Code of Practice

on Working near Electricity Supply Lines

2018 Edition

EMSD

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on

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2018 Edition

Electrical and Mechanical Services Department
The Government of the Hong Kong Special Administrative Region

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Foreword

This Code of Practice ("Code") is approved by the Director of Electrical and Mechanical Services and issued in accordance with the provisions of Section 15 of the Electricity Supply Lines (Protection) Regulation ("ESLPR") made under the Electricity Ordinance (Cap.406) ("EO"). This version of Code takes effect on 29 December 2018, which supersedes all previous versions of the 'Code of Practice on Working near Electricity Supply Lines'.

The purpose of the Code is to provide practical guidance in respect of the requirements of the ESLPR to ensure that works carried out in the vicinity of underground electricity cables and overhead electricity lines do not prejudice safety or the continuity of the electricity supply. These requirements are more specifically defined in Sections 10(1) and (2) of ESLPR as follows:

"10. Requirements relating to works in the vicinity of electricity supply lines

(1) A person shall not -

(a) carry out or cause or permit another to carry out in the vicinity of an underground electricity cable any works which are below ground level; or

(b) carry out or cause or permit another to carry out in the vicinity of an overhead electricity line works of any kind,

unless before the works are begun all reasonable steps have been taken to ascertain the existence within the proposed works site and its vicinity of any such underground electricity cable and its alignment and depth or of any such overhead electricity line and its alignment, distance from the ground and voltage, as the case may be.

(2) A person who -

(a) carries out or causes or permits another to carry out in the vicinity of an underground electricity cable any works which are below ground level; or

(b) carries out or causes or permits another to carry out in the vicinity of an overhead electricity line works of any kind,

shall ensure that all reasonable measures are taken to prevent the occurrence of an electrical accident or an interruption to the supply of electricity arising from those works."

For works in the vicinity of an underground electricity cable, Section 10(3) of the ESLPR stipulates what can be regarded as reasonable steps having been taken to ascertain the existence of the underground electricity cable and its alignment and depth for the purpose of complying with Section 10(1)(a) of ESLPR.

Pursuant to Section 10(4) of the ESLPR, subject to the provisions Section 11(7) and 10(3) of the ESLPR, compliance with the provisions of the Code shall be deemed to constitute the taking of all reasonable steps, or all reasonable measures, for the purposes of the requirements of paragraph (a) or (b) of subsection (1) or (2) of Section 10 of the ESLPR, as the case may be. Although a failure on the part of any person to observe any provision of the Code shall not of itself render him liable to any civil or criminal proceedings, Section 16 of the ESLPR allows that any provision of the Code relevant to a requirement under the ESLPR alleged to have been contravened is admissible in evidence in criminal proceedings and a failure to observe such provision of the Code may be relied upon by the prosecution to establish contravention of the requirement under the ESLPR.

However, for a charge of contravening any requirement of Section 10(2)(a) or (b) of the ESLPR, Section 18 of the ESLPR provides for a defence to the charge if the person charged can show that (a) before the works began, all reasonable steps had been taken for the purposes of Section 10(1); and (b) any failure in the taking of all reasonable measures for the purposes of Section 10(2) was due to reliance on information contained in a report prepared by a competent person or on information provided by the electricity supplier who is the owner of the electricity supply line concerned.

1 Introduction

Incidents involving damage to electricity supply lines can have serious consequences for workers and adversely impact on the community. Various types of works have the potential to cause such damage but adequate precautions can dramatically reduce the risk of an incident. This Code outlines the dangers and provides guidance on how to reduce risk.

1.1 Background

1.1.1 **Damage to electricity supply lines** can cause **electrical accidents**[1] and **electricity supply interruptions.** Fatal accidents and serious injuries have occurred during excavation close to underground electricity cables and during lifting operations by cranes or hoists near overhead electricity lines. In addition, damage may also cause an electricity supply interruption that could potentially affect thousands of homes and businesses.

1.1.2 This Code outlines the **dangers** that can arise from works near underground electricity cables ("U/G cables") or overhead electricity lines ("O/H lines") and gives guidance on how to **reduce the risk**. It deals specifically with risks to persons carrying out works and the necessary precautions needed to reduce the risk of accidents due to damage and unsafe practices.

1.1.3 During the preparation of this Code, the Director of Electrical and Mechanical Services ("the Director") consulted the electricity suppliers, the construction industry, the other utility companies and relevant Government Departments. The **views and advices** given by these organizations have been taken into account in this Code wherever possible.

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[1] Electrical accident means an incident involving electricity that causes a fire or explosion or that causes death or injury to a person (Section 2 of Electricity Ordinance).

1.2 Scope

1.2.1 **This Code applies to all works** carried out in the works site or in its vicinity where U/G cables or O/H lines may be found. In addition to a safe system of work, it provides practical safety precautions to avoid damage to electricity supply lines in different situations, including works that involve excavation, ground penetration, lifting operations by cranes or hoists, and earth moving operations by heavy machinery.

1.2.2 The term "works" is defined in the ESLPR and this definition is also included under Section 1.3.1.7 of this Code. However, the following **works need not follow** the safe system of work set out in this Code unless probable damage to U/G cables is seen:

(a) the milling of paved surface up to 120mm below ground level in carriageways for the purpose of road resurfacing; and

(b) the replacement of existing paving block up to 120mm below ground level.

Moreover, this Code does not apply to dredging works and extraction of material from the seabed.

1.2.3 **This Code is intended to be used by** all those who have responsibilities under relevant legislation, including employers, employees, contractors[2], competent persons, electricity suppliers and those concerned with planning, designing, organizing, supervising and carrying out works near U/G cables or O/H lines. Those who wish to carry out their works in some other ways than that provided in this Code must ensure that they achieve an equal or higher standard of safety.

[2] Contractor, in relation to works, means any person or site personnel engaged in carrying out works by way of trade or business, either on his own account or pursuant to a contract or arrangement entered into with another person including the Government or any public body.

1.3 Definitions

1.3.1 This Code adopts the following definitions from the EO and ESLPR:

1.3.1.1 "competent person" means a person approved as a competent person[3a] under Section 3 of ESLPR.

1.3.1.2 "electricity supplier" means a person who generates, supplies and sells electricity at low or high voltage[3b] for use in an electrical installation[3c].

1.3.1.3 "electricity supply line" means an electric line or any cable used in conjunction with such a line for the purpose of transmitting control signals, which is owned by an electricity supplier.

1.3.1.4 "overhead electricity line" (O/H line) means an electricity supply line located at or above ground level.

1.3.1.5 "site contractor" means a person who carries out or is engaged to carry out any works on a particular works site.

1.3.1.6 "underground electricity cable" (U/G cable) means an electricity supply line located below ground level.

[3a] Under Section 6 of ESLPR, a person's approval as a competent person may be suspended or revoked by the Director in accordance with subsection (1) or (2) respectively.

[3b] Under Section 2 of the EO, "low voltage" means voltage normally exceeding extra low voltage but normally not exceeding –

(a) between conductors, 1000V root mean square alternating current or 1500V direct current ; or
(b) between a conductor and earth, 600V root mean square alternating current or 900V direct current.

Under Section 2 of the EO, "high voltage" means voltage normally exceeding low voltage.

[3c] Under Section 2 of the EO, "electricity installation" means an assembly of associated electrical equipment.

1.3.1.7 "works" means -

(a) any kind of works involving or in connection with –

(i) building works within the meaning assigned to that term in Section 2(1) of the Buildings Ordinance (Cap.123)[4a], and for the purposes of this subparagraph reference in that Section to "ground investigation in the scheduled areas" shall be read as a reference to "ground investigation";

(ii) the laying out, construction, alteration or repair of any road (whether or not at ground level), footpath, cycle track, pedestrian subway, footbridge, tunnel, airport runway, canal, reservoir, pipeline, railway or tramway;

(iii) trench works, including -

(A) water mains, storm water drains and sewers; and

(B) such works when carried out by or for any public utility;

(iv) the extraction of material from land or the seabed;

(v) landfill works, river training works, slope works or reclamation works; or

(vi) levelling, piling, ramming, dredging, boring, tunnelling or blasting works;

(b) the use of any crane or hoist (within the meaning assigned to those terms in Regulation 2(1) of the Construction Sites (Safety) Regulations (Cap.59 sub.leg.I)) or other equipment for the purpose of lifting objects;

[4a] According to Section 2(1) of the Building Ordinance (Cap.123) "building works" includes any kind of building construction, site formation works, ground investigation in the scheduled areas, foundation works, repairs, demolition, alteration, addition and every kind of building operation, and includes drainage works.

(c) the use of any heavy machinery or other equipment for the purpose of earth moving, but does not include works necessary to ascertain the alignment and depth of an underground electricity cable, nor any electrical work carried out by a registered electrical worker[4b] or registered electrical contractor[4c].

1.3.1.8 "works site" means any area in which works are being carried out.

1.3.2 The following terminologies are used in this Code:

1.3.2.1 "hand tool" means a non-mechanized tool designed for operation by hand including, but is not limited to spades, shovels, picks or forks.

1.3.2.2 "hand-held power tool" means a hand-held mechanized tool designed for operation that utilizes electrical or pneumatic power.

1.3.2.3 "minor shallow excavation" means an excavation not greater than 2 sq. m in area and 450mm in depth and dug using hand tools with the exception that hand-held power tools can be used to break the paved surface up to a depth of 150mm in a footpath or 450mm in a carriageway and, in both cases, with at least 250mm clearance from any cable alignment.

1.3.2.4 "trial hole" means an excavation for exposing part of the target cable, carried out under the supervision of a competent person at the point of works where the site personnel use hand tools for digging with the exception that hand-held power tools can be used to break the paved surface up to a depth of 150mm in a footpath or 600mm in a carriageway and, in both cases, with at least 250mm clearance from any cable alignment.

[4b] Under Section 2 of the EO, "registered electrical worker" means an electrical worker registered under section 30.

[4c] Under Section 2 of the EO, "registered electrical contractor" means an electrical contractor registered under section 33.

1.3.2.5 "**works in the vicinity of U/G cables**" are defined in Table 1.1.

Table 1.1 - Works below ground level in the vicinity of U/G cables

Type of works below ground level	Distance[5]
Trench or other excavation works in stable ground conditions up to 1.5 metres in depth	3 metres
Trench or other excavation works in stable ground conditions over 1.5 metres and up to 5 metres in depth	5 metres
Trench or other excavation works in stable ground conditions over 5 metres in depth	10 metres
Vertical, horizontal or inclined penetration including sheet piling, ground investigation and any kind of drilling or core sampling or ramming – either by hand tools, hand-held power tools or machines	3 metres
Welding or other hot works near exposed U/G cables	10 metres
H-Piling, percussion moling or pipe jacking	15 metres
Any form of tunnelling, boring, construction of caverns, driving headings, cable jacking	always consult electricity supplier
Use of explosives	60 metres

1.3.2.6 "**works in the vicinity of overhead lines**" means any works, except for blasting works, found within a horizontal distance of 9m from the outermost conductor of an O/H line (Fig 1.1). For blasting works, they are considered as works in the vicinity of O/H lines if any blasting point is within a horizontal distance of 25m from the nearest conductor of an O/H line or radial distance of 50m from the centre of any O/H line footing.

[5] Measurement is taken from the centre line of the U/G cable to determine whether works will be considered to be in its vicinity.

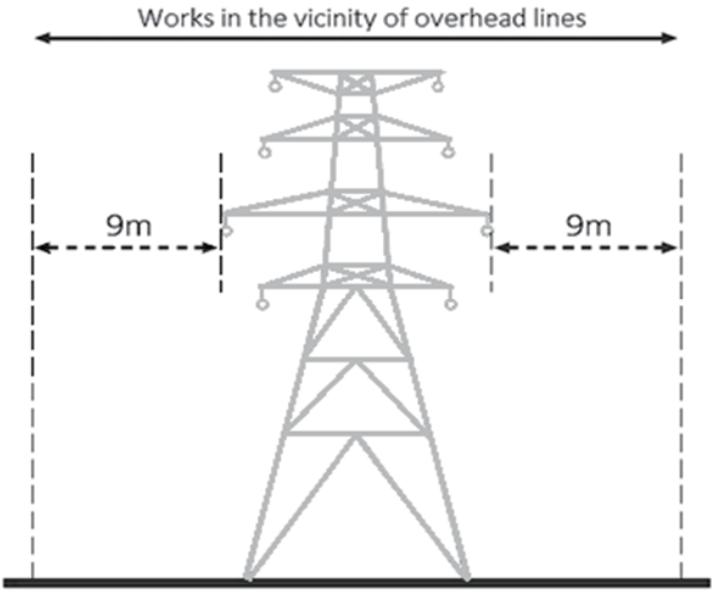

Fig 1.1 - Works in the vicinity of overhead lines (except blasting works)

1.3.2.7 "working party" means any person, including contractor, site contractor and site personnel, concerned with planning, designing, organizing, supervising and carrying out works near U/G cables or O/H lines.

1.4 The dangers associated with damage to U/G cables and O/H lines

1.4.1 **Damage to U/G cables** can cause fatalities or severe injuries and electricity supply interruptions. There are three common types of damage to U/G cables:

(a) **Damage due to penetration by a sharp object up to the cable conductor.** This will immediately cause an explosive arcing current and a short-circuit fault on the U/G cable.

(b) **Damage due to penetration by a sharp object up to the cable insulation.** While this may not cause immediate danger, it constitutes a potential hazard and could result in an electrical fault later as the damaged insulation deteriorates.

(c) **Damage due to mechanical stress in the U/G cable.** Mechanical stress often occurs when a long section of U/G cable is overhanging without proper support or when the earthworks fall onto an exposed U/G cable. This stress is transmitted to the nearest cable joint, where an electrical fault may subsequently develop.

1.4.2 **Damage to the control cables** associated with U/G cables could trip major cable circuits and cause electricity supply interruptions.

1.4.3 **Other services**, such as plastic gas pipes, may also be at risk if they are near to damaged live U/G cables. If the gas main leaks at the same time, the damage could cause a gas explosion which imposes a higher risk to the persons in the surrounding.

1.4.4 **Getting close to O/H lines**, or coming into contact with them, is highly dangerous and may result in fatalities, severe injuries, shocks or burns to any persons in the vicinity due to an electrical explosion or arcing from the O/H lines. The instantaneous short circuiting of high voltage O/H lines to the ground, following damage or interference by an overhead crane, can cause a voltage surge on the ground potential. Any persons on the ground in the vicinity may suffer electric shock, and any electrical products in nearby houses may burn out.

1.5 Electricity supply in Hong Kong

1.5.1 Electricity supply lines used for the transmission and distribution of electricity are scattered throughout Hong Kong Island, the Outlying Islands, Kowloon and the New Territories. Currently there are two electricity suppliers in Hong Kong, namely, **CLP Power Hong Kong Ltd. (CLP) and The Hongkong Electric Co., Ltd. (HEC)**. Both CLP and HEC own and operate extensive electricity supply systems at various voltage levels. Consumers in Hong Kong Island, Lamma Island and Apleichau are supplied by HEC while CLP supplies electricity to consumers in the rest of Hong Kong Special Administrative Region ("HKSAR"). The electricity supply systems operated by CLP and HEC are outlined in Appendix 3. The typical colours, sizes and buried depths of CLP's and HEC's U/G cables are given in Table A3.1 of Appendix 3.

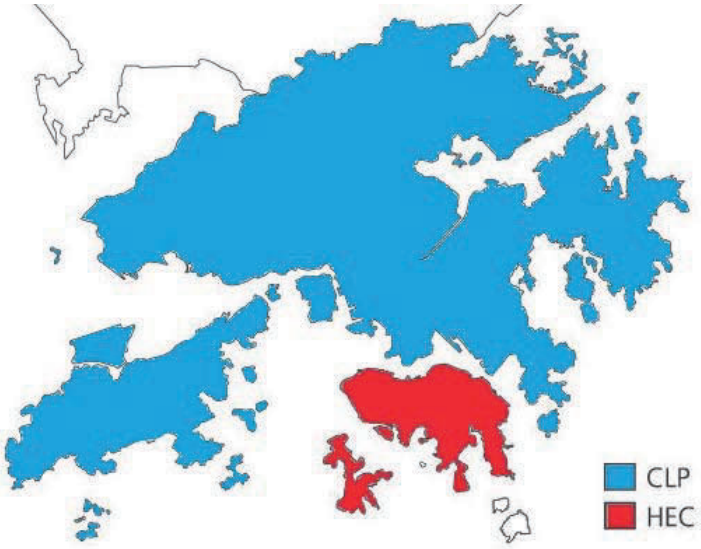

Fig 1.2 - Demarcation of electricity supply systems between CLP and HEC

2 Safe System of Work

A safe system of work protects those working in the vicinity of electricity supply lines. The working party who requires to work in the vicinity of electricity supply lines is responsible for executing the safe system of work. In carrying out the works, the working party shall, in accordance with the relevant legislation and guidelines, adopt appropriate safety measures to avoid accidents.

2.1 The working party's safe system of work

2.1.1 **The working party**[6] is responsible for ensuring that those working in the vicinity of electricity supply lines adhere to a safe system of work. This safe system of work has two key elements: reasonable steps and reasonable measures.

2.1.2 **Before commencement of works in the vicinity of U/G cables**, the working party shall take all reasonable steps to ensure safety, which include obtaining cable plan from electricity supplier, appointing a competent person for cable detection work and ensuring that personnel at the works site are fully aware of the details of the U/G cables.

2.1.3 **Before commencement of works in the vicinity of O/H lines**, the working party shall take all reasonable steps to ensure safety, which include planning the works, consulting the electricity supplier and ensuring that personnel at the works site and the appointed signaller fully understand all necessary safety precautions to be taken.

2.1.4 **In the course of works** in the vicinity of electricity supply lines, the working party shall adopt the reasonable measures appropriate to the nature of the works.

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6 See Definition in Section 1.3.2.7

2.1.5 **The safe system of work**, together with the safety guidelines on handling accidents or emergencies, shall be effectively communicated to all persons likely to be engaged in the works in the vicinity of electricity supply lines.

2.2 Electricity supplier's responsibility

2.2.1 The electricity supplier[7] shall:

(a) **accurately record** the as-built alignments of its electricity supply lines and maintain the accuracy of such records as long as the supply lines remain underground or overhead; and

(b) provide the working party with the most updated **U/G cable plan or O/H line drawing** upon request within the agreed time frame.

2.2.2 The electricity supplier accepts the need for **close co-operation** with those who carry out works in the vicinity of electricity supply lines. According to the nature of the works, the electricity supplier shall attend site meetings and provide safety advice to the working party as necessary. When electricity supplier believes that the electricity supply lines may be susceptible to damage, the working party shall take additional safety precautionary measures against the cable damage, and report to the Director. An arrangement of additional site patrol is required when electricity supplier believes that it is necessary to monitor the electricity supply lines so as to prevent them from being susceptible to damage.

[7] See Definition in Section 1.3.1.2

2.3 Competent person's responsibility

2.3.1 A competent person[8] shall:

(a) coordinate with the working party to undertake an **investigation** to ascertain the existence of any U/G cable within the proposed works site and its vicinity, and to determine its alignment and depth; and

(b) provide the working party with a **Competent Person Written Report** and give a briefing on it as required by the working party.

2.3.2 The competent person **shall not delegate** the function and duty of the investigation to another person.

2.3.3 The competent person shall **seek assistance** from the electricity supplier if he encounters genuine difficulty in locating the U/G cables.

[8] See Definition in Section 1.3.1.1

3 Reasonable Steps for Working near Underground Electricity Cables

The reasonable steps to a safe system of work for works near U/G cables begin at the design stage and involve the early participation of the electricity supplier. Once cable plans have been received from the supplier, a competent person is appointed to detect the alignment of the U/G cables and propose trial hole locations. Working closely with site personnel, the competent person helps[9] to open trial holes and expose cables to allow their alignment and depth to be accurately ascertained by means of toroidal active detection. He then prepares the "Competent Person Written Report" and clearly marks up cable alignment and depth on site. In an emergency involves works in the vicinity of underground electricity cables, the working party should refer to Section 3.5.

3.1 Plans from electricity supplier

3.1.1 The working party shall approach electricity supplier for information and cable plans **before any works begin**, except for works which involve only minor shallow excavation[10]. In case of minor shallow excavation works, the working party shall appoint a competent person to carry out cable detection work.

3.1.2 An **early approach to the electricity supplier** is particularly recommended for a major project involving large scale construction or horizontal drilling or tunnelling. Consideration should be given at the design stage, as early as the feasibility study, to planning works away from the vicinity of existing U/G cables. If a major diversion of U/G cables is necessary, the electricity supplier may require a long lead time to plan and complete the diversion.

3.1.3 The request for information made to the electricity supplier should include a **full description** of the scope and, where appropriate, the nature of the proposed works. The electricity supplier can then identify the area

9 See details in Section 3.3 Trial holes (exposing cable and active detection).

10 See definition in Section 1.3.2.3

over which it considers its U/G cables may be affected and provide all available records of U/G cables in the vicinity.

3.1.4 Upon receiving written notice of proposed works from a working party, the electricity supplier shall without charge provide the cable plans of the proposed works site or its vicinity **within 14 working days** or such period as is mutually agreed between the concerned parties.

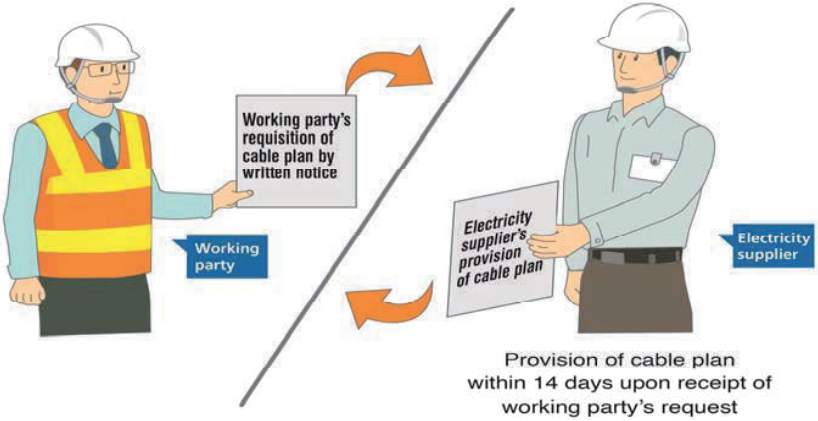

Fig 3.1 - Requisition and provision of cable plan

3.1.5 The date of commencement of the time period stipulated above (in 3.1.4) is the date upon which the electricity supplier received and date-stamped the notice. Notices shall be immediately date-stamped when they are received by the electricity supplier and retained for a minimum of five years. The working party may request, in the notice, an acknowledgment of its receipt, stating the date upon which it was received.

3.1.6 The working party shall consult or request new cable plans from the electricity supplier **14 working days before commencement of works**, if the plans in hand have been provided for more than three months. After commencement of works, if the working party has overall control of the works site until completion of the works, the requisition of new cable plans is not necessary unless the working party has given access to the electricity supplier for laying new cables.

3.1.7 **The cable plans**[11] provided by the electricity supplier shall be of suitable scale sufficient for the working party to identify the following cable information:

(a) number of cables including abandoned cables;

(b) their respective voltage rating and size;

(c) their alignment, with dimensions making reference to appropriate reference points; and

(d) any shallow cover locations (i.e. cables with buried depth less than 900 mm in a carriageway or 450 mm in other areas), to the best of the electricity supplier's knowledge.

The electricity supplier should provide cable plans for different voltage levels upon request by the working party as appropriate.

