Performance Audit: 2014 Sidewalk Data

October 2014

City Auditor
City of Lawrence, Kansas

October 2, 2014

Members of the City Commission

Lawrence residents use sidewalks for both for recreation and transportation. Property owners bear the responsibility for maintaining sidewalks.

The City created an inventory of defects and ramps in 2014. Inspectors collected the information across the city, recording defects and ramps as they walked or drove.

The 2014 inventories of defects and ramps are generally reliable based on comparisons of the data with observed conditions. I reviewed 735 defects and ramps. Testing the data found it to be generally reliable and identified several limitations to keep in mind.

Cities use different approaches to maintaining sidewalks. The differences can be characterized by differences in how maintenance needs are identified and how repairs are made and paid for.

I recommend adopting written guidelines for defects and ramps and making the guidelines and data available to the public on the City's web page.

I appreciate the cooperation and assistance I received from City staff in the departments of Public Works, Information Technology and Planning and Development Services Department.

Michael Eglinski
City Auditor

Performance Audit: 2014 Sidewalk Data

Table of Contents

Performance Audit: 2014 Sidewalk Data

Results in Brief

Lawrence residents use sidewalks for both for recreation and transportation. A relatively high portion of Lawrence residents walk as transportation. Lawrence ranks 17th in the portion that walk to work based on U.S. Census data for 366 metropolitan areas.

Property owners bear the responsibility for maintaining sidewalks. Both state law and city code establish this primary responsibility. The City defines sidewalk hazards as deflections more than one-half inch or holes or depressions that could injure a pedestrian.

The City created an inventory of defects and ramps in 2014. Inspectors collected the information across the city, recording defects and ramps as they walked or drove.

The 2014 inventories of defects and ramps are generally reliable based on comparisons of the data with observed conditions. The City Auditor reviewed a total of 735 defects and ramps. Testing the data found it to be generally reliable and identified several limitations to keep in mind.

Cities use different approaches to maintaining sidewalks. The differences can be characterized by differences in how maintenance needs are identified and how repairs are made and paid for.

The City Auditor recommends adopting written guidelines for defects and ramps and making the guidelines and data available to the public on the City's web page.

Performance Audit: 2014 Sidewalk Data

Sidewalks in Lawrence

Lawrence residents use sidewalks for both for recreation and transportation. A relatively high portion of Lawrence residents walk as transportation. Lawrence ranks 17th in percent of total that walk as transportation to work based on U.S. Census data for 366 metropolitan areas. While the city ranks high, the total portion on residents walking to work is low compared to those driving to work. Many "college towns" rank high in the portion walking to work.

Respondents to resident surveys in both 2011 and 2007 identified the number of walking and biking trails as parks and recreation areas for high emphasis in coming years. The results may reflect resident's recreational uses of sidewalks.

Table 1 Parks and recreation issues for most emphasis over next two years

Percent of respondents who selected item as one of their top three:			
2007 survey		**2011 survey**	
Cleanliness of public areas in the City	33	Number of walking and biking trails	30
Number of walking and biking trails	30	Condition of equipment/facilities at City parks	21
Beautification of downtown Lawrence	29	Cleanliness of public area in the City	20

Property owners bear the responsibility for maintaining sidewalks. Both state law and the City Code establish this primary responsibility.[1] The City Code defines sidewalk hazards as deflections more than one-half inch or holes or depressions that could injure a pedestrian. The City can inform property owners of the need to make repairs and, if repairs aren't made, may make the repairs and assess the costs. This maintenance approach follows from English common law and is a barrier to sidewalk maintenance.

[1] Kansas Statutes, Chapter 12, Article 18: Sidewalks 12-1808; City Code, Chapter 16, Article 2: Sidewalk Construction and Repair 12-209 and Article 1: General Provisions 16-105.

Maintaining sidewalks

Property owners bear responsibility for maintaining adjacent sidewalks with exceptions:

- By ordinance, the City maintains the 8 and 10 foot wide sidewalks on the west side of Kasold Drive from Bob Billings Parkway to 31st Street.
- By practice, the City maintains sidewalks with widths of 8 feet or more.
- By practice, the City maintains sidewalks with defects associated with city infrastructure.

The City created an inventory of defects and ramps in March and April of 2014. Four inspectors collected the information across the city. Inspectors used Ipads to record information about sidewalk defects and ramps as they observed the sidewalks on foot or from a vehicle. Inspectors selected defects and ramp descriptions from a menu. GPS built in to the Ipads provided locations of the features the inspectors noted.

