southwest	
1-2	4.8	13.1	38.0	24.5	**80.4**
3-4	8.2	13.7	15.2	12.8	**50.0**
5-6	1.9	8.8	7.2	3.5	**21.4**
7-8	0.6	1.2	1.7	0.3	**3.8**
9-10	0	0	0	0	**0**
11-20*	0.7	0.2	0.5	0.9	**2.3**
Total	**16.2**	**37**	**62.7**	**42.0**	**157.8**

**Only sidewalks on Snow Removal Pilot streets have scores in this range.*

Local vs. Federal Aid Eligible Streets

One way to classify any given street is to determine whether or not it is eligible for federal aid. Every street in the city has a functional classification based on the kind of service and level of connectivity it provides. In urban areas, streets that are classified as arterials and collectors are eligible for federal aid. All other streets – classified as local streets – are not. Roughly two-thirds of Syracuse's streets are local streets.

Functional class is not an input to the Priority Score. However, the criteria used – particularly traffic volume – tend to prioritize federal aid eligible (FAE) streets over local streets. As Table 7 shows, the average score for sidewalks on local streets is less than half of the average score on FAE streets. Using the Priority Score on its own would put sidewalk repair and maintenance on most neighborhood streets well behind busier, more heavily-used corridors. Objectively, this

makes sense, but from the point of view of city residents who must deal with issues on sidewalks in their neighborhoods, this is liable to be frustrating.

Table 7 – Federal Aid Eligibility and Priority Scores

Federal Aid Eligible?	Sidewalk Mileage	Average Priority Score (weighted)
Yes	231	10.1
No	503	4.1

Rather than restructure the Priority Score to artificially promote local streets, the SMTC recommends that the City use the "Federal Aid Eligible" data associated with sidewalk segments to split sidewalks into two types: local and FAE. The City can then use Priority Scores within these two categories to prioritize sidewalk investments, at a ratio determined by the City.

New Sidewalks

The Priority Score does not reflect whether or not a sidewalk currently exists. Construction of new sidewalks can be considerably more labor- and cost-intensive than maintaining existing sidewalks; determining how to allocate sidewalk resources is a policy decision that the City must make. The Priority Score can help the City determine where to allocate sidewalk construction funds, but this will likely involve considerably more analysis than would be involved in allocating maintenance funds. There may be insufficient right-of-way on some streets to allow sidewalks. Some neighborhoods or blocks may be less receptive to the idea of new sidewalks than others. The complexity of sidewalk construction makes prioritizing these projects extremely difficult.

Sidewalk Quality Data

ADA Standards

The Americans with Disabilities Act (ADA) requires that state and local governments make reasonable accessibility accommodations for people with disabilities who want to use public facilities, including sidewalks. In 2011, the United States Access Board published a set of

Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way, also known as the Public Rights-of-Way Accessibility Guidelines (PROWAG). PROWAG is currently the most widely accepted set of best practices for accessible sidewalk design and construction.

Neither the ADA nor PROWAG require that municipalities provide sidewalks. But where sidewalks are present, they must be accessible. This means that there must be curb ramps that provide access between the street and the sidewalk, and that the sidewalk itself must "be generally planar and smooth". While PROWAG does not specify the materials to be used in sidewalk construction, it advises that "surfaces should be chosen for easy rollability", advising against heavily textured, rough surfaces that will increase rolling resistance.[viii]

PROWAG provides the following specifications in sidewalk design and maintenance:

- Maximum vertical surface discontinuity (bump height): ½ inch
    - Vertical surface discontinuities between 1/4-inch and 1/2-inch can be beveled with a slope not steeper than 50 percent.
- Horizontal openings in gratings and joints: cannot permit passage of a sphere more than ½-inch in diameter.
    - Elongated openings in gratings should be placed so that the long dimension is perpendicular to the direction of travel.
- Slope:
    - The running slope of a sidewalk adjacent to a street cannot be greater than the general grade established for the street or highway. Other pedestrian routes – those not contained within a street or highway right-of-way – cannot exceed a five percent maximum running slope.
    - Cross slope: maximum of two percent.
- Sidewalk width:
    - Recommended: five-foot continuous width.
    - Minimum: four feet, with five-foot-wide passing spaces at 200-foot intervals.

Quality Standards

Consistent with PROWAG, the SMTC recommends that the City's sidewalk quality standards emphasize a smooth, continuous, low-friction surface. While the City's ordinance has required concrete sidewalks on residential streets since 2003, many sidewalks citywide may predate this requirement and consist of asphalt or other materials. The operative question for city residents interested in using a sidewalk is not whether or not the sidewalk is made of concrete, it is whether or not the sidewalk is passable. The City's top priority should be to ensure the latter. Sidewalk width and cross slope, on the other hand, are much more relevant to whether or not a pedestrian in a wheelchair can safely use a sidewalk and, moreover, are included in ADA regulations.

Proposed Quality Inventory

As stated above, the SMTC assumes that the City will collect quality data for the city's sidewalk network in 2020. This is likely to involve teams of interns on foot using GPS-enabled tablet computers to collect point- and line-based data. Ideally, this data will be collected in such a way that it can be easily combined (for example, through a spatial join) with the existing sidewalk inventory and the SMTC's prioritization scoring.

The City should consider collecting the following items:

- Sidewalk width
- Sidewalk material
- Block-length continuity
- Year constructed (when available)
- Coordinate points (latitude and longitude) for the following:
    - Extremely heaved slabs;
    - Obstructions;
    - Missing or severely cracked slabs;
    - Cross-slopes greater than two percent; and

- Breaks in sidewalk continuity.

