

Geotechnical Courses

Soil Description Workshop

25th September 2015

28th October 2015

Rock Description Workshop

12th August 2015

30th September 2015



Health & Safety Courses

IOSH Safe Supervision (3 Day)

26th - 28th August 2015

IOSH Avoiding Danger (1 Day)

4th September 2015



IOSH Working Safely (1 Day)

18th September 2015

Geotechnical Courses

In Situ Testing

19th August 2015

6th October 2015

Geotech' Lab Testing Awareness

20th August 2015

13th October 2015



Technical Seminars

CPT in Geotechnical Practice

24th - 25th November 2015

Geophysics in Geotechnical Practice

TBC



theGeotechnica

August 2015 | Issue 43

New Ground Investigation Standard

Chair of the Revision Panel
Professor David Norbury discusses
the third version of BS5930.



RoGEP hits 250 registrants

The UK Register of Ground Investigation Professionals continues to grow

Retaining walls making life easier

Maccaferri help steeply sloping building sites become a reality

Geophysics Borehole Imaging

Geophysics expert Kim Beesley looks at borehole imaging



EQUIPE TRAINING

Health and Safety Courses

DELIVERED IN PARTNERSHIP WITH: RPA SAFETY SERVICES LTD

IOSH Safe Supervision of Geotechnical Sites

This three day geotechnically focussed health and safety course has been developed by industry specialists and is a unique course for managers and supervisors involved in projects in the drilling and geotechnical industry. The course is certified by IOSH and has been approved by The Environment Agency, Thames Water, AGS and BDA and also meets all of the requirements of the UKCG (formerly the Main Contractor's Group).

NEXT COURSE DATES: 26th - 28th August 2015
7th - 9th October 2015

IOSH Avoiding Danger from Underground Services

This one day geotechnically focussed health and safety course follows the requirements and guidance set out within HSG47 and includes the four chapters; identifying and managing the dangers; planning the work; detecting, identifying and marking and safe excavation. Important aspects include the use of real examples from the geotechnical industry and delivery by chartered advisors who are from within the industry.

NEXT COURSE DATES: 4th September 2015
16th October 2015

IOSH Working Safely (on Geotechnical Sites)

This one day geotechnically focussed health and safety course has been developed by industry specialists as a foundation to site safety for all personnel involved in projects in the drilling and geotechnical industry. Its aim is to impart the core safety skills required of those working on geotechnical sites by building on their existing specialist technical skills and making it relevant to their place of work.

NEXT COURSE DATES: 18th September 2015

Contents

- 7** [250 RoGEP Registrants and Growing Fast](#)
Providing a registrant number update for the UK Register of Ground Engineering Professionals this month are RoGEP Panel Member David Gibson and Chairman of the RoGEP Panel, Jim Cook.
- 11** [Steeply sloping building sites made viable with Maccaferri retaining walls](#)
David Crowther, Technical Manager of Geo-engineering specialists Maccaferri, explains how innovation in retaining wall design, materials and construction could help relieve the UK's critical housing shortage.
- 17** [BS5930:2015 – the new version of the Standard on Ground Investigation is about to reach the public](#)
This month Professor David Norbury, Independent consultant and Chair of the Revision Panel, discusses BS5930, the 3rd version of which is due out in July 2015.
- 19** [Geophysical Borehole Imaging](#)
Providing an in-depth look at geophysical borehole imaging this month is geophysical specialist and Managing Director of European Geophysical Services, Kim Beesley.
- 27** [Directory](#)



For more information, contact Equipe Training:

- info@equipegroup.com
- www.equipegroup.com
- +44 (0)1295 670990
- +44 (0)1295 678232
- [Equipe Group](#)
- [@EquipeGroup](#)
- [EquipeGroup](#)

GEOTECHNICAL COURSES

SOIL DESCRIPTION WORKSHOP - £265 + VAT

25th September 2015
28th October 2015
4th December 2015

ROCK DESCRIPTION WORKSHOP - £265 + VAT

12th August 2015
30th September 2015
27th November 2015

GEOTECHNICAL FOUNDATION DESIGN - £225 + VAT

3rd September 2015
15th October 2015
10th December 2015

IN SITU TESTING - £225 + VAT

19th August 2015
6th October 2015
3rd December 2015

GEOTECHNICAL LABORATORY TESTING AWARENESS - £225 + VAT

20th August 2015
13th October 2015
1st December 2015

**BOOK ONLINE NOW @
WWW.EQUIPEGROUP.COM**



UPCOMING COURSES IN 2015

FROM THE UK'S
LEADING GEOTECHNICAL
TRAINING PROVIDER

Supported by



Welcome

Welcome to the 43rd Edition of **theGeotechnica** - the UK's fastest growing online geotechnically focussed e-magazine.

Included alongside this month's issue of **theGeotechnica** is the full Event Review of Geotechnica 2015 - the UK's largest geotechnical conference and exhibition that took place last month. The Event Review provides full statistical details of show including visitor numbers, as well as including an overview of the incredibly well received Geotechnical Conference.

On to the this issue of theGeotechnica itself: Providing a registrant number update for the UK Register of Ground Engineering Professionals this month are RoGEP Panel Member David Gibson and Chairman of the RoGEP Panel, Jim Cook.



Next up we have David Crowther, Technical Manager of Geo-engineering specialists Maccaferri. In this extremely insightful article David explains how innovation in retaining wall design, materials and construction could help relieve the UK's critical housing shortage.

Following this we have an update on the recent Eurocode updates that came into effect in July. In the cover story for this month's issue

of **theGeotechnica**, Professor David Norbury, Independent consultant and Chair of the Revision Panel, discusses BS5930, the 3rd version of which was unveiled in July 2015.

Finally, providing an in-depth look at geophysical borehole imaging this month is geophysical specialist and Managing Director of European Geophysical Services, Kim Beesley.

As with every new edition of the magazine, the Editorial Team here at **theGeotechnica** will be on the lookout for even more new, original and interesting content from all corners of the sector, and would actively encourage all readers to come forward with any appropriate and relevant content - whether it be a small news item or a detailed case study of works recently completed or being undertaken. If this content is media rich and interactive, then all the better. We are looking to increase the already large readership of the magazine through better social media integration and promotion, as well as improving content month on month.

Finally, for any content that is submitted we will ensure that an advertising space, proportionate to the quality of content provided, is reserved should you wish to place an advert in that single edition of the magazine. We hope you enjoy this month's edition of the magazine and are inspired to contribute your own content for the coming editions of **theGeotechnica**.

**Editorial Team,
theGeotechnica**

To book your place, please contact Equip Training:



info@equipegroup.com



www.equipegroup.com



+44 (0)1295 670990



+44 (0)1295 678232

Other courses are available. Please visit our website for more details.

**EQUIPE
GROUP**

250 RoGEP REGISTRANTS AND GROWING FAST

Providing a registrant number update for the UK Register of Ground Engineering Professionals this month are RoGEP Panel Member David Gibson and Chairman of the RoGEP Panel, Jim Cook.

The UK Register of Ground Engineering Professionals (UK RoGEP) now has 250 registrants - confirming the continuing progressive growth of the register. The original target was 700 registrants so the register is well on the way to achieving that.

RoGEP Panel Chairman Jim Cook commented: "I am really pleased the way the register is gaining in popularity and is taking the lead in Europe for the registration of ground engineering professionals". He added "In the few years that the register has been in existence, we have seen steady growth and industry acceptance. Indeed several major clients are now insisting on registration as a means of raising standards and project delivery".

