

# Ground Investigation - Slope Solutions



**Slope failures on earthworks in railway and highway environments are increasingly common. Site investigations are important to characterise the ground conditions in these areas of instability, enabling geotechnical engineers to design appropriate remedial measures.**

Traditionally, investigation of these sites either entailed designing and installing platforms using scaffolding that would service a cut down cable percussion or rotary rig, or more commonly clients would need to accept a downgrade in the data that could be recovered using limited hand held window sampling and other equipment. In addition, these difficult to access locations are often remote from access points, so possessions of the railway and traffic management on highways are often required. Moving and establishing equipment/scaffolding on and off site can take a long time and be prohibitively expensive when using these traditional techniques.

To combat these issues, Central Alliance has developed a range of drilling rigs that are able to access restricted sites and provide the high quality geotechnical data required by design engineers. We have used our experience of current drilling technology and projects on 'difficult access locations' to design rigs that are **true 'geotechnical investigation' rigs.**

Our clients have been impressed by our ability to access difficult areas, quality of data capture and high quality instrument installation capabilities that require no scaffolding, no possessions and no helicopter hire!

## Our solutions include:

- **Slope climbing rigs (CPT, CPTu, direct push sampling, undisturbed sampling, dynamic sampling, rotary drilling, SPTs)**
- **Long reach mounted platform rigs with dual dynamic sampling and rotary masts**
- **Telehandler mounted platform rigs with dual dynamic sampling and rotary masts**
- **Modular dynamic sampling rigs**
- **Modular rotary rigs (including skid mounted modular rotary rigs)**

When combined with our innovative Survey techniques including UAV and mobile mapping solutions these ground investigation techniques provide the highest quality of site investigation information that has ever been available on slopes and remote and difficult access sites.



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# Slope Climbing Rigs

Our remote control slope climbing rigs are self-levelling and mounted with a CPT/CPTu mast or a conventional dynamic sampling and rotary mast. The rigs have full body and mast rotation enabling us to carry out ground investigation holes in the same orientation and locations as proposed remedial works such as soil nailing or Electrokinetic slope stabilisation systems, reducing the risk of encountering unforeseen ground conditions during construction. The ability to measure in-situ pore-water pressures on slopes, often critical in slope stability analysis, marks a significant step forwards in the quality of investigative information that can now be provided to designers, with data emailed directly from the drilling rig.

## Slope Climbing rig with CPT Mast capability of measuring pore water pressure on slopes

- Qc tip resistance and fs (lateral friction) every cm
- U (pore pressure)
- Penetration tilt angle
- Dissipation tests
- In-situ data for slope stability analysis



Unique Worldwide CPTu Slope climbing rig, remote control, self-levelling, drill at any angle. GI for proposed Electrokinetic remediation.  
Photo: A14 Brampton Hut, Amey/Highways England, 2017

## Slope Climbing rig with combined dynamic sampling and rotary mast for conventional ground investigation work

- Dynamic sampling
- Standard penetration tests
- Undisturbed sampling
- Rotary coring
- Rotary open hole
- Holes at any angle - full mast and body rotation



Unique Worldwide Dynamic Sampling and rotary slope climbing rig, remote control, self-levelling, drill at any angle.  
Photo: New for January 2017





# Modular Rigs

Our modular rigs have been designed and constructed in-house for use on restricted and difficult access locations - difficult access locations, limited headroom sites, embankments and cuttings for highways, railways and also inside buildings or basements.

## Modular rigs for dynamic sampling

- The rig is capable of completing all the operations possible with a tracked rig including SPT (1m intervals), U38, U70, U100 and U100T sampling, dynamic sampling, dynamic probing (DPSH) and simultaneous casing of boreholes
- The rig is powered by a portable hydraulic power pack which can be operated approximately 10m from the rig
- The rig has a mast height of just 2.30m in height making it suitable for working closer to overhead line electrification structures than conventional tracked rigs
- The rig requires a base area of just 1.50m by 1.00m.



Modular dynamic sampling rig capable of SPT's and undisturbed sampling. Can be dismantled, carried by hand and re-assembled.

Photo: Fairfield Farm (Hope Valley), J Murphy & Sons Ltd, 2015

## Modular rigs for rotary drilling

- Rotary skid mounted modular rigs can be disassembled and re-assembled on site, allowing ease of manoeuvring between borehole positions
- Rotary open hole, down the hole hammer, rotary coring capabilities
- Secured by a ground anchor and used with rope access.



Skid mounted modular rotary rig - used with ground anchor and rope access.

Photo: Harbury East Cutting, J Murphy & Sons Ltd, 2016



Long reach mounted platform rig capable of dynamic sampling with SPT's and undisturbed sampling and rotary coring.

Photo: Eden Brows, Story Contracting Ltd, 2016



Telehandler mounted platform rig capable of dynamic sampling with SPT's and undisturbed sampling and rotary coring.

Photo: Scout Tunnel Emergency Works, J Murphy & Sons, Ltd, 2017

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