



## Seepage Solutions: Engineering Excellence on the Erie Canal

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The Erie Canal began operating in 1825 after eight years of construction. Today, the New York State Canal Corporation, a subsidiary of the New York Power Authority, is responsible for maintaining, improving, and promoting the Canal system's 524-mile waterway network. In the western region, water levels have been lowered due to concerns over embankment integrity, with seepage as a common issue. After nearly 200 years of continuous operation, the aging infrastructure of the Canal presents significant maintenance challenges.

Embankment failures could have serious consequences for nearby communities and downstream areas, including loss of life, property damage, or harm to essential infrastructure. This presentation will be of particular interest to those dealing with active seepage through an earthen embankments and aging infrastructure requiring rehabilitation.

We will detail an innovative construction method known as one-pass trenching technology, which is revolutionizing the engineering and installation of underground systems. The project aimed to extend the service life of the embankment by over 50 years and allow for a higher normal operating pool. Instrumentation was installed to monitor construction safety and assess post-construction performance.

A 1.3-mile soil bentonite cutoff wall was designed and installed along the Canal embankment. The design was completed in under two months, and the construction was finished in just 40 working days, thanks to the one-pass trenching technology. This method mixes low-permeability bentonite into the existing soil matrix to create a barrier without the need for an open trench excavation, reducing site disturbance, cost, material use, and installation time, plus enormous construction and dam safety benefits.

During construction, QA/QC testing ensured the hydraulic conductivity stayed below the maximum allowable value, and 22 active seeps were monitored. Only one active seep was detected in the first watered-up season after installation, showcasing the project's success. Instrumentation data indicated a significant lowering of the phreatic surface on the downstream (outboard) side of the Canal by up to 14 feet in some locations. Visual observations and data confirmed that the cutoff wall has substantially reduced or eliminated seepage issues at the Royalton embankment section.

The findings from this project will inform future rehabilitation efforts along the Erie Canal, ensuring the waterway's safe operation of infrastructure for generations to come. This presentation will share insights with the audience, providing valuable information for similar embankment rehabilitation projects worldwide.