Now that the register is gaining in size, it provides more confidence to both candidates who are considering applying and clients who are considering making formal registration

a requirement of ground engineering staff working on their projects. Recent tender documents in both the transport and water industries have seen specification clauses calling for key staff working on projects to be registered.

Ongoing discussions with various clients, consultants, contractors and other interested parties have confirmed the value of the register to all sections of the ground engineering profession.

Various communications with a wide variety of consulting engineering firms has also indicated that there is a widespread policy of encouragement and support for their staff to apply for RoGEP registration. It is worth noting that those who apply within 12 months of becoming Chartered with ICE, IoM3 (via their Professional Review route) or the Geological Society London can benefit from notable time saving, effort and a 50% application fee.

Therefore, 2015 is anticipated to be another busy year for new applications. There are increased numbers of assessors to cope with demand and the application process has been streamlined.

The decision last year to move to four fixed submission dates is paying off. It gives candidates a more certain date for achieving accreditation and makes the whole assessment and accreditation process easier to administer. The remaining 2015 submission deadlines are 4th August and 3rd November 2015.

"The names of all registrants are provided in the list published on the RoGEP webpages hosted on the ICE website..."

The names of all registrants are provided in the list published on the RoGEP webpages hosted on the ICE website, so ensuring transparency. Formal certificates are now being issued to all registrants. Discussions are ongoing regarding post-nominal letters but this is taking time owing to the significant legal processes involved.

The RoGEP panel now has 13 members representing clients, consultants, contractors and academia as well as the supporting professional bodies



Jim Cook hands over a RoGEP certificate to Alice Shrubshall - RoGEP Panel Professional Grade Representative

of the ICE, IOM3, Geological Society, Ground Forum and the AGS. Jim thanked his fellow panel members "The panel members are all volunteers who provide their time without charge and have been key to the progress that we have made to date. The early years have seen developments and improvements and these will continue so that the register

remains relevant and of value to the industry."

One such improvement has been an updated logo, which is helping with the distinctive identity of the register.

While RoGEP is very much a UK register, already there have been communications with other countries to explore

co-operation. As Jim Cook remarked "While we remain very open to collaboration with European countries in particular and will engage with similar organisations in other parts of the world, our primary focus is ensuring that we meet the aspirations of the UK ground engineering fraternity in the first place." ■



THE GEOTECHNICAL ACADEMY

Got the theory but missing the practice?

**On-the-ground practical training for
aspiring geo-professionals**

The Geotechnical Academy is a partnership between Geotechnical Engineering Ltd & Equipe Training, providing a unique, good value, high quality vocational geotechnical **CPD** and **training** to propel bright engineers through professional hoops and hurdles.

◆◆◆ **Enlisting Now** ◆◆◆

Interested or know someone who might be?

Contact us on: 01452 527743

Or visit our website: www.geotechnicalacademy.co.uk

◆ Peer support ◆ Mentoring ◆ Debate & Discussion ◆ Demonstrations ◆ Knowledge Transfer ◆ Confidence Building ◆ 8 sessions per group throughout the year



CPD Approved Courses for Geotechnical Academy Alumni

Specifying Site Investigations

This one day course will look at the various methods available to carry out intrusive and non intrusive investigation. Whilst the course will concentrate on geotechnical methods some geo-environmental methods will be briefly discussed. The course will look at the aims of SI and categorise the various stages in an investigation.

Soil Description Workshop

From 2007 new European Standards have started replacing the British Standards (Codes) under which investigations in the UK have been carried out. UK working practice will have to change to meet these new requirements but few practitioners are aware of the changes or the timetable. The workshop will comprise a series of lectures on the changes, and lectures on soil description followed by practical sessions describing soil samples.

Rock Description Workshop

From 2007 new European Standards have started replacing the British Standards (Codes) under which investigations in the UK have been carried out. UK working practice will have to change to meet these new requirements but few practitioners are aware of the changes or the timetable. The workshop will comprise a series of lectures on the changes, and lectures on rock description followed by practical sessions describing rock and compiling mechanical logs of rock core.

In Situ Testing

The course will cover both the theory and the practice of various In Situ Testing techniques used on typical geotechnical projects. In addition the courses will consider the effect that Eurocodes will have on the UK's current practice. This course provides an overview of in situ tests used in common practice and some of the more specialist tests together with their advantages and limitations.

Field Instrumentation and Monitoring

The course comprises a comprehensive one day appreciation of the complete process involved in Instrumentation and Monitoring in the geotechnical environment. The course provides an overview of the current guidance documents and their requirements. The course will consider the design of both individual installations and the installation of suites of instruments in the wider site context.

Geotechnical Foundation Design

This one day course will provide a general overview of foundation design. It will include an assessment of the use and choice of shallow foundations and piles. It will cover the derivation of bearing capacity formula and their use. Exercises will be carried out to calculate the working loads and settlement of simple foundations. The methods used to calculate these will be in accordance with those described in Eurocode.

IOSH Working Safely (on Geotechnical Sites)

This one day course is developed by industry specialists within RPA Safety Services and Equipe Training as a foundation to site safety. Its aim is to impart the core safety skills required of those working on geotechnical sites by building on their existing specialist technical skills. After attending the course, candidates should be able to identify hazards on site, understand basic safety legislation, participate fully and confidently in site safety consultation and manage priority risks to a sufficient standard.

IOSH Avoiding Danger from Underground Services

Partnering with RPA Safety Services once again, Equipe provide another IOSH certified health and safety course. This one day course is aimed at anybody involved in specifying, instructing, managing, supervising or actually breaking ground and really addresses the problems and risks related to underground services, which may be encountered during both planning and execution of geotechnical projects.

IOSH Safe Supervision of Geotechnical Sites

Equipe has partnered with RPA Safety Services, an independent occupational health and safety specialist, to provide a unique IOSH certified course for the Drilling and Geotechnics industry. The three day course is certified by IOSH, is specifically focussed on the geotechnical industry and provides a totally unique and relevant Health and Safety course for managers and supervisors.

Visit our websites for more details:
www.geotechnicalacademy.co.uk
www.equipegroup.com



**THE
GEOTECHNICAL
ACADEMY**

A collaboration between



**15% off
Equipe Courses
for Academy
Alumni**



8.0m high split level Gabion retaining wall for Huddersfield, West Yorkshire.

STEEPLY SLOPING BUILDING SITES MADE VIABLE WITH MACCAFERRI RETAINING WALLS

David Crowther, Technical Manager of Geo-engineering specialists [Maccaferri](#), explains how innovation in retaining wall design, materials and construction could help relieve the UK's critical housing shortage.

Although most UK housebuilding companies say that they are busier than they have been for years, we are also told that the country is in the middle of an acute housing shortage. Reasons are many and varied, including short-term materials shortages and the lack of



4.0m high Timber Crib retaining wall. Dumfries, Scotland.

skilled labour, but one which frequently finds itself at the top of pile is the lack of good quality building land.

Building on green-belt sites is not an environmentally responsible option and in October 2014, the then Communities Secretary Eric Pickles responded to calls to relax restrictions by saying he would be tightening the government's new planning rules on the subject of the greenbelt.

As a consequence, house builders have been forced to find ways of using more brown-field sites as well as land that was previously felt to be at the margins of usability – particularly steeply sloping sites that need considerable re-

“The construction material industry has responded positively to these challenges and has provided house builders with a range of innovative ground engineering solutions...”

profiling before being viable.

