



Legislation Details (With Text)

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Title: Pavement Condition Survey Report

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Attachments: 1. City of Fayetteville Pavement Management Report 2022, 2. Pavement Preservation Presentation 2022.10.pdf

Date	Ver.	Action By	Action	Result
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TO: Mayor and Members of City Council
THRU: Adam Lindsay, Assistant City Manager
FROM: Sheila Thomas-Ambat, Public Services Director
Byron Reeves, Assistant Public Services Director

DATE: October 3, 2022

RE: Pavement Condition Survey Report

COUNCIL DISTRICT(S):
All

Relationship To Strategic Plan:

Goal I: Safe and Secure Community
Goal II: High Quality Built Environment

Executive Summary:

The City has recently completed a comprehensive pavement condition assessment and pavement management analysis on the City’s roadway network. The objectives of this study were to perform a network-level condition survey of City maintained streets, provide the City with an up-to-date PAVER pavement management system, estimate the rate of deterioration of the City’s pavement and estimate the future Maintenance and Rehabilitation requirements for the City’s pavement infrastructure.

In addition, several budgeting scenarios, to include a potential influx of funding from a General Obligation Bond, were run to forecast the future network average Pavement Condition Index (PCI).

The results of this Pavement Condition Survey outlines the methodology, prioritization, and recommendations for the City's Pavement Preservation Program moving forward.

Background:

When looking at the City's street network, an estimated \$560M financial asset, it is an integral part of everyday life, that can have a significant impact on many aspects of municipal activities. The City's street network totals approximately 756 centerline miles. This is a total of 63% of all of the streets within the city limits.

Prior to this current effort, the most recent pavement condition survey conducted by the City was completed in 2016. In this survey, data was collected only through cameras (no automated laser crack detection was utilized). The data was assessed by checking photographs and windshield observations. In 2016 the determined/converted PCI of the City's network was an 81.

For the current survey, an automated pavement condition survey system fitted with 3D laser crack measurement system (LCMS) was deployed for distress detection. 4K HD digital cameras were used to capture surface pictures for forward, side, rear and right of way views. All distresses including patches/potholes, settlements, alligator and edge cracks were assessed in accordance with ASTM D6433. This methodology is used to determine the PCI for each segment of the road. PCI scores range from 0, indicating a completely failed pavement, to 100, indicating a pavement in excellent condition.

PCI Ranges and Assessments are as follows:

Condition Assessment	PCI Range
Good	85-100
Satisfactory	70-85
Fair	55-70
Poor	40-55
Very Poor	25-40
Serious	10-25
Failed	0-10

The current PCI for the City pavement network is 72, falling in the lower range of Satisfactory. Individual street PCI ratings can be found in the attached *City of Fayetteville Pavement Management Report 2022*.

In addition to the PCI data for each street, the City is now also implementing PAVER as its new pavement management system. Developed by the US Army Corps of Engineers, PAVER is the most widely used pavement management system in the world. It is state of the art technology in pavement management, using PCI criteria as ASTM standard. It is promoted by the American Public Works Association (APWA) and supported by the Department of Defense, US Air Force, US Army, US Navy, Federal Aviation Administration, and Federal Highway Administration.

Issues/Analysis:

City's PCI:

City streets can be broken into four different functional classes; principal (1%), arterial (1%), collector (2%), and residential (96%). Based on functional class, principal streets had a PCI of 69, arterial had a PCI of 71, collector had a PCI of 73, and residential had a PCI of 72. Overall, the City street network has a PCI value of 72.

When comparing to PCI values from 2012 (82) and 2016 (81), the deterioration of the entire street network is accelerating. This is contributed to the City's prior practice of solely utilizing traditional resurfacing as the only option for pavement preservation and only recently utilizing preventative treatments (in FY22) such as slurry seal and cape seal. Additionally, increased maintenance costs have reduced the miles of streets that have received treatments while funding outside of the City's Powell Bill allotment have proven to be insufficient to sustain and improve the City's overall pavement condition.

Pavement starts deteriorating rapidly once it hits a specific threshold (Critical PCI). A nominal investment in cheaper surface treatments at 40% lifespan is much more effective than deferring maintenance until heavier overlays or possibly reconstruction is required just a few years later. Roadways that are repaired while in good condition will have an extended lifetime and will cost less overall than those left to deteriorate to a poor condition.

Pavement preservation is the proactive maintenance of asphalt by applying proper treatment at the right time. Preventative maintenance costs are far less than the ultimate repair costs. By applying cost-effective preservation treatments to your asphalt, you can extend the life of your road and save valuable budget dollars.

