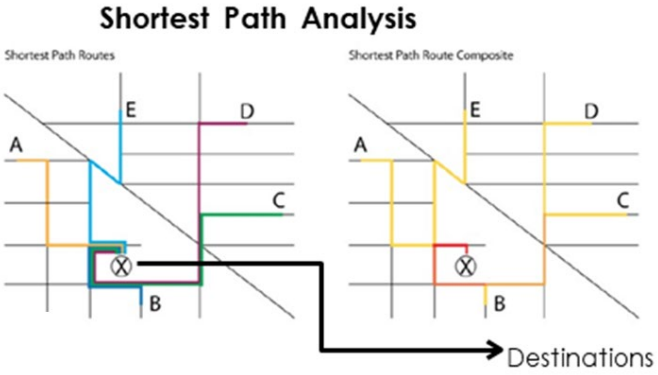
Data Driven Process to identify Sidewalk Improvement Routes for the Annual Sidewalk Improvement Program

Shortest Path Analysis

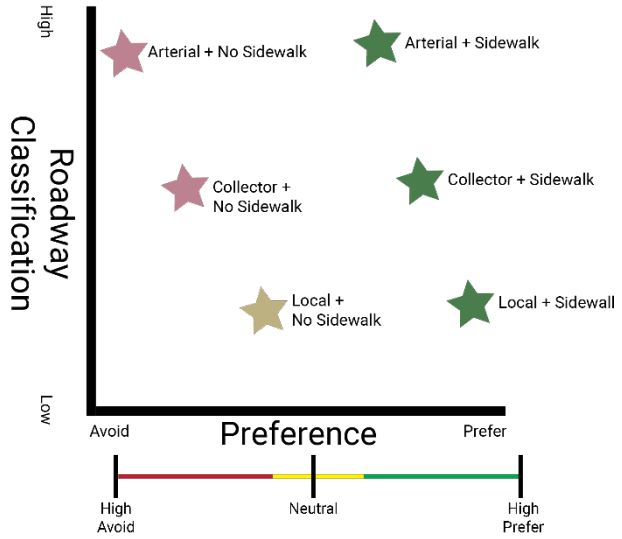
A GIS- based network analysis is built upon a sidewalk network that exists to represent existing sidewalk connections throughout Lawrence. Each segment in the model connects to crossings that weave a network across the city. The analysis identifies routes that take the shortest path between identified origins and destinations.



Source: Alta Design & Planning

Route origins are identified by using residential addresses within a 1-mile walking route within each destination. Destinations include: Schools K-12, Park entry points, public attractions, public transit stops, public government institution, Health, Daycare, Higher Education, Non-Profit, Retail.

Individual routes are drawn from each origin to each destination. Segments in the GIS layer have weighting based on street classification and existence of sidewalk and/or crosswalk/traffic control that adjusts their distance required to travel to reflect the attractiveness or unattractiveness to the path versus another option. The network assigns priority with these classes: High Prefer, Prefer, Slight Prefer, Neutral, Slight Avoid, Avoid, High Avoid, Restrict.