The City also created an inventory of street segments with information on associated sidewalks in 2006. City staff inspected sidewalks along each block of city streets and noted where sidewalks weren't available. Staff collected descriptive information about sidewalk materials (e.g. brick or concrete), width and ADA ramps. Staff also rated the condition of each block of sidewalk. Conditions categorized as good, fair, poor or critical.[2]

The data collected in 2014 is intended to serve a number of purposes, including:

- Helping the City Commission understand the magnitude of problems with sidewalks
- Providing updated information on sidewalk conditions to the community
- Helping the City identify sidewalks that need repairs and plan and prioritize repairs
- Identifying gaps in existing areas
- Providing information to formulate options for managing sidewalks
- Estimating the costs to repair non-City-owned sidewalks

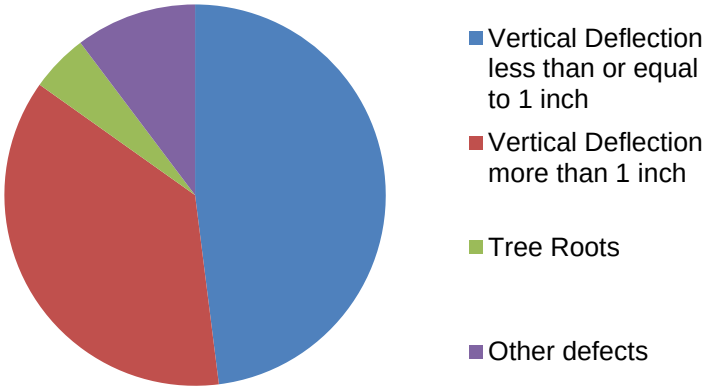
[2] Some of the information (less than 4 percent) has been updated since 2006.

2014 Inventory Provides Reliable Information on Defects and Ramps

The 2014 inventories of defects and ramps are generally reliable based on comparisons of the data with observed conditions. The City Auditor reviewed a total of 735 defects and ramps. Testing the data found it to be generally reliable and identified several limitations to keep in mind.

Defect data

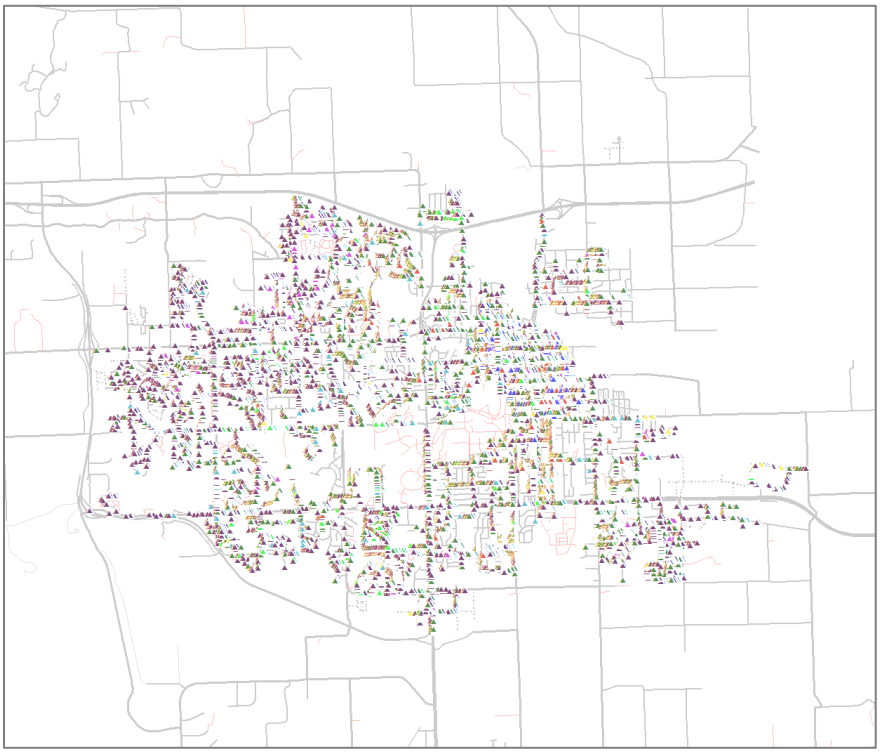
City inspectors identified over 20,000 sidewalk defects in 2014. Most (85 percent) were vertical deflections.



The photo shows an example of a vertical deflection.

Defects located throughout Lawrence

The map shows all of the defects identified in the 2014 data collection.