Funding Scenarios and Budget Constraints:

The Pavement Condition report looked at several different budget scenarios to project the PCI of the City's network when applied to a five-year cycle with various funding amounts.

Annual Condition for Various Budget Levels Table (70/30 Resurfacing/Slurry):

Scenario Description	Annual Budget (Yearly)	5 Year Total Spending (Yearly)	Remaining B/L (Yearly)	Total Cost (Spending +B/L) (Yearly)	5 th Year PCI
Backlog Elimination	\$33.5 M	\$167.5 M	\$0	\$167.5 M	86.1
Unlimited Budget	\$29.6 M	\$148 M	\$0	\$148.06	85.8
Maintain PCI	\$10.1 M	\$50.8 M	\$148.53 M	\$199.4 M	70.6
\$6.5M/Year	\$6.5 M	\$32.5	\$164.12	\$196.6 M	68.9
\$5.5M/Year	\$5.5 M	\$27.5 M	\$168.8 M	\$196.3	68.1
\$6M/Year	\$6 M	\$30 M	\$166.26 M	\$196.3	68.5
\$4.7M/Year (70/30 Split)	\$4.7 M	\$23.5 M	\$172.166 M	\$195.6	67.5
\$4.7M/Year (Resurfacing)	\$4.7 M	\$23.5 M	\$171.115 M	\$195.5	65

From the table above, to eliminate the City's current backlog, a budget scenario was run to determine the cost associated with reducing the backlog to \$0. This cost would be approximately \$33.5M per year and will result in a PCI of 86.

To maintain the City's current PCI would cost approximately \$10.2M per year and will result in a PCI of 71.

To operate under the City's Powell Bill allotment of \$4.7M per year would will result in a network average PCI score of 68 and a backlog of \$172M.

For comparison, if the City elected to 'Do Nothing', after 5 years, this scenario results in a network average PCI drop from a 72 to a 64 and an increase in backlog to nearly \$192M.

As apparent from the funding scenarios, utilizing the City's Powell Bill as the only funding source for pavement preservation will result in a continual decline of the City's overall network. In addition to the Powell Bill, funding in excess of \$5.5M is needed on an annual basis just to maintain the current network condition.

Current condition is such that approximately 318 miles (43%) are recommended for traditional resurfacing, 280 miles (37%) are recommended for preventive maintenance, and 151 miles (20%) are satisfactory to good and require no essential maintenance at this time.

If the City were to elect to neglect the 280 miles in need of preventive maintenance and focused solely on resurfacing, in a five-year span, only 75 miles would be resurfaced. This would result in the condition of the 280 miles worsening, adding more miles to the 'Poor' category needing expensive maintenance and contributing to a growing backlog. With this in mind, staff continues to recommend a funding scenario of devoting 70% of the Powell Bill funds received to resurfacing and 30% of funds to preventative surface treatments.

Street Selection:

PAVER utilizes an internal algorithm to develop optimized treatment plan based on the following criteria:

- Critical PCI;
- Street Classification (traffic volume);
- Annual Budget;
- Time Period;
- Treatment Type and Cost.

The software outputs street recommendations optimizing the best usage of funds to:

- Obtain the highest PCI for the City's network;
- Optimally assign maintenance strategies;
- Scatter maintenance actions throughout the City;
- Allow for long-term planning of both preventive and traditional resurfacing actions.

Additional, subjective criteria are also applied. These result from staff deferring identified streets if they are scheduled for a large capital improvement project (i.e. stormwater improvements), located in a future annexation area, or identified by Fayetteville PWC as needing major utility upgrades (i.e. water & sewer improvements).

Potential Infrastructure General Obligation Bond:

With respect to the general obligation bond referendum in November, approximately \$14.7M of the \$25M Infrastructure GO Bond has been identified to be utilized for street improvements. Staff's recommendation, should the bond pass, would be to utilize this funding for traditional resurfacing of City streets. Realistically, the funding could be expended in a period of three years, adding approximately \$4.9M per year (for 3 years) of additional budget on resurfacing projects. Utilizing the funding from the potential bond, staff estimates the Overall PCI of the City's network after a five-year period to be a 70. Contrast that to the projected PCI of 67.5 achieved by utilizing solely Powell Bill funding.

Budget Impact:

There is no budget impact at this time as this item was to inform Council on the results of the Pavement Conditions Survey.

However, unless additional funding (outside of Powell Bill) is provided on an annual basis, the overall street condition for the City will continue to deteriorate.

Options:

There is no Council action needed as this item was to inform Council on the results of the Pavement Conditions Survey.

Recommended Action:

There is no Council action needed as this item was to inform Council on the results of the Pavement Conditions Survey.

Attachments:

City of Fayetteville Pavement Management Report 2022