



### Key achievements

- High intensity, safety-critical short term slope monitoring system on a major roadway.
- Essential monitoring scheme supporting an award-winning project

#### • The Project

Site investigation was required after cracks appeared in the pavement alongside the road in an area that is susceptible to landslips. Core samples needed to be taken from the road and the slope below to determine the ground conditions and the cause of the failure.

#### • The Challenge

A slope monitoring scheme would be needed to ensure the safety of teams undertaking the ground investigation. The system must be reliable and have a high reading frequency with automated, timely alerts going to site personnel in the event of excessive movement.

The critical nature of the works required swift site-specific design, fast mobilisation to site and an efficient installation.

#### • The Solution

A detailed system of high accuracy crack meters and wireless tiltmeters was designed to monitor changes in the pavement and the slope.

At the pavement level, a combination of a biaxial tiltmeter mounted on a beam and a crack meter were installed at six stations along the site. This composite solution gave a thorough measurement of any potential slope movement in multiple dimensions, either through creeping or in an unlikely catastrophic event. On the slope below the road, seven tiltmeters were installed on stakes at varying distances down the wooded slope and in-line of each cantilever platform. These were installed by a specialist abseiling subcontractor and provided means of monitoring potential larger scale ground movements.

The monitoring system provided readings every 5 minutes, 24 hours a day. GEO-Instruments' QuickView software managed an alerting system including immediate notifications of potential trigger breaches and data outages via SMS and emails.

#### Application

Slope stability monitoring

#### Technique

Tilt Monitoring  
Crack Monitoring

#### Market

Highways

#### Client

Arcadis  
Highways England

#### Project Duration

2 months

#### Instrumentation

Wireless Tiltmeters  
Tilt Beams  
Crackmeters

#### Keller companies

GEO-Instruments