



نظام الشارقة للسلامة والصحة المهنية
Occupational Safety & Health Sharjah

حكومة الشارقة
هيئة الوقاية والسلامة
Government of Sharjah
Prevention And Safety Authority



Code of Practice

Overhead and Underground Services

OSHJ-Cop-09

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1 Introduction

Overhead and underground services provide utility services to residential and commercial premises. Overhead services are above the ground and noticeable, underground services are hidden and isolated from damage during normal conditions.

Overhead and underground services include:

- Overhead power lines;
- Overhead telecommunication lines;
- Underground services:
 - Power cables;
 - Gas pipes;
 - Water pipes;
 - Sewage pipes;
 - Telecommunication cables;
 - Fiber optic cables;
 - Petroleum and fuel oil pipelines;
 - Other pipelines that transport liquids or substances under pressure.

2 Purpose and Scope

This Code of Practice (CoP) has been developed to provide information to entities to assist them in complying with the requirements of the Occupational Safety and Health System in Sharjah.

This Code of Practice (CoP) defines the minimum acceptable requirements of the Occupational Safety and Health System in Sharjah, and entities can apply practices higher than, but not lower than those mentioned in this document, as they demonstrate the lowest acceptable level of compliance in the Emirate of Sharjah.

3 Definitions and Abbreviations

Entity:	An organisation, company, business, or institution irrespective of the nature of their activities operating within the Emirate of Sharjah.
Risk:	Is the combination of likelihood of the hazard causing the loss and the severity of that loss (consequences).
Risk Assessment:	The systematic identification of workplace hazards and evaluation of the risks associated. This process takes existing control measures into account and identifies and recommends further control measures where required.
Hazard:	Anything that has the potential to cause harm or loss (injury, disease, ill-health, property damage etc).

Competence:	The combination of training, skills, experience and knowledge that a person has and their ability to apply all of them to perform their work.
Underground Services:	Underground utility services to residential and commercial premises which are hidden and isolated from damage under normal conditions.
Overhead Services:	Utility services to residential and commercial premises in the form of overhead power lines or telecommunication lines.

4 Roles and Responsibilities

4.1 Entity Responsibilities

- Identify and adequately assess all work activities undertaken on or near overhead and underground services;
- Implement effective control measures to manage risks to ensure work activities are conducted safely and without risk to health;
- Develop a safe system of work for each location where employees work on or near overhead or underground services;
- Ensure work on or near overhead or underground services are adequately planned and supervised;
- Have an adequate emergency response procedure in place;
- Provide emergency equipment, which is adequately maintained, inspected and available for the planned work activities;
- Ensure employees are provided with the necessary safety information, instruction, supervision and training.

4.2 Employee Responsibilities

- Not endanger themselves or others;
- Follow precautionary control measures to ensure work activities associated with overhead and underground services are performed safely and without risk to health;
- Cooperate with the entity and receive safety information, instruction, supervision and training;
- Report any activity or defect which they know is likely to endanger the safety of themselves or that of any other person.

5 Requirements

The entity shall plan their work activities, ensuring they are appropriately supervised and carried out safely and without risk to health. Planning includes conducting a risk assessment, the selection of work equipment and preparation for emergencies. Work activities on overhead or underground services should cause the minimum inconvenience to utility users.

5.1 Planning

Liaison with the relevant authorities or statutory bodies may be required in planning the works to obtain any necessary licences, approvals and temporary regulation orders/notices in advance of the works commencing. For emergency works, as much warning must be given to utility users as possible.

5.2 Risk Assessments

The entity shall assess the risks associated with work activities and take all reasonably practicable precautions to ensure the safety of employees and others who could be affected by work activities.

The risk assessment shall take into consideration the following factors, including but not limited to:

- Identifying overhead power lines;
- Detecting underground services;
- Excavation;
- Barricading;
- Work equipment;
- Personal protective equipment;
- Information, instruction, supervision and training;
- Emergency procedures and response.

Further information of risk assessment can be found in OSHJ-CoP-01: Risk Management and Control.

5.3 Safe Working Near Underground Services

The entity planning or undertaking work that may disturb underground services must contact the relevant authorities responsible for those services for information about the location and status of the services. Relevant authorities and operators should be prepared to help locate and identify the underground services.

The entity shall plan work to avoid underground services, where this is not possible, develop plans to minimise the risk of damage to those services in the work area.

Detecting underground services will require information from those who own the services. Competent persons with sufficient experience and technical knowledge should carry out a comprehensive survey of the work area using the appropriate survey tools and equipment.

Every underground cable should be at such depth or be otherwise protected as to avoid any damage. Protective tiles or marking tapes should be placed above cables to warn any employees excavating in the vicinity and maps made available to indicate cable runs.

