

How will updates to Health and Safety Regulations affect you?

An extensive look at CDM 2015 following the regulations update

New Lab Product Development

GDS reveal details about the multi-directional dynamic cyclic direct simple shear apparatus

Geotechnica 2012 - A Retrospective

A look back at the fourth Geotechnica as we build towards 2015's show

Asbestos in soil

An update from Hazel Davidson of Derwentside Environmental Testing Services

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17th June 2015, 12th August 2015
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Welcome

Welcome to the 40th Edition of **theGeotechnica** - the UK's fastest growing online geotechnically focussed e-magazine.

This month, once again, we have a fantastic line-up of insightful and informative articles that make for a must-read.



The first article of this month's issue is also our cover article and comes from Tom Phillips of RPA Safety Services, in conjunction with Equip Training. This month Tom examines CDM2015 and how the changes to the regulations could directly affect your day-to-day work.

The second article of this month's issue is also the cover article. The article comes from the GDS Instruments' Technical Team. This month GDS turn their focus to their newly developed product, a multi-directional dynamic cyclic direct simple shear apparatus.

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look back at previous Geotechnica events in the build-up to this year's event in July. This month Calum takes a look at Geotechnica 2012 - the fourth event in Geotechnica's history.





The final article this month comes from Hazel Davidson of Derwentside Environmental Testing Services. In this excellently informative article, Hazel provides a welcome update on asbestos in soils.

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**.

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HEALTH AND SAFETY UPDATES: CDM2015

Writing for **theGeotechnica** this month is Tom Phillips of [RPA Safety Services](#), in conjunction with [Equipe Training](#). This month Tom examines CDM2015 and how the changes to the regulations could directly affect your day-to-day work.

Over the last 12 months, we have all been discussing forthcoming changes to the Construction Design and Management Regulations. These have now been laid before parliament and unless there are any last minute changes (this is very unlikely) they will come into force on the 6th of April 2015. They will thereafter be known

as CDM2015.

All projects starting after this date will need to comply with the new regulations. All existing projects must be compliant by 6th October 2015.

They mean significant changes to your duties as an organisation whether you are a client, a

“The following document attempts to answer questions you may have and give some guidance as to what is required.”

designer or a contractor. The aim of the regulations is to simplify the CDM process, reduce bureaucracy and improve safety – particularly on smaller construction sites.

The following document attempts to answer questions you may have and give some guidance as to what is required. What constitutes construction under the terms of the regulations?

The definition of construction remains broadly unchanged from the 2007 version:

“Construction means the carrying out of any building, civil engineering or engineering construction work...”

Construction means the carrying out of any building, civil engineering or engineering construction work and includes—

(a) the construction, alteration, conversion, fitting out, commissioning, renovation, repair, upkeep, redecoration or other maintenance (including cleaning which involves the use of water or an abrasive at high pressure, or the use of corrosive or toxic substances), de-commissioning, demolition or dismantling of a structure;

(b) the preparation for an intended structure, including site clearance, exploration, investigation (but not site survey) and excavation (but not pre-construction archaeological investigations), and the clearance or preparation of the site or structure for use or occupation at its conclusion;

(c) the assembly on site of prefabricated elements to form a structure or the disassembly on site of the prefabricated elements which, immediately

before such disassembly, formed a structure;

(d) the removal of a structure, or of any product or waste resulting from demolition or dismantling of a structure, or from disassembly of prefabricated elements which immediately before such disassembly formed such a structure;

(e) the installation, commissioning, maintenance, repair or removal of mechanical, electrical, gas, compressed air, hydraulic, telecommunications, computer or similar services which are normally fixed within or to a structure.

What are the main changes?

The main changes are as follows:

- Replacement of the CDM Coordinator (CDMC) role, with the role of Principal Designer (PD)

“Client must appoint (in writing) a Principal Designer (PD) and Principal Contractor (PC) if a project involves more than one contractor...”

- Client must appoint (in writing) a Principal Designer (PD) and Principal Contractor (PC) if a project involves more than one contractor (regardless of notification status) at the earliest practicable opportunity and at least before site work starts

- Domestic work will be covered under the full scope of the regulations

- Construction phase health and safety plans will be required for all projects

“The notification threshold changes to cover projects lasting more than 30 working days and having more than 20 workers working simultaneously...”

- The notification threshold changes to cover projects lasting more than 30 working days and having more than 20 workers working simultaneously at any point in the project, or exceeding 500 person-days

What will be kept?

Most general duties similar to those under the Health and Safety at Work Act and Management Regulations, such as the duties to others and the duties to produce risk assessments, will remain. The following will also be kept:

- The Client is the person who whom the work is ultimately being undertaken

- Principles of prevention and designers duties

- Part 4 and Schedule 2, which set out the specific technical requirements relating to health and safety on construction sites

- The need to employ competent contractors, staff and others





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NEXT COURSE DATES: 16th - 18th June 2015
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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: 26th June 2015
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NEXT COURSE DATES: 5th June 2015



“As Client, you need to ensure you consider the project in plenty of time and ensure you have engaged competent persons and organisations...”

So as Client, what are my duties?

As Client, you need to ensure you consider the project in plenty of time and ensure you have engaged competent persons and organisations to allow the project to proceed safely.

As Client, it will be down to you to ensure you have provided sufficient time, resources and arrangements to allow those with duties under the regulations to safely complete

the work.

CDM2015 increases the emphasis on the Client to ensure the work is carried out safely. It states:

“CDM 2015 makes the client accountable for the impact their decisions and approach have on health, safety and welfare on the project.”

‘CDM 2015 makes the client accountable for the impact their decisions and approach have on health, safety and welfare on the project.’

‘Most clients, particularly those who only occasionally commission construction

work, will not be experts in the construction process and for this reason they are not required to take an active role in managing the work. However, the client is required to make suitable arrangements for managing the project so that health, safety and welfare is secured.’

“As a client, you will need to be clear about your expectations and ensure everyone involved in the project communicates fully.”

As a client, you will need to be clear about your expectations and ensure everyone involved in the project communicates fully. As Client you must ensure that the Principal Contractor and Principal Designer, when appointed, are competent to



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fulfill their duties. If you do not make these appointments (they must be in writing), you will pick up the duties yourselves and be expected to fulfill them.

“The main change will be that the Client may now be held accountable for the activities of those undertaking the work.”

The main change will be that the Client may now be held accountable for the activities of those undertaking the work.

What do I do if I work for domestic clients?

Domestic clients are in scope of CDM 2015, but their duties as a client are normally transferred to either:

- The contractor, on a single contractor project
- The principal contractor, on a project involving more than one contractor
- The principal designer where there is a written agreement that the principal designer will fulfil those duties

What is a contractor?

The definition of a contractor is broad. A contractor is any person (including a nondomestic client) who, in the course or furtherance of a business, carries out, manages or controls construction work.

Contractors must ensure they are competent to undertake the tasks for which they have been engaged and ensure they

“Contractors must ensure they are competent to undertake the tasks for which they have been engaged...”

cooperate with other parties involved in the project.

What is a Principal Contractor and what is their role?

Where more than one contractor will be required on a project, a Principal Contractor (PC) will need to be appointed in writing by the Client. The PC will need to ensure they:

- Plan, manage, monitor and coordinate the construction phase of a project
- Liaise with the client and principal designer
- Prepare the construction phase plan
- Organise cooperation between contractors
- They must ensure:
 - Suitable site inductions are provided
 - Reasonable steps are taken to prevent unauthorised access
 - Workers are consulted and engaged in securing their health and safety and that welfare facilities are provided

Who is a Principal Designer and what is their role?

