MEASURAND

SLOPE STABILITY MONITORING
Location: US Route 2, MN

Soil erosion has lead to a number of landslides in the Crookston, Minnesota region in recent years. In September 2003, a landslide in downtown Crookston between US Route 2 and the Red Lake River caused significant property damage, leading the Minnesota Department of Transportation (MnDOT) to investigate new monitoring solutions. The department had used traditional inclinometers, but were interested in automation and remote collection of data. A pilot project determined the viability of Measurand's ShapeArray to be installed in two road-way sections experiencing stress related to erosion and soil instability.

Soon after installation, ShapeArray data revealed that soil movements at the Crookston East site were deeper than anticipated. With this new data, experts determined that the slope was no longer creeping, but rather a major failure was occurring. The MnDOT closed the west-bound lanes of US 2 and detoured traffic north of the city on Monday, Sept. 15, 2008. Ten

days later, a large progressive landslide occurred, dropping a 500-foot section of US 2 down 10 feet. The slide continued over several days. The monitoring provided by ShapeArray, helped engineers ensure that no members of the public were hurt during the sliding event.

ShapeArray survived unprecedented deformation during and after the event. The instruments continued to provide engineers with useful data until the slide forced the casing to move from their vertical down-hole position to a horizontal one. The system remains in place and provides valuable data to the MnDOT.

Dasenbrock, D. "Automated Landslide and Instrumentation Programs on US Route 2," Proceedings of the University of Minnesota 58th Annual Geotechnical Engineering Conference, St. Paul, 26 February 2010, pp. 165-185.

FIGURE 1

Global view of the progressive slide east of Crookston, MN.

FIGURE 2

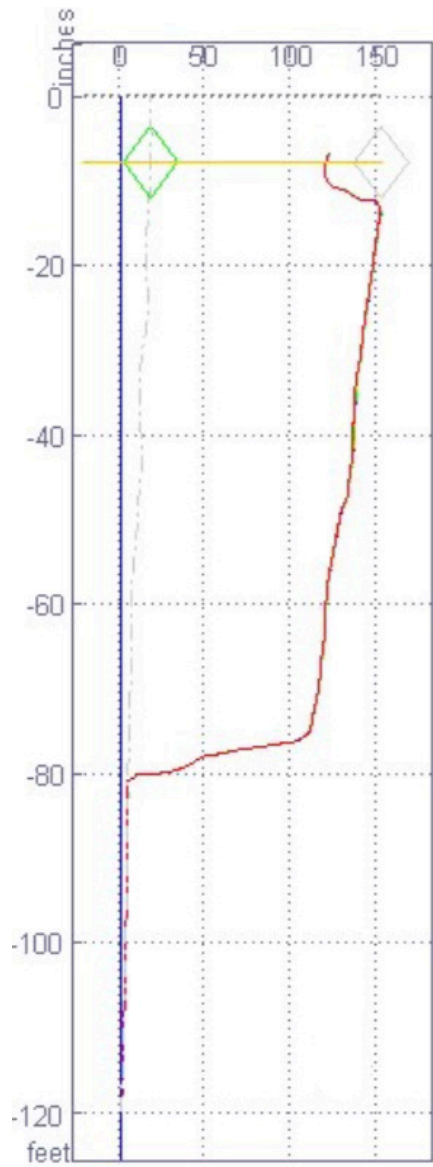Location of ShapeArray 5 next to data acquisition system and escarpment.

Absolute deformations measured for ShapeArray 5.