State of the Sidewalks in East Kensington

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Introduction

East Kensington is a neighborhood in transition, displaying similar qualities of both of its neighboring areas of Kensington and Fishtown. A historically industrial neighborhood, East Kensington has inherited a residential fabric that houses a diverse population of working class families, millennials, and young professionals. The neighborhood is situated between two commercial corridors and is well served by public transit. These factors should enable it to be easily walkable. However, that is not necessarily the case. The neighborhood's industrial background has led to high vacancy rates, given the presence of empty industrial buildings, unused residential structures and vacant lots. The deterioration and neglect seen in parcels and blocks have carried over to the neighborhood's sidewalks, so that many of them are in a state of disrepair. In turn, these sidewalks make walking less safe and even cause pedestrians to walk on the road. They also negatively affect businesses by decreasing foot traffic and hampering mobility for the elderly and the disabled. Deteriorated sidewalks make streets less presentable, thus lowering a block's perception and isolating the neighborhood's residents. Finally, sidewalks are a public domain of which all residents make use. In East Kensington, they are a space common to residents, old and new. The existence of damaged sidewalks in East Kensington highlights a missed opportunity to create a sense of community in a neighborhood in transition.

In 2012, the East Kensington Neighborhood Association worked with Philadelphia City Planning Commission to secure a grant through the Delaware Valley Regional Planning

Commission's Transportation and Community Development Initiative. This grant resulted in the East Kensington Transportation and Community Development Plan. As part of the plan, residents identified neighborhood issues to address, including crime reduction, increased policing, improved street lighting, and safer sidewalks. EKNA then approached the Mayor's Office of Transportation and Utilities (MOTU) to see what could be done regarding sidewalk repair, particularly due to the link between sidewalks, travel safety and quality of life in neighborhoods. MOTU then worked with the Mayor's Internship Program (MIP) to assess the quality of the sidewalks that the East Kensington Transportation and Community Development Plan had found to be in worst conditions. Through MIP, the interns were tasked with defining and measuring damage of EKNA sidewalks, prioritizing sidewalks based on their proximity to neighborhood resources, and preparing cost estimates for sidewalk repair.

The project had 3 phases: **data collection, data analysis, and cost analysis**. In the first phase, the interns surveyed the sidewalks that the East Kensington Transportation and Community Development Plan had highlighted. For each sidewalk, they measured total area, the missing areas and the areas free of damage. They also counted the instances of cracks, lifting and sinking, and the number of clusters of cracks. They assessed how much of the sidewalk was covered by obstacles like vegetation, debris and ponds. Finally, they qualitatively assessed the condition of each sidewalk on a 1-10 scale. Once the data had been collected, it was mapped and analyzed based on damage scores. The damaged sidewalks were then prioritized based on their proximity to schools and school crossings, EKNA green areas, Market-Frankford stations, and commercial corridors. Once sidewalks had been prioritized, the cost to repair them was calculated according to four funding scenarios: repairing only the 25% highest priority sidewalks, the top 50% highest priority sidewalks, all surveyed sidewalks and only the areas with

missing sidewalk. The ultimate goal of the project was to assess the sidewalks in East Kensington and to provide the City with an action plan so that a large number of residents may benefit from the improved public realm. It is the team's desire to see children able to play and residents of all physical abilities able to navigate their neighborhood safely and enjoyably.