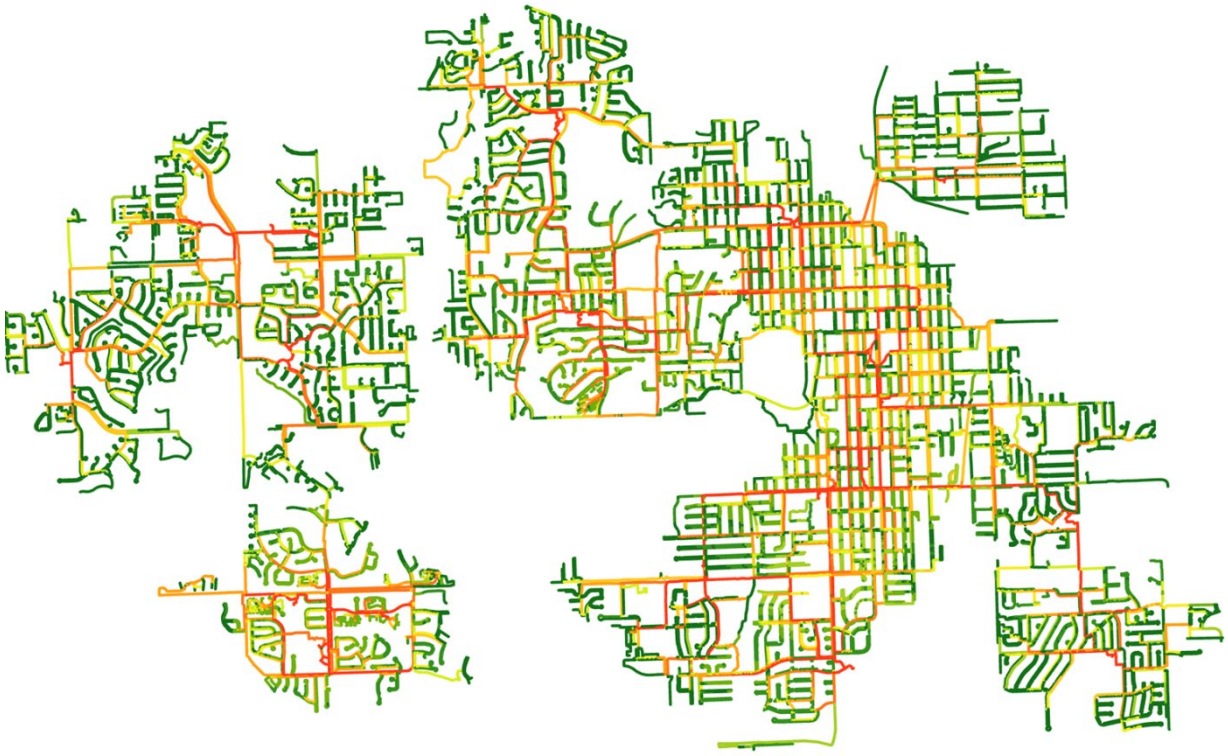


Source: City of Lawrence

Example: K-12 School shortest path routes:

Source: City of Lawrence

Example: K-12 school shortest route composite (not weighted):



