Geocomp
Trusted to help mitigate risk

PROJECT BRIEF

Smithland Hydroelectric Plant Instrumentation & Monitoring

PROJECT PROFILE

CLIENT:
E.L. Robinson Engineering
C.J. Mahan Construction

LOCATION:
Smithland, KY

VALUE:

- Real-time risk monitoring of performance to ensure safety of 200-400 employees at peak of construction
- Large quantities of data taken overtime to demonstrate performance of the seepage barrier and identify areas where remedial work was required
- Allowed designers the opportunity to compare the design values to real-time field performance data and adjust design parameters as necessary

SERVICES PROVIDED:

- Instrumentation and monitoring
- Real-time data reporting on *i*SiteCentral®.

"The instrumentation program demonstrated the ability to help the contractor work in a safe excavation while giving the designers a chance to verify their design and relax some of the constraints as a result of the instrumentation monitoring." - Jamal Nusairat, Ph.D., P.E., E.L. Robinson

INSTALLATION OF GEOTECHNICAL INSTRUMENTS & DATA MANAGEMENT COLLECTION

Geocomp installed nine in-place inclinometer strings to measure lateral displacements within the vertical profile of the embankment surrounding the 110-ft deep excavation. Thirty-four piezometers were installed around the excavation both inside and outside the slurry wall, cofferdam, and excavation for measurement of pore water pressure to evaluate the effectiveness of the seepage cutoff wall. Thirteen *i*Site® data loggers, powered by seven solar panel systems, were installed for storage and transmission of instrumentation data. Robotic total stations monitored twenty-nine prisms at the top of the earth embankment surrounding the excavation to measure settlement and lateral movement. Real-time data were collected from all instruments. Downloadable charts, tables, and reports were provided on a project website and used for performance monitoring during ongoing construction of the powerhouse to demonstrate stable slopes, effectiveness of the seepage barrier, and functioning dewatering system.

BACKGROUND

A hydroelectric facility valued at $450 million, generates an annual output of 379 million kWh using three 24-MW bulb-type turbine and generating units. The project construction diverted water from the Smithland Lock and Dam on the Ohio River through the new powerhouse in order to create clean, renewable energy for the region. The entire site was intentionally flooded in May 2011 in order to prevent serious damage to the structure of the cofferdam due to high river levels. The elevation of the Ohio River near the Smithland Dam crested above the 100 Year Flood elevation, a level not reached since 1937. Fortunately, little damage was caused to either the structure or the side walls and slopes, which was confirmed by real-time instrumentation data on *i*SiteCentral®.