Neighborhood Profile

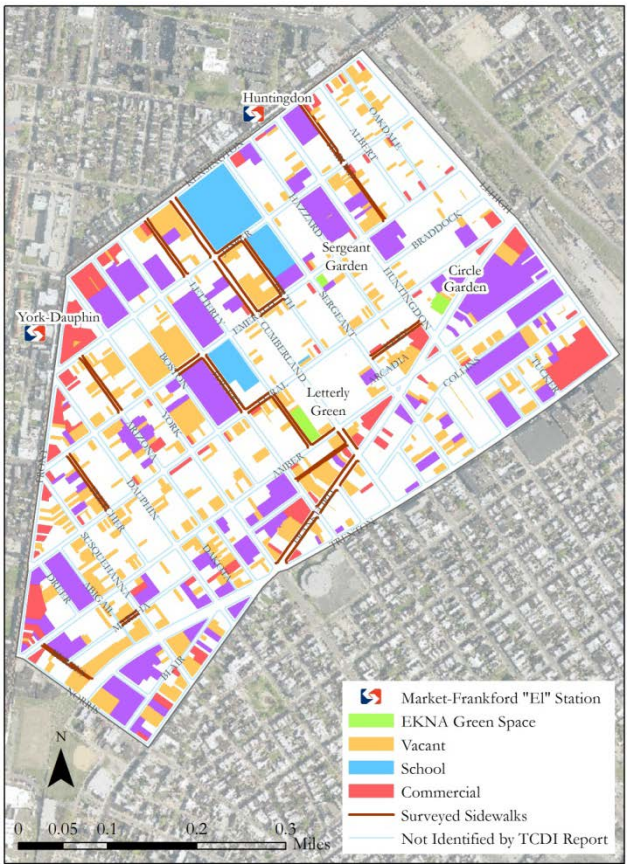

Figure 1: East Kensington Land Use Map

East Kensington represents a growing area of Northeast Philadelphia. The boundaries of the neighborhood are drawn at Front St. and Kensington Ave to the west, Lehigh Ave to the north, Trenton and Frankford Ave to the east, and Norris St to the south. The neighborhood is serviced by three Market-Frankford Line stops: Berks, York-Dauphin, and Huntingdon, as well as three bus routes. The population of East Kensington as of the 2010 census was 5,590. It grew between 2000-2010 for the first time after declining for 50 years from its peak population of 11,840 in 1950. Two crucial neighborhood demographic groups, 20-34 year olds and 35-59 year olds, have led this population increase.

Although population growth is generally connected to increased prosperity and gentrification, East Kensington still encounters a multitude of socioeconomic issues. The median household income is $27,000, compared to the citywide median of $34,000. While the poverty rate has declined from 48% in 2000 to 33% in 2011, it is still above the citywide rate of 28%.

Land use in East Kensington is primarily residential, with the exception of two commercial corridors: Kensington Ave and Frankford Ave. There is great potential for further growth on these corridors, especially given the limited retail and services available in this neighborhood. As for the residential areas, there is great disparity in property occupancy and maintenance. East Kensington is characterized by a growing number of newly constructed homes and properties, interspersed with older homes, or even crumbling or vacant ones. The interns anecdotally found that the difference in property quality and maintenance is strongly correlated with the quality of the sidewalks.

Many East Kensington residents commute on public transit. An estimated 30% of employed residents of East Kensington utilize the Market-Frankford line and the buses that service the area. It is important to note that in order to reach bus and train stops, many residents choose to either walk or ride their bikes. Even if residents are not walking to work, they still use the sidewalks and the streets in their daily lives.

Survey Methodology

Based on the Transportation and Community Development Plan undertaken in 2013 as per request of the East Kensington Neighborhood Association, the interns selected the streets that residents suggested as most in need of repair. They devised a system of measurement using a hand roller to quantify cracks, tree pits, holes, missing sidewalk, rising/sinking, vegetation,

debris and a subjective measure of perceived sidewalk quality. They also noted the amount of each construction material used for the sidewalks. The goal was to prioritize the streets in need of repair by taking into account their location, foot traffic, availability of bike lanes, proximity to public transit, and potential obstacles for civilians. See Appendix for a complete breakdown of the sidewalk characteristics the team measured with a copy of the sidewalk survey.

Analysis Methodology

Upon the interns' collection of the data set, the group developed ways to assess the degree of damage and assign a level of priority to each sidewalk. Through the use of GIS mapping, the interns visually depicted the data and devised a comprehensive system of sidewalk analysis.

Categorical Variables

The survey contained three broad groups of categorical variables (measurements of crack width, measurements of crack length, and measurements of sidewalk covered with foreign materials), and each of these groups had four categorical variables.

For categorical variables, a point system was uniformly applied to each surveyed street. With the variables under the groups cracks width and cracks length, a minimum value received 0.25 points, and each additional ordinal value received 0.25 more, such that each variable has a minimum value of 0.25 and a maximum value of 1. Furthermore, to add weight to major cracks, each variable received a multiplier of +1 for each ordinal increase in severity. For instance, a sidewalk with 50-99 cracks of 0.5"-1" in length would receive 0.5 base points, plus a 2x multiplier to make it 1 point total. A sidewalk with 50-99 cracks of 2"+ in length would receive 0.5 base points, plus a 4x multiplier to make it 2 points total. This allows each group to be worth

a maximum of 10 points (if it had 150+ cracks for each variable) and a minimum of 2.5 (if it had <50 cracks for each variable). Points for coverage were measured in a similar manner. For each variable, slight coverage was worth 0 points, moderate coverage was worth 1 point, high coverage was worth 2 points, and extreme coverage was worth 3 points. The total score for coverage was then weighted at .83 to make the entire group of coverage variables worth a maximum of 10 points in total.

