

PROJECT PROFILE

INSTRUMENTATION AND MONITORING FOR COFFERDAM SYSTEM

Construction of a new lock at the 70-year-old Point Marion lock and dam located close to the West Virginia-Pennsylvania border required incorporation of the existing 1,200-foot-long land wall (wall) into the 2,000-foot-long cofferdam system to allow excavations to 50 feet below the upper pool level. Two important design concerns associated with this construction approach were:

- The integrity of the 45-foot-high concrete monoliths that formed the existing land wall.
- The effect of excavations below the elevation of the bottom of the land wall on the wall's stability.



Excavation for new lock and instrumented existing lock monolith wall.

D'Appolonia was retained to install an extensive instrumentation and data acquisition system to monitor the response of construction operations on the wall and on sheetpile cofferdam cells located at the ends of the wall. The instrumentation included:

- Borehole inclinometers (quantity = 40) extending from the top of the existing land wall into foundation shales to measure lateral movements.
- Horizontal (37) and vertical (40) shear strips installed in the wall and

cofferdam cells to detect relative displacements between adjacent monoliths and between monoliths and wall foundations, respectively.

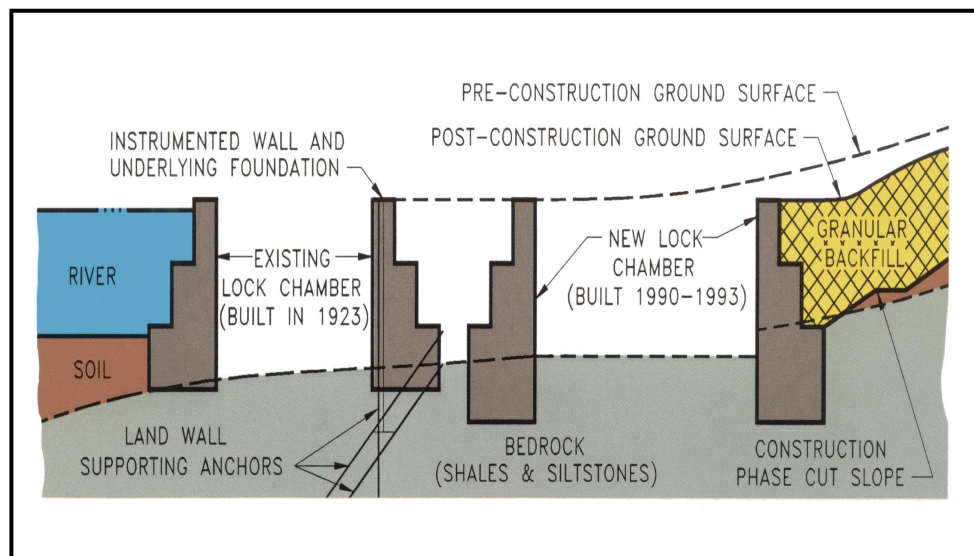
- Load cells (37) to measure forces on anchors extending through individual wall monoliths into rock.
- Standpipe piezometers (16) to determine the ground water level in the cofferdam cells and in the nearby soil slopes.
- Tilt plates (40) to measure the rotation of monoliths.

- Survey control points (40) consisting of brass pins installed in the new and existing concrete structures and steel rods welded to the cofferdam cells.
- Survey benchmarks (3).

The data obtained from the shear strips and load cells were continuously monitored by an automatic data collection system that was connected to an alarm system that would alert workers if it became necessary to evacuate the excavation. A tape system integral to the slope inclinometer recording equipment allowed direct transfer of data files into the data collection system for subsequent analysis.

The scope of work for the project involved the drilling of more than 20,000 lineal feet of boreholes through the existing lock structure and the reinforced concrete and rock foundations. The drilling work also included destructive drilling and coring of the concrete/weathered rock foundation interface at several locations.

D'Appolonia provided monitoring services for field activities related to drilling and instrumentation installation.



Schematic drawing showing construction of new lock chamber adjacent to original lock.