Source: City of Lawrence

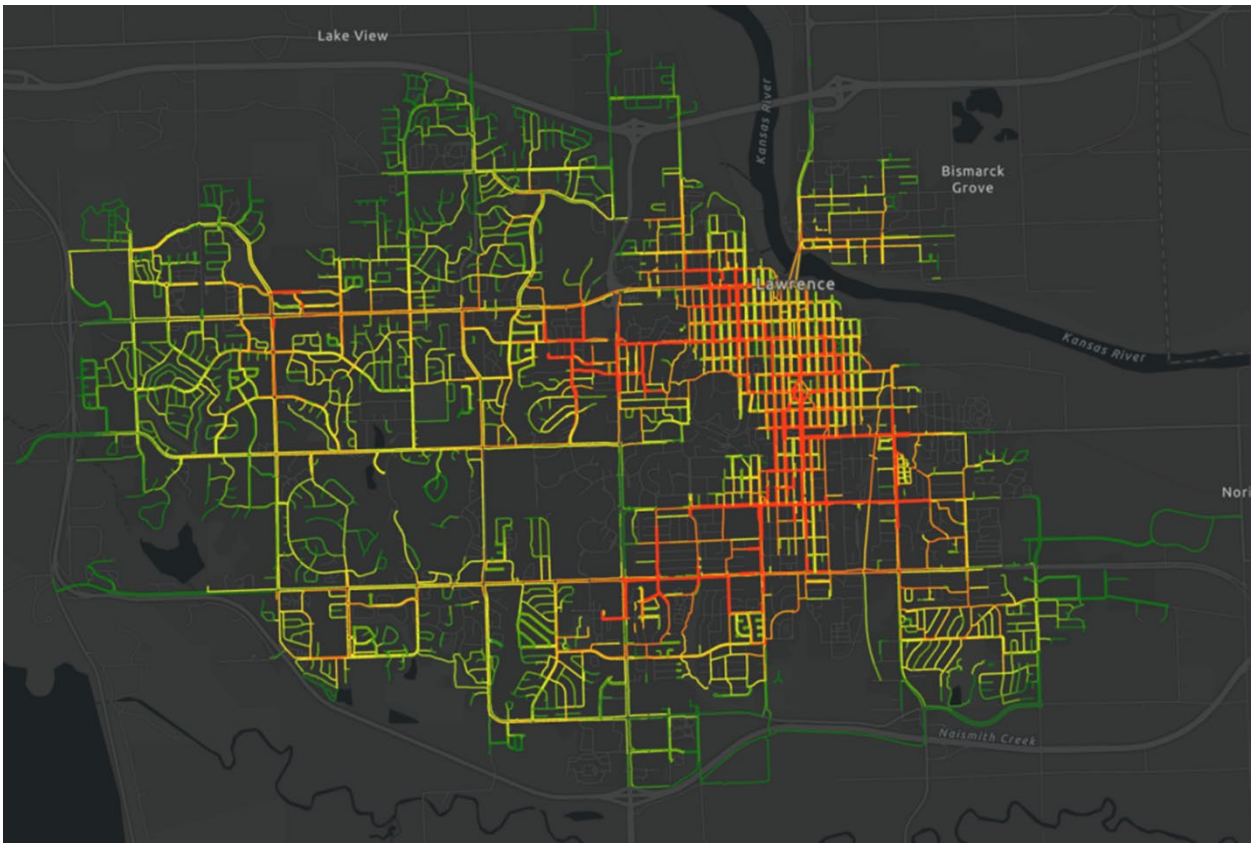
Weighting for Destination Type and Distance

These routes are then added together to get a combined network that identifies the segments with the highest volume of trips or potential pedestrian demand. This shortest path route composite is generated for every destination. All segments are weighted by the destination types and distances (similar to the Non-Motorized Project Prioritization Policy (NMPPP)).

Facility Category	Within 1/8 mile	Within 1/4 mile	Within 1/2 mile
Schools K-12	12 (720)	8 (480)	4 (240)
Park Entry Points, Public Attraction, Public Transit Stops	6	4	2
Public Government Institution, Health, Daycare, Higher Education, Non Profit, Retail	3	2	1

