



WORKSAFE VICTORIA

# GUIDE FOR UNDERTAKING WORK NEAR UNDERGROUND ASSETS

JULY 2004

## A GUIDE TO THE NO GO ZONES

WorkSafe's expectations for safe work practice.



*plan before you start work*



On 18 June 2017, the Occupational Health and Safety Regulations 2017 (OHS Regulations 2017) replaced the Occupational Health and Safety Regulations 2007 (OHS Regulations 2007), which expired on this date. **This publication has not yet been updated to reflect the changes introduced by the OHS Regulations 2017 and should not be relied upon as a substitute for legal advice.**

Information on the key changes introduced by the OHS 2017 Regulations can be found in the guidance titled *Occupational Health and Safety Regulations 2017: Summary of changes* - available at [https://www.worksafe.vic.gov.au/\\_data/assets/pdf\\_file/0011/207659/ISBN-OHS-regulations-summary-of-changes-2017-04.pdf](https://www.worksafe.vic.gov.au/_data/assets/pdf_file/0011/207659/ISBN-OHS-regulations-summary-of-changes-2017-04.pdf). However, this guidance document contains material of a general nature only and is not to be used as a substitute for obtaining legal advice.

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## Disclaimer

While every reasonable effort has been made to ensure that this document is correct at the time of printing, the Project Team disclaim any and all liability to any person in respect of anything or the consequences of anything done or omitted to be done in reliance upon the whole or any part of this document.

These documents contain the findings of a project involving industry participants and does not necessarily reflect the single position of any individual organisation, company, statutory body or person/s involved and are provided to provide a guidance for a base level safety solution for undertaking work near underground utility services.

- **Access Authority:** any form of authorisation which allows work on or near an asset which is issued by a representative of the asset owner to an individual, allowing work to be conducted in accordance with the conditions specified on the Authority.
- **Asset:** an overhead cable network or an underground water/drainage/sewerage, electricity, gas or communications network.
- **Asset Owner:** the owner of an asset or the provider of a utility service.
- **Aerial Service Line:** the final span or section of an overhead electrical service running from a power pole to the point of supply for a customer.
- **Awareness training:** a regime endorsed by the USC which provides an individual with an appropriate awareness level of hazards posed by utility assets including the risks associated with utility services at a worksite.
- **Cable/s:** a wire, conductor or form of material designed for carrying electric current or communications signals.
- **Competent:** a suitably trained individual with sufficient experience to safely perform, with minimal supervision, work outlined in this guidance material.
- **Deemed to Comply:** a process described in this guide governing activities near utility services which is accepted as complying with relevant legislation, regulations or rules.
- **Driver:** the person responsible for direct operation of any vehicle in transit mode.
- **Earthmoving Machinery:** as defined in the OH&S (Plant) Regulations - 1995. "Means plant used to excavate, load, transport, compact or spread earth, overburden, rubble, spoil, aggregate or similar material, but does not include a tractor, industrial lift truck, or a vehicle designed to be used primarily as a means of transport on public roads".
- **Elevating Work Platform (EWP):** a vehicle mounted boom-type mechanical device that is primarily used to support a work platform in an elevated position. The control of the platform position may involve luffing, (raising) telescoping and slewing actions.
- **Envelope:** the space encapsulating a plant item, including attachments such as rotating/flashing lights or radio aerials and is categorised as:
  - Design:* the space encapsulating all possible movements of the plant and any load attached under maximum reach.
  - Operating:* the area encompassing the movement of plant and any load under controlled and managed circumstances or encompassing engineering solutions controlling the movement of plant and its load.
  - Transit:* the area encompassing the normal height and width of a vehicle or plant when travelling to or from a worksite.
- **Excavating:** the movement or placement of soil or other surface materials by removing, boring or forcing objects into the ground or earth surface.
- **Hazard:** a source of potential harm or a situation with a potential to cause loss.
- **High Voltage or HV:** a nominal voltage exceeding 1000 volts.
- **Insulated:** separated from adjoining conducting material by a non-conducting material to mitigate the danger of electric shock.
- **Inspector:** an individual authorised under the *OH&S act*.
- **Job Safety Analysis (JSA):** Formal method of identifying possible hazards associated with a particular job and determining the control measures to be implemented to minimise the hazards.
- **Low Voltage or LV:** a nominal voltage exceeding 50 volts but not exceeding 1000 volts.

