



## **BRITISH TUNNELLING SOCIETY**

### **Annual Report and Accounts for the Year Ended 31 December 2014**

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# BRITISH TUNNELLING SOCIETY ANNUAL REPORT 2014

## COMMITTEE:

### Chairman:

Roger Bridge  
Balfour Beatty plc

### Vice Chairman

Mark Leggett  
Mott MacDonald Ltd

### Immediate Past Chairman

Damian McGirr  
Donaldson Associates Ltd

## Elected Members and Trustees

NAME	COMPANY	TERM	RESPONSIBILITY
Rod Young (until 15 May)	Barhale Construction	Retired 2014	Training & Courses
Simon Stroud (until 15 May)	Parsons Brinckerhoff	Retired 2014	Sustainability
Alastair Smith (until 15 May)	Halcrow	Retired 2014	Newsletter
Helen Nattrass (until 15 May)	Sir Robert McAlpine	Retired 2014	APPiG
David Terry	London Bridge Associates	Retires 2015	Papers and Meetings
Steven Cowell	Murphy Group Ltd	Retires 2016	Awards
Nicholas Tucker	Mott MacDonald Group	Retires 2016	Technical
David McCann	Halcrow	Retires 2016	
Andrew Stenning	Atkins	Retires 2016	
Ivor Thomas (from 15 May)	BAM Nuttall	Retires 2017	
Paul Perry (from 15 May)	CH2M Hill	Retires 2017	
Andreas Raedle (from 15 May)	Hochtief	Retires 2017	
Jamie Standing (from 15 May)	Imperial College	Retires 2017	

## Co-opted Members:

NAME	COMPANY	RESPONSIBILITY
Ken Spiby	London Bridge Associates	Website
Myles O'Reilly	Consultant	T&TI Editorial Advisory Board
Donald Lamont	Hyperbaric & Tunnel Safety Ltd	Health and Safety
John Scholey	Halcrow	Annual Dinner
Eoin O'Murchu (from 19 Nov)	CH2M Hill	Young Members Chair
Joanne Sui (until 19 Nov)	London Bridge Associates	Young Members Chair(now past)
Kate Cooksey	Morgan Sindall	MSc
Shani Wallis	Freelance Tunnelling Journalist	Media Relations & Publishing

## Members invited to report to the Committee:

Martin Knights	Halcrow	ITA
Andy Flowerday	Barhale	Pipe Jacking Association

## Institutional Representatives:

Bill Grose	Independent & Past BTS Chairman	Institution of Civil Engineers
Alan Bozeat	Hunter Personnel	Institute of Materials, Minerals and Mining

The British Tunnelling Society was formed as an unincorporated association by the Constitution adopted on 23 September 1971 and as amended on 21 January 1993, 16 May 2002 and 17 May 2012. The Society became a registered charity in March 1993. The Charity number is 1017887.

#### LEGAL AND ADMINISTRATIVE INFORMATION

The principal and registered office of the charity is:                    One Great George Street  
Westminster  
London SW1P 3AA

Names and addresses of other relevant organisations or persons:

Bankers	National Westminster Bank Strand Branch PO Box 414 38 Strand London WC2H 5JB	CCLA Investment Management Limited St. Alphage House 2 Fore Street London EC2Y 5AQ
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Solicitors: Solicitors are appointed from time to time as the need arises.

Examiner: Jonathan Healey FCA  
Lindeyer Francis Ferguson Ltd  
North House  
198 High Street  
Tonbridge  
Kent  
TN9 1BE

Investment Advisers: Investment advisers are appointed from time to time as the need arises.

## **CHAIRMAN'S ANNUAL REPORT 2014**

### **Introduction and Industry**

It has been pleasing to see that activity in our industry continues to increase. The greater levels of interaction that the BTS is having with Clients, Stakeholders and Government bodies is testament to this. The increased workload this has created for the committee is challenging but gratifying and confirmation of the position the BTS holds within the industry.

Works on Crossrail and London Underground Stations at Tottenham Court Road, Bond Street and Victoria are all well under way and with many milestones met. In 2015 we should see the majority of the tunnelling works complete on these schemes. On the Lee tunnel scheme, the main bore has been completed and works are progressing for the all-important secondary lining.

For site activity, 2015 is likely to be a quiet year as current projects start to wind down with tunnelling completed. This is likely to be offset with the activities surrounding preparation for Bank Station, Northern Line extension, HS2, Silvertown, Tideway and Crossrail 2. Hopefully we will see progress on Hinkley works and Stonehenge has arisen once again

We must ensure that all of the progress the tunnelling industry has made in skills development taking place over recent years is not lost. We must also continue with initiatives to encourage "fresh blood" into the industry and look to ensure we have a sufficient and capable workforce for the envisaged workload that we face.

### **Awards/Training and Courses/Registration**

The 2014 James Clark Medal was awarded to Peter Jaques for his long service to the BTS and the wider tunnelling industry and for his long established record of tunnelling innovation.

As agreed last year, the Harding Prize will now be held on an annual basis and the 2014 Harding Prize was awarded to Ed Batty for his paper "Crossrail Western Tunnels TBM Breakthrough at Bond Street". The continuing interest from young members to enter the competition is testament to the honour its award holds in the society and the industry. I would commend all of the entries and especially the three finalists for their excellent presentations to the gathered BTS members at the April meeting.

Both our annual 'Tunnel Design and Construction' and the 'Underground Health and Safety' courses continue in development and success. This is only possible due to the hard work of the committee and also the presenters, all of whom give their time freely to support the future generations of our industry. This also reflects the input that has been given to date in the development of the survey courses. On the subject of volunteers, it is also worth noting that the MSc at the University of Warwick continues to have a 20-30% industry involvement, which is unique in academia. Aside from the BTS awarding a bursary for 2014, we need more support for the MSc financially from the industry. Government announced that they would be looking at changing rules relating to the funding of second degrees which will make it financially easier for students to take the MSc. When this will happen is uncertain so we would recommend employers look to the benefits of sponsoring a student through the course.

Once again the BTS continue in their support and close cooperation with TunnelSkills (TS). The BTS continues to support TunnelSkills (TS) in their endeavours to improve the competence of operatives and supervisors in the UK workforce and provide a competency standard for new entrants into the industry. As part of these activities, we have joined the Crossrail led Employer Ownership of Skills (EOS2). We have committed to on-going assistance in the development of industry related training schemes and courses.

As in 2013, Registration has been a subject of much discussion in the BTS, we need to push forward with this subject and ensure that as a Society we have developed a solution before one is imposed upon us. The need to be "masters of our destiny" is a compelling case for development of a solution.

### **BTS Young Members**

The Young Members Committee continues to grow in success and number on previous years. After the initial discussions on the subject of an ITA Young Members association there has been progress and, at WTC 2014, the ITAYM group met. Once again a part of the BTS has been instrumental in the development of the process on the international stage and the Young Members continue to exhibit the high standards in performance that characterise the BTS. The on-going programme of meetings workshops and the annual conference all assist in the continued growth in the numbers and activities associated with the Young Members. Congratulations to Joanne and Eoin.

### **Finance and Membership**

Both individual and corporate membership continues to increase with 2014 seeing a reversal in the downward trend seen in previous years. Increasing our membership is a key aim of the society with increased membership bringing greater presence in the industry. Our particular mix of individual and corporate membership is unique amongst other similar societies and gives us engagement opportunities not seen by other bodies. As in previous years, we will continue to encourage the development of numbers in the Young Members body and plans for the 2015 conference should encourage a greater take up of young membership.

The Society has built up a good reserves policy in the last number of years. In line with guidance to charities we have aimed to maintain reserves in line with one year's annual income. Increases in membership have boosted the society's funds with reserves at the end of 2014 totalling £97,591 equating to a small increase from the figure of £93,596. We have also become more efficient by adopting more electronic means for information distribution and reducing postage, copying and secretariat time and costs. The intention, looking forward, is to run with this figure.

#### **Technical**

It was pleasing to announce the publication of the Timbering Guide which is now available to download from the BTS website. Bound copies will be available and a number will be gifted to Colin Mackenzie and the ICE Library.

There have been no other publications this year, however work continues on the development of the SCL Good Practice Guide but the overall workload of the committee members had prevented the desired level of progress on this document in 2014. Greater focus will be placed on this document in 2015.

All Parliamentary Infrastructure Group (APPGI) continues to be chaired by the Rt Hon Nick Raynsford MP although we are in process of looking for a new Chairman with Nick's pending retirement from Parliament in 2015.

Once again the Health & Safety and Standards sub-committee has been relatively quiet this year as BS6164 is in the 5 year period between revisions and CEN standards on machinery have yet to be passed off and should be available in 2015.