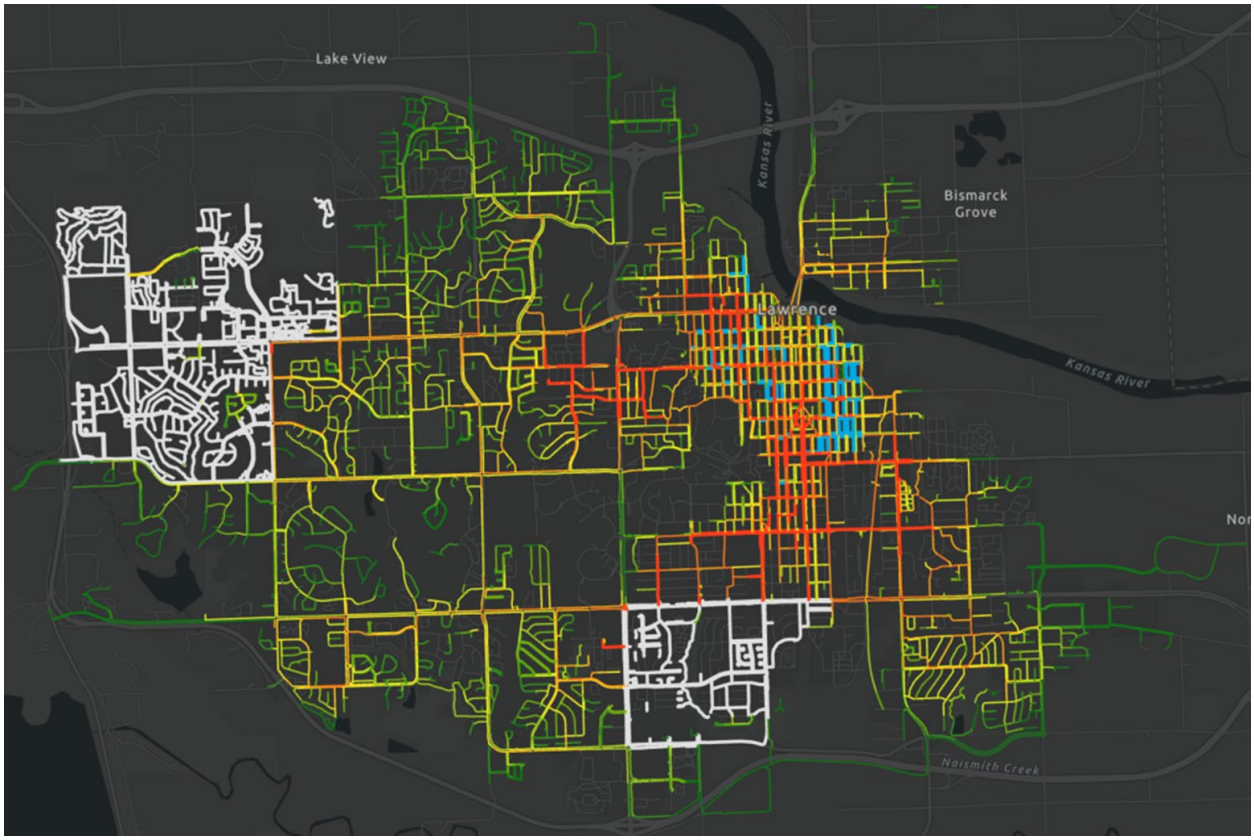
Once the composite of all trips to all destinations is compiled, the segments are stratified by where that section falls with number of trips.

Map 1: Composite route scores



Source: City of Lawrence

Map 2: Composite route scores with previous zones removed and brick sidewalks identified in blue:



Source: City of Lawrence

Weighting for Transportation Disadvantaged Populations

Transportation disadvantaged populations were analyzed to elevate equity. These characteristics include households with a person who has a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, population under 18 and over 65, and low-moderate income households. The city average was found for each topic except for income. One point was assigned if the block group was equal to or 20 percent higher than the regional average. Two points were attributed if the block group was 20 percent to 40 percent of the regional average. Three points were assigned if the block group was greater than 40 percent higher than the regional average. Low-moderate income data is the Community Development Block Grant (CDBG) identified low-moderate income areas. A block group is low-moderate income if the low-moderate income percentage for the block group is 51.0%. The 27 block groups that are considered low-moderate income were stratified into 3 groups of 9 and the highest percentage of low-moderate