3.1.8 Cable plans provided by the electricity supplier provide a good indication of the presence and alignment of U/G cables at a particular site, and will help subsequent cable detection. However, it should be noted that **the accuracy of plans cannot be relied upon fully** because:

(a) the position of reference points (e.g. the kerb or building line) may have been moved since the plans were drawn;

(b) regrading or resurfacing of the road may mean that the depth shown, if provided, are now incorrect;

(c) U/G cables may have been moved without the authorization or knowledge of the electricity supplier;

(d) U/G cables, marked as straight lines may not, in practice, run in a straight alignment; and

[11] Information on depth of U/G cable is not generally available in the electricity supplier's cable plans. Normally the electricity suppliers install new cables according to the buried depth shown in Table A3.1 of Appendix 3.

(e) the level and alignment of U/G cables may change sharply over a short distance due to the presence of underground obstructions.

3.2 Locating U/G cable alignment (passive detection)

3.2.1 The working party shall decide whether the works site is within the vicinity of U/G cables in accordance with the distance specified in Table 1.1 (i.e. Section 1.3.2.5). If the cable plans supplied by the electricity supplier indicate that there are U/G cables within the works site and/or the area of the specified distance from the works site, the working party shall **appoint a competent person** to carry out the cable detection work.

3.2.2 Before the cable detection takes place, the competent person shall be provided with **electricity supplier's cable plans and works site drawings**. The cable detection device to be used by the competent person shall be non-destructive and calibrated as per the manufacturer's requirements. In the course of cable detection, the competent person shall repeatedly refer to the cable plans to pinpoint as accurately as possible the alignment of any U/G cables.

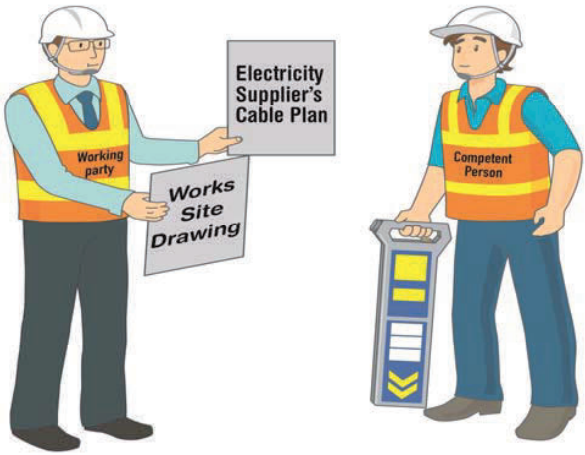

Fig 3.2 - Appointment of competent person by the working party to carry out cable detection work

3.2.3 Under normal conditions, the competent person should select the **50Hz passive detection mode** of the cable detection device for alignment detection. The larger the 50Hz unbalanced current (i.e. the vector sum of the currents in phase conductors is not zero) flowing in the cable gives a stronger signal, allowing the competent person to locate the most probable alignment of each U/G cable. However, depth measurement from this detection mode is not accurate and should not be relied upon.

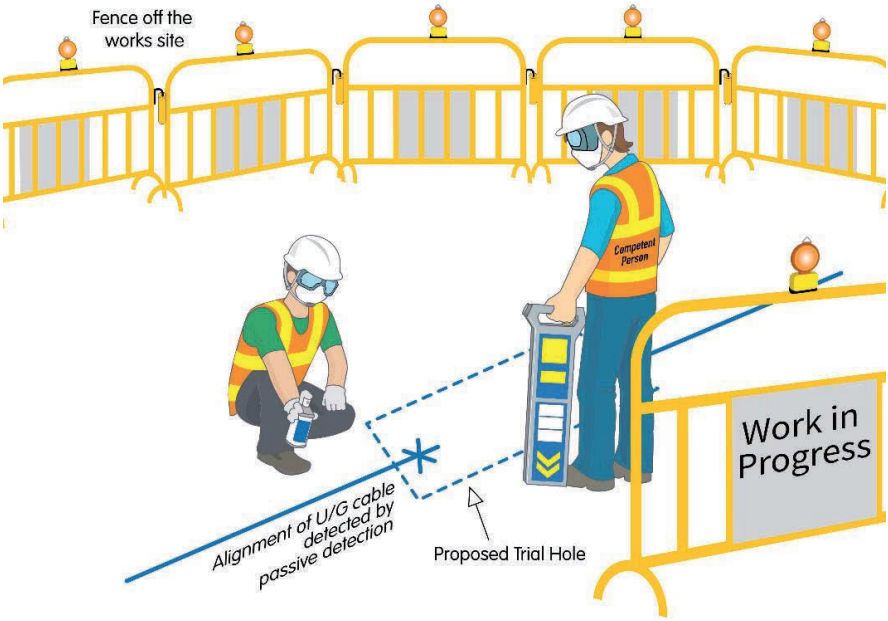

Fig 3.3 - Passive detection

3.2.4 It should be noted that 50Hz passive detection cannot detect the existence of de-energized U/G cables, energized U/G cables with no load and current-balanced U/G cables. **If the cable alignment cannot be detected** by means of 50Hz passive detection, the competent person can switch to the following alternative detections:

(a) **Radio frequency passive detection** – Another passive mode selected at the cable detection device, this method provides less definite alignment detection than 50Hz passive

detection because other utilities with metallic objects may also re-emit the radio frequency signal.

(b) **Inductive detection** – This detection mode requires the use of a signal generator (the transmitter) and a separate receiver. This method can only be used when certain part of the U/G cable alignment is accurately known so that the transmitter can be properly positioned right above it. It should be noted that the accuracy of this method is very much affected by other utilities with metallic objects close to the target cable.

3.2.5 The competent person should be able to detect the most probable alignment of the U/G cables identified on the cable plans if the current-carrying cables are properly laid out with an adequate horizontal clearance. However, if the U/G cables are very close to each other or crossing each other or laid in different layers (e.g. cables in the same alignment but at different depths), the competent person will not be able to detect the most probable alignment for each U/G cable. Instead, he can locate a **peak signal for the group of U/G cables** and record its alignment and note the number and voltage level of the cables that it may represent.

3.2.6 The competent person is required to note in writing the existence of any U/G cable at the works site or its vicinity and any identified U/G cable alignment. Upon completion of passive cable detection, the competent person shall prepare a proper record form. This form should make reference to the format of the sample form at Appendix 4 and shall bear the heading **"Cable Alignment Record"** and include the following details:

(a) name and approval number of competent person;

(b) name of the site contractor or other working party;

(c) location, date and time for which the work on locating the U/G cable alignment was carried out;

(d) U/G cable alignment (for each U/G cable or for each group of cables) based on common reference points (e.g. lamp pole, traffic light post or hydrant, etc.)

(e) brand name, model number, serial number, calibration record and mode of operation of the U/G cable detection device used for the detection;

(f) proposed trial hole locations; and

(g) photos showing site markings for cable alignment and proposed trial hole locations.

At the time of submission of the Cable Alignment Record to the working party appointing him, the competent person should remind the working party if active cable detection is not yet completed to ascertain the depth and alignment of the U/G cables.

3.2.7 The competent person shall **propose trial hole locations** according to the detected alignment or, in case the alignment cannot be located due to de-energized or current-balanced cables, by referring to the electricity supplier's cable plans. The proposed locations at appropriate intervals shall be, as far as practicable, convenient for the working party to expose as many U/G cables as possible for the purpose of toroidal active detection as described in Section 3.3.1 (b).

3.2.8 The competent person is responsible for **marking the alignment** at the location and its vicinity where the trial hole is to be opened. This marking should be done with waterproof crayon, paint or self-adhesive temporary road marking tapes on paved surfaces, or with wooden pegs in grass or unpaved areas.

3.2.9 The competent person should **brief the working party** on the content of the cable alignment record, with particular reference to the locations of the proposed trial hole opening and the number of target U/G cables to be exposed.

3.2.10 In case of a minor shallow excavation, the working party shall appoint a competent person to carry out cable detection work. The competent person shall be personally on site for direct supervision of cable detection works and mark the cable alignment, if any, within and in the

vicinity of the works site and submit the Cable Alignment Record to the working party appointing him.

3.3 Trial holes (exposing cable and active detection)

3.3.1 The working party shall proceed with the following reasonable steps except for works which involve only minor shallow excavation:

(a) **Trial hole Excavation – Great caution has to be exercised when exposing the target U/G cable.** The excavation of the trial hole shall be supervised by the competent person personally on site until the target cable is exposed or the excavation work of trial hole is completed. The competent person should repeatedly use a cable detection device and frequently update the site personnel as to the most accurate cable location until the target cable is exposed. The site personnel shall only use hand tools for digging. Hand-held power tools can only be used to break the paved surface up to a depth of 150mm in a footpath or 600mm in a carriageway and, in both cases, with at least 250mm clearance from any cable alignment. Mechanical excavators and other machinery (with the exception that hand-held power tools for breaking the paved surface) shall not be used for trial hole excavation. The working party should avoid digging trial hole inside a manhole. As a general reminder, the working party is reminded that in carrying out the works, apart from ESLPR, there may be other legislation and guidelines which the working party is required to comply with, and appropriate safety measures should be adopted in accordance with the relevant legislation and guidelines to avoid accidents.

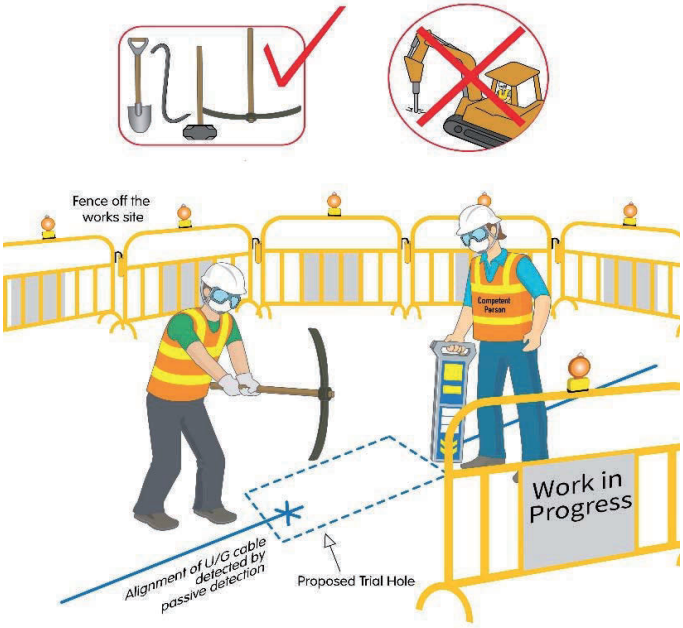

Fig 3.4 - Trial hole Excavation (Step 1)

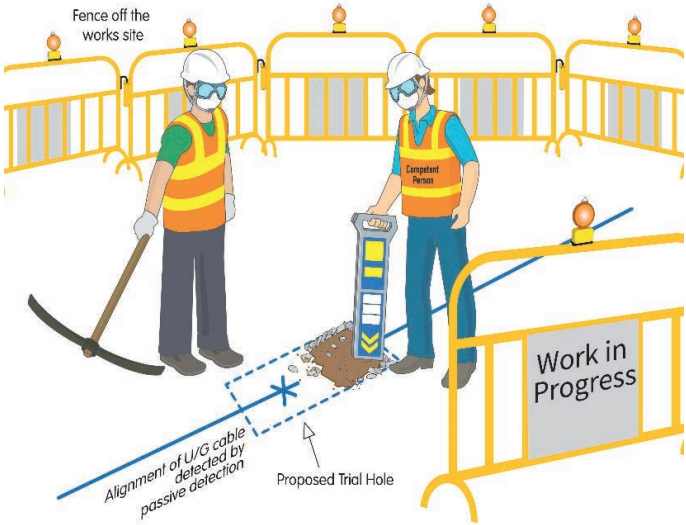

Fig 3.5 - Trial hole Excavation (Step 2)

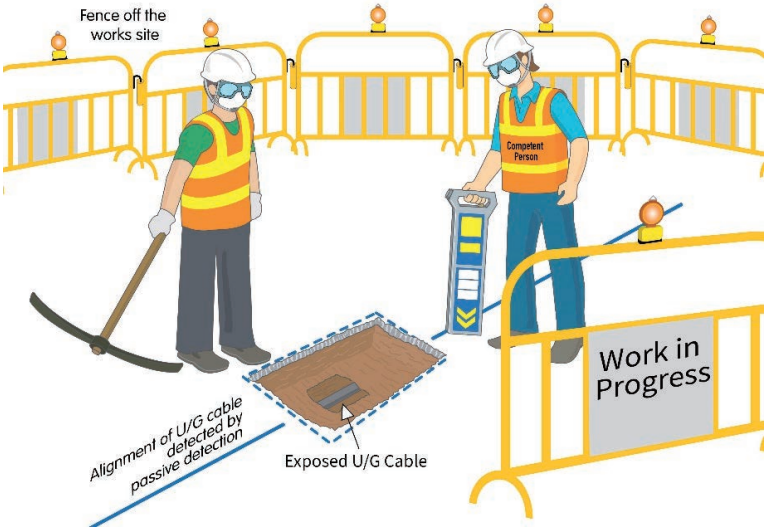

Fig 3.6 - Trial hole Excavation (Step 3)

(b) **Toroidal active detection** - The target cable inside the trial hole is adequately exposed so as to permit the competent person to place a **signal clamp** around it. A known high frequency signal is injected into the cable by electromagnetic induction through the signal clamp. As only the target cable carries this high frequency signal, the competent person can use a receiver selected to this signal frequency to detect at appropriate interval (say, 1-3m) the alignment and depth of the unexposed part of the target U/G cable, starting from the trial hole. For U/G cable of voltage 132kV or above, electricity supplier shall be consulted before excavating the trial hole and toroidal active detection work.

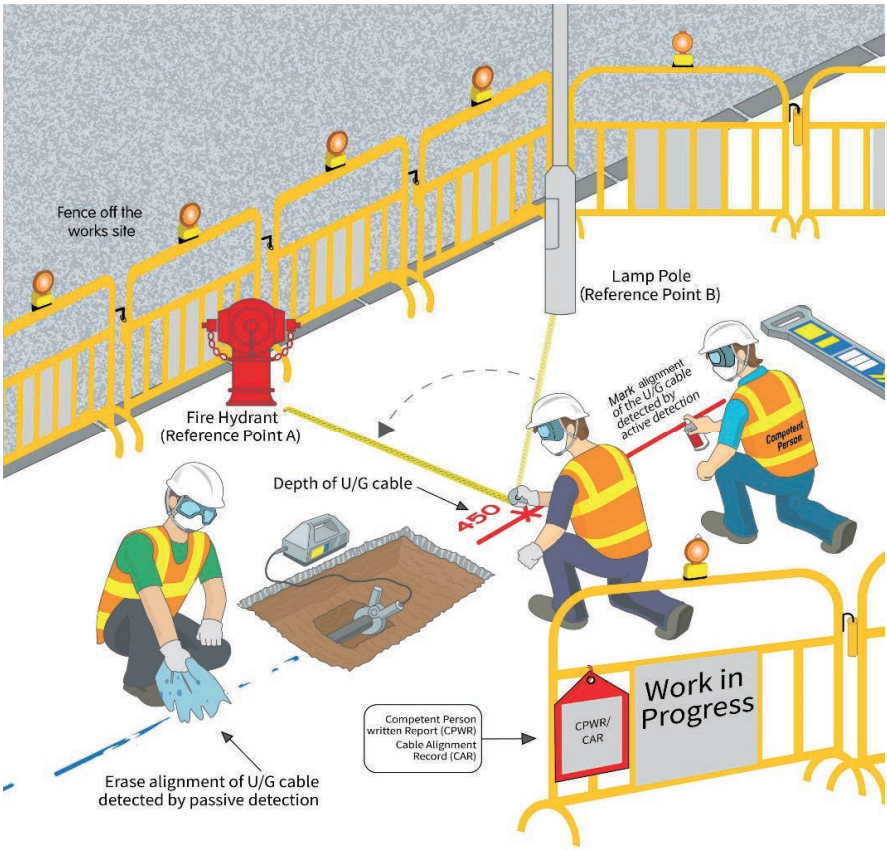

Fig 3.7 - Toroidal active detection

3.3.2 Trial hole excavation shall be carried out when:

(a) the alignment of any **U/G cable detected by passive detection is located** within the works site and/or within the area 500mm away from the boundary of the works site; or

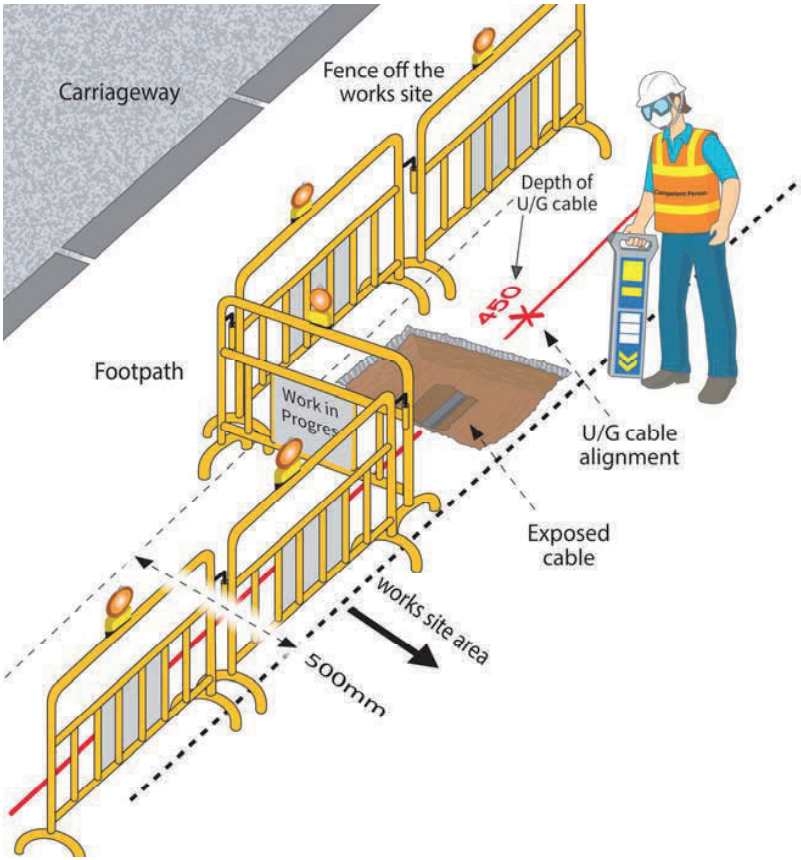

Fig 3.8 - Alignment of U/G cable

(b) the alignment of any peak signals for **a group of U/G cables detected by passive detection is located** within the works site and/or within the area 3m away from the boundary of the works site.

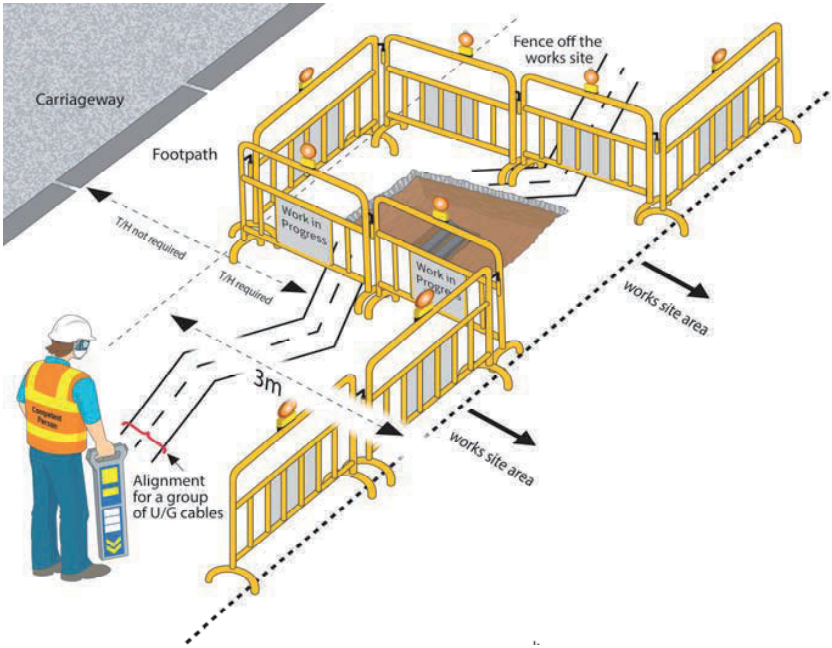

Fig 3.9 - Alignment of peak signals for a group of U/G cables

3.3.3 As to 3.3.2 (b), if the alignment of the peak signals is located between the area 500mm and 3m away from the works site and it is **not practicable to open trial hole** within that area (e.g. the works site is at a footpath whereas the alignment is located at a carriageway), the competent person should propose the following:

(a) open a number of trial holes along the boundary of the works site opposite the alignment of the peak signals. The competent person shall determine the size, depth and number of trial holes based on the alignment, the type and the number of cables within the group. In principle, the closer the alignment and/or the greater the number of cables within the group, the more trial holes will be required.

(b) The trial holes should be proposed at the locations where the peak signals are closest to the works site.

(c) The trial hole should be excavated at a right angle to the alignment and extended 500mm away from the works site.

(d) The alignment and depth of any cables found in the trial holes shall be ascertained by means of toroidal active detection.

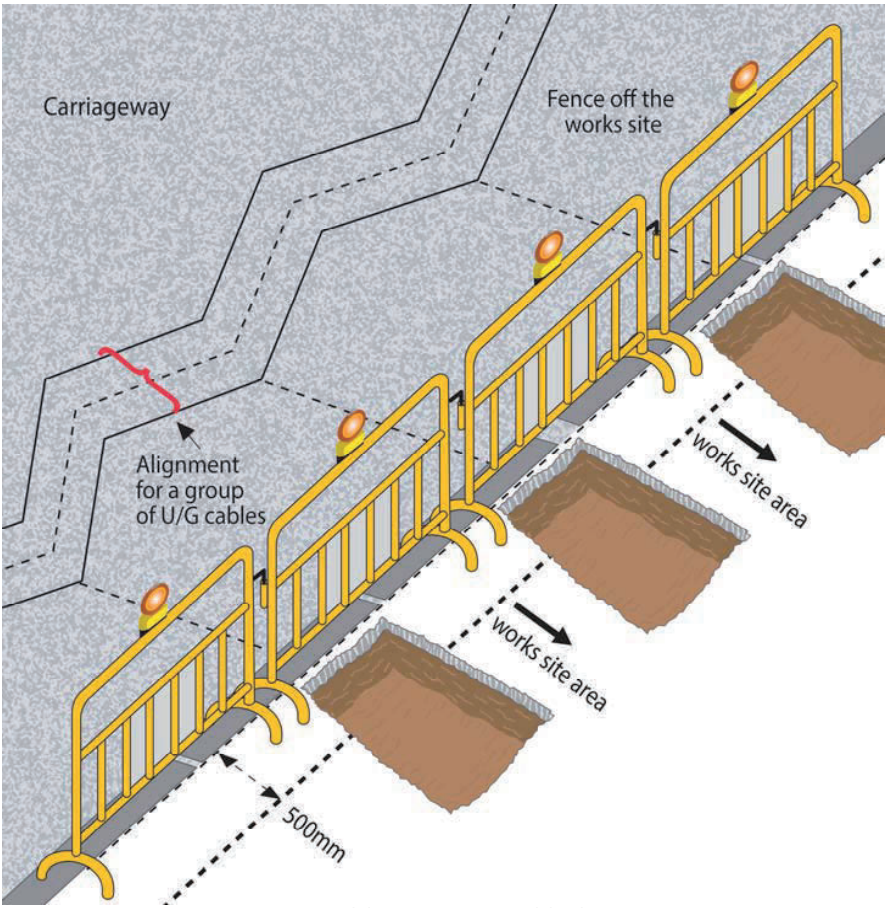

Fig 3.10 - Not practicable to open trial hole at a carriageway

3.3.4 Before commencing trial hole excavation, the working party shall **inform the electricity supplier** of the nature of the intended works if:

(a) the target cables are of voltage 132kV or above; or

(b) the works involve trenchless excavation or horizontal drilling such as tunnelling, percussion moling, pipe jacking and soil nailing, etc.

