

GEOTECHNICS
geotechnical and geoenvironmental specialists



**Rail
Capability**



From the Chairman

Geotechnics and Site Investigations for Railways

The investigation of ground conditions relevant to the maintenance or upgrading of rail assets has been a key element in the service which Geotechnics provides for over a quarter of a century. It requires a special commitment to working within the constraints imposed by a working rail system, often overnight at weekends in a very limited time frame in confined sites at locations which are often remote from the point of access for plant and equipment. Furthermore the weather conditions at the pre-determined time required by the programme cannot be selected so that they have to be accommodated.

Collaborative working, where Geotechnics' expertise can be combined with that of its clients within the constraints which have been outlined, is essential to success in such an environment and this fits well into Geotechnics' policies and strategic objectives. The Company has systems and a team of Engineers and Technicians with a great deal of experience and up-to date certification in safety procedures which are subject to annual audit under the Achilles RISQS scheme, consistently achieving high grades for its work.

Drawing on its experience we are frequently able to provide guidance on efficient, practical and safe ways to achieve the objectives of the designers and we have custom built equipment available for use where necessary. Notable projects completed include work on the West Coast mainline upgrade, work on the Evergreen 3 London to Birmingham improvements project, on CrossRail at Plumstead and at Tebay. Regular smaller scale projects are part of our monthly work load. Each of its offices can call on trained and capable staff which can be made available in any of the regions as needs arise.

Clients can be confident that by commissioning Geotechnics to do their work they will be employing one of the UK's leading specialists.

Len Threadgold
Chairman – Geotechnics Limited



Our Rail Capability

Geotechnics Limited was established in 1983 to provide the full spectrum of services covering the design, implementation, interpretation and evaluation of geotechnical and contaminated land site investigations. Our head office and laboratory are based in Coventry, with additional offices in Chester, Exeter and Yorkshire.

Our Directors are industry leading RoGEP Advisers, and the majority of our staff are professionally qualified, many of which hold Geotechnical Advisor status. Company-wide we can call on a knowledge base with a vast range and depth of experience in Geotechnics, Engineering Geology and Contaminated Land. We have over 30 years' experience within the UK rail sector and we have highly experienced PTS qualified staff across all four of our offices.

Our success is based on our innovative approach, supported by the knowledge and experience of our staff, and the ability to provide integrated, appropriate solutions to meet our Clients' needs.

Geotechnics Limited holds certificates from Constructionline and RISQS certifying that our organisation is approved and listed on the UK Register of Qualified Construction Services and for Railway work respectively. We are Quality Assured to **BS EN ISO 9001:2008** and **ISO 14001:2004**, and UKAS accredited for over 50 Geotechnical tests at our in-house laboratory in Coventry.

Our Laboratory

Based in Coventry, Geotechnics Limited has its own in-house UKAS accredited laboratory which provides geotechnical testing in conjunction with, or independently of the investigation and specialist advisory services.

Strength and compressibility data together with soil classification and grading are required for foundation design whilst potential aggression to concrete can be determined from chemical analysis.

Investigation of sites which slope, or where slopes are to be formed, requires the measurement of long term soil behaviour. For roads and earthworks, the suitability of soils for use in embankments needs to be assessed, together with subgrade characteristics for road pavement design.

We also work closely with partner organisations to offer chemical contamination testing for a wide range of determinands.

A total of some 50 accredited tests include:-

- Triaxial
- Shear Box
- Particle Size Distribution
- Index Property
- CBR
- Chemical Analysis
- Rock Strength
- Shear Box
- Consolidation
- Compaction
- MCV
- Lime/soil interaction
- Density



Meet the team

Terry Clark

Commercial Manager

With over 40 years' experience in site investigation, Terry has gained extensive knowledge. As Commercial Manager he has successfully managed large, complex rail site investigations for schemes such as the West Coast Mainline upgrade, Nuneaton Station Improvements, Railtrack Boundary Survey, Evergreen 3 upgrades and CrossRail.

tclark@geotechnics.co.uk

Steve Miller

Senior Estimator

Steve has over 12 years' experience within the site investigation industry with responsibility for pricing and planning rail project tenders. He has been involved with notable large scale projects including various packages for the CrossRail project and the Midland Mainline Electrification project.

smiller@geotechnics.co.uk

Steven Chapman

Rail Geotechnical Project Manager

Steven has over five years' experience of site investigation and has been involved with the rail industry throughout, working initially as a Site Engineer and progressing to a Project Manager. He has considerable experience in planning and implementing a wide range of rail projects from simple projects comprising a single shift to complex long term investigations. He has been instrumental in solving the problems associated with large scale rail projects and delivering information to the Client on time. Recent site investigation projects have included schemes such as the North West Electrification Project (NWEPE), Huddersfield to Bradford Re-signalling and CrossRail.