5.3.1 Site Surveys

A service detection and mapping survey of the work area should be undertaken at the planning stage as its findings will be useful in designing out and planning to reduce the risk of damage to the underground services.

Time spent on a survey at this stage can save significant costs and delays to the work by allowing for the avoidance of damage to underground services and efficient programming of the work.

5.3.2 Risk Control Measures

The entity shall ensure all significant risks have been identified and a safe system of work developed, documented and communicated. The precautions required to create a safe system of work will depend on the nature of the excavation and the hazards identified during the risk assessment.

A safe system of work for working near underground services includes three basic elements, which complement each other and should always be used together, including:

- Planning excavation and earthworks;
- Locating underground services and identifying them;
- Safe digging practices and procedures.

Where excavation work requires additional control measures, a permit to work shall be used to adequately control the excavation work. A written permit to work system should result in a higher standard of safety and supervision.

The permit to work system shall also apply to contractors and subcontractors. Excavation work shall not be carried out unless it is authorised and properly supervised by a competent person who has knowledge of the work to be carried out, the risks involved and the precautions to be taken.

Further information on permit to work can be found in OSHJ-GL-16: Permit to Work.

5.3.3 Detecting Underground Services

The main types of detectors, include:

- Hum detectors;
- Radio frequency detectors;
- Transmitter-receiver instruments;
- Metal detectors;
- Ground probing radar;
- Radio Frequency Identification (RFID).

5.3.3.1 Hum Detectors

Hum detectors detect the magnetic field radiated by electricity cables, which have a current flowing through them. They do not respond to:

- Cables where there is little or no current flowing;
- Direct current cables;
- Well-balanced high voltage cables, which generate relatively little field, which in turn may be further screened by the cable sheathing.

5.3.3.2 Radio Frequency Detectors

Radio frequency detectors respond to low-frequency radio signals, which may be picked up and re-emitted by long metallic pipes and cables.

Other metallic objects may re-radiate the signal and results may vary appreciably according to locality, length of the buried cable or pipe and distance from the termination and geographical orientation.

5.3.3.3 Transmitter-Receiver Instruments

Small portable transmitters can be connected to a cable or pipe or placed very close to it so that the signal is introduced into it. The receiver can then detect this signal. Usually, the location of some part of the cable or pipe needs to be already known so that the transmitter can be correctly positioned, these locators generally require more skill to operate than most other types.

5.3.3.4 Metal Detectors

Conventional metal detectors will usually locate flat metal covers, joint boxes etc, but may well miss round cables or pipes.

5.3.3.5 Ground Probing Radar

The ground probing radar method is capable of detecting anomalies in the ground.

When these anomalies can be plotted into a continuous line, this may indicate a cable, duct or pipe. The technique alone cannot determine the precise nature of the service.

Some commercially available instruments use more than one of the techniques outlined and may also include a depth-measuring facility.

5.3.3.6 Radio Frequency Identification (RFID)

RFID is a system increasingly used to mark or 'tag' new services. These markers can be programmed with information about the particular service and its depth, and this information can be read by detecting devices. The accuracy of the information depends on the marker being properly attached to the service.

As a developing system, RFID will often be found on new services so will not necessarily assist with older services. RFID marker systems may require specific detecting tools that may not be compatible with one another.

5.3.4 Use of Locating Devices

The degree of confidence with which buried services can be detected depends on a number of factors, including but not limited to:

- The training, skill and experience of the operator;
- The hearing acuity of the operator;

- The characteristics of the device being used;
- The calibration and reliability of the locating device;
- The type, length and depth of the service;
- For cables, the magnitude of the current being carried;
- The effects of other nearby services.

Locators may not be able to distinguish between cables or pipes running close together and may represent them as a single signal. If two are sited one above the other, the lower one may not be detected. Exposing one cable or pipe does not mean that there is not another close by.

Frequent and repeated use should be made of locators during the course of the work as service location is likely to become more accurate as cover is removed.

Locators, with the possible exception of ground probing radar, are unable to detect plastic pipes or other non-metallic services unless a metallic tracer wire has been laid with the pipe or a small signal transmitter is inserted into and pushed along the pipe.

Telecommunication and railway signalling cables also cannot be traced by locating devices, unless metal components, such as a metal sheath are connected to earth.

5.3.5 Identifying and Marking Services

Failure to correctly identify exposed services is a common cause of incidents. Difficulties arise because a wide variety of materials and colours have been used for underground services over the years and black plastic has often been used to cover water pipes, electricity cables and telecommunication cables.