The BTS have been invited to join HS2 as co-sponsors of a new Publically Available Specification for the design of fibre-reinforced concrete linings. Once a draft document has been produced, the BTS will be involved in its development and ensuring it meets the requirements of the industry, and the brief to produce a document that improves efficiency in lining design in the absence of detailed design codes for this subject. We will be looking for engagement with members to permit input from as broad a range of interested parties as possible to ensure that the document has industry acceptance and credibility.

#### **Website/Tunnels and Tunnelling/Newsletter**

The mainstay of the Society's activities is the varied programme of discussions and presentations held at the ICE in London each month. These cover projects of interest, latest developments in tunnelling and other issues for our industry. We strive to build upon that programme each year, to fulfill our Learned Society function of knowledge sharing. Attendance at the meetings is extremely high with the Thomas Telford lecture theatre often full to capacity with many more online from around the world using the live internet broadcast which is proving ever more popular.

The BTS website continues to develop since its re-launch in 2014. Hopefully all users find the site more informative and easier to navigate through. Ken Spiby continues with the task of keeping the site relevant and current.

Tunnels & Tunnelling International continues to deliver reporting and editorial content and is watched over by our Advisory Board which meets with T&TI editorial and production staff four times a year.

We have drifted away from the production of a newsletter and the intention is that more of this information features in Tunnels and Tunnelling.

The social activities of the Society form an integral part of its function in delivering a platform for the sharing and dissemination of knowledge and this is exemplified by our monthly meetings. The annual BTS dinner was held once again at the popular Brewery venue in London where we had record numbers of over 800. Once again we have decided to remain with the Brewery as the venue for the 2015 event.

#### **Finally**

It only remains for me take this opportunity to thank the members of the committee and this extends to the members of the Young Members committee. As the society becomes more engaged with industry, clients, and stakeholders, the extent of the work that is required to be undertaken by the committee continues to grow and it is the hard work, enthusiasm and commitment of the members of each committee that ensure we meet our obligations and achieve the goals of the society. The fact that this Society is so successful, well-respected, well-attended, and sociable is due in no small measure to the tremendous enthusiasm of the committee, who give their time so generously, and to the support of their employers who accept the cost of this time. Without this the BTS would not have the reputation that it has.

It seems likely that the activity in the industry and the subsequent involvement and activities of the Society will continue to grow in 2015 and beyond. I hope that as an industry we will respond to this as we have traditionally and prove ourselves capable and able. I look forward to the on-going support shown historically by our corporate members permitting their staff the time and resources to undertake activities associated with the society, document development, lecturing or attending courses. Our intention is to continue to help the UK tunnelling industry to maintain its position at the forefront of world tunnelling capability. The Society and the tunnelling industry should look forward to the future and build on the great opportunity that we have as an industry to develop tunnelling as a safe, efficient, sustainable and cost effective solution to meet the needs of society by continuing to develop best practice both in design, construction and safety.

Finally I will thank Damian McGirr for his council as I have progressed through the first year as Chairman, Mark Leggett for his support as my Vice Chairman and finally the committee for their assistance in all of the activities we have undertaken. Look forward to an exciting 2015 and wish all members a successful, safe year.

Roger Bridge  
BTS Chairman

Date of Approval: 12<sup>th</sup> May 2015

## **TRUSTEES REPORT**

The Trustees present their report together with the financial statements of the British Tunnelling Society (the 'Society') for the year ending 31<sup>st</sup> December 2014. The financial statements have been prepared on the accounting policies set out on page 23 of the financial statements and comply with the current statutory requirements, applicable law and the Statement of Recommended Practice 'Accounting and Reporting by Charities' issued in April 2005.

### **Organisational structure**

The Trustees of the British Tunnelling Society are the ex officio and elected members of its Committee, with the Committee consisting of elected members, nominated members, co-opted members and ex-officio members. Nine members of the Committee are elected by postal ballot, the result of which is announced at the Annual General Meeting. Members elected to the Committee serve for a term of three years and then retire from the Committee, unless they are elected Chairman or Vice-Chairman. A retiring member is ineligible for re-election to membership of the Committee for a period of one year after they retire.

Two members, one nominated by each of the Institutions of Civil Engineers and Mining and Metallurgy, serve for a three-year term of office and then retire from the Committee unless they are elected Chairman or Vice-Chairman.

The Committee elects from amongst its members a Chairman to hold office for two years immediately following the Annual General Meeting. Such election is held at the last Committee meeting of the previous Chairman's term of office. On expiration of a Chairman's term of office, he may serve on the Committee in an ex officio capacity for a period of two years as immediate past Chairman.

The Committee elects from amongst its members a Vice-Chairman to hold office for two years immediately following the Annual General Meeting. Such elections are held at the last meeting of the Committee of the previous Vice-Chairman's term of office.

The Committee may co-opt a member of the Society to the Committee at any time and for whatever purpose the Committee so decides. A co-opted member to the Committee will hold office until the following Annual General Meeting.

Any casual vacancy, whether in the offices of Chairman or Vice-Chairman or amongst the elected or nominated members of the Committee, may be filled by the Committee, with the approval of the appropriate Institution in the case of a nominated member. A person appointed to fill a casual vacancy will hold office until the following Annual General Meeting, they will then retire. The casual vacancy will then be filled either by an election, by postal ballot, or by a nominated person from an Institution, as appropriate.

A term of office in a co-opted capacity or as the result of an appointment to fill a casual vacancy will not be counted for purposes of eligibility for subsequent re-election to the Committee.

Any individual member of the Society or nominated representative of a corporate subscriber of the Society or a nominated individual from an Institution will be eligible, except as otherwise provided, for election or appointment or co-option to the Committee.

### **Objects and policies & public benefit**

The Society's objective is summarised as the advancement of the education of the public in and the promotion of the art and science of tunnelling, including the creation and use of underground space, by fostering learning, understanding, experience, interest and research therein.

In furtherance of this the Society:-

- Provides a forum for the discussion of the problems and techniques of tunnelling by holding monthly meetings which are free and open to all interested parties in addition to Society members
- Encourages tunnelling research and development so as to improve health and safety of the workforce, reducing both risk to the public and the cost of provision of infrastructure
- Provides training courses on a non-profit-making basis to train young tunnellers in tunnelling best practice
- Supports a Young Members division that embraces the objectives of the Society but focuses towards graduates, school leavers, and students still at school
- Supports the development of apprenticeships and QCF NVQ qualifications via its work with the National Working Group and TunnelSkills

- Produces and arranges for the publication of papers and reports to disseminate information on tunnelling and to provide points of reference
- Co-operates with other associations in holding meetings and conferences locally, nationally and internationally
- Is the national representative body to the General Assembly of the International Tunnelling and Underground Space Association (ITA) for the UK
- Pays its annual membership fees to the ITA for the maintenance and on-going management of the Association. ITA fees for the year 2013 totalled £979
- Maintains liaison with similar associations and individuals in other countries and co-operates and participates in the formation, continuance and furtherance of an international society devoted to the interests of tunnelling and of other international, national or local associations whose objects are allied to those of the Society
- Offers specialist assistance and advice to H.M. Government, statutory authorities, boards, institutions and similar bodies and to make representations to such bodies
- Does all such other things as are incidental or conducive to the attainment of any or all of the above aims.

### **ADMINISTRATION OF THE SOCIETY**

The business affairs of the Society are administered by a committee consisting of nine elected members, several co-opted and ex officio members together with a representative from the Institution of Civil Engineers, the Institute of Materials, Minerals and Mining and the Pipe Jacking Association.

The 2014 AGM saw vacancies arise in the Committee, due to retirement of elected members. This year 4 BTS members were duly elected to serve from the 2014 AGM for a period of three years. They are:

Paul Perry  
Ivor Thomas  
Jamie Standing  
Andreas Raedle

In addition, the Committee requested that Myles O'Reilly, Donald Lamont, Shani Wallis, Ken Spiby, Joanne Sui, Kate Cooksey and John Scholey continue their roles as co-opted members of the Committee, which they agreed to do. Eoin O'Murchu was asked to take on the responsibility of Young Members' Chair in November 2014.

The British Tunnelling Society is one of the largest and most active of the Associated Societies of the Institution of Civil Engineers. The Committee deals with its substantial workload by allocating it to sub-committees as detailed in their individual reports (see pages 9 to 21).

## **1. PAPERS AND MEETINGS**

Dave Terry (Chair), Paul Perry, Alan Bozeat, Nick Tucker, Jamie Standing

The year has seen a full calendar of high quality presentations covering a wide range of topics. The Committee and members' thanks go to all the presenters.