Observing a sample of defects identified few data problems

Observations of 372 ramps and defects identified 94 percent of the recorded ramps and defects. The City Auditor tested the data by selecting a sample of ramps and defects, visiting those locations, and recording each item in one of three categories: found with no questions, found with some question or not found. The sample was drawn by selecting 15 randomly located defects and then identifying all of the ramps and defects within a 300 foot radius of those random selections. Follow-up observations with city staff generally confirmed the audit observations.

Table 2 Results of audit observations

	Ramps	Defects	Total
Found with no questions	85	253	338
Found with some question[3]	3	8	11
Not found	2	21	23

[3] This category included minor discrepancies such as a defect recorded as a deflection that was observed to be a very small crack. Because so few items were coded as "found with some question," the auditor didn't do additional follow-up visits to these locations.

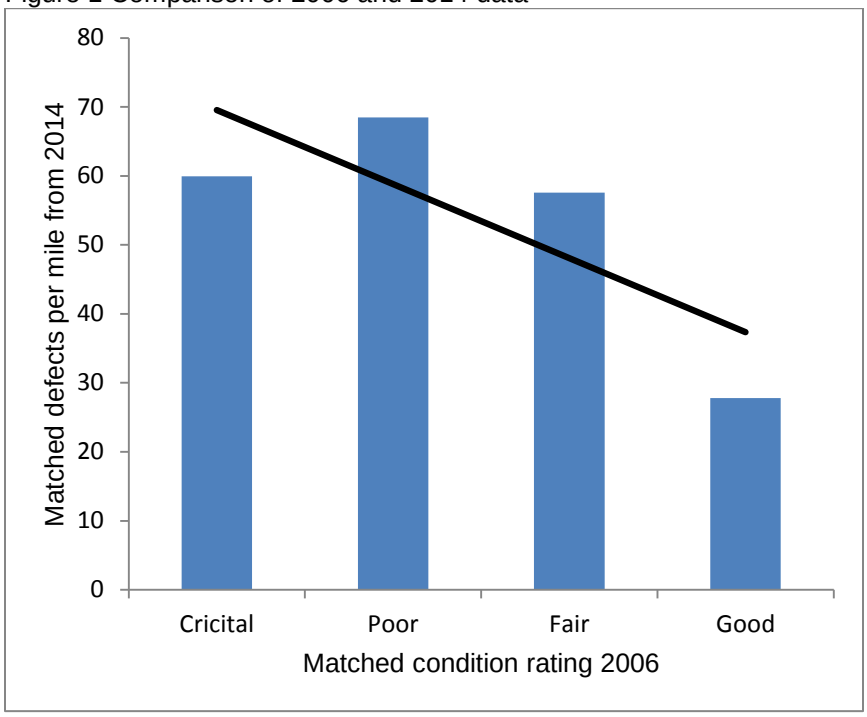
Inspectors missed a few defects and ramps

Observations of a sample of areas identified 16 defects and ramps that had not been captured in the City's data collection. Follow-up observations with city staff generally confirmed the audit observations.

Defect inventory generally consistent with older condition data

The data the City collected in 2014 is generally consistent with the data the City collected in 2006. The City Auditor matched 2014 defect and 2006 inventory data and then looked at the relationship between the conditions and the number of defects. Sidewalks with better ratings in 2006 have fewer defects in 2014. Consistency in the data suggests the data is reliable. Figure 1 shows the relationship between the 2006 and 2014 data collection efforts. The line shows the general relationship between the number of defects per mile of sidewalk and the condition ratings.[4]

Figure 1 Comparison of 2006 and 2014 data



Most locations accurate within about 15 feet

Recorded locations for 80 percent of the features tested are within 15.3 feet of the true location. A random sample of 313 locations ranged from 0

