



# SURCO Training

## **Geospatial Engineering Training** from SURCO Training

SURCO is the information business of the Chartered Institution of Civil Engineering Surveyors (ICES) and is responsible for its commercial activities.

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## SURCO Training Geospatial Engineering modules

The geospatial engineering training courses included in this brochure serve the particular purpose of providing a training basis for non-surveyors.

All the courses currently offered by SURCO Training's three training partners are focused on improving site setting out skills, providing support training in the difficult field of locating and mapping underground services and teaching the application of AutoCAD and related computer software.

The ability to set out civil engineering work quickly and accurately is an essential skill for young civil engineers. For those who work for contractors, setting out forms a major part of a young engineer's daily activity. Unfortunately, setting out skills are not learned or practised sufficiently at civil engineering first degree level and we are pleased to recommend The Survey School to make up some of the missing elements.

The Chartered Institution of Civil Engineering Surveyors has strong historic links with the Survey School including the funding of prizes awarded to the students for excellence in achievement.

Computer-Aided Design (CAD) is the use of computer technology for the process of design. Since the 1980s the importance of CAD in civil engineering and associated fields has grown to the extent that traditional drafting techniques are no longer taught. Current CAD software packages include both 2D drafting and 3D modelling systems. AIT Spatial provides training courses covering several Autodesk products including AutoCAD Map 3D as well as a number of geospatial workshops including mapping and the management of data.

The Benchmark Utility Surveyor Qualification is a new professional standard for the location and mapping of underground services. Underground services have always been a problem in the civil engineering industry and the ability to locate them is vital to the Health and Safety of the workforce on any site.

LTU is acknowledged as a world expert in the location of underground utilities and was instrumental in establishing definitive standards in the field. In addition to training at a professional level, current Health and Safety legislation demands that training programmes in the location of underground services are also undertaken by site based operatives. LTU provides training at both levels.



## The Survey School

Levelling  
Total Stations  
Surveying Equipment  
Land Survey Techniques  
Basic Setting Out  
Setting Out  
Advanced Setting Out  
Setting Out for Engineers



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## AIT Spatial

AutoCAD Suites  
Aerial Imagery and Raster Data Management  
Civil Engineering Software



**Pages 6 - 7**

## LTU

CAT and Genny Training  
Utility Surveying Training  
Utility Avoidance



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Discounts are available on all these courses for members of the Institution located in the UK and Ireland if the booking is made through SURCO. Please complete the online enquiry form for further information.

Approval of a training company or partner by SURCO Training must not be construed to mean that SURCO Training approves the content or quality of any of the courses offered by it.

Companies and/or individuals booking courses with approved training companies do so entirely at their own risk.



## **L1 - Levelling** **Two day course**

This course is designed for people such as architects, engineers, planners, environmental workers, site supervisors and others who need to be able to take levels using a level instrument and staff. The course takes the student through the theory and practice of levelling from finding elevations to checking the instrument.

## **L2 - Total Stations** **Three day course**

This course is designed to give engineers and personnel in the construction industry a good grounding in how to use modern total stations and is aimed at new recruits or staff who have little or no experience of using modern total stations. The course covers best practice in the use of total stations and covers basic detail surveying and setting out.

## **L3 - Surveying Equipment** **Five day course**

This course is a combination of our levelling and total station courses and is designed for people such as architects, engineers, planners, environmental workers and those who might wish to go on to train as surveyors and who need to be able to take levels using a level instrument and staff and also to have an introduction to measurement with a total station instrument.

## **L4 - Land Survey Techniques** **Five day course**

This course is designed to give surveyors and engineers a good grounding in the principals and practical application of site surveying and setting-out. The course includes the calculation and adjustment of traverses, resection, detail surveying and bearings and distances to enable the surveyor to calculate or check the required setting out points from drawings.



## **S1 - Basic Setting Out** **Five day course**

This course is designed to give site staff in the construction industry and personnel in many other fields, a basic knowledge of using surveying instruments and setting-out on site using mainly the level and total station. Candidates are not required to have any previous experience of using surveying equipment.

## **S2 - Setting Out** **Five day course**

This course is designed to give engineering graduates and persons working in the construction industry an understanding of the principals and calculations required for more complex setting-out conditions. It is particularly suitable for candidates who have already completed our S1 course.

## **S3 - Advanced Setting Out** **Five day course**

This course is aimed at the experienced site engineer who requires training in the principles and applications of setting out on different types of sites and structures as well as setting out using GPS.

## **S4 - Setting Out for Engineers** **Five day course**

This course is designed to give engineering graduates and persons working in the construction industry experience in the principals and practical application of site setting-out.

Although some participants may have some previous experience with surveying instruments these are revised from basics to ensure that everyone has a full understanding of their application.

Emphasis is put on the use of the many built-in functions of the total station, which can greatly speed up operations efficiency on the site.