**If there are any suggestions, offers or requests for presentations please forward them to the BTS, either [david.terry@lbassoc.co.uk](mailto:david.terry@lbassoc.co.uk) or [greg.james@ice.org.uk](mailto:greg.james@ice.org.uk)**

To detail the talks given in the year:

**Thursday 16<sup>th</sup> Jan: *Concrete and Materials Engineering and its role in underground construction***  
**Speakers: Charles Allen, CA Consult; Roland Weiss, VSH AG; Richard Sutherden, AECOM**

This popular presentation explained the fundamentals of the use of concrete in underground construction and highlighted the very demanding requirements involved with the construction of tunnel linings. The talk detailed the requirements of the Client, Designer and Contractor and provided examples of concrete engineering and development of innovative concrete engineering using the Lee Tunnel in London as a case study.

**Thursday 20<sup>th</sup> Feb: *The use of explosives for New York East Side Access***  
**Speaker: Andy Thompson, Hatch MottMacdonald**



This year's joint MinSouth/BTS meeting focused on the East Side Access Project in New York, which is designed to reduce overcrowding in New York's Penn Station and the subways that take commuters from there to the east side of the city.

The presentation detailed the tunnelling techniques and use of explosives in the densely populated Manhattan environment, explaining how some 800,000 yd<sup>3</sup> of Manhattan Schist has been removed to date, including from directly beneath the operational Grand Central Terminal.

**Thursday 20<sup>th</sup> March: *High Speed Guangzhou-Shenzhen-Hong Kong Railway***  
**Speakers: Andy Sloan, Donaldson Associates**

A fascinating talk provided detail of a very busy Hong Kong tunnelling market and in particular focussed on the construction of the High Speed railway between Hong Kong and Guangzhou, MTR Corporation contract 824.



**Thursday 10<sup>th</sup> April: *Harding Prize Competition 2014***  
**Speakers: Ed Batty, Bam Nuttall; Leigh Holland, Crossrail; Angelos Gakis, Dr. Sauer & Partners**

A total of 7 exceptional papers were submitted for this year's Harding Prize. Following a lot of deliberation, 3 of these were selected for presentation. All 3 presenters were of the highest standard and it fell to the judges to select Ed Batty as the winner of this year's competition.

For a full report of the Harding Prize competition please refer to the report from the Prizes and Awards Subcommittee.

**Thursday 15<sup>th</sup> May: C310 Thames Tunnel, geotechnical and tunnelling related specifics in urban tunnelling and river crossing with low overburden**  
**Speakers: Riku Tauriainen, Andreas Raedle, Andy Ingram; Hochtief Murphy JV**



The evening started with the Annual General Meeting, and the well-deserved presentation of the James Clarke Medal to Peter Jaques.

The evening presentation gave a very good insight into the typical problems faced by tunnellers in urban environments. Using the recently constructed C310 as the case study, the talk focused on the difficulties of constructing shallow tunnels in the vicinity of a variety of Network Rail assets and beneath the River Thames, with variable cover.

**Thursday 19<sup>th</sup> June: The Harding Lecture: Health & Safety in Tunnelling, evolution and revolution**  
**Speaker: Donald Lamont**

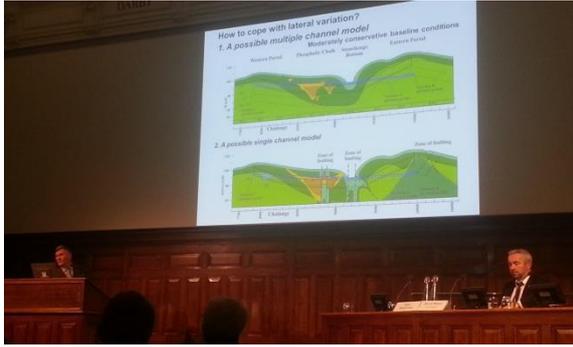
A packed Telford Theatre saw Donald Lamont present this year's Harding Lecture entitled, 'Health and safety in tunnelling, evolution and revolution'. The talk drew heavily on the presenter's vast experience in the tunnelling industry evoking memories of bygone days and how the future will look. An enthralling talk was followed in fitting style by a good turn-out in the ICE bar!

**Thursday 23<sup>rd</sup> September: Crossrail Western Tunnels, Urban Tunnelling Through the Capital**  
**Speaker: Andy Alder, CH2M; Adrian St John, BFK JV; Stephan Fleischman, (BFK JV)**



As part of the BTS Conference 2014, representatives from all sides of the Crossrail team provided an insight into the design, development and construction of the western tunnels. Insights into how the project dealt with third parties aplenty and overcame numerous technical challenges along the route were provided to a packed auditorium.

**Thursday 16<sup>th</sup> October: “What could possibly go wrong with a site investigation in chalk?”**  
**Speakers: Professor Rory Mortimore**



In a departure from the conventional project-based presentation, Professor Mortimore gave an entertaining viewpoint on engineering in chalk, in particular with site investigations. Drawing upon a lifetime's experience of ground engineering in chalk, the talk was well delivered and prompted a lively question and answer session.

**Thursday 20<sup>th</sup> November: Tuen Mun tunnel project in Hong Kong**  
**Speaker: Vincent Avrillon, Bouygues TP UK.**

This presentation addressed one of the biggest difficulties that had to be overcome on the £315m contract to build the section of the high-speed rail link between Hong Kong and Guangdong (Mei Lai Road to Hoi Tong Road), which was driven using slurry TBMs.

A considerable number of obstructions (deep-laid foundations of current structures, metro lines etc.) along the route, namely 127 piles of varying types had to be removed from 10 different locations, with the presentation giving details of the techniques employed. The talk proved that despite all the good planning and preparation, contingency arrangements were still required as the TBM encountered unforeseen obstructions which were removed using compressed air intervention after a thorough ground treatment operation.



**Thursday 11<sup>th</sup> December: The BTS Debate, “This house believes that Regulation and the accompanying compliance culture is stifling Innovation & Creativity within the tunnelling industry”**  
**Speakers: Bob Ibell, London Bridge Associates; Bob Cummins, SODAK; Kevin McManus, TfL; Darren Page, OTB Engineering**

In December, the BTS held its (almost) traditional Annual Debate which was generated from an article in NCE about the effects of regulation and compliance. The proposers argued that the principle behind regulation was rapidly approaching the status of a culture as opposed to a requirement. The opposition opted for a traditional approach of pouring healthy measures of scorn on the motion and the proposer's arguments, instead putting forward the idea that creativity and innovation was rife on our projects but had to be carefully nurtured, as current levels of management could indeed have the stifling effect that the motion alluded to. The debate was opened to the floor with several contributions and then put to the vote.

The motion was rejected!



Festive cheer was provided all round by the Chairman's announcement that the bar was to be sponsored.

## **2. TRAINING, EDUCATION and YOUNG PERSON'S COMMITTEE**

Andrew Stenning (Chair); Roger Bridge, Steve Cowell, Rod Young, Ivor Thomas, J Standing, Joanne Sui

### **BTS Tunnel Design and Construction Course**

The fifth Tunnel Design and Construction course to be held at Warwick University took place from 30th June to 4th July 2014. The course programme was changed in some areas following the feedback from the 2013 course, and welcomed a number of new speakers. The main workshops were Risk Management and TBM Choice and Sustainability.

The course maintained a high level of interest with the number being increased to 80 delegates, representing a mix of Clients, Designers, Contractors, and the Insurance industry. This number included five University students chosen from a limited number of applicants, whose fees were sponsored by the BTS.

A full timetable of lectures and workshops was accompanied by social events - on the first evening BBQ with rounders & later in the week an evening of indoor volley ball, and the traditional Course dinner was held on Thursday evening. The Course dinner was also attended by course speakers & BTS committee members to provide networking with delegates. Feedback was sought from delegates during and following the course, showing the course was extremely well received.

Thanks are extended to all the Speakers, Day Chairman, and assistants without whom this could not have taken place.

The 2015 course will be held from 29th June to 3rd July, and will once again be held at Warwick University.

### **BTS Underground Health & Safety Course**

The seventh annual BTS Underground Health and Safety Course was held at the ICE on 24th and 25th November 2014. The course was well attended with 77 delegates, representing a wide mix of Clients, Designers, and Contractors. This number included five University students chosen from 10 applicants, whose fees were sponsored by the BTS.

The feedback was by paper evaluation forms handed out on the last day, and the correlated information will be used to further improve the 2015 course. The overall consensus from discussions gave a very positive response, confirming the perception, at the time, that the Course was once again a great success.

The 2015 Course will be held at the ICE on 23rd and 24th November.

### **BTS Survey Course – Development**

In conjunction with TunnelSkills & 3rd party survey organisations/experts, several meetings have occurred to develop 2 courses.

- a. A practical course (with a minor amount of theory and maths) aimed at new-entrants to the sector.
- b. A theoretical course (with some practical) aimed at tunnelling engineers.

