CASE STUDY
M42-M6N Link MP35-6 Gabion Wall

The Contract:
Structural inspections, on behalf of Highways England, in August 1983 and 2015 during asset management in Area 9 have revealed forward rotation of a gabion wall on the northbound link from the M42 to the M6 motorway. A site investigation was required to confirm the ground model and identify parameters for design of a new retaining solution. A number of remediation solutions were being considered.

The Challenge:
To complete three boreholes, one vertically through the carriageway, one at an inclination of 20 degrees below horizontal and one on the cutting. The boreholes were to be completed during night time shift working within traffic management. An engineering geologist was required to supervise the works, identify the geological stratum and provide technical assistance in the installation of vibrating wire piezometers and a steel rod for a pull out test.

The Solution:
Geotechnical Engineering mobilised one multipurpose Pioneer rig capable of both dynamic sampling and rotary coring, and one award winning P60 slope climbing rig capable of dynamic sampling and rotary coring on slopes up to 45 degrees. Two boreholes were completed to depths between 5 and 10m and installed with vibrating wire piezometers. The vibrating wire piezometers were set in a 3:1 cement: bentonite grout surround. A Wi-SOS 480 monitoring system was installed to allow remote access. The Wi-SOS 480 system comprised a data logger fitted into each borehole; the data logger was capable of communicating via a central “gateway” transmitter unit. The transmitter was mounted onto a steel post in a safe and remote location away from the live carriageway. Real time data was then transmitted digitally to a portal which could be accessed remotely from both the Kier and Geotechnical Engineering offices. A 32mm steel bar was installed in the inclined borehole to a depth of 5m and set within a cementitious grout which was cured for 10 days. A pull out test was then carried out by specialist subcontractors in accordance with BS EN 14490:2010 and BS 8081:2015.

Geotechnical laboratory testing was carried out on samples selected by Kier. These included the routine laboratory tests of natural water content, liquid and plastic limits and plasticity tests, particle density and particle size distribution. Further tests included one-dimensional consolidation, small shear box to provide peak and residual effective shear parameters, residual effective shear strength using the Bromhead ring shear, consolidated drained triaxial compression and point load tests. Subcontract laboratories were used to carry out BRE SD1 tests, redox potential, soil resistivity using the disc electrode method and chemical analyses for a suite of contaminants.

On completion the results of the investigation were presented as information in pdf form and as AGS data.

Project Overview

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<th>Project Name:</th>
<th>M42-M6N Link MP35-6</th>
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<tbody>
<tr>
<td>Project Type:</td>
<td>Roads</td>
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<tr>
<td>Client Name:</td>
<td>Highways England &amp; KIER</td>
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<tr>
<td>Date/Duration:</td>
<td>April and May 2016</td>
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