## ATC AutoCAD Courses

- Learn AutoCAD/AutoCAD LT
- AutoCAD Intermediate
- AutoCAD Creating and Presenting 3D Models
- AutoCAD Transitioning from Last Version
- AutoCAD Raster Design Essentials

## ATC Civil Engineering Courses

- Learn AutoCAD Civil 3D
- AutoCAD Civil 3D Creating and Managing Plans
- AutoCAD Civil 3D Designing Intersections and Cul de Sac
- AutoCAD Civil 3D Residential Grading

## Visualisation Courses

- Autodesk 3ds Max Essentials
- Autodesk Maya Essentials
- XSI Essentials
- Autodesk Mudbox
- Autodesk Model Builders
- Autodesk Combustion

## Geospatial Workshops

- Importing Ordnance Survey MasterMap into AutoCAD Map 3D
- Managing Aerial Imagery and Raster data
- Optimising data creation using Feature Classifications
- Integration of Geospatial data in Oracle
- Managing Geospatial data using FDO (Feature Data Objects)
- Ordnance Survey and other Geospatial Data Formats explained
- Creating and Managing a Land Terrier
- Report writing for the Geospatial Environment
- Introduction of authoring and publishing Geospatial data
- Ordnance Survey MasterMap Management
- Integration of Geospatial data in Google Maps
- AutoCAD Map 3D for entry level map and civil users



## Autodesk Training and Autodesk Certification Centre

ATC Training courses, workshops and customised courses provided to suit your requirements and using your data if desired, either on-site or at our training centre. Training can be conducted on a one-to-one basis or as a group (maximum of 6 people); entire course or selection points to suit your type of work. This type of approach allows you to train at the same time as working on a project, thereby maximising the benefit of the training.

AIT Spatial has recognised that some organisations, notably Local Authorities, have diverse needs and requirements for Autodesk products especially AutoCAD Map 3D. In response to this, AIT Spatial has developed a series of ½ and 1 day industry specific workshops covering particular aspects of the product.

You can gain a competitive edge in your industry with AutoCAD Certification. Through certification you can demonstrate your knowledge and skills to prospective employers and advance your career opportunities. Programme highlights include an Application Proficiency examination, Certification preparation guides, and the Certification exams.

AIT Spatial Limited is a solution focused company specialising in CAD, mapping, geographical information, ground modelling and data systems. AIT Spatial provides technically advanced knowledge and expertise in the geospatial environment, specially to your needs.

- Customised training
- Production of land ownership plans
- Electoral boundary digitizing
- Experienced, project specific personnel
- Topographical and measured building surveys
- Data Transformation
- Draughting services
- Software Development



## CAT and Genny Training

To enable operatives to make the best use of their location equipment and to comply with current health and safety legislation, a full training programme must be undertaken by all operatives.

LTU provides in-depth courses on the full range of cable avoidance tools, regardless of the manufacturer.

### Training Credentials

LTU currently employ three full time consultants, qualified to undertake such training in line with the manufacturer's guidelines. All three were previous sales engineers or managers at Radiodetection (RD) and, as such they have an in-depth knowledge of the RD and other manufacturers' product ranges.

### Course Formats

A variety of course formats are available. A typical programme for a half-day course would be:

Reasons for using locators: Safety, legal and financial.

Theory: Covering both the benefits of the system and as important, the limitations of the technology

Examples of utility strikes & the implications

Practical work: Hands-on locating using receiver, transmitter and accessories.

Feedback, questions/answers, application and techniques, general care and maintenance of equipment.

Assessment Courses

In addition to the standard operator courses, LTU also offer an Assessment Course which means the operators must complete a practical and written assessment before being awarded a certificate.

LTU recommend that operatives attend a refresher course annually, as a minimum, to ensure best practices are still being adhered to. These can be arranged for groups at a discount price - please contact LTU directly to discuss your requirements.

Other courses can be tailored to individual company requirements, please contact LTU for further information.

## Benchmark: Utility Surveying Training

The Benchmark Utility Surveyor Qualification is a new professional standard for the location and mapping of Underground services.

Designed for practitioners by practitioners, the course is set to become the benchmark for knowledge and skills; a definitive way of identifying quality and professional competence.

### Utility Plans

- Explanation, purpose and interpretation of plans

- Marking up of plans, identifying marker posts, covers and any visible signs of utility routes

- Examples Of utility plans

### The Introductory Certificate

Module 1 forms a 'back-to-basics' introduction to buried utilities, covering fundamental topics such as utility network design and functioning.

Although aimed at the novice utility surveyor, this module serves as the building-block for advanced location techniques and sophisticated technology covered in Modules 2 and 3.

Too often, the fundamentals of infrastructure design are overlooked or misunderstood by 'experienced' surveyors, restricting the effectiveness of their work.