The following key areas to be developed have been drawn up:-

1. Course Content aspirations
2. Suitable locations
3. Equipment
4. Lecturers
5. Funding
6. Frequency
7. Numbers attending
8. Agree development committee(s)
9. Accreditation by which body
10. Facilities

An application has been made to CITB for funding to permit the courses to be developed and written by a suitable person with assistance from industry professionals ensuring that the course is developed in a suitable manner. Accreditation for the courses will be considered.

### **TunnelSkills (Rod Young reporting)**

Led by Chairman, Tom Lane, membership stands at 27 companies, with some movement, departing & others joining. TunnelSkills have worked on numerous initiatives during the year, some detailed below:-

Short-term training funding bid was successful for a further year for £25k to be used through 2014, some of this funding was used to run Concrete Pumping Courses, SMSTS (Tunnelling) training, Tunnel entry courses & SCL up-skilling courses.

The two tunnelling apprenticeships have seen no take-up in 2014, primarily due to the fall off in recruitment. L2 diploma courses and apprenticeships in Tunnelling Operations & SCL Work to have been completed at TUCA.

The SUP for SCL operatives under development.

Tunnelling Safety Training & Test (TSTS) replacement for Passport, TSC and HS&E test has been developed & will be rolled out in Spring 2015. Training likely to be via Site Safety Plus and results to be visible on individual CSCS cards.

#### Proposed Initiatives for 2015

Develop career progression for Tunnellers.

Develop Tunnelling Survey & Setting-out Courses jointly with BTS and TUCA

Support EOS2 'Tunnelling Talent' projects

Trailblazer apprenticeships

#### **British Tunnelling Society Young Members Committee (BTSYM)**

Joanne Sui (Chair); Eoin O'Murchu (Incoming Chair); Petr Salak (ITAYM representative); Matthew Lane; Peter Coppenhall; Emyr James.

The year has seen a BTSYM calendar packed full of events. In summary, the BTSYM hosted five talks, four workshops, four school visits, three university visits and had a stand at three Big Bang Fairs in 2014. These events were in addition to assisting the main BTS Committee and having regular involvement with the ITAYM.



In January, the BTSYM kicked off with a tunnels lecture to 3<sup>rd</sup> year Geology students at Plymouth University. Later in January, the BTSYM hosted an event at St Paul's School for Girls in the Midlands.

**Picture Left: St Paul's Girls School, Midlands**

February saw the collaboration between the BTSYM and ICE with a talk on 'Why become Chartered with the ICE' by Elena Rinaldi, ICE Membership Development Officer. The BTSYM held a tunnels and case studies talk to Masters Students at Portsmouth University and the first social of 2014 was well attended and hosted in February.

The BTSYM attended the Plymouth University GEOCAREERS Careers Fair and hosted an Introduction to tunnelling and tunnelling design exercise at The Westgate School in March. The school event was attended by over 300 students (10 lessons, 30 students per lesson, 1 hour lessons, 5 lessons per hour). March was also the first workshop of the year on Waterproofing – Designing and detailing by Stefan Lemke.

April was a talk on Low Power Wireless Sensor Network Installed in Cast Iron Tunnel Linings by Heba Bevan, Cambridge University

In May, the BTSYM gave two talks in one evening on Confined Space Hypoxia by Tim Newman and Current Design Approaches Model Code, Eurocode and Fibre Reinforced Concrete by Christophe Eberle, Mott MacDonald.

In June, the BTSYM hosted an event at Shooters Hill Sixth Form College attended by 15 sixth form students. Later that month the BTSYM gave a workshop on Ventilation and Fire Safety in Tunnels – What you need to consider in tunnel design, by Dr Peter Woodburn and Sandeep Upadhy, CH2M.



**Picture Above: Big Bang Fair, London – July 2014**

July saw the BTSYM visit Richard Challoner School for a day for an Introduction to Tunnelling to 80 Year 10 students. THE BTSYM had a stand at the Big Bang Fairs in Coventry, London and Derby with a total attendance of over 10,000 people.

September was the BTSYM workshop on Temporary Works in Underground Spaces by Andy Machon, UnPS and a lean management site visit at the Jaguar Factory.

In October, the BTSYM gave a talk on Numerical Modelling for Complex Tunnelling Projects – practical insights by Panos Spyridis, Dr Sauer & Partners. The BTSYM also gave a talk at Warwick University that month.

The final talk of the year in November that succeeded the Annual General Meeting was on the ITAYM by Petr Salak, Vice Chair of the ITAYM and BTSYM Past Chair

The final workshop of the year was on Construction Contracts by Charles Blamire-Brown, Elizabeth Harwood and Lynne Davy, Pinsent Masons in December.

2014 was finished off with a final social of the year, the Christmas Jumper Night Out. This event was well attended by both new and old committee members plus general BTSYM attendees.

Development of the Teaching continued throughout the year and Teaching pack meetings were arranged with the BTS and Terry Crabb Memorial Trust – updates are ongoing.

In addition to these events the BTSYM have been planning the long awaited BTSYM Conference 2015.

### **ITAYM**

In 2014 the ITA included the development of the ITAYM group as an important strategic goal. The creation of the ITAYM Group during the WTC 2014 was a result of over 16 months of team work, which began in January 2013 by the BTSYM. The ITA General Assembly in Brazil unanimously approved the creation of the ITAYM Group. The main goals were to provide a technical networking platform within the ITA for young professionals and students, bridge the gap between generations, network across all experience levels in the industry and increase awareness of the tunnelling and underground space industry to new generations.

The ITAYM Steering Board was elected during the WTC 2014 and will finish 2 years mandate during the WTC 2016.

#### *ITAYM Steering Board for 2014-2016*

Chair: Jurij Karlovsek (Australia), Vice-Chair: Petr Salak (UK), Treasurer: Lasse Vester (Denmark), Secretary: Nichole Boulton (Canada), Communications and Marketing Officer: Sindre Log (Norway)

#### *Member Nations with YM Groups:*

Australia, Brazil, Canada, Colombia, Denmark, Greece, Norway, United Kingdom, USA & South Korea

*In planning phase:* Belarus, Czech Republic & Hungary

The ITA Executive Council (ExCo) had a meeting on the 28/09/2014 in Athens prior to the 2nd East European Tunnelling conference where Petr Salak was invited by Olivier Vion (ITA Executive Director) to report on the ITAYM Group progress. The ITA ExCo positively commented on the fast development of this group and expressed their strong support.

The ITAYM is preparing together with a partner a dedicated magazine with the title Breakthrough in order to inform and communicate amongst the young professionals and students around the world. The target is to have the first published magazine ready for the WTC 2015 in Dubrovnik.

Petr Salak will continue as the BTSYM official representative until 2016 to support his role of the ITAYM Vice-Chair. The BTSYM past Chair Joanne Sui will become the official representative for 2016-2018.

The BTSYM will continue to play a key role in the ITAYM development in 2015.

### **3. EDUCATION incl. MSc**

Mark Leggett (Chair); Damian McGirr; Robert Ibell, Kate Cooksey, Ross Dimmock, David McCann, Paul Perry

The 2014/2015 MSc started at the end of September 2014; there are a total of 23 students (16 full time and 7 part time). The course continues to be well received by all of the students and has sparked quite a bit of interest including very good press articles; one in New Civil Engineer (Spike in tunnelling students on Warwick masters, 22 October 2014), Tunnelling Journal and Tunnels & Tunnelling (October 2014).

The MSc in Tunnelling at Warwick University continues to build an international reputation and its unique approach of 20% of the course content delivered by industry is getting the attention of the other Warwick courses and other universities.

The MSc modules can also be purchased as individual CPD courses, including:

Underground Construction Methods Part 1  
Underground Construction Methods Part 2  
Geological Investigation and Ground Characterisation  
Rock Mechanics  
Health, Safety and Environmental Considerations  
Tunnel Design  
Finite Element Methods for Tunnelling  
Construction Management

Material for the project is also supplied by the tunnelling industry which allows the students to undertake an intensive and detailed study using real project data. The BTS is committed to build on the success of the course to date and have a greater number of students. The course is available as a 1 year MSc on a full time basis or part time over 2 years. The modules are undertaken in week-long blocks thus making it easier for part time students to attend, or for companies to purchase a module as training for staff not enrolled on the MSc.

Thanks are due to the many BTS members who have supported the MSc this year. More than 20% of the teaching this year has been delivered by guest lecturers from the tunnelling industry, which has really given the course a practical flavour that is much appreciated by the students. This input requires a huge commitment from the industry members for which the BTS and Warwick University are extremely grateful.

#### **MSc Course – Final Project Presentations**

The Final Project in 2014 was based around a cable tunnel in London. The presentations were given on the 4th September 2014 to an appreciative audience and the teams tackled the questions well. We all agreed that their work was of a very high standard. The evening was rounded off with a dinner to celebrate the end of the course.