The electricity supplier may deem the excavation of a trial hole unnecessary if the works involved are below ground level, where U/G cables would not be affected or where U/G cables do not exist. Any agreement between the electricity supplier and the working party shall be properly signed and recorded for inspection upon request by EMSD.

3.3.5 **If the works site is not large but heavily congested** with many U/G cables and/or other utilities (e.g. in a rear lane), working party should consider conducting risk assessment and adopting reasonable precautionary measures accordingly, and the competent person should, apart from supervising the excavation of the trial hole as required in Section 3.3.1(a) above, consider also supervising the excavation until all U/G cables are exposed within the works site.

3.3.6 **If the competent person encounters genuine difficulty** in locating the U/G cables shown in the electricity supplier's plans, he shall seek necessary assistance from the electricity supplier. The electricity supplier shall provide advice on reasonable alternatives to help the competent person locating the cables and/or send technical staff to the site, not more than three working days after receipt of the request, to assist with locating U/G cables as necessary without charge.

3.3.7 Should there be any doubt regarding **discrepancies between the cable detection results and the electricity supplier's cable plans**, the competent person shall repeat the cable detection and/or contact electricity supplier for clarification on site.

3.4 Competent person written report

3.4.1 Upon completion of active cable detection, the competent person shall prepare a proper record for submission to the working party appointing him. Reference should be made to Appendix 5 for the format of such record and the record shall bear the heading **"Competent Person Written Report"** and include the following details:

Fig 3.11 - Submission of "Competent Person Written Report"

(a) name and approval number of competent person;

(b) name of the site contractor or other working party;

(c) location, date and time for which the active detection was carried out;

(d) the cable layout plan detailing the alignment of each U/G cable based on common reference points (e.g. lamp pole, traffic light post, or hydrant, etc.) and any cable sections in shallow depth;

(Note: a **cable alignment band** can be used to represent a group of U/G cables of which the ascertained alignment are very close to each other. The alignment and size of the band shall be dimensioned and the number of U/G cables that the band represents shall be specified.)

(e) depth profile of each U/G cable (i.e. cable depth corresponding to each measurement point along the cable alignment);

(f) voltage level of each U/G cable;

(g) electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans, if any;

(h) photos showing the toroidal active detection and site markings for cable alignment and depth; and

(i) brand name, model number, serial number, calibration record and the adopted frequency of the U/G cable detection device used for the detection.

3.4.2 The relevant working party (for example, the main contractor, sub-contractor, site contractor, etc.) shall provide the site personnel concerned with a copy of the Competent Person Written Report. In addition, the working party should arrange **a site briefing** given by the competent person to ensure that the site personnel, such as the operators of excavator/machine and workers engaged in excavation work, are conversant with the contents of the Report, including the meanings of markings at site, and aware of the potential danger as a result of cable damage and the required safety precautions. The competent person should clearly record attendance of the site personnel participated in the site briefing in the Competent Person Written Report for record purpose.

Fig 3.12 - Conduct site briefing to site personnel

3.4.3 The working party should keep a copy of Cable Alignment Record, and Competent Person Written Report on site and **make available the relevant document for inspection, upon request by the Director** until the works are completed without occurrence of any cable damage. The Cable Alignment Record/Competent Person Written Report should be posted on the barrier or railing on the site.

3.4.4 **The competent person is responsible for marking the alignment and depth of all U/G cables** with waterproof crayon, paint or self-adhesive temporary road marking tapes on paved surfaces or with wooden pegs in grass or unpaved areas. Steel pins, spikes or long pegs, which could damage U/G cables laid at shallow depth, must not be used. Any section of the U/G cable with a sudden reduction of buried depth shall be clearly marked along the alignment.

3.4.5 The working party shall ensure that the markings (both alignment and depth) identified by the competent person are available at site before the commencement of works. To avoid confusion to drivers, markings in carriageways should only be laid after the area is fenced off from traffic. Such markings should be completely removed before the area is re-opened to traffic.

3.4.6 After the removal of road surface or pavement cover, if further works are required at the concerned working area, the working party should re-paint/ retain cable markings in accordance with the Competent Person Written Report, so as to alert the engaged site personnel, such as the operators of excavator/ machine and workers, on the alignment and depth of U/G cables.

3.4.7 After completion of works, the working party should erase any residual markings on paved surfaces and not deface any road marking.

3.5 Emergency situation

3.5.1 In an emergency involving works in the vicinity of electricity supply lines, the working party shall contact the 24-hour emergency service of the electricity supplier by telephone. The electricity supplier shall provide immediate advice as far as practicable by telephone, facsimile or other electronic means. In addition, if the electricity supplier is aware of an imminent danger arising from the electricity supply lines, emergency personnel shall be immediately despatched to the site. The contact information of the two electricity suppliers can be found in Appendix 3 of this Code.

3.5.2 The electricity supplier shall provide cable plans/alignment drawings and safety advice to the working party at site. In case of works in the vicinity of U/G cables, the working party shall arrange a competent person to ascertain the position of the U/G cables by conducting passive detection before commencement of works. In an emergency situation, the electricity supplier shall offer assistance to the working party.

4 Reasonable Measures for Working near Underground Electricity Cables

The reasonable measures to a safe system of work for excavation works near U/G cables encompass the safe use of tools, protections of exposed U/G cable and safe backfilling practices and include safe working practices for different excavation methods (hand-held power tool, mechanical excavators, trenchless methods, horizontal drilling, vertical, horizontal or inclined penetration, use of explosives, H-piling) or where welding is to be carried out. In an emergency involves works in the vicinity of underground electricity cables, the working party should refer to Section 4.7.

4.1 Safe working practices for different types of excavation

4.1.1 The following general requirements shall be followed:

(a) Other than minor shallow excavation, the electricity supplier shall be informed before commencing any excavation in the vicinity of **U/G cables of voltage 132kV or above**. The working party should also provide method statement detailing the working method, plants employed and the safety precautionary measures required to the electricity supplier before commencement of works; and

(b) The site personnel, such as the operators of excavator/ machine and workers engaged in excavation work, should always refer to the **Competent Person Written Report** in the course of excavation, and be vigilant for signs, alignment and depth of U/G cables.

4.1.2 As the position of excavation by mechanical excavators and hand-held power tools cannot be precisely controlled in practice, **adequate minimum safe working distance shall be maintained** between any U/G cable and the point where the equipment is used:

(a) **Hand-held power tools** – 500mm in any direction from any U/G cable, except when breaking out paved concrete surface where a horizontal safe working distance of 250mm is required;

(b) **Mechanical excavators and others** – 1m in any direction, for U/G cables of voltage below 132 kV and 3m for voltage 132 kV or above.

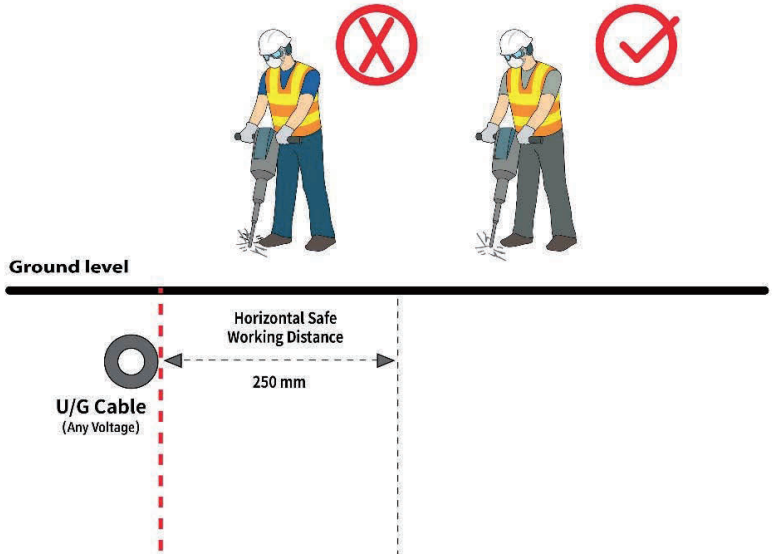

Fig 4.1 - Horizontal safe working distance when breaking out paved concrete surface

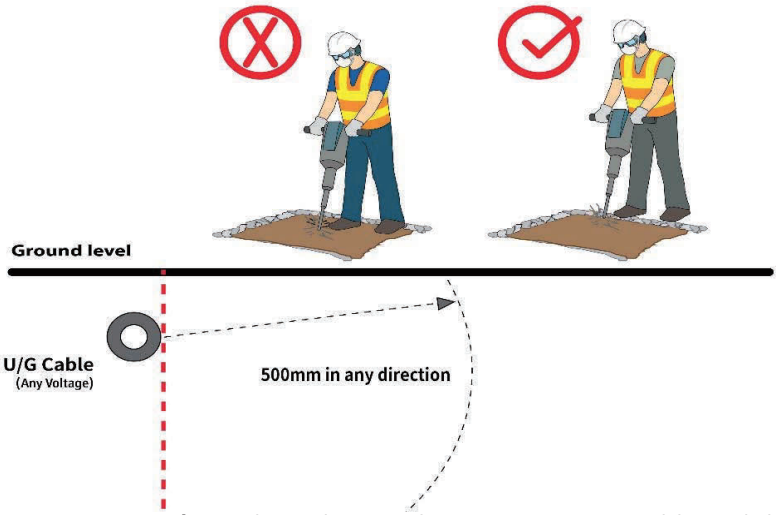

Fig 4.2 - Minimum safe working distance between any U/G cable and the point where hand-held power tools are used for excavation

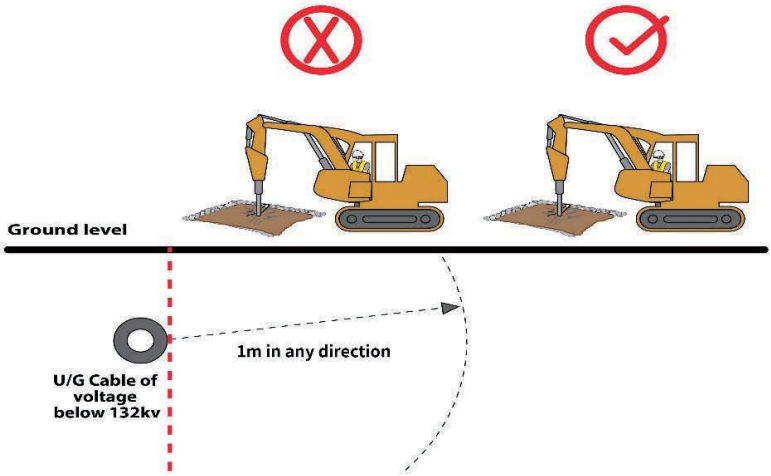

Fig 4.3 - Minimum safe working distance between U/G cables of voltage below 132kV and the point where mechanical excavators are used

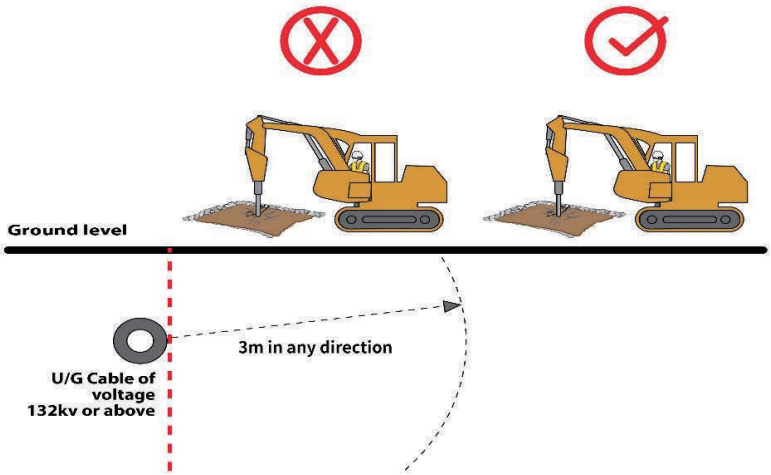

Fig 4.4 - Minimum safe working distance between U/G cables of voltage 132kV or above and the point where mechanical excavators are used

4.1.3 The working party shall consult the **electricity supplier** before commencement of works if the required clearance in Section 4.1.2 from the U/G cable cannot be achieved and keep records. Greater safety clearance may be required by the electricity supplier or the Director, depending on operating voltage of the U/G cable and its strategic importance to electricity supplies in the HKSAR.

4.1.4 Hand tools are commonly used for exposing U/G cables. Every effort shall be made to **excavate alongside U/G cables** rather than directly above it. Final exposure of U/G cables by horizontal digging is recommended as the force applied to hand tools can be controlled more effectively. In particular:

(a) **spades and shovels** shall be used rather than other tools. They should not be thrown or spiked into the ground but eased in with gentle foot pressure;

(b) **picks or forks** may be used with care to free lumps of stone, etc. and to break up hard layers of earth; and

(c) **picks** should not be used in soft clay or other soft soils near to U/G cables.

4.1.5 Whenever the excavation involves the removal of hard materials (e.g. concrete, bitumen and the like) in which the **U/G cable is covered or embedded,** the electricity supplier should be consulted before commencement of works.

4.2 Safe working practices for exposing U/G cables

4.2.1 **U/G cables uncovered in an excavation** need to be suitably supported and protected as recommended by the electricity supplier. The electricity supplier should be consulted in advance wherever an excavation may cause any U/G cable overhanging or change of U/G cable position within the works site. The working party should use appropriate cover board, sand bag, etc. to protect exposed cable. The working party should not alter depth or alignment of any cable or cable joint. When alternation is considered necessary, the working party should consult the views from the electricity supplier in advance. U/G cables and cable joints of voltage 132kV or above should not be disturbed until the working party has worked out proper protective measures with the electricity supplier.

4.2.2 **Collapse of excavation** may result in damage to exposed U/G cables within a trench of depth greater than 1.2m. To protect the U/G cables and site personnel, it is essential to provide temporary support for the excavation (e.g. shoring, or timbering or sheet piling, as the case may be) to ensure the stability of the excavation during works.

4.3 Safe backfilling practices

4.3.1 All **warning tapes, tiles, protection plates** or other protection materials shall be reinstated in their original position by the working party.

The electricity supplier should be approached to make up cable protection materials if they are found to be damaged or missing before the backfilling.

4.3.2 The same **backfilling materials** should be used unless otherwise agreed with the electricity supplier. In general, cement bonded sand[12] or sieved soil[13] of suitable fineness shall be used as covering material for the backfilling, as the case may be.

4.3.3 **Unsuitable filling materials** which are likely to cause damage or reduce the rating of the U/G cables (e.g. rock, rubble, bituminous material, brick, stone, timber, rubbish and other materials of high thermal resistivity) must not be used. If in doubt, the working party should seek advice from the electricity supplier on the specific backfilling requirements (thickness of the bedding layer, type of materials to be used and method of compaction, etc.).

4.3.4 The backfill shall be **adequately compacted**, particularly beneath the cable, to prevent any settlement which would subsequently damage the cable. No power compaction should take place until a 150mm cover of selected fine fill or sieved soil has been suitably compacted above the U/G cable. Hard materials (e.g. concrete, bitumen and the like) shall not be used for backfill within 300mm of an U/G cable in any direction.

4.3.5 Before backfilling, the electricity supplier shall be notified to allow it to take appropriate **precautionary measures** if:

(a) the exposed U/G cable, in particular U/G cable of voltage 132kV or above, need to be relocated to other position (either depth or alignment); or

(b) the U/G cable is found at a depth less than the minimum depth required by the Highways Department.

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[12] 1:14:2 cement bonded sand is defined as a machine mixed material consisting of 1 part cement and 14 parts sieved sand and 2 parts water by weight. Sieved sand is defined as washed sand passing through a 5mm x 5mm mesh screen.

[13] Sieved soil is defined as soil of suitably low thermal resistivity passing through a 12mm x 12mm mesh screen.

4.4 Safe working practices for trenchless methods drilling and slope stabilization

4.4.1 Trenchless methods drilling are increasingly being used for laying and renovating cables and pipes, particularly where there is a need to avoid surface disruption. The most widely used techniques are percussion moling, pipe jacking and auger boring. Drilling is also commonly adopted in landslip prevention works for slope stabilization. The **electricity supplier shall be informed before commencement of works** in addition to the necessary consultations at the planning or design stage.

4.4.2 The reasonable steps shall be followed to ascertain both the alignment and depth of the existing U/G cables, unless advised otherwise by the electricity supplier. As a general guide, the **minimum safe working distance** between the path of the drilling/boring device and the adjacent U/G cables shall be of at least **1m in any direction**. This safe working distance may need to be varied, taking into account the electricity supplier's advice and other factors such as the construction of adjacent plant, ground conditions, bore diameter, the accuracy and reliability of the device being used.

4.4.3 When the path of moling or pipe jacking comes too close to adjacent U/G cables, extreme care must be taken to avoid cable damage by soil displacement. A mole tracking device shall be used if the working party finds that the moles are prone to deflection from their original course.

4.5 Safe working practices for vertical, horizontal or inclined penetration

4.5.1 **Vertical, horizontal or inclined penetration** works such as sheet piling, geotechnical investigation, core sampling or ramming – either by hand tools or machines are common causes of U/G cable damage at construction sites. The reasonable steps shall be followed to ascertain the alignment of the existing U/G cables by toroidal active detection. If there is genuine difficulty in locating the U/G cables in the vicinity of the works site, assistance should be sought from the electricity supplier.

4.5.2 **A 500mm minimum horizontal safe working distance** shall be maintained between the point of vertical, horizontal or inclined penetration and any electricity supply lines.

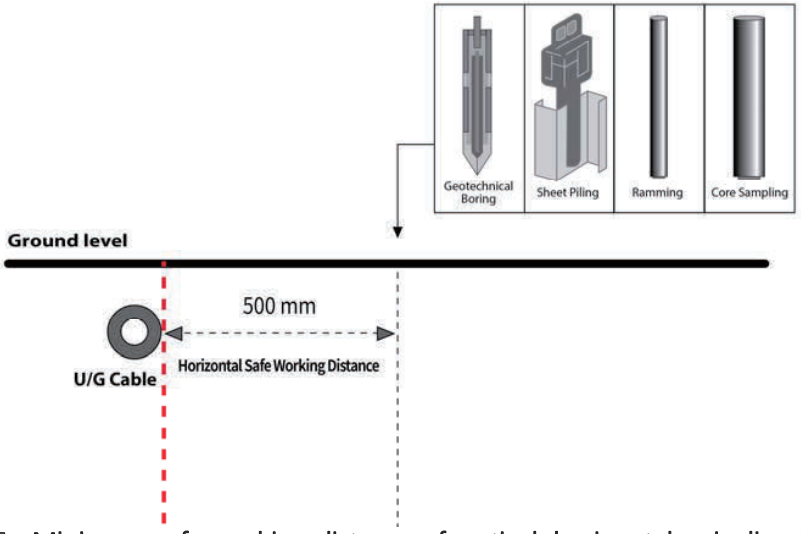


Fig 4.5 - Minimum safe working distance of vertical, horizontal or inclined penetration works

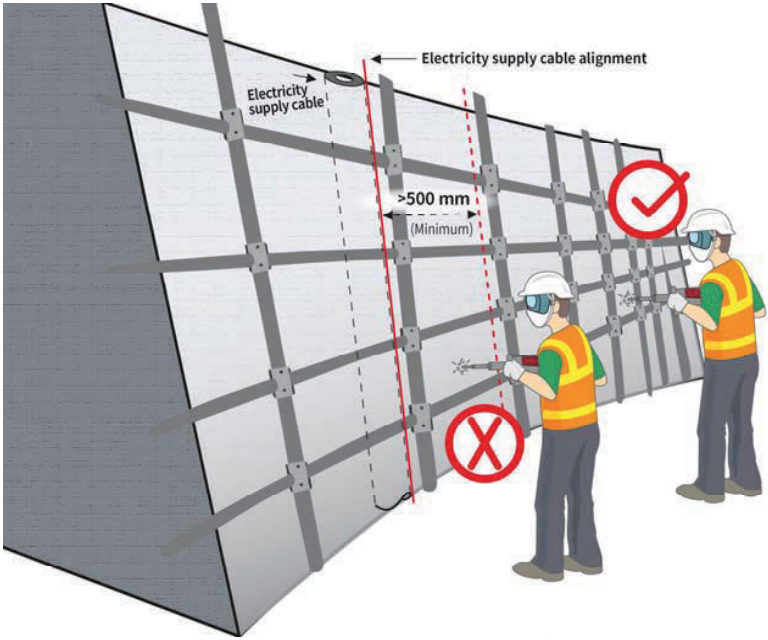


Fig 4.6 - Minimum safe working distance of horizontal or inclined penetration works

4.6 Safe working practices for other works

4.6.1 Where **explosives** are to be used within 60m of an U/G cable, or where H-piling, vertical boring for building structure, etc. are to be carried out within 15m of an U/G cable, protective measures should be agreed with the electricity supplier before any works take place.

4.6.2 If **welding or other hot works** are to be carried out within 10m of exposed U/G cables, the working party shall take necessary safety precautions to avoid damage by heat, sparks or naked flames to the protective coatings and sheaths of the U/G cables. If the welding or hot works are in the close proximity of the exposed U/G cables, the working party shall consult the electricity supplier on any special protective measures required.

4.7 Emergency Situation

4.7.1 If an emergency involves works in the vicinity of underground electricity cables or the electricity supplier cannot immediately provide the assistance for the excavation work, the excavation shall be under direct supervision of a competent person who should repeatedly use a cable detection device and frequently update the site personnel as to the most accurate cable location until excavation is completed. Extreme caution must be taken with the assumption that there are U/G cables in the vicinity. For particular situation, if an emergency involves works in the vicinity of U/G cables of voltage 132kV or above but written method statement is not available at the moment, the working party shall contact the electricity supplier and should notify to the electricity supplier on their detailed work arrangement as a matter of collaboration before proceeding of works.

5 Special Safety Precautions against Damage to Underground Electricity Cables

Large construction or demolition projects place particular demands on the working party with respect to protecting U/G cables. Similarly, special safety precautions apply when U/G cables are found to be damaged or at risk, when plant or other utilities are to be installed near U/G cables, or when there is any doubt about cable identification between the different utilities. The involvement of the electricity supplier is crucial in all of these circumstances.

5.1 Large construction works

5.1.1 In large construction projects, the safe system of work for working near electricity supply lines can be integrated into the site contractor's **Permit-to-Dig system**. This helps site personnel to check that all reasonable steps have been completed prior to excavation and aids compliance with all reasonable measures, as specified in the Permit, in the course of the works.

5.1.2 The working party has a duty to give **sufficient notice to the relevant electricity supplier** so that adequate precautions can be taken to ensure the safety of U/G cables within and adjacent to the works site.

5.1.3 For large construction or demolition sites, the working party should:

(a) **identify all U/G cables that need to be diverted**. These U/G cables are treated as live unless they have been confirmed by the electricity supplier the otherwise, or unless the diversions have been completed by the electricity supplier;

(b) **protect all in-service U/G cables** by appropriate means, in particular those subjected to pressure by construction traffic; and

(c) **designate a cable reserve** to help control the separation distances from other underground utilities. A marked-up cable reserve plan, with warning sign and notice as appropriate, should be posted on site by the builder/developer for the information of all those involved in excavation and ground works.

