Memorandum

City of Lawrence

Utilities Department

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| TO: | David L. Corliss – City Manager  Diane Stoddard – Assistant City Manager  Casey Toomay – Assistant City Manager |
| CC: | Dave Wagner – Director of Utilities  Mike Lawless – Deputy Director of Utilities  Beth Krishtalka – Assistant to the Director |
| FROM: | Philip Ciesielski – Assistant Director of Utilities |
| DATE: | May 27, 2015 |
| RE: | 2010 – 2015 Watermain Rehabilitation Program Summary |

In February 2010 Department Staff presented the City Manager an analysis of the future funding requirements for the ongoing replacement of water distribution system watermains based on expected service lives. At the time the system was made up of 354 miles of watermain ranging in diameter from 4” to 12”; pipe materials of cast iron, ductile iron, pvc and transite; and installation years from 1886 to 2009. The pipes were grouped into the following material and installation eras, with resulting life spans based on industry accepted ranges.

1886 – 1976 cast iron and transite – 50 year life span

1977 – 2009 ductile iron – 75 year life span

1977 – 2009 pvc – 100 year life span

Based on the 2010 watermain inventory a backlog of 44.7 miles of existing watermain had met, or exceeded, its expected 50 year life span at an estimated replacement cost of $19.3 million.

The 2010 analysis, and the updated information presented below, are meant to provide an overall look at the potential funding requirements for the replacement of aging watermains. Actual replacement projects are selected on an annual basis using an analysis that takes into account the age, diameter/criticality, break history, pipe material, soil corrosion potential, proximity to critical/large users, and financial breakeven analysis of each watermain in the system.

Since 2010 a total of 14.8 miles of watermains have been replaced by a combination of Capital Improvement Projects and projects constructed by Department of Utilities crews. 10.8 miles of the replaced watermains had met, or exceeded, their 50 year life. Between 2010 and 2015 an additional 10.2 miles of watermains have been added to the backlog of watermains which have met, or exceeded, their 50 year life. Based on the 2015 watermain inventory there is a current backlog of 44.2 miles of watermains that have met, or exceeded, their 50 year life at an estimated replacement cost of $37.3 million.

Note that the cost from the 2010 analysis was based on approx. $80/foot using information from the 2003 Water Master Plan, and completed projects. The current analysis is based on an average project of $160/foot based on project data from both the Capital Improvement Projects and the Department constructed projects completed 2010 - 2015. The increase in cost is attributed to inflation, generally higher project costs due to the complexity of the project areas recently completed, the use of horizontal directional drilling instead of typical trenching for construction, and generally higher construction material and labor costs.

The chart below shows the anticipated expenditures for the replacement of watermains over the next 10 years based on the above life span criteria. The annual amounts include the inventory of watermain which reaches its end of life in a given year, plus a distribution over the 10 years of the $37.3 million value of the current backlog of watermains which have exceeded their 50 year life.

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The [attached chart](cc_workplan_05_2016_pipe_renewal_analysis_chart.pdf) shows projected watermain replacement costs based on the 50, 75 and 100 year life spans carried out to full replacement of the water distribution system, along with a level of funding based on the current allocation increased by 4% per year. The gap in projected watermain replacement between 2027 and 2051 is due to the expected jump in life span from 50 to 75 years for pipe installed in the late 1970’s. This era will allow for a period of ‘catching up’ for those near term years that are underfunded. In addition, the anticipated life spans are generally accepted for large cohorts of watermains. However, individual watermains will reach the end of their life at varying times due to their surroundings, installation practices and damage by third parties all but ensuring the need for a continuous program of replacement.