

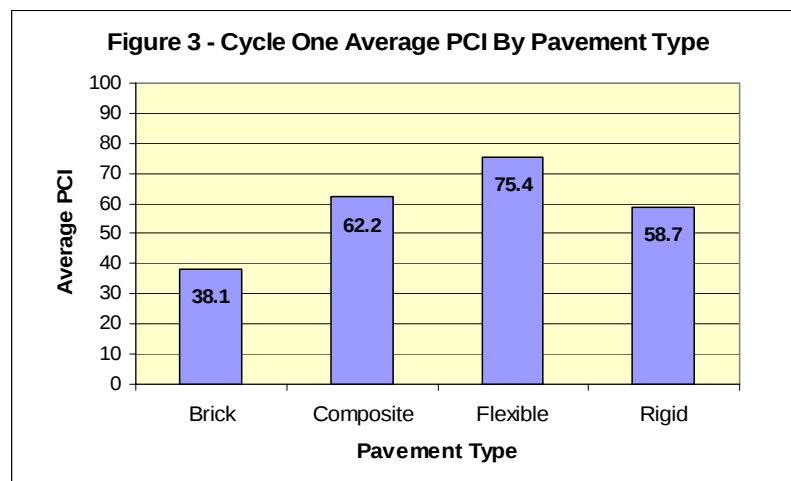
Memo

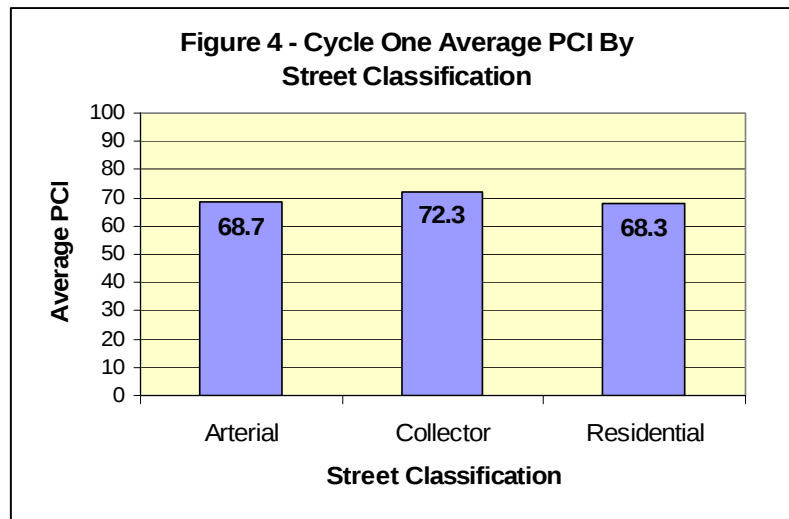
To: City Commission
Cc: Mike Wildgen, City Manager
Debbie Van Saun, Asst. City Manager
Dave Corliss, Asst. City Manager
Chuck Soules, P.E.
Terese Gorman, P.E.
From: Steven M. Lashley, P.E.
Date: December 14, 2005
Re: Pavement Management System Update – Cycle One
Status Report

Introduction

In late October, 2005, the first cycle of the street pavement condition inventory for the Pavement Management System (PMS) was completed, which involved a physical inventory and analysis of every street segment within the City of Lawrence. The PMS provides Public Works with a management tool to maintain an inventory of street pavement, their respective condition and maintenance work history, and the ability to identify budget needs and impacts associated with pavement preservation strategies and asset management.

