PACP™ AND REMAINING USEFUL LIFE (RUL) PART 3:

THE TRENCHLESS REHABILITATION DESIGN VERSUS RUL CONUNDRUM

By NASSCO TAC Chair Christopher Garrett, P.E., Brown and Caldwell

Continuing our discussion on condition assessment and Remaining Useful Life (RUL) of gravity pipe assets, we conclude the three-part series with an examination of rehabilitation methods and anticipated service life.

Historically, aging infrastructure professionals accepted a typical pipeline asset service life to be about 50 years. I accepted this as fact and did not question the basis of the estimation or its validity. Logic was that as the asset approached that magic age, the option was to either replace or rehabilitate. Lynn Osborn, P.E., NASSCO's former Technical Director, a current member of NASSCO's Technical Advisory Council (TAC) and UESI President, relates a similar experience with cured-in-place pipe (CIPP):

> "The initial declaration of a design life for gravity sewer CIPP came out of marketing, not engineering. In the mid-1980s, customers began asking how long CIPP would last; what is its design life? There were several responses when customers were asked how long they would like for CIPP to last, but one response seemed to take hold: a common planning cycle for governmental units is 50 years, so 50 years would be good. Thus, an expected design life of 50 years was accepted, and this value began to appear in conference papers, product advertisements and trade show stands."

This sober view of the genesis of RUL for rehabilitation has been validated with standards development, such as ASTM F1216 and F2019 for CIPP, supported by repeatable testing results that have produced a reliable design methodology. These design standards include groundwater influence, live load, soil surcharge and soil movement / migration / strength as design parameters of concern, which reflect their influence on pipe deterioration.

Christopher Garrett, P.E., Brown and Caldwell

Christopher Garratt is a Professional Engineer with an emphasis on Aging and Buried Infrastructure projects for gravity and pressure mains by promoting advanced condition assessment technologies; risk-based prioritization and contingency planning; rehabilitation design and construction administration. He is also a trainer for the NASSCO PACP/MACP/LACP program, having trained and certified over 1,500 students since 2002.

Keeping in mind that soil migration and loss of trench support of pipe are the main drivers for external pipe failure and degradation of RUL, having a rehabilitation solution that addresses these conditions as a part of its design is necessary to assure a long-lasting solution. This can be seen across the spectrum of rehabilitation options, based on host pipe condition versus the long-term need for both gravity (partially versus fully deteriorated design conditions) and pressure pipe (Grade I, II, II or IV per the AWWA M28 standard). As our understanding of deterioration mechanisms deepens, our design methodology will also evolve as reflected in refinements to the design standards (see ASTM F2019-20 and the recommendation for use of the Modified-Glock buckling analysis).

Our challenge with design standards, no matter how reliable and well understood, is resolving the confusion between a robust design life versus actual RUL. The confusion lies in the assumption that a 50-year design for wall thickness, liner thickness or coating thickness based on an assumed reduction in materials strength of the rehabilitation solution is an implied guarantee about the RUL of the product. Unless stated specifically by the installer or supplier, most warranties are for one year, and the design is based on performance assumptions that may or may not reflect actual installation conditions. Additionally, the first CIPP was installed in the early 1970s, so we are just now able to validate a 50-year service life of installed trenchless rehabilitation solutions.

"The initial declaration of a design life for gravity sewer CIPP came out of marketing, not engineering."

So how does PACP™ address trenchless rehabilitation and where are we headed with assessing RUL of rehabilitation solutions? PACP has Lining Feature (LF) group observations that provide visual assessment of mostly CIPP solutions. As Grade 3 structural observations, they imply conditions that could compromise the effectiveness of the new pipe, but do not offer an assessment of reduced RUL. Though insightful, this visual assessment should be coupled with testing of pipe coupons and inspection documentation of the installation to assess its long-term effectiveness. Bottom line is that RUL for rehabilitated assets is an assumption based on confidence in the design standard, qualified manufacturers and installers, and a commitment to quality assurance and quality control measures to assure that the installation meets the industry standard of care.

NASSCO will be presenting a webinar on RUL in the coming months. Please look for forthcoming information and join us as we further explore this topic by visiting NASSCO.org.

TECH TIPS IS A BI-MONTHLY ARTICLE ON TRENDS, BEST PRACTICES AND INDUSTRY ADVICE FROM NASSCO'S TRENCHLESS TECHNOLOGY MEMBERSHIP PROFESSIONALS

Follow us on social media or visit ***NASSCO.org***

NASSCO