A Principal Designer (PD) is a designer appointed in writing by the Client in projects involving

more than one contractor. They can be an organisation or an individual with sufficient knowledge, experience and ability to carry out the role.

They are responsible for:

- Eliminating or controlling foreseeable risks
- Ensuring designers carry out their duties
- Preparing and providing relevant information to other duty holders
- Liaise with the Principal Contractor to help in the planning, management, monitoring and coordination of the construction phase

“On small projects, the role of the PD will be fairly simple but on larger projects, the PD duties will be more onerous...”

On small projects, the role of the PD will be fairly simple but on larger projects, the PD duties will be more onerous – requiring project management skills. In all cases, the PD will need to have a broad understanding of the construction techniques involved and be familiar with the principles of prevention.

The role of PD can be combined with other duties (PC, Client etc.) but the duty holder needs to be clearly identified and there must be a level of independence between duty holders.

Who are designers and what are their duties?

Designers are those, who as part of a business, prepare or modify designs for a building, product or system relating to construction work.

“Anyone from the client to a contractor can be a designer, if they make a decision related to the design of the project.”

Anyone from the client to a contractor can be a designer, if they make a decision related to the design of the project. This could range from specialist design skills such as the specification and design of foundations or roofing structures, to the selection of floor coverings, paints,

windows etc.

Their main duties:

- When preparing or modifying designs, to eliminate, reduce or control foreseeable risks that may arise during construction and the maintenance and use of a building once it is built.
- Provide information to other members of the project team to help them fulfil their duties.

What is a construction phase plan?

The principal contractor should be appointed early enough in the preconstruction phase to help the client meet their duty to ensure a construction phase

plan is drawn up before the construction phase starts.

“A Construction Phase Plan (CPP) is a site or project specific document that outlines the arrangements for managing safety.”

A Construction Phase Plan (CPP) is a site or project specific document that outlines the arrangements for managing safety. It is intended as a guide for those engaged on the project to help them understand and comply with their duties, how the Principal Contractor and client expects the work to be managed and how everyone on site will be



engaged in safety.

The construction phase plan must set out the arrangements for securing health and safety for the period during which construction work in a project is carried out. These arrangements include site rules and any specific measures put in place to where work involves one or more of the risks listed in Schedule 3 (regulation 12(2)) of the Regulations.

For projects involving more than one contractor, the principal contractor must ensure the plan is drawn up during the pre-construction phase and before the construction site is set up. It must take into account the information the principal designer holds such as the preconstruction information

and any information obtained from designers. During the construction phase, the principal contractor must ensure that the plan is appropriately reviewed, updated and revised so that it remains effective.

“For single contractor projects, it is the responsibility of the contractor to ensure the construction phase plan is drawn up.”

For single contractor projects, it is the responsibility of the contractor to ensure the construction phase plan is drawn up.

The plan must be concise, cover

all the essential elements and avoid the inclusion of generic risk assessments and method statements. There should be nothing in the plan that gets in the way of clear health and safety for that particular project. Typical contents should include:

- Health and safety arrangements for the construction phase
- Site rules; and
- Where relevant, specific measures concerning work that falls within one or more of the categories listed in Schedule 3 of the regulations.

The following list of topics should be considered when drawing up the plan:

- A description of the project such as key dates and details of key members of the project team
- The health and safety aims for the project
- The site rules
- Arrangements to ensure cooperation between project team members and coordination of their work e.g. regular site meetings
- Arrangements for involving workers
- Site induction
- Welfare facilities; and
- Fire and emergency procedures ■

Note to our readers:

Equipe Training and RPA Safety Services will be collaborating to provide a one-day seminar on CDM2015 on the 22nd of May 2015 at Equipe's offices, just outside of Banbury, Oxfordshire. The seminar will discuss the new regulations in more detail and there will be opportunity for discussion on the topic. Please see below for more details.

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May 22nd 2015 @ Equipe Training Offices

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- Outline context and purpose of regulations and areas of application
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- Introduce the principles of prevention
- Introduce the HSE RAG list
- Look at what a Construction phase plan should be and what should be included
- Summarise general safety duties on construction sites

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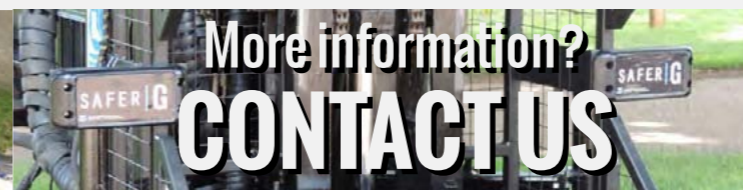


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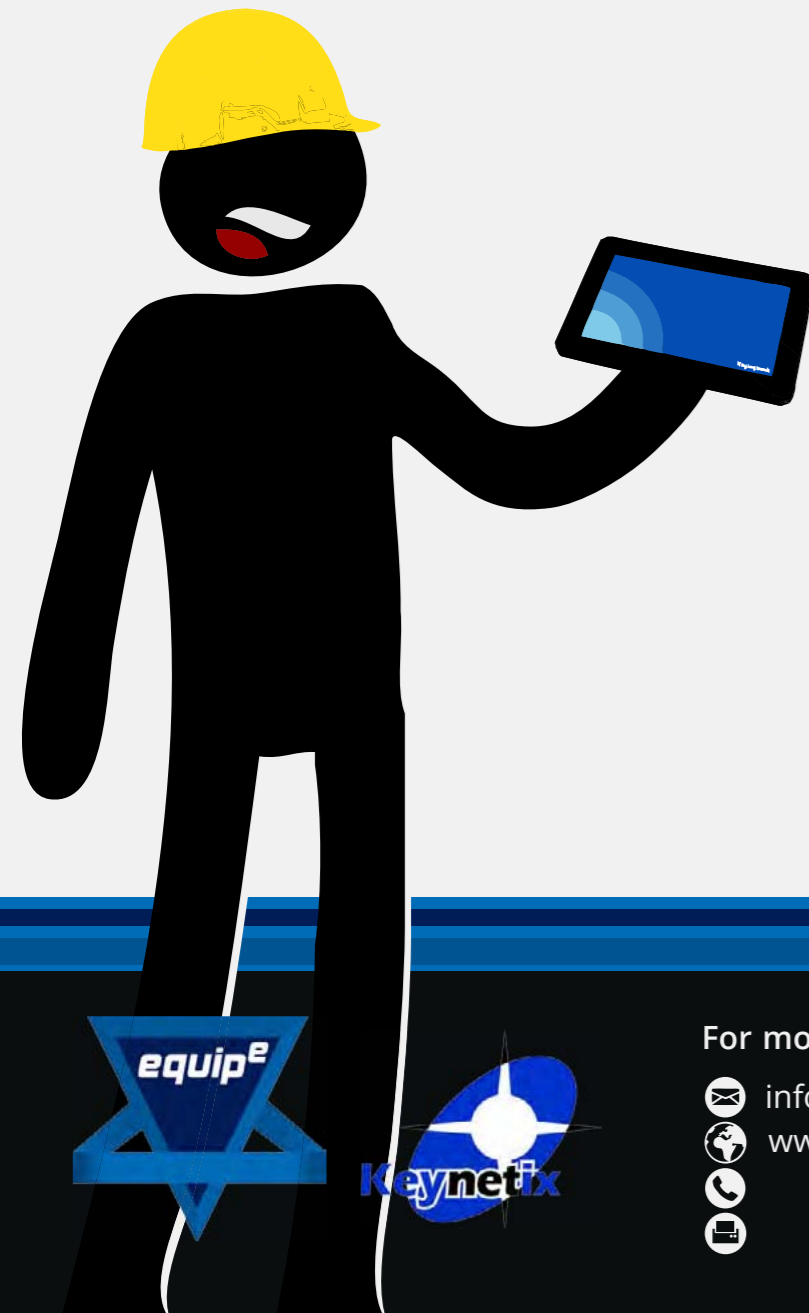
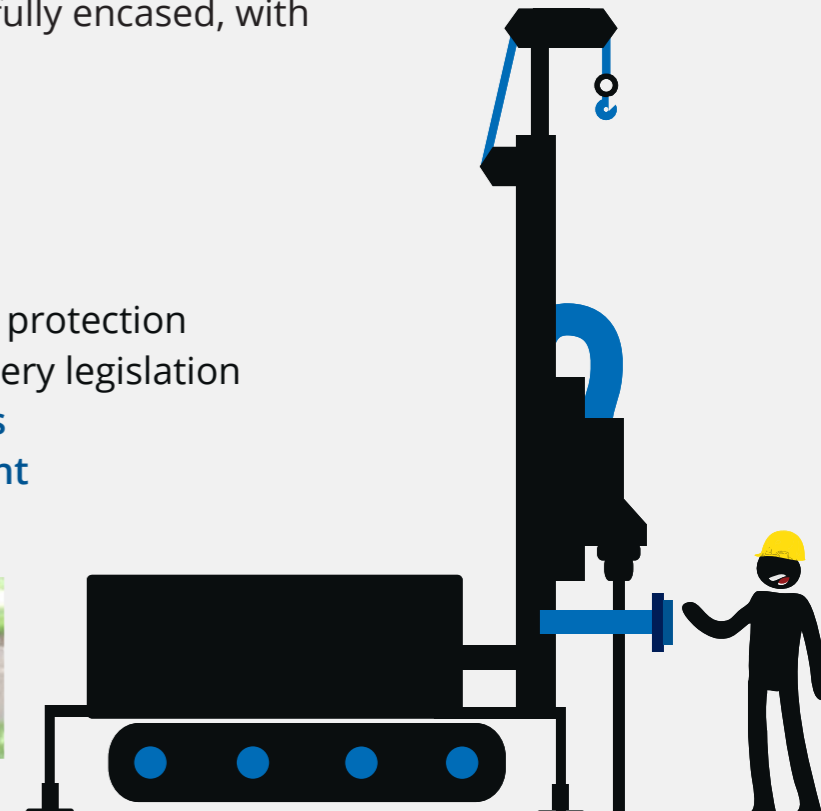
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NEW PRODUCT DEVELOPMENT: A MULTI-DIRECTIONAL DYNAMIC CYCLIC DIRECT SIMPLE SHEAR APPARATUS