This part of the course is incredibly valuable and the BTS need to gather data on more project examples to give to Warwick to use; ideally a straightforward single tunnel route from A to B, with constraint identified, design criteria, objectives, geotechnical data etc. for the students to base their work on. Anyone with any interest in supporting this aspect of the Tunnelling MSc please contact Mark Leggett.

#### **MSc Course – New Intake Reception/Welcome**

The new intake reception took place in Mott MacDonald's London office on 2nd October 2014, attended by members of the sub-committee along with some of the industry contributors. Once again the enthusiasm of the new students was obvious to all.

#### **MSc Course – BTS Bursary**

At the time of writing the BTS has not awarded a bursary for 2014. We would also like to encourage our corporate members to support the MSc by offering financial support to students or placing staff onto the course.

### **4. REGISTRATION**

Damian McGirr (Chair); Roger Bridge; Mark Leggett; Ivor Thomas & Joanne Sui.

Following a survey of both members and industry in 2013 with some varying responses, the Committee reviewed the proposal for registration once more. A more simplified proposal was partly developed along the lines of a Register of Tunnellers to an extent that this was ready for further consultation within the BTS. However in 2014 there has been limited progress on the subject of Registration. It is a complex issue that has been wrestled with by the BTS for many years and to commit to this would require quite significant changes to the operation of the Society.

It is proposed that in 2015 we again look at this and we will explore further with other accreditation bodies such as ICE and RoGEP to see what we can learn from them and determine the best way to take forward any proposal for Registration of tunnellers.

The committee apologises for the slowness of this but I am sure that you will agree that such a significant step for our society requires careful consideration and we should make sure we take our time to make the correct decision.

### **5. AWARDS**

Steve Cowell (Chair); Mark Leggett; Dave McCann; Petr Salak; Dave Terry; Nick Tucker.

**Harding Prize 2014** - Judging was completed on the evening of the 10<sup>th</sup> of April 2014 and the winner of the competition was announced as Edward Batty with his paper "Crossrail Western Tunnels: TBM Breakthrough at

Bond Street Station". A total of seven papers were submitted encompassing a wide range of topics from performance of circular shaft excavations to fire testing of composite SCL linings. The quality of the submissions was excellent and it was a difficult task for the judges to select a winner.

**James Clarke Medal 2014** - The 2014 medal was presented to Peter Jaques prior to the start of the evening meeting held on the 15<sup>th</sup> of May 2014. The award was made in recognition of his valued contribution to the BTS, the wider UK tunnelling industry and the innovations that he has brought to tunnel engineering. The citation was read by friend and former colleague James O'Callaghan and the medal was presented by Damian McGirr, BTS Chairman.

**James Clarke Medal Winners Luncheon 2014** - The 28<sup>th</sup> anniversary meal was held on Thursday the 20<sup>th</sup> of November 2014 to coincide with the BTS evening meeting. It was a pleasure to welcome many previous James Clarke Medal Winners together with members of the current BTS Committee. The meal was hosted by Roger Bridge, BTS Chairman, and took place in the Council Room at One Great George Street.

## **6. FINANCE AND MEMBERSHIP**

Mark Leggett (Chair); Roger Bridge

### **Finance**

In line with the logic adopted last year we have made no changes to the annual membership rates for 2015 but are reviewing the society finances to determine whether an increase will be necessary for the 2016 membership. These rates can be seen in the table below. The previously agreed rates for the on-going provision of Tunnels & Tunnelling remain in operation for the next four years enabling a certain amount of stability.

The rates for 2015 are as follows:

	<b>UK</b>	<b>Overseas</b>
	<b>£</b>	<b>£</b>
Corporate Member Small (Up to 50 employees)	405.00	510.00
Corporate Member Medium (50 to 500 employees)	645.00	880.00
Corporate Member Large (More than 500 employees)	1045.00	1510.00
Individual	80.00	130.00
Retired	31.00	42.00
Student	27.00	42.00
Young Member	40.00	50.00

The membership fee for 2015 will again include for provision of a digital version of Tunnels & Tunnelling.

**Membership:** The detail of the current membership is set out below:

	<b>Member Classification</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>	<b>Change 2013/14</b>
<b>UK</b>	Corporate members	66	62	61	64	+4
	Individual members	495	482	481	462	+13
	Students & Retired	85	80	67	62	+5
	<b>Total</b>	<b>646</b>	<b>624</b>	<b>609</b>	<b>588</b>	<b>+22</b>
<b>Overseas</b>	Corporate members	8	7	4	5	+1
	Individual members	134	142	157	162	-8
	Students & Retired	10	6	7	8	+4
	<b>Total</b>	<b>152</b>	<b>155</b>	<b>168</b>	<b>175</b>	<b>-3</b>
	<b>Overall Total</b>	<b>798</b>	<b>779</b>	<b>777</b>	<b>763</b>	<b>+19</b>

The change in membership from 2014 has been a net increase with a reduction in overseas membership balanced by an increase in UK members indicative of the increased activity in the UK market. Of particular note is the increase in student members hopefully an indication of the growing influence and success of the Young Members committee. There remains interest from a number of potential new Corporate members but these have yet to apply formally.

We have made a small profit during the 2014 period, with the reserve increasing from £93,596 to a figure of £97,591 by the end of 2014. As forecasted, this was mainly due to the payment of a bursary for the Warwick MSc £12,000 and investment in a new website which is now live. The on-line payment system is now fully operational and in use for course bookings and the annual dinner.

The budget for 2015 indicates a reduction in reserves with expenditure going towards further development of the website and the database with systems being developed to permit simple BTS member log-in and a data storage capability for working groups. There is intention to continue with the activities aimed at young members and supporting this activity with necessary funding as well as looking to develop new courses that have been identified during the year. The training theme continues with on-going funding to TunnelSkills, and the Society will also fund one bursary for the Warwick MSc with £12,000 available if the successful applicant performs suitably.

## **7. HEALTH & SAFETY and STANDARDS**

Donald Lamont (Chair)

### **Safety, Standards and Codes**

2014 was a relatively quiet year for activity in this field. Having had the most recent revision published in 2011, BS 6164 is not due for its 5-yearly review until 2016. Hence there was no activity on British Standards this year.

The revision of the CEN standards for tunnel machinery safety (EN 16191 (TBMs), EN 12110 (Airlocks) and EN 12111 (Roadheaders)) was completed in 2014. Their status as harmonised standards within Europe was finally confirmed in the Official Journal of the European Community. These standards have now been adopted in the UK as BS EN 16191, BS EN 12110 and BS EN 12111.

### **Compressed Air Working Group**

The Group met twice during 2014. The main item of business at both meetings was the revision of the ITA/BTS CAWG 'Guidelines for Good Working Practice in High Pressure Compressed Air'. The major input to the revision has come from CAWG and has focussed on saturation working and mixed gas exposure limits. This document illustrates the unique position of CAWG in combining engineering and medical expertise along with tunnelling and diving knowledge. CAWG is a BTS resource and any BTS member wishing advice on compressed air working is welcome to refer their problem to CAWG for an expert opinion.

High Pressure Compressed Air working is and always will be a very specialised high risk tunnelling activity. One of the very few tunnels currently being built and requiring the use of HPCA working is the Tuen Mun - Chek Lap Kok Link tunnel in Hong Kong which is part of the Hong Kong - Zhuhai - Macao Bridge project across the Pearl River Delta. The Labour Dept. in Hong Kong has adopted the ITA/BTS "Guidelines" as the default standard for HPCA work on the project. It is hoped that with the publication of the revision in 2015, the ITA/BTS "Guidelines" will become the internationally recognised default standard for this topic.

## **8. TECHNICAL**

Nick Tucker (chair); Mark Leggett; Steve Cowell; Andrew Stenning; Paul Perry; Andreas Raedle; Jamie Standing; Andrew Flowerday; Alan Bozeat

The Technical Sub-committee is working on the following main topics which are briefly detailed below:

### **SCL Best Practice Guide**

The SCL sub-committee prepared the guideline structure for the SCL Best Practice Guideline and has continued to work on it throughout 2014. Progress has been slow due to work pressures on the sub-committee members, although the design section is quite well progressed. Other SCL guides are being prepared concurrently by other groups in the industry.

### **Traditional Timbering in Soft Ground Tunnelling**

The BTS Guide - Timbering in Soft Ground - has now been published by the BTS. "Traditional timbering in soft ground tunnelling - a historical review", - September 2014. It is available to download for free from the BTS website and hard copies will be available at the ICE library.

### **BTS Tunnel Lining Design Guide**

Review of the BTS Tunnel Lining Design Guide with regard to deciding if an update was needed progressed in 2014. It was agreed that a major update would be required but this would be delayed until the SCL best practice guide notes currently in production were completed.

