

PROJECT PROFILE

FORENSIC ANALYSIS OF FOUNDATION MOVEMENTS AND REMEDIAL DESIGN

A large coal preparation complex had been built in the New River Gorge in West Virginia. The site was located on a steep slope and comprised an area nearly one mile wide. The site included six major structures connected by numerous pipes and conveyors.

Shortly after construction was completed, slope movements were observed and substantial differential movements between some of the major site structures were apparent. Also, there were substantial differential movements associated with the foundations for individual structures.

D'Appolonia was retained to investigate the cause of these movements and to develop means for controlling them. An instrumentation program was implemented at the site. More than 50 borehole inclinometers were installed in the slope for the purpose of obtaining data to aid in understanding the depth, direction and rate of movement of the slope, as well as ground water levels.

Data obtained from the instrumentation revealed that movements ranging as high as four inches per month were occurring in isolated areas and that the

average rate of movement in the vicinity of the most important structures was approximately one inch per year. The maximum depth of moving material was 107 feet.

D'Appolonia developed and managed the implementation of various systems to control the slope movements, including the following:

- Vertical dewatering wells,
- Horizontal drains,
- Pond Liners, and
- Stormwater runoff conveyance systems.

The above measures were employed to control water levels in the colluvial soils responsible for the slope failure. As movements were brought under control, structures were monitored to determine when foundation movements ceased. When the movements became negligible, remedial designs to restore structures affected by foundation movements to their original condition were prepared by D'Appolonia and subsequently implemented by the owner.



Observed offset in site railroad track caused by movement of slope.



Shims placed beneath column supports for a 100-ton storage/truck loading bin.



Major site structures for coal preparation complex located in the New River Gorge.