schapman@geotechnics.co.uk

Andy Suominen

Rail Geotechnical Project Manager & Staff Co-ordinator

With over ten years' rail experience, Andy undertakes both a Project Management and Rail Staff Co-ordinator role within the company, ensuring that all rail trained staff companywide meet the required level of competency and are working in accordance with the most up-to-date industry requirements. He has gained experience not only in the Project Management of large scale site investigations for schemes such as Rugby Re-signalling, Midland Mainline Electrification project, CrossRail and the Nottingham Hub, but has also been involved with the production of Work Package Plans, Task Briefings and Risk Assessments.

asuominen@geotechnics.co.uk

Rob Webster

Rail Geotechnical Project Manager

Rob has seven years' rail experience of site investigation, working initially as a Site Engineer, progressing to Project Manager. He has considerable experience of planning and implementing both straightforward and highly complex site investigation works within the rail environment, and has been instrumental in successfully addressing challenges of difficult access and specialist instrumentation. Key projects include the Kettering to Corby line, Evergreen 3 and CrossRail.

rwebster@geotechnics.co.uk

Ian Boyle

Rail Geotechnical Plant Co-ordinator & Senior Site Supervisor

Ian has thirty years' experience of site investigation in the UK rail industry, starting out as a laboratory technician and progressing to Contracts Manager and then Senior Field Technician. During his career he has gained considerable experience in the field management of rail site investigations, and has gained a substantial knowledge of all field activities, including in-situ monitoring, testing, and both the logistics and mechanics of rail specific investigation plant.

iboyle@geotechnics.co.uk

Dave Cage

Business Development Manager

With over ten years' experience Dave has specified and undertaken the project management of large scale site investigations for schemes such as the West Coast Power Supply Upgrades, Evergreen 3, and East West Rail Phase 1. During his career he has gained additional experience in the production and approval of Construction Phase Plans, and rail specific geotechnical asset management (principal and secondary inspections).

dcage@geotechnics.co.uk

Sensitive Slope Stabilisation

Daniels Mill and the Severn Valley Railway

The historic Daniels Mill to the South of Bridgnorth in Shropshire was hit by the twin disasters of flooding and landslip during extreme rainfall in the area during the summer of 2007. These problems were intimately associated with those of the adjacent Severn Valley Railway which passes to the west of the site on a viaduct over the valley of the stream which serves the mill. This sensitive earthworks project was conceived and directed by Geotechnics Ltd to protect this famous Mill and maintain support to the viaduct abutment.

The landslip impacted on one of the outbuildings and stabilisation works were required to address both the slope behind the building and the slopes and buttress associated with the viaduct. The mill is sited in a heritage and conservation area and therefore required innovative and sensitive re-mediation to recognise the historic environment, access constraints, sustainability issues and the maintenance of stability to the viaduct throughout the construction. Reinforced Soil was seen as providing the optimum solution.

Geotechnics Limited became involved when Len Threadgold, Chairman and Chief Engineer was asked, on behalf of the Mill owner's Insurers, to inspect the slope failure and examine causes and potential solutions. Following a ground investigation, failure of the superficial deposits and the weathered Keele Beds, associated with high groundwater levels, was identified and a potential solution involving the construction of a reinforced soil slope analysed by Geotechnics' Trevor Hardie.

The solution was developed further by Paul Thurlwell from P&S Consulting Engineers (PaSCoE) who undertook both the detailed design of the reinforced soil wall

and slope and close monitoring and supervision of the work on site. This allowed changes to the design and construction to be implemented as the work proceeded following exposure of soil and rock in the slope and minimised the volume of soil to be excavated and exported from the site. It also minimised the volume of imported material required, further adding to the sustainability of the solution. Exposure of the viaduct abutment foundations resulted in changes to the slope profile close to the abutment to maintain the stability.

