

## USEPA Research on Condition Assessment of Wastewater Collection Systems

Fu-hsiung (Dennis) Lai<sup>1</sup> and Christopher S. Feeney<sup>2</sup>, Katherine D. Martel<sup>3</sup>

<sup>1</sup> U.S. Environmental Protection Agency, ORD, National Risk Management Research Laboratory, Water Supply and Water Resources Division, Urban Watershed Management Branch, Edison, NJ

<sup>2</sup> The Louis Berger Group, Inc., Providence, RI

<sup>3</sup> The Cadmus Group, Inc., Watertown, MA

Municipal sanitary sewer collection systems play a critical role in protecting public health in our municipalities. They are designed to convey wastewater from their sources to a wastewater treatment plant (WWTP). Collection systems consist of house service laterals, sewers, pumping stations, force mains, manholes, and all other facilities used to collect wastewater from individual residential, industrial, and commercial sources. The performance of these systems can significantly influence the performance of the WWTP.

Much of the nation's sanitary sewer infrastructure has been installed over a long time period, with some sewers being over 100 years old. As the integrity of a sewer system starts to deteriorate because of a variety of factors such as old age, traffic load and overburden, poor design, and lack of maintenance, the system's ability to transport wastewater to treatment facilities is impaired. Sewer stoppages and collapses were reported to increase at a rate of approximately 3% per year nationwide. About 50,000 breaks and 500,000 stoppages were estimated to occur annually in the nation. Deterioration of jointing materials, force main pressure surges, disturbance by construction or direct tapping, and seismic activity also contribute to collection line failures. These problems result in approximately 75% of the nation's piping systems functioning at 50% of capacity or less, and consequently contributing to sanitary sewer overflows (SSOs). It is estimated that there are about 40,000 SSO events per year nationwide, raising serious health and environmental concerns.

To assist municipalities in assessing the conditions of their deteriorating wastewater collections systems, the U.S. Environmental Protection Agency (USEPA) commenced a research project in 2008 to review and evaluate existing and emerging inspection and assessment technologies, and select and prepare them for controlled-condition testing and field demonstration. Condition assessment encompasses the collection of data and information through direct inspection, observation and investigation and in-direct monitoring and reporting, and the analysis of the data and information to make a determination of the structural, operational and performance status of capital infrastructure assets. It also includes the practice of failure analysis which seeks to determine the causes of infrastructure failures in order to prevent future failures.

The project objectives include: (1) identification and characterization of the state of the condition assessment technology; (2) preparation of protocols and site selection criteria and selection of innovative technologies for controlled-condition testing and field demonstration.; (3) identification and evaluation of innovative closed circuit television (CCTV) technologies currently used by more advanced wastewater utilities for transfer to utilities at large; and (4) research and evaluation of performance and cost of innovative and advanced assessment technologies including wireless and remote sensing approaches developed in other industries as to their applicability for assessing the conditions of collection sewers. To complete this research, the EPA has hired The Cadmus Group in association with The Louis Berger Group Inc., ADS Environmental Services, and Red Zone Technology.

While this project is expected to take three years of effort, some essential elements of the project are expected to be completed or being actively pursued at the time of this conference. In addition to provide a project overview, the presentation will also include: (1) findings of a white paper on the status of condition assessment technologies; (2) conclusions from the International Technology Forum; (3) CCTV technologies identified for transfer; and (4) advanced assessment technologies being pursued for field demonstration.