Writing for **theGeotechnica** this month are the [GDS Instruments' Technical Team](#). This month GDS turn their focus to their newly developed product, a multi-directional dynamic cyclic direct simple shear apparatus.

What is a multi-directional laboratory test apparatus?

A significant majority of test apparatuses traditionally used in soil laboratories shear soil elements in a single direction only. Examples include the direct shear apparatus, in which a test specimen is sheared in a single horizontal direction following application of normal stress, and the triaxial apparatus, in which soil elements are compressed or extended vertically following completion of saturation and consolidation. Such apparatuses may be termed uni-directional, as the direction of shearing is fixed to one specific axis.

It is however possible to design and build more advanced apparatuses in which soil elements can be sheared in more than one direction – such apparatuses may therefore be termed multi-directional. To highlight this idea, Figure 1

“It is however possible to design and build more advanced apparatuses in which soil elements can be sheared...”

displays a three-dimensional and plan view of a soil element subjected to vertical normal stress and shear stresses applied from two directions (τ_x and τ_y). Here the application of τ_y perpendicular to τ_x leads to a resultant shear stress, τ_{xy} , acting in a direction different to the X and Y components. Further to this, changing the relative magnitudes of τ_x and τ_y vary the direction in which τ_{xy} acts, enabling shear in any horizontal direction to be specified and applied.

What effect does multi-directional loading have on soil response?

Although many laboratory test apparatuses are uni-directional, loading conditions in the field are typically three-dimensional in nature. This includes cyclic stresses induced during earthquake shaking, and the cyclic loadings applied to offshore structures as the direction of wind and wave action varies. Recognising this difference between field loading and laboratory simplification, a number of studies reported in the geotechnical literature have investigated the effect uni-directional and multi-directional loadings have on soil strength and deformation. An early example regarding soil response during earthquakes include the shake table tests reported by Pyke et al. (1975), during which dry sand settlements were shown to increase significantly when multi-directional shaking was used in place of uni-directional shaking. More recently, work conducted at the Hamburg University of Technology (TUHH) by Dührkop and Grabe (2008) has shown that laterally-loaded mono-piles used to support offshore wind turbines accumulate larger displacements when the applied cyclic loadings are multi-directional.

With the difference in load directionality between the field and laboratory equipment recognised, a number of multi-directional laboratory apparatuses have been constructed by various institutions at points throughout the evolution of soil mechanics. These include the multi-directional direct simple shear apparatuses reported by Ishihara and Yamazaki (1980), Boulanger et al. (1993), and Rutherford and Biscontin

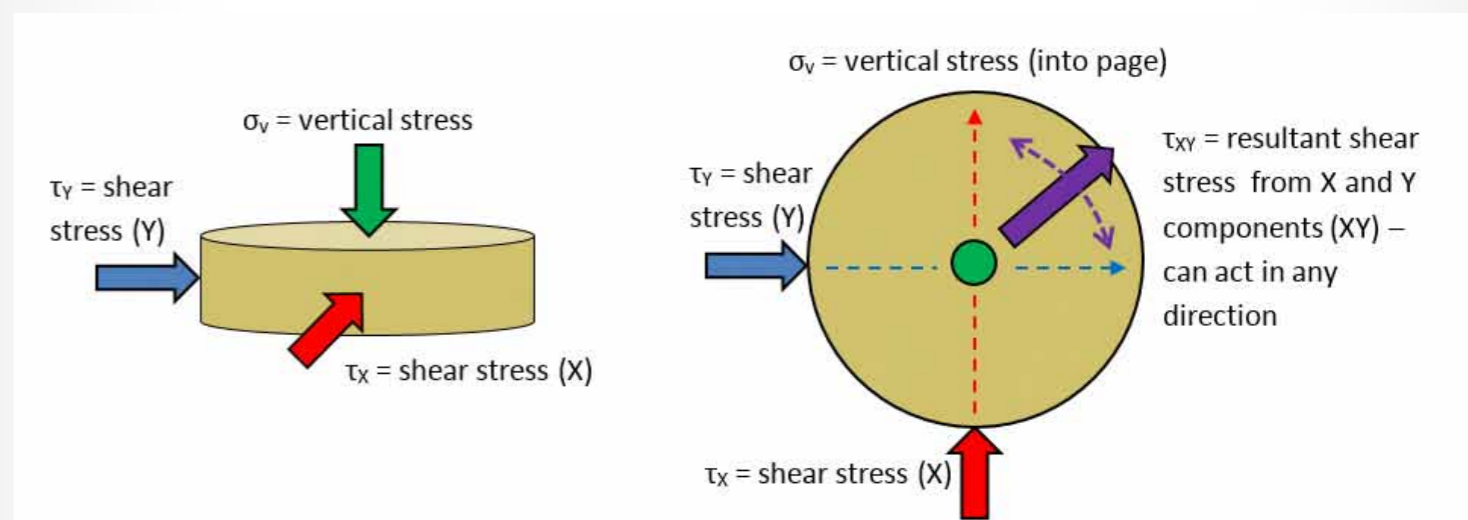


Figure 1 – 3D and plan view of a soil element, showing shear stresses τ_x and τ_y applied along two axes (in red and blue). Note the direction of the resultant stress, τ_{xy} , can be varied by changing the relative magnitudes of τ_x and τ_y .