Specialist environmental contractor, WM Longreach, was appointed to carry out the complex stabilisation works. Due to the access constraints, their solution was to use a long reach excavator for the slope reconstruction, provided from their own long reach plant business, WM Plant Hire Ltd. The machine to be used was selected by Damian McGettrick following his site meeting with Len Threadgold. This was fitted with a tilting bucket attachment and was able to sit in one location to remove the failed material and subsequently place the new fill material in layers. Over 2000 tonnes of material had to be excavated from the failed slope profile, replaced with a structural stone fill reinforced with Heusker

geogrid materials and compacted to a high specification. A small excavator was used to level the stone prior to compaction and, using a tensioning system, the geogrid was tightened over each layer to form the new steep slope profile. Topsoil was wrapped in a finer geotextile at the slope face to allow successful vegetation growth through hydroseeding. The upper slope was reprofiled and dressed in a coir matting to prevent short term erosion during the winter months and facilitate the subsequent establishment of the grass and vegetation in this area. A feature wall, dressed in Wenlock stone, was at the base of the slope to blend in with the mill.

Water from behind the filling and the base of the new slope feature was drained to an outfall downstream of the Mill and the driveway and car parking areas were resurfaced to provide a high quality appearance to the finished works. The Mill owners were delighted with the end result and were complimentary of the attitude, commitment and conscientious approach of the project team in achieving a successful outcome to what was a very challenging and high profile project, with disruption kept to a minimum, despite being done during one of the most severe winters on record.

This work was recognized by the Institution of Civil Engineers West Midlands Region who presented the team with the Geotechnical Award for 2010 at their recent Awards Dinner.

Crossrail not Crosslines

Balfour Beatty Rail (BBR) invited Geotechnics Limited to tender for ground investigation works for the new Crossrail lines from Plumstead to Abbey Wood in South East London. Balfour Beatty, who are working for Network Rail, are designing re-location of the existing up and down North Kent Lines (NKL) to create a corridor for Crossrail lines from the Plumstead Portal to beyond Abbey Wood Station. The works will require the widening of the existing embankment and track corridor to accommodate the extra lines and associated equipment.

The investigation was to comprise Cable Percussive boreholes, piezocone CPT's, with pore pressure dissipation testing, Window Sample boreholes and Inspection Pits/Trenches. Most of the work was trackside and to be undertaken in weekday night or weekend possessions. Geotechnics Limited opted to use the extended weekend possessions as those on weekday nights afforded only very short working times.

BBR awarded the contract to Geotechnics and following a number of meetings and extensive communications a programme of work was agreed, commencing with a 51 hour possession over a three day period in March 2012, followed by normal weekday work on non-trackside exploratory holes up until Easter 2012, when another extended possession was available. Geotechnics team was headed by Andy Suominen and Ian Boyle, ably supported on site by Steve Chapman, Nick Tarrant, Lawrence

Page and Leigh James, drill crews and specialist sub-contractors. A variety of road/rail plant was mobilised for the weekend possession including excavators, trailers, CPT track-truck and track trolleys.

Problems with Possessions and access gave rise to an amended scope of work and exploratory hole relocation. Window sampling was undertaken along both sides of the track at the western end of the site; in the CESS within protected green zone on the south side and in the Crossrail compound on the north. Five boreholes were drilled using standard cable percussion techniques but two required the use of a modular cable percussive rig in a protected green zone. Two further trackside boreholes were drilled using Window Sample techniques and in four of the boreholes standpipe piezometers were installed to allow monitoring of water levels post-installation. Ground conditions were shown to be variable with Made Ground and Alluvium, including peat, being encountered over medium dense to very dense granular deposits.



Rotary percussive sampling, night-time trackside working

Over an Easter weekend a CPT track truck undertook 9 CPT's in the Four Foot between the rails whilst a further 2 tests were undertaken in the CESS from a road/rail mounted unit. The final test was undertaken using the truck in the Crossrail Compound. For a number of the tests a Magcone (CPT with magnetometer fitted) was used to sense the possible presence of Unexploded Ordnance (UXO) as the work progressed.

Following the successful completion of site work and a programme of geotechnical and Geoenvironmental testing, a factual report was prepared and submitted to BBR. We were very proud to subsequently receive a letter of praise from the Client!

The success of such logistically demanding projects depends upon the skill, experience and teamwork of all parties giving rise to good working relationships and flexibility on site to make sure that no one gets their lines crossed and the work gets done.

Where are we?



Coventry Office
The Geotechnical Centre
203 Torrington Avenue
Tile Hill
Coventry, CV4 9AP

02476 694 664

Chester Office
The Geotechnical Centre
Unit 1B, Borders Industrial Park
River Lane, Saltney
Chester, CH4 8RJ

01244 671 117

Exeter Office
The Geotechnical Centre
7 Pinbrook Units
Venny Bridge
Exeter, EX4 8JH

01392 463 110

Yorkshire Office
Unit 1
Bypass Park Estate
Sherburn-in-Elmet
Yorkshire, LS25 6EP

01977 525 037



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024 7669 4664



www.geotechnics.co.uk



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