STONEMARK
CONSTRUCTION MANAGEMENT

Building Confidence
Los Angeles
Santa Barbara
Ventura

Pipes are *Not* a Lifetime Component

A "lifetime building component" may be a correct reserve study term but is actually a misnomer, in that nothing lasts forever. This is particularly true of piping systems, which are exposed to friction, corrosion and wear. If properly installed, galvanized steel pipes have a life expectancy of 30-50 years, copper 40-75 years, cast iron 50 to 75 years. But these are just generalities; it is not unusual to see pipes failing at 30- 40 years or even earlier. Even with a financial forecast horizon of 30 years, it is rare for building owners to plan for pipe replacement. Of course, the best time to perform pipe replacement is just before they fail, avoiding water damage to buildings and personal property, resultant mold, and loss of use. But how do you determine the magic moment just prior to pipe failure? When do you stop responding to service-calls for piecemeal repairs? How do you address and plan for major repairs? In order to answer these questions, let's first look at why pipes fail.

Causation for Pipe Failure. Many factors affect the life expectancy of piping:

- **Manufacturing defects.** Precise manufacture of pipes is critical to life expectancy. For example, residual stress from improper manufacturing of cast iron pipes increases the chance of later cracking, and sand cast into copper piping can create pinhole leaks much later on. These conditions create the potential to make every pipe in a building a future time bomb.
- **Design**. Undersized drainage piping will clog, corrode and fail more quickly than properly sized piping. Improperly designed systems may increase the friction on the interior of pipes and accelerate corrosion. Corrosion increases with use and velocity: recirculated hot water piping corrodes more quickly than unrecirculated cold water piping.
- **Improper installation** conditions, including contact with concrete or dissimilar metals, lack of pipe support, general poor workmanship and improper or crooked pipe joints all stress piping.
- **Location.** Drainage piping on ground floors suffers from the combined gravitational effects of greater use and corrosion, and sometimes unintended weight from unsupported pipes from floors above. Accessibility of cleanout valves can greatly aid preventive maintenance or complicate repair and replacement.
- **Improper use**, especially in residential buildings, is a significant factor in pipe failure. Garbage disposals introduce grease and food residues which adhere to the interior walls of pipes causing stoppages and backups, and often premature corrosion.
- **Corrosion**. All metals corrode in contact with water, air and chemicals, some faster than others. Corrosion can be internal such as through contact with water and caustic cleaning chemicals, and external such as from salt air with proximity to the ocean. Below-ground piping often ages more rapidly than above-ground because of contact with acidic or alkaline soils.
- **Patterns of occupancy** affect pipe longevity. In full-time occupancy, the pipes maintain a consistent moist environment, whereas in vacation or second homes which are used sporadically, pipes can dry out and become more prone to cracking. Piping in high-population buildings typically sees an accumulation of more corrosion and buildup in the system.

- **Lack of maintenance,** such as the lack of routine hydrojetting of main sewer lines, contributes to buildup and failure.
- **High rise considerations**. A mid- or high-rise building adds another level of complexity with sophisticated mechanical systems, utilizing pumps to distribute flow throughout the buildings through large diameter steel piping. Each part of the system is prone to failure and has the potential for catastrophic water damage.
- **Other factors** include tree roots, stress from earthquakes or other building movement, shrinking of wood studs, to name a few.

With the cumulative effects of all of these issues, pipe systems face a losing battle to remain leak-free over time. We frequently see a combination of many factors plaguing aging buildings.

Telltale Maintenance Patterns. A good way to determine whether the pipes in your building are nearing their life expectancy is to watch for emerging maintenance patterns. There will be increasingly more pinhole leaks, clogs and backups, more complaints, and more service calls. Particularly if you are managing resultant mold damage due to water damage from piping, we suggest you take a step back and look at the larger picture. It may be time to evaluate the system as a whole.

Do you need pipe replacement? To answer this question, a construction professional needs to evaluate all causes for pipe failure in your building. Do not assume that there is one reason only; we've seen too many instances where the cause of a particular failure is too readily assumed, time and money are spent correcting the problem, only to subsequently experience additional failures from yet other undiagnosed causes. Evaluation methods include videoing and hydrojetting sewer and storm drain lines, physical inspection for installation flaws, destructive testing, pipe sampling and analysis by a metallurgical laboratory which can evaluate wall thickness and integrity and possible residual stress, and prototype repairs to typical units.

Pipe replacement costs vary tremendously due to the accessibility of piping. Typically the costs to expose the piping and restore finishes are greater than the pipe replacement itself. There are many options, and combinations of options, that should be considered in a pipe replacement project that can be made only after a thorough investigation. The repair strategy should be driven by causation to ascertain the best and most cost effective approach.

Alternative technologies. Pipe coating and lining are offered by many companies and manufacturers, with competing technologies, approaches and warranties. The concept of lining or coating is an attractive option because it does not entail the expensive destruction and renovation of finishes within units, particularly in kitchens and bathrooms. Many pipe coating, lining, and trenchless technologies can be effective and come with extended warranties. These processes all need to be carefully considered for their appropriateness to the specific conditions in your building, its population and usage. Not all treatments are appropriate in every situation, and it bears mentioning that some are new enough to not have a reliable track record to determine true longevity.

Without a thorough evaluation and cost-benefit analysis, it will not be clear which approach is best for each situation. Often, an amalgamation of multiple techniques is the best or most effective approach.

Challenges from hazardous materials are often encountered in re-piping projects. If your building was constructed prior to 1978 or even after, it is likely that large diameter pipes are wrapped with asbestos insulation, and other building materials requiring demolition to access piping may be asbestos containing, such as drywall tape compound and plaster. It is very wise in the planning phase prior to establishing the budget, to incorporate a pre-demolition survey so as to determine the prevalence of hazardous materials. If there has been any type of pipe failure, with resultant water damage, anticipate mold. It is not unusual for mold remediation to add a whopping 25% or more to the total cost of a project.

Risk Management. Any project that includes access into units and damage to finishes carries risk. In a project of substantial size, careful management of contract negotiations can protect your liability and control costs. The never ending insurance crisis facing contractors limits the number of bidders, reduces their insurance companies' liability for future failures, and also tends to increase costs.

These myriad dynamics associated with re-piping create a tremendous challenge on controlling costs for a project. Due to the complexities and variables of problems of access, hazardous materials, and varying causes of pipe failure, it is essential that your re-piping project be professionally managed through careful investigation, planning and design. While these initial steps cost money, proper investigation and planning is a worthwhile investment that pays dividends in the long run.

Bart Mendel is President of Stonemark Construction Management, a full-service planning and construction management firm that specializes in management of capital and tenant improvements, construction defect investigation and repairs, water infiltration and problem building analysis for commercial and multi-family residential projects.

This and other educational articles are available on our website at www.stonemarkcm.com.