

SGG08B - GUIDANCE ON UNDERGROUND SERVICES AND EXCAVATIONS

Competence

Individuals with the responsibility for planning excavation and underground services activities should possess adequate knowledge, training and experience to ensure that they are competent to develop a safe system of work.

All plant operators involved in excavation or underground services activities should possess the correct CPCS / NPORS card for the item of plant they operate, and be experienced in working on similar excavations or underground services activities.

Excavation Hazards

The risk assessment should consider both site wide and task specific issues relating to excavation and underground services, and consideration should be given to the following hazards:

1. Overhead and underground services
2. Proximity of pedestrian and vehicle routes;
3. Plant movements;
4. Undermining adjacent structures;
5. Support of excavations;
6. Confined spaces;
7. Access and egress;
8. Lifting operations;
9. Storage of spoil and surcharging;
10. Lighting;
11. Health risks, including leptospirosis (Weil's disease) and sewage related micro-organisms.

Underground Services

During planning for excavation activities, it is essential that all necessary precautions are taken to avoid contact with underground services. A full services search (statutory undertakers search) should be carried out, which involves contacting all statutory services suppliers, and obtaining record information for all assets located on, or in close proximity to, site. The following statutory suppliers should be contacted regarding underground services:

1. Electrical network companies;
2. Water and sewerage companies;
3. Gas network companies;
4. Telecommunications companies;
5. Cable companies

There are organisations that are capable of providing a turnkey service for utilities searches, which may be useful in identifying underground services on site.

In addition to statutory services, it is also possible for large sites and existing developments to have private underground services located on site, and all efforts should be made to obtain record information regarding these services. Health & Safety Files and Operation & Maintenance Manuals for the site should be reviewed, to identify whether any underground services exist and records maintained.

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Once underground services have been located through a desktop study, a site based survey should be carried out to verify the exact location of each service. This should be carried out using detection equipment such as:

1. Cable avoidance tool (CAT) and generator (genny);
2. Metal detector; or
3. Ground penetrating radar (GPR).

All of these items of equipment have their limitations in identifying underground services, therefore, selection of equipment should be based on the specific condition of the site underground services.

To ensure that the risk of contact with underground services is eliminated, each underground service should be identified and marked to confirm the exact location and connection status. To identify the exact location and depth of the underground service, trial holes should be dug by hand or through the use of vacuum excavation. Power tools should only ever be used to break out hard surfaces, however, these should avoid penetrating too deep in the event that the underground service has been laid in a shallow trench.

Finally, once exposed and correctly identified, the underground service should be properly marked on site through the use of paint on hard surfaces, or the use of wooden stakes or posts in soft ground. The marking should correctly colour code the service and, if possible, provide additional information relating to the depth and connection status.

If an underground service is not required on site following identification, then a request should be made to the owner or operator to disconnect the underground service, or terminate the feed outside of the site boundary.

Ground Investigation

A ground investigation should be carried out on all sites where excavations or underground services activities are planned, to provide more detailed information of the ground to be excavated. As ground conditions can vary widely, it is important to identify the geological formation, and hence, the properties and characteristics of the various materials to be excavated.

An interpretive report from a ground investigation should be provided to anyone planning an excavation or underground services activities, in order that they can adequately assess the requirement for temporary support.

In addition, a ground investigation should also be used to analyse soil samples and determine whether contamination is present within the ground. The soil testing results should allow anyone planning an excavation or underground services activity to assess the need for additional risk control measures, in the event that contamination is present.

Confined Spaces

A confined space is created when a work area is substantially (though not always entirely) enclosed, and where there is a reasonably foreseeable risk of serious injury from hazardous substances or conditions within the space or nearby.

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All excavations should be assessed for the potential for confined spaces working, either due to existing environmental hazards, or those that may be introduced as part a work activity. Particular soil types such as chalk can create hazardous gases, and exhaust gases generated from nearby plant or vehicles can seep into the excavation, creating a confined space.

It is essential that a thorough assessment is carried out for excavation works and underground services, and consideration should be given to the following enclosed spaces:

1. Tunnels;
2. Boreholes;
3. Bored piles;
4. Manholes;
5. Shafts;
6. Sumps;
7. Inspection pits; and
8. Cofferdams.

Consideration should also be given to the following hazards:

1. Flammable substances;
2. Oxygen enrichment;
3. Oxygen deficiency;
4. Toxic gases, fumes or vapour;
5. Ingress of liquids;
6. Free flowing solids; and
7. Excessive heat.

Temporary Works

Excavations are items of temporary works as they enable construction of, and provide support to, the works and as such all excavations are subject to the temporary works requirements. This means that a design brief, design and design check should be carried out on all excavations, and that the excavation is identified on the temporary works register.

All types of excavation sides and support are subject to temporary works, whether they are a designed batter or stepped excavation, or whether they are a proprietary support solution such as a trench box or sheet piling.

Proprietary Supports Systems

Proprietary support systems can be used to provide safe excavations, where the footprint of the site does not allow a suitable angle of repose on a batter, or a sufficiently stepped side to be created. The proprietary support system should be designed and checked under the temporary works process, even though the equipment is likely to have a standardised design specification.

A safe system of work should be developed and implemented for the installation, use and removal of the proprietary support system.

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Battered and Stepped Excavations

Providing that the footprint of the site allows a suitable angle of repose to be constructed, an excavation can be battered back to provide a safe working environment. The angle of repose is important in providing stability to the excavation, therefore, the angle must be designed and calculated by an engineer based on the known ground material. Certain conditions may affect the angle, such as wet weather, and these should be taken into account when the excavation sides are designed.

If the footprint of the site does not permit a sufficient angle of repose, then it may be possible to step the sides of an excavation. The depth and height of the steps should be designed and calculated by an engineer based on the known ground material.

Means of Access

Safe means of access to and egress from an excavation must be provided, and consideration should be given to means of escape in the event of an emergency. Ideally, safe means of access should be provided by a staircase, rather than ladder, and should only be installed once the excavation sides have adequate support.

If ladder access is to be installed, then it should be sited on a firm level base, secured to prevent movement, and extend above the landing place by 1 metre. In large excavations, two forms of ladder access should be used to provide alternative means of escape in the event of an emergency.

Edge Protection

Edge protection should be provided around the perimeter of every excavation, were there is a foreseeable risk that someone may fall into the excavation. Edge protection should be provided in the form of physically robust barriers, such as tube and fitting scaffold or proprietary crowd barriers. Edge protection should be located at least one metre back from the excavation, so that the stability of the excavation sides are not affected.

Where an excavation is supported by a proprietary system, then the edge protection system shall be compatible with the proprietary system. It may be possible to oversize trench boxes or sheet piling, or to install guardrails onto the proprietary, however, the top guardrail should be one metre from ground level.

Where vehicles require access in close proximity to the excavation then barriers or stop blocks, such as baulk timbers, should be installed to prevent vehicles and plant from surcharging the excavation. In addition to the physical barrier, suitable signage should be erected, warning of the danger of surcharging.

Any material that is excavated should be stored a safe distance from the excavation, again to prevent surcharging. A safe distance from the edge of the excavation is generally deemed to be equal, or more than, the depth of the excavation.

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Statutory Inspections

A competent person should inspect any excavation at the commencement of each shift, and after any event likely to have affected their stability. A written report of the inspection is required once every 7 days, unless there has been a collapse / fall of material or other event likely to affect stability. In this case an inspection and report is required before work starts again.

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