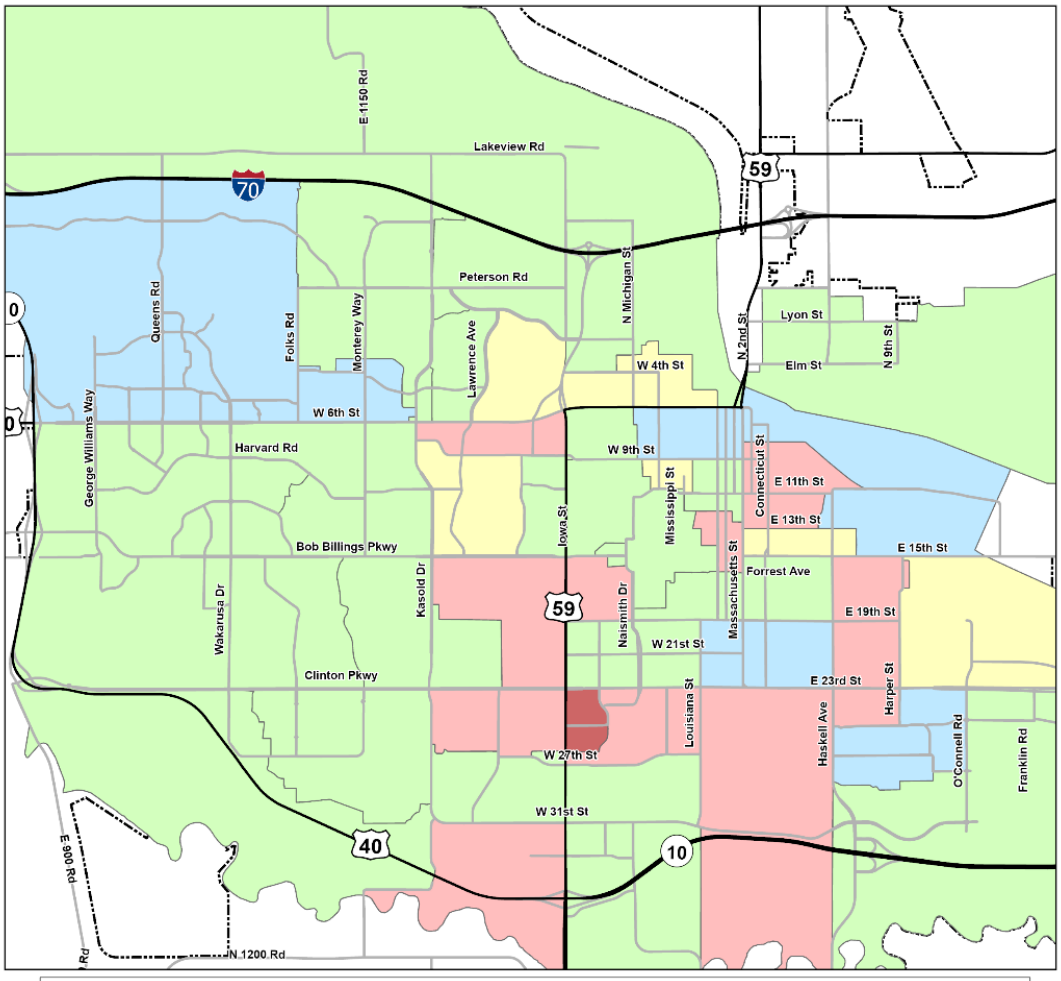
Topic	Lawrence Average	1 Point	2 Points	3 Points
Person who has a disability	19.3%	19.3% to 39.3%	39.3% to 59.3%	Greater than 59.3%
Less than high school diploma	4.7%	4.7% to 24.7%	24.7% to 44.7%	Greater than 44.7%
Minority	15.0%	15.0% to 35.0%	35.0% to 55.0%	Greater than 55.0%
Single parent household	32.5%	32.5% to 52.5%	52.5% to 72.5%	Greater than 72.5%
Households without vehicles	7.8%	7.8% to 27.8%	27.8% to 47.8%	Greater than 47.8%
Youth (under 18)	16.3%	16.3% to 36.3%	36.3% to 56.3%	Greater than 56.3%
Senior citizens (65+)	10.5%	10.5% to 30.5%	30.5% to 50.5%	Greater than 50.5%
Low-moderate CDBG income		51.0% to 62.5%	62.5% to 79.0%	Greater than 79.0%

Source: 2018 American Community Survey 5-year Estimates and CDBG Income. Points were assigned based on the percentage of each measure per block group. Then one point was assigned if the block group was equal to or 20 percent higher than the Lawrence average. Two points were attributed if the block group was 20 percent to 40 percent of the Lawrence average. And three points were assigned if the block group was greater than 40 percent higher than the Lawrence average. Low-moderate income data is the Community Development Block Grant (CDBG) identified low-moderate income areas. A block group is low-moderate income if the low-moderate income percentage for the block group is 51.0%. The 27 block groups that are considered low-moderate income were split into 3 groups of 9 and the highest percentage of low-moderate income were assigned three points, then two points, and lastly one point. The FFY21 TIP Transportation Disadvantaged Population was created using the county average, since the MPO is countywide. This analysis was developed for the sidewalk improvement area discussion and only uses the Lawrence average.

income were assigned three points, then two points, and lastly one point.

