



Case Study: Wyoming, Michigan, Uses KANEW for Asset Management - 02/08/2006

The Issue

In the early 1990s, the City of Wyoming, Michigan, faced an enviable situation: it had a young distribution system, 95 percent of it built since 1960 (and 30 percent since 1980), and leakage and break problems were limited. Wyoming, however, did not have a renewal/replacement plan in place and the city's public works director sought to maintain consistent rates and deliver current levels of customer service into the future.

The city, adjacent to Grand Rapids, obtains its water from Lake Michigan to the west. Water treatment takes place near the lake at a facility co-owned by Wyoming and when it reaches the city limits the distribution system is the city's sole responsibility. Wyoming has a population of about 73,000 and it maintains 250 miles of water mains, from six to 42 inches in diameter made variously of ductile iron, pre-stressed concrete cylinder, and two types of cast iron. In 1966 the system delivered a peak flow of 32 million gallons per day; today, peak flow is up to 90 mgd.

The Solution

Wyoming's public works director attended an asset management (AM) conference in the mid-1990s where he heard first-hand of AM practices in Britain, Canada, and Australia. In 2002, Wyoming hired consultant CH2M Hill to apply their Infrastructure Capital Asset Management (ICAM) program to the city's utilities, including the drinking water distribution system, sewers, and streets. The consultant also had experience applying the Water Research Foundation's KANEW software.

Specifically, CH2M Hill uses ICAM to determine future capital rehabilitation, renewal, and replacement needs, quantify the condition of components and risks associated with condition deficiencies, and support short- and long-term budget decisions. ICAM takes an inventory of pipes and their age and condition and develops a hierarchy, given the pipe size, material, age, and condition assessment; then it projects optimum renewal priorities and timing over 10 to 50 years. KANEW is applied to predict replacement needs for classes of pipe, grouped by material. KANEW provides statistically likely projections, such as "x" percent of a specific group of pipes is likely to fail after "x" number of years.

KANEW software was developed in the late 1990s for the Foundation report, *Quantifying Future Rehabilitation and Replacement Needs of Water Mains* (order # 265). (This program requires Microsoft Access 97 to run.)

The city sought a long-term (greater than 50-year) plan for pipe renewal or replacement, based on the likelihood of failure. Wyoming's system is composed of four different pipe materials: ductile iron, pre-stressed concrete cylinder, and two types of cast iron (pre-WWII cast iron and post-WWII cast iron). Most of the system is ductile iron; most breaks occur in the system's small percentage of cast iron pipes. The very limited data the city had on leaks and

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breaks did not yield much support for the renewal and replacement models. Instead, the participants used the system's installation dates and pipe materials as their baseline.

The resulting profile of the system showed that renewal/replacement needs will be level at an approximate cost of \$500,000 per annum for five to eight years, then average about \$1.5 million per annum for 50 years as replacement needs become greater. The project also included the concept of "level of service," so as the utility renews its distribution system it will do so while meeting its customers' established expectations on service.

From a budget and rate perspective, the utility is in a relatively strong position. It is currently selling revenue bonds to fund the pipe replacement work.

Specifically, the city's largest mains are projected to perform well for another 40 to 50 years, due to their material (concrete). The small percentage of pre-WWII cast iron mains are expected to be replaced within the next 10 years. Construction methods and location of pipes did not appear to be relevant to these projections.

The coming decade of stable, affordable investment gives Wyoming the time to develop funding alternatives for its increased future needs, while educating stakeholders on its needs and costs. Meanwhile, an ongoing effort to improve documentation of leaks and breaks should provide data to fine tune these projections and to create metrics to determine the ultimate success of this effort. One expected metric is that a long-term investment of capital should produce a corresponding stability or even decrease in the separate operations-and-maintenance budget.

Lessons Learned

The biggest lesson learned, according to Wyoming's public works director, is that the lack of historical leak and break data can limit efforts to produce an accurate renewal and replacement capital plan. Maintenance crews need encouragement to consistently collect solid data, as their primary responsibility is restoring service. In order to overcome a lack of leak and break data, Wyoming 's water utility made many assumptions regarding the design life of the water distribution system.

According to the consultant, one lesson learned in using the KANEW software is that a utility needs an accurate inventory of its distribution system pipes, which is difficult if there are gaps in geographic information system (GIS) data. Knowing a pipe's material, size, and location isn't helpful unless the database also includes the year of installation. One old lesson on GIS, revisited: quality of input governs quality of output.

Utility Profile

Utility name: City of Wyoming, a municipally owned utility

Service area: serves a population of 73,000 (~ 20,000 customers) over 26 square miles

Size of utility in mgd: average = 35 mgd, peak = 90 mgd

Source of water: Lake Michigan

Utility contact: Bill Dooley, public works director, DooleyB@ci.wyoming.mi.us