The construction material industry has responded positively to these challenges and has provided house builders with a range of innovative ground engineering solutions to make difficult sites

economically build-able.

One company at the leading edge of ground re-profiling is retaining solutions specialists Maccaferri. The company has developed a portfolio of retaining wall and soil reinforcement systems which allow major contour modifications through the introduction of retaining walls and engineered terracing. [see above]

From a site sustainability perspective, the re-use of site won soils as structural fill in these reinforced soil retaining structures virtually eliminates the need to import and export bulk materials and reduces heavy-truck movements to a minimum.

Gabions

Gabions are stone filled cages of woven wire mesh, nominally 2.0x1.0x1.0m. Their mass and flexible composition means that Gabion walls are ideal for engineered applications and can accommodate significant differential settlement, should this be a requirement.

“The un-bound stone infill also prevents the build-up of hydrostatic pressure behind the wall...”

The un-bound stone infill also prevents the build-up of hydrostatic pressure behind the wall and, because of these qualities, engineers throughout the world have frequently made gabions their retaining wall, solution-of-choice.

When used in combination with geosynthetic reinforcing geo-grid, they can create reinforced soil structures of immense strength and durability, as in the Maccaferri Paramesh system.

Gabions are also available in square welded wire composition for use where engineering requirements are less onerous or where a higher aesthetic finish is desired.

Green Terramesh

Green Terramesh is a modular, steep-slope, reinforced soil system. The integral



MacWall "Vertica" masonry faced wall. Inverkip, Renfrewshire.



Maccaferri FlexMac DT, temporary retaining wall under construction.



Maccaferri's Green Terramesh system at Bellway Homes "Inches" development overlooking the River Tay near Perth, Scotland.

stiffened face is designed to allow creation of a steeply sloping vegetated-face structure.

Double twist wire mesh forms the basis of the reinforced

"A bio-degradable blanket is factory fitted behind a stiff, steel mesh face to provide shape..."

facing unit. A bio-degradable blanket is factory fitted behind a stiff, steel mesh face to provide shape, prevent initial erosion and promote rapid vegetation establishment. For higher structures, geo-grids are used to supplement the woven mesh facing unit.

A wedge of topsoil behind and in contact with the blanket provides a moisture and nutrient reservoir, essential for successful vegetation.

Green Terramesh is an ideal

solution when a naturally vegetated "green-faced" steep slope is required, such as in environmentally sensitive areas.

Timber Crib

Timber Crib is a mass gravity system comprising interlocking timber header and stretcher units that form a cribwork structure which is then filled with stone, typically 75-40mm. The system is straightforward to install and forms an effective retaining structure where the aesthetics of timber are desired.

Sustainability and aesthetics are often strong influencing factors in the choice of timber crib over other retaining wall systems. Timber provides a unique balance of function and appearance. Timber weathers naturally and it is easy to build in pockets of soil behind the wall face which can be planted to further soften the aesthetics.

Masonry

Maccaferri's MacWall system provides a masonry faced retaining wall. The blocks work with geo-grids to form a robust and highly efficient reinforced **"The individual, split-faced concrete blocks are dry laid by hand onto prepared granular footings - no concrete or mortar is required."**

soil structure. The individual, split-faced concrete blocks are dry laid by hand onto prepared granular footings - no concrete or mortar is required.

Geogrids are sandwiched between the block courses and laid out behind the wall face in combination with layers of compacted backfill. Speed of installation and the ability to accommodate complex curves to the near vertical

wall face make reinforced-soil, segmental block, masonry retaining walls extremely popular on high aesthetic value schemes.

Temporary structures

For projects where temporary retaining structures are required Maccaferri has developed a re-useable system. FlexMac DT is essentially a network of open bottomed wire cages similar to Gabions, but lined with geotextile fabric. The system is quick to install and uses site won spoil as bulk fill rather than the stone.

FlexMac DT is supplied ready assembled but folded to allow easy handling on site. The unit opens to form three rectangular cells nominally 1.0m cubed, which can be connected to form linear runs of any required length. The wall height can also be readily increased by stacking additional units on top of the bottom run.

"The open base of the cells means that the units can be removed by mechanical lifting, allowing the fill to discharge, then folded away and retained for future use."

The open base of the cells means that the units can be removed by mechanical lifting, allowing the fill to discharge, then folded away and retained for future use.

Design, Supply, Install

For clients requiring the peace of mind of a comprehensive, turnkey service, Maccaferri Construction, the Company's specialist installation subsidiary, is able to provide a fully indemnified design, supply and install package throughout

the UK and Ireland.

Conclusion

From an engineering design perspective, soil retaining walls are relatively straightforward structures. As soil is weak in tension it cannot support itself at steep angles. In equilibrium, most soils would create nothing more than a gentle slope between two grades. A vertical or near vertical wall would be impossible to build with soil alone.

By introducing a mass gravity system such as a Gabions or Timber Crib or a reinforced soil system such as Green Terramesh, Paramesh or a segmental block masonry, it is possible to retain large volumes of material and design steeper slopes that allow the creation of flat buildable spaces of land which would have otherwise been unsuitable for housing development. ■

SAFER | G



THE WORLD'S FIRST SENSOR BASED ROTARY RIG GUARD

Introducing Equipe Geosolutions' latest product innovation: SAFER G. Primarily aimed at land based rotary drilling rigs, SAFER G is a sensor-based guarding system that allows for increased access and productivity whilst operating on site, removing the need for restrictive and fully enclosing guarding systems. A less obstructive method of guarding, the sensors operate outdoor in all weathers and function in even the most harsh conditions and environments including: Rain, sleet, snow, ice and associated low temperatures; Sun and associated high temperatures; Dust, dirt (including mud, soil, gravel, vegetation, etc); High volumes of water, air, mist, foam and other flush medium. The sensors are fully encased, with no moving parts and ultra-robust.



THE BENEFITS OF SAFER G

- Improves rig **productivity**
- **Improves reliability** in personnel protection
- **Complies** with safety and machinery legislation
- Fully compatible with **all rig types**
- Creates a **safer work environment**

KeyLogbook®

digital logging solution

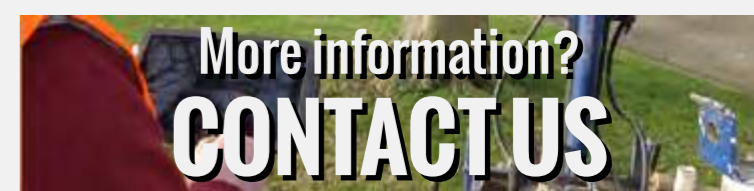


BOREHOLE AND TRIAL PIT LOGGING SOLUTION

KeyLogbook® revolutionises the way site data is captured, recorded and transmitted. Drillers and engineers no longer need to keep re-entering the same data repetitively. You will therefore reduce errors and make the whole process **simpler, faster, smarter, greener and more efficient**. The system records all site data at source and transmits it directly from site, saving time and money from the outset.

