Blast Vibration Monitoring

Blast vibration monitoring and predictions

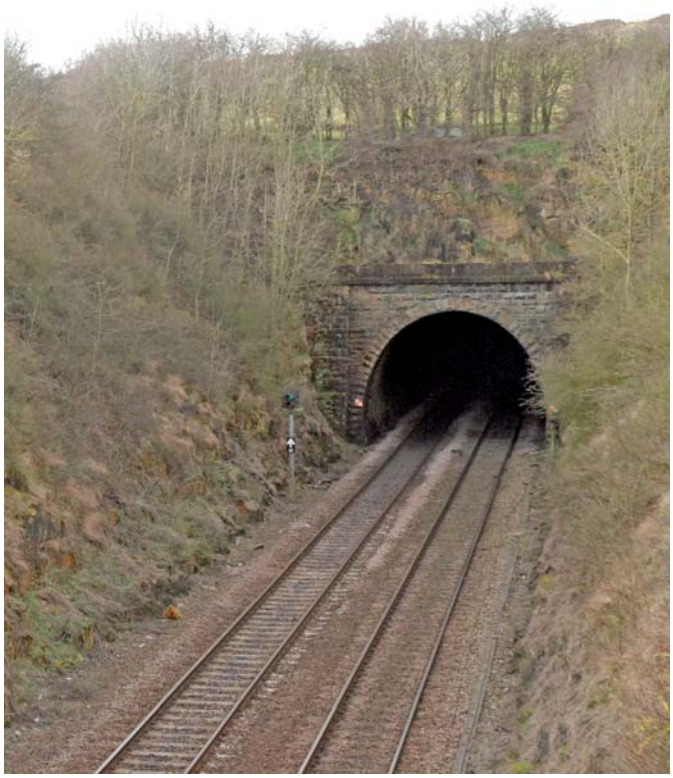
Reference: B-001

Project Details:

Location:	Whitwell Quarry, United Kingdom
Client:	Lafarge Aggregates
Dates:	2006 - 2012
Project Value:	£100,000
Sector:	Blast Monitoring

Brief Description:

Monitoring of vibrations resulting from blasting in close proximity to an active railway tunnel and forming vibration predictions and delay time optimisation to ensure vibration limits are not exceeded.



Detailed Project Description:

Blast Log Ltd worked in close co-operation with Lafarge Aggregates to gain access to limestone reserves adjacent to an active railway tunnel, running through Whitwell Quarry. Blasting the rock was made possible through stringent vibration monitoring and vibration predictions.

Bespoke monitoring instrumentation have been designed, built and installed so that precise ground vibration levels and waveforms produced from each blast can be recorded. The geophone arrays are installed along the length of the tunnel, attached to the tunnel lining. Additional arrays have also been installed in boreholes flanking both sides of the tunnel at 60m intervals and at depths in line with the soffit and invert of the tunnel.

The optimum delay timings for each blast are calculated and provided to the quarry's shot firers in order to control and minimise the resulting vibrations at the tunnel. The delay timings are determined by recording the signature waveform from a single hole blast and inputting this waveform into a linear superposition software programme from which the optimum inter hole detonator delay time can be established. This has allowed for greater control on the resulting vibrations produced from the blasting and has ultimately allowed for blasting operations to advance within 50m of the tunnel whilst maintaining vibrations levels below the set limit. Prior to involvement from Blast Log Ltd, keeping to vibration limits was not possible closer than 80m to the tunnel.

Vibration predictions are provided on a blast by blast basis. The predicted values, generated by the Blast Log analysis package provides an accurate check prior to blasting, to show that the resulting vibrations will be within the imposed vibration limit. The prediction process has been successful and all blasts have remained below the limit.

Key contact:

Dr. Shazad Hosein, Blasting Engineer. E-mail: shazH@blastlog.co.uk