

Remediation of the New Baltimore Slide



The New Baltimore landslide, located along the Pennsylvania Turnpike in Somerset County, has been problematic for the Turnpike ever since its construction in 1939. Being an active landslide, it continues to move toward the eastbound lane at a rate of approximately 6-10 inches/year causing the shoulder and right lane to heave approximately 8 inches/year. Overall, this ancient landslide is a translational failure with localized rotational slides, rock falls, and flows.

The geology at the site consists of the Upper Devonian Catskill Formation that includes sandstone, siltstone, mudstone, and shale units. The landslide was mapped in detail to show the presence of major and secondary scarps, tension cracks, drainage channels, and depressions. Several subsurface investigations, beginning in 1972, were performed to investigate the pore water pressures at different depths and determine the location of the failure plane. These subsurface investigations consisted of, but were not limited to, more than 30 borings (ranging in depth from 39.4 feet to 118.1 feet), the installation of 8 slope inclinometers, 15 piezometers, and 11 Time Domain Reflectometry (TDR) cables.

After several years of carefully considered design, construction of the New Baltimore Slide Remediation began in 2015 with a 7-stage construction sequence. Stages 1 through 3 and 5 through 7 are for the purpose of safely moving traffic away from the work area and providing a work zone and access for the project. Stage 4 is for mass excavation: 2.1M yards³ of excavation required to remediate the New Baltimore Slide and an additional 1.6M yards³ of excavation for an adjacent cut slope. This slope is being modified in order to realign an existing 4-degree curve to a 3-degree curve, which will bring it into compliance with current Turnpike design criteria and facilitate the Turnpike's widening to 6 lanes. The construction sequencing of the slide remediation consists of 26 phases in a top down manner. Each phase or slot is 75 feet wide and the idea is to "flip flop" the excavated material on top of the previous sequence where the slide plane has been removed. Each sequence is an orchestration of blasting, excavation, benching, backfilling, and grading.

In addition to the monitoring devices used pre-construction, the New Baltimore Slide is being monitored by a Leica survey system. Over 100 prisms were installed and are being monitored 24 hours a day. Each prism is targeted every 15 minutes and a measurement sent to our dedicated project web site. This data was compiled for over a year prior to the beginning of construction. Once construction began, the system has continued to collect data which is presented in spreadsheet form. The data is presented to the construction management team on a weekly basis using a rolling 30-day period. Any noticeable changes or loss of data collection (e. poor weather conditions) are reported immediately. After construction is complete, this monitoring system will still remain in place along with 10 strategically located prisms.

This project is the first of its kind – the first time an ancient, active landslide has been remediated by removing the failure mechanism and using the slide mass as an engineered fill back in its original location.