MEMORANDUM

TO: Mayor and Council

FROM: Sue McCormick, Public Services Area Administrator

DATE: June 28, 2011

SUBJECT: Agenda Item DS-4, Resolution to Approve a Professional Services Agreement with AECOM for Engineering Services for the Water Distribution Level of Service & Reinvestment Study

The purpose of this memo is to supplement the above-mentioned agenda item, so as to provide additional background following the questions raised on May 16, 2011 when this item was first presented to the Council.

City of Ann Arbor Water Main Distribution System

The City's water distribution system includes approximately 500 miles of underground pipe and its associated items, such as fittings, valves and fire hydrants. The vast majority of pipes in the system are either cast or ductile iron, with some concrete pipe and a small amount of plastic pipe.

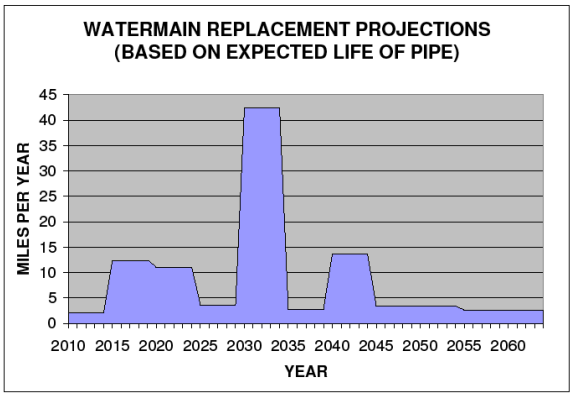
Though the original water mains in the system which were installed in its inception in the 1880's have been replaced, nearly 10% of the current pipe system is eighty to ninety years old dating back to the 1920's. In addition, nearly 40% of the pipe system was installed within a ten-year period forty to fifty years ago. As a result, a large portion of the water distribution system is likely to reach the end of its useful life within a relatively narrow span of time.

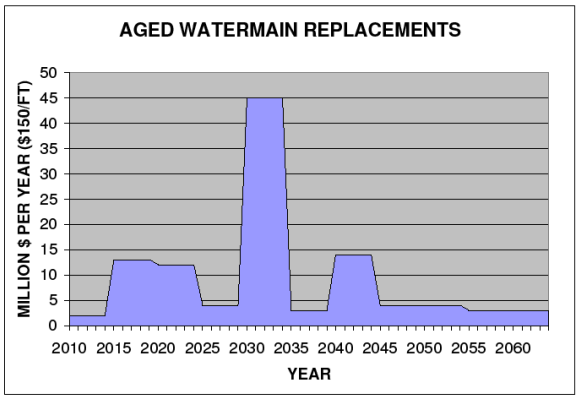
The age of a water main can be used as a long range planning tool to determine when replacement of a grouping of pipes is likely needed. That is, based on date of installation a generalization about expected service life and thus replacement needs can be made. This method does not allow for determining when a specific water main will need to be replaced, but it does allow for the long-term forecasting of when groupings of water mains of similar age will likely require replacement. Included below is a set of graphs that show specific data for the Ann Arbor water distribution system's longer range replacement needs forecast.

The following graphs are based on the following assumptions:

INSTALL DECADE	LIFE EXPECTANCY
1800's - 1910	120 YEARS
1920 -1940	100 YEARS
1950 - PRESENT	75 YEARS

Replacement Cost @ $150/foot of main





These graphs show that starting in approximately 2016 there is likely to be an increasing need to replace water main pipes within the system. This increase in reinvestment is anticipated to be in the range of 10 times the current rate of replacement. The actual need will be identified as the mains age.

As with most other utilities and municipal agencies, the issue of how to position ourselves to strategically and sustainably replace our aging infrastructure systems, in this case Ann Arbor's water distribution system, is upon us.

Water Main Replacement Background

Although the age of the water distribution system is a key attribute used in planning and evaluating the system, age is not the sole factor determining when to replace a portion of the system. In addition, the decision to replace a water main is not primarily an economic decision, as the costs to perform repairs or more involved system operations, such as water main flushing, on a particular section of water main is usually less costly than it is to fully replace the water main.

Water main piping is replaced when it no longer meets desired service levels (e.g., altered color, taste, odor or flow delivery is reduced). Additionally, water mains are replaced when rate of recurrence of water main breaks becomes problematic resulting in frequent disruption of service or disruption to surface features such as roadways.

What is a "Level of Service" Study?

The purpose of this study is to determine the appropriate sustainable level of service (LOS) for the water distribution system, which will help identify critical infrastructure and establish priority/timing for replacement of assets through the City's capital improvement program planning. This will allow the City to prioritize limited funds to focus on assets with the greatest need as determined by the public served by the system.

Specific deliverables from this study include:

- Establishment and definition of the level of service the City's water distribution system will provide to its customers
- Benchmarking of the City's system at a national level and to comparable cities
- Determination of the level of reinvestment through replacement and/or rehabilitation of the system over the next 20 years, including the development of a Capital Asset Prioritization Simulator (CAPS) database
- An assessment of the likelihood of failure of the major concrete pipes in the system

With these deliverables, it is anticipated that the City's water distribution system will gain reduced risk of unexpected costs, reduced probability of sudden and potentially costly water main failures and more efficient use of its capital funds.

The consultant that staff has selected for this work, AECOM, has recently performed similar studies for:

- Region of Peel (Toronto Area)
- Chicago
- New Orleans
- Winnipeg
- US Air Force
- Orange Water and Sewer Authority (OWASA)

OWASA is a Municipal Infrastructure Authority that is similar to City of Ann Arbor, providing service to Carrboro-Chapel Hill in Southern Orange County, NC including the University of North Carolina. OWASA staff used the LOS study and Prioritization Model to establish their annual water main replacement program for inclusion in their budget, which helped optimize annual expenditure on water main replacement/rehabilitation.

cc: Cresson S. Slotten, P.E., Manager, Systems Planning Unit
Jennifer Lawson, Water Quality Manager