(2013), which were produced to study topics ranging from sand response during multi-directional earthquake shaking, to rate and load direction effects on pore pressure generation in marine clays.

The direct simple shear apparatus

First built by the Royal Swedish Geotechnical Institute in 1936 and reported by Kjellman (1951), the direct simple shear apparatus (DSS) is a relatively common sight in soil testing laboratories today.

“Its popularity stems from a number of practical advantages over traditionally-used devices...”

Its popularity stems from a number of practical advantages over traditionally-used devices such as the triaxial apparatus, including the ability to deform soil elements in plane strain and smoothly rotate the principal stress directions. Such loading conditions are often representative of those observed in the field, including

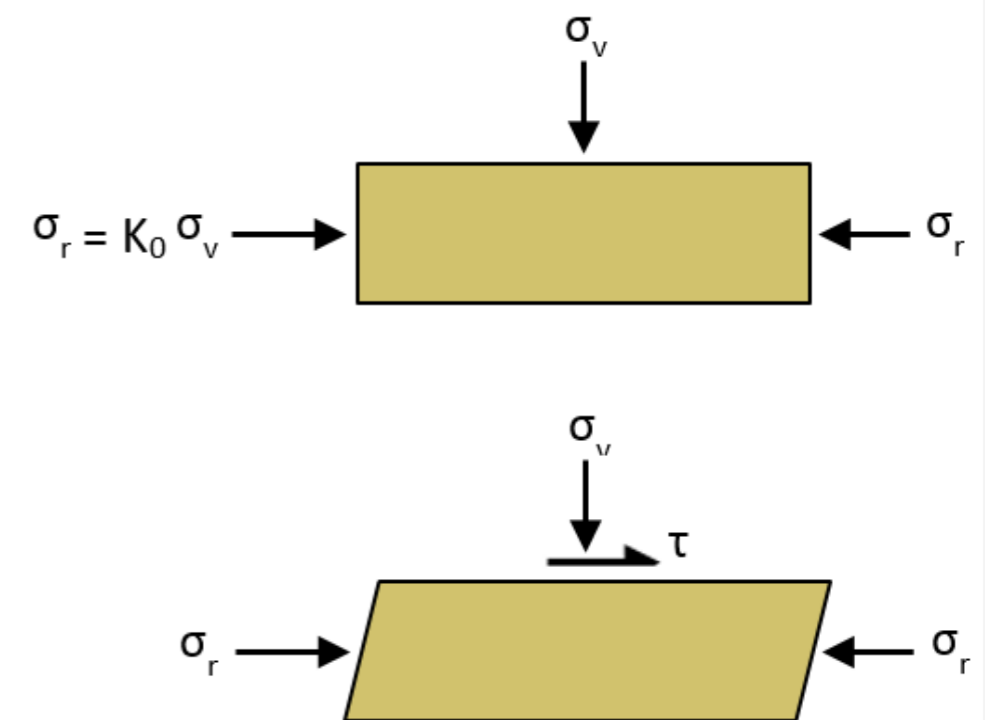


Figure 2 – Boundary stresses in the direct simple shear test during (a) consolidation (K_0 conditions), and (b) specimen shearing. Note a lack of a complementary shear stress during shearing, one of the DSS test's limitations.

where the soil adjacent to friction piles is deformed, or when approximating the stress state applied to soils underlying offshore structures. Direct simple shear has also been suggested to better represent the soil response to vertically-propagating shear waves generated by earthquakes when compared with the triaxial test. These advantages have therefore made DSS

testing an important addition to laboratory investigations during many engineering projects.

Of course the DSS test does come with limitations, as do all laboratory tests. Here an inability to apply complementary shear stresses along the specimen sides (see Figure 2) results in non-uniform stresses being



Figure 3 - The variable direction dynamic cyclic simple shear apparatus (VDDCSS), designed and built by GDS Instruments in cooperation with TUHH.

developed during shear, while there is also potential (when using less-rigid test systems) for significant relative motion, or 'rocking', to occur between the top and base specimen

"However despite these known limitations, the DSS test has continued to be a useful laboratory tool..."

platens. However despite these known limitations, the DSS test has continued to be a useful laboratory tool when investigating the response of cohesive and granular soils under static and dynamic loading conditions.

Given the usefulness of the DSS test, and the recognised effect multi-directional loads

may have on soil response, GDS Instruments designed and built a new multi-directional direct simple shear apparatus in cooperation with TUHH. This was done as part of the continued TUHH work investigating the response of offshore mono-piles during multi-directional loading.

New product development: The GDS VDDCSS

The variable direction dynamic cyclic simple shear apparatus (VDDCSS), designed by GDS Instruments in cooperation with TUHH, and shown in Figure 3, is an SGI-style DSS device based around the GDS uni-directional dynamic cyclic simple shear

"Here the test specimen is laterally confined using a standard latex membrane..."

system (EMDCSS). Here the test specimen is laterally confined using a standard latex membrane and stack of Teflon-coated rings, which enables K_0 conditions to be maintained during consolidation, and radial deformations prevented during specimen shearing. Note reinforced membranes may also be used within the apparatus.

With three electro-mechanical actuators used instead of the two required for uni-directional testing, the VDDCSS operates at frequencies up to 1 Hz via specifically-designed system firmware, applying shear stresses to specimens in any horizontal direction. In addition to its third axis positioned perpendicular to

