



COMMERCIAL SERVICES & ESTATES DEPARTMENT

Safe System of Work

Excavations Procedure

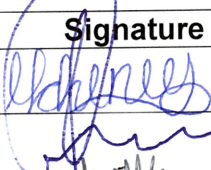
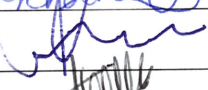
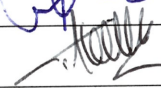
Rev 4

Safe Systems of Work

Excavations Procedure

Document History

Document Revision	Date	Description of amendments	Revision Author
1	01/06/2018	Procedure developed by Matt Cheney and issued as a departmental procedural document in replacement of the previously titled 'Permit to Work Procedure'.	MC
2	18/12/2018	Update section 1.3 Responsibilities. Update of EMM/EPM to AP throughout document.	MC
3	29/01/2020	Annual document review. Update section 1.3 responsibilities to include ETS.	MC
4	18/01/2023	Updated Estates Director, added 2.5 Spiking in the ground. Department name updated throughout.	MC
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SECTION 1

CSE Safe Excavations Work

1.1 Introduction & Scope

1.1.1 This procedure has been developed as part of a suite of Safe Systems of Work (SSoW) for the University of Kent's Commercial Services & Estates (CSE) department. The person with overall responsibility for controlling and updating these procedures is the assistant director of Energy & Hard FM and is deemed to be the duty holder.

1.1.2 Compliance with this procedure is mandatory in order to establish safe working practices for the protection of persons under the management of Commercial Services & Estates whose activities involve excavation and trenching work within University of Kent grounds. The definitions of 'Excavation' and 'Emergency Work' are as follows;

'Excavation' - is the breaking, digging or removal of ground with the purpose to expose underground services or plant, install or maintain underground services or plant or to install foundations and other building structures.

'Emergency Work' – work that needs to be done immediately to repair damaged services in order to prevent continuing risk to health and safety. This does not mean restoration of service to meet customer service targets.

1.1.3 The procedure governs work associated with University of Kent and applies to both employees of the University of Kent's CSE department and those contractors and suppliers engaged by the University of Kent, directly or via third parties, to work on its sites and premises.

1.1.4 All persons who are, or who may be, associated with the planning, monitoring, construction, inspection, maintenance of excavations shall comply with the University of Kent's excavation procedure, which observes the following statutory provisions:

- The Construction (Design and Management) Regulations 2015
- Provision and Use of Work Equipment Regulations 1998
- Personal Protective Equipment Regulations 2002

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- The Health and Safety at Work Act 1974 and subordinate legislation;
 - The Management of Health and Safety at Work Regulations 1999
- 1.1.5 Any work undertaken may also be governed by University of Kent's policies and safety rules other than those for safe excavations, such as those applying to general occupational health and safety matters and not least the requirement that work activities are subjected to risk assessment and method statement.
- 1.1.6 This procedure outlines the University of Kent's safety rules and arrangements to achieve compliance of the Construction (Design and Management) Regulations 2015 and to ensure employees and contractors are not exposed to unnecessary risks associated with excavations.
- 1.1.7 These arrangements will assist employees with assessing the risks associated with the various scenarios where it is difficult to eliminate working in excavations. This procedure also outlines the duties of those persons engaging in associated excavation activities to enable them to work safely.
- 1.1.8 The University of Kent is committed to provide the necessary resources to enable the management of health and safety risks associated with undertaking excavation work or work in proximity to excavation work.
- 1.1.9 This procedure covers all contractors and staff working on behalf of the CSE department within all University of Kent campuses who are required to excavate any land or work within an excavation.
- 1.2 Application of the CSE Department Safe Excavations Procedure**
- 1.2.1 All persons who have cause in the normal course of their duties to be involved with all or part of this procedure, shall be provided with a copy of this procedure by the appropriate manager.
- 1.2.2 Contractors or any other persons working on university property who have cause to be involved with work outlined in 1.1.4 above, will be supplied with a copy of this procedure by the appropriate manager
- 1.2.3 All employees and persons issued with this procedure shall sign a receipt for their copy and shall keep them in good condition and have them available for reference.

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1.3 Responsibilities and Competency

Those having specific responsibilities for excavation safety matters include the following:

Assistant Director of Energy & Hard FM is the duty holder, who is the individual responsible for controlling work activities under the Construction (Design and Management) Regulations 2015 and updating and maintaining these procedures.

