



Losing Your Grip? Liftoff Testing of 41-year-old Post-tensioned Rock Anchors

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The age of dams in the US is increasing with the average age close to 60 years. The northeast region hosts the highest percentage (71%) of dams over 50 years old. Many of these dams have been retrofitted in the distant past. As a result, the adequacy and longevity of these past repairs is coming into question by both Dam owners and consulting professionals. Delta Reservoir Dam is a 106-foot-high cyclopean concrete gravity dam located in Rome, NY that was originally constructed in 1912 to supply water to the summit section of the Erie Canal. The dam has undergone numerous rehabilitations including a project in 1984 that included installation of post-tensioned anchors (PTAs) extending through the dam 100+ feet to bedrock. Past research on 1980's era PTAs has shown that some anchors as young as 28-years old have lost significant amounts of pretension due to stress relaxation or completely failed due to corrosion (John Day Dam). When the Delta Reservoir Dam was anchored, three of the 93 anchor heads were constructed with access manholes and tensometers to periodically check the tension in the anchor cables. Use of the tensometers was not successful a few years following the anchoring. Ascertaining the performance of the anchors was identified as a follow-up from a potential failure modes analysis (PFMA) performed in 2023. A liftoff procedure to test the anchors was developed and test apparatuses were designed and fabricated, including a custom stressing head and lift chair. The liftoff testing was successfully performed in October of 2025 on the three accessible anchors. Liftoff testing results show that the tested anchors are within the expected range of tension, ranging from 70-74% of ultimate tensile strength. The results show that properly installed anchors are likely to survive more than 40 years, and potentially well beyond that. PTAs with modern corrosion protection systems should have an enduring useful life. The anchor information will be utilized to reassess structural performance of the dam and help better inform risk assessments of the dam in the future through a program to periodically retest the anchors.