ABSTRACT

This thesis presents a technical investigation into the failure of a hydro mechanical component one Radial Gate arms at the Pradhan Path Barrage, Chhattisgarh. The barrage, constructed for irrigation and flood control, experienced a critical gate failure during a high-flow event in the monsoon season. The failure of the radial gate arm resulted in uncontrolled water discharge and structural damage of gate, raising serious questions about the design robustness, material condition, and maintenance protocols. The study adopts a technical engineering approach to examine mechanical, structural, and operational factors contributing to the incident. Field visits, interviews, and official reports form the basis for reconstructing the failure sequence. Preliminary findings suggest that the failure was due to a combination of aging infrastructure, fatigue in trunnion arms, corrosion, and improper hoisting mechanism function during high discharge events. The thesis research aims to provides with the empirical and numerical analysis and successful design of dam gate comparison with failed gate, technical engineering recommendations for maintenance protocols, gate redesign considerations, inspection, and operation of radial gates in similar hydraulic structures and disaster response planning to mitigate future risks in similar infrastructure.

Keywords: Hydro mechanical component radial gate arms; hydrodynamic load; failure mechanism; empirical and numerical analysis.