Estates Maintenance Manager (EMM) - A person who fulfils the requirements of a Competent Person (CP) is over 21 years of age, who is principally of an engineering/construction discipline or who has significant experience and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Estates Project Manager (EPM) - A person who fulfils the requirements of a Competent Person is over 21 years of age, who is principally of an engineering/construction discipline or who has significant experience and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Estates Technical Support (ETS) - A person who fulfils the requirements of a Competent Person is over 21 years of age, who is principally of an engineering discipline or who has significant experience and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Both the EMM, EPM and ETS will be considered Authorised Persons (AP) following written authority by the duty holder.

Apart from EMM/EPM and ETS other positions may also be classified as Authorised Persons (AP) and shall receive written authority from the duty holder.

The AP will ensure compliance with the requirements of the Construction (Design and Management) Regulations 2015 and this safe working procedure by;

- Identifying excavation activities while specifying work
- Carrying out a risk assessment considering the task and the location of work.
- Agreeing a safe working procedure with those carrying out the work and issuing an appropriate permit;

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- Ensuring the control measures identified in the risk assessment and permit are communicated to those carrying out the work and that those control measures have been understood.
- Ensuring that staff are suitably trained before taking part in any dig or excavation.
- Where the work is to be undertaken by a contractor, a competent contractor with experience in the type of work must be selected.
- Ensure the selected contractor has sufficient information to carry out the required hazard appreciation and risk assessment.
- Ensure that an agreed dig location has been marked, no digging outside of that area takes place without a further survey
- Ensure that any excavation with the risk of public access, whether with or without permission, is assessed and suitable arrangements are in place.
- The AP will determine whether hand digging should apply.

Authorised Persons shall hold recognised formal qualifications beyond their experience with a minimum of City & Guilds or equivalent. Where formal City & Guilds type qualifications have not been attained a recognised ONC, HNC, HND or Degree relevant to the AP activity will satisfy this requirement.

Competent Person (CP) - A person who is essentially of an engineering/construction discipline and has adequate technical knowledge and experience of the excavation techniques to avoid danger to himself or others for whom he may be responsible.

Competent Person(s) shall comply with this procedure by;

- Carrying out their roles safely in line with their training
- Complying with all requirements set out in the risk assessment and the relevant permit.
- Understanding and following the requirements detailed in this procedure as it pertains to their work.
- Using only equipment which is suitable for the task and the location.
- Only operating equipment which they have been trained and authorised to use.
- All excavations are left in a safe condition or secured against access.
- No new excavations or extensions of existing excavations take place without a check for buried utilities and ground conditions.

The AP, and the maintenance trades staff at the University of Kent are deemed Competent Persons by reason of training and experience.

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All contractors shall have evidence of having received appropriate training and provide a written method statement and risk assessment for review by AP and have a valid Permit-to-Work prior to undertaking any work associated with excavations. Contractors will comply with this procedure and the duties outlined under Competent Person(s) in this subsection.

1.4 Standard Operating Procedures

Some activities or equipment may have standard operating procedures or have similar documentation in place, developed by the CSE department, to ensure safe working practices and methods are adopted. The introduction of standard operating procedures can play a positive role in risk reduction and may alleviate the requirement of a Permit to Work in excavations. Where it is identified that a standard operating procedure is required it will be the responsibility of the Authorised Person (AP) to ensure this is in place.

1.5 Dangerous Occurrences or Accidents

All Dangerous Occurrences and Accidents shall be immediately reported to line management, to the Health and Safety Advisor and to the AP.

1.6 Operational Restrictions

Operational restrictions identified from any source are to be registered with the AP. These may include, but may not be limited to:

- Health and Safety Executive (HSE) safety alerts.
- Manufacturer's product safety alerts.
- Failures of equipment during operation.
- Third party reports or other safety alerts.

1.7 Objection to Instructions

If a person has an objection on safety grounds to instructions received for work in, or the operation of, any equipment used for excavations, he/she shall make their objection known to their line manager. The manager shall consider the matter immediately, referring to the AP if the matter cannot otherwise be resolved.

1.8 Signs and Barriers

Responsibility for placing in position or moving any signs or barriers required in connection with the issuing of written work authorisation documents rests with the AP/Competent Person (CP).