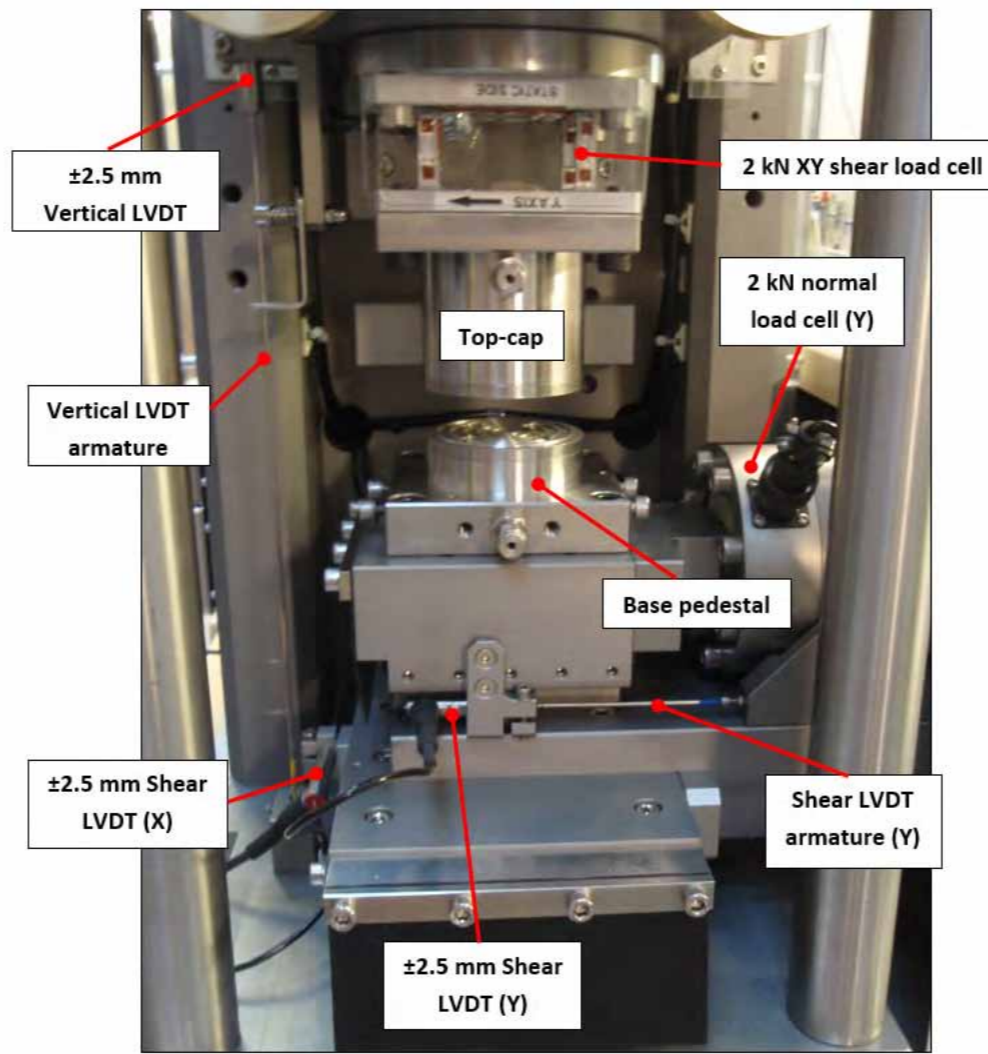


Figure 4 - VDDCSS platens and transducers (load and displacement). Note some system transducers are not shown in this photo.

the primary shear actuator, the VDDCSS uses the same rigid frame developed for the EMDCSS, reducing system compliance and relative motion between the specimen platens.

"The apparatus also contains four load cells for measuring normal and horizontal loads..."

The apparatus also contains four load cells for measuring normal and horizontal loads, including one mounted directly above the top-cap to eliminate friction error when taking horizontal load readings. To measure displacements, three low-range LVDTs are positioned

around the specimen platens, complementing the displacement readings obtained from the high-accuracy actuator encoders. Many of the apparatus transducers can be seen in Figure 4.

Combined with control and acquisition through their

"... the VDDCSS enables complex dynamic cyclic multi-directional tests to be performed with relative ease..."

GDSLab software, the VDDCSS enables complex dynamic cyclic multi-directional tests to be performed with relative ease

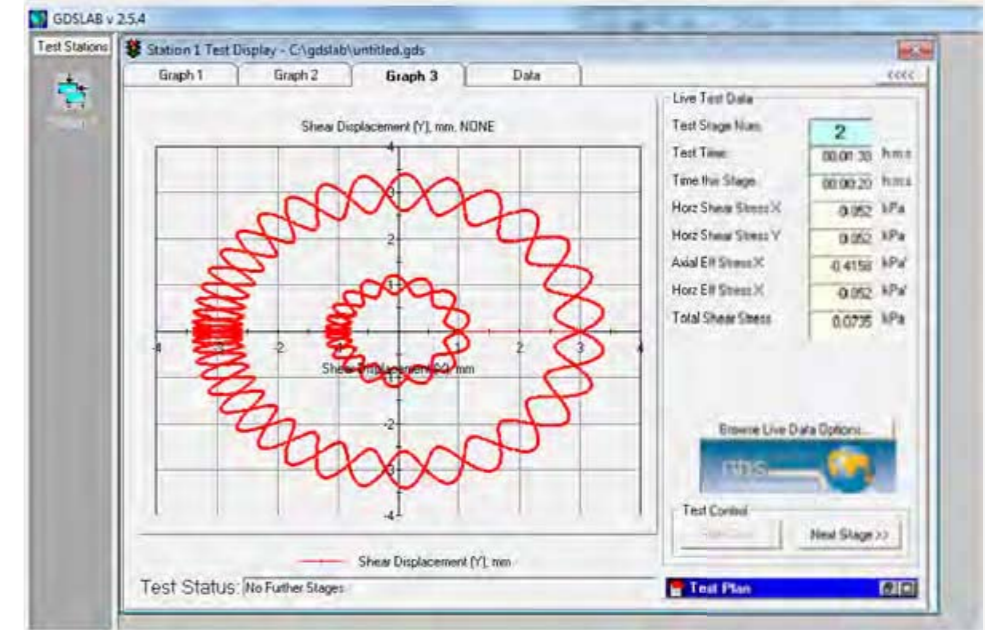


Figure 5 - Complex response of the VDDCSS displayed within the GDSLab software.

(complex apparatus response can be viewed in Figure 5), while outputting stress and strain calculations to file. Further information regarding the VDDCSS can be found at www.gdsinstruments.com/gds-products/variable-direction-dynamic-cyclic-simple-shear, which includes a video showing the apparatus in operation.

Using the VDDCSS to investigate offshore mono-pile response at TUHH

"The TUHH team firstly performed drained... monotonic shear tests on medium to dense sand specimens..."

Initial testing performed at TUHH and reported by Rudolph et al. (2014) on a well-graded fine sand from the North Sea, conducted as part of their mono-pile response research, has helped to experimentally verify the VDDCSS. The TUHH team firstly performed drained (constant normal stress) monotonic shear tests

on medium to dense sand specimens, checking the friction angles obtained in the VDDCSS with those previously derived from uni-directional DSS

"Here the TUHH team reported good agreement, with dense specimens sheared in the VDDCSS producing friction angles approximately equal to 29.5°..."

testing. Here the TUHH team reported good agreement, with dense specimens sheared in the VDDCSS producing friction angles approximately equal to 29.5°, compared with 30.3° obtained in the uni-directional DSS apparatus.

Focus then shifted to drained cyclic testing, during which a number of different loading schemes were used to model possible multi-directional loading of offshore mono-piles. This included one scheme as shown in Figure 6, for

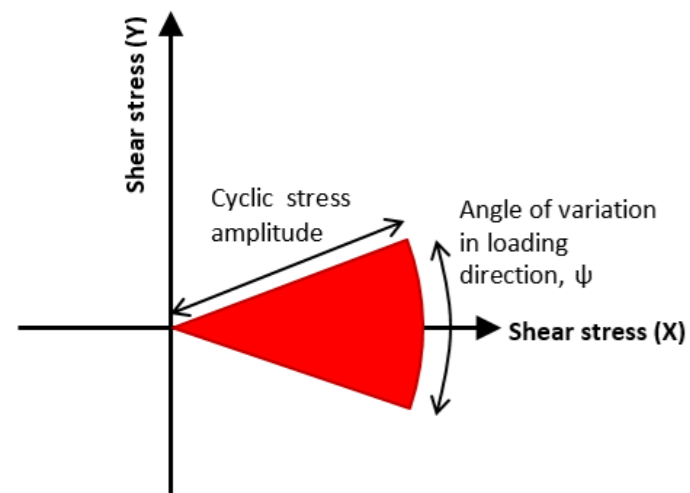


Figure 6 – One loading scheme used by Rudolph et al. (2014). Note the red sector gives the applied shear stress boundary for 1000 load cycles.