- Revolutionises the way site data is captured, recorded and transmitted
- **Confidence that all data is complete**
- AGS Data available immediately
- **Accurate financial control**
- Quicker, more efficient turnaround of logs and data
- **Easier to maintain chain of custody**
- NEW TRIAL PIT LOGGING FUNCTION

FULL PACKAGE AVAILABLE FOR PURCHASE NOW
30 DAY FREE TRIAL AVAILABLE FOR DOWNLOAD NOW



For more information, contact Equipe Geosolutions:

- ✉ info@equipegroup.com
- 🌐 www.equipegroup.com
- ☎ +44 (0)1295 670990
- 📠 +44 (0)1295 678232

- 🌐 Equipe Group
- 🐦 @EquipeGroup
- 📺 EquipeGroup



For more information, contact Equipe Geosolutions:

- ✉ info@equipegroup.com
- 🌐 www.equipegroup.com
- ☎ +44 (0)1295 670990
- 📠 +44 (0)1295 678232

- 🌐 Equipe Group
- 🐦 @EquipeGroup
- 📺 EquipeGroup



BS5930:2015 - THE NEW VERSION OF THE STANDARD ON GROUND INVESTIGATION IS ABOUT TO REACH THE PUBLIC

This month Professor David Norbury, Independent consultant and Chair of the Revision Panel, discusses BS5930, the 3rd version of which is due out in July 2015.

BS5930 has underpinned ground investigation practice in the UK and abroad since its original publication in 1981. The original version broke new ground by standardising for the first time many of the aspects of an investigation and was published at about the same time as international guidance from ISRM and IAEG on similar themes. This standard always had wider coverage by including guidance on selection of drilling methods, and covering field and laboratory

tests.

The subsequent 1999 revision was an update to reflect the ongoing evolution of investigation methods. Since then there have been two major amendments (2007 and 2010) to incorporate the requirements of EN standards related to Eurocodes, specifically the standards associated with EN1997-2, in sampling, testing and soil and rock description. BSI rules do not permit additional amendments, and the decision was taken to undertake a full revision not only to include additional requirements relating to the Eurocodes but also to ensure that current best practice was incorporated throughout the document.

“BS 5930:2015 presents an update on the requirements for the investigation of sites in order to assess their suitability for construction...”

BS 5930:2015 presents an update on the requirements for the investigation of sites in order to assess their suitability for construction and to identify the characteristics of a site that affect the design and construction of the project. The Standard emphasises the importance of the evolving ground model and that ground investigation is not

necessarily a linear process. It also considers related issues including the environment and the security of adjacent land and property.

According to the drafting panel, BS 5930 should be used on all investigations to help ensure:

- geotechnical design and ground investigations are achieving the best results;
- UK practitioners are carrying out their work in ground investigation and geotechnical design in accordance with the latest EN and ISO standards;
- UK practitioners can export their skills to other countries where the same international standards are in use;
- the most appropriate equipment is deployed to carry out ground investigation from selection of exploratory techniques, to methods of sampling, testing and measurement;
- complete, accurate and informative description of the soils and rocks encountered; and
- complete reporting of the investigation for use by others in the design chain whether by paper, pdf and digital data transfer formats.

Apart from changing the title from ‘site’ to ‘ground’ investigations, readers might not see much change in the content. However, a lot of effort has been input

to update best and current practice, accommodate EN ISO standards and to cut repetition. Not least, the structure of the content has been significantly revised and the Section headings of the revised standard are listed below. Several of these sections have been raised from clause to section level, as denoted by an asterisk below, to better reflect their importance to the investigation process.

1. Preliminary considerations
2. Desk studies and field reconnaissance**
3. Planning ground investigations
4. Field work
5. Geophysical field investigations**
6. Description of soils and rocks
7. Field tests
8. Field instrumentation**
9. Laboratory tests on samples
10. Reports and interpretation
11. Review during and after construction

The schedule of Annexes supporting the main text is as follows:

- National safety legislation**
- General information required for desk study
- Sources of information
- Notes on field reconnaissance**
- Detailed information for design and construction
- Ground Investigation in ground affected by voids *

- Photographic records**
- Integrated investigations**

The revision process started in late 2011 and was completed in late 2014 when the draft for public comment was issued. The public certainly commented with over 1000 comments being received – the largest number ever seen by BSI. A period of intense work in early 2015 saw these comments reviewed and incorporated ready for publication in July 2015. The four year period to revise such a large standard is testament to a lot of hard work by the members of the Panel listed here for the record:

- David Norbury representing the Geological Society of London
- David Entwisle representing AGS
- Dick Gosling representing British Drilling Association
- John Powell present as Chair of B/526/3
- Andrew Ridley co-opted to write on instrumentation
- Mike Smith present to guide us on integrated investigations
- Graham Taylor representing British Geotechnical Association

and with significant contributions from George Tuckwell on geophysics and Tom Phillips on safety, and not forgetting our patient editor Mary Groom. ■

GEOPHYSICAL BOREHOLE IMAGING

Providing an in-depth look at geophysical borehole imaging this month is geophysical specialist and Managing Director of [European Geophysical Services](#), Kim Beesley.

A continuous orientated image of the borehole wall is extremely useful to geologists by providing in situ information on the geology, structure, fractures and stress orientation. Additionally the images can assist in orientating core samples and fine tuning core logs. "With the developments in digital technology over the years both optical and acoustic imaging of boreholes using slim-line televewers is possible..."

logs. With the developments in digital technology over the years both optical and acoustic imaging of boreholes using slim-line televewers is possible and is proving cost effective in geotechnical site investigations.

The Acoustic Imager produces an image of the borehole

wall using the travel time and amplitude of an acoustic signal transmitted and received by a rotating ultrasonic sensor in the tool. The variance of the acoustic properties of the formation and associated features enable the nature of fractures, fissures, veins, bedding planes and lithological changes to be determined. The reflected amplitude of the acoustic signal is a function of rock hardness - see Figure 1. Features such as fractures and bedding can be identified - see Figure 2. In unstable boreholes an acoustic image can also be recorded through plastic casings - see Figure 3. The imagers have high resolutions of the order of 0.5 to 2mm.

"The logs in Figure 4 illustrate the relative resolution of common formation logs such as natural gamma and focussed resistivity..."

The logs in Figure 4 illustrate

the relative resolution of common formation logs such as natural gamma and focussed resistivity, the natural gamma having the least resolution, but all logs respond to the differences between mudstone and limestone in this example.

"The images are orientated to Magnetic North and displayed as an unwrapped image log."

The images are orientated to Magnetic North and displayed as an unwrapped image log. This enables detailed structural interpretations to be made - see Figure 5. Also the production of a virtual core is possible see - Figure 5 (right hand side) which is a useful aid to orientating core.

The Optical Imager uses a precision-machined prism and CCD camera to produce high definition optical images of the borehole wall which can be captured in a variety of horizontal and vertical resolutions. The images are orientated to Magnetic North and displayed as an

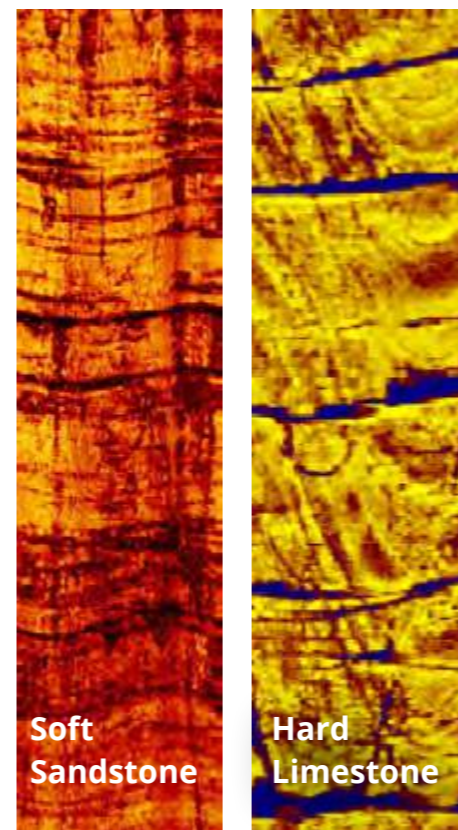


Figure 1 (above): Acoustic images of soft and hard formations.