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1.9 Information, Information & Training

Arrangements shall be made by the University to ensure:

- That all employees concerned are adequately trained, informed and instructed as to the system, equipment and area that are affected by particular aspects of work and which legal requirements, safety procedures and related documents still apply.
- That other persons that are not employees but who may be affected by the operations or work also receive adequate information, instruction and training where appropriate.

Never perform excavation work unless you have received the necessary training, have the appropriate experience and have been authorised to undertake the work.

1.10 Review of CSE Department Safe Excavations Procedure

Due to the nature of any work undertaken within excavations this procedure will be under constant review, updated and amended accordingly.

SECTION 2

Safe Excavation Activities

2.1 Procedure

Prior to undertaking any excavation activities a suitable and sufficient assessment of the risks must be completed in accordance with this procedure, and with the necessary control measures communicated to all staff involved in the activity; ensuring the legal duties identified by the Construction (Design and Management) Regulations 2015 are adhered to, i.e.:

All practicable steps must be taken to prevent danger to any person, including, where necessary, the provision of supports or battering, to ensure that;

- no excavation or part of an excavation collapses;
- no material forming the walls or roof of, or adjacent to, any excavation is dislodged or falls; and
- no person is buried or trapped in an excavation by material which is dislodged or falls.

Suitable and sufficient steps must be taken to prevent any person, work equipment, or any accumulation of material from falling into any excavation.

Suitable and sufficient steps must be taken, where necessary, to prevent any part of an excavation or ground adjacent to it from being overloaded by work equipment or material.

Construction work must not be carried out in an excavation where any supports or battering have been provided in accordance with the above unless the excavation and any work equipment and materials which may affect its safety have been inspected by a competent person;

- at the start of the shift in which the work is to be carried out;
- after any event likely to have affected the strength or stability of the excavation; and
- after any material unintentionally falls or is dislodged; and

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- the person who carried out the inspection is satisfied that construction work can be safely carried out there.

It is the responsibility of the AP to ensure a risk assessment is completed and a safe system of work is communicated.

This assessment will determine the required control measures and safe system of work to be adhered to for the duration of the activity. The main elements that may be considered to form a safe system of work include;

- Temporary support – Before digging any trench pit, tunnel, or other excavations, decide what temporary support will be required and plan the precautions to be taken.
- Make sure the equipment and precautions needed (trench sheets, props, baulks etc) are available on site before work starts.
- Battering the excavation sides – Battering the excavation sides to a safe angle of repose may also make the excavation safer.
- In granular soils, the angle of slope should be less than the natural angle of repose of the material being excavated. In wet ground a considerably flatter slope will be required.
- Loose materials – May fall from spoil heaps into the excavation. Edge protection should include toe boards or other means, such as projecting trench sheets or box sides to protect against falling materials. Head protection shall be worn.
- Undermining other structures – Check that excavations do not undermine scaffold footings, buried services or the foundations of nearby buildings or walls. Decide if extra support for the structure is needed before you start. Surveys of the foundations and the advice of a structural engineer may be required.
- Effect of plant and vehicles – Do not park plant and vehicles close to the sides of excavations. The extra loadings can make the sides of excavations more likely to collapse.
- Prevent people from falling – Edges of excavations should be protected with substantial barriers where people are liable to fall into them. To achieve this, use;

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- Guard rails and toe boards inserted into the ground immediately next to the supported excavation side; or
- Fabricated guard rail assemblies that connect to the sides of the trench box
- The support system itself, e.g. using trench box extensions or trench sheets longer than the trench depth.

Where specified, by the risk assessment, a Permit to Work shall be prepared by the AP which will specify all the precautions taken. The permit shall also detail any action required from the recipient of the permit prior to the start of work and any specified periods or stages during the work.

A permit may not be needed for shallow excavations – down to 300mm – where only hand digging will be used.

2.2 Factors to be assessed

If it is not reasonably practicable to avoid work associated with excavations or work in close proximity to excavations the AP must assess the risks connected with the work activities. The assessment should identify the risks to those entering or working there, and also any others, for example other workers including contractors and the general public in the vicinity who could be affected by the work to be undertaken. The risk assessment must be carried out by someone competent to do so.

Where a number excavation activities are broadly the same, and if the risks and measures to deal with them are the same, it may be possible to devise a 'model' or generic risk assessment covering them all. Any differences in particular cases that would alter the conclusions of the model Risk Assessment must be identified. Failure to include relevant information in the Risk Assessment could lead to inadequate precautions in the subsequent system of work.