5.2 U/G cable found damaged

5.2.1 If an U/G cable is damaged, the electricity supplier shall be notified immediately, regardless of how slight the damage and even if it is only on the cable sheath. The working party shall keep people **well clear of the area** until the electricity supplier has attended the site and given further safety advice. Under no circumstances shall any unauthorized repairs be made to the U/G cable.

5.3 Doubt about identification of cables amongst different utilities

5.3.1 The typical colours, sizes and buried depth of CLP's and HEC's U/G cables are given in Table A3.1 of Appendix 3. The working party and the competent person should be aware that **there is NO standard colour coding** system identifying all U/G utilities services. Certain high voltage U/G cables may look like water pipes; some U/G cables are yellow and mistakable for polyethylene gas pipes. The electricity supplier should be consulted if there is any doubt about the identification of cables amongst different utilities.

5.3.2 Unless it is proved that the underground service is not U/G cable, this service **shall be treated as a LIVE cable** whenever works are carried out in its vicinity.

5.4 U/G cable found in shallow cover

5.4.1 **If an U/G cable is found to be in shallow cover**, the working party shall ensure that the electricity supplier is notified before the excavation is backfilled. The electricity supplier shall take remedial action to safeguard electricity safety as far as reasonably practicable. Where the cable plan is proved inaccurate, the electricity supplier shall amend its records accordingly.

5.5 Installation of plant or other utilities close to U/G cables

5.5.1 **Installation of plant or other utilities** should be kept away from the U/G cable as far as practicable. It is essential that the electricity supplier should be consulted prior to the construction of any manhole, chamber or other structure over, around or under an U/G cable.

5.5.2 As far as practicable, **new utilities installations** should be separated from existing U/G cables by the distances agreed with the electricity supplier. In general, the minimum safe working distance shall be 300mm for U/G cables of voltage below 132kV and 1m for voltage 132kV or above to allow for future maintenance or emergency operations.

5.5.3 Any working party which carries out works near U/G cables shall observe **any reasonable requirements made by the electricity supplier** for protection of U/G cables. Where there is any doubt about the reasonableness or adequacy of the electricity supplier's requirements, or where the measures called for are not adequately implemented, the Director, upon request, shall decide whether the electricity supplier's requirements are reasonable and/or whether enforcement action is required according to the ESLPR.

5.6 Works on cables embedded in concrete or other hard materials

5.6.1 If any cable is found or suspected to be embedded in hard materials (e.g. concrete, bitumen and the like) and breaking of these hard materials is unavoidable, the working party should consult the electricity supplier for agreement with the working procedures before commencing the works.

6 Reasonable Steps for Working near Overhead Electricity Lines

The reasonable steps to a safe system of work for works near O/H lines involve planning and consultation. During planning of the proposed works, the working party is required to ascertain the actual alignment and ground clearance of any O/H lines found within and close to the works site. In consultation with electricity supplier, the working party shall obtain all necessary safety advice including the minimum safe working distance.

6.1 Planning

6.1.1 **Works near O/H lines should be well planned** before their commencement. For a large project (e.g. housing development) where a major diversion of O/H lines is necessary, the working party should propose their diversion requirements to the electricity supplier at the design stage or during the feasibility study. It should be noted that a long lead time is required by the electricity supplier to plan and complete an O/H line diversion of voltage 132kV or above.

6.1.2 Since O/H lines are clearly visible, the acquisition of O/H line alignment drawings from the electricity supplier is not mandatory. However, the **information contained in these drawings is useful to setting out safety precautions** against damage to O/H lines. When the request for information is made to the electricity supplier, the scope and, where appropriate, the nature of the proposed works should be fully described.

6.1.3 Based on the described works in the vicinity of O/H lines, the electricity supplier shall, without charge, provide O/H line alignment drawings and any related information within **14 working days** or such period as is mutually agreed between the concerned parties.

6.1.4 The **date of commencement** of the time period stipulated above (in 6.1.3) is the date upon which the electricity supplier received and date-stamped the notice. Notices shall be immediately date-stamped when they are received by the electricity supplier and retained for a minimum of five years. The working party may request, in the notice, an acknowledgement of its receipt, stating the date upon which it was received.

6.1.5 The **O/H line alignment drawings** provided by the electricity supplier shall be of suitable scale sufficient for the working party to identify the following O/H line information:

(a) the alignment in respect of the O/H lines, poles or towers corresponding to appropriate reference points or mapping grid; and

(b) their respective voltage levels.

6.1.6 As the alignment shown in the drawings may be different from actual site installations due to changes in landscape, construction of roads, etc, the working party shall conduct **site inspection and surveying** to ascertain the actual alignment, distance from the ground and voltage of any O/H lines found within or close to the works site. Should there be any queries about the alignment or other matters relevant to the O/H lines, the working party shall contact the electricity supplier, which shall provide a response within three working days.

6.1.7 It is the working party's responsibility to decide whether the works site is in the vicinity of the O/H lines (as defined in Section 1.3.2.6). If there are works to be carried out in the vicinity of O/H lines, the working party shall take all **reasonable steps and reasonable measures** to prevent damage to the O/H lines.

6.1.8 All site personnel, especially those who operate lifting and earth moving equipment, should receive **adequate training** on working in the vicinity of O/H lines, such as training courses for crane operators, and loadshifting machinery safety training courses. Organizations such as Construction Industry Council can give advice on available training and the Labour Department can provide information on the relevant mandatory safety training.

6.2 Consultation

6.2.1 For the **proposed plan of works** in the vicinity of O/H lines, even of a short duration, the working party shall discuss with the relevant electricity supplier before commencement of the works. During the consultation, the working party shall obtain all necessary safety advice from the electricity supplier including the minimum safe working distance.

6.2.2 Where the working party gives written notice to the electricity supplier to **request a site discussion** on the proposed works, the electricity supplier shall without charge attend the site meeting within 14 working days or such period as is mutually agreed between the concerned parties.

6.2.3 The **date of commencement** of the time period stipulated above (in 6.2.2) is the date upon which the electricity supplier received and date-stamped the notice, as outlined in Section 6.1.4 of this Code.

6.2.4 Both the working party and the electricity supplier should keep a **record of all site meetings** held, which shall include:

(a) names of all attendees;

(b) location, date and time for which the meeting was conducted; and

(c) a brief description, with the aid of diagrams if necessary, of the advice provided by the electricity supplier in relation to the proposed works plan.

6.2.5 The working party should **retain for inspection upon request by the Director any site meeting records** described in Section 6.2.4 of this Code until the related works have been safely completed. Similar to the notice for requesting the provision of O/H line information, the electricity supplier shall retain the meeting records for a minimum of five years.

6.2.6 The working party responsible for the works shall ensure that information about the O/H lines (e.g. alignment, distance from ground, voltage of the O/H line) and the safety advice obtained from the electricity supplier (e.g. minimum safe working distance) are made **available to the site personnel** including supervisors, signallers, plant operators and workers.

7 Reasonable Measures for Working near Overhead Electricity Lines

The reasonable measures to ensure a safe system of work for works near O/H lines involve implementing safety precautions on site to ensure that works are always carried out at a safe working distance. These precautions include erecting suitable ground level barriers, creating safe passageways (with goal posts, gateways and warning signs), assigning a signaller and fitting physical restraining devices to equipment.

7.1 General safety practices

7.1.1 **Any O/H lines found in the vicinity of the proposed works must be assumed to be LIVE** unless the O/H lines concerned are confirmed dead by the electricity supplier.

7.1.2 The working party shall ensure that all necessary **safety precautions** have been taken and **all site personnel** are fully conversant with safety precautions implemented on site.

7.1.3 No works shall be carried out in the vicinity of O/H lines unless **a safe working distance** is always maintained in such a way that damage to O/H lines can be prevented and personal safety can be safeguarded.

7.2 Where no works are carried out underneath the O/H lines

7.2.1 **Ground level barriers** parallel to the O/H lines should be erected at a horizontal distance of at least 6m from the outermost conductor of the O/H lines to prevent any part of the plant or equipment approaching too close to the lines.

7.2.2 If lifting and earth moving equipment (e.g. lorry crane, mobile crane or tower crane) are to be used or site personnel may carry steel bars, ladders or other conducting objects, the barriers shall be erected further from the O/H lines so that **a minimum 6m horizontal distance** is always maintained between any part of the crane (including loaded material) or hand-carried material and the outermost conductor of the O/H lines.

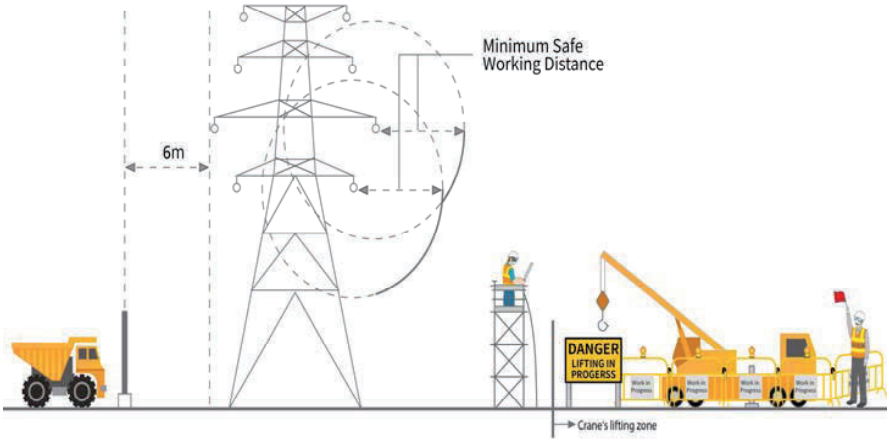


Fig 7.1 - Minimum horizontal distance between the crane or earth moving machinery and outermost conductor of O/H lines

7.2.3 If an O/H line crosses a works site in which works are to be conducted on either side of the line, **barriers on both sides of the line** are required.

7.2.4 The electricity supplier or the Director may vary the minimum safe working distance required based on the type of works and plant or equipment used, voltage and spans of the O/H line, etc. **If barriers cannot be erected** to meet the safe working distance requirement due to the constraints of the site, the electricity supplier shall be consulted before commencement of works.

7.2.5 Ground level barriers should be set up such that they are **stable when subject to strong wind or any human force**. Typically, these barriers could be:

(a) a rail fence;

(b) a plastic/nylon rope fence with stout posts planted in between;

(c) an electrically earthed wire fence under tension to be set up in consultation with the relevant electricity supplier;

(d) an earth bank boundary of at least 1m in height, marked by sign posts to stop vehicles from entering; or

(e) a properly spaced array of large steel or plastic drums filled with rubble, timber balks or concrete blocks.

7.2.6 The **barriers should be clearly visible** for the benefit of the plant equipment operators. This could be achieved by putting up cloth flags (i.e. bunting) suspended vertically above ground between 3m and 5m on top of the barriers, or by applying paint stripes with distinctive colours on drums. To warn personnel of the nearby O/H lines, **warning notices** should be attached to or displayed on the barriers at intervals of not less than 2m. Care must be exercised when erecting the bunting to avoid becoming too near to the conductors of the O/H lines.

7.2.7 **No materials whether or not to be used in relation to the works should be stored,** even for a short duration, in the area between the O/H lines and the ground level barrier without first consulting the electricity supplier.

7.3 Where there will be plant or equipment passing underneath the O/H lines in the course of works

7.3.1 Allowing the passage of plant or equipment under the O/H lines increases the danger and should only be considered if reasonable alternative routes are not available. In order to minimize the danger areas, the number

of the passageways for plant or equipment should be minimized. For safest crossing, the passageway, if provided, should be at right angle to the alignment of the O/H lines wherever possible.

7.3.2 In general, the **precautions** to be taken when making provisions for the passageway are as follows:

(a) **Gateways** to the passageway should be set up at both sides of the entrance by erecting goal posts. Similar to the barriers, the route of the passageway should be clearly fenced.

(b) **The goal posts and crossbars** should be rigid and of non-electrically conductive materials and be marked with distinctive colour stripes. If metallic goal posts or crossbars are used, they must be adequately earthed.

(c) Clearly marked **warning notices** should be placed at both gateways of the passageway indicating the potential electrical danger and ground clearance of the cross bar and advising that no part of the plant or equipment shall exceed this ground clearance when passing the fenced passageway.

(d) The **passageway shall be sited, as far as practicable, on level ground and its surface must be adequately compacted**, flattened and maintained to prevent the plant equipment and the loads being carried from undue tilting or bouncing when moving.

(e) **Adequate lighting** for the notices, signs, passageway and its gateways should be provided if movement of plant or equipment is to take place after dark. Light fittings for illumination of the O/H line conductors immediately above the passageway should be sited at ground level projecting light upwards towards the conductors.

(f) **Warning notices** should be erected on all approaches to the crossing and in legible letters and characters each not less than 100 mm high.

(g) A **signaller** who is able to assess the clearance between the plant or equipment and the goal post shall be assigned to **guide the movement of plant or equipment** underneath the O/H lines. The signaller shall agree with the operator on suitable hand signals or flag signals to be adopted during moving.

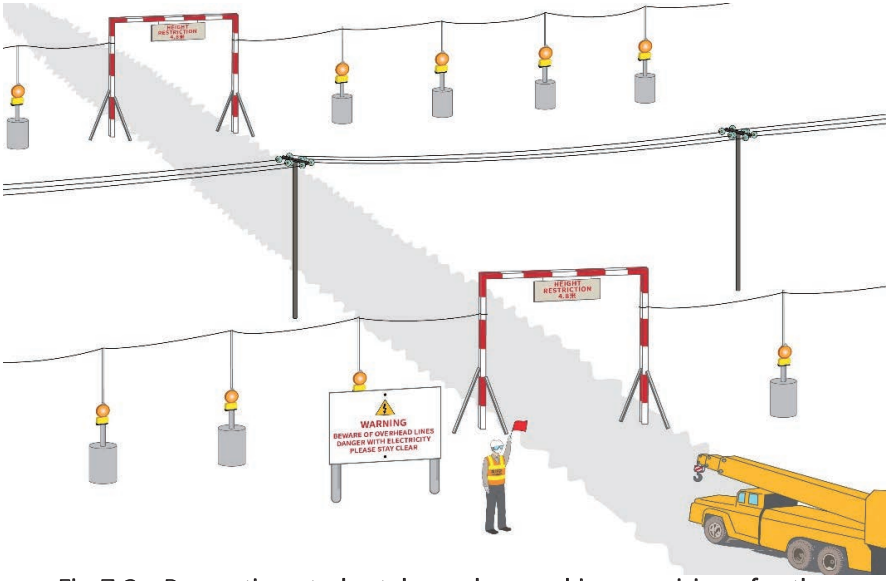


Fig 7.2 - Precautions to be taken when making provisions for the passageway underneath the O/H lines

7.3.3 Due consideration should be given to the **speed, stopping distance, size and manoeuvrability** of any plant or equipment when deciding the location of the goal posts and form of warning notices to be used. The gateway should be erected far enough away from the O/H lines such that the plant/equipment does not stop underneath the lines if it hits the goal post or crossbar.

7.3.4 If it is not possible to place a rigid crossbar on top of the goal posts due to the width of the passageway (e.g. the construction of carriageways underneath the O/H lines), a string of strong non-metallic rope under tension or an electronic detection beam could be used as a **height limiter**. The distance between the height limiter used in a gateway and the outermost O/H line conductor should be at least 12m.

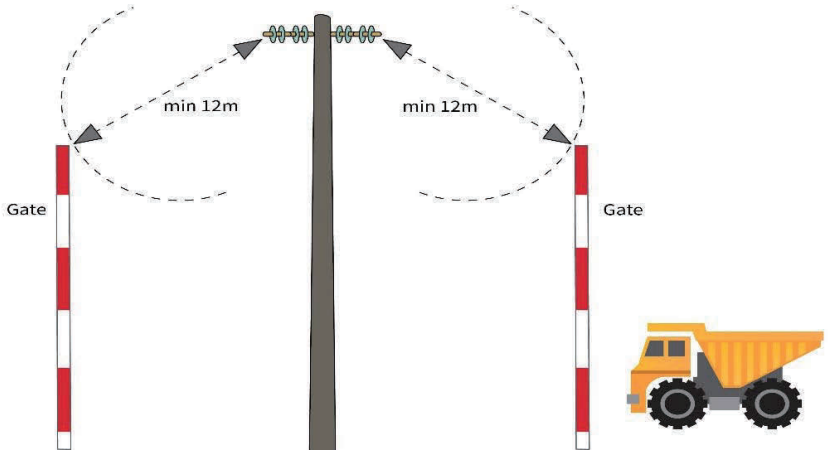


Fig 7.3 - The distance between the height limiter used in a gateway and the outermost O/H line conductor

7.4 Where works are carried out underneath the O/H lines

7.4.1 In addition to the use of ground level barriers, gateways and warning notices mentioned in Sections 7.2 and 7.3, **additional precautions are required for works carried out within a 6m horizontal distance** from the O/H lines, particularly where upward movements of plant or equipment (e.g. cranes, loader arms, excavator buckets), or construction works could encroach on the safe working distance, resulting in damage to O/H lines and/or personal injury.

7.4.2 The following **additional precautions** shall be exercised when ground level works underneath an O/H line are undertaken (e.g. pipe laying, road construction/maintenance, etc.):

(a) Based on the minimum safe working distance advised by the electricity supplier, the **working party shall assess** its works underneath the O/H line to determine whether any tools, equipment and part of plant or equipment could encroach on the minimum safe working distance.

(b) **No tools, plant or equipment shall be used if they could encroach beyond the minimum safe working distance** when operated underneath the O/H line.

(c) Suitable **physical restraining devices** should be fitted to plant or equipment to inhibit any of its moving parts (e.g. derricks, cranes, jibs, hoists, etc.) from reaching beyond the safe working distance.

Fig 7.4 - Minimum safe working distance underneath the O/H lines

(d) A **signaller** shall be assigned to **direct the operator in maintaining sufficient safe working distance** when plant or equipment is operated underneath O/H lines. Depending on the site situation, the signaller should be provided with red and green flags or suitable communication equipment to maintain dialogue with the operator.

7.4.3 Site personnel should **observe any warning notices** in the vicinity of the O/H lines and never disturb any earthing conductors connecting the O/H line poles/towers to the ground. These conductors are normally buried.

7.4.4 **The electricity supplier must be informed immediately of any damage**, however slight, or interference to an O/H line. The working party shall keep people well clear of the area until the electricity supplier attends the site and gives further safety advice. No attempt should be made to remove any objects or retract any mobile crane which is in contact with the O/H line conductor unless the line is confirmed dead by the electricity supplier. This also applies in the case of an injured person who is still in contact with the O/H line conductor.

7.4.5 **Stacking of goods and containers, erection of buildings and structures, etc. underneath an O/H line should be avoided** as the distance between the line conductor and the top of the object is reduced and the chance of an object encroaching on the safe working distance is higher.

7.4.6 If there is genuine need to work directly underneath an O/H line but the safe working distance cannot be maintained at all times by all appropriate means, the working party should request that the electricity supplier **de-energizes the O/H line** for a certain period at a suitable time agreed between them.

7.5 Safe working practices for blasting works

7.5.1 **Blasting works should be kept well away from an O/H line** in order to prevent damage to the line and its supporting structure from flying debris. The following precautions should be taken if blasting works need to be carried out in the vicinity of an O/H line:

(a) The **maximum particle velocity** caused by the blasting shall be restricted to 25 mm/sec at the O/H line footing;

(b) **Mechanical detonators** should be used whenever possible. If an electric detonator is used, the suppliers of the explosives and detonating system should be consulted about their suitability. In general, electric detonators should only be used at least 60m from the nearest conductor of the line;

(c) **Damping mats** should be erected to reduce the effect of flying debris; and

(d) The requirements of the **Buildings Department and Civil Engineering and Development Department** in relation to blasting works should be followed.

7.6 Emergency Situation

In case of an emergency involving O/H line (e.g. O/H line or tower is damaged, etc.), no works are allowed in the vicinity of electricity supply lines without the consent of the electricity supplier.

8 Other Aspects relating to Works near Overhead Electricity Lines

8.1.1 Although **general warning devices** are erected by the electricity supplier near O/H lines, they must not be used as substitutes for any of the **precautionary measures** prescribed in this Code.

8.1.2 Where aircraft, including helicopters, are to be used in the vicinity of O/H lines (e.g. O/H line insulator cleaning, delivery of materials, etc.), advice must be sought from the **Director of Civil Aviation and the relevant electricity supplier.**

Appendices

Appendix 1 contains the following legislation in connection with the legal requirements of working near electricity supply lines:

A.1.1 Section 10 of ESLPR – Requirements relating to works in the vicinity of electricity supply lines
A.1.2 Section 11 of ESLPR – Remedial Notices
A.1.3 Section 18 of ESLPR – Defence
A.1.4 Section 6A & 6B of the Factories and Industrial Undertakings Ordinance (Cap. 59) – General duties of a proprietor and persons employed
A.1.5 Other legislation

Appendix 2 lists the provisions of Section 3 of ESLPR concerning the requirements for approval of a competent person.

Appendix 3 provides the following information in respect of the two electricity suppliers:

A.3.1 Brief of CLP's electricity supply system
A.3.2 CLP's contact information (address, telephone and fax)
A.3.3 Brief of HEC's electricity supply system
A.3.4 HEC's contact information (address, telephone and fax)
A.3.5 Typical U/G cable plan and O/H line alignment drawing
A.3.6 Typical colours/sizes/buried depths of U/G cables

Appendix 4 provides a sample form of Cable Alignment Record

Appendix 5 provides a sample form of Competent Person Written Report

Appendix 6 provides 13 steps for underground cable detection

Appendix 7 provides 11 measures for underground cable protection

Appendix 8 provides 5 steps and 5 measures for protecting overhead electricity lines

Appendix 1: Legislation

Relevant legislation enforced by the Director of Electrical and Mechanical Services ("the Director")

A.1.1 The Electricity Supply Lines (Protection) Regulation ("ESLPR"), made under the Electricity Ordinance, (Cap.406) ("EO"), applies to any works in the vicinity of "electricity supply lines[14]". In particular, Section 10 of ESLPR requires that:

> "10. Requirements relating to works in vicinity of electricity supply lines
>
> (1) A person shall not -
>
> (a) carry out or cause or permit another to carry out in the vicinity of an underground electricity cable any works which are below ground level; or
> (b) carry out or cause or permit another to carry out in the vicinity of an overhead electricity line works of any kind,

[14] "Electricity supply line" means an electric line, or any cable used in conjunction with such a line for the purpose of transmitting control signals, which is owned by an electricity supplier.

"Electric line" means -
(a) a conductor used for the purpose of conveying, transmitting or distributing electricity and any casing, coating, covering, tube, pipe or insulator enclosing, surrounding or supporting such conductor, or any part of it;
(b) any apparatus connected with such conductor or other thing mentioned in paragraph (a) for the purpose of conveying, transmitting or distributing electricity,

and in paragraph (a), reference to a conductor used for the purpose of conveying, transmitting or distributing electricity includes reference to a wire or to any other means used for that purpose.

unless before the works are begun all reasonable steps have been taken to ascertain the existence within the proposed works site and its vicinity of any such underground electricity cable and its alignment and depth or of any such overhead electricity line and its alignment, distance from the ground and voltage, as the case may be.

(2) A person who -

(a) carries out or causes or permits another to carry out in the vicinity of an underground electricity cable any works which are below ground level; or

(b) carries out or causes or permits another to carry out in the vicinity of an overhead electricity line works of any kind,

shall ensure that all reasonable measures are taken to prevent the occurrence of an electrical accident or an interruption to the supply of electricity arising from those works.