Quantitative Variables

For quantitative variables, a point system was applied based on a normalized scale that established the minimum value for the given variable as "0" and the maximum value as "1". All normalized values were then set to a 0-10 scale. For instance, the east side of Jasper Street between Cumberland and Firth has a total area of 997.5 sq. feet and is missing 111.13 square feet, or 11.1% of the total area. For all sidewalks, missing sidewalk ranged from 0% to 17% (not including outliers), and so the formula to normalize this observation is $\frac{0.111-0.0}{0.17-0.0}$ *10, or 6.53. For all variables, outlier values were excluded and assigned the maximum or minimum amount of points. For example, the south side of Letterly Street between Kensington and Jasper was missing 79% of its sidewalk. It received the maximum value, 10 points.

Determining the Overall Damage

The points of each category were added together to create a raw score. For the six categories that indicated damage, the maximum potential score was 10 and the minimum potential score was 0. For the one category that indicated non-damage, the maximum potential score was 0 and the minimum potential score was -10. Raw scores were then once again rescaled to a 0-10 point scale.

Sidewalk Priority Scoring

Given the scarcity of financial resources, it is necessary to prioritize the sidewalks to be replaced. This prioritization should not only consider severity of sidewalk damage, but also proximity to key community services. Key services include SEPTA Market-Frankford ("El") stations, schools, school crossing guard locations, commercial corridors, and community-identified green spaces. Figure 3 in the Recommendations Section of the paper depicts the location of these services in East Kensington. The priority score was compiled by first assigning a single point to each sidewalk each time it was located in the following locations:

- On either side of a street adjacent to an "El" station
- On either side of a street adjacent to a school
- On either side of a street of the 4 streets intersecting at a school crossing guard location
- Along East Kensington commercial corridors located along Kensington Avenue, Front Street, and Frankford Avenue
- On either side of a street adjacent to an East Kensington Neighbors Association-identified green space

The final sidewalk priority score weighs evenly between the damage score and proximity score by multiplying the two figures together and normalizing it to a 1-10 scale.

Results

After developing the method of analysis, the interns found that the quantitative data from the surveys reflected the observations they made in the field. From there, the team provided cost estimates and divided the data points into quartiles, based on the final priority score.

The correlation coefficient between the calculated damage score and the interns' subjective rating of the sidewalks was .86. Due to the strong correlation between the survey results, analysis methods and original perceived quality of the sidewalks, there is strong evidence to support that the method the team used is meaningful.

Top 25% Highest Priority

Sidewalk	**Damage Score (0-10)**	**Priority Points (1-5)**	**Priority Score (0-10)**	**Cost in US$**
Jasper, Cumberland and Firth, E	7.13	3	10	9,981.27
Cumberland, Jasper and Emerald, S	7.38	2	6.9004207	24,107.72
Letterly, Coral and Amber, N	7.01	2	6.5544648	21,113.17
Frankford, York and Hagert, W	3.19	4	5.9654045	15,621.67
Amber, Letterly and Cumberland, W	6.35	2	5.9373541	22,691.82
Letterly, Coral and Amber, S	5.8	2	5.4230947	28,161.12
Frankford, York and Hagert, E	2.81	4	5.2547917	22,167.89
Cumberland, Amber and Martha, S	10	1	4.6750817	12,321.89
Harold, Jasper and Emerald, N	8.67	1	4.0532961	32,829.07
Martha, Hagert and Cumberland, W	8.6	1	4.0205703	26,243.54
Cumberland, Kensington and Jasper, S	2.03	4	3.7961664	13,079.63

25%-50% Highest Priority

Sidewalk	**Damage Score (0-10)**	**Priority Points (1-5)**	**Priority Score (0-10)**	**Cost in US$**
Frankford, Letterly and Cumberland, E	3.88	2	3.6278634	12,588.89
Cumberland, Jasper and Emerald, N	3.74	2	3.4969611	26,362.28

Firth, Jasper and Emerald, S	3.68	2	3.4408603	27,884.73
Martha, Hagert and Cumberland, E	6.73	1	3.1463301	28,911.41
Berges, Amber and Trenton, S	6.71	1	3.1369798	17,472.80
Letterly, Kensington and Jasper, S	6	1	2.8050492	15,387.74
Harold, Jasper and Emerald, S	5.88	1	2.7489481	31,098.68
Harold, Kensington and Jasper, S	5.72	1	2.6741469	104,374.82
Cumberland, Amber and Frankford, N	5.39	1	2.5198691	16,831.00
Fletcher, Emerald and Coral, S	5.3	1	2.4777935	39,352.87
Frankford, Hagert and Cumberland, W	1.74	3	2.4403927	8,983.89

The survey also resulted in a list of sidewalks that are not in compliance with ADA requirements. Their walking space width is less than 3 feet.