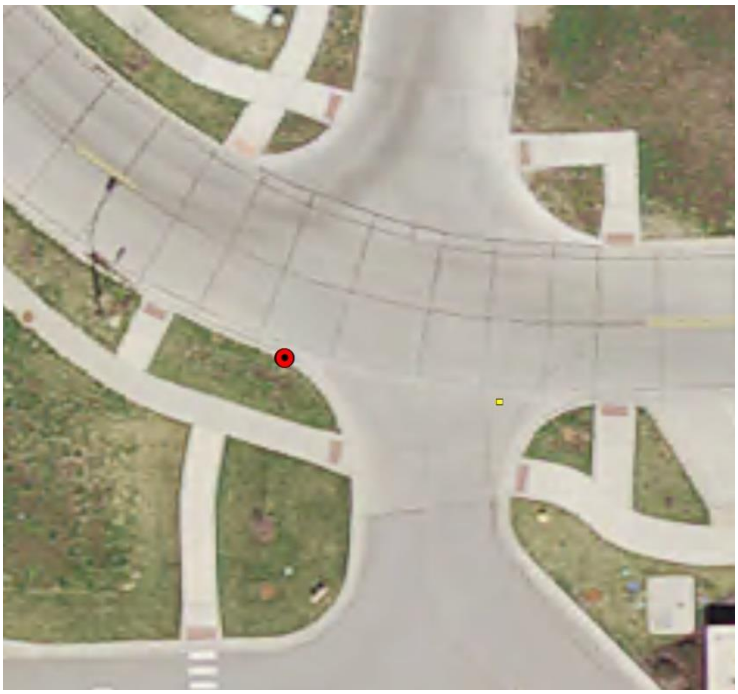
[4] Note that this analysis understates the true number of defects per mile of sidewalk because in spatially joining the two datasets a significant number of defects were excluded because they weren't within 10 feet of the location of the 2006 sidewalk inventory features.

to 40 feet away from the true location. Location data can be inaccurate due to precision of the GPS or errors by the inspectors. The accuracy between inspectors was consistent indicating that most of the error was likely due to GPS accuracy.

.

Checking the Accuracy of Locations

To check the accuracy of location data, the City Auditor measured the distance between ramp points and the nearest ramp visible in air photos. The photo below shows a sampled ramp location (the red bull's-eye feature) and the surrounding ramps visible in the air photo. A measurement tool in the City's geographic information system allows precise measurement of the straight line distance between two points. In this case, the nearest ramp is south and east of the location point and the distance is 17 feet.



The location analysis relied on ramps because they are clearly visible in the air photos. Because defect data was collected using the same method as ramp data, the results of the analysis apply to the defect data as well.

Important limitations to the defect and ramp data

Testing the data found it to be generally reliable, but there are some important limitations to keep in mind when using the data to address any of the intended purposes. Limitations include variation in position and observation accuracy, the data show defects and ramps rather than sidewalks, that certain public sidewalks were excluded from data

collection, the data provide a snapshot of conditions at a particular time, and the data exclude some conditions that reduce the use of sidewalks.

Variation in position and observation accuracy
The location data for defects and ramps are accurate to about 15 feet. This will matter if, for example, defects are to be associated with specific properties or categories of properties. For example, a defect that is located nearest a parcel in the data may actually be located on a neighboring parcel.

Individual inspectors have some differences in how they record the height of deflections. Inspectors didn't directly measure deflection heights but made estimates based on observations. Public Works staff noted that different people will observe heights in different ways and audit observations confirmed some differences.

The data show defects and ramps rather than sidewalks
The data identify defects and ramps rather than sidewalks. Each defect is associated with a geographic point but not with a specific sidewalk. In contrast, the city's pavement management system associates street defects with specific sections of streets.

The data excludes certain public sidewalks
The City collected data for sidewalks along roads but excluded sidewalks within parks and some of the shared use paths. As a consequence the data collected in 2014 includes some defects on City property but not all. Estimates of the cost to repair sidewalks on city-owned property based on the 2014 data will likely understate the costs of repairs.

Conditions change over time
The data reflect conditions when the city collected the data, primarily in March and April 2014. Changes since then aren't reflected. New defects may have appeared and defects may have worsened. Defects may also have been repaired since the data was collected.

Conditions change over time

City inspectors found 9 defects along a stretch of sidewalk in March 2014, but by July the defects had been repaired.

Data don't include some conditions that can affect users

Inspectors didn't collect data on vegetation or debris, except where roots have damaged sidewalks. Vegetation overhanging or growing next to sidewalks can reduce the space used by pedestrians. Vegetation and debris built up on surfaces can also affect the use of sidewalks.

Vegetation can reduce access

Vegetation and debris can reduce pedestrian's abilities to use sidewalks. The photo shows a sidewalk that is in generally good condition but which is difficult to use because of vegetation overhanging the path.

Written inspection guidelines help ensure consistency

The City didn't develop written inspection guidelines for the data collection initially. Staff in the Planning and Development Services Department has developed written guidelines as a tool for use in Eudora and Baldwin City for data collection for the metropolitan planning organization (MPO). The MPO will use the information as it develops a regional pedestrian plan. Staff in Public Works should review the guidelines, make any necessary changes, and adopt the resulting guidelines for any future data collection. The guidelines should be made publicly available. Written guidelines help ensure consistency between inspections.