(3) For the purposes of subsection (1) as it applies in relation to works in the vicinity of an underground electricity cable, and without affecting the generality of that subsection, reasonable steps shall not be regarded as having been taken unless a competent person has undertaken an investigation for the purpose of ascertaining the existence within the proposed works site and its vicinity of any such underground electricity cable and its alignment and depth and has provided a written report of his findings as to those matters.

(4) Subject to section 11(7), where the Director has approved a code of practice for any of the requirements of paragraph (a) or (b) of subsection (1) or (2), then, subject to subsection (3), compliance with the provisions of that code shall be deemed to constitute the taking of all reasonable steps, or the taking of all reasonable measures, as the case may be, for the purpose of that requirement.

(5) A competent person who undertakes an investigation to ascertain the existence, alignment and depth of an underground electricity cable -

(a) shall not delegate the function and duty of the investigation to another person;

(b) may carry out the investigation with the assistance of any other persons, but such persons shall be directly supervised by that competent person at the proposed works site in the course of the investigation;

(c) shall carry out the investigation in a manner that does not cause damage to, or impair the operation of, the underground electricity cable; and

(d) shall provide the person requesting the investigation with a written report of his findings as to that matter."

A.1.2 Section 11 of ESLPR empowers the Director to serve on a person remedial notice for contravention of a requirement under the ESLPR stating his opinion and reason for such notice, directing the person as appropriate to remedy the contravention or the matter as follows -

"11. Remedial notices

(1) Where the Director is of the opinion that a person -

(a) is contravening a requirement under this Regulation; or

(b) has contravened such a requirement in circumstances that make it likely that the contravention will continue or be repeated,

he may serve on the person a notice ("remedial notice") stating that he is of that opinion, giving particulars as to why he is of that opinion, and directing the person to remedy the contravention or the matter occasioning it, as the case may be, within the period specified in the notice.

(2) Except as provided in subsection (3), the period to be specified in a remedial notice under subsection (1) shall be a period of not less than 14 days.

(3) If the Director is of the opinion that the circumstances of the contravention are such that there is an undue risk of an electrical accident or an interruption to the supply of electricity occurring, he may specify in the remedial notice such lesser period as he reasonably considers appropriate in the circumstances.

(4) A remedial notice may contain instructions as to the measures to be taken to remedy any contravention or matter to which the notice relates, and any such instructions may be framed -

(a) wholly or in part by reference to any approved code of practice; and

(b) so as to afford the person on whom the notice is served a choice between different ways of remedying such contravention or matter.

(5) Subject to section 43(4) of the Ordinance, a direction specified in a remedial notice shall take effect at the time of the notice being served or at such later date, if any, as may be specified in the notice.

(6) In addition to service as provided under section 52 of the Ordinance, service of a remedial notice on a person who is a site contractor may also be effected by delivering the notice to a person at the works site who appears to be the person in charge of the site activities or who identifies himself as being the site contractor's representative on the site.

(7) Where -

(a) the Director has approved a code of practice for any of the requirements of paragraph (a) or (b) of section 10(1) or (2) ; and
(b) the Director has served a remedial notice under subsection (1) in relation to a contravention of the same paragraph,

then, subject to section 10(3), compliance with the provisions of that code and the direction in that notice shall be deemed to constitute the taking of all reasonable steps, or the taking of all reasonable measures, as the case may be, for the purposes of that requirement.

(8) For the purposes of subsection (7), where there is any conflict or inconsistency between any provision in the code of practice and any direction in the remedial notice, then that direction shall, to the extent of that

conflict or inconsistency, as the case may be, prevail over that provision."

A.1.3 Section 18 of ESLPR sets out the defence provision to a prosecution brought against any person under section 17(4) of ESLPR as follows -

"18. Defence

It shall be a defence to a charge under section 17(4) alleging a contravention of section 10(2) for the person charged to show that -

(a) before the works began, all reasonable steps had been taken for the purposes of section 10(1) ; and

(b) any failure in the taking of all reasonable measures for the purposes of section 10(2) was due to reliance on information contained in a report prepared by a competent person or on information provided by the electricity supplier who is the owner of the electricity supply line concerned."

Relevant legislation enforced by Commissioner for Labour

A.1.4 The Factories and Industrial Undertakings Ordinance (Cap.59) places duties on both proprietors and their employees with regard to health and safety at work in industrial undertakings -

a) Section 6A General duties of a proprietor

(1) It shall be the duty of every proprietor of an industrial undertaking to ensure, so far as is reasonably practicable, the health and safety at work of all persons employed by him at the industrial undertaking.

(2) Without prejudice to the generality of a proprietor's duty under subsection (1), the matters to which that duty extends include in particular—

(a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;

(b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;

(c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of all persons employed by him at the industrial undertaking;

(d) so far as is reasonably practicable as regards any part of the industrial undertaking under the proprietor's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks; and Factories and Industrial Undertakings Ordinance

(e) the provision and maintenance of a working environment for all persons employed by him at the industrial undertaking that is, so far as is reasonably practicable safe, and without risks to health.

(3) Subject to subsection (4), a proprietor of an industrial undertaking who contravenes this section commits an offence and is liable to a fine of $500,000. (Amended 40 of 1997 s. 2)

(4) A proprietor of an industrial undertaking who contravenes this section wilfully and without reasonable excuse commits an offence and is liable to a fine of $500,000 and to imprisonment for 6 months. (Amended 40 of 1997 s. 2)

(Added 71 of 1989 s. 5. Amended 81 of 1993 s. 3)

b) Section 6B General duties of persons employed

(1) It shall be the duty of every person employed at an industrial undertaking while at work—

(a) to take reasonable care for the health and safety of himself and of other persons who may be affected by his acts or omissions at work; and

(b) as regards any duty or requirement imposed on a proprietor of the industrial undertaking or on any other person by this Ordinance for securing the health and safety of persons employed at the industrial undertaking to co-operate with him so far as is necessary to enable that duty or requirement to be performed or complied with.

(2) A person who contravenes subsection (1) commits an offence and is liable to a fine at level 4. (Amended 40 of 1997 s. 3)

(3) A person employed at an industrial undertaking who willfully and without reasonable excuse does anything while at work likely to endanger himself or other persons commits an offence and is liable to a fine $50000 and to imprisonment for 6 months. (Amended 81 of 1993 s. 4)

(Added 71 of 1989 s. 5)

Other legislation

A.1.5 Public utilities and others intending to carry out works in roads or Government land should comply with the applicable statutory requirements. In case of excavation on Government land, generally speaking, a permit has to be obtained from the Director of Highways or other authority as appropriate and conditions contained therein should be complied with the conditions contained in the permit. For emergency and excepted works, the agreed requirements and procedures between utilities and government departments prevailing at that time shall be observed.

Appendix 2: Approval, etc of competent person

A.2.1 Section 3 of ESLPR –

"Approval, etc. of competent person

(1) The Director may, in accordance with this section, approve a person as a competent person for the purposes of this Regulation.

(2) An application for approval as a competent person shall be in such form as may be specified by the Director and shall be accompanied by the fee specified in the Schedule.

(3) Subject to subsection (4), the Director shall grant an application for approval as a competent person if-

(a) the Director is satisfied that-

(i) the person has attended and passed a course in the locating of underground electricity cables which has been approved by the Director for the purposes of this section; and

(ii) during the period of 3 years immediately preceding his application, the person has had not less than 6 months' practical experience in locating underground electricity cables, or has had such other practical experience as the Director may consider relevant and equivalent for the purposes of this Regulation; or

(b) in the opinion of the Director, the person is by reason of his knowledge and practical experience capable of carrying out the work of locating underground electricity cables in a competent manner,

and the Director may grant his approval subject to such conditions as he reasonably thinks fit.

(4) The Director may refuse an application for approval under this section if a previous approval granted to the person has been revoked on grounds other than the grounds specified in section 6(2)(d) or (e).

(5) An approval granted under this section shall be valid for a period of 3 years from the date of its grant.

(6) The Director shall publish in the Gazette notice of any approval, granted by him for the purposes of this section, of a course in the locating of underground electricity cables."

Appendix 3: Information on electricity suppliers

CLP Power Hong Kong Limited (CLP)

A.3.1 Apart from the U/G cables and O/H lines in Hong Kong Island, Lamma Island and Apleichau, all U/G cables and O/H lines in Hong Kong are owned and operated by CLP. The CLP electricity supply system consists of extensive networks of U/G cables and O/H lines operating at 400kV, 132kV, 33kV, 11kV and 380/220V. Since CLP's major power stations are located far away from the load centres, O/H lines are widely used to carry the bulk of electricity to consumers. U/G cables are used to transmit and distribute electricity in urban and new town areas. Submarine cables are also used to deliver electricity to outlying islands.

A.3.2 Details of U/G cables or O/H lines in the vicinity of works to be undertaken may be obtained from CLP at the following address -

CLP Power Hong Kong Limited
8 Laguna Verde Avenue
Hung Hom

General enquiries and incident reporting regarding U/G cables or O/H lines can be made through the following contact numbers:

Office hours **Tel. 2678 6704**
(08:30hrs – 17:00hrs Mon - Fri) **Fax. 2678 6757**

After office hours **Tel. 2678 7721**
Fax. 2678 6368

The Hongkong Electric Company Limited (HEC)

A.3.3 All U/G cables and O/H lines in Hong Kong Island, Lamma Island and Apleichau are owned and operated by HEC. Due to geographical reasons, HEC depends primarily on U/G cables and submarine cables to carry electricity generated at Lamma Island to consumers. Its voltage levels are similar but not identical to those of CLP, namely 275kV, 132kV, 22kV, 11kV and 380/220V. Although relying mainly on U/G cables, HEC does operate a small number of 132kV and 380V/220V O/H lines.

A.3.4 Details of U/G cables or O/H lines in the vicinity of works to be undertaken may be obtained from HEC at the following address –

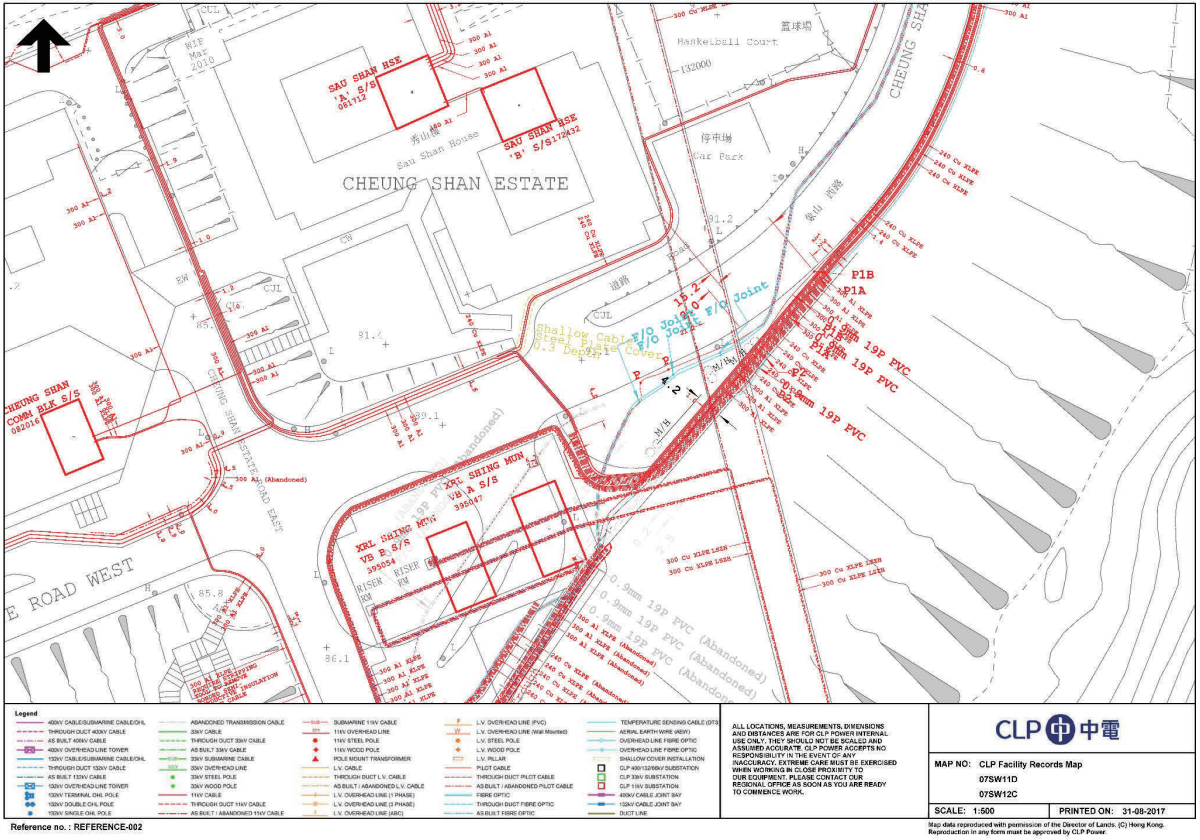
The Hongkong Electric Company Limited
Hongkong Electric Centre
44 Kennedy Road
Hong Kong

General enquiries and incident reporting regarding U/G cables or O/H lines can be made through the following contact numbers:

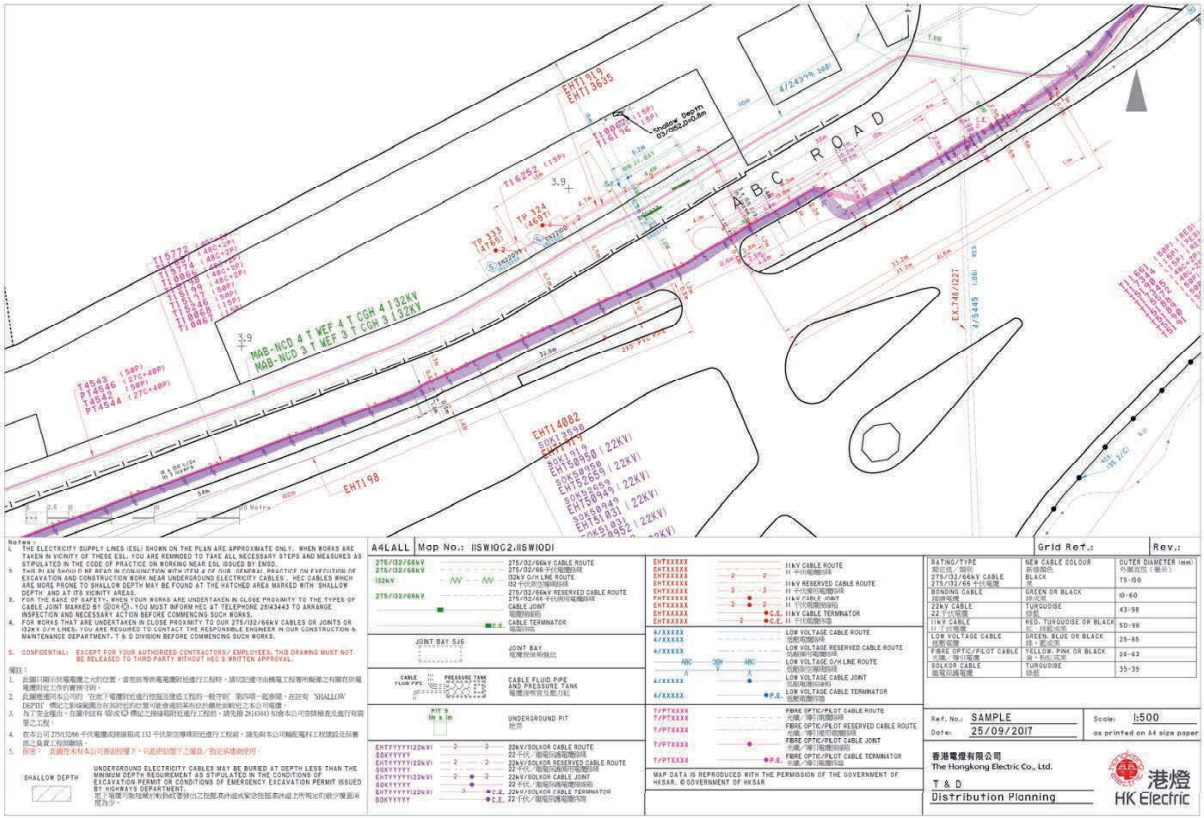
Office hours
Mon – Fri 08:45hrs - 17:15hrs

General enquires	**Tel. 2814 3443 (24-hr hotline)** **Fax. 2810 0506**
Emergency enquiries	**Tel. 2814 3443 (24-hr hotline)** **Fax. 2843 3110 (office hours)** **Fax. 2510 7812 (after office hour)**
Incident reporting	**Tel. 2555 4000 (English 24-hr hotline)** **Tel. 2555 4999 (Chinese 24-hr hotline)** **Fax. 2555 6637**

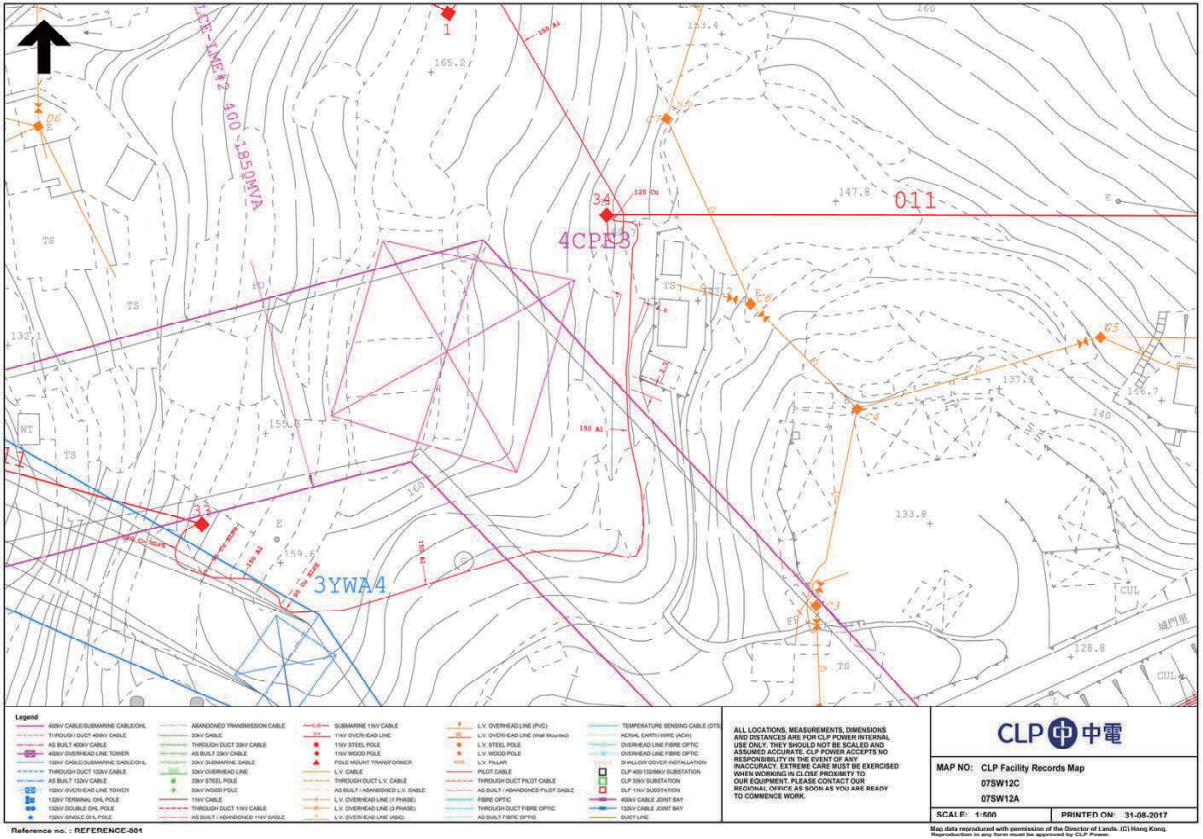
A.3.5 Figure A3.1 - Typical CLP U/G cable plan



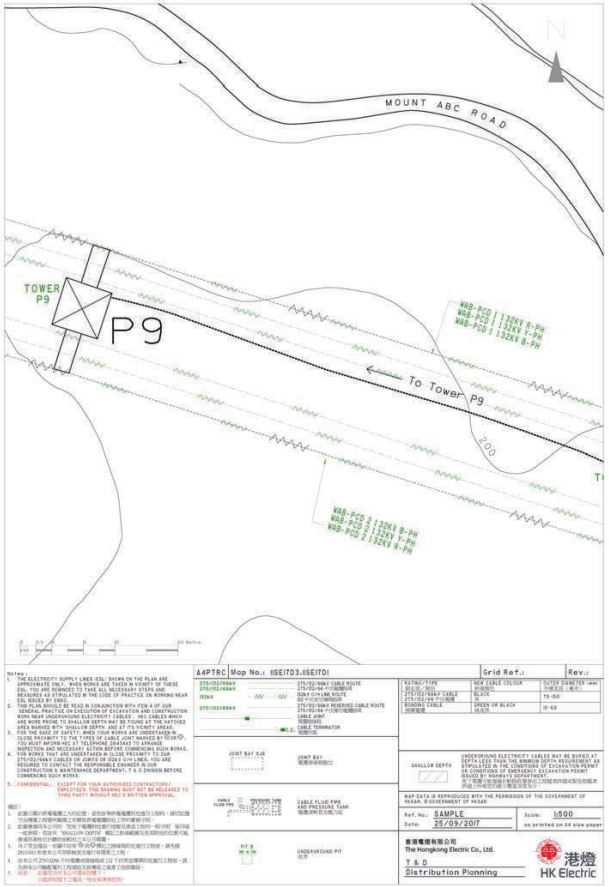
A.3.5 Figure A3.2 - Typical HEC U/G cable plan

