Stephen Jemieson

Willow Creek Dam is a 95-foot-high, zoned-embankment dam in located northwestern Colorado. The dam impounds approximately 27,000 acre-feet of water to form Steamboat Lake. The reservoir is one the most popular recreation facilities that are owned and operated by Colorado Parks and Wildlife (CPW). Steamboat Lake provides significant environmental and economic benefits to the local economy. Unfortunately, CPW's recent portfolio Screening Level Risk Analysis also identified significant potential piping risks in the outlet works and marginal slope stability in the dam's left abutment. These issues resulted in the dam being listed in CPW's "Evil Eleven," one of CPW's dams with the highest risk of failure. This paper will illustrate how collaboration and partnering were used to overcome construction challenges and reduce dam safety risks.

Dam modifications include lining the 6-foot-diameter, reinforced concrete outlet conduit with a new steel liner; installing an upstream guard gate on the outlet works; constructing a filter diaphragm around the outlet conduit; and constructing a left abutment blanket drain and stability berm. Construction challenges include a limited construction season because the dam is located above 8,000 feet in elevation. In addition, CPW determined that the reservoir could not be drained to facilitate the construction because it could take several years to refill the lake, which would have a disastrous effect on the local economy and environment. As a result, significant portions of the work must be completed underwater by divers.

This paper will discuss the collaborative design review process between CPW, the engineering design team and the Colorado Dam Safety Branch. This process resulted in several design refinements to reduce the construction risk, including the need for CPW to pre-purchase key long lead time components such as steel pipe and sluice gates. The paper will also discuss the prequalification process to select CPW's construction contractor and a required Partnering process that helped the owner, contractor, engineering team, and state dam safety office to work together to identify and resolve construction risks.