Transportation Disadvantaged Population Scores which are higher reflect areas of additional priority to provide improved multimodal trip making for areas with transportation disadvantages. The chart below displays the scoring and map to represent data presented.

Map 3: Transportation Disadvantaged Populations



Transportation Disadvantaged Population scoring is comprised of US Census Bureau American Community Survey (ACS) data and Community Development Block Group (CDBG) income data. 2018 ACS data includes: people who have a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, and population under 18 and over 65. Higher points indicate a greater deviation from the regional average.

Transportation Disadvantaged Population Score

≤2 ≤4 ≤6 ≤9 ≤12 County Limits City Limits

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0 1 2 Miles

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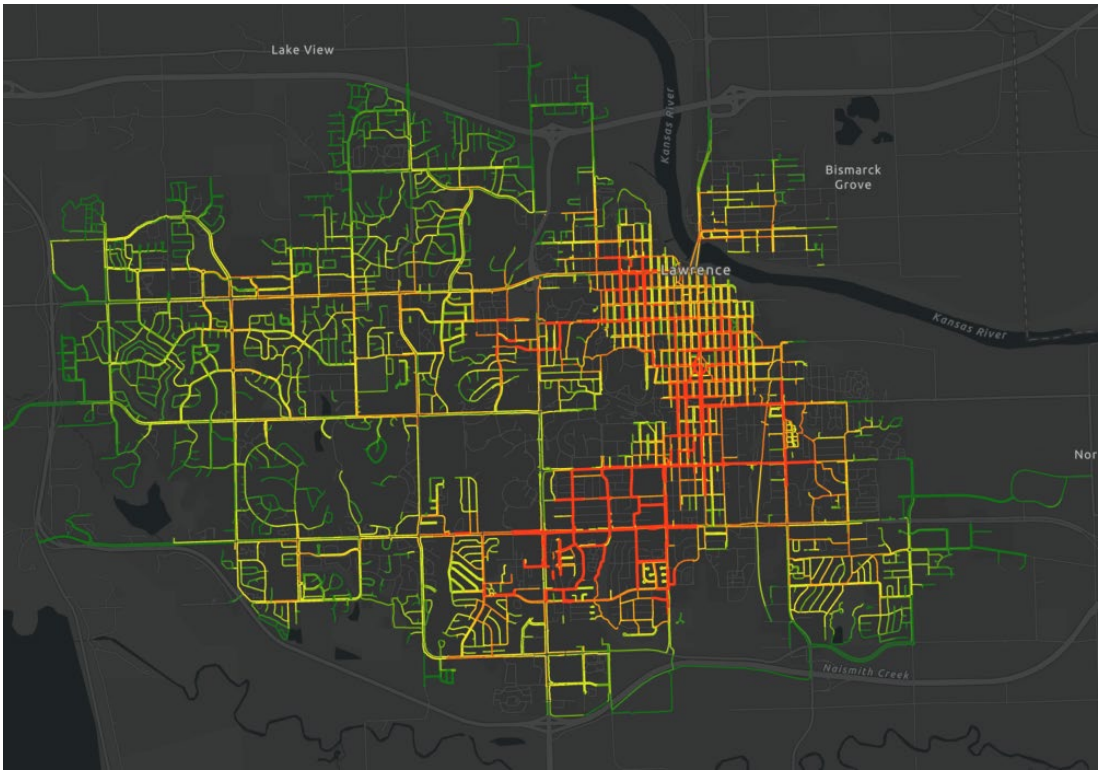
Date Exported: 8/24/2020
Source: 2018 ACS 5-yr Est. & CDBG Income (Lawrence Average)
Produced: Lawrence-Douglas County MPO