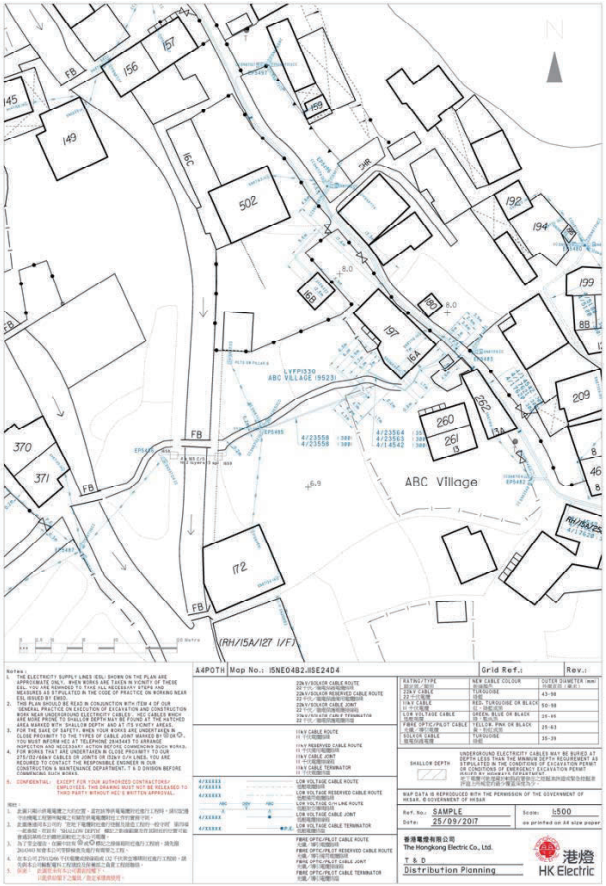


A.3.5 Figure A3.3 - Typical CLP O/H line alignment drawing



A.3.5 Figure A3.4 - Typical HEC O/H line alignment drawing





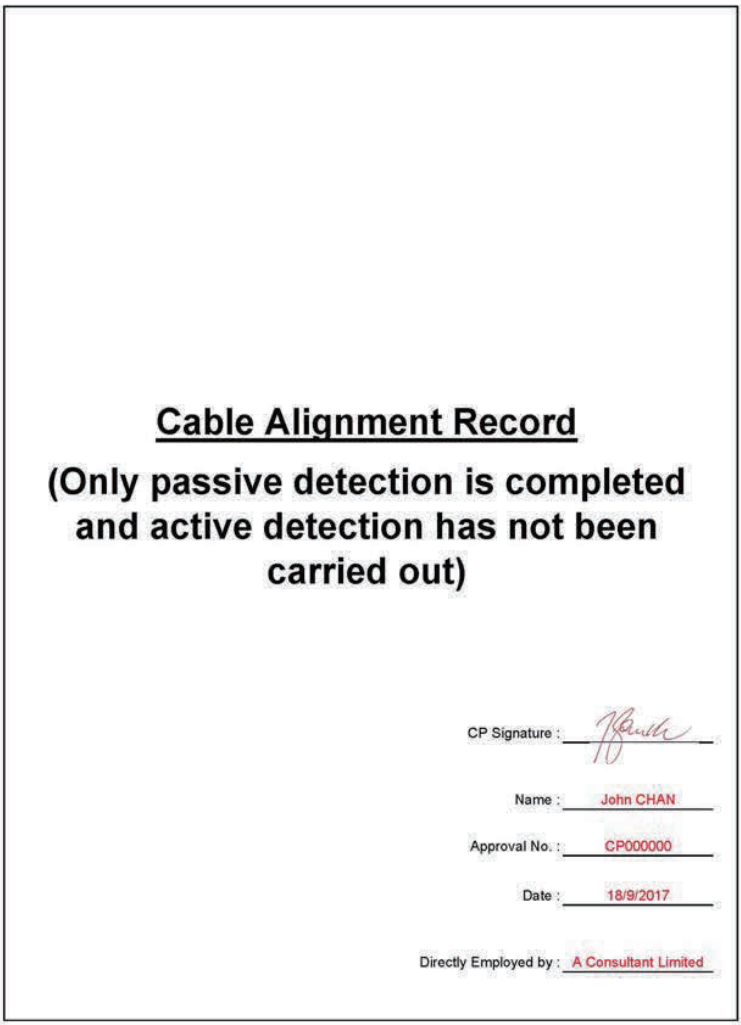
A.3.6 Table A3.1: Typical colours/sizes/buried depths of CLP and HEC U/G cables

System Voltage/ Type	Colour		Outer Diameter (mm)		Buried Depth (mm)	
	CLP	HEC	CLP	HEC	CLP	HEC
380/220V	Black	Green or Blue or Black	24 - 65	25 - 85	≥450	450 - 900
11kV	Red or Black	Red or Black or Turquoise	54 - 92	50 - 98	≥750	450 - 900
22kV	N/A	Turquoise	N/A	43 - 98	N/A	450 - 900
33kV	Red or Black	N/A	70 - 84	N/A	≥1000	N/A
66kV*	Black	Black	40 - 110	75 - 120	≥1000	1000 - 2000
132kV	Black	Black	50 - 143	50 - 143	≥1000	≥1000
275kV	N/A	Black	N/A	75 - 140	N/A	≥1000
400kV	Black	N/A	110 - 140	N/A	≥1000	N/A
Pilot	Yellow or Black	Yellow or Black or Turquoise	20 - 40	23 - 63	≥600 or in depth with related U/G cable	450 - 900 or in depth with related U/G cable
Fibre Optic	Orange or Black or Purple	Pink or Black	5 - 20	5 - 63	≥600 or in depth with related U/G cable	450 - 900 or in depth with related U/G cable
Bonding	Black	Green or Black	20 - 65	10 - 60	≥600 or in depth with related U/G cable	450 - 900 or in depth with related U/G cable

Note: The table indicates approximate information only, actual dimensions vary with brands, year of manufacture and site conditions.

* Both CLP and HEC have already decommissioned 66kV electricity supply lines. However, abandoned 66kV U/G cables still exist underground.

Appendix 4: A sample form of Cable Alignment Record



Cable Alignment Record

(Only passive detection is completed and active detection has not been carried out)

CP Signature : _____

Name : John CHAN

Approval No. : CP000000

Date : 18/9/2017

Directly Employed by : A Consultant Limited

Appendix 4: A sample form of Cable Alignment Record

Record No. : 266366EMSD

To : Foreman (Post) of B Company Limited (Name of site contractor or other working party)

Part A - Basic Information

I John CHAN the Competent Person of underground electricity cable detection

Approval No.: CP000000 expiry date: 1/12/2017

in accordance with Electricity Supply Lines (Protection) Regulation,

from 2017 year 9 month 18 day 10 hour 0 minute

to 2017 year 9 month 18 day 12 hour 0 minute

at Opposite to Carpark of Tai Wai Street, Tai Po, N.T.

undertook underground cable detection (passive detection only) and marked the cable alignment and depth on site.

Part B - Equipment used during underground cable detection

Receiver Brand name: C Serial No.: 456123

Model No.: 123 Calibration record (Date) 15/8/2017

Part C - Matters requiring particular attention

Underground cable detection is not completed yet, working party is required to arrange Competent Person to conduct active cable detection before commcement of work.

For example: major discrepancies between cable detection results and the electricity supplier's cable plans/ cable is found to be in shallow depth and has discussed the issue with the electricity supplier on _____ and the result is as follow:

The above mentioned underground cable detection was carried out with the assistance of Peter MA and he/ she was directly supervisied by me in the course of the detection.

CP signature: _____ Date: 18/9/2017

CP assistant signature: _____ Date: 18/9/2017

Name: (Peter MA)

Appendix 4: A sample form of Cable Alignment Record

Part D - Attachments

1	Work Procedure	(Total 1 sheets)
2	Measurement record	(Total 1 sheets)
3	Cable Alignmnet Layout Plan of Underground Cables Detected by Passive Detection	(Total 1 sheets)
4	Photos showing proposed trial hole locations and site markings for cable alignment and depth	(Total 4 nos.)
5	Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans (if any)	(Total 0 sheets)
6	Electricity supplier's cable plans	(Total 1 nos.)
7	Site briefing	(Total 1 sheets)
8	Others: _____	(Total 0 sheets)

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Work Procedure

Record No. : 266366EMSD Page : 3

Working Place : Opposite to Tai Wai Street Carpark, Tai Po, N.T.

Nature of Work : Trench work

Date / Time	Cable Detection Work Procedure	Relevant Photo No.
18/9/2017 at 10:30	Having obtained the location plan of the construction site and the corresponding underground cable plan, passive detection was being planned to carry out.	
18/9/2017 at 11:00	Passive detection was carried out.	Photo 1 and Photo 2
18/9/2017 at 12:00	Marked the cable alignment	Photo 3 and photo 4

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Measurement Record

Record No. : 266366EMSD Page: 4

Cable No. 123456

Cable Quantity: 1

Voltage: ___ no. control signal cable; ___ no. 380/220V; ___ no. 132kV; 1 no. 11kV; ___ no. 275kV; ___ no. 22kV; ___ no. 400kV

Cable detection point	Distance from reference point (A)*		Distance from reference point (B)*		Depth from ground level*		Remarks (Cable information)
	Actual (m)	Ratio 1:300	Actual (m)	Ratio 1:300	Passive detection^ (mm)		
P1	10.8	36.0	1.8	6.0	800		1 no 11kV Underground cable
P2	9.0	30.0	3.6	12.0	750		1 no 11kV Underground cable
P3	7.2	24.0	5.4	18.0	800		1 no 11kV Underground cable
P4	4.2	14.0	8.4	28.0	750		1 no 11kV Underground cable

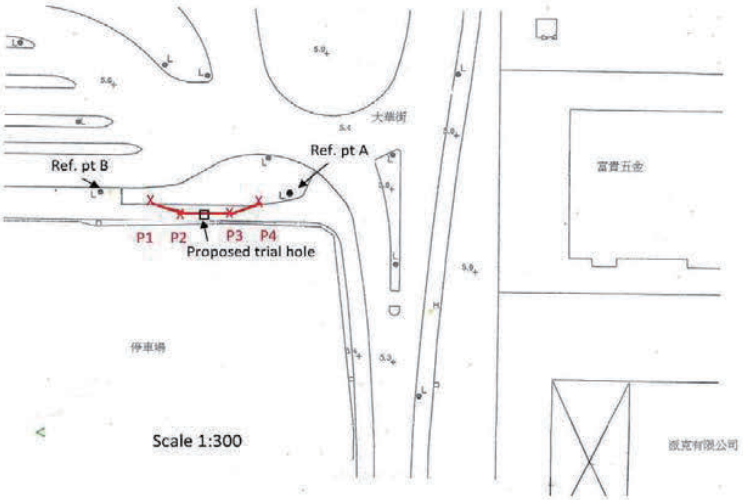
* Deviation is less than 25%

^ depth measurement from passive detection is not accurate and the figure is for reference only

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Layout Plan of Underground Cables

Record No. : 266366EMSD Page: 5



Legend:
(For reference only)
X : Measurement Point
D : Cable Depth (mm)
----: Cable Alignment
A : Reference Point A
B : Reference Point B

A
D
-------- ------ X ------ ------
B

Remarks : The cable layout plan should include all the relevant details to clearly indicate the cable location such as site area, cable alignment, reference point, sequence number of detection points, cable depth, cable quantity, cable voltage level, proposed trial hole location, kerb, building line, manhole, etc.

Ratio 1 : 300

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Photos for Passive Detection

Record No.: 286366EMSD Page: 6

Photo 1 Passive detection was carried out	Photo 2 Cable detection area
	
Photo 3 Marked the cable alignment	Photo 4 Marked the cable alignment
	

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record

Record No. :266366EMSD Page: 7

Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans (if any)

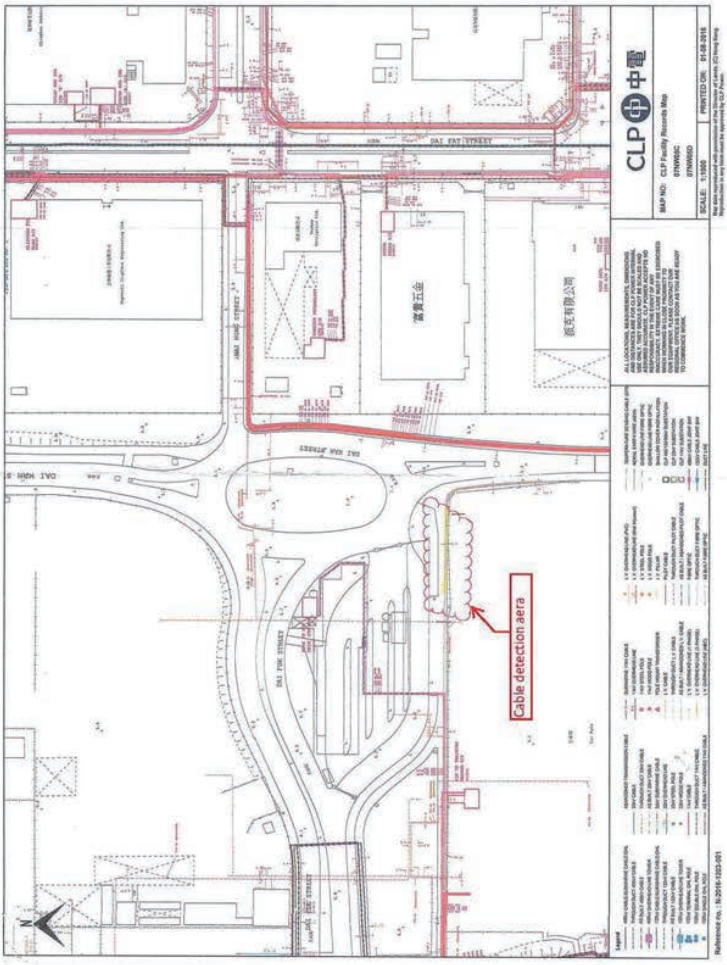
The working party has requested cable plans from the electricity supplier on 10 August 2017 and has received the cable plans from the electricity supplier on 20 August 2017.

Appendix 4: A sample form of Cable Alignment Record

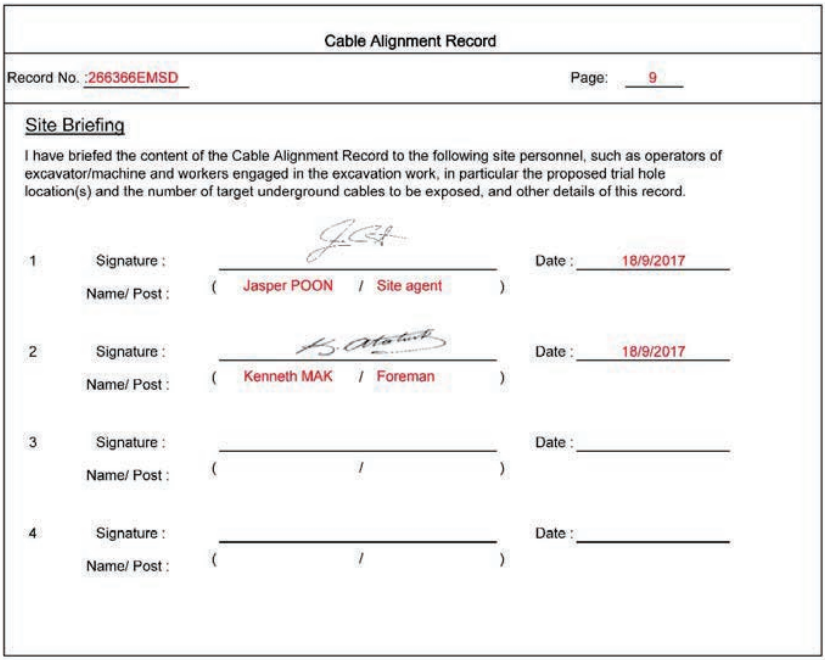
Cable Alignment Reord
Cable Layout Plan of Electricity Supplier

Record No. :266366EMSD

Page: 8



Appendix 4: A sample form of Cable Alignment Record



Cable Alignment Record

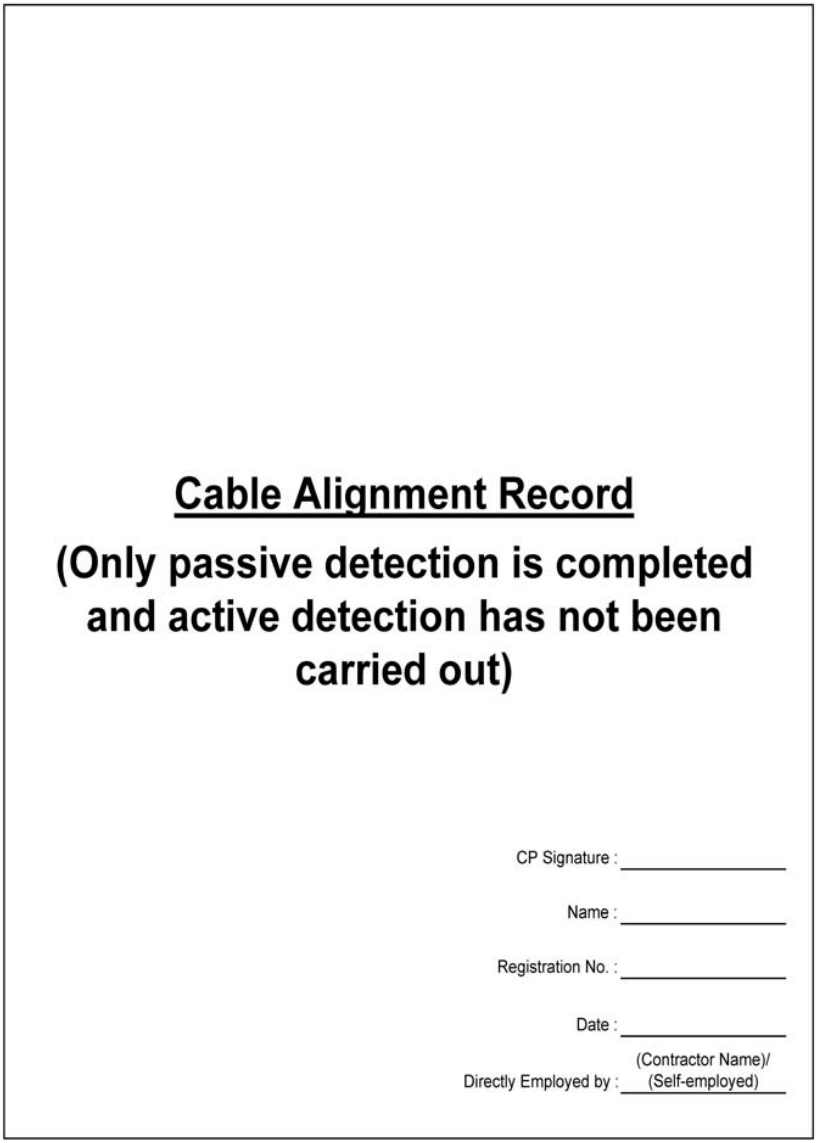
Record No. :266366EMSD Page: 9

Site Briefing

I have briefed the content of the Cable Alignment Record to the following site personnel, such as operators of excavator/machine and workers engaged in the excavation work, in particular the proposed trial hole location(s) and the number of target underground cables to be exposed, and other details of this record.

1	Signature :		Date : 18/9/2017
	Name/ Post :	(Jasper POON / Site agent)	
2	Signature :		Date : 18/9/2017
	Name/ Post :	(Kenneth MAK / Foreman)	
3	Signature :		Date :
	Name/ Post :	(/)	
4	Signature :		Date :
	Name/ Post :	(/)	

Appendix 4: A sample form of Cable Alignment Record



Cable Alignment Record

(Only passive detection is completed and active detection has not been carried out)

CP Signature : _____

Name : _____

Registration No. : _____

Date : _____

Directly Employed by : _____ (Contractor Name)/ (Self-employed)

Appendix 4: A sample form of Cable Alignment Record

Record No. : _____

To : _____ (Post) of _____ (Name of site contractor or other working party)

Part A - Basic Information

I _____ the Competent Person of underground electricity cable detection

Approval No.: _____ expiry date: _____

in accordance with Electricity Supply Lines (Protection) Regulation,

from _____ year _____ month _____ day _____ hour _____ minute

to _____ year _____ month _____ day _____ hour _____ minute

at _____

undertook underground cable detection (passive detection only) and marked the cable alignment and depth on site.

Part B - Equipment used during underground cable detection

Receiver Brand name: _____ Serial No.: _____

Model No.: _____ Calibration record (Date) _____

Part C - Matters requiring particular attention

Underground cable detection is not completed yet, working party is required to arrange Competent Person to conduct active cable detection before commcement of work.

For example: major discrepancies between cable detection results and the electricity supplier's cable plans/ cable is found to be in shallow depth and has discussed the issue with the electricity supplier on _____ and the result is as follow:

The above mentioned underground cable detection was carried out with the assistance of _____ and he/ she was directly supervisied by me in the course of the detection.

CP signature: _____ Date: _____

CP assistant signature: _____ Date: _____

Name: ( )

Appendix 4: A sample form of Cable Alignment Record

Part D - Attachments

1	Work Procedure	(Total_____sheets)
2	Measurement record	(Total_____sheets)
3	Cable Alignmnet Layout Plan of Underground Cables Detected by Passive Detection	(Total_____sheets)
4	Photos showing proposed trial hole locations and site markings for cable alignment and depth	(Total_____nos.)
5	Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans (if any)	(Total_____sheets)
6	Electricity supplier's cable plans	(Total_____nos.)
7	Site briefing	(Total_____sheets)
8	Others: _____	(Total_____sheets)

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Work Procedure

Record No. : _____ Page : _____

Working Place : _____

Nature of Work : _____

Date / Time	Cable Detection Work Procedure	Relevant Photo No.

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Measurement Record

Record No. : _____ Page: _____

Cable No. _____

Voltage: _____ no. control signal cable
_____ no. 380/220V _____ no. 132kV
_____ no. 11kV _____ no. 275kV
_____ no. 22kV _____ no. 400kV

Cable Quantity: _____

Cable detection point	Distance from reference point ( )*		Distance from reference point ( )*		Depth from ground level*		Remarks (Cable information)
	Actual (m)	Ratio 1:	Actual (m)	Ratio 1:	Passive detection^ (mm)		

* Deviation is less than 25%

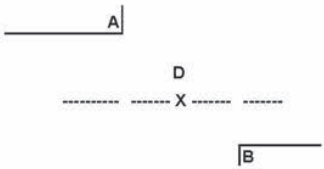
^ depth measurement from passive detection is not accurate and the figure is for reference only

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record
Layout Plan of Underground Cables

Record No. : _____ Page: _____

Legend:
(For reference only)
X : Measurement Point
D : Cable Depth (mm)
----: Cable Alignment
A : Reference Point A
B : Reference Point B



Remarks : The cable layout plan should include all the relevant details to clearly indicate the cable location such as site area, cable alignment, reference point, sequence number of detection points, cable depth, cable quantity, cable voltage level, proposed trial hole location, kerb, building line, manhole, etc.

Ratio 1 :

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record

Record No. : **Page:**

Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans (if any)

The working party has requested cable plans from the electricity supplier on _____ and has received the cable plans from the electricity supplier on _____.

Appendix 4: A sample form of Cable Alignment Record

Cable Alignment Record

Record No. : _____ **Page:** _____

Site Briefing

I have briefed the content of the Cable Alignment Record to the following site personnel, such as operators of excavator/machine and workers engaged in the excavation work, in particular the proposed trial hole location(s) and the number of target underground cables to be exposed, and other details of this record.