Figure 2 (right): Acoustic image clearly showing fractures and bedding.

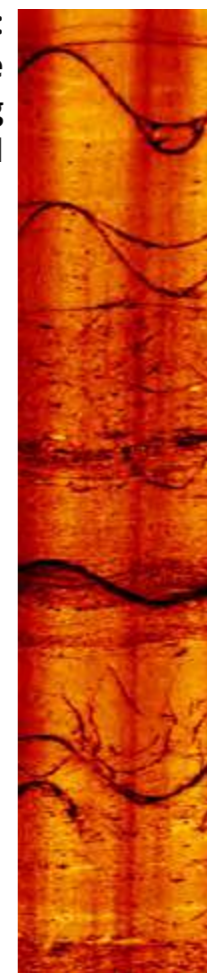


Figure 3 (right): This is an acoustic amplitude log obtained through plastic casing. The upper section of the borehole was very broken and prone to collapse, so the borehole was lined with plastic casing and the acoustic imaging carried out through the plastic.

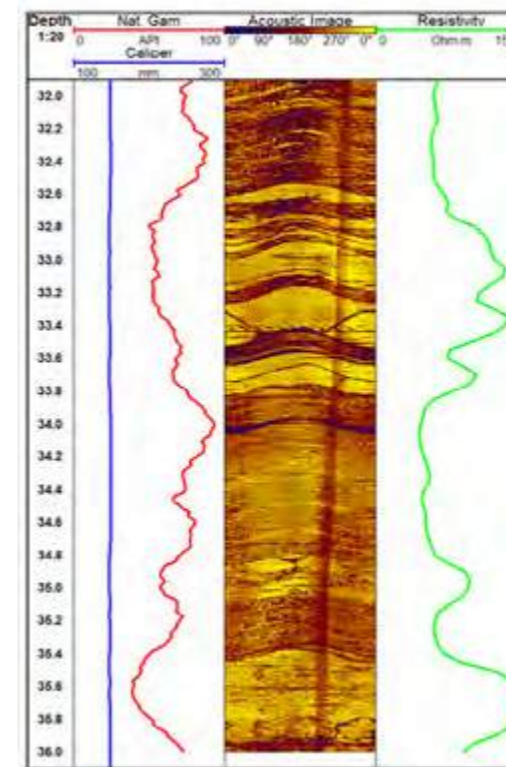
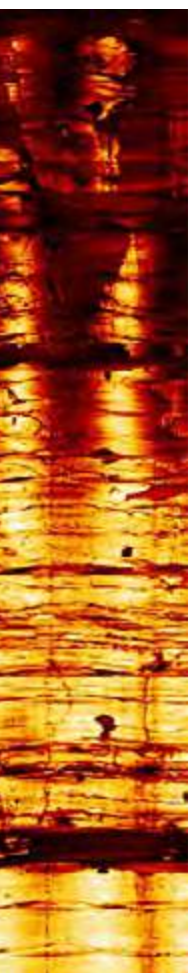


Figure 4 (above): Comparison of an acoustic image with other geophysical logs.

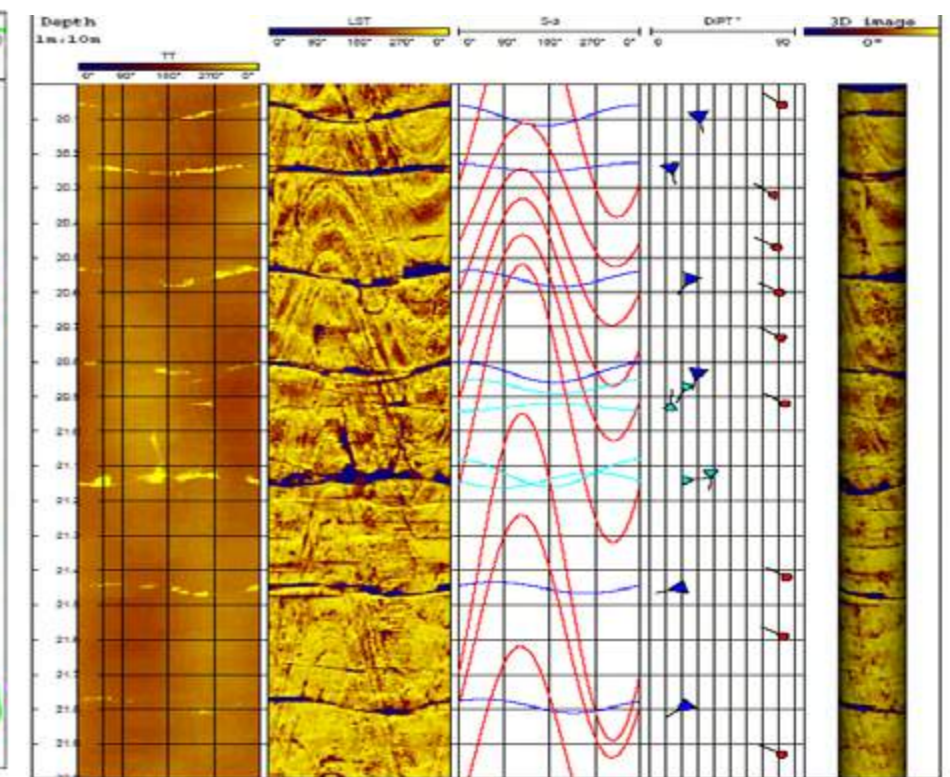


Figure 5 (above): Acoustic imaging with structure picking.