In outline, Module 1 covers the following areas:

### Overview of buried utilities and utility types

- Types of buried services

- Typical placement

- Materials used (metallic / plastic construction)

### Examination of utility networks from source to end-user (power, gas, water reviewed separately):

- Physical observation (including use of dye and sound testing)

- 'Mapping without a locator' techniques and practical know-how

### Working with utility plans (interpretation and conventions)

- Drawing-up techniques and approaches

### Legislative Environment

- HS(G)47

- Asset ownership principles

- Legal restrictions on the utility surveyor

- Site safety awareness

- Safe working practices

Continued ...

## Benchmark: Utility Surveying Training continued

### Introduction to the equipment range used by a utility surveyor

#### Limitations of technology

- 'Impossible situations'
- Recording and highlighting untraceable services

#### The Intermediate Diploma

Module 2 focuses on 'hands-on' equipment use.

The two principle technologies - electromagnetic (EM) and ground penetrating radar (GPR) - are examined through a combination of theory and practical sessions.

Once basic equipment usage has been established, the course looks at 'real-world' scenarios, examining how a utility surveyor should approach a given survey area.

All practical elements of the course are delivered on-site. Theory and discussion sessions are held in the classroom.

#### Electromagnetic equipment

- Equipment range and popular manufacturers
- How EM locators work - the theory
- Limitations and problems with EM technology
- Techniques (focus on location rather than avoidance of buried utilities)
- Use of sondes

#### GPR equipment

- Equipment range and popular manufacturers
- How GPR locators work - the theory
- Limitations and problems with GPR technology site appraisal
- 'Plan of attack'
- Importance of observation (building on module 1)
- Different approaches ('grid' technique versus tracing methodologies)
- Practical applications (use of manhole and valve reference points)

#### The Advanced Diploma

Module 3 deals with advanced location techniques. It requires a solid understanding of GPR and EM use, combined with extensive field experience.

Module 3 begins with a session on 'myth-busting' aimed at dispelling the many fallacies commonplace within utility location. Specifically, this session will examine limitations of technology - what can and can't be done - the importance of ground conditions and why many popular techniques have become accepted working practices despite any sound technological basis.

The module will then be structured around the two main technologies again, before a concluding session draws the course together.

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## Benchmark: Utility Surveying Training continued

### Electromagnetic

- Current direction
- Current measurement
- Deep sewer location techniques
- Use of peak / null and the impact of distortion
- Double-ended connection
- Cathodic protection
- Locating a sonde inside metallic pipes
- Interpreting fluctuations in audio:
- HV / LV differences

### Ground Penetrating Radar

- Introduction to off-site processing
- Introduction to mapping techniques and post-processing

### The Experience Route

Utility surveyors who are actively employed in the location of buried services and are familiar with non-intrusive technology, may consider the experience route to fast-track qualification.

The experience route allows practitioners to skip module 1 or modules 1 and 2. Note that there is no exemption available for Module 3, the Advanced Diploma stage.

A detailed checklist of skills and required knowledge for each module is available on the LTU website. Candidates will be expected to confirm their eligibility using this checklist.

Candidates must also demonstrate a minimum length of work experience (verified by their employer) in order to pass over Modules 1 or 2. In order to advance straight to Module 2 you must have already worked as a surveyor for 6 months. Advancement straight to Module 3 requires a minimum of 1 years experience.

Eligible candidates are encouraged to apply for exemptions, with some reservations. Many practising surveyors have gaps in their technical knowledge or breadth of experience and would benefit from a 'back-to-basics' approach. If you decide to progress straight to Modules 2 or 3, you must be confident that you have the knowledge and experience detailed on the appropriate skills checklist.

Candidates are strongly advised that they are unlikely to pass the exam and practical assessment otherwise.

## Utility Avoidance

### Course Objectives

Improve operative's awareness of how to avoid damaging buried utilities and operate in a safe, efficient & more cost effective manner.

### Course Format – Classroom

Reasons for using buried pipe & cable locators – Understanding health, safety & financial implications including guidance on how to comply with HS(G)47 – Avoiding Danger From Underground Services. Other National & Company Legislation will be discussed. Examples of “getting it wrong” will be demonstrated & discussed.

Buried Service Plans (STATS) – Operatives will learn how to interpret & understand all types of service plans.

Basic Electromagnetic Theory – How a pipe & cable locator works, theory & limitations, tips & tricks. A session on “myth busting” will help operatives understand what the equipment can and cannot locate.

Controls & operation – Which buttons to press, checking equipment is functioning correctly.

### Course Format – Site

Service plans and existing site information will be used to ascertain the indicated routes of buried mains & services, operatives will learn the importance of site visual checks before any work is undertaken.

Operatives will be trained in the correct use of the equipment in all modes, confirming and locating buried mains and services from the service plans and previous visual inspection, testing and ensuring equipment is in satisfactory operating condition.

