

## **Hurricane Matthew Aftermath: Mirror Lake Dam Emergency Response, Planning, Design, and Construction**

Maridee Romero-Graves, Schnabel Engineering

Mirror Lake Dam is an earthen embankment dam built in 1959 for recreational purposes. The dam impounds a 2-acre lake in a residential sub-division in Fayetteville, North Carolina. Mirror Lake Drive, a two-lane, asphalt paved road maintained by the City, runs along the crest of the dam. The dam is regulated as a small-size, high-hazard dam by the North Carolina Department of Environmental Quality Dam Safety Program.

On October 8, 2016 Hurricane Matthew floodwaters overtopped the dam resulting in significant erosion of the downstream slope of the embankment, including portions of the road and impacting several utilities located within the embankment. As an emergency response, the lake was drained and Mirror Lake Drive closed as a result of this damage until construction repairs are completed in January 2020.

In August 2017, the City of Fayetteville retained Schnabel Engineering to perform the engineering design and provide construction support to repair the dam and roadway. The planning, design, and construction phases of the project each involved multiple challenges including navigating local, state, and federal requirements to secure repair funding; a tight schedule driven by the need to have Mirror Lake Drive back in service; the management and coordination of various permits, regulators, and other key stakeholders, including the surrounding community; and developing and implementing technically appropriate and cost effective solutions around a myriad of site constraints including flood impacts to residents upstream and downstream of the dam.

This presentation will examine the failure of the Mirror Lake Dam, the process followed for funding to repair the dam to increase spillway capacity, provide dam overtopping protection, implement risk reduction measures, the design and construction challenges, and the incorporation of elements to upgrade the dam to meet current NC Dam Safety criteria. While the presentation will focus on Mirror Lake Dam as the primary case study, the challenges presented are applicable to many dam repair and rehabilitation projects, and the objective is to share the approach and lessons learned from this project to benefit owners, consultants, and regulators on their own projects related to dam incidents, emergency response, public safety, regulatory issues, and funding.