### **BTS Specification 2011**

The committee considered that a BTS Specification 3<sup>rd</sup> Edition was not required. The BTS committee agreed to create a number of guides across subjects thus avoiding any revisions to the BTS Specification. A guidance note for Maintenance and Repair Section is being drafted to accompany the BTS Tunnelling specification. Guidance notes will typically be 2-3 pages with a BTS header and be downloadable from the BTS site.

### **BTS Case Studies Working Group**

Preliminary discussions have been had to set up a new working group to look at case studies. The objectives of the working group would be; to provide coordination between parties; to encourage the publication of case studies and to give assistance to those involved in the publication of case studies. This stalled in 2014 and will be developed further in 2015.

## Publicly Available Specification (PAS) for Fibre-Reinforced Lining Design

We have been approached by High Speed 2 and BSi to join in the sponsorship of the new PAS for fibre-reinforced tunnel linings. The aim is to create a document that simplifies and clarifies the design process in line with HS2's commitment to improving project efficiency.

The BTS committee will be involved in reviews of the document as it is developed over 2015.

## BTS Best Practice Recommended Reading List

A committee has been set up to prepare a Tunnelling Best Practice recommended reading / reference list for current and on-going specifications, guides, standards and reports.

## 9. PARLIAMENTARY LIAISON GROUP

Bill Grose (chair); Roger Bridge; Mark Leggett; Damian McGirr; David McCann; Ivor Thomas

The BTS, alongside the ICE, takes an active role in promoting the tunnelling industry and sustainable infrastructure to Government and Parliamentarians. This is achieved through the All Party Parliamentary Group on Infrastructure (APPGI), and communications with Whitehall, including HM Treasury, the Department for Business, Innovation and Skills and Cabinet Office.

Over the year, the Rt. Hon. Nick Raynsford MP has remained as Chairman of the All Party Parliamentary Infrastructure Group. He has signalled his intention to step down from Parliament at the next General Election. We have been considering likely successors.

In July 2014, over 90 politicians and professionals across civil engineering, tunnelling and the construction industry gathered at ICE for the Summer Reception. Nick Raynsford, Chair of the Group, highlighted the importance of cross party consensus for infrastructure investment and how Groups such as the APPGI can address key infrastructure issues and bring industry and policy makers together in a politically neutral forum.

Recently we have been planning an event focusing on ideas for tackling flooding using solutions generated by Civil Engineers, including those involved in the creation of underground structures, tunnels and other potential emergency water storage/control schemes.

In the run-up to the 2015 General Election we will be working with the ICE to ensure that engineering and infrastructure issues are addressed in the election manifestoes of the major political parties.

## 10. WEBSITE

Ken Spiby (Chair)

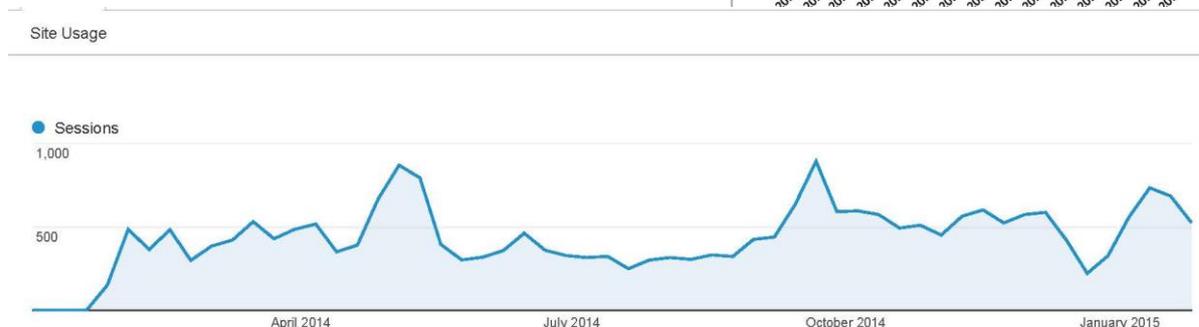
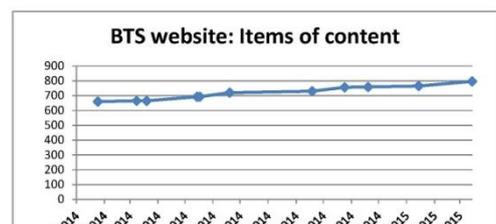
The new look BTS website ([www.britishtunnelling.org.uk](http://www.britishtunnelling.org.uk)) went live, replacing the previous site, in late January 2014. The re-design was intended so that the website would:

- Have a more modern look and feel, and encourage new visitors to the site
- Be laid out in an intuitive fashion with easy navigation
- Bring together the BTS and BSYM websites
- Contain significantly more information than the existing website, and be sufficiently flexible to allow for future expansion (with a significantly increased data storage capacity)
- Provide a new web-based booking and payment system for the BTS training courses and Annual Dinner

We believe these aims have been achieved.

The new website is now controlled and updated by the website sub-committee directly (and not via a third party) allowing for more rapid and precise updating, and providing a significant saving on annual charges.

The website continues to perform well with good traffic figures. Regular updates have been made throughout the year. The website was launched with 660 items of content (pages or list items), and at the end of 2014 contained 765.



Further developments that are planned include:

- The inclusion of further information on tunnelling and careers in tunnelling
- A 'members only' area, restricting access to certain sections and information to members only
- A secure file storage and transfer site for the committee, sub-committees, and working groups

The new website included a booking and payment system, which was put live in 2013 (on a temporary address), and used successfully for the bookings for the BTS Design and Construction and Health and Safety courses in 2013. This system was then used for the BTS Annual Dinner 2014. Whilst generally successful, a number of lessons were learnt from this, and a number of changes will be introduced for the 2015 Annual Dinner bookings.

The UK Tunnels Database is now significantly out of date and work has started on the updating of this to encourage data entry from newer projects, and to encourage its use internationally.

## **11. TUNNELS & TUNNELLING INTERNATIONAL EDITORIAL ADVISORY BOARD**

Myles O'Reilly (Chair); Keith Bowers; Roger Bridge; Mark Leggett; Roger Margerison; Barry New; Ken Spiby; Petr Salak; Andrew Smith; Joanne Sui; Ivor Thomas and Eddie Woods

All members of the British Tunnelling Society (BTS) receive a monthly copy of Tunnels & Tunnelling International (T&TI). This journal contains a wide range of technical articles and is accompanied by notices of meetings, circulars and other information for members. The Advisory Board met three times in 2014 to review the content of the magazine and discuss topics for inclusion in forthcoming issues.

The views of BTS members on matters relating to T&TI are much appreciated and invariably there are some members of the Advisory Board attending the BTS meetings at One Great George Street. BTS members are encouraged to submit articles, news items and letters to T&TI.

## **12. INTERNATIONAL TUNNELLING ASSOCIATION (ITA)**

Damian McGirr (Member Nation Representative); Donald Lamont; Roger Bridge & Mark Leggett.

The 2014 ITA General Assembly and World Tunnel Congress were held in Iguassu Falls in Brazil in May 2014. The WTC and GA was sandwiched between the BTS Annual Dinner and the BTS AGM making it a little more complicated for attending. Despite the fact that it was in South America there appeared to be a larger than normal attendance from the UK/BTS albeit still small in comparison to many other member nations.

As always BTS had influence over ITA affairs beyond its numerical representation. Donald Lamont continued to be Animateur of ITA WG5 while Jon Baber is Animateur of ITA WG 11 "Immersed and floating tunnels". There was other BTS/UK representation on a small number of working groups.

2014 saw the formalisation of the ITAYM group that was a proposal made from the BTS by Petr Salak. Petr was elected as Vice President of the Steering Committee for the ITAYM. It is intended that the first General Assembly for the ITAYM will be in 2015.

Bergen in Norway was elected as the host city for the WTC and GA in 2017.

The 2015 GA and WTC will be held in Dubrovnik, Croatia. Damian McGirr will make his first attendance as UK Member Nation Representative replacing Donald Lamont.

During 2014, the BTS committee decided that it was time that the UK once again made a bid to host the GA and WTC. The next available opportunity is 2019 and it is intended that this will be taken forward in 2015.

Last year, Damian McGirr took over as the Member Nation Representative for the UK from Donald Lamont. The BTS would like to record their thanks to Donald for undertaking this role. He has led the charge for the BTS in ITA and has been one of the reasons why we continue to have a strong voice in the ITA. Donald will of course continue as Animateur of WG5. Thank you, Donald.

## **13. ANNUAL DINNER**

John Scholey (Chair); Damian McGirr, Anita Wu; Kate Cooksey, Steve Cowell, Shani Wallis, Petr Salak

The Society's twenty-sixth annual dinner was held at The Brewery banqueting centre on Friday 9th May 2014. We again had a full house, with 819 attendees.