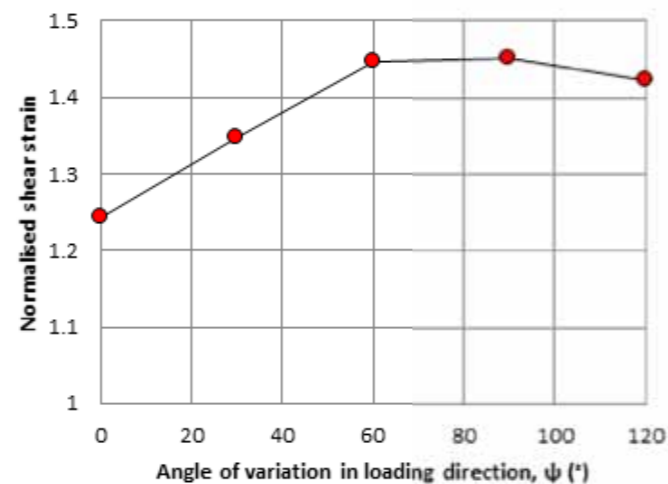


Figure 7 – Accumulation of shear strain as the variation in loading direction is increased, reproduced from Rudolph et al. (2014).

which a constant cyclic shear stress amplitude was applied, while the direction of stress was slowly varied over the course of 1000 load cycles (note this variation was controlled via a sinusoidal waveform).

“The angle of variation in loading direction, ψ , was then systematically increased throughout five tests...”

The angle of variation in loading direction, ψ , was then systematically increased throughout five tests, ranging from 0° (i.e., uni-directional shearing) to 120°.

The response observed during these five tests highlighted an increase in accumulated shear strain, γ , as ψ was raised from 0° to 90°. This trend is displayed in Figure 7, which has been reproduced from Rudolph et al. (2014). Here the shear strain after 30,000 load cycles, $\gamma_{30,000}$, is normalised by the shear strain recorded after

completion of the first load cycle, γ_1 .

In addition to shear strain, Rudolph et al. (2014) also reported an increase in volumetric strains for test specimens where the direction of loading was varied, mirroring the higher settlements observed by Pyke et al. (1975) during multi-directional shake table tests. Such agreement is encouraging to see, and with three other VDDCSS apparatuses currently installed in various laboratories around the world the GDS team look forward to reading further publications discussing the response of DSS specimens sheared in multiple directions.

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ADVANCED GEOTECHNICAL LABORATORY TESTING



Seminar Date: 28th May 2015

At a time when Clients are asking for more efficiency in their designs whilst reducing costs, Geotechnical Engineers and Designers are increasingly specifying Advanced Geotechnical Laboratory Testing to obtain reliable data to enable cost effective design. Advanced tests such as Effective Stress have become commonplace but other advanced tests can also provide invaluable data during and after ground investigations. This seminar will provide perspectives from the laboratory and engineer from specifying the tests to receiving the results.

In collaboration with



Speakers:
Dr John Powell,
Technical Director,
GEOLABS Ltd

Chris Wallace,
Director of Innovation &
Training, GEOLABS Ltd

What delegates will learn

- Have an understanding of the importance of identifying appropriate samples for testing
- How to obtain appropriate samples
- Understand how to specify the tests or who to talk to
- Understand the limitations of the tests
- Understand why it is important to involve the laboratory when specifying
- Have an appreciation of what the results mean and how they are obtained

Who should attend?

Geotechnical Engineers, Engineering Geologists, Consulting Engineers, Designers, Developers and Clients.

Seminar Programme

- 09:00 – 09:30 Registration & Tea/Coffee
- 09:30 – 10:30 Effective Stress presentation
 - What the test is
 - What you should specify
 - What results you will get
 - What the results can be used for
- 10:30 – 11:00 Effective Stress tour
- 11:00 – 11:15 Refreshment break
- 11:15 – 12:20 Sampling and sample disturbance presentation
- 12:20 – 13:00 Buffet lunch
- 13:00 – 14:15 Advanced Triaxial Testing presentation
 - What the test is
 - What you should specify
 - What results you will get
 - What the results can be used for
- 14:15 – 15:00 Overview of other advanced tests
 - Cyclic Triaxial
 - Direct Simple Shear (static and dynamic)
 - Constant Rate of Strain (CRS) Oedometer
 - Resonant Column
- 15:00 – 15:20 Refreshment break
- 15:20 – 16:00 Advanced Testing tour
- 16:00 – 16:15 Quality Assurance
- 16:15 – 16:30 Any questions and close



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GEOPHYSICS IN GEOTECHNICAL PRACTICE



Seminar Date: 2nd June 2015

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 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?

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
- Using suites of tools to enhance the data
- Data handling and interpretation
- 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



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CONE PENETRATION TESTING IN GEOTECHNICAL PRACTICE



Seminar Date: 23rd - 24th June 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 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?

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

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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.

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GEOTECHNICA 2012

A RETROSPECTIVE

Writing for **theGeotechnica** this month is Calum Spires of the [Equipe Group](#). This month is the fourth in a series of articles from Calum that will take a look back at previous Geotechnica events in the build-up to this year's event in July. This month Calum takes a look back at Geotechnica 2012.

If you ask the majority of the British public what their most prominent memories are of the summer of 2012, the answers from most would likely include Andy Murray, Mo Farrah, Jessica Ennis, Greg Rutherford and Super Saturday, the celebration of the NHS, James Bond parachuting into the Olympic Stadium and also less happy memories of civil war in Syria and the riots and disruption in Egypt. For the Equipe Group and the wider geotechnical and drilling industry however, it was less about incredible sporting celebrations at the Olympics, but rather more about rigs,

conference talks and live music in an increasingly damp field in rural Oxfordshire. Indeed, for the Director's at Equipe, Geotechnica 2012 was the most important the focal-point of the summer.

Following three incredibly successful years based on The Upton Estate in Oxfordshire, 2012 was to be the first year that the infamously inconsistent British weather would threaten to disrupt the UK's largest geotechnical conference and exhibition.

"For the first three years of

"... there hadn't been any Michael Fish-levels of forecasting mistakes, so up until then we hadn't had any issues with a predominantly outdoor exhibition."

Geotechnica the weather had behaved exceptionally, the sun was either shining or at least holding back the rain, and there hadn't been any Michael Fish-levels of forecasting mistakes, so up until then we hadn't had any issues with a predominantly outdoor exhibition." Julian Lovell, Managing Director of the Equipe Group recalled. "However 2012's event was the first to test our contingency plans for if the weather did

take a turn for the worse."

"Being in the great outdoors and in beautiful countryside was one of the things that initially made Geotechnica so appealing to many stakeholders in the industry. Geotechnics and land-drilling is all about being outside, whatever the weather, and that was one of the main reasons why Geotechnica was initially based in marquees outdoors, in order to maintain that affiliation and cerebral connection with the outdoors. We always used to joke with exhibitors when calling them to update them on details for that year's Geotechnica that we had booked the sunshine for the week – if only British weather was that simple!" quipped Keith Spires, Operations Director at Equipe.



Geotechnica had enjoyed an increased marketing effort in 2012 in order to ensure optimum attendance, as well as an improved food court and welfare facilities following feedback from previous year's attendees. Despite a relatively dry and sunny setup on the Tuesday, a downpour early on Wednesday morning meant a slightly damp start to the

"Fortunately the very worst of the weather was saved until Friday the 4th of July, meaning that the two days of the actual exhibition were relatively unscathed..."

event. Fortunately the very worst of the weather was saved until Friday the 4th of July, meaning that the two days of the actual exhibition were relatively unscathed – in fact the Thursday morning was the best weather than any Geotechnica has enjoyed, with blazing sunshine and clear blue skies. Unfortunately the Friday was also the day that the majority of the heavy plant

and machinery were due to be removed from the exhibition field – cue a lot of muddy wheel-spinning and slipping and sliding on increasingly sodden grass, as well as an SOS call to the Upton Estate farmhands for use of their tractors for towing purposes.