# DEFINITIONS

- **Near:** a distance from an asset as follows:

*Overhead electrical assets:* a distance of 6.4 metres from overhead cables at voltages less than 66kV and 10 metres in the case of voltages greater than 66kV.

*Underground assets:* a distance of 2 metres from any underground asset and 3 metres from any underground assets registered under the *Pipelines Act* or an underground electrical cable with an in-service voltage greater than 66kV.

- **Network Asset Regulations:** the Statutory Rule No 141/1999 – Electricity Safety (Network Assets) Regulations 1999 including all the provisions contained therein.
- **No Go Zone:** the area surrounding:
  - overhead electricity cables on poles anywhere above or within 3000 mm to the side and below overhead power lines in the case of power lines up to and including 66kV and 8000 mm in the case of voltages above 66kV (tower lines); or
  - underground services being 300 mm for individuals and 500 mm for plant or equipment or 3000 mm of any underground assets registered under the *Pipelines Act* or an underground electricity cable with an in-service voltage of greater than 66kV.

**Note: Some asset owners may have a requirement for greater clearances than articulated here to ensure the integrity of their assets at a specific worksite. Any information pertaining to this additional requirement will be provided with the response to an asset enquiry.**
- **OCEI:** Office of the Chief Electrical Inspector.
- **OGS:** Office of Gas Safety.
- **Operation of plant and equipment:** the physical use of such items at a worksite.
- **Operation of Assets:** the physical management of utility services, including installation, maintenance and commissioning functions.
- **Operator:** the individual in control of a piece of plant or equipment at a workplace.
- **Permission:** where the Asset Owner or their representative has granted approval for the undertaking of a task or series of tasks near their assets. This approval may be subject to workplace safety and network or asset requirement provisions on the individual seeking to undertake the work.
- **Permit or Permit to Work (PTW):** an authority issued by an electricity asset owner, refer to definition of Access Authority (above) which allows work in the Permit Zone.
- **Permit conditions:** permission conditions stipulated by an asset owner.
- **PPE:** refers to personal protective equipment.
- **Plant:** any machinery, equipment or appliance including any component, fitting or accessory in relation to plant and defined as plant under the OH&S Plant Regulations (1995) with the specific exclusion of hand tools or endorsed devices used to locate and or maintain clearances from underground assets.
- **Plant operator:** see 'Operator'.
- **Pressurised:** a constrained flow of a substance in pipeline which may be of varying diameters and thicknesses, the flow of which may or may not be directly controlled by an asset owner.
- **Practicable:** has the meaning defined in the *Occupational Health & Safety Act 1985*.
- **Risk:** the likelihood of injury or illness or disease arising from exposure to or contact with overhead or underground services.
- **Safe:** not posing an unacceptable risk to life, health or property.
- **Safe systems of work:** work practices in which the health and safety risks to employees have been controlled so far as practicable.

- **Spotter:** a competent person who undertakes the task of observing and warning against unsafe approach to overhead and underground assets. A spotter for overhead electrical cables shall have successfully completed an endorsed training course.
- **Spotter Zone:** means the area adjacent to overhead assets (power lines) on poles anywhere within 3 to 6.4m to each side, and 8 to 10m on Tower Lines, and at or within 500 mm of an underground asset (mechanical plant) or 3m of an asset registered under the *Pipelines Act*.
- **Step potential:** means the potential electrical difference between any two (2) points, typically on the ground, which can be touched simultaneously by a person.
- **Supervisor:** a representative of the principal for a worksite, who has the delegated responsibility for a task or range of tasks being undertaken at the worksite.
- **Work:** an undertaking at a worksite involving plant and equipment other than hand-held equipment or tools.
- **Works:**
  - Planned or Programmed:* any work which has followed the normal planning process prior to work commencing, i.e. where the worksite has been physically inspected and assessed in advance of the work crew arriving on site.
  - Unplanned:* any urgent works where there has not been a reasonable opportunity to follow normal planning processes prior to work commencing. This includes works where the supervisor has not physically inspected the work place or where a work crew has come across a scope of work requiring action during the normal course of their duties.
  - Emergency:* where a crew is despatched to the work site in response to an immediate threat/danger to an individual, the public, property or the asset.
- **WorkSafe Victoria:** the regulator for workplace safety in Victoria.
- **Worksite:** the workplace under the *Occupational Health and Safety Act 1985*.