The most likely hazards encountered during excavation activities are;

- Unstable ground conditions – depending on the topography and geology of the ground to be excavated, soil and rock, once disturbed can become unstable and slip. This can lead to the collapse of trenches and excavations, the subsidence of building structures and the breach of services.
- Underground structures or water courses – natural water courses such as underground rivers and streams exist under much of the UK. Once disturbed they can alter their flow and cause flooding and land slippage. Many other structures can be found underground

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ranging from oil and gas distribution pipes, disused service tunnels, residual voids from previous mining activity and natural caves and caverns.

- Interference with plant and underground services – most of our highways and footpaths cover a wide range of underground plant and utilities; these include gas pipes and distribution valves, high and low voltage electric cables, water distribution pipes and valve boxes, telecommunications cables, fibre optic cables and both foul and storm drain networks. Each of these carries their own hazards and risks when damaged or broken.
- Asphyxiation of personnel due to the presence of toxic gasses, fumes and vapours in the excavation - this could be caused by residues of hazardous substances in subsoil, leaks from pipe work, or valves being accidentally opened whilst personnel are working in excavations.
- Drowning of Personnel – this could be caused by the unexpected ingress of water into the excavation, water from natural sources and from distribution pipe work should be considered.
- Collapse of excavations – caused by a range of factors such as unstable bedrock or subsoil, unsupported sides of an excavation, water ingress, explosion and vehicle movement close to the edges of excavations.
- Falling or dislodging material – the surface edges of an excavation are usually unstable and the topsoil and subsoil are usually easily dislodged by pedestrian or vehicle movements around the edge of the excavation. Dislodged material can fall into the excavation causing a risk for those working in the excavation. Spoil piles placed too close to the edge can also be easily dislodged and fall into the excavation.
- Falling into excavations – personnel and vehicles may fall into an excavation if they work in proximity of the edge and no edge protection is provided around the perimeter of the excavation.
- Fire or explosion - caused by the presence of flammable gas or fume in sufficient quantities to be within the substances lower and upper explosion limit. Fire caused by the ignition of flammable material from cutting, welding and other hot work may cause smoke generation which could put personnel at risk. Oxygen enriched atmospheres due to chemical reactions or use of oxy-gas equipment can create additional hazards.

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- Biological hazards – a range of bacteria, fungi, viruses, hazardous substances and animal bi-products could be present in soil and water within an excavation. The most prevalent risks are; leptospirosis (Weil's disease), anthrax, radon gas, asbestos and bacterial infections such as e-coli from sewage pipes.

You should assess the general condition of the excavation site prior to undertaking any works to identify what hazards may be present and which of these may pose a problem. Consideration should be given to;

- Local site conditions – including access, ground slope, adjacent buildings and structures, water courses (including underground) and trees,
- Depth of excavation,
- Soil properties – including variable soil types, stability, shear strength, presence of ground water, effect of exposure to the elements,
- Fractures or fault in rocks – including joints, bedding planes, dip and strike directions and angles, clay seams,
- Any specialised plant or work methods required,
- The methods of transport, haulage routes and disposal,
- What exposures may occur – such as noise, vibration, hazardous chemicals,
- The number and type of persons involved,
- The possibility of unauthorised access to the work area,
- Local weather conditions,
- The length of time the excavation will be open.

You should also ensure that you assess the hazards that may arise directly from the work to be undertaken in the excavation. The work itself may produce a hazard or conditions may become hazardous when the work is done.

2.3 Health and Safety Information

Before any excavation work is undertaken, an investigation of the proposed area must be undertaken; this investigation will be both desk based and ground based. Sources of information can include;

- Previous excavation reports that may indicate soil types and other particular issues
- Maps, drawings and survey reports
- Utility and service drawings
- Land quality assessments
- Walking the ground

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- Cable scans and ground penetrating radar can be used to identify sub surface issues.

Once all data is gathered it should lead to an initial plan on how the task will be carried out. The initial plan should cover the following elements;

- A site map showing where the excavations will take place
- Markings in the form of either pegs or spray paint to indicate the route or external dimensions
- Protection to prevent students, visitors, public and any other unauthorised persons gaining access to the excavation. It is particularly important to consider the risk of children gaining access to the site.
- Any excavation site under the control of University of Kent Estates & Commercial Services Department will be subject to inspections in accordance with HSE Guidance 'HSG 150 – Safety in Construction'. Where the site is handed over to a contractor then this requirement must be specified under 'Section 1: Instructions to Tenders' of the Estates & Commercial Services Tender Document.