The following general precautions are recommended to be followed until the nature of the service is confirmed, including but not limited to:

- Black plastic services should be assumed to be live electricity cable;
- Iron and steel pipes should be treated as gas pipes;
- Continuously welded steel pipes should be treated as containing hazardous or high pressure fluid;
- Where there is any doubt about the identity of an exposed service, it should be treated as an electricity cable or gas pipe until proved otherwise.

The line of any identified services should be noted and marked with waterproof crayon, chalk or paint on paved surfaces, or with wooden pegs in grassed or un-surfaced areas. Steel pins, spikes or long pegs, which could damage services laid at shallow depth, should not be used.

5.3.6 Safe Excavation

Once a locating device has been used to determine position and route, excavation may proceed with trial holes dug using suitable hand tools as necessary, to confirm the position of any buried services. The entity shall ensure control measures are in place prior to digging above or close to the assumed line of such a service.

Further information on excavation can be found at OSHJ-CoP-08: Safe Excavation.

5.4 Safe Working Near Overhead Services

High voltages can arc flash across an air gap, it is not necessary to touch live parts to suffer a shock or burns. To minimise this risk, it is always desirable to maintain the maximum practicable distance at all times between any person and any item of live electrical equipment. Under normal circumstances, the presence of fences and/or barriers, or the suspension of live conductors on wooden or metal towers provides adequate clearance to ensure that electric shock or arcing do not occur.

For work at or near overhead power lines, planning and assessment should identify if the work could be avoided, if not, make the lines dead during the work or provide necessary precautions. In some cases, it may be necessary to use suitable combinations of these measures.

The precautions depend upon the nature of the work at the site. There are three broad categories of this work, including:

- Work areas where there will be no scheduled work or passage of plant under overhead lines;
- Work areas where plant will pass under overhead lines;
- Work areas where work will be carried out beneath overhead lines.

Further information on overhead power lines can be found in OSHJ-CoP-05: Electrical Safety at Work.

5.4.1 Risk Control Measures

Where the overhead power line cannot be diverted or switched off, and there is no alternative to carrying out the work near it, the entity shall consider how the work can be done safely. If the work cannot be carried out safely, it should not be done at all, the site specific risk assessment will enable this decision to be made.

The risk assessment should consider the following factors, including but not limited to:

- The voltage and height above ground of the power lines. Their height should be measured by a competent person using non-contact measuring devices;
- The nature of the work and whether it will be carried out close to or underneath the overhead power line, including whether access is needed underneath the line;
- The size and reach of any machinery or equipment to be used near the overhead line;
- The safe clearance distance needed between the line and the plant or equipment and any structures being erected. The relevant authority will be able to advise on safe clearance distances;
- The site conditions;
- The competence, supervision and training of people working at the site.

If the power line can only be switched off for short periods, schedule the passage of tall plant and, as far as is possible, other work around the line for those times.

Do not store or stack items so close to overhead lines that the safety clearances can be infringed by people standing on them.

5.4.2 Work Areas Near but Not Under Overhead Services

Where there will be no work, passage of plant or equipment under the overhead line, the risk of contact can be reduced by erecting ground level barriers to establish a safety zone to keep people and machinery away from the overhead services.

This area should not be used to store materials, plant or equipment.

The entity shall ensure hard barricading is used as suitable barriers to provide a physical barrier, including but not limited to:

- Mesh or hoarding fencing panels;
- Scaffolding tube and fitting to construct temporary walkways and handrails;
- Road traffic control barricade;
- Free standing A-frame barricades.

The safety zone should extend 6 metres horizontally from the nearest wire on either side of the overhead line. The width of the safety zone may need to be increased on the advice of relevant authorities or statutory bodies to allow for the possibility of a jib or other moving part encroaching into the safety zone.

Where plant such as a crane is operating in the area, additional high-level indication should be erected to warn the operators. A line of coloured plastic flags or 'bunting' mounted 3–6 metres above ground level over the barriers is suitable. Ensure when erecting bunting and flags to avoid contact or approach near the wires.

Further information on barricading can be found in OSHJ-GL-24: Barricading.

5.4.3 Work Areas Where Plant Will Pass Under Overhead Services

The entity shall ensure defined passageways are constructed and the number of such passageways should be kept to a minimum. The passageway shall be fenced to define its route, and goal posts erected at each end to act as gateways in the barriers, running parallel to the overhead line.

The goal posts shall be constructed from rigid, non-conducting material such as suitable timber or plastic pipe and distinctively marked. At either side of the passageway, on or near the goal posts, there shall be warning signage giving the cross-bar clearance height and keep below this height while crossing.

The surface of the passageway shall be levelled, firmed up and well maintained to prevent undue tilting or bouncing of the equipment when moving under the overhead line.