How sidewalks are damaged

Sidewalks deteriorate for several reasons:

- Changes in weather can cause ground to heave, damaging sidewalks.
- Crack in surfaces can allow water to get into the subgrade and weaken it, particularly through freeze and thaw cycles.
- Ground can settle related to city infrastructure such as storm sewer inlets.
- Ground can settle related to non-city infrastructure.
- Heavy vehicles on sidewalks can cause damage.
- Tree roots can cause damage.
- Base material improperly prepared during construction can lead to settlement and damage.

As a result of these factors, sidewalks require maintenance over time.

Cities Use a Variety of Approaches to Maintain Sidewalks

Cities use different approaches to maintaining sidewalks. To identify the range of approaches, the City Auditor reviewed information from a group of communities similar to Lawrence, cities with relatively high portions of residents who walk to work, and select literature. The differences can be characterized by differences in how maintenance needs are identified and how repairs are made and paid for. The differences and examples illustrate the range of options but don't necessarily describe which options are most common or most efficient, effective and equitable.

Table 3 Range of options for identifying repair needs

How are sidewalk maintenance needs identified?			
Respond to complaints	Respond to complaints and provide information to property owners	Systematically inspect and follow-up	Systematically inspect on an established regular basis

Table 4 Range of options for repairing sidewalks

How are sidewalk repairs made?					
Property owner	Property owner with city making repairs if not made timely, costs invoiced or assessed to owner	Property owner with shared funding or assistance, funding through normal budget process	Property owner with shared funding or assistance, funding through a dedicated revenue source	Repair by the city but funded by assessment to the property owner	City with funding through either the regular budget process or a dedicated funding source

To provide additional information on the range of approaches, the City Auditor reviewed sidewalk repair approaches for a number of cities. The text boxes that follow summarize approaches from Iowa City, IA, Ann Arbor. MI, and Corvallis, OR.[5]

[5] All three are college towns with a relatively high portion of people who walk to work. Population totals (2010): Iowa City 67,862; Ann Arbor 113,934; and Corvallis 54,462.

Iowa City sidewalk program funded by property owners

Iowa City uses a systematic inspection program to identify sidewalks that require maintenance with the responsibility for repair borne by the adjacent property owner. The program has been in place for nearly 20 years. Iowa City is divided into 10 areas and one area is inspected each year using published criteria for identifying defects that require repairs. Inspectors provide property owners with written summaries of the inspections and instructions for making repairs. The inspectors also mark slabs of sidewalks that need repairs.

Follow-up inspections identify where property owners haven't made the required repairs. The city seeks bids for all of those repairs and the city manages the contractors who make repairs. The city then chargers property owners for the cost of the work plus a $25 administrative fee. If property owners do not pay, the city assesses the costs against the property.

Iowa City has two exceptions for property owners paying the costs of repairs. If the damage to the sidewalk was caused by a city utility or tree, the city bears the cost of the repair. If the repaired sidewalk is 8 feet wide, the city and property owner split the cost of the repair.

Ann Arbor city-wide sidewalk program funded by taxes

Ann Arbor uses a systematic inspection program to identify sidewalks that require maintenance and pays for repairs. Voters approved a 1/8 mil increase in property tax for 5 years to repair sidewalks in the public right-of-way. The city is divided into areas throughout the city for inspection and repair. Over five years, the city will inspect and repair sidewalks across the entire city. Prior to implementing the mil increase, the city made an effort to require property owners to make repairs and assess owners who didn't make the necessary repairs.

Ann Arbor pays for repairs on property-tax paying properties but not on exempt properties. For exempt properties, the city identifies repair needs and requires those property owners to make the repairs.

Ann Arbor is under a consent decree that requires the city to bring pedestrian facilities into compliance with current ADA requirements by 2018. Revenue from the mil increase also provides revenue for ADA compliance efforts.

Rank in portion who walk to work: Iowa City 4th; Ann Arbor 11th; and Corvallis 3rd. Lawrence's population was 87,643 in 2010. Lawrence ranked 17th in portion walking to work (2008-2012 American Community Survey 5-year estimates).