For Cycle One, the overall average Pavement Condition Index (PCI) for Lawrence streets was 69.0 based on a "0-100" rating scale. A score of "0" represents a pavement with all distresses present at their highest severity and extent levels. A street pavement segment with a score of "100" represents a pavement segment that has no visible distresses. The average PCI for Brick, Composite, Flexible, and Rigid streets, respectively, is 38.1, 62.2, 75.4, and 58.7 (See Figure 3). The average PCI for Arterial, Collector, and Residential streets, respectively, is 68.7, 72.3, and 68.3 (See Figure 4). *Please note that curb and gutter conditions on the pavement segments surveyed does not impact the PCI for the street.*





Goal

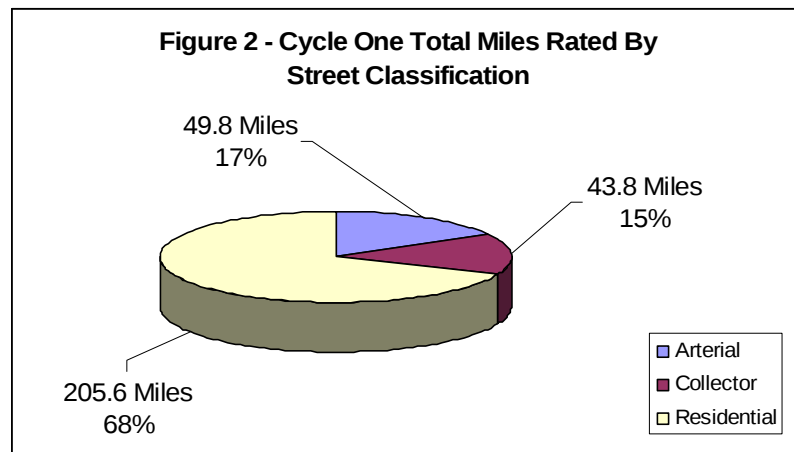
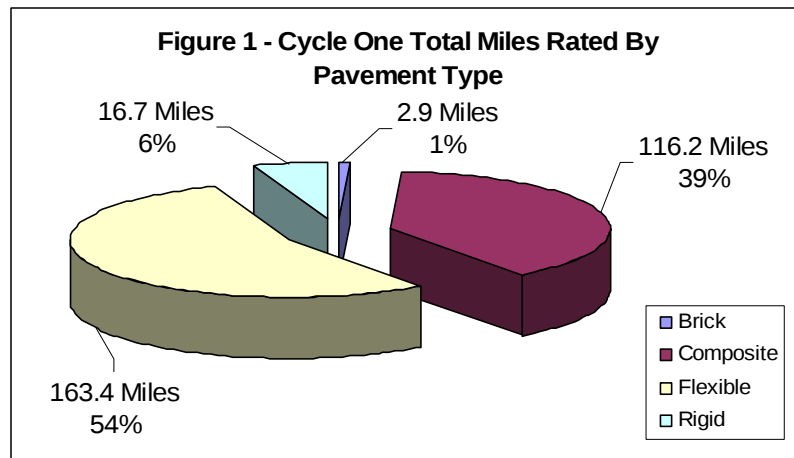
An effective Pavement Preservation Program (P3) focuses on “keeping the good pavements in good condition”. The goal of pavement preservation is to slow the deterioration rate and to extend the life cycles of our city streets. This can be done effectively through the timely application of preventative maintenance techniques to postpone pavement failure. Essentially, it is more economical to preserve the streets than to delay the proper repairs and end up with the need for minor to major rehabilitation of city streets.

Background and Analysis

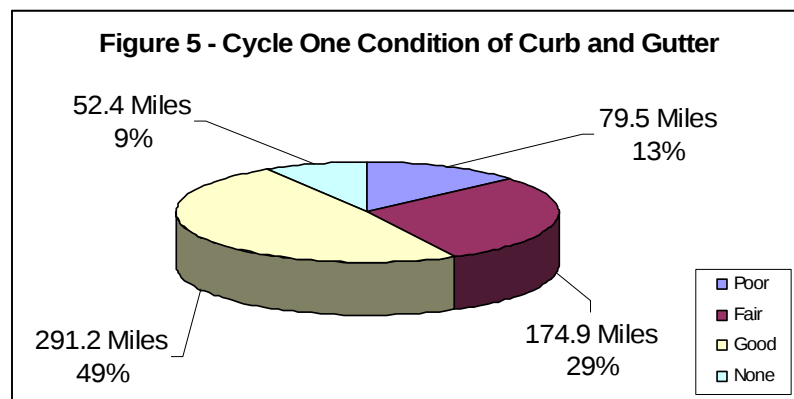
Through the use of the PMS, we can develop cost-effective strategies and build a P3 by applying preventative maintenance techniques such as crack sealing, surface seals, and micro-surfacing, along with minor rehabilitation such as milling and overlay, in coordination with routine maintenance provided by the Street Maintenance Division.

