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| **CAL-HS-PD-5001** |
| **Underground Services & Excavations Procedure** |
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| **Procedure** |
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# PURPOSE

1. The purpose of this procedure is to define the health and safety controls associated with avoiding underground utilities during excavation works. This includes all the definitions below.

# DEFINITIONS

## Breaking Ground

1. Where work activities which involve ground penetration by (this list is not exhaustive):

* excavation (mechanical and non-mechanical)
* drilling/boring/cutting
* driving pins or posts (including setting out)
* road surface cutting or planing operations
* road surface laying operations (which has the potential to damage surface valves and valve housings)
* piling
* de-vegetation / topsoil strip
* planting vegetation/trees
* any other work which involves breaking the surface of the ground at, or below, surface level

## Underground

* below ground level whether the level has been reduced below original ground surface level or built up above original ground level, both within and outside structures.

## Utility Owner

* the owner or operator / manager of the underground utility.

## Works covered by the New Roads and Street Works Act

* all highways and roads, except motorways and any dual carriageways with

a speed limit of 50 mph or more and applies to works carried out by or on behalf of both highway authorities and statutory undertakers.

## Exclusion Zone

* a defined area immediately around a utility within which safe excavation practices (e.g., air pick, vacuum excavation) must be adopted and must be defined within the safe system of work.

# COMPETENCIES

## Utility Mapping Company

1. The Utility Mapping Company must be full members of The Survey Association and ideally accredited to ISO 9001 which includes underground utility surveying as part of their accredited scope.
2. Where Ground Penetrating Radar (GPR) is used, the company must be a member of EuroGPR (an association made up of users and manufacturers of GPR equipment, intent on raising standards within the GPR industry) and must hold an OFCOM GPR licence.

## Responsible Person in Excavation Team

1. Within every team of people who are required to excavate, or work within an excavation, or on or near underground utilities, an individual must be appointed as the person responsible for implementing the safe system of work.
2. The person must be competent and adequately trained for the task being undertaken. They must also hold the relevant qualifications detailed in the table below, appropriate to the type of work being undertaken.
3. The training associated with the responsible person role should include, in addition to the below, safe digging techniques and the action in the event of an emergency.
4. The responsible person must ensure that:

* The conditions of any Permit to Break Ground are followed.
* Safe excavation techniques are applied.
* The ground is scanned for utilities as work proceeds.
* Exposed utilities are supported/protected as necessary.
* Work is stopped if circumstances change.

1. The responsible person must be in attendance when work is carried out under a permit to break ground. Work must stop if the person is not in attendance.

# PROHIBITIONS

* Disturbing any service (whether live or disconnected) encased in or surrounded by concrete is prohibited, until a safe system of work has been agreed.
* Access into, across or out of an excavation using walings, struts or exposed buried services is prohibited
* Breaking ground without a valid permit in place is prohibited.

# REQUIREMENTS

## 1. General

1. The Manager/ Supervisor/ Senior Operative must ensure the hierarchy of control is followed for the avoidance of danger from utilities to ensure that options for redesign to eliminate, minimise or mitigate the requirement within or near the exclusion zone area.
2. Early identification and planning are essential as such requests will need to include a sufficient period of notice.
3. Prior to breaking ground a Manager/ Supervisor/ Senior Operative must ensure the following appointments are made:

* Responsible Person: to implement the safe system of work. The appointment should be formal and the individual fully aware that they are undertaking this role The duties of the Responsible Person are to ensure:
* The conditions of all relevant permits are followed.
* Safe excavation techniques are applied.
* The ground is scanned for utilities as work proceeds, as necessary.
* Exposed utilities are supported/protected as necessary and as agreed with the owner.
* Work is stopped if circumstances change.
* On-going Inspection of the excavation works

## 

## Detecting Utilities

1. Where redesign has not been deemed practicable or granted, contact must be made with the Utility Owner to request isolation of the utility for the period of excavation works. Written confirmation from the Utility Owner must be in place recording their decision prior to the commencement of breaking ground. Planning of the activity must take cognisance of time scales for isolation (sometimes several weeks).
2. All isolated or redundant utilities must be treated as live unless proved dead by physical means.

## Desktop Survey

1. Utility Owners’ plans in the form of colour drawings, showing the location of all underground utilities, must be made available. Where Utility Owners are unable to meet this requirement and additional clarity is required please consult the relevant Utility Owner.
2. Written confirmation from Utility Owners must be obtained to identify and confirm redundant utilities, unless proved dead by physical means by the owner i.e. cut.