- Letterly, between Kensington and Jasper, southern side
- Frankford, between Hagert and Letterly, eastern side
- Firth, between Jasper and Emerald, southern side
- Berges, between Amber and Trenton, southern side
- Arizona, between Jasper and Emerald, southern side
- Arizona, between Jasper and Emerald, northern side

Moreover, the interns compiled a list of streets where cars were parked on the sidewalk, furthering their damage.

- Frankford, York and Hagert, western side
- Fletcher, Emerald and Coral, southern side

Figure 2: Severity of Damage Among Community-identified Sidewalks

- Arizona, Jasper and Emerald, northern side
- Harold, Jasper and Emerald southern side
- Harold, Jasper and Emerald, northern side
- Harold, Kensington and Jasper, southern side

Cost Analysis

After the scores were rescaled based on their prioritization, the list of sidewalks was divided into quartiles. Such division intended to place the sidewalks into clusters that could be assessed individually. The interns were also able to provide multiple cost analyses based on the different clusters.

According to the Streets Department, it costs $103/square yard to repair sidewalk. This includes removal of old sidewalk, procurement, and installation of the new sidewalk. The following estimates do not include engineering or overhead costs.

Case 1: Repair 25% of damaged sidewalks, ranked by priority scores and selected by highest priority

Total area: 31,423.13 sqft

Total area missing: 3,159.98 sqft

Total area free of damage: 11,472.95 sqft

Total area to be repaired: 19,950.19 sqft

Cost: $228,318.78

Case 2: Repair the sidewalks in the top half, based on priority scores

Total area, after the addition of the sidewalks above: 72,035.71 sqft

Total area missing: 6,168.58 sqft

Total area free of damage: 23,316.19 sqft

Total area to be repaired: 48,719.52 sqft

Cost: $557,567.89

Case 3: Repair 100% of damaged sidewalk by replacing with new sidewalk:

Total area: 136,834.52 sqft

Total area missing: 7366.82 sqft

Total area free of damage: 64,388.60 sqft

Total area to be repaired: 72,445.92 sqft

Cost: *$829,103.3*

Case 4: Install sidewalk only where it is missing

Total area: 136,834.52 sqft

Total area missing: 7366.82 sqft

Cost: $84,309.16

Recommendations & Conclusion

This project sought to assess the extent of the problem and provide the City with the information necessary to repair the sidewalks in East Kensington that the community had identified as damaged. The next steps now that the data has been collected and costs have been estimated are to seek out funding sources, including grants, so that the sidewalks can be repaired. The different cases put forth in the Cost Analysis section take into consideration the different possibilities in availability of funding. MOTU will be able to determine for which grants they will apply based on how much the City wants to repair, and the amount of funding that can be acquired.

This project recommends that the streets with higher priority scores be addressed first, and that the City take into consideration the clusters and cases put forth in this paper. Improving sidewalks is crucial in the development of East Kensington, and the interns believe that the repair

of the highest priority sidewalks will bring the most benefit to the community. As the map shows in Figure 3, the streets with the highest priority scores are located in two clusters. This cluster-based approach allowed our team to target multiple sidewalks rather than isolated parcels in order to most effectively increase the quality of life in the areas of highest public use.

The first cluster surrounds the Brown Henry A. School and Brightside Academy, adjacent to Kensington Ave and the Huntingdon Market-Frankford Line stop. This section is highly trafficked by schoolchildren, parents, and subway passengers. Four streets in this cluster are among our 25% most prioritized along Cumberland Ave. Due to Cumberland Ave's central location in the neighborhood and usefulness as a connection between the Frankford Ave commercial corridor and the SEPTA routes on Kensington Ave, this should be the first area to address. It would allow residents to safely traverse the neighborhood's center, creating an area of greater promise between two important axes in the neighborhood.