"I'm sure at one point we had all of the Estate's farm vehicles towing one rig or another off of the field – evidently some vans and 4x4s weren't quite as well equipped for the wet weather as many of us thought. By the time everyone had left the field looked like it had been through hell – I'd seen drill-sites in the depths of winter left in better condition!" joked Keith.

Wedged in between the dire weather on the Friday and the pleasant sunshine of the Tuesday was another addition to 2012's event in the shape of a 'Battle of the Bands' during the Evening Networking Event. In an attempt to provide a little more 'razzmatazz' to the evening's proceedings, three bands were invited to provide music entertainment for the attendees: the aptly named 'Chain Dogs', 'Indigo Wolf' and the highly regarded 'Patsy



Gamble Band'. It would be the latter of the three that walked away with the title, however all three acts were incredibly well received as the event's punters washed down their hog roasts with a wide selection of drinks from the fully-licensed bar that was also a very welcome addition to the evening's proceedings.

"The hog roast from 'Pig on the Hill' was a great addition that many people thoroughly enjoyed and appreciated, along with the live musical entertainment—the Networking Event certainly felt a lot more lively and added to the appeal for that year's Geotechnica. Live music worked well in the setting – after all, most musical festivals tend to take place in muddy fields, plus the opportunity to hold a competition called 'Geotechnica Rocks!' was too good of a pun to ignore!" laughed Julian.

Sponsorship of Geotechnica 2012 again came from all areas of the industry, with Geotechnical Engineering and Geotechnical Observations remaining as the main sponsors for the event, however Rockbit UK, DuraDeck and Clear Solutions also supported the exhibition, much to Equipe's

"The layout for 2012 remained much the same as the 2011 offering, with extremely positive feedback..."

delight. The layout for 2012 remained much the same as the 2011 offering, with extremely positive feedback leading to Equipe continuing in order to maintain the sense of unity and cohesion that the event always prospered from.

"From the feedback that we got from the 2011 show we concluded that if it wasn't broke, then we shouldn't try and fix it!" continued Keith.

The focus of the Geotechnical Conference was reasonably broad in 2012, with six different sessions all focussing on separate areas of site investigation and the various updates and developments in each area. The sessions included talks dedicated to Standards and Codes, Geology, Data Handling, Geo-Environmental Engineering, Geotechnical Engineering and Geohazards and Risk Management.



Julian continued: "In previous years at Geotechnica the conference had always tended to promote discussion and increase knowledge around a select few areas of concern. However in 2012 we wanted to discuss a higher number of topics in order to peak interest from as many areas of the geotechnical market

"We had industry leading experts such as Keith Banton talk about risks and hazards when drilling near coal, Professor Rory Mortimore discussing chalk, and also the greatly popular Professor Eddie Bromhead return to discuss more about slope stability."

at possible. We had industry leading experts such as Keith Banton talk about risks and hazards when drilling near coal, Professor Rory Mortimore discussing chalk, and also the greatly popular Professor Eddie Bromhead return to discuss more about slope stability."

Session 1 was dedicated to Standards and Codes and was chaired by one of the UK's leading experts in the field of Eurocodes, Dr John Powell, Technical Director of GEOLABS Ltd. John opened the session himself, delivering a sorely needed update on Eurocodes, explaining how newer codes were coming into effect, before detailing exactly how they would take alter day-to-day on-site works. Derek Smith of Coffey Geotechnical followed Dr Powell with a look at the new 'Yellow Book': Conditions of Contract for Plant and Design-Build. Dr Kieran Dineen of Terra Firma Ground Investigation built on Derek's presentation to close out Session 1 by discussing the many contracts utilised in the geotechnical industry in order to give attending delegates a better understand of them.

Session 2 examined the Geology of the UK and how it has a direct effect on geotechnical site investigations. Chaired by the highly regarded chalk expert, Professor Rory Mortimore of ChalkRock Ltd, Professor Mortimore lead the session by discussing what the future held for chalk in the UK. Following Rory came the



now Chairman of the British Drilling Association, Keith Banton. Representing The Coal Authority, Keith discussed the risk of hazardous gases when drilling or piling near coal, and what could be done to manage

"Dr Jackie Skipper... offered an overview of the geology of the London Basin, and the various difficulties faced when designing the ground model for the Crossrail project."

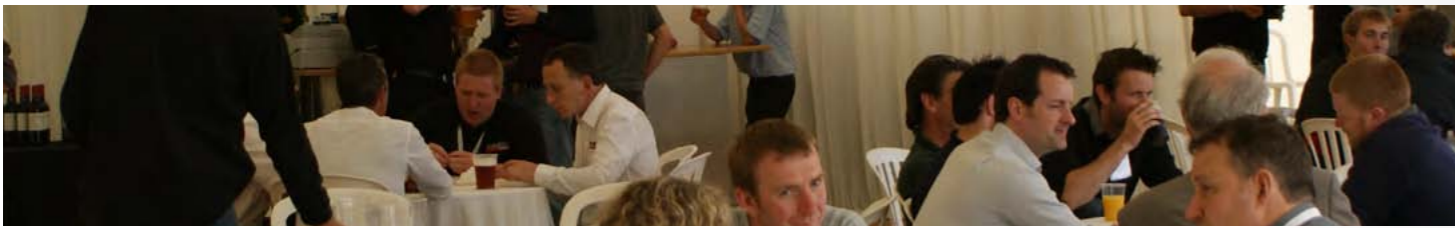
said risks. Finally Dr Jackie Skipper of the Geotechnical Consulting Group offered an overview of the geology of the London Basin, and the various difficulties faced when designing the ground model for the Crossrail project.

The final session of day one of the conference was chaired by former Technical Director of Equipe, Peter Reading, and looked at how to improve efficiencies and data handling for site investigation. Session 3 was opened by Soil Engineering's Digby Harman who examined the process of transferring data from rig to the final report, and the

benefits and opportunities offered by digital solutions such as KeyLogbook. Geotechnical digital data specialist Dr Roger Chandler of Keynetix then outlined the 5 biggest problems that you must avoid when working with geotechnical data. Pete Reading then rounded out the day's talks with a look at sampling integrity and how it can influence results obtained in laboratory testing.

Day two of the conference was started with a session on Geo-Environmental Engineering, and was led by Professor Paul Nathanail of LQM Ltd. Paul kicked off proceedings by discussing sustainable remediation, before Dr Jamie Cutting of Chemtest explained the role of applied geochemistry when examining contaminated land. Seamus Lefroy-Books of LBH Wembley rounded off the morning session with a look at the developments of testing for asbestos in soil.

Following Seamus came Session 5 which examined Geotechnical Engineering on a larger scale. Neil Smith of the AGE was first up to discuss temporary works and what the geotechnical difference is from usual construction work. Dr Mohsen Vaziri and



Simon Davies of Ramboll then continued the session with a look at offshore windfarms, providing a geotechnical consultants prospective on the challenges of such a project. Dinesh Patel of ARUP then rounded out the session with a case study on the geotechnical challenges of building large structures, particularly in London City Centre.

