

Please click here for the full version of this document – redistribution is subject to ASCE license or copyright. <http://www.ascelibrary.org/>

Exposure of Deep Foundations for the Kentucky Lock Addition Project

Thomas Weinmann¹, Robert Nyren², Ph.D., W. Allen Marr³, Ph.D., P.E.

¹Practice Area Leader- Structural Monitoring, Geocomp Consulting, 1390 Bush Parkway, Buffalo Grove, IL 60089, TWeinmann@Geocomp.com

²Senior Project Manager, Geocomp Corporation, 125 Nagog Park, Acton, MA 01720, RNYren@Geocomp.com

³CEO, Geocomp Corporation, 125 Nagog Park, Acton, MA 01720, WAM@Geocomp.com

ABSTRACT: The Kentucky Lock Addition project is the construction of a new 34 m wide by 366 m long navigation lock that will be located landward and adjacent to the existing 34 x 183-m lock. The U.S. Army Corps of Engineers, Nashville District, has the primary responsibility for designing and constructing the project and will operate the lock once it is complete. However, the Tennessee Valley Authority (TVA) is an active partner in the new lock since it will be an integral component of TVA's Kentucky Dam

Prior to construction of the new lock, a cofferdam had to be built to act as a temporary dam to hold back upstream water (Kentucky Lake). Once the cofferdam was constructed, excavation began for the new deep foundation by removal of soil material downstream from the cofferdam and immediately adjacent to the existing land-side lock wall. This leaves the cofferdam and existing lock wall unrestrained on the exposed land side which could result in movements or instability that could cause life-safety issues to construction workers, construction delays and closure of the existing lock.

Having both the water loads on only one side of both the cofferdam and existing Lock wall required installation of an autonomous sensor array to continuously monitor horizontal soil displacement (in-place-inclinometers), water levels (piezometers) and Lock wall movement (tilt meters and joint meters). Data was automatically collected from IPis, Piezometers (cofferdam), tilt meters and joint gages (Lock Wall) from remotely positioned Data Loggers powered by solar panels.

Each sensor has limit values assigned that when exceeded, trip email messages to staff that allow for remote access and review of data for decisions related to changes in construction sequencing or implementation of contingency plans. The system is integrated into Geocomp's iSiteCentral GIS database software for ease of data collection, review and reporting. Each data logger location and sensor is superimposed onto an aerial plan view of the project site. The sensor icons are active and provide pull-up plots of active, near real-time data. This system has been in continuous operation since 2008, providing continuous 24/7 monitoring and reducing risk for both the Contractor and Owner.