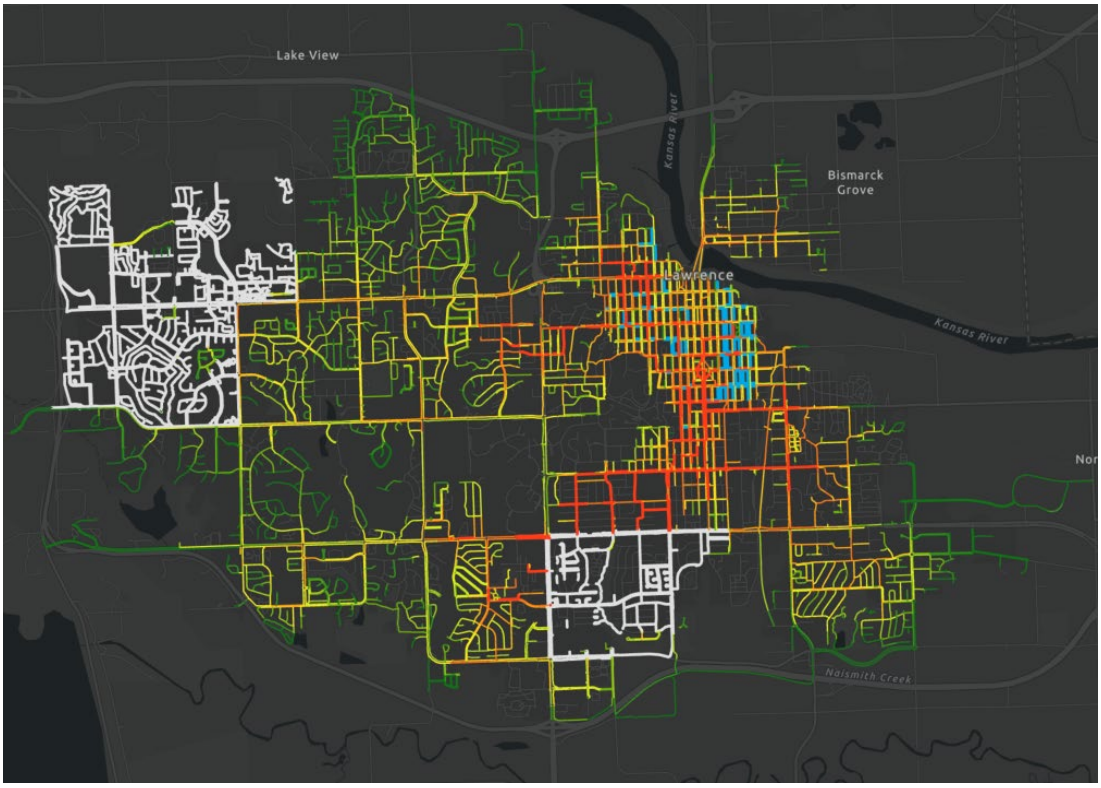
Transportation Disadvantaged Population block group scoring was weighted 25% of the total route score. Map 4 & 5 show the route scoring with weighting for Transportation Disadvantaged Populations.

Map 4: Transportation Disadvantaged Population weighted 25%:



Source: City of Lawrence

Map 5: Transportation Disadvantaged Population weighted 25% (with previous zones removed and brick sidewalks identified in blue):



Source: City of Lawrence

Considerations for choosing routes for annual inspection

The data driven process will inform where sidewalk segments can be prioritized by route. Routes that were part of previous phases (2019 & 2020) will be removed and final routes will be chosen considering the following:

- Focus on highest priority routes identified
- Connect routes to promote continuous, hazard-free pedestrian pathways
- Group routes to promote economies of scale for the contract and lower bid prices (i.e. both sides of the street even though routes may have different scores)
- Maximize quantity of routes inspected given funds available for repairs
- Brick sidewalks won't be included in inspected routes until the community stakeholders working on brick sidewalk & street standards have completed their work
- Sidewalk condition LIDAR data can be used in future iterations to inform scope/scale of work, and/or future prioritization considerations.