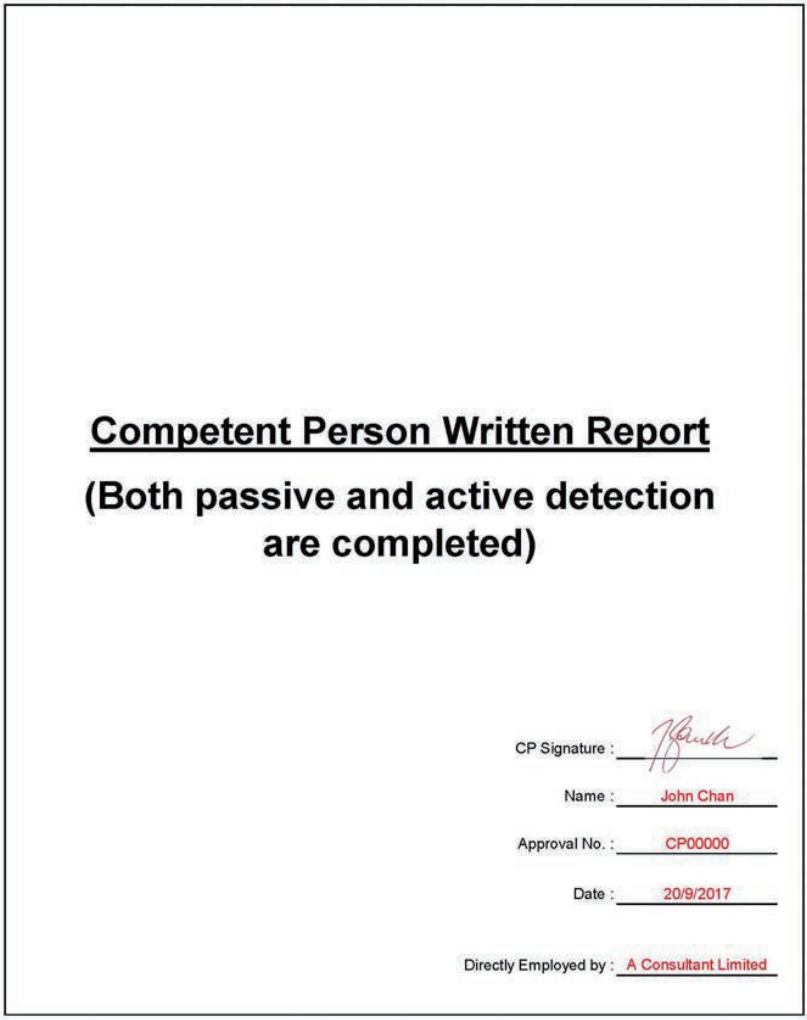
1 Signature : _____ Date : _____
Name/ Post : (/)

2 Signature : _____ Date : _____
Name/ Post : (/)

3 Signature : _____ Date : _____
Name/ Post : (/)

4 Signature : _____ Date : _____
Name/ Post : (/)

Appendix 5: A sample form of Competent Person Written Report



Competent Person Written Report

(Both passive and active detection are completed)

CP Signature : _____

Name : John Chan

Approval No. : CP00000

Date : 20/9/2017

Directly Employed by : A Consultant Limited

Appendix 5: A sample form of Competent Person Written Report

Record No. : 266366EMSD

To : Foreman (Post) of B Company Limited (Name of site contractor or other working party)

Part A - Basic Information

I John Chan the Competent Person of underground electricity cable detection

Approval No.: CP00000 expiry date: 1/12/2017

in accordance with Electricity Supply Lines (Protection) Regulation,

from 2017 year 9 month 18 day 10 hour 0 minute

to 2017 year 9 month 20 day 15 hour 0 minute

at Opposite to Tai Wai Street Carpark, Tai Po, N.T.

undertook underground cable detection (both active and passive detection) and marked the cable alignment and depth on site.

Part B - Equipment used during underground cable detection

Receiver	Brand name:	C	Serial No.:	456123
	Model No.:	123	Calibration record (Date)	15/8/2017
Transmitter	Brand name:	C	Serial No.:	123456
	Model No.:	123a	Calibration record (Date)	15/8/2017
			Frequency:	8kHz, 11kHz & 33kHz

Part C - Matters requiring particular attention

Having found that the quantity of exposed cable was not matched with the cable shown in the underground cable plan, we discussed this issue with the electricity supplier on 19.9.2017 and the result was as follow:
The electricity supplier confirmed that the location of the part of the cable shown in the cable plan had been altered.

The above mentioned underground cable detection was carried out with the assistance of Peter MA and he/she was directly supervisied by me in the course of the detection.

CP signature: Date: 20/9/2017

CP assistant signature: Date: 20/9/2017

Name: (Peter MA)

Appendix 5: A sample form of Competent Person Written Report

Part D - Attachments

1	Work Procedure	(Total 1 sheets)
2	Measurement record	(Total 1 sheets)
3	Underground Cable Alignment Layout Plan by Active Detection	(Total 1 sheets)
4	Photos showing toroidal active detection and site markings for cable alignment and depth	(Total 6 nos.)
5	Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans (if any)	(Total 1 sheets)
6	Electricity supplier's cable plans	(Total 1 nos.)
7	Site briefing	(Total 1 sheets)
8	Others: _____	(Total 0 sheets)

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Work Procedure

Record No. : 266366EMSD Page: 3

Working Place : Opposite to Tai Wai Street Carpark, Tai Po, N.T.

Nature of Work : Trench work

Date / Time	Cable Detection Work Procedure	Relevant Photo No.
18/9/2017 at 10:30	Having obtained the location plan of the construction site and the corresponding underground cable plan, passive detection was being planned to carry out.	
18/9/2017 at 11:00	Passive detection was carried out.	Photo 1 and Photo 2
19/9/2017 at 10:00	Supervion of trial holes excavation until the target cable was exposed.	
19/9/2017 at 12:00	Having found that the quantity of exposed cable was not matched with the cable shown in the underground cable plan, we liased with CLP.	
19/9/2017 at 13:00	Having liased with CLP, CLP confirmed the above cable location had been altered. Therefore, the quantity of the exposed cable was correct.	
20/9/2017 at 10:00	Carried out torodial active detection to identify the alignment & depth of the un-exposed underground cable	Photo 3
20/9/2017 at 11:00	Marked the cable alignment & depth on site & took photos for record purpose	Photo 4, photo 5 and Photo 6
20/9/2017 at 11:30	Measured and recorded the distance between the detedtion point & the refernce point A & B	
20/9/2017 at 13:30	Submission of competent person writtten report to the working party	
20/9/2017 at 14:30	The working party arranged site briefing given by the competent person to ensure that the site personnel were conversant with the contents of the report and the site personnel was requested to sign for record purpose.	

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Measurement Record

Record No. : 266366EMSD Page: 4

Cable No. 123456

Cable Quantity: 1

Voltage: ____ no. control signal cable
____ no. 380/220V ____ no. 132kV
1 no. 11kV ____ no. 275kV
____ no. 22kV ____ no. 400kV
____ no. Control signal cable

Cable detection point	Distance from reference point (A)*		Distance from reference point (B)*		Depth from ground level*		Remarks (Cable information)
	Actual (m)	Ratio 1:	Actual (m)	Ratio 1:	Passive detection^ (mm)	Active detection (mm)	
P1	10.8	36.0	1.8	6.0	800	800	1 no. of 11kV underground cable
P2	9.0	30.0	3.6	12.0	750	790	1 no. of 11kV underground cable
P3	7.2	24.0	5.4	18.0	800	810	1 no. of 11kV underground cable
P4	4.2	14.0	8.4	28.0	750	800	1 no. of 11kV underground cable
P5	2.7	9.0	10.2	34.0	750	800	1 no. of 11kV underground cable
P6	1.5	5.0	11.4	38.0	750	800	1 no. of 11kV underground cable

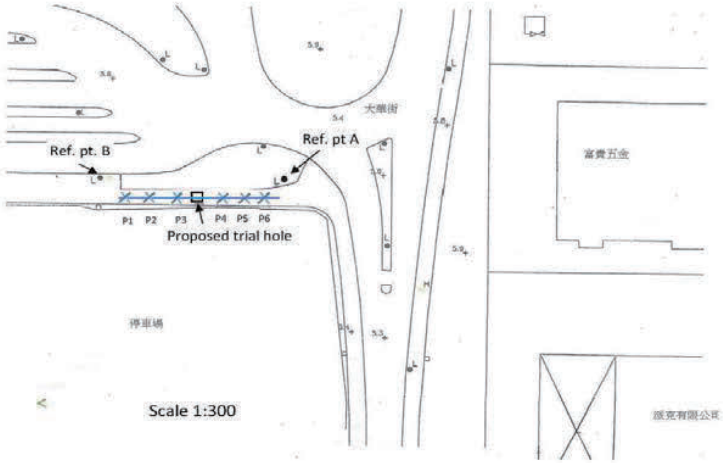
* Deviation is less than 25%

^ depth measurement from passive detection is not accurate and the figure is for reference only

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Underground Cable Layout Plan

Record No. : 266366EMSD Page: 5



Legend:
(For reference only)
X : Measurement Point
D : Cable Depth (mm)
---: Cable Alignment
A : Reference Point A
B : Reference Point B

A

D

-------- ------ X ------ ------

B

Remarks : The cable layout plan should include all the relevant details to clearly indicate the cable location such as site area, cable alignment, reference point, sequence number of detection points, cable depth, cable quantity, cable voltage level, trial hole location, kerb, building line, manhole, etc.

Ratio 1 : 300

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Photos for Active Detection

Record No. :266366EMSD **Page :** 6

Photo 1 (Passive detection was carried out)	Photo 2 (Cable detection area)
	
Photo 3 (Carried out torodial active detection)	Photo 4 (Marked the cable alignment & depth on site)
	
Photo 5(Marked the cable alignment & depth on site)	Photo 6 (recorded Marked the cable alignment & depth)
	

Appendix 5: A sample form of Competent Person Written Report

CP Written Report

Record No.: 266366EMSD Page: 7

Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans (if any)

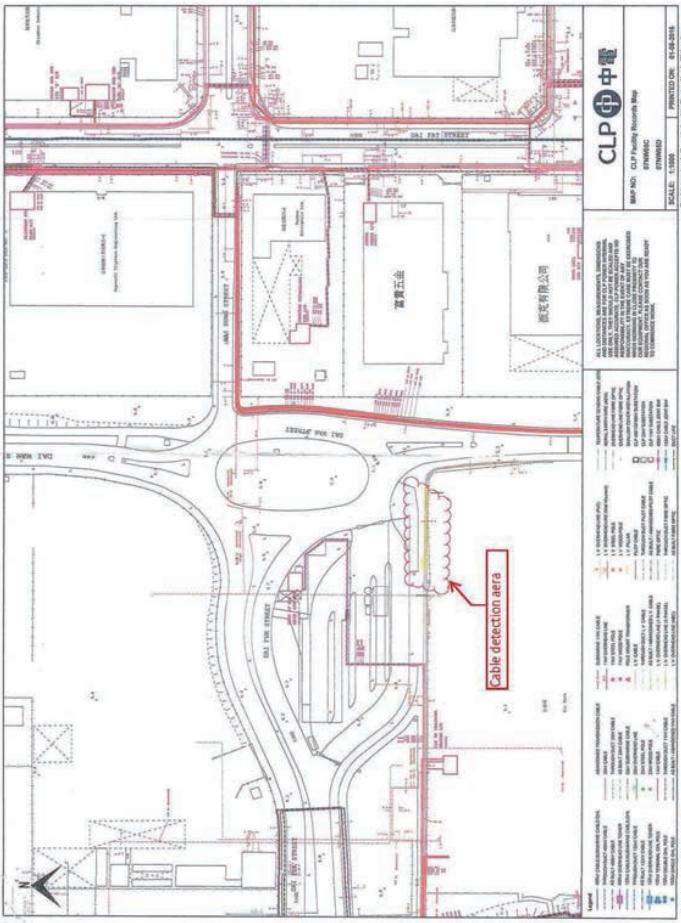
The working party has requested cable plans from the electricity supplier on 1 August 2017 and has received the cable plans from the electricity supplier on 10 August 2017.

Having found that the quantity of exposed cable was not matched with the cable shown in the underground cable plan, we discussed this issue with the electricity supplier on 19.9.2017 and the result was as follow:
The electricity supplier confirmed that the location of the part of the cable shown in the cable plan had been altered.

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Cable Layout plan of Electricity Supplier

Record No.: 266366EMSD Page: 8



Appendix 5: A sample form of Competent Person Written Report

CP Written report

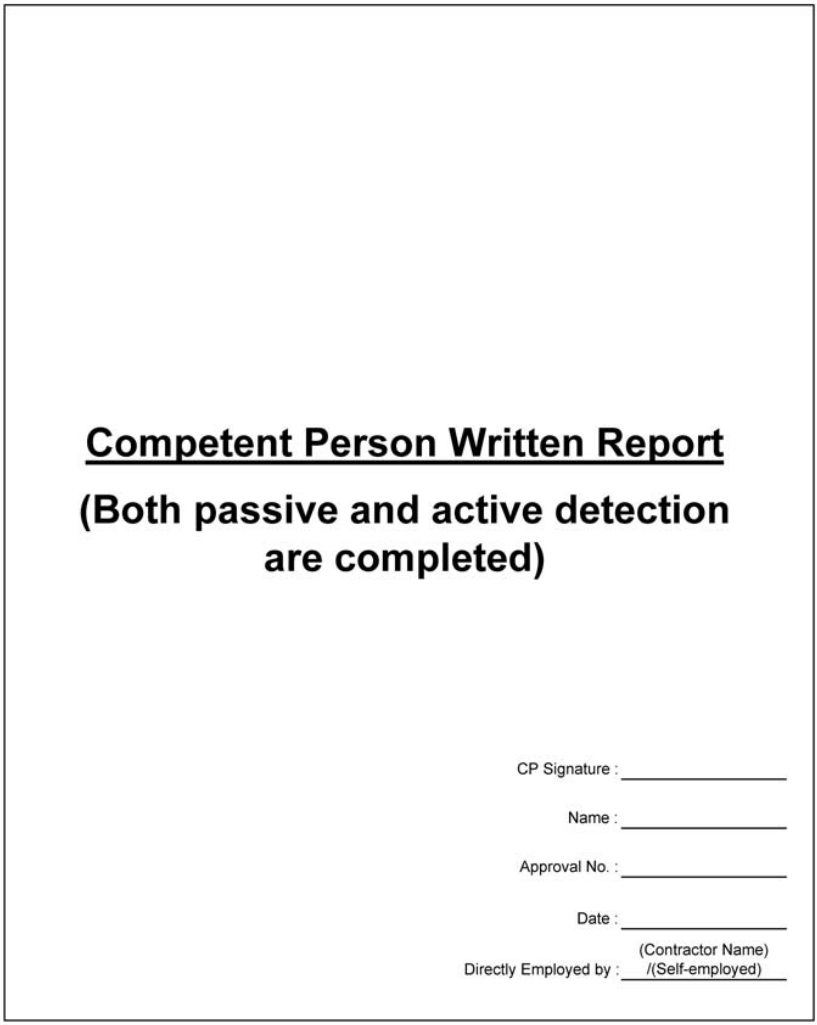
Record No.: 266366EMSD Page: 9

Site Briefing

I have briefed the content of the Competent Person Written Report to the following site personnel, such as the operators of excavator/machine and workers engaged in excavation work, including the meaning of site markings, potential danger as a result of cable damage and the required safety precautions, and other details of this report.

1	Signature :		Date : 20/9/2017
	Name/ Post :	(Jasper POON / Site agent)	
2	Signature :		Date : 20/9/2017
	Name/ Post :	(Kenneth MAK / Foreman)	
3	Signature :		Date : 20/9/2017
	Name/ Post :	(David CHEUNG / Operator)	
4	Signature :		Date : 20/9/2017
	Name/ Post :	(Johnson KWOK / Worker)	

Appendix 5: A sample form of Competent Person Written Report



Competent Person Written Report

(Both passive and active detection are completed)

CP Signature : _____

Name : _____

Approval No. : _____

Date : _____

Directly Employed by : (Contractor Name) /(Self-employed)

Appendix 5: A sample form of Competent Person Written Report

Record No. : _____

To : _____ (Post) of _____ (Name of site contractor or other working party)

Part A - Basic Information

I _____ the Competent Person of underground electricity cable detection

Approval No.: _____ expiry date: _____

in accordance with Electricity Supply Lines (Protection) Regulation,

from _____ year _____ month _____ day _____ hour _____ minute

to _____ year _____ month _____ day _____ hour _____ minute

at _____

undertook underground cable detection (both active and passive detection) and marked the cable alignment and depth on site.

Part B - Equipment used during underground cable detection

Receiver Brand name: _____ Serial No.: _____

Calibration record

Model No.: _____ (Date) _____

Transmitter Brand name: _____ Serial No.: _____

Calibration record

Model No.: _____ (Date) _____

Frequency: _____

Part C - Matters requiring particular attention

For example: major discrepancies between cable detection results and the electricity supplier's cable plans/ cable is found to be in shallow depth and has discussed the issue with the electricity supplier on _____ and the result is as follow:

The above mentioned underground cable detection was carried out with the assistance of _____ and he/ she was directly supervisied by me in the course of the detection.

CP signature: _____ Date: _____

CP assistant signature: _____ Date: _____

Name: ( )

Appendix 5: A sample form of Competent Person Written Report

Part D - Attachments

1	Work Procedure	(Total_____sheets)
2	Measurement record	(Total_____sheets)
3	Underground Cable Alignment Layout Plan by Active Detection	(Total_____sheets)
4	Photos showing toroidal active detection and site markings for cable alignment and depth	(Total_____nos.)
5	Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans(if any)	(Total_____sheets)
6	Electricity supplier's cable plans	(Total_____nos.)
7	Site briefing	(Total_____sheets)
8	Others: _____	(Total_____sheets)

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Work Procedure

Record No. : _____ Page : _____

Working Place : _____

Nature of Work : _____

Date / Time	Cable Detection Work Procedure	Relevant Photo No.

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Measurement Record

Record No. : _____ Page: _____

Cable No. _____

Cable Quantity: _____

_____no. control signal cable

Voltage: _____no. 380/220V _____no. 132kV

_____no. 11kV _____no. 275kV

_____no. 22kV _____no. 400kV

Cable detection point	Distance from reference point ( )*		Distance from reference point ( )*		Depth from ground level*		Remarks (Cable information)
	Actual (m)	Ratio 1:	Actual (m)	Ratio 1:	Passive detection^ (mm)	Active detection (mm)	

* Deviation is less than 25%

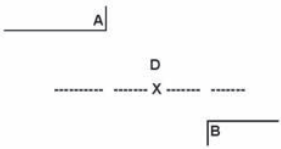
^ depth measurement from passive detection is not accurate and the figure is for reference only

Appendix 5: A sample form of Competent Person Written Report

CP Written Report
Underground Cable Layout Plan

Record No. : _____ Page: _____

Legend:
(For reference only)
X : Measurement Point
D : Cable Depth (mm)
----: Cable Alignment
A : Reference Point A
B : Reference Point B



Remarks : The cable layout plan should include all the relevant details to clearly indicate the cable location such as site area, cable alignment, reference point, sequence number of detection points, cable depth, cable quantity, cable voltage level, trial hole location, kerb, building line, manhole, etc.

Ratio 1 :

Appendix 5: A sample form of Competent Person Written Report

CP Written Report	
Record No.: _____	Page: _____
Electricity supplier's advice, such as advice sought from the electricity supplier upon detecting major deviations of cable alignment on site from electricity supplier's cable plans(if any) The working party has requested cable plans from the electricity supplier on _____ and has received the cable plans from the electricity supplier on _____.	

Appendix 5: A sample form of Competent Person Written Report

CP Written Report

Record No.: _____ Page: _____

Site Briefing

I have briefed the content of the Competent Person Written Report to the following site personnel, such as the operators of excavator/machine and workers engaged in excavation work, including the meaning of site markings, potential danger as a result of cable damage and the required safety precautions, and other details of this report.

1 Signature : _____ Date : _____
Name/ Post : (/)

2 Signature : _____ Date : _____
Name/ Post : (/)

3 Signature : _____ Date : _____
Name/ Post : (/)

4 Signature : _____ Date : _____
Name/ Post : (/)

Appendix 6: 13 Steps for Underground Cable Detection

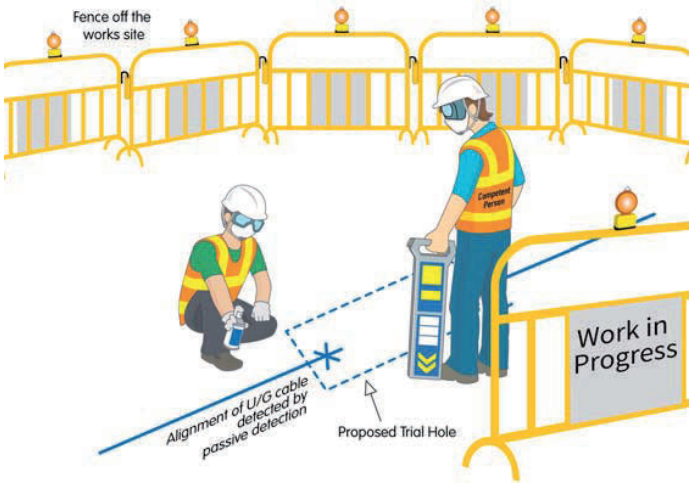
Illustrations and text description in the Appendix 6 are for reference only, with a view to providing an easy-to-understand summary of the provisions in this Code. In the event of any conflict or inconsistency between the illustrations/text description in the Appendix and the provisions in the main text of the Code, the provisions in the main text of the Code shall prevail.

Appendix 6: 13 Steps for Underground Cable Detection

Step 1:

Obtain drawings of works site and electricity supplier's cable plans

Step 2:



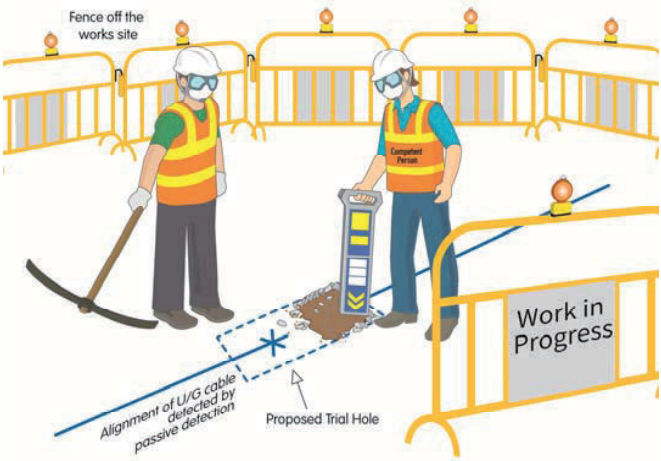
Carry out passive cable detection and propose trial hole locations

Appendix 6: 13 Steps for Underground Cable Detection

Step 3:

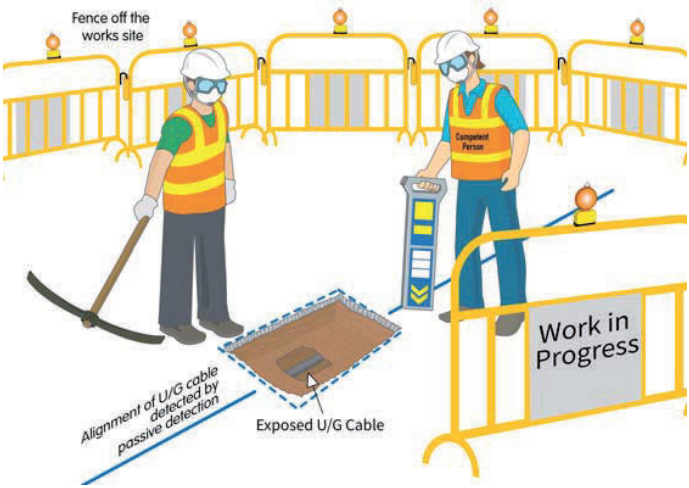
Appendix 6: 13 Steps for Underground Cable Detection

Step 4:



The competent person should repeatedly use a cable detection device and frequently update the working personnel as to the most accurate cable location.

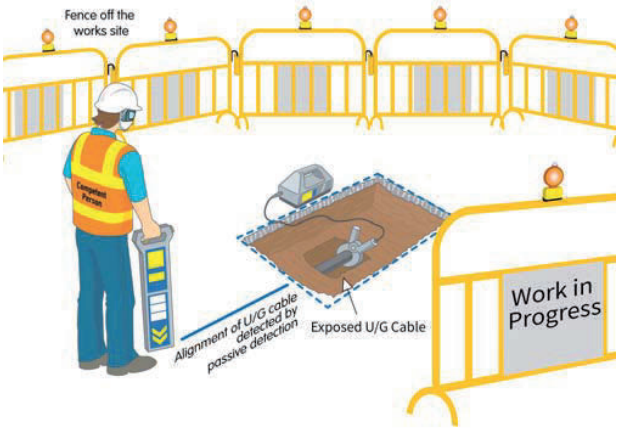
Step 5:



Trial hole excavation completed and the target cable is exposed.