# GUIDE TO UNDERTAKING WORK NEAR UNDERGROUND SERVICES

## INTRODUCTION

These guidelines provide occupational health & safety advice on situations where underground services exist and where work is undertaken involving penetrating the ground at or below surface level. This document does not seek to impose on compatible legislation or guidelines involving excavations near gas or oil transmission. It aims to provide a framework which includes these existing requirements and advise persons who may have obligation under various pieces of legislation, including the *Occupational Health and Safety Act 1985*. These obligations exist for employers, self-employed persons and those in control of workplaces, principal contractors and workers.

The principal legislation covering utility assets and excavations works are the:

- *Crimes Act 1914*
- *Gas Safety Act 1997*
- *Electricity Safety Act 1998 including the Electricity Safety (Network Asset) Regulations 1999*
- *Occupational Health and Safety Act 1985*
- *Pipelines Act 1967*
- *Water Industry Act 1994*

Many accidents occur as a result of damage to underground services during excavation and other work involving ground penetration. Not every accident happens immediately. Some occur years after the work is completed, perhaps when a damaged service corrodes over time. In addition to the risk of personal injury, the financial and social costs of damaging underground services can be extremely high! Electricity and telecommunications distribution cables, gas and water pipelines may supply entire communities. Every effort should be made to ensure underground assets are not damaged in any fashion.

In addition to the above issues, any individual working on or near an associated field without the appropriate training is risking potentially fatal consequences.

## SCOPE

This document provides the principle OH&S guidance framework for those individuals undertaking work near underground assets. This should be considered a base level document of best practice guidelines for Victorian Industry. By providing a 'universal behaviour standard' approach, the guide presents a 'deemed to comply' position for OH&S matters. To further reduce individual and asset risk, these guidelines also require an individual to seek "permission" from the relevant asset owner if they are not fully able to comply with the guidance framework or are seeking to work within the permissioning clearance area around an asset.

The guidelines ensure asset owners, employers and industry are aware of their obligations to:

- Manage the risks involving underground services at a workplace.
- Provide safe systems of work for individuals dealing with works near underground services.
- Foster co-operation between underground utility owners and industry, to minimise risk to individuals, the community and damage to underground services.
- Operate and maintain utility services.
- Encourage the use of agreed practices for such work.

The terms of agreement between the project team members on OH&S matters including the recommended standards of work, procedures, and permissioning processes are contained in this guide.

<sup>1</sup> Independent research conducted by Ernst & Young established that a single telecommunications cable damaged can cost more than \$290,000, Telstra Corporation "Dial before you Dig" information.

# WHAT TO DO BEFORE YOU START EXCAVATING

All service utilities are required to maintain records of their underground services. When planning a job requiring excavation, a complete record search must be undertaken by lodging an enquiry with the central call service, known as 'Dial Before You Dig'. Asset owners who are not members of this service must also be contacted. Many risks associated with working near existing underground services can be minimised at the project planning stage. Lodging an enquiry with 'Dial Before You Dig' is as simple as visiting [www.dialbeforeyoudig.com.au](http://www.dialbeforeyoudig.com.au) or phoning 1100. Once the records are obtained, they should remain in the work area and be accessible to all. When carrying out emergency work, every effort should be made to obtain records as soon as possible. If work must commence prior to the records being obtained, it should be carried out on the basis that underground services are present. When an asset location is requested, asset owners may provide information on the recommended practices for work near that location or service.