2.4 Avoiding Danger from Underground Services

Those involved in commissioning, planning, managing and carrying out work on or near underground services should be aware of the potential associated dangers and direct risks to people's health and safety as well as indirect risks arising through damage to services.

Damage to underground services can cause fatal or severe injury as well as significant disruption and environmental damage; it can also delay projects and incur considerable costs.

University of Kent staff and third parties who are planning or undertaking any excavation work that may disturb underground services must contact the CSE department for information about the location and status of services. Estates & Commercial Services have a responsibility under this procedure to provide any relevant information about services in the work area.

Work should be planned to avoid underground services wherever possible. Where work cannot avoid underground services, plans must be developed to minimise the risk of damage to those services in the work area.

A risk assessment and safe working method statement must be completed prior to the start of any excavations, of or near, underground services and an Excavation Permit must be issued to those undertaking the work.

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You must identify clearly the extent of the work area and find out what underground services are within the area before considering if they are likely to be disturbed;

- Obtain service drawings from utility companies and other organisations with relevant information about the site.
- Survey the site to identify the services and other underground structures. Record the location of any services.
- Provide either up-to-date readable plans, which show the recorded line and depth (where known) of all our known services buried in the proposed work area, or other information which achieves the same aim.

Where it is not possible for those undertaking the work to obtain information, as may be the case when emergency work has to be undertaken, the work must be carried out as though there are underground services in the area.

Anyone who is selecting detection tools and survey methods must understand the range of methods and tools and their limitations. In particular, they need to be aware of the potential for false readings or signals in certain techniques as they may lead to inaccurate information being included in the plan of work and, in turn, lead to a false sense of security.

2.5 Spiking into the ground

Metal spikes of up to 1m in length are often used to secure temporary structures such as marquees and tents to the ground. The risks associated with this activity are substantial if not adequately controlled.

Where possible the use of weighted blocks either concrete or water filled should be used. This method will ensure 100% safety in respect of buried services.

If these weights cannot be used then consider the use of < 30cm long pegs to secure the marquees and tents in soft ground.

Where no other option is available and large spikes must be used then this must be done in an agreed location for which the University of Kent hold detailed services drawing layouts including depths of services such that marquees and tents can be erected safely.

- Library Lawn
- Registry Lawn
- Parkwood Sports Field
- Three areas used by the Canterbury Retreat

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Any school or department wishing to erect a marquee or tent must initially notify CSE Technical Support for approval and assistance. As much notice as possible is required for Technical Support staff but certainly not less than two weeks.

A request form should be used to request support from CSE Technical Support staff. Absolutely, no marquees or tents should be erected without Technical Support engagement.

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APPENDIX 1 Permit to Work

Permit to Work – Excavation below 300mm Estates SSoW: Excavation Procedure	
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Permit to excavate – below 300mm

Date Time Permit Number

Description of Work

Exact Location of Proposed Work

Checklist	YES	NO	N/A
Have services been positively identified via site drawings or plans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have live services been made dead?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has the area been surveyed by a competent person using appropriate detection? (State detection device type, serial number and calibration date) <input style="width: 200px;" type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have the position of any services been marked on the ground?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have service providers been notified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are power tools or plant being used within 500mm of services?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there a Risk Assessment / Method statement for this task?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there a documented safe system of work and workers aware of the controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person in charge of excavation is competent to supervise task?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Workers appropriately qualified for performing excavations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If plant being used is operator trained on use of plant and familiar with site risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procedures inc. emergency arrangements have been communicated to all personnel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all personnel aware of the steps to take if asbestos materials are uncovered?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have arrangements been made to close off the area and post warning signs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are there any other safety measures or special instructions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you, please provide details below.

I declare that it is safe to work on the excavation detailed above.

UoK Permit Authority Contact No

Signature Date

I confirm that all controls as above are in place and I have understood the requirements of this permit.

Competent Person Contact No

Signature Date

Work Completion

I have inspected the worksite. I am satisfied that the work is complete, all equipment returned and the site safe.

Uok Permit Authority

Signature Date