Corvallis sidewalk program funded by monthly fees

Corvallis uses systematic inspections to identify sidewalks that require repairs and pay for those repairs through a monthly charge for all utility accounts. Before the city initiated the monthly charges, property owners were responsible for repairs with the option of using a city contractor to do the work. The city is divided into districts for inspections. Staff makes inspections following published criteria and provides written inspection reports to property owners.

Corvallis established a sidewalk repair funding mechanism in the beginning of 2011. The city charges each utility account a monthly fee of $0.80.

Recommendations

The City Auditor recommends that the City Manager:

1. Review, modify as appropriate, and adopt the guidelines prepared by Planning and Development Services of sidewalk conditions.

2. Make the guidelines and sidewalk defect data available on the city web page.

Potential future performance audit issues

It may be appropriate to conduct additional performance audit work if the City moves toward an asset management approach for sidewalk or develops an expanded program to addressing sidewalk maintenance. Additional work could address:

- Should the City create a sidewalk condition system?
- Has the City adopted good practices for sidewalk maintenance?

Good practices for a sidewalk program could include:

- Setting and publicizing clear policies, procedures, plans and standards for sidewalks and enforcement processes
- Inventorying and inspecting sidewalks on a systematic basis
- Documenting and resolving complaints
- Ensuring a coordinated city approach
- Measuring and reporting on results and efforts to maintain sidewalks

The good practices are based on review of literature on regulatory programs and the US Department of Transportation's *Guide for Maintaining Facilities for Enhanced Safety*. A performance audit would further develop the practices.

Performance Audit: 2014 Sidewalk Data

Scope, methods and objectives

This performance audit was designed to address:

- Does the sidewalk data collected in 2014 provide reliable information to inform decisions?

To test the reliability of the 2014 defect and ramp data, the City Auditor interviewed staff in the Public Works Department and the Planning and Development Services Department, observed a sample of defects and ramps, and reviewed the data.

The City Auditor observed over 700 items in the defect and ramp databases. Most of the observations involved two specific tests of the data. One test involved comparing the locations of 313 randomly selected ramps in the data with the location of those ramps. The other test involved observing a total of 372 defects and ramps within a 300 foot radius of 15 randomly selected defects.

The City Auditor also reviewed relevant city documents, Kansas state statute and the City Code, relevant literature, and information from other cities including similar college towns and cities with high rates of walking to work. Among the literature reviewed were:

- *Guide for Maintaining Pedestrian facilities for Enhanced Safety*, U.S. Department of Transportation, Federal Highway Administration, October 2013.

- *Managing Selected Transportation Assets: Signals, Lighting, Signs, Pavement Markings, Culverts, and Sidewalks*, Transportation Research Board, 2007.

The City Auditor conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require planning and performing the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for findings and conclusions based on the audit objectives. The City Auditor believes that the evidence

obtained provides a reasonable basis for the findings and conclusions basd on the audit objectives.

The City Auditor provided a final draft of the report to the City Manager on August 21, 2014. The City Manager's written response is included.

Performance Audit: 2014 Sidewalk Data

Management's Response

City Code requires a written response addressing agreement or disagreement with findings and recommendations, reasons for disagreement, plans for implementing solutions, and a timetable for completing such activities.

City of Lawrence
KANSAS

CITY COMMISSION

MAYOR
MIKE AMYX

COMMISSIONERS
JEREMY FARMER
DR. TERRY RIORDAN
ROBERT J. SCHUMM
MICHAEL DEVER

DAVID L. CORLISS
CITY MANAGER

City Offices
Box 708 66044-0708
TDD 785-832-3205

6 East 6th
785-832-3000
FAX 785-832-3405

www.lawrenceks.org

September 21, 2014

Mr. Michael Eglinski
City Auditor

Re: Performance Audit on recently performed review of City sidewalks

Dear Michael,

Thank you for your report reviewing the recently conducted inspections of City sidewalks. I understand your conclusion is that this review provided reasonably reliable information to have a generalized understanding of the scope of sidewalk repair needed within the community. Staff believes this information will be useful as we continue to discuss necessary progress on this issue. Obviously, the major issue is one of priority and funding for this important City infrastructure. The audit does not address or make a recommendation on this issue. The audit does request that we place the data on the City website, which has been accomplished by the Director of Public Works. Please see the link:

http://www.lawrenceks.org/city_maps

(link to the downloadable maps and then to sidewalks for a map showing the conditions of sidewalks from this recent review)

Your other recommendation is to make the sidewalk guidelines prepared by both Planning and Public Works an adopted document. This is something we plan to continue to use unless altered by the City Commission.

Sincerely,

David L. Corliss
City Manager