Before undertaking an excavation in any street or footway, approval from the authorities and asset owners involved should be obtained. In most instances, approval may be obtained in the asset owner's response to a request for information via the 'Dial Before You Dig' service. Asset owners not members of the 'Dial Before You Dig' service, must be contacted directly. Asset owners may already have formal agreements in place describing how work may be undertaken near each other's assets.

For works on public lands, some utility/service providers, e.g. the Roads Authority (i.e. the Local Council, or in the case of State Roads, VicRoads) may have approval processes in place as a result of legislation or established agreements. Where any exemptions apply, the Roads Authority or other entities may still require notification of the works.

A critical part of planning safe systems of work is the validation of records at the work site. With some services installed over 60 years ago, it is likely that changes would have been made to the surface of the land at some stage. Road widening and regrading of surfaces are common causes for inaccuracies in records. For this reason, when working from old records, pipe and cable locating devices should be used. Any inaccuracies in records should be notified to the relevant authority.

Utility companies typically require notification and approval of a major project or where the project may require supply of a service or product outside normal residential demand.

At the project planning stage, it is important to consider minimising damage to surface infrastructure and disruption of services to residents, pedestrians and traffic.

Any construction or maintenance technique should ensure adequate clearances are maintained between services and that other services crossings are identified.

Consideration should also be given to the appropriate level of supervision and training, including specific industry awareness training, for an individual undertaking work near any gas or electrical assets.

## TRENCHLESS TECHNIQUES

Before commencing trenchless techniques, the location of other services and survey marks is required. Pot-holing (or equivalent asset location techniques) must be used to locate existing underground services to ensure adequate clearances are maintained between services and to locate other service crossings. Pot-holing at each service crossing and at regular spacing along services is recommended.

Where high risk services are identified, consultation with the utility/service provider may be required. Where clearances required



# WHAT TO DO BEFORE YOU START EXCAVATING

by other services cannot be achieved at the proposed depth of service installation, alternative solutions should be sought in consultation with the relevant parties, which may include the regulatory authority. Alternative solutions may include seeking alternative routes, relocation of existing assets, installing the new asset with reduced clearances, or installing the new asset well below the existing services.

It is crucial to provide the “as constructed details” on this type of installation for future reference, for the following reasons:

- The ground above the bore is typically undisturbed, not offering any indication of previous works.
- Inability to provide warning tape or mechanical protection above the asset.
- The bore may not follow a direct route.

## EXCAVATION AND TRENCHING

*(Note: These guidelines are not designed to impact the Mines Legislation)*

The following general information is provided when undertaking such work:

- The requirements of the WorkSafe Victoria Code of Practice - Safety Precautions for Trenching Operations, including the appropriate standards relating to road opening or traffic management, must be observed.
- Approved, non-destructive methods of underground asset location are supported within this guidance material. However, these should not be relied upon as the sole method of asset location.
- If a road opening permit is required for the worksite, it must be obtained from the Road Authority.
- To maintain essential support and protection of other existing services, excavations in the vicinity must not disturb the embedment around each service (See Table A for

minimum approach distances to identify if the Asset Owner must be contacted for specific approach conditions). This information should be supplied by the utility owner through a ‘Dial Before You Dig’ request. Where this is not possible, the relevant Utility/Service Providers must be consulted and permission obtained.

- Excavations in a road must be backfilled, compacted and re-sealed to the appropriate standard prior to opening the road to traffic.
- Permanent restorations should be done in as short a time as practicable so as not to cause a risk or hazard.
- Temporary restorations in roads and footways must be of sufficient quality to ensure the safety of pedestrians and vehicles until the final restoration is undertaken.
- Temporary restorations must be regularly checked by the responsible party to confirm their integrity.

## ABANDONED AND DISUSED OR RETIRED UNDERGROUND SERVICES, AND ASSETS LEFT IN-SITU

In cases where services are no longer to be utilised and are to be left in-situ, they are to be disconnected and/or filled, capped, plugged or otherwise rendered safe to avoid any future problems.

All such services shall be:

- Treated as in-service unless otherwise positively proven out of service.
- Marked accordingly on the appropriate asset record.
- If OOS, retired or abandoned services, etc. are to be interfered with, the owner of the service should be contacted and arrangements made to locate the service.
- A service shall not be used by others without prior agreement with the utility/service owner, so both organisations’ records can be updated.