The dinner was followed by a short address from BTS Chairman Damian McGirr followed by some words of encouragement from the chairman's guest Andy Mitchell, recently appointed as Thames Tideway Tunnel's CEO.

Instead of a set piece celebrity speaker, the formalities were rounded off by a few quips from up and coming stand-up comedian Tom Price.

Profits from the dinner go to support the BTS learned society activities, in particular training. We are particularly grateful to our sponsors, who have enabled us to increase this contribution. These are:

- Halcrow (a CH2M Hill company), who again sponsored the pre-prandial champagne reception,
- Murphy, who again sponsored the dinner,
- Hunter Personnel, who again sponsored the menu and
- TunnelTalk, who again arranged for the presence of a roving photographer, with photographs available to view and order at [www.TunnelTalk.com](http://www.TunnelTalk.com).

## **14. SUSTAINABILITY**

Andreas Raedle (Chair), Bill Grose, Andrew Stenning, Steve Cowell

### **Best Practice for sustainability in tunnelling and heavy civil engineering projects**

As the first initiative for the 2nd half of 2014 to 1st half of 2015, it was agreed to capture the best practice for sustainability in tunnelling and heavy civil engineering projects applied on the current Crossrail project. A lot of good things happened and were developed/implemented on this project.

The BTS Sustainability group is working with colleagues from Crossrail and C122 (Arup/Atkins Design JV) in the collation of best practice for sustainability.

The following main list highlights some of the achievements:

#### **TBM Tunnelling:**

- Usage of groundwater for grout mixing and bentonite mixing operations in lieu of using potable water,
- Steel Fibre Reinforced (SFRC) segmental tunnel lining in lieu of conventional reinforced segments (reduction of reinforcement content),
- Groundborne noise and vibration monitoring,
- Fibre optic monitoring of sewers and segmental tunnel lining,
- Usage of re-usable SAAs for deformation monitoring.

#### **General Site installation:**

- Photovoltaic LED site lighting,
- Hybrid working platforms,
- Recycled hoarding,
- Hydrogen fuel cell in lieu of generators,
- Dust suppression using chemical membrane,
- Biometric site access controls,
- Diesel particle filters on all construction equipment.

#### **Heavy Civil Engineering:**

- General 90 % of construction waste materials will be re-used and recycled,
- Soil washing facilities,
- Usage of clamshell excavators,
- Bored piles with polymer support in lieu of bentonite (polymer is biodegradable),
- Crushed concrete as general fill material for working platforms/haul roads etc.,
- Re-usage of hydraulic props in lieu of steel props,
- Jet-Grout spoil arisings to fill temporary constructions shafts,
- Non-destructive pile removal.

The aim within the Sub-Committee is to capture from the different main construction lots similar examples and that the information will be compiled and resp. summarised in a joint "Crossrail/BTS Guideline for Best Practice for Sustainability in Tunnelling". This would need to be coordinated with the Chief Engineer Group from Crossrail. On the "Innovate 18" platform from Crossrail a lot of best practices are published and shared.

#### **Carbon footprint calculation.**

The tender documents from several recent large scale design and built infrastructure projects in the UK such as e.g. Thames Tideway tunnel, Northern Line Extension and Bank Station Upgrade require contractor's to submit within their tender submissions carbon footprint (CO<sub>2</sub> –Emission) reduction calculations and demonstration that appropriate measures within the design are considered.

## **15. RELATIONSHIP WITH ICE (Bill Grose reporting)**

BTS continues to enjoy a close and positive relationship with ICE.

BTS is one of the largest (and most active) of the ICE's Associated Societies and as such is a significant user and beneficiary of ICE facilities including meeting rooms, lecture theatres, bar and restaurant, and secretariat support. The arrangement is via a Service Level Agreement which continues to be reviewed annually.

With the President of the ICE, Geoff French, attending one of the BTS committee meetings it has been agreed that this will become an annual event permitting direct discussions on the subjects that are relevant to both parties.

BTS, with ICE, run the All Party Parliamentary Group for Infrastructure, following its merger in 2012 with the All Party Parliamentary Group for Underground Space (run by BTS). A significant amount of economic infrastructure being built in the UK involves tunnels or other underground space and is therefore of serious interest to parliamentarians.

ICE regularly refer tunnel-related media queries to BTS committee members and rely on our advice and expertise in such matter.

## **16. RESERVES POLICY**

There has been no change in the Trustees policy of maintaining reserve levels equivalent to a year's subscription income with sufficient funds available to meet the needs of the Society. The reserves as of 31<sup>st</sup> December 2014 are £97,591. This figure is in accordance with the agreed strategy to reduce the reserves from the previous figure of £117,497. This was achieved by the funding of a bursary for the Warwick MSc course and on-going development of a new website and database for the society as well as increasing funding for the growing Young Members Society.

The full reduction in reserves was achieved taking into account profits made on the Annual Design & Construction course and the Health and Safety course. With the 2014 annual subscription received being £102,342 after an increase in membership figures, the Society now has a reserve balance that is much closer than in 2013. We will continue to monitor reserves and avoid a significant change.

## **17. INDEPENDENT EXAMINERS**

The audit requirement for a Charity such as the BTS is for an 'independent examination' of our accounts. This independent examination is undertaken by **Lindeyer Francis Ferguson Ltd**. We have been satisfied with the service provided to date and we propose that this relationship continues for the forthcoming year.

### **Trustees' responsibilities for the financial statements**

The trustees are required to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the charity and the incoming resources and application of resources, including the net income or expenditure, of the Charity for the year. In preparing those financial statements, the Trustees are required to:

- Select suitable accounting policies and then apply them consistently
- Make judgements and estimates that are reasonable and prudent
- State whether applicable accounting standards and statements of recommended practice have been followed, subject to any material departures disclosed and explained in the financial statements.
- Prepare the financial statements on an on-going concern basis unless it is inappropriate to presume that the Charity will continue in business.

The Trustees are responsible for keeping proper accounting records which disclose, with reasonable accuracy, at any time, the financial position of the Charity and which enable them to ensure that the financial statements comply with the Charities Act 2011. They are also responsible for safeguarding the assets of the Charity and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

*The Trustees' Report on pages 22 was approved by the Committee and was signed on its behalf by:*

Roger Bridge  
Chairman of the Society

Date of Approval:

**REPORT OF THE INDEPENDENT EXAMINER TO THE TRUSTEES OF  
THE BRITISH TUNNELLING SOCIETY**

I report on the accounts for the year ended 31 December 2014, which are set out on pages 24 to 28.

**RESPECTIVE RESPONSIBILITIES OF TRUSTEES AND EXAMINER**

The Charity's Trustees are responsible for the preparation of the accounts. The Charity's Trustees consider that an audit is not required for this year under section 144(2) of the Charities Act 2011 and that an independent examination is needed.

It is my responsibility to:

- Examine the accounts under section 145 of the 2011 Act;
- To follow the procedures laid down the General Directions given by the Charity Commission under section 145(5)(b) of the 2011 Act; and
- To state whether particular matters have come to my attention.

**BASIS OF INDEPENDENT EXAMINER'S REPORT**

My examination was carried out in accordance with the General Directions given by the Charity Commissioners. An examination includes a review of the accounting records kept by the Charity and a comparison of the accounts presented with those records. It also includes consideration of any unusual items or disclosures in the accounts, and the seeking of explanations from you as Trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit and, consequently, no opinion is given as to whether the accounts represent a 'true and fair' view and the report is limited to those matters set out in the statement below.

**INDEPENDENT EXAMINER'S STATEMENT**

In connection with my examination, no matter has come to my attention:

- i. that gives me reasonable cause to believe that in any material respect, the requirements:
  - to keep accounting records in accordance with section 130 of the 2011 Act; and
  - to prepare accounts which accord with the accounting records and to comply with the accounting requirements of the 2011 Act;have not been met; or
- ii. to which, in my opinion, attention should be drawn in order to enable a proper understanding of the accounts to be reached.

**Jonathan Healey FCA**

**LINDEYER FRANCIS FERGUSON LTD**  
**Chartered Accountants**  
**Tonbridge, Kent**

**Date**

## **ACCOUNTING POLICIES**

### **BASIS OF PREPARATION**

The financial statements have been prepared under the historical cost convention as in accordance with United Kingdom applicable accounting standards and the Statement of Recommended Practice 'Accounting and Reporting by Charities' (SORP) issued in March 2005 and the Charities Act 2011.

The principal accounting policies remain unchanged and are set out below.

### **TAXATION**

The Charity is exempt from taxation under current legislation.

### **INCOMING RESOURCES**

Income is included when the conditions for receipt have been met and there is a reasonable assurance of receipt.

#### **Income and Donations and Member subscriptions**

Income from member subscriptions is included in incoming resources when these are receivable.