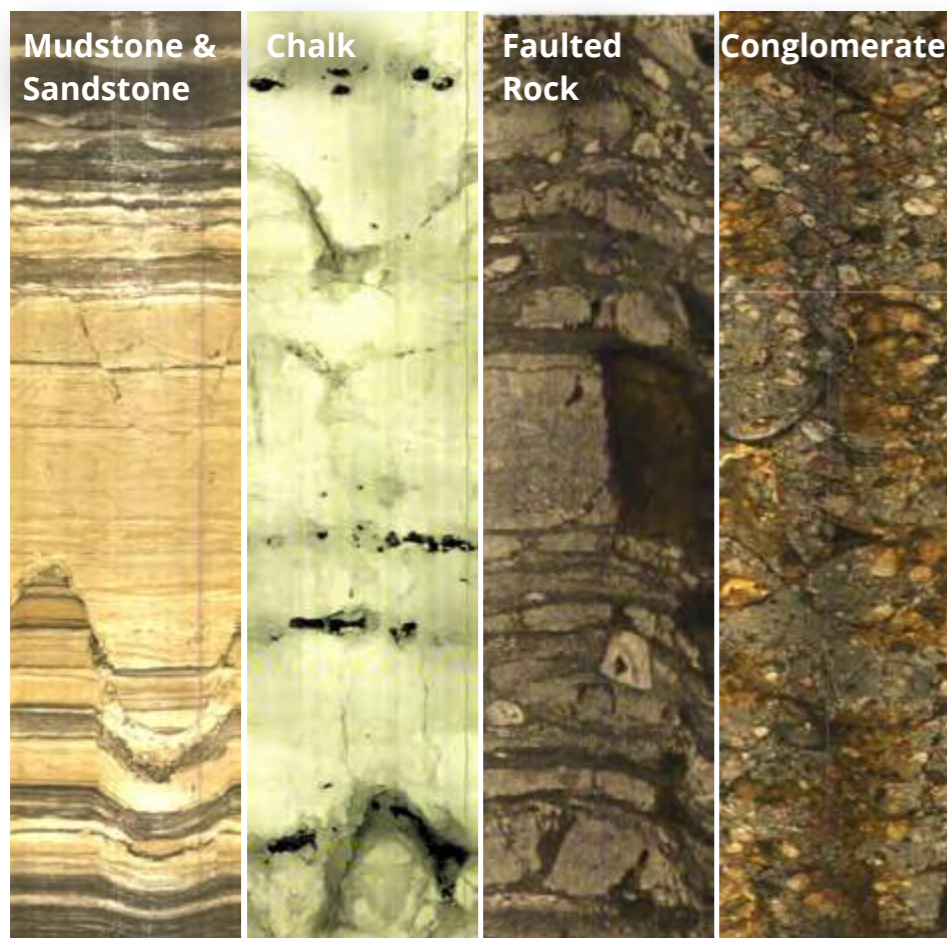


Figure 6 (left): Examples of Optical Images of a variety of rock types.

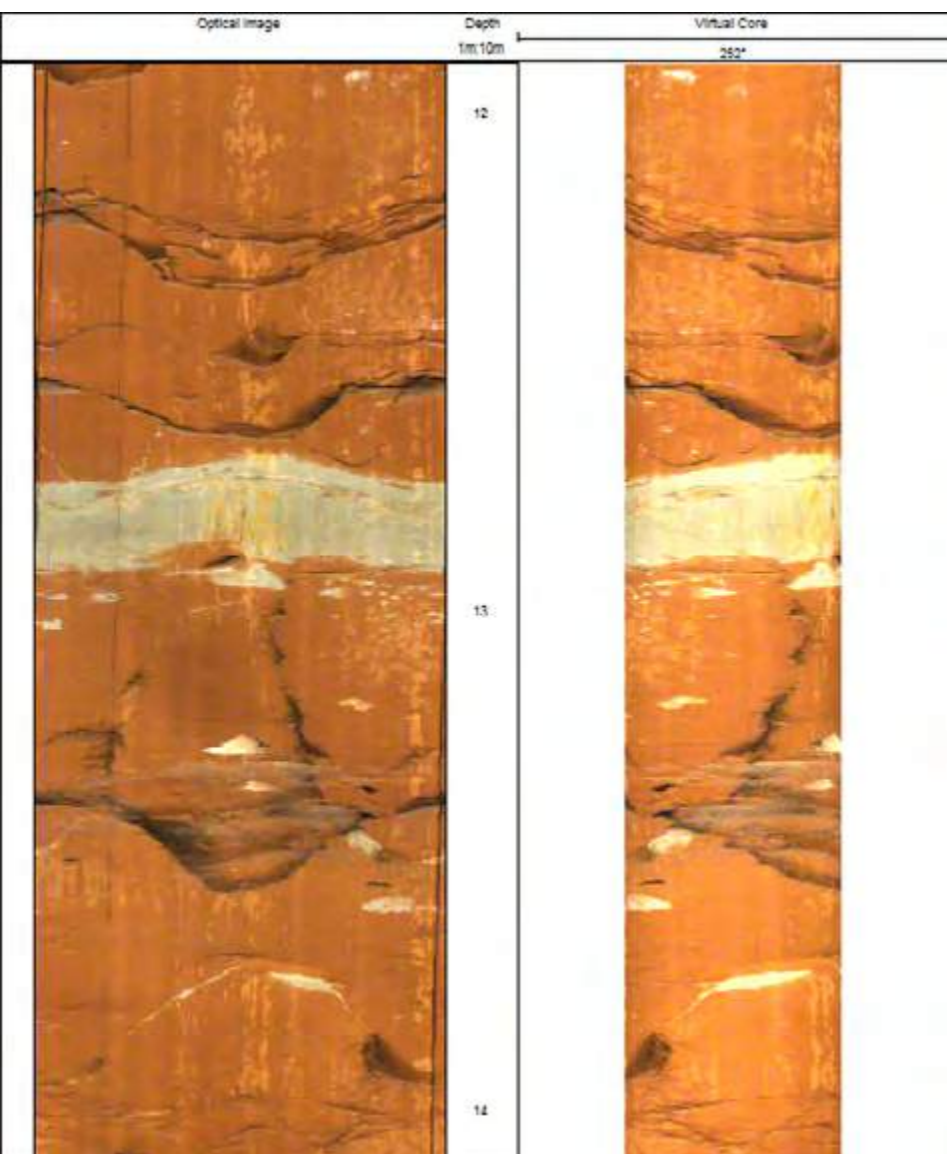


Figure 7 (left): An unwrapped optical image (LHS) of sandstone plus a virtual core (RHS).

“Structure picking and interpretations can be made in the same way as for the acoustic imager. The optical imager can be run above the water level in dry sections or in clean, clear fluid.”

unwrapped image logs - see Figures 6 and 7 (left). Structure picking and interpretations can be made in the same way as for the acoustic imager. The optical imager can be run above the water level in dry sections or in

clean, clear fluid.

Borehole Conditions

Good quality boreholes and conditions therein are paramount for best results. Boreholes should be thoroughly cleaned out to ensure there is no smearing of the borehole wall (see Figure 8 on next page) and those that are water filled allowed to settle for a period of time. Even plumbing or dipping the borehole fluid just prior to surveying can disturb the water. Good water clarity is essential for the optical imager and for this reason this tool is run first and recorded downwards for the best chance of obtaining quality images.

“As both techniques are very sensitive to diameter changes and borehole wall rugosity, the choice of drilling technique is important to ensure a good regular bore as possible...”

The acoustic imager does work in cloudy water or homogenous mud, providing the amount of particles in suspension is low. As both techniques are very sensitive to diameter changes and borehole wall rugosity,

Deepen your expertise in drilling and geology

Looking for a chance to join an experienced and enthusiastic ground investigation team? ESG is one of the UK's leading geotechnical services companies and we're seeking to employ the best talent in our industry:

Senior Geotechnical Reporting Engineer - Doncaster

Senior Geotechnical Field Engineer - Doncaster

Cable-Percussion Driller - Nationwide

Cable-Percussion Lead Driller - Nationwide

Think you've got what it takes to add value to our success? Click the job titles to find out more and apply.

ESG is an equal opportunities employer.

www.careers.esg.co.uk



“Most imagers have an optimum diameter working range of 80 - 250mm, so typical geotechnical site investigation boreholes of 90 -146mm diameter are ideal.”

the choice of drilling technique is important to ensure a good regular bore as possible - such as using diamond bits. Most imagers have an optimum diameter working range of 80 - 250mm, so typical geotechnical site investigation boreholes of

90 -146mm diameter are ideal.

Some times certain features are better seen on one imager type rather than the other - see Figure 9, hence it may be advantageous to run both types of imagers and enhance interpretations.

Other applications

Optical imaging has been used successfully to monitor the success of cement pressure grouting of fractured formation - see Figure 10, where grouting was done in two phases. ■

Figure 8 (right): Optical image of sandstone where lower section has not been sufficiently cleaned out - resulting in a smeared borehole wall.