# WHAT TO DO BEFORE YOU START EXCAVATING

**TABLE A: TYPES OF ASSETS AND LIMITS OF APPROACH**

ASSETS	CLEARANCES	CONTROLS
Types of underground assets  [Note: The owners of assets registered with the Dial Before You Dig service and covered by this guide require an enquiry through this free service and the compliance with any directive issued with information regarding the asset].	Minimum approach distance for individuals (A), and the working envelope of plant and equipment (B) for the guideline provisions.	Safety Controls required for the Deemed to Comply guideline provisions to take effect unless specifically undertaking careful excavation to locate underground assets or where specific permission has been granted.
6. Assets listed under the Pipelines Act.	3000 mm	Must contact the Asset Owner for specific conditions.
7. All electricity conductors greater than 66kV.	3000 mm	Must contact the Asset Owner for specific conditions.
8. All electricity conductors up to and including 66kV.	300 mm (A), 500 mm (B)	See specific requirements in the underground guidelines.
9. Telecommunications Cables.	300 mm (A), 500 mm (B)	Must contact the Asset Owner for specific conditions.
10. All Gas pipelines other than 6 above.	300 mm (A), 500 mm (B)	See specific requirements in the underground guidelines.
11. Water, Drainage & Sewerage pipelines.	300 mm (A), 500 mm (B)	Must contact the Asset Owner for specific conditions.

- Where a service is inserted into an OOS, retired or abandoned conduit, pipe or duct, the records shall show this information.
- If assets are sold or disposed of to another owner, then both organisations records should show such information.

## SERVICES AROUND POLES

Unless otherwise agreed, underground services and other obstructions around poles are to be kept a minimum distance of 300 mm from the periphery of the pole, to allow inspections by utility/service provider staff.

No excavation within 10 metres of a SWER transformer pole is to occur without the approval of the local electricity company.

## GENERAL REQUIREMENTS

General requirements to meet the “guidance material” provisions of this document are set out below to:

- Determine if you have underground services near the worksite;
- Provide hazard and risk identification on the asset;
- Provide appropriate OH&S requirements at a worksite;
- Provide management of the risks associated with damage to the surrounding environment or other services and reduce risk to the public.

# WHAT TO DO BEFORE YOU START EXCAVATING

## PLANNING AND LIAISON

Liaison with all authorities involved is to be undertaken before the start of work which may affect utility assets, to identify:

- Existing utility services;
- Duration of the project and scope of works;
- Future planned Services;
- Opportunities for coordination of works;
- Shared trenching opportunities;
- Utility/service providers and Roads Authority concerns and conditions; and expected working procedures;
- Any requirement/s for the worksite involving:
  - Relocation of assets
  - Access to assets
  - Permissioning requirements
  - Recording of infrastructure or assets locations or relocations
  - Financial costs
  - Individual, Asset or Community safety
  - Worksite and traffic management requirements
  - Reinstatement requirements  
(This liaison is in addition to the statutory notification required by legislation).

The planning before the start of work which may affect a utility asset should include consultation with, but not limited to:

- Local Council
  - Obtain Road Opening Permit/Notification
  - Confirm hours of operation
  - Identify & determine exact location of assets owned or managed by Council.
  - Approval of Traffic Control Plan
- VicRoads (for work on State Roads including any Road managed by VicRoads)
  - Road Opening Permit/Notification
  - Approval of Traffic Control Plan

– Identify & determine exact location of assets owned or managed by VicRoads.

- Utility/service providers
  - Agreement on the use of OOS, retired or unused services
  - Advise affected residents/occupants
  - Permit requirements and conditions for undertaking the works
  - Identify & determine exact location of services
  - Methods to be adopted to protect existing services
  - Further consultation as required by the scope of works.
- 'Dial Before You Dig' and the asset registers of other infrastructure owners not registered with 'Dial Before You Dig'.
- Where underground services exist, the precise location of the Services shall be established by exploratory excavation (or equivalent non-destructive asset location techniques) prior to the principal excavation commencing.
- Consideration needs to be given to the presence of private property services e.g. gas, stormwater, sewerage and water services. These private property services are unlikely to be found on any plans and are best identified by a visual on-site inspection.