Quality Issues

After a survey of the city's sidewalks is complete, quality issues can be grouped by severity. Any sidewalks that have been reconstructed in the past five years are very unlikely to need maintenance in the next five years, and should be de-prioritized, regardless of their Priority Score. Similarly, sidewalks that are out of compliance with City codes but provide a smooth, stable surface and provide sufficient width (at least four feet) should be addressed after sidewalks that present obstacles to mobility. The highest priority should be sidewalk slabs that are extremely heaved, completely missing, or that present a danger to pedestrians. Within each of these quality categories, the Priority Score can be used to identify the sidewalk issues that should see repair or replacement first.

Geodatabase

It is not practical, nor would it be particularly helpful, for the SMTC to provide in this memo a listing of the more than 8,000 records in the existing sidewalk inventory with their Priority Scores and other relevant data. The SMTC will provide the City with a geodatabase of sidewalk segments, including a Priority Score for each segment based on the methodology described above.

This geodatabase will also include the following data for each sidewalk segment:

- Street Name;
- Functional class;
- Federal aid eligibility;
- Segment length;
- Value (sidewalk presence or absence, and continuity, evaluated most recently in 2015 using aerial photos);

- AADT (where available);
- Proximity to schools;
- Snow Removal Pilot routes;
- Known upcoming projects;
- Pedestrian Demand Model Score; and
- City Quadrant.

Using the information in this geodatabase, the City can develop annual work plans based on the mix of criteria of its choosing and the resources available in a given year, such as a mix of maintenance on federal aid-eligible (FAE) and local (non-FAE) streets as well as a certain number of miles of new sidewalk construction.

Sidewalk Maintenance Planning vs. Pedestrian Planning

The approach to prioritizing sidewalk maintenance outlined in this memo strives to be objective and quantitative. It is driven by data, because the question at hand is: where should the City invest limited sidewalk funds to get the greatest return on investment, as measured in overall pedestrian mobility?

It is worth noting that sidewalks are not like other kinds of infrastructure. Kids love sidewalk chalk, but there is no such thing as “water pipe chalk” or “catch basin chalk”. A spalling bridge abutment may be unsightly, but it is not going to create a problem for an elderly pedestrian the way a spalled sidewalk might. Joggers, dog walkers, parents pushing strollers, and many other frequent sidewalk users know every crack, tripping hazard, and poorly drained section of sidewalk in their neighborhood. They may also prefer to walk on some routes rather than others based on things that are not easily quantified, like aesthetics, the opportunity to see friends and neighbors, or perceived personal safety. These subjective elements may be more important to many residents than the objective criteria used in this methodology.

The value that people attach to their favorite walking routes is best captured in a separate, neighborhood-based, pedestrian planning approach. A process that includes multiple in-depth discussions with residents of each city neighborhood can answer questions like: which street or route do you *prefer* to walk on (and why), given a choice of routes? What connections (trails, bridges, etc.) are missing? Do sidewalks need to be widened beyond the minimum width in specific blocks? Where is more lighting needed? A sidewalk prioritization scheme can serve as a helpful backdrop to these conversations, but it cannot hope to capture this level of detail. In the long-term, the City should consider developing a pedestrian plan based on neighborhood-level conversations.

Conclusion

There are infinite ways to categorize and prioritize the city's sidewalk network, and given sufficient time and resources, they will all produce a complete sidewalk network in good repair. The methodology recommended in this memo is intended to ensure that the City has the tools it needs to target investments strategically: to high-use, high-volume streets, as well as to high-demand local streets.

The SMTC recommends combining a metric for walkability (the PDM score) and a metric for safety (daily traffic volume, with increasing volume associated with decreasing safety) to create a priority ranking, and applying quality data to the resulting categories to address the worst quality problems on the highest-ranking sidewalk segments first.

The result will be a ranking system and, perhaps more importantly, a dataset that can help answer the many questions that will crop up in the course of developing specific sidewalk project lists. Issues that will require further review and discussion by City staff include:

- Selecting a mix of FAE and local streets for annual maintenance;
- Considering a manageable number of miles of new sidewalk construction annually;

- Developing an asset management system to enable long-term tracking of sidewalk improvements and quality; and
- Ensuring that proposed sidewalk projects are not in the footprint of known, upcoming projects that are likely to reconstruct sidewalks.

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[i] See Syracuse Mayor Ben Walsh's *State of the City* address, January 16, 2020, available at: https://www.syracuse.com/news/2020/01/read-the-full-text-of-ben-walshs-2020-state-of-the-city-address.html

[ii] See City of Golden, Colorado, *Crosswalk Manual*. Retrieved: https://www.cityofgolden.net/media/CrosswalkManual.pdf.

[iii] *An Analysis of Factors Contributing to 'Walking Along Roadway' Crashes: Research Study and Guidelines for Sidewalks and Walkways,* Federal Highway Administration, 2002.

[iv] *Our Nation's Highways – Selected Facts and Figures*, Federal Highway Administration, 1998.

[v] *An Examination of the Increases in Pedestrian Motor Vehicle Crash Fatalities during 2009 – 2016*, Wen Hu and Jessica Cicchino, Insurance Institute for Highway Safety, May 2018.

[vi] For a detailed discussion of how roads are classified by function, see the Federal Highway Administration's *Highway Functional Classification Concepts, Criteria and Procedures*, available online at: https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section00.cfm.

[vii] *City of Syracuse Comprehensive Plan 2040, Vision for a Sustainable Community, 2012 Plan Update*, City of Syracuse, page 25.

[viii] PROWAG, Chapter R3: Technical Requirements, Advisory R302.7.1, https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines/chapter-r3-technical-requirements.