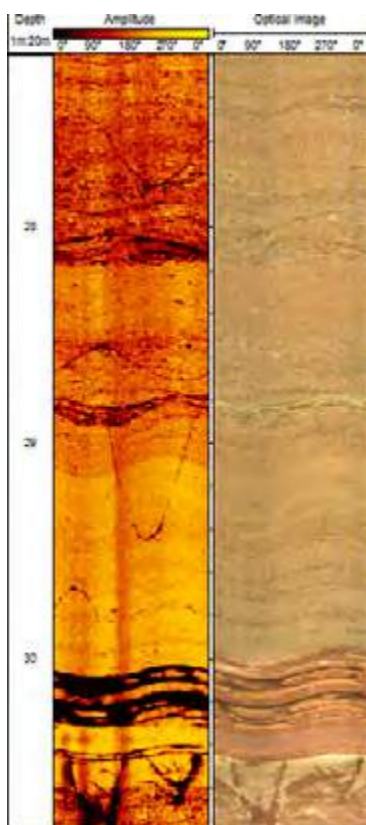


Figure 9 (above): Comparison of Acoustic and Optical images. Some features are seen on the acoustic and not on the optical.

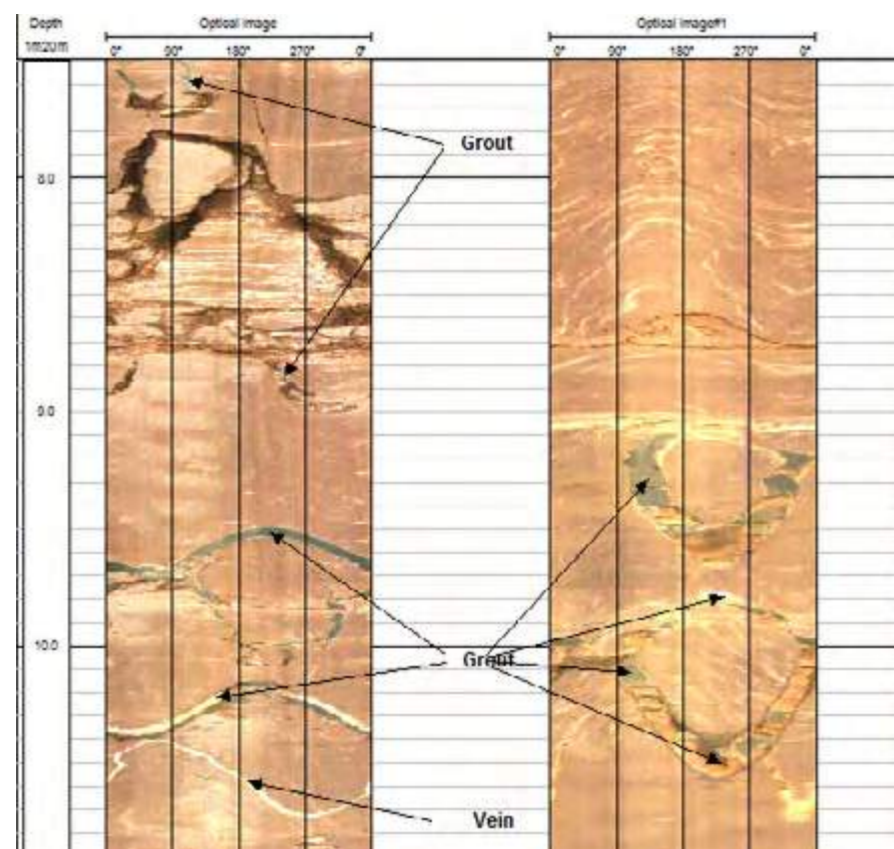


Figure 10 (above): This borehole was drilled 3m away from one used to grout fractures in broken sandstone. The grout is seen as white (1st phase) and grey (2nd phase) fracture filling.

GEOPHYSICS IN GEOTECHNICAL PRACTICE

Seminar Date: TBC

The seminar will increase the awareness regarding the correct use of geophysics for non-invasive investigations, structural and geological mapping and ground modelling which can provide an in depth and continuous understanding of both surface and subsurface conditions and can also reduce the risk of underground hazards and optimise budgets.

What delegates will learn

- Have an understanding of the importance of using a geophysics specialist
- Advantages and limitations of land and downhole geophysical techniques
- Have an understanding of how geophysics can be used to reduce risk
- Have an understanding of when geophysics can complement obtrusive investigations
- Have an appreciation of what the results mean and how they are obtained

Who should attend?

Geophysical Investigation Specifiers, Geophysics Graduates, Geotechnical Engineers, Engineering Geologists, Consulting Engineers, Designers, Developers and Clients.

Content Covered

- How to choose the best techniques
- Key points when scheduling geophysics
- Using geophysics to manage risk
- Overview of surface techniques
- Overview of down-hole techniques
- Advantages and limitations of techniques
- Data handling
- Advances in geophysics
- Case Studies



In collaboration with



Speakers:

Kim Beesley, Managing Director, European Geophysical Services Ltd

Dr Simon Hughes, Operations Manager, TerraDat Ltd

Location:
Equip Training
Offices, Banbury



ONLY £150 + VAT
PER DELEGATE

Interested?
BOOK ONLINE NOW

For more information, contact Equip Training:

- ✉ info@equipegroup.com
- 🌐 www.equipegroup.com
- ☎ +44 (0)1295 670990
- 📠 +44 (0)1295 678232
- 🌐 Equip Group
- 🐦 @EquipGroup
- 📺 EquipGroup

EQUIPE GROUP



AGS Association of Geotechnical & Geoenvironmental Specialists



CONE PENETRATION TESTING IN GEOTECHNICAL PRACTICE

Seminar Date: 24th - 25th November 2015

An essential comprehensive training course and refresher for geotechnical and geo-environmental practitioners involved in Cone Penetration Testing for Onshore and Offshore Geotechnics. The course is devoted to raising awareness of current test procedures, advances, data derived from the tests and the importance of quality control.

What delegates will learn

- Have an understanding of the importance of using CPT specialists
- Advantages and limitations of CPT tools and techniques
- Have an understanding of how CPT data can be used for soil interpretation
- Have an understanding of how CPT data can be used for design
- Have an appreciation of recognising suspect/erroneous data

Who should attend?

Onshore and offshore specifiers, procurers and users of Cone Penetration Testing. Geotechnical Engineers, Engineering Geologists, Consulting Engineers, Civil Engineers, Designers, Developers and Clients involved in onshore and offshore ground investigations.

Seminar Programme

Day 1

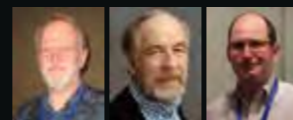
08:45 – 09:00	Registration – Tea/Coffee
09:00 – 09:15	Introduction
09:15 – 10:00	Historic overview, equipment and procedures, data acquisition
10:00 – 10:45	Standards and guidelines. Data processing and corrections
10:45 – 11:10	Quality control – with examples offshore and onshore
11:10 – 11:30	Morning Break
11:30 – 12:15	Soil profiling and soil identification
12:15 – 13:00	Interpretation in terms of soil parameters in sand
13:00 – 14:00	Buffet Lunch
13:30 – 14:30	Demonstrations
14:30 – 15:15	Interpretation in terms of soil parameters in clay
15:15 – 15:30	Afternoon Break
15:30 – 16:15	Question and answer session
16:15 – 16:30	Summary and Close