The close out process of the project or scope of work may typically involve recording the:

As constructed diagram of the asset or service and providing this record to the appropriate agency with details of:

- Finished Surface Level
- Depth of asset or service
- Alignments from property boundary and or kerb, etc.
- Type of cover or warning device installed e.g. warning tape, concrete slab, mechanical polymeric protection strip, etc.

# WHAT TO DO BEFORE YOU START EXCAVATING

- New ownership details of the services
- Services retired, removed, declared OOS, etc.
- Type, size, location & installation method of services
- Surface and underground markings installed
- Advice to any authorities, agencies, etc. on the completion of the project or scope of works
- Cancellation of any permits, authorities, etc.
- The provision of a copy of the asset plans to the new owner.

## REFERENCE DOCUMENTS

### Australian Standards

AS 2648.1 1995 Underground Marking Tape

AS 1345-1995 Identification of the contents of pipes, conduits and ducts

AS 2566.2 2002 Buried flexible pipelines

AS 4271 – Interim – Geographic information Data dictionary

AS 1742.3 Traffic control devices for works on roads

Copies of these standards can be purchased from Standard Australia's Customer Service Centre on 1300 654 646 or over the net at <http://www.standards.com.au/>

### Legislation

*Electricity Supply Act 1998*

*Gas Safety Act 1997*

*Water Act 1994*

*Occupational Health and Safety Act 1985*

*Pipelines Act 1967*

*Commonwealth Legislation:*

*Telecommunications Act 1997*

*Occupational Health & Safety*

*(Asbestos) Regulations 2003*

*Telecommunications Codes of Practice 1997*

*ACIF C524:2001*

### WorkSafe Victoria Codes of Practice

Code of Practice: Safety Precautions in Trenching Operations

Code of Practice: For Confined Spaces

Code of Practice: For First Aid in the Workplace

# LOCATING UNDERGROUND ASSETS

## INTRODUCTION

The purpose of this guide is to provide basic information to industry on how the location of underground assets may be undertaken. It is intended to be a guide only and cannot represent every given situation - variations can and do exist between field locations and those indicated by maps and plans.

Under the various pieces of legislation governing the gas, water and electricity assets, there is a responsibility on the individual undertaking the scope of work to positively locate the underground asset or service, by hand excavation or other approved method such as non-destructive excavation.

## INDUSTRY PRACTICES

The following information has been included to provide background information on current industry practices.

Even though there are basic depth requirements for installation on all utility services, plans supplied by utilities may not provide the depth at which the underground service is buried. This is due to the fact that over the years these may have been changed or altered, the ground contours may have changed due the addition or removal of earth during road or other construction works over the underground service.

A service may be laid with protection such as concrete surrounding it, to provide extra protection against excavation. In other cases, warning tape or polymeric, timber or concrete slabs may be laid over the service. The service could also be installed in conduit or pipe work.

Asbestos reinforced pipelines and duct work has been widely utilised in the utility industry with much of this type of asset still in service. Separate guidance material is available dealing with the safe removal and management of asbestos in the workplace.

## ELECTRICITY CABLES

### Cables

Cables are generally described by their:

- operating voltage
- conductor size and material
- number of conductors in the core
- insulation type and design grouping

Electric cables consist of a conductor or conductors to carry the current, and insulation to isolate the conductors from each other and from their surroundings. In several types, such as low voltage street lighting cables, the two components may form the finished cable, but generally as the voltage increases, the construction becomes more complex. Other cable components may include screening to obtain a radial electrostatic field, a metal sheath to keep out moisture or to retain a pressuring medium, armouring for mechanical protection and corrosion protection for any metallic components. Cable systems may also have a variety of external additions such as earthing conductors or pipes to supply oil or gas to the cables.

Cables are designed for installation in ducts or to be buried directly in a suitable stone-free backfill. They are not designed to resist the impact of plant or machine tools and are not designed to be left unsupported over any great distance.