Major rehabilitation and reconstruction are activities that would not be considered “pavement preservation” strategies. A major rehabilitation differs from a minor rehabilitation activity based on the need for more costly structural enhancements such as full-depth pavement removal and replacement. Reconstruction would be an even greater expense due to the need for removal and replacement of the entire existing pavement structure, which would typically occur when a pavement has failed beyond the effective application of major rehabilitation maintenance work. (An example of street reconstruction would be the segment of Kasold Drive, south of Bob Billings Parkway, which is scheduled as a project for 2006.) Ultimately, correctly applied and timely preventative maintenance activities can sustain and improve the PCI of our city streets to a higher level for a relatively lower cost.

Approximately 299 miles (1922 pavement segments) of streets were surveyed in Cycle One. Cycle One condition survey data consists of the following pavement types and miles rated of each (See Figure 1): 2.9 miles of Brick (exposed), 116.2 miles of Composite (asphaltic concrete or bituminous material over concrete or brick), 163.4 miles of Flexible (any full-depth asphaltic concrete or bituminous pavement), and 16.7 miles of Rigid (concrete). The miles rated based on street classification are (See Figure 2): 49.8 Arterial miles, 43.8 Collector miles, and 205.6 Residential miles.



The condition of the curb and gutter (both sides), if it exists, along the various pavement segments surveyed have a separate and simplified rating scale designation of Poor, Fair, and Good. The PMS reports, for Cycle One, that 79.5 miles of curb and gutter are in Poor condition, 174.9 miles in Fair condition, 291.2 miles in Good condition, and 52.4 miles of non-existing curb and gutter (See Figure 5). The estimated cost to remove and replace all poor curb and gutter is \$12.5 million.



Using the PMS database, there are 31.5% of the city streets that fall into an unacceptable rating level. This 31.5% of streets represents the “backlog” of pavement segments that need rehabilitation or reconstruction efforts. The other 68.5% of streets are in an acceptable condition that should be treated with cost-effective preventative maintenance. The point at which a pavement segment falls from an acceptable rating to an unacceptable rating is based on the specific need for minor rehabilitation, such as milling and overlay that does not include major patchwork. This rating level designation varies for pavements in consideration of street classification and the need for a higher level of service. So, in general, to follow P3 strategies, we apply our preventative maintenance efforts to the 68.5% of streets in an acceptable condition.

Budget Projections

Deterioration rates have been determined for each of the pavement types based on original construction dates, overlay work history, and the corresponding pavement condition survey date for each pavement segment. Deterioration rates and forecasted cost estimates were used to determine how much milling and overlaying would need to take place to maintain and repair the “acceptable” streets that are projected to fall into the “unacceptable” street category. To meet previously stated goals, it is projected that approximately \$6 million is needed in 2006, \$6.4 million is needed in 2007, and \$4.9 million is needed in 2008 for milling and overlaying. The projected three-year figures include costs associated with the removal and replacement of “poor” curb and gutter in conjunction with the milling and overlaying activities on the pavement segments. This information is provided as a follow up of previous cost projections made per the June 20, 2005 memorandum (attached) on “Maintenance Funding”. *Please note that this most recent cost analysis for 2006, 2007, and 2008 does not address the remaining (approximately \$9.5 million) amount of poor curb and gutter previously discussed above, it does not include any other preventative maintenance work needed (crack sealing, micro-surfacing), and does not include any of the “backlog” streets.*