On workplaces where work continues after dark, the signage and cross-bars shall have adequate lighting and warning signage erected on the approaches to the crossing.

5.4.4 Work Area Where Work Will Be Carried Out Under Overhead Services

The entity shall ensure work carried out under overhead services has adequate precautions in addition to the erection of barriers with passageways. The safe clearance required beneath

the overhead lines shall be ascertained from relevant authorities or statutory bodies who will advise on the safe distance between services and the work activities.

Plant, equipment or hand tools that could reach beyond the safe clearance limit shall not be taken under the line. Plant such as cranes and excavators shall be modified by the addition of suitable physical restraints so that it cannot reach beyond the safe clearance limit. Restraining devices may be fitted to the derricking or slewing mechanism, or both, as required. Cranes with telescopic or fly jibs may need additional restraining devices to prevent alteration in length of jib or angle of fly jib.

Access for plant, materials and the working of plant shall be under the direct supervision of a competent person, appointed to ensure that safety precautions are observed.

In cases where buildings or structures are to be erected under overhead lines, and for those occasions when work has to be done at or from an existing building, increased risks will arise because of the risk of safe clearances being reduced by the proximity of the works and by provision of the required access above ground level. If the lines cannot be diverted or made dead, the following precautions are strongly recommended:

- The relevant authorities or statutory bodies should be consulted about proposed working methods;
- The work should be carried out under the direct supervision of a suitable person, familiar with the risk, and appointed for the purpose of ensuring that safety precautions are observed;
- The use of tools or items of equipment, which can reach high enough to touch the overhead line, or, going close enough to it to cause arc flash to take place, should be avoided;
- A horizontal barrier of timber or other insulating material should be erected beneath the live conductors to form a roof over the construction area. Alternatively, in some cases, an earthed steel net may be used. In either case, this work should be carried out only after agreement with relevant authorities or statutory bodies and it may be necessary to have the line/s temporarily made dead to enable safe erection or dismantling of the barrier.

6 Training

The entity shall ensure that all personnel involved in work on or near overhead and underground services are adequately trained.

The entity shall provide employees with training in languages and in a format that employees understand, including but not limited to:

- Identifying overhead power lines;
- Detecting underground services;
- How to conduct safe excavation;
- Selection and installation of barricading;
- Selection and use of work equipment;
- Personal protective equipment;

- Information, instruction, supervision and training;
- Emergency procedures and response;
- Further information on specialist training can be found in:
 - OSHJ-CoP-05: Electrical Safety at Work;
 - OSHJ-CoP-06: Management of Confined Spaces;
 - OSHJ-CoP-08: Safe Excavation.

Periodic refresher training shall be conducted to ensure employees competency is maintained, including but not limited to:

- Where training certification has expired;
- Where identified as part of a training needs analysis;
- Where risk assessment findings identify training as a measure to control risks;
- Where there is a change in legal requirements;
- Where incident investigation findings recommend refresher training.

The entity must record and maintain accurate training records of OSH training provided to employees.

Further information on training can be found in OSHJ-GL-26: Training and Competence.

7 Emergency Preparedness and Response

The entity should be prepared for emergencies that may occur during working on or near overhead or underground services. Due to increased risks from overhead and underground services, the entity needs to have a plan on what to do when an emergency occurs on how to respond to that emergency.

The entity shall ensure the following factors are considered in the emergency plan, including but not limited to:

- Providing a rapid and effective response for employees who have contacted energised power cables or overhead lines and have sustained an electric shock or burn injuries;
- Ensuring employees providing first aid response know what actions to take to reduce their own risk of an electric shock or burn injuries;
- Appointing emergency response personnel who can take charge and make decisions on behalf of the entity during an emergency and liaise with emergency services;
- Employees are trained in emergency response, including information of first aid arrangements and where first-aiders, first aid equipment and facilities are located;
- Employees are appointed as first-aiders and available at each location and on each working shift.

Further information on first aid can be found in OSHJ-CoP-16: First Aid at Work.

Further information on developing an emergency plan can be found in OSHJ-CoP-18: Emergency Preparedness and Response.

8 References

OSHJ-CoP-01: Risk Management and Control

OSHJ-CoP-05: Electrical Safety at Work

OSHJ-CoP-06: Management of Confined Spaces

OSHJ-CoP-08: Safe Excavation

OSHJ-CoP-16: First Aid at Work

OSHJ-CoP-18: Emergency Preparedness and Response

OSHJ-GL-16: Permit to Work

OSHJ-GL-24: Barricading

OSHJ-GL-26: Training and Competence

9 Document Amendment Record

TITLE	Overhead and Underground Services		
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1	15 SEP 2021	New Document	N/A