Operatives will learn how to use the transmitter correctly, in all modes and will understand the benefits of always using the receiver & transmitter combination.

Operatives will learn how to effectively locate “problem” services such as street lighting & small service cables.

Practical site assessments - all operatives will be assessed on their ability to locate & mark up buried services using all modes.

### Written Assessments

Operatives will return to the classroom and sit a multiple choice, written assessment paper, a pass mark of 70% or greater is required. Operatives with dyslexia or reading difficulties will be permitted to sit an aural assessment.

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## **Utility Avoidance** continued

### **Course Timings**

Course timings remain fluid but the course will be undertaken over two days, with a suggested start time of 9:00 am and finish time of 4:00 pm with appropriate breaks throughout the course.

### **Course Requirements**

STATS Plans (service drawings) appropriate to the site must be available for the practical site work. If no existing plans are available, LTU can supply plans for an additional cost to be agreed prior to the booking of the course. If different sites are to be used, further plans will be required.

Each operative will need the appropriate receiver he/she is being trained on, one transmitter with accessories will also be required for each course. LTU can supply the equipment at an additional cost to be agreed prior to the booking of the course.

A meeting/conference room suitable for up to ten people will be required, with appropriate welfare facilities.

Operatives must have appropriate PPE to comply with National & Company Health & Safety requirements.

A suitable site with buried metallic utilities must be available near to the meeting/conference room, LTU can advise on suitability of sites or can arrange for specific sites to be used but additional cost may be incurred .i.e. hiring of meeting room.

## **TSA Training Course: “An Introduction to Surveying”**

SURCO Training has been granted user rights to conduct geospatial training workshops utilising The Survey Association’s (TSA) ‘Introduction to Surveying’ course syllabus (also known as the Technician Training Course) outside the UK and Ireland.

The course has been created specifically for the development of new entrants into the Geomatics Industry, or those with experience but no formal training. It is intended to broaden the student’s practical experience and to supplement the theoretical experience gained from their employer. The full course is accredited by ICES at Technician level and is taught at The Survey School in Worcester.

The course, generally accepted as being the best available at its level, is split into six two week blocks spread over two years. Each block is capable of being taught independently or in any combination with any of the others depending on the Client’s requirements.

The blocks are:

- Block 1: Basic Surveying & Mathematics
- Block 2: Control and Detail Surveying
- Block 3: Projections and Grids, GPS Surveying, Photogrammetry and Advanced Fixation
- Block 4: Measured Building and Specialist Surveys
- Block 5: Construction and Engineering Surveys
- Block 6: Survey Management and Advanced Computer Usage

SURCO Training has a flexible arrangement with The Survey School that may allow any block, or combination of blocks, to be taught abroad, if the demand is sufficiently strong, with the assistance of Survey School resources.

If the training need exists in the Middle East, India, or the Pacific Basin, SURCO Training is a partner in a joint venture training company, BK SURCO, based in Hong Kong. In these cases the training would be channelled through BK SURCO and may also utilise local specialists.

Enquiries for this course, or any block from it, to be delivered in locations outside the UK and Ireland should be made, in the first instance, to SURCO Training at its UK office.

Enquiries about attendance on this course in the UK should also be made to SURCO Training in the first instance.

## NOTES



The Chartered Institution of Civil Engineering Surveyors (ICES) was founded in 1969 to represent the interests of and set the competence standards for geospatial engineers or commercial managers working in the civil engineering industry. The geospatial discipline includes land and engineering surveying, hydrographic surveying, photogrammetry and remote sensing, geographic information systems (GIS) and cartography/visualisation. Collectively, members are known as civil engineering surveyors.

ICES supports the education and professional development of civil engineering surveyors whether they are monitoring and setting out the works or working in measurement or Commercial Management roles.

For more information about membership please contact the Institution's membership department on 0161 972 3100 or go to the Institution's website, [www.cices.org](http://www.cices.org).

ICES recognises that training in the workplace is a vital element in reaching the competence levels required by law to operate successfully within a construction team and to achieve corporate or chartered membership of an appropriate professional body. Whilst the Institution promotes, assists with and accredits cognate courses in both Universities and Colleges of Further Education, it focuses particularly on its library of Approved Development Schemes (ADS). These schemes are agreements between employers and the Institution that define the training, experience and overall development framework that will be made available by the employer to allow an individual to progress to corporate membership levels of ICES.

SURCO Training is the training division of SURCO Limited, which is the information business of ICES. SURCO Training workshops provide an excellent opportunity to expand the knowledge and understanding of the essential workplace skills of a civil engineering surveyor and to support individuals in attaining the competence requirements necessary for full corporate membership of the Institution.

The Institution recommends SURCO Training modules and workshops to its membership and to the civil engineering industry as a whole.

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