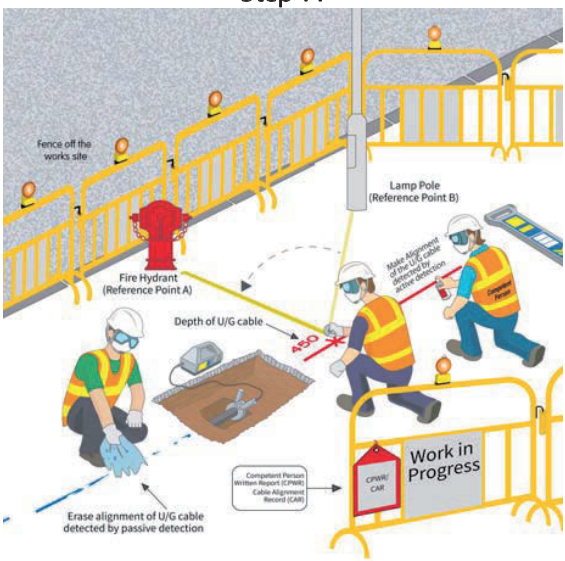
Appendix 6: 13 Steps for Underground Cable Detection

Step 6:



Place a signal clamp around the cable and carry out toroidal active cable detection in order to ascertain the alignment and depth of the unexposed underground electricity cables.

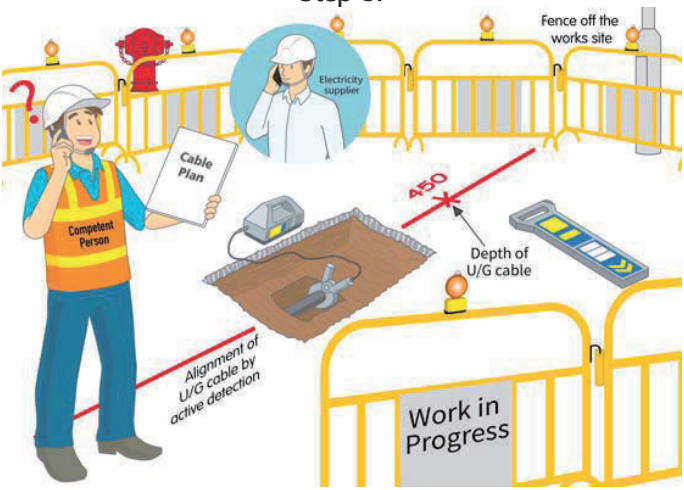
Step 7:



Mark the alignment and depth of underground electricity cables on the ground.

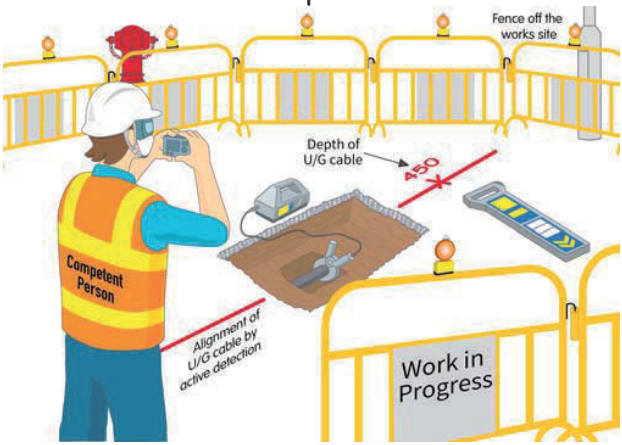
Appendix 6: 13 Steps for Underground Cable Detection

Step 8:



The competent person shall repeat the cable detection and/or contact the electricity supplier when he finds discrepancies between the cable detection results and the electricity supplier's cable plans.

Step 9:



Take photos to record the cable detection process.

Appendix 6: 13 Steps for Underground Cable Detection

Step 10:

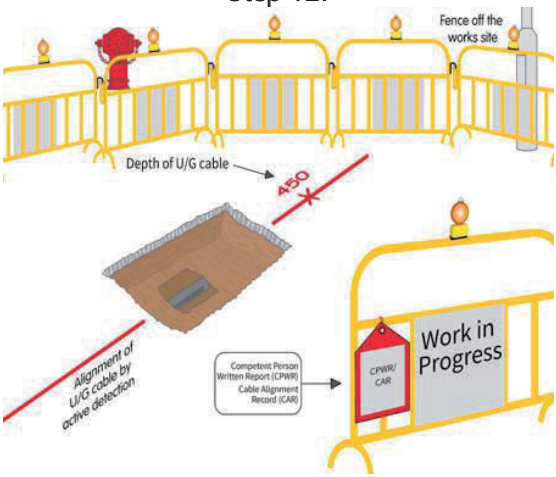
Provide a "Competent Person Written Report" to the working party.

Step 11:

Conduct site briefing to site personnel to explain the contents of the Report and the safety precautions.

Appendix 6: 13 Steps for Underground Cable Detection

Step 12:



Working party shall keep the Competent Person's Written Report or Cable Alignment Record available on the construction site for the Director's inspection. The report/record should be posted on the barrier or railing on the site.

Step 13:

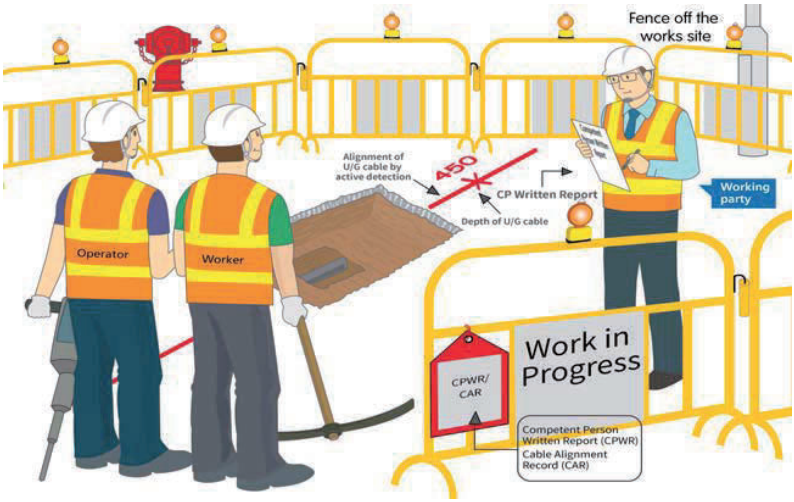
Working party shall ensure the markings (both alignment and depth) identified by the CP are available at site before the commencement of works.

Appendix 7: 11 measures for underground cable protection

Illustrations and text description in the Appendix 7 are for reference only, with a view to providing an easy-to-understand summary of the provisions in this Code. In the event of any conflict or inconsistency between the illustrations/text description in the Appendix and the provisions in the main text of the Code, the provisions in the main text of the Code shall prevail.

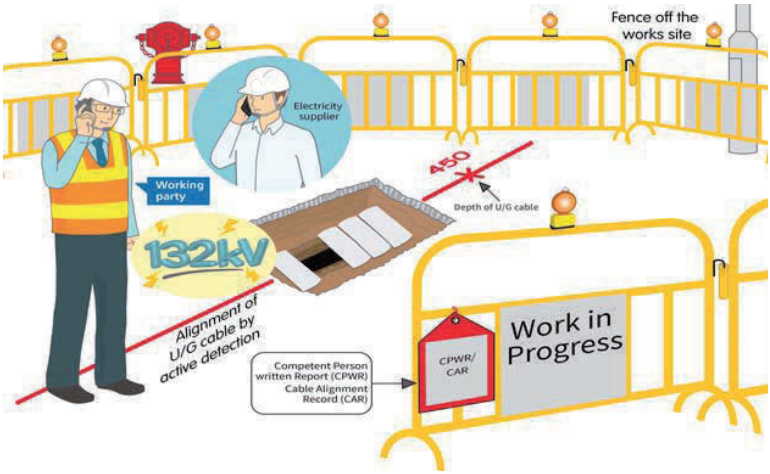
Appendix 7: 11 measures for underground cable protection

Measure 1:



Working party should brief the site workers of the site markings (both alignment and depth) according to Competent Person Written Report.

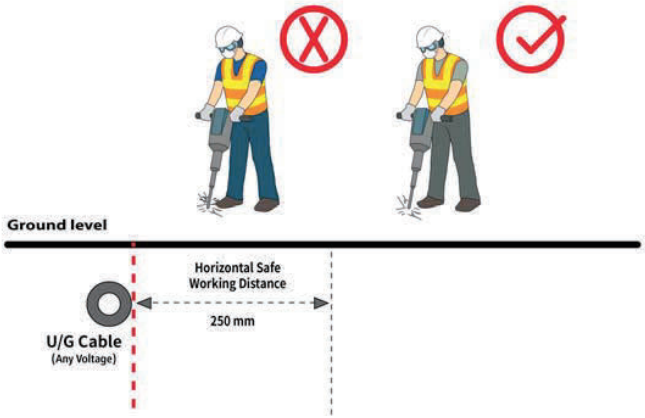
Measure 2:



If the voltage of the cable is 132kV or above, the electricity supplier must be informed before excavation.

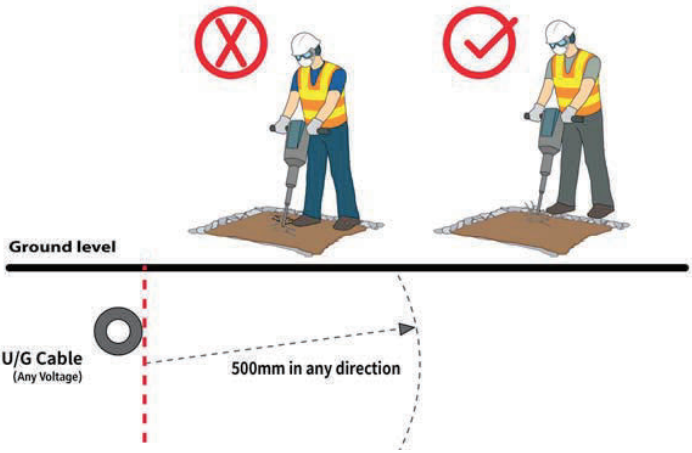
Appendix 7: 11 measures for underground cable protection

Measure 3:



Minimum horizontal safe working distance between any U/G cable and the point where hand-held power tools is used for breaking out paved concrete surface.

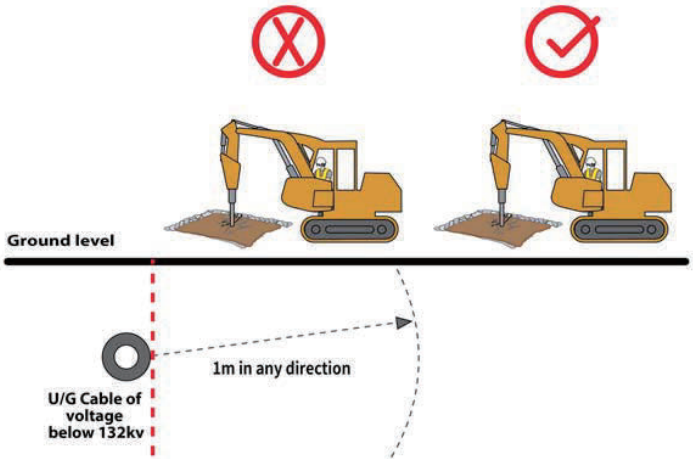
Measure 4:



Minimum safe working distance between any U/G cable and the point where hand-held power tools is used for excavation.

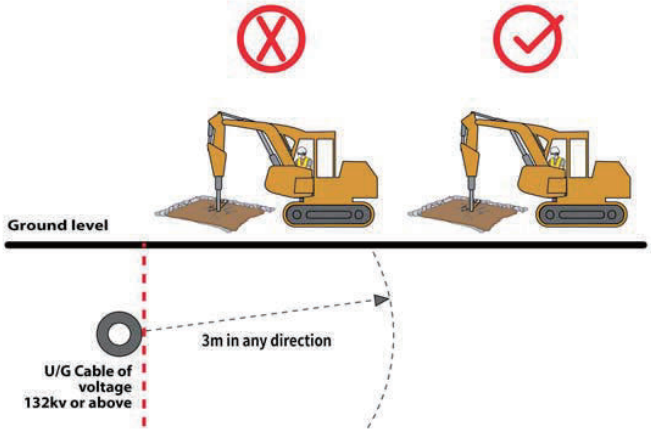
Appendix 7: 11 measures for underground cable protection

Measure 5:



Minimum safe working distance between U/G cables of voltage below 132kV and the point where mechanical excavators is used.

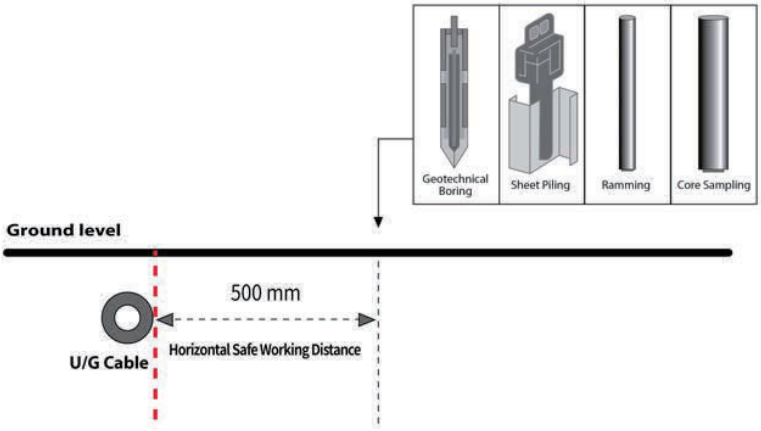
Measures 6:



Minimum safe working distance between U/G cables of voltage 132kV or above and the point where mechanical excavators is used.

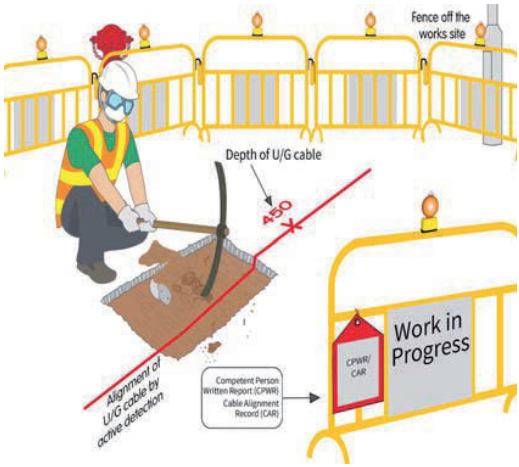
Appendix 7: 11 measures for underground cable protection

Measure 7:



Minimum safe working distance of vertical, horizontal or inclined penetration works.

Measure 8:



Use hand tools carefully to expose underground electricity cables.

Appendix 7: 11 measures for underground cable protection

Measure 9:

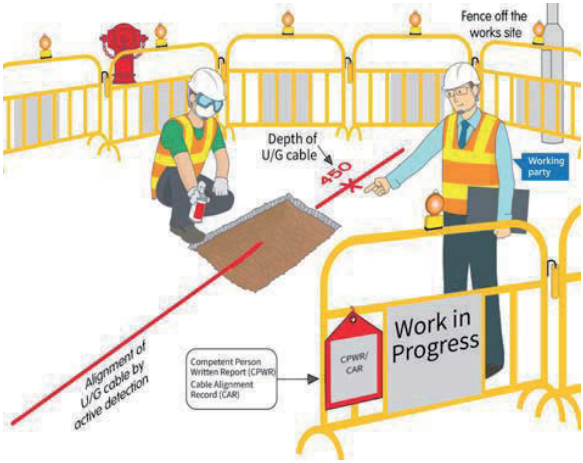
Provide proper support and protection to the exposed cables. Working party should contact electricity supplier in case of abnormal findings from underground cables (e.g. concrete surrounding for U/G cables) on site to seek technical advice.

Measure 10:

Provide proper backfilling for the cables. Approach electricity supplier to follow-up the damaged or missing cable protection materials.

Appendix 7: 11 measures for underground cable protection

Measure 11:



Working party shall ensure the site markings (both alignment and depth) identified by the CP are available at site before the commencement of works.

Appendix 8: 5 steps and 5 measures for protecting overhead electricity line

Illustrations and text description in the Appendix 8 are for reference only, with a view to providing an easy-to-understand summary of the provisions in this Code. In the event of any conflict or inconsistency between the illustrations/text description in the Appendix and the provisions in the main text of the Code, the provisions in the main text of the Code shall prevail.

Appendix 8: 5 steps and 5 measures for protecting overhead electricity lines

Step 1:

Obtain drawings of works site and electricity supplier's cable plans.

Step 2:

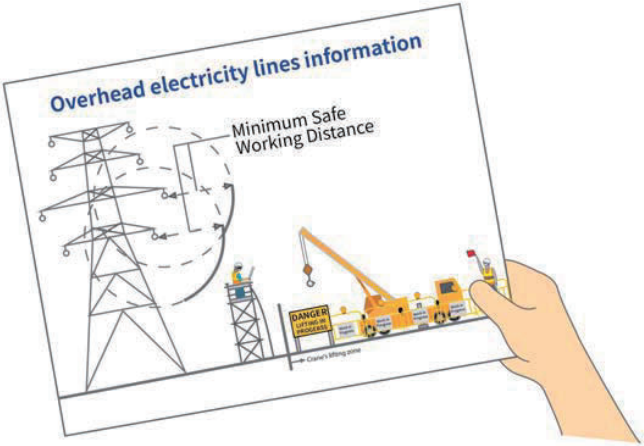
Ascertain the actual alignment, ground clearance and voltage of overhead lines.

Appendix 8: 5 steps and 5 measures for protecting overhead electricity line

Step 3:

Obtain safety advice from electricity supplier including the minimum safe working distance.

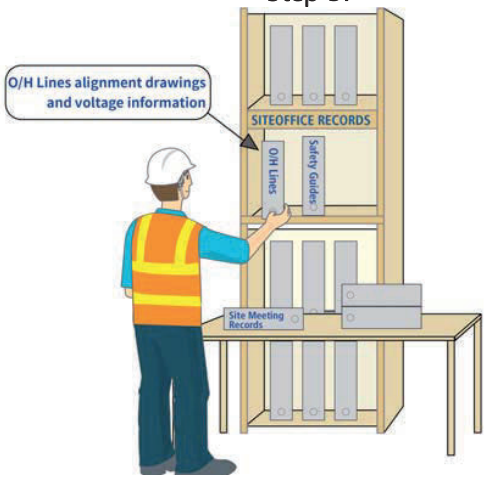
Step 4:



Provide site personnel with information about overhead lines and minimum safe working distance.

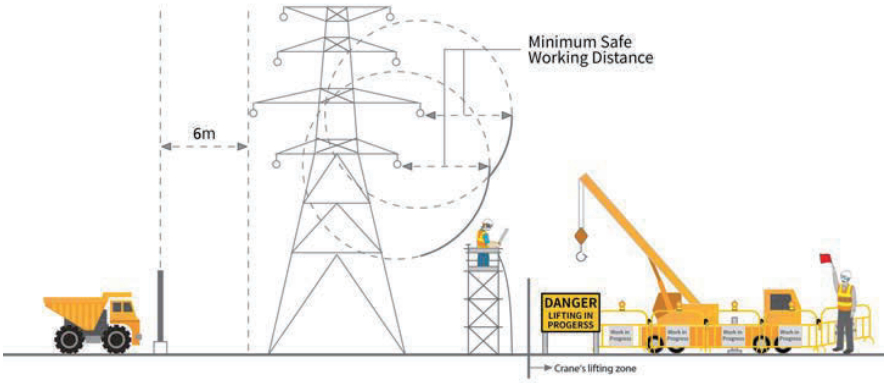
Appendix 8: 5 steps and 5 measures for protecting overhead electricity line

Step 5:



Working party should ensure all information about the O/H lines (e.g. alignment, distance from ground, voltage of the O/H line) and safety advice from the electricity supplier are made available for site personnel (e.g. supervisors, signallers, plant operators and workers), and working party should retain site meeting records described in Section 6.2.4 for inspection upon request by the Director.

Measure 1:

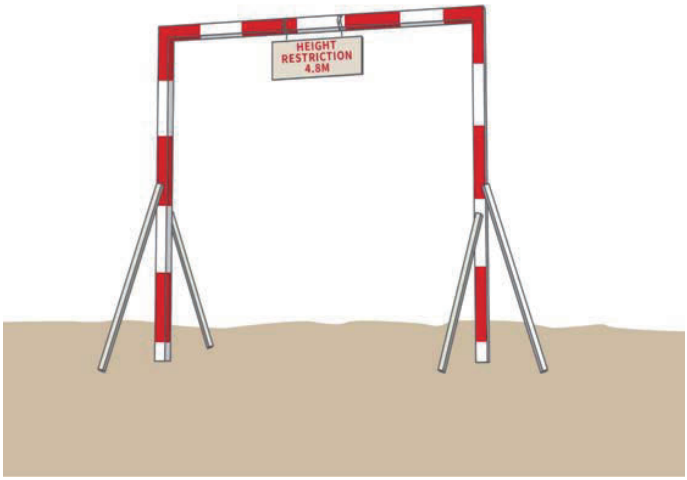


Minimum safe working distance underneath the O/H lines

Appendix 8: 5 steps and 5 measures for protecting overhead electricity line

Measure 2:

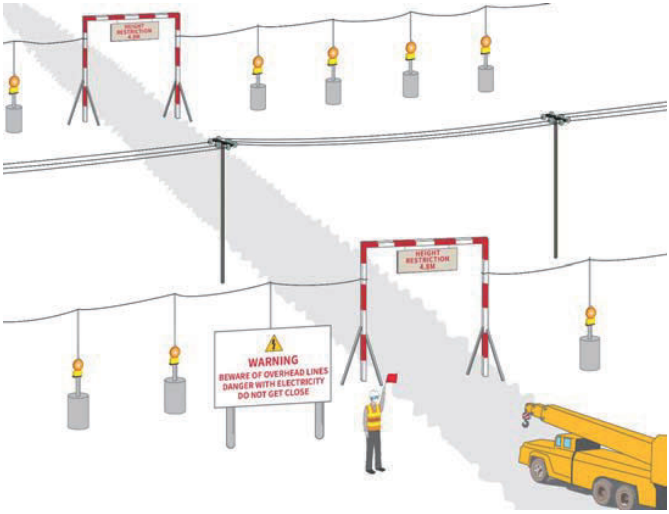
Measure 3:



Provide passageway with gateways should plant or equipment pass underneath overhead lines.

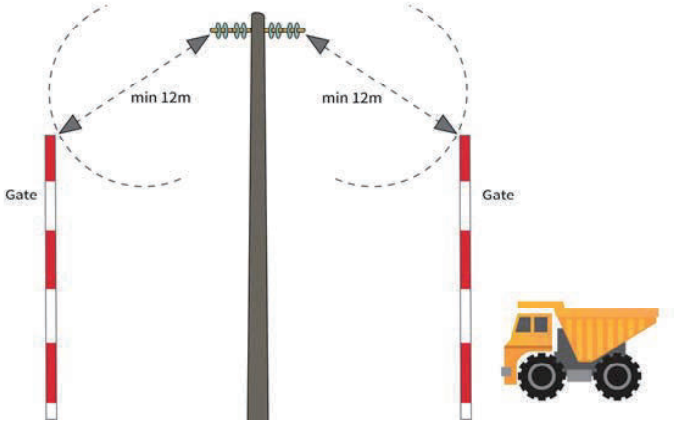
Appendix 8: 5 steps and 5 measures for protecting overhead electricity line

Measure 4:



Assign a signaller to guide the movement of plant or equipment.
Take all safety precautions to prevent personnel, plant and equipment from encroaching on the safe working distance.

Measure 5:



The distance between the height limiter used in a gateway and the outermost O/H line conductor.

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