Day 2

08:45 – 09:00	Tea/Coffee
09:00 – 09:30	Interpretation in other soil types (silt, chalk, peat --)
09:30 – 10:00	Full flow penetrometers in very soft clays
10:00 – 10:45	Advantages of other sensors (seismic cone, electrical resistivity, nuclear density etc)
10:45 – 11:00	Morning Break
11:00 – 11:35	Direct application of CPT data (pile design, compaction control, correlation to SPT)
11:35 – 12:10	Sampling with CPT equipment
12:10 – 13:00	Case histories onshore and offshore
13:00 – 14:00	Buffet Lunch
13:30 – 14:30	Demonstrations
14:30 – 15:30	Work shop on CPT interpretation
15:30 – 15:45	Afternoon Break
15:45 – 16:00	Summary and Close



In collaboration with



Speakers:

Dr John Powell,
Technical Director,
GEOLABS Ltd

Tom Lunne,
Expert Advisor, NGI

Darren Ward
Managing Director, In
Situ SI Ltd

Location:



**ONLY £350 + VAT
PER DELEGATE**

Interested?
BOOK ONLINE NOW

Health and Safety Specialists



Established in 1995, we offer a wide range of services designed to support clients and businesses throughout the UK. **Our clients know us, trust us and value the personal service we provide.** Our consultants are Chartered Members of IOSH (CMIOSH) or relevant professional bodies, registered on the OSHCR and have a track record of providing pragmatic and competent advice.

- Safety policies and arrangements
- IOSH and CIEH training
- Bespoke training
- Site and systems audits
- Construction Phase Plans
- Fire risk assessments
- Noise surveys
- Face fit testing
- Health surveillance
- Air monitoring
- Risk assessments
- Training



RPA SAFETY SERVICES Ltd

Telephone: 01933 382004

Email: enquiries@rpsafetyservices.co.uk

Website: www.rpsafetyservices.co.uk

Chemtest

The UK & Ireland's premier environmental laboratory



The right chemistry to deliver results...

Analysis is undertaken for the following industry sectors:

- Environment
- Remediation
- Geotechnical
- Rail
- Construction
- Waste Management
- Asbestos
- Petrochemical

For more information on our services please contact us on
t. +44 (0) 1638 60 60 70 w. chemtest.co.uk

Chemtest

Dipol Road, Halesowen, CE6 9PL
22 Farnley Way, Coventry West Midlands CV3 2FQ
Unit 2, Kennedy Enterprise Centre, Blackwell Road, Dulais, BT11 9DT

QUALITY SLOPE DATA

from our innovative
slope climbing rigs



For more information, contact Equipe Training:

- info@equipegroup.com
- www.equipegroup.com
- +44 (0)1295 670990
- +44 (0)1295 678232
- Equipe Group
- @EquipeGroup
- EquipeGroup



01452 527743
geotech@geoeng.co.uk
www.geoeng.co.uk



Directory

WANT TO ADVERTISE IN THE GEOTECHNICA?

1. Select your advert size.
(Full, Half, Quarter Page, Directory Entry, etc)
2. Select timescale.
(1, 3, 6 or 12 Months)
3. Format your artwork.
(Adobe PDF, .jpg or .png)
4. Send your artwork to us.
(magazine@geotechnica.co.uk,
or contact us on 01295 670990)

Advert Size	Single Insertion
Double Page	£980
Full Page	£550
Half Page	£310
Third Page	£260
Quarter Page	£160
Sixth Page	£125
Directory Entry (Art)	£40
Directory Entry (Text)	£30

Rates for advertisements placed for longer than a single month are negotiable. Please contact magazine@geotechnica.co.uk for details.

2015 Advertising Rates (£) - All rates are given excluding VAT.

geotechnical specialists

Soils Limited
Newton House
Tadworth
Surrey
KT20 5SR

soils
LIMITED
Geotechnical and
Environmental Consultants

Phone 01737 814221
Fax 01737 812557
Web www.soilslimited.co.uk

health and safety

RPA SAFETY SERVICES Ltd
SAFETY SERVICES FOR BUSINESSES

iosh **QMCR**
Registered Consultant

Email: enquiries@rpsafetyservices.co.uk
Telephone: +44 (0)1933 382004
Web: www.rpsafetyservices.co.uk

geotechnical software

Datgel - the gINT Experts

Datgel
DATA SOLUTIONS
Geotechnics • Geoenvironment • Laboratory

- ▶ gINT Add-In software products for CPT, SI, lab testing and monitoring
- ▶ Geotechnical data management
- ▶ Custom development services
 - gINT reports, databases and correspondence files
 - gINT Rules Add-Ins
 - Microsoft .NET, SQL Server, Excel and Access
- ▶ gINT and Datgel software training

www.datgel.com | +44 20 36953856 | sales@datgel.com

laboratory services

Chemtest

THE RIGHT CHEMISTRY TO DELIVER RESULTS

11 Depot Road, Newmarket, CB8 0AL
Telephone: +44 (0) 1638 606 070 | Fax: +44 (0) 1638 606 071
Email: sales@chemtest.co.uk | Website: www.chemtest.co.uk

drilling contractors

BOREHOLE SOLUTION LTD

Borehole Solution LTD HQ
8 Enterprise Court
Eagle Business Park
Yaxley
Peterborough
PE7 3GR

T: 01733 685340 | M: 07969715655
W: boreholesolutions@gmail.com | E: www.boreholesolutions.co.uk

geophysics

European Geophysical Services
Delivering geexcellence

European Geophysical Services Limited
22 Sansaw Business Park, Hadnall,
Shrewsbury, Shropshire SY4 4AS, UK

Telephone: +44 (0)1939 210 710
Fax: +44 (0)1939 210 532
Email: eurogeophys@europeangeophysical.com
Web: www.europeangeophysical.com

GEOTECHNICAL DATA MANAGEMENT SOFTWARE

TRANSFORMED

START TRANSFORMING THE WAY YOU VIEW DATA WITH A FREE TRIAL TODAY.

HoleBASES! **AUTODESK**
Geotechnical & Geoenvironmental | Geotechnical Industry Partner

ELAB

- Free Sample Collection
- Free Container Supply
- Fast Track Processing

Soil / Water / Asbestos Contamination Data
www.elab-uk.co.uk

Tel: 01424 718 618
Email: info@elab-uk.co.uk
Unit A2, Windmill Road, St Leonards on Sea, TN38 9BY

geotechnical
A ground investigation you can rely on.

Geotechnical Engineering Limited
Centurion House
Olympus Business Park
Queodeley, Gloucester
GL2 4NF

Telephone: +44 (0)1452 527743
Fax: +44 (0)1452 729314
Email: geotech@geoeng.co.uk
Web: www.geoeng.co.uk

TERRA DAT
geophysical innovation

Engineering & Environmental Geophysics

TerraDat UK Ltd
Unit 1, Link Trade Park
Cardiff CF11 8TQ
United Kingdom

Phone: +44 (0)8707 303050
Fax: +44 (0)8707 303051
Email: web@terradat.co.uk
Web: www.terradat.co.uk

ADVERTISE HERE FOR JUST £40 A MONTH
OR £380 FOR 12 MONTHS (10 ISSUES)

site investigation

geotechnical
A ground investigation you can rely on.

Geotechnical Engineering Limited
Centurion House
Olympus Business Park
Queodeley, Gloucester
GL2 4NF

Telephone: +44 (0)1452 527743
Fax: +44 (0)1452 729314
Email: geotech@geoeng.co.uk
Web: www.geoeng.co.uk

theGeotechnica



Driving our industry forward...

Equipe Group
The Paddocks, Home Farm Drive
The Upton Estate
Banbury, OX15 6HU

Find us online:



Equipe Group



@EquipeGroup



Equipe Group



Equipe Group