Chaired by the widely well received Professor Eddie Bromhead, the final session of Geotechnica 2012's conference placed the microscope of scrutiny over geohazards and methods of risk management. Eddie offered an expert look at the case of slope stability and how risks from landslides can be managed effectively. Dr Clive Edmunds of Peter Brett Associates followed Professor Bromhead by promoting awareness of ground instability geohazards and how preventing or at least properly investigating them can help to avoid extra 'over-construction' costs. Finally the excellent conference came to a close with Paul Maliphant of Halcrow taking a closer look at

risk management, and asking if geotechnical contractors could afford not to pay close attention to it.

Julian Lovell again offered his summary of the conference, emphasising the broad scope of topics that were discussed throughout the conference:

"On reflection on 2012's conference, we may have tried to cover one too many bases, however these were and still are important topics that need **"The expert knowledge-transfer from specialists to attending delegates was absolutely vital..."**

to be discussed further. The expert knowledge-transfer from specialists to attending delegates was absolutely vital, particularly when discussing the proper management of risks, as well as promoting best practice procedures for things like digital data handling and the role of various contracts. We were delighted at the feedback from the talks, with a great many of the attending

delegates remarking that the knowledge of the speakers in their areas of expertise provided invaluable feedback and answers to questions that would previously have proved troublesome. In that respect 2012's conference was the most successful to date at that point."

Geotechnica 2012 was seen as a rousing success. Despite the weather's best efforts, the conference and exhibition attracted over 720 visitors from a broad spectrum of geotechnical markets. However 2012 would be the final year of the show's presence in the fields of the Upton Estate, as despite its glorious backdrop, Geotechnica was heading in a direction that required a slightly more sophisticated and professional environment. There will always be fond memories of Geotechnica's time in marquees in a field, and 2013's show presented a whole new dilemma for the Equipe team – how to keep the essence and spirit of Geotechnica alive and well in its new home – the Warwickshire Exhibition Centre. ■

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Wednesday 8th July 2015

Morning Session
Keeping on the right side of Health and Safety legislation

Session sponsored by:



A series of short presentations from the HSE and industry leaders to update the community on Health and Safety topics and concerns. Topics covered will include an update from HSE, Asbestos in Soil, new BDA audit and CDM 2015.

Speakers include:
John Underwood, Construction Inspector - Construction Sector Safety Team, Health and Safety Executive
Hamish Campbell, British Drilling Association
Seamus Lefroy-Brooks, Managing Director, LBH Wembley

Afternoon Session
How AGS data makes organisations more efficient

Session sponsored by:



A series of short presentations about advances in the use of capturing and using Geotechnical Data from site, through the laboratories to report and beyond. The talks will discuss the use of AGS through the process and will include a number of case studies to show how it works for real projects.

Speakers include:
Ben Armstrong, General Manager, Ground Technology Services
Simon Miles, Principal Geotechnical Engineer, Atkins
Dr Roger Chandler, Managing Director, Keynetix

Thursday 9th July 2015

Morning Session
Can the geotechnical industry fulfil the Client's requirements?

A series of presentations from leading procurers of geotechnical work including HS2 and Network Rail, in which they outline their requirements and expectations from the geotechnical and drilling community. The talks will not only outline current requirements but the Client's will also discuss future requirements and aspirations and ask how the Community can meet these.

Speakers include:
Jonathan Gammon, HS2
Mike Brown, Senior Engineer, Network Rail

Afternoon Session
Advances in Remote Monitoring of geotechnical structures

A series of presentations looking at how the use of field instruments and technologies have advanced and how they can be used to efficiently monitor geotechnical structures remotely. The session will look at a few of these technologies but also discuss how the data can be used more efficiently and possibly in the future be shared with the Community.

Speakers include:
Dr Andrew Ridley, Managing Director, Geotechnical Observations
Prof. Neil Dixon, Professor of Geotechnical Engineering, Loughborough University
Dr David Gunn and Dr Jonathan Chambers, British Geological Survey

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AN UPDATE ON ASBESTOS IN SOIL

Writing for **theGeotechnica** this month is Hazel Davidson of [Derwentside Environmental Testing Services](#). In this excellently informative article, Hazel provides a welcome update on asbestos in soils.

Asbestos in soils continues to be a troublesome issue, with no further guidance as yet from either the EA or DEFRA. There is a raft of documentation and legislation relating to handling asbestos when working in areas at risk, air monitoring, and demolition precautions, (e.g. Control of Asbestos Regulations 2012), much of which can be found on the HSE website. However, documentation relating specifically to soils is still limited.

The CIRIA document *Asbestos in soil and made ground: a guide to understanding and managing the risks* was published in March 2014, and is a very comprehensive document (over 200 pages), **“...but it does not provide any soil guideline value ratified by a regulator.”**

but it does not provide any soil guideline value ratified by a regulator. It gives a very good survey of the history and current situation, with details of asbestos regulations relating to air monitoring and demolition issues, but also highlighted many areas where there was a shortfall in knowledge or data. A summary can be downloaded

free of charge, but there is a cost for the full document.

A shorter document relating just to site safety is the AGS SIARA (Site Investigation for Asbestos Risk Assessment), and this can be downloaded free of charge from the AGS website. It was initially published in 2013, and is a very useful document for site staff.

Waste material containing > 0.1% asbestos is classified as hazardous waste, but human health risk from soils and associated materials is still based on the <0.001% asbestos in soil value expressed as potentially producing > 0.1 fibres/ml (current control limit), in a small study performed by Addison et al working at the IOM in 1996. This figure has never been ratified by any regulator.

The Joint Industry Working Group (JIWG) was set up over two years ago through the Environmental Industries Commission (EIC) asbestos subgroup, with CL:AIRE running the secretariat, and is in the process of producing a full Code of Practice (CoP). This will build on the CIRIA document, but the JIWG is also working on further information, including:

- Background levels of asbestos in 400 soils
- Information on fibre release rates from a wider range of soil types and asbestos concentrations
- An algorithm helping to predict risk from any particular site
- A recommended method for the identification and quantification of asbestos in soils

The JIWG is working closely with the EA, DEFRA, HSE, and UKAS to produce a document acceptable to the regulators, and participants on the JIWG include representatives from many stakeholders, such as environmental consultants, lawyers, property developers, and land owners. Publication is intended by the end of 2015. The method for analysing asbestos in soil is being

prepared by the Standing Committee of Analysts (SCA), who produce the Blue Books (guideline methods for environmental analysis). These methods are currently hosted on the EA website, but this may change as government publications are moved to the **“This method is nearing completion and will go out for final consultation to a wide range of industry participants in June this year.”**

.gov.uk website. This method is nearing completion and will go out for final consultation to a wide range of industry participants in June this year.

The method is based on It is critical that the

the HSG 248 document *Asbestos: The Analyst's Guide for Sampling, Analysis, and Clearance Procedures* (2005), for the identification of asbestos material, using Polarised Light Microscopy (PLM), and then details the method for the identification/quantification stages. These involve gravimetric (weighing) the larger pieces of asbestos containing material (ACM) plus fibre bundles, and a method for dispersion of free fibres requiring filtration, identification, counting and measurement, using Phase Contrast Microscopy (PCM). The results will then provide a total percentage by weight of asbestos, plus asbestos type and percentage of each type, plus the percentage of respirable fibres, if required.

concentration of dispersed free fibres is included in the method, as these are most likely to become airborne, and therefore present the greatest hazard for human health risk. Methods which only provide gravimetric data are not considered sufficiently robust. It is also critical that laboratories are accredited to ISO 17025 for this method.

As the JIWG has recognised, the risk of airborne fibres released from asbestos containing soils is key to assessing the risk to human health, although there are few laboratories which can currently provide this data, and the fibre release test is currently time consuming and expensive. Hopefully, this will change in the foreseeable future. ■



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