Next Steps

In January, 2006, the list of streets to repair in the 2006 Contract Maintenance Program will be provided. \$500,000 of the budgeted \$4 million in funds for 2006 will be dedicated to crack sealing efforts and specifically targeting those streets that would benefit the most from this type of preventative maintenance. The remaining \$3.5 million will be utilized for the milling and overlaying of streets along with the replacement of poor curb and gutter on those streets. Recommendations on selected streets for the 2007 and 2008 maintenance lists will follow in February, 2006. Additionally, staff will begin the survey (Cycle Two) and analysis of City streets as soon as weather permits in 2006.

Summary

This memo highlights the data that has been gathered as part of the PMS Cycle One analysis. To follow our pavement preservation goals and strategies, further detailed analysis of this data will be utilized to assist in determining the right maintenance treatment, at the right time, on the right pavement segment. As more survey cycles are performed through the future years, the PMS will be able to provide increasingly more accurate deterioration rates for forecasting pavement conditions through performance modeling and will also improve our abilities to evaluate maintenance practices and their effectiveness.

Memorandum

City of Lawrence

Engineering

TO: Chuck Soules

FROM: Terese Gorman

CC: Steve Lashley

Date: June 20, 2005

RE: Maintenance Funding

The City Engineer, Assistant City Engineer, Engineering Aide, and GIS Analyst studied all the data currently available in the Pavement Management Database. At the current time, 75% of the city streets have been surveyed and rated.

We analyzed the database information based on the street classification (arterial, collector, residential) and looked at the deterioration rates on these streets. We determined that the average deterioration rate for arterials was 9 points per year, on collector streets it is 7 points per year, and on residential streets it is 5 points per year. From the database information and from our field observations, it had previously been determined that when an arterial reaches a PCI of 65 it should be overlaid, a collector after reaching 60, and a residential after reaching 55.

In order to predict our required maintenance costs for 2006, we looked at all the arterials with a PCI between 65-74, collectors with a PCI between 60-67, and residential streets with a PCI between 55-60. These are the streets that would need to be milled and overlaid in 2006. Arterial streets that met this criteria had an estimated cost of \$1.5 million to mill and overlay. These arterial streets did NOT include any of the state highways. On the arterial streets that were selected, we determined the linear feet of curb and gutter in poor condition and the estimated cost to repair this was \$500,000. For collector streets currently within the PCI range of 60-67, the estimated cost to mill and overlay these streets next year is \$900,000, and to repair the curb and gutter in poor condition on these collector streets is \$225,000. For residential streets currently within the PCI range of 55-60, the estimated cost to mill and overlay these streets is \$1.4 million, and to repair the curb and gutter is \$650,000.

So for 2006, the total estimated dollars needed to maintain 75% of our streets is \$5,175,000. Increasing it by 25% for the portion of the city streets not yet rated, the total amount needed in 2006 to maintain our streets is \$6,468,750.

Using the same analysis to predict our required maintenance costs for 2007, we included the arterials with a PCI between 74-83, collectors with a PCI between 67-74, and residential with a PCI between 60-65. For arterials, the estimated cost to mill and overlay is \$2,700,000 and repair poor curb and gutter is \$500,000. For collectors, the estimated cost to mill and overlay is \$700,000 and repair poor curb and gutter is \$200,000. For residential, the estimated cost to mill and overlay is \$1.9 million and to repair poor curb and gutter is \$350,000.

So for 2007, the total estimated dollars needed to maintain 75% of our streets is \$6,350,000. Increasing it by 25% for the portion of the city streets not yet rated, the total amount needed is 2007 is maintain our streets is \$7,937,500.

Terese A. Gorman, P.E.
City Engineer

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