## Visual Survey

1. The Manager/ Supervisor/ Senior Operative must implement the use of local knowledge of a particular site or area ofland for example, from the landowner, nearby houses etc., to assist in establishing the potential existence of any underground utility that might not otherwise be documented.
2. Arrangements must also be made for competent individuals to visually scan the work area and surrounding areas for signs of the presence of uncharted utilities for example trench reinstatement scars, nearby dwellings, lighting columns and feeder pillars, illuminated signs, traffic control systems, inspection chamber covers and roadside marker posts.

## GPR Survey

1. A Ground Penetrating Radar survey should be considered unless one has already been undertaken by the Client using an acceptable Utility Mapping Company.
2. A GPR survey may not be necessary where the benefits of the survey are limited.

## Detection Survey

1. Prior to the commencement of any breaking ground a full cable avoidance tool (EziCat or similar) survey must be carried out and the positions, route and depth of the utilities marked on the ground.
2. Once utilities have been verified on completion of trial holes, the ground surface above the utility must be highlighted with tape or waterproof paint.

## Service colours

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| **Item** | **Colour** |
| Water | Blue |
| Gas | Yellow |
| Electric All Voltage | Red |
| Data/Telecom | White/ Green |
| Oil/Fuel Pipeline | Black |
| Sewerage | Concrete pipe/ plastic pipe |
| Duct | Grey |

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# VERIFICATION OF SURVEY/TRIAL HOLES

1. All underground utilities within or near to the work area as identified and following a full Cat scan/ GPS Survey, must be positively verified by trial holes to establish the exact locations and depths. Where the risk of exposing critical or sensitive utilities which are outside but near to the work area outweighs the benefit of exposing them, a high level of utility detection control must be established to positively confirm its location and depth over its entire length where it interfaces with the work area.
2. All permits must be fully briefed to all personnel in supervising and undertaking the works to confirm an understanding of;

* Safe System of Work
* Prohibition on the use of mechanical plant/equipment whilst executing these works (unless safe to use plant)
* Location of existing utilities and their exclusion zones.
* Utility markings and protection requirements.

1. All trial holes must be undertaken using safe excavation practices (i.e. vacuum excavation) and must be defined within the safe system of work. Where hand tools are being used, all operatives involved in breaking ground must only use electrically insulated tools.
2. All personnel must be briefed daily, before commencement, on the content of the Permit to Break Ground. They must be provided with specific instructions relating to the presence of the utilities, the dangers associated with the utilities, the controls to be applied whilst exposing the utilities and the physical extent of the Permit.
3. All operatives involved in locating utilities must wear one piece full cover flame retardant coveralls, flame retardant Hi vis jacket/vest (where the coveralls are not hi-vis) and flame retardant gloves to minimise the risk of a burn should uncharted utilities be encountered or charted utilities be damaged (note if risk to burns then this PPE should be worn i.e excavating around lie gas pipes). Any other member of the team at risk during inspection or supervising the work area should also wear flame retardant clothing and gloves when applicable.
4. Where there is a road, pavement, or other hard surface, power tools such as road saws and jack hammers may be used to break through the surface. However, this may only be undertaken where there is a detailed, highly supervised safe system of work.
5. As the excavation proceeds, drawings must be rechecked and the ground must be re-scanned, by a trained/competent individual, at 300mm intervals, using CAT/Genny equipment, as the location of utilities and associated equipment (such as junction box, branch or siphon valve) are likely to become more accurate as cover is removed.
6. When excavating around a known utility, work must progress with consideration given to the possible variations in the route and depth of the utility.
7. Regular monitoring must be undertaken by the Supervisor to ensure that the work is being carried out in accordance with the Permit controls.
8. Where the line and level of the utility cannot be confirmed with confidence for its full length within the scope of the works, mechanical excavation, drilling equipment, road planing
9. equipment, post and pin driving tools and hand-held power tools are not permitted and further trial holes are carried out.
10. An underground utility which has been exposed must be appropriately supported and protected (following consultation with the Utility Owner), must not be used as a means of access or egress in an excavation and must be visually inspected periodically for signs of damage / deterioration or change.
11. Where a damaged utility is uncovered during the location process the Utility Owner must be informed. Where there is a risk of harm to people resulting from the damage, arrangements must be made to keep them well clear of the area.
12. All positively located utilities must be identified on the Specific Drawing(s)/schedule.

# EXCAVATION: STABILITY ASSESSMENT

1. Where surface water is present e.g. streams or rivers, a thorough assessment must be made about its effects and whether either the excavation route or the water source needs redirecting.
2. Where water is likely to enter an excavation (e.g. from ground or surface water) a water management system must be documented.

