

DRILLING & BLASTING OF 200,000 TONNES OF ROCK LOCATED JUST 100 METRES AWAY FROM A 250 YEAR OLD STONE BRIDGE

CLIENT WELSH ASSEMBLY

MAIN
CONTRACTOR JONES BROS

PROJECT A5 TY NANT

PLACE NORTH WALES, UK

DATE 2006-2007



OBJECTIVES & CONSTRAINTS

- The A5 road in the UK forms an ancient and well-used route through the hills and mountains of North Wales. In the 1990's a programme of work was conducted to upgrade the road to modern standards. As part of this work a new cutting was constructed to bypass a portion of road routed through a gorge close to the village of Ty Nant
- This new cutting was to be formed through drilling, blasting and extensive rock bolting, however, the levels of Vibration, air overpressure and flyrock began to raise apprehension amongst local residents, leading to a minority of farmers activating demonstrations near to the site
- In 2006 the failure of several rock anchors on the north face of the rock cutting were discovered during routine inspections. A remediation programme was agreed including the blasting of a considerable quantity of rock to form a new calculated stable angle
- Previous history of blasting in this area signified a system of public relations would need to be developed and implemented before the project commenced
- Blasting Services Ltd (EPC Groupe) was asked to undertake D&B design, drilling, shotfiring, environmental monitoring and control

KEY FIGURES

VIBRATION OBJECTIVES & CONSTRAINTS

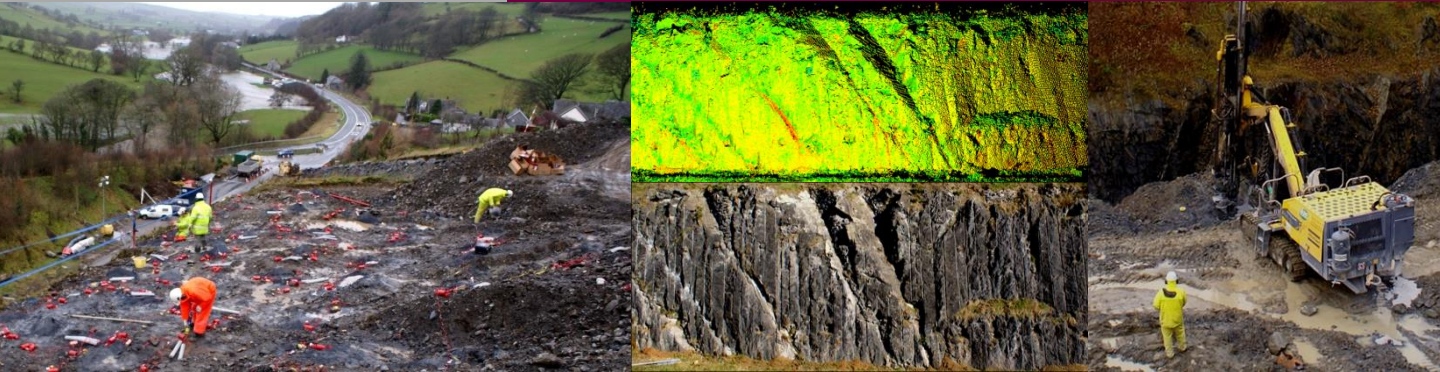
- Structures within 100m (300ft):
 - 2 houses
 - A 250-year-old stone bridge
 - A 200-year-old stone retaining wall (Historical monument)
- PPV @ Occupied Structures: 95% of Blasts < 6 mm/s
- Air Overpressure Limit : 140 dB(Linear)
- PPV@ Unoccupied Structures : 15 mm/s (BS7385 Part 2)



BLASTING / ENVIRONMENTAL PERFORMANCE

- Slope to be reduced to an angle of 34 degrees
- 200,000 tonnes of Rock to be Removed
- Time Slot For Blasting: 30 minutes road closure
- 40 Blasts
- 5100 Electronic Detonators and
- 15.8 tonnes packaged explosive
- 100% of blast <6mm/s (58% <3mm/s)





SAFETY & SOCIAL RESPONSIBILITY

- Extensive public relation work prior to blasting included community meetings and discussions with local schools
- Remote control drilling technology was implemented (Atlas Copco ROC D7) to reduce risk to operators when working on unstable rock slopes. This particular model allowed for the assessment of difficult hole locations via an articulated drill arm.
- 89mm diameter drilling (proximity of properties)

TAILORED BLASTING PROCEDURE

- Working under the UK Quarry Regulations the project required full blast specifications (drilling Plan, drilling log, hole survey, face survey and photograph, hole loading diagrams, initiation plan, danger zone)
- An efficient procedure for danger zone checks and post blast checks was set up to match the limited time slot for blasting (30 minutes road closure, including inspection of A5 Wall)

UNEXPECTED CHALLENGES

- A 3D face survey and photograph revealed hundreds of long and short rock bolts, horizontal drain holes and stone work
- Vertical steel dowels (100mm diameter pipes, filled with grout) were also found at the bottom of the bench, every 3 metres

ENVIRONMENTAL PERFORMANCE

- An objective of the project was to specify vibration limits and produce a monitoring scheme. This was successfully carried out using 8 seismographs along with electronic detonators (HotShot)
- The condition of the A5 retaining wall was checked by local highways engineers after each blast
- 100% of the 40 blasts, including shots fired at 80m (260ft) from the nearest residential property were monitored at a level of below 6mm/s