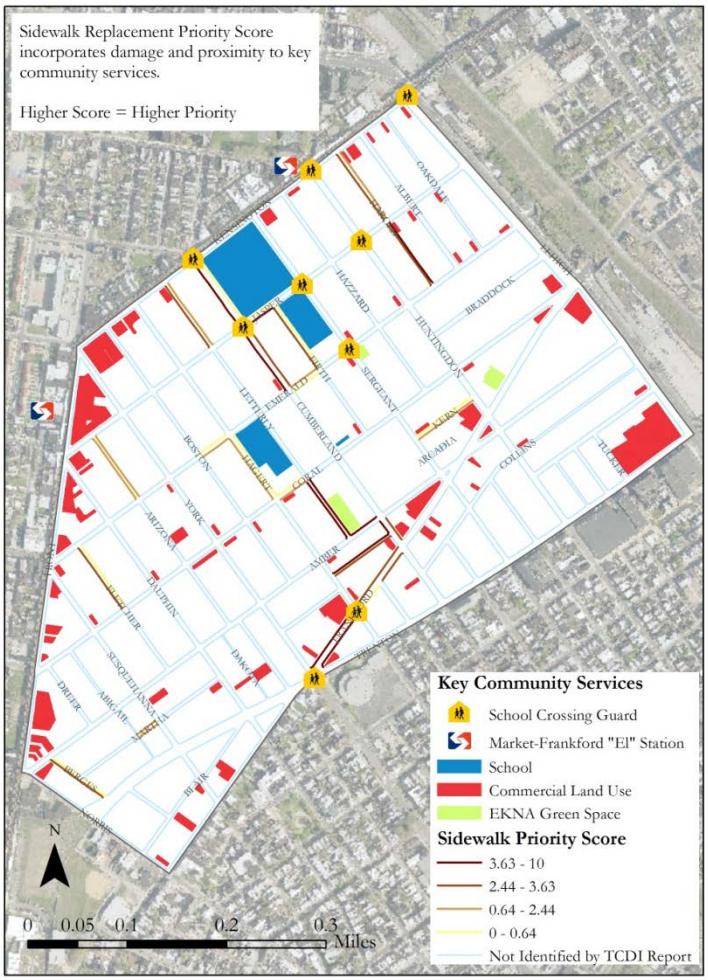

Figure 3: Sidewalk Replacement Priority Scoring

The second cluster we identified as top priority is the commercial corridor on Frankford Ave. Three of the top 25% highest priority streets are located within this cluster. Repairing sidewalks along this corridor would improve access to businesses and increase foot

traffic near the neighborhood's border. This would in turn further promote commercial expansion along Frankford Ave, thus attracting pedestrian-oriented business that would serve the community. Cumberland Ave would be the main connection between the two commercial corridors and the center of the neighborhood. It is a high priority street because of foot traffic and high circulation of pedestrians.

The severe issues the interns observed occurred as a result of sidewalks being used for non-pedestrian functions such as illegal parking and construction. If the City is to repair these sidewalks, it should also invest in preventative measures to provide for their longevity.

Restoring and maintaining sidewalks in East Kensington is a crucial contribution toward an increased quality of life in this emerging Philadelphia neighborhood. As such, it is imperative to further promote partnerships between the City and thriving neighborhood organizations such as EKNA, to combine firsthand resident expertise with expansive city data and tools. East Kensington faces numerous obstacles such as crime and land vacancy, which are representative of the greater Philadelphia experience. It is through the improvement of infrastructure as simple as a sidewalk that a neighborhood can be viewed as a successful model for our City.

Appendix: Sidewalk Survey Sheet

Surveyor Names:

Street Block (Specify name and the streets it lies between):

Side of the Street (Circle One): N S E W

BASIC MEASUREMENTS

	Total sidewalk	Missing sidewalk	Free of damage	Walking space
Length				
Width				

TREE PITS

Length	
Width	
Number of Tree Pits	

ADA RAMPS

Intersection		
Which Corner (Circle One)	NE NW SE SW	NE NW SE SW
Number of ADA Ramps		

MATERIALS

	Cement	Slate	Brick	Other (Please specify material)
Length				
Width				

SIDEWALK IRREGULARITIES

Total instances of cracks <1/2" wide (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks 1" – 2" wide (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks 1/2-1” wide (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks >2” wide (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks <1/2” long (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks 1” – 2” long (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks 1/2-1” long (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of cracks >2” long (check one)

- ☐ <50 cracks
- ☐ 50-99 cracks
- ☐ 100-149 cracks
- ☐ 150+ cracks

Total instances of 5+ cracks meeting in a cluster:

LIFTING/SINKING

	Slight = 1/4”-1/2”	Moderate = 1/2" – 1”	High = 1” – 2”	Extreme = >2”
Total Instances of the Sidewalk Lifting/Sinking				

SIDEWALK COVER

	Slight = Covers < 10%	Moderate = Covers 10% - 30%	High = 30% - 50%	Extreme = Covers > 50%
Vegetation [% of Total Walking Zone] (Mark One)				
Ponding [% of Walking Zone Width] (Mark One)				
Debris [% of Total Walking Zone] (Mark One)				
Other [% of Total Walking Zone] (Mark One)				

NOTES:

GENERAL FEELING

On a scale of 1-10, how would you rank this sidewalk?

1 = the need for complete reconstruction, 10 = completely new. Circle One:

1 2 3 4 5 6 7 8 9 10

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