Project: Evaluation of the Effects of pre-grouting on cutoff wall construction risks; Analysis of drain effectiveness & implications for failure probability for concrete gravity dams.

Client: US Army Corps of Engineers New Orleans District
Client Contact: Danny Thurmond

MSMM Services: Project Management

DESCRIPTION

- **Evaluation of the Effects of pre-grouting on cutoff wall construction risks, USACE New Orleans District.** The U.S. Army Corps of Engineers (USACE) has constructed large cutoff walls to control seepage and reduce internal erosion risks at several major **dams**. Included with this work is the "pre-grouting" of the geologic formations through which the cutoff walls were constructed to avoid slurry loss and other problems. The main objective of this task order project was to investigate the efficiency and effectiveness of pre-grouting in **mitigating construction risks** and to evaluate alternative methods to accomplish the same results. The work effort included the collection of world-wide information on cutoff wall construction for **dams**. It was important to identify when pre-grouting was performed, when it was not, the justification for either case, and the success or lack thereof of the construction. Using USACE cutoff wall project data, the work also included determining where, how, and to what extent the pre-grouting was effective in reducing risks during cutoff wall construction. The work also evaluated **methods for controlling slurry loss and trench caving** (including pre-grouting) and for identifying under what conditions each might be applicable and to what level they might need to be deployed.

- **Analysis of drain effectiveness & implications for failure probability for concrete gravity dams, USACE New Orleans District.** The US Army Corps of Engineers (USACE) has many **large concrete gravity structures associated with dams** and related works. While appropriate for new structures, design criteria may not be appropriate for evaluating existing structures. It is important to evaluate actual **failure probabilities** in a reasonable fashion so that limited resources can be targeted to the structures that pose the largest risk. The goal of the project research was to evaluate the probability of failure for concrete gravity dam structures including the effects of potential cracking and drainage. The work effort incorporated previous research results of uplift in cracked, drained concrete dams into a **stability analysis**, and clarification of the role of water pressure in cracks or rock joints at critical locations in the foundation. The work also extended analyses to examine the propagation of cracking and global stability, using **classical limit equilibrium approaches and modern nonlinear finite element analysis** that accounts for the coupling of pore fluid flow and solid skeleton deformation in the jointed/cracked rock foundation and cracked concrete dam itself.