#### **Interest receivable**

Interest is included when receivable by the Charity.

### **RESOURCES EXPENDED**

Resources expended are included in the SOFA on an accruals basis.

#### **Costs in support of charitable activities**

Costs in support of charitable activities are comprised mainly of:

- the costs of organising meetings
- arranging training and education courses specifically in tunnelling
- supporting MSc tunnelling students with bursaries
- Publishing best practice guides and technical documents
- Managing a website that is open and accessible to all
- Including as part of the membership fee a copy (hard copy and/or digital copy) of the monthly magazine T&T

#### **Governance Costs**

Comprises the costs of Trustees' expenses and independent examiner's fees.

#### **Fund accounting**

Restricted funds are to be used for specified purposes laid down by the donor. Expenditure for those purposes is charged to the fund.

### **CASH FLOW**

The Society has used the exemption under Financial Reporting Standard No 1 (Revised) not to prepare a cash flow statement as it qualifies as a small entity.

**BRITISH TUNNELLING SOCIETY**  
**STATEMENT OF FINANCIAL ACTIVITIES FOR THE YEAR ENDED 31 DECEMBER 2014**  
**(INCLUDING INCOME AND EXPENDITURE ACCOUNT)**

	Note	Unrestricted Funds £	Restricted Funds £	Total Funds 2014 £	Total Funds 2013 £
<b>Incoming Resources</b>					
<b>Incoming Resources from Charitable Activities</b>					
Members subscriptions	1	102,342	-	102,342	97,927
Activities for Generating Funds	2	179,220	-	179,220	181,091
<b>Total Incoming Resources</b>		<u>281,562</u>	<u>-</u>	<u>281,562</u>	<u>279,018</u>
<b>Resources Expended</b>					
Costs of Generating Funds:					
Activities in furtherance of the charity	3	216,385	-	216,385	217,489
Costs in support of charitable activities	4	59,322	-	59,322	83,600
Governance Costs	5	1,860	-	1,860	1,830
<b>Total charitable expenditure</b>		<u>277,567</u>	<u>-</u>	<u>277,567</u>	<u>302,919</u>
<b>Net Movement in Funds</b>		3,995	-	3,995	( 23,901)
Total Funds at 1 January 2014		93,588	8	93,596	117,497
<b>Total Funds at 31 December 2014</b>		<u><u>97,583</u></u>	<u><u>8</u></u>	<u><u>97,591</u></u>	<u><u>93,596</u></u>

All the Society's activities derived from continuing operations during the above two financial periods.  
The notes on pages 25 to 27 form part of these financial statements.

The Society has no gains or losses other than those shown in the statement of financial activities above.

**BRITISH TUNNELLING SOCIETY**  
**BALANCE SHEET AT 31 DECEMBER 2014**

		2014		2013
	Note	£		£
<b>CURRENT ASSETS</b>				
Debtors	8	30,289		22,609
Short term deposits		63,367		96,138
Cash at bank		25,831		15,123
		119,487		133,870
<b>CURRENT LIABILITIES</b>				
Creditors:				
Amounts falling due w ithin one year	9	21,896		36,305
<b>NET CURRENT ASSETS</b>		<b>97,591</b>		<b>117,497</b>
<b>INCOME FUNDS</b>				
Unrestricted	12	97,583		117,489
Restricted	12	8		8
		<b>97,591</b>		<b>117,497</b>

Approved by the board and signed on its behalf by:

Mr Roger Bridge - Chairman

Date

The notes on pages 25 to 27 form part of these financial statements.

**BRITISH TUNNELLING SOCIETY**

**Notes to the accounts for year ended 31 December 2014**

**1. Members' subscriptions**

The geographical analysis of subscriptions is as follows:	<b>2014</b>	2013
	£	£
United Kingdom	<b>79,058</b>	75,319
Rest of the world	<b>23,283</b>	22,608
	<b><u>102,342</u></b>	<u>97,927</u>

**2. Activities for generating funds**

	<b>2014</b>	2013
	£	£
<b>Unrestricted Funds</b>		
BTS Course & Annual Dinner	<b>169,522</b>	168,080
Publications	<b>1,537</b>	1,933
Underground Health & Safety Course	<b>7,150</b>	7,560
Sponsorship	<b>747</b>	-
Investment Income	<b>265</b>	313
BTS Young Members' 5th Anniversary Dinner	<b>-</b>	3,205
	<b><u>179,220</u></b>	<u>181,091</u>

**3. Activities in furtherance of the charity**

	<b>2014</b>	2013
	£	£
<b>Unrestricted Funds</b>		
Expenses re course & dinner	<b>141,847</b>	143,822
Publications	<b>65,448</b>	63,195
General Function expenses	<b>-</b>	-
Underground Health & Safety Course	<b>8,549</b>	2,108
APPGI Reception	<b>-</b>	-
Compressed Air Working Group	<b>95</b>	-
Young Members' Committee	<b>446</b>	2,905
Harding Lecture Honorarium	<b>-</b>	-
BTS Young Members' 5th Anniversary Dinner	<b>-</b>	5,459
	<b><u>216,385</u></b>	<u>217,489</u>

**4. Costs in support of charitable activities**

	<b>2014</b>	2013
	£	£
<b>Unrestricted Funds</b>		
Printing, stationery & photocopying	<b>1,403</b>	3,160
Postage	<b>910</b>	4,275
Meeting expenses & secretarial	<b>33,451</b>	42,447
Subscription to other bodies	<b>1,535</b>	1,544
Website Costs	<b>7,019</b>	11,438
Other costs	<b>992</b>	990
Publicity	<b>606</b>	2,746
Awards & Prizes	<b>1,405</b>	2,000
Grant	<b>3,000</b>	3,000
Bursary	<b>9,000</b>	12,000
	<b><u>59,322</u></b>	<u>83,600</u>

**BRITISH TUNNELLING SOCIETY**

**Notes to the accounts for year ended 31 December 2014**

<b>5. Governance Costs</b>	<b>2014</b>	<b>2013</b>
	£	£
Examiner fees	<b>1,860</b>	1,860
Trustee meeting expenses	-	-
	<u><b>1,860</b></u>	<u>1,860</u>

**6. Employees and Employment costs**

The Society does not employ staff directly.

**7. Trustees' remuneration**

Trustees do not receive remuneration.

Four trustees were reimbursed expenses to the value of £3,572 in 2014.

Four trustees reimbursed £3073.00 in 2013.

<b>8. Debtors</b>	<b>2014</b>	<b>2013</b>
	£	£
Debtors	<b>12,975</b>	14,214
Prepayments	<b>7,560</b>	8,395
ICE Intercompany	<b>9,754</b>	-
	<u><b>30,289</b></u>	<u>22,609</u>

<b>9. Creditors: amounts falling due within one year</b>	<b>2014</b>	<b>2013</b>
	£	£
ICE Intercompany		11,129
Purchase Ledger Control Account	<b>171</b>	8,367
Subscriptions in advance	<b>9,565</b>	17,638
Accruals	<b>12,160</b>	3,140
	<u><b>21,896</b></u>	<u>40,274</u>

**10. Restricted Funds**

The committee administers the BTS CEN fund which was established in January 1991 to provide financial support to UK members of the CEN TC/151 Working group 4 which is producing European Standards for the safety aspects of tunnelling machines.

The Historical Database fund was established in July 2000. The fund is to provide financial support for a tunnelling

**BRITISH TUNNELLING SOCIETY**

**Notes to the accounts for year ended 31 December 2014**

<b>11. Analysis of net assets between funds</b>	<b>Unrestricted funds</b>	<b>Restricted funds</b>	<b>Total funds</b>
	£	£	£
Fund balances at 31 December 2014 are represented by:			
Current assets	119,479	8	119,487
Current liabilities falling due within one year	( 21,896)	-	( 21,896)
	<u>97,583</u>	<u>8</u>	<u>97,591</u>

<b>12. Funds</b>	<b>Balance 01.01.14</b>	<b>Transfers</b>	<b>Incoming Resources</b>	<b>Resources Expended</b>	<b>Balance 31.12.14</b>
	£	£	£	£	£
<b>Unrestricted Funds</b>					
General Funds	93,588	-	281,562	(277,567)	97,583
	<u>93,588</u>	<u>-</u>	<u>281,562</u>	<u>(277,567)</u>	<u>97,583</u>
Total Unrestricted Funds	93,588	-	281,562	(277,567)	97,583
Restricted Fund	8	-	-	-	8
Total Funds	<u>93,596</u>	<u>-</u>	<u>281,562</u>	<u>(277,567)</u>	<u>97,591</u>

**Related Party Transactions**

During the year, BTS was invoiced by London Bridge Associates Ltd, a company in which David Terry, a trustee of BTS, is a director, for services provided amounting to £8336.