

## **Water Infrastructure Replacement Prioritization**

Brian Long, P.E., City of Houston

Derek St. John, P.E., Lockwood, Andrews, & Newnam, Inc.

E-mail: [dstjohn@lan-inc.com](mailto:dstjohn@lan-inc.com)

It is no secret that Houston's infrastructure, like that of many other major metropolitan areas, is aging, and in many instances requires considerable restoration. As Houston has developed over time, roads, waterlines, sanitary and storm sewers have been installed at a frenzied pace to meet the demands of the steadily growing suburban population. Now, 20 plus years later, many of these infrastructure components have deteriorated considerably, are operationally and/or structurally questionable, and are subsequently in need of significant rehabilitation or replacement in order to prevent their otherwise inevitable failure.

According to the American Water Works Association (AWWA), in a report released in May 2001, replacing the nation's aging basic water infrastructure will cost an estimated \$250 billion over the next 30 years. AWWA officials believe that although the country's existing water system has been constructed in spurts since the late 1800s, distribution system piping and other water transmission components will reach the end of their useful life at approximately the same time due to changes in materials and construction techniques over the years.

Although the City of Houston recognizes the importance of replacing its aging water infrastructure, it is not economically feasible to replace all of the existing system components simultaneously. This situation presented a complicated challenge for the City, who was effectively tasked with developing a method for infrastructure replacement prioritization that would maximize the benefits of the financial investment, while meeting the needs of its citizens.

For many municipalities, major capital improvement project decisions are politically-motivated and prioritized to benefit those individuals or groups with the loudest voice and/or the deepest pockets. This "band-aid" approach is reactive as opposed to proactive, and does little to solve the overall problem of remediating aging local infrastructure. Rather than following a politically-driven repair and replacement schedule, the City of Houston has opted to implement a methodology, which gives precedence to waterlines based on an analysis of available historical and scientific data, objective criteria, and sound engineering principles. This type of prioritization program will eventually save the City millions of dollars in restoration costs and will protect its citizens and businesses from the crippling effects of broken waterlines.

The City of Houston's Water Infrastructure Replacement Prioritization (WIRP) program takes advantage of its investment in Geographic Information Systems (GIS) and Enterprise Infrastructure Asset Management Systems, to provide the data and software necessary to support the systematic prioritization of small diameter waterline replacement

projects within the City's existing system. Specifically, the WIRP selection process is based on 18 waterline and historical water repair categories, developed by Lockwood, Andrews, & Newnam, Inc., in conjunction with City of Houston staff members.

The various evaluation categories are weighted to place emphasis on the more influential criteria, and are then entered into a system developed to prioritize the highest need for replacement. Ultimately, simple visual exhibits of the prioritized projects are produced through the combined use of GIS and the Asset Management System, and provided to local decision-makers for consideration. The implementation of the WIRP-based capital improvements selection process has allowed the City of Houston to make dramatic strides in the efficient repair and replacement of their aging water infrastructure in recent years, and will continue to benefit them in the future.