GroundSolve Limited

Consulting Geotechnical, Engineering Geology and Environmental Engineers

Project Sheet:
Pont Cwm Pydew Landslide

Client: Cyngor Sir Ddinbych / Denbighshire County Council

Contractor: Colin Jones (Rock Engineering) Ltd.

Construction Value: £128,500

Services Inclusive of:

- ground investigation,
- detailed design,
- contract documentation and management
- site supervision

Description of Project

Following a landslide in 2001, the B4391 road to the south of Bala was at risk of being undermined by future failures.

The road cuts though a steep valley side, and is supported locally by masonry retaining walls. Downslope of the landslide there is a hairpin bend, under which a culverted mountain stream flows. The bend collected water and was hazardous in freezing conditions.

In 2008 GroundSolve Ltd. were appointed to carry out an investigation of the landslide and design a cost effective, long term solution.

Rotary percussive probing was carried out using rope access techniques to define the rockhead profile along the failure. A soil nailed solution was then designed, with an anchored reinforced concrete beam at the crest of the slope to provide further protection to the carriageway.

In addition to the reinstatement works on the landslide, the following improvements were also incorporated into the works to minimise future maintenance and repairs:

- Reinforcement of failing masonry retaining walls with anchored, masonry clad reinforced concrete buttresses, see photo;
- Formation of a pre-cast drainage channel to collect groundwater which discharged from the upslope heathland;
- Repairs to the existing culvert headwalls

Site works commenced in April 2009, and were completed on schedule in August 2009.

Long reach excavator installing soil nails

Anchored reinforced concrete buttress (prior to cladding)

Value Engineering

New drainage gully for standing water on bend

Extended and anchored top beam

GroundSolve Ltd. were responsible for the project management and site supervision of the works.

The supervision was carried out on a visiting basis to minimise costs. However, regular site visits and constant updating of the ground model and measure allowed the works to be optimised and enabled additional works to be incorporated into the works while staying on budget and on time.

The following additional works were carried out within the original budget for the works:

- Increase in soil nailed area by 80% to cover recent landslide;
- Increase length of anchored beam at crest of slope by 50% to cover recent landslide;
- Replacement of soft verges with aggregate;
- Formation of an earth safety bund;
- Installation of drainage gullies to remove standing water from carriageway.

Environmental and Sustainability Issues

The site was bounded by a SSSI, and CCW permission was required for aspects of the works. Due to the sensitive environmental nature of the site the following measures were implemented:

- The concrete buttresses were clad with local masonry, recovered by the contractor from a disused quarry in the forest downstream of the site;
- Excavated soil from the landslide was used to reinstate the drainage works, ensuring no foreign seeds were introduced to the SSSI;
- Excess arisings from the works were used to landscape a local disused quarry in the ownership of CCW;
- Vegetation on the landslide was left in place to encourage rapid growth that will rapidly camouflage the rock mesh and base plates for the soil nails.

Concrete buttress clad in local stone to tie into existing wall

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