# EXCAVATION: SAFE SYSTEM OF WORK

1. Risk assessments must seek to eliminate risk. For example, using trenchless techniques or ensuring the sides are ‘battered’ or ‘stepped’, thus minimising the risk of collapse. They must also take into account any temporary works requirements and the specific hazards identified below:

* Collapse of the sides
* Installing support systems
* Underground and overhead services
* Contaminated ground
* Fall of materials, persons, plant or equipment into the excavation.
* Confined spaces – toxic, noxious, explosive atmospheres or lack of oxygen,
* Flooding.
* Moving plant
* Lifting operations
* Undermining adjacent structures or services.
* Surcharging the sides of excavations.
* Low Lighting levels.
* Changing conditions.
* Over excavation.

Note this list is non-exhaustive.

# EXCAVATION: SUPPORT SYSTEMS

1. Where support systems have been identified within the safe system of work they must have
2. been designed and checked for the purpose and approved by the TWC (if applicable).
3. Additionally adequate supply of support materials must be available on site ready for use before the excavation works commence.
4. Support systems must be sound, free from defects, of adequate strength, of good construction
5. and properly maintained. All supports must be fully secured to prevent any displacement.
6. All support systems must be erected, altered and dismantled by personnel, who have been briefed on the manufacturer’s or system designer’s instructions, under the supervision of a competent person and in conjunction with the TWC (if present/ applicable).
7. Excavation support systems must not be surcharged from plant or material loadings.
8. Utilities spanning along or across a trench must be adequately supported.

# EXCAVATION: ACCESS AND EGRESS

1. A safe means of entering and exiting an excavation must be provided. Where possible, proprietary stair systems should be used in place of a ladders. Ladders can be used provided they have been checked for defects before use, are made of aluminium, commercial grade and are tied off.

# GUARDING ARRANGEMENTS

1. Suitable and sufficient measures must be taken to prevent any person, vehicle, plant or equipment or materials from falling into an excavation.
2. Excavations must have suitable and sufficient edge protection to prevent people falling over the edge. Protection from falling objects must also be provided where the risk exists. Edge protection must be provided, before work commences.
3. Where excavations are being carried out in areas normally accessible to the public, appropriate signage and guarding arrangements must be put in place to ensure public safety at all times and the trench must be back-filled and closed in the shortest amount of time that is practical.
4. Where excavation work is carried out on the public highway the appropriate approval must be obtained from the highway authority.

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| EXCAVATION: VEHICLES AND PLANT |  |
| 1. All vehicles and plant (except those directly involved in the excavation process) must be kept away from excavations. Traffic routes must be planned accordingly. 2. Excavation plant and equipment must be appropriate for the ground conditions and be selected and used in accordance with appropriate standards and specifications. 3. Where vehicles or plant is used to tip materials into an excavation, suitable measures (such as stop blocks/soil bunds) must be used to prevent the vehicle entering the excavation. These blocks/bunds must be placed at a suitable distance from the edge of the excavation to prevent breaking away under the weight of the vehicle. |  |

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| **EXCAVATION: INSPECTIONS AND REPORTS** |  |
| 1. All excavations and support systems must be inspected by the Responsible Person : |  |
| * at the start of every shift in which work is to be carried out. |  |
| * after any significant modification to the support system or fall of material. |  |
| * after any event likely to have affected the strength or stability of the excavation, or any part of it. |  |
| 1. If any changes in ground conditions, excavation depth or any other circumstances affecting stability are identified during the inspection, work must stop and M2 Safety contacted for advice on how to proceed. Works must not re-commence until the risks have been re-assessed and suitable controls have been established and authorised in conjunction with M2 Safety and all personnel have been briefed on the revised safe system of work. 2. The Supervisor must regularly check that the Responsible Person is undertaking and recording inspections.  REMOVAL OF UTILITIES  1. Where the scope of the works involves the removal of existing utilities, the following controls must be implemented:  * Under no circumstances should anyone attempt to break or sever any utility until this procedure is fully implemented. * Management must manage the activity and to ensure that all of the information used is verified as being correct. |  |

1. The Utility Owner must be contacted and a site meeting convened to record:

* The extent of the utility to be removed.
* The timescale of the activity.
* Responsibility for the removal. The Utility Owner must be requested to conduct the removal of the utility.
* The means of verifying isolation.
* The method of removal.
* Request to Witness removal of the utility

# BACKFILLING UTILITIES

1. Any new utility installations must be accurately recorded and as-built drawings must be provided to relevant parties as the work progresses and immediately on completion of the works.
2. Backfilling must be effectively designed, planned and executed to ensure that utilities are not damaged during either the backfilling process, or at a later date.
3. Any unidentifiable utility (e.g. clay sewers, MDPE pipe, plastic ducting) installed under the permit must be fitted with a tracer tape installed at the correct height above utility and a survey conducted to verify its integrity.
4. Where the backfill requirements are not clearly identified in the specification, the Utility Owner/ Local Authority must be contacted to discuss and agree the backfill material and technique.

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