Geocomp

Technologies to manage risk for infrastructure

Project Brief

Kentucky Lock and Dam

Client:

Tennessee Valley Authority and The U.S. Army Corps of Engineers

Location:

Kentucky

Services Provided:

- Installation of robust monitoring system
- Provided real-time measure of lateral movement

Value Provided:

- Real-time feedback on dam safety

Background & Project Challenges

Kentucky Lock on the Tennessee River is a 600-ft-long navigation structure and is the busiest lock on the river for both material passage and lock utilization. Most commercial shipping vessels must be moved through the lock using a time consuming double-lift procedure resulting in average wait times of over 6 hours.

Construction of a new 1,200-ft-long lock immediately adjacent to the existing lock will significantly reduce or eliminate delays. The total project cost is estimated at over $750M, with completion expected around 2018. Savings in transportation costs will be realized for businesses in 20 states that move goods through the lock. Successful construction necessitates that the existing lock remain open for river traffic at all times.

The construction program involves excavating soil behind the existing lock wall. The excavation effectively removes the lateral earth support against the wall that counters the water pressure inside the lock basin. This will generate new stresses on the lock wall. In addition, the segmental nature of the lock structure (built as a series of large concrete monoliths founded on bedrock) may result in distinct movements of each wall monolith. The individual responses will be influenced by construction sequencing, and the condition of soil and foundation rock along the length of the wall.

The Tennessee Valley Authority (TVA) and the U.S. Army Corps of Engineers (the lock owners and operators respectively) were concerned that a single monolith could shift or collapse if the excavation created an unstable situation, making the lock unusable. They decided that an extensive monitoring program was needed to control the construction and provide warning of unsafe conditions.

Geocomp Role & Accomplishments

In September 2002, the Army Corps awarded the instrumentation contract to Geocomp to develop and install an automated instrumentation system, and to monitor the lock over the 5-year project duration. Geocomp worked closely with the Army Corps to select the most suitable instrumentation components. The sensors installed include in-place inclinometers and tilt meters to measure lateral movements at the monolith and are connected to a wireless network of data loggers.

Instruments are scanned once per minute and each reading is compared to pre-defined alarm limits. Principals are notified within 5 minutes by telephone or email of the development of an alarm status. Routine monitoring data are only recorded twice per day. Alarms and data collection are automatically processed by Geocomp's *iSiteCentral*™ web-based data collection and reporting system.