### Use of cables

Cable installations can be divided into two broad classifications:

- local area distribution
- transmission

Local area distribution generally involves installation of low voltage cables (415V) and high voltage 6.6kV, 11 kV or 22 kV cables. These installations are common throughout city business districts, shopping centres, industrial

# LOCATING UNDERGROUND ASSETS

centres and residential estates. It is common practice to provide underground electricity supply to street lighting on major roads and to traffic signalling equipment.

Cables for transmission systems are typically 66kV or above and interconnect supply points or load centres. In some areas, buildings and street lights are obviously supplied by underground cables as there are no overhead lines. However, even when a local area is supplied by overhead lines, an electrical underground cable network may still be present. These cables may interconnect the various supply points and load centres by the shortest available route. Electricity cables may also be installed in parks, easements, rights of way, unformed road reserves, swamps, cemeteries, bridges and waterways. Most electricity cables are owned by the local electricity distribution authorities. However, other electricity cables may be present that are owned by electricity generation, rail or tram companies or road and traffic authorities.

## Cable records

Under the Electricity Act, records are required to be maintained on electricity cables. These records are maintained in the form of plans drawn to a suitable scale or on computer-aided mapping systems.

The detail of the records will vary with the type of installation. For cable installed in a standard allocation, the records may provide only general cross sectional arrangements of cable and conduits together with road crossing and street lighting information.

It is common practice to negotiate a special alignment on the roadway, for transmission cables. For this type of installation, the records are more detailed with reduced level and offset information provided. The details of local area distribution and of transmission cables are typically shown on separate plans.

## Cable installation

The current requirements for permanent installation of underground electricity cables on public lands are set down in the Electricity Safety (Network Assets) Regulations 1999. The depth of cover for underground electricity cables and underground control cables may vary from 450 mm to 750 mm, depending on the circumstances. If in doubt always assume a cable may be there.

Over the years, there have been many changes to cable installation methods and materials. Various measures have been taken to ensure the safety of persons digging in the vicinity of cables, including use of one or more of the following:

- Conduits/Ducts - Orange PVC, concrete, fibro asbestos concrete, earthenware, steel
- Bricks/tiles - Terracotta, concrete
- Marker tape - Polymeric
- Cover boards - Polymeric, concrete, timber

## GAS PIPES

### Gas reticulation systems

Over the past 100 years, many and varied methods of gas reticulation have been used, from low pressure services through to transmission systems. These have been constructed from a wide range of materials including coated welded steel, cast iron, uncoated steel and a variety of plastics. In most areas, these are buried directly in a suitable stone-free backfill. They are not designed to resist the impact of tools or mechanical plant or to be left unsupported over any great distance. These pipeline systems could convey different types of gases, such as natural gas or liquefied natural gas (LNG). The operating pressure of the distribution system could range from as low as 1.1kPa up to as high as 15mPa for a transmission system.

# LOCATING UNDERGROUND ASSETS

All high pressure steel pipelines have protection systems. These form part of the pipeline and incorporate test points and anodes at various points along its length. If these are broken or damaged, it should be reported to the gas utility immediately. They are easily rectified but can be extremely difficult to locate if the damage is not reported.

## Properties of gas

Gases have different properties. Should a leak occur, it's important to understand these properties.

### a. Natural Gas

Natural gas is lighter than air, allowing most leakage to disperse rapidly into the atmosphere.

### b. Liquid Natural Gas (LNG)

LNG is natural gas in its liquefied form. When cooled to  $-161^{\circ}\text{C}$ , natural gas becomes a clear, odourless and colourless liquid which takes up only 1/600 of the space of natural gas. When cold LNG makes contact with warmer air, it becomes a visible vapour cloud. As it gets warmer, the vapour cloud becomes lighter than air and rises becoming potentially dangerous. When enough LNG is spilled on water at a very fast rate, a Rapid Phase Transition (RPT) occurs. Heat is transferred from the water to the LNG, causing the LNG to instantly convert from a liquid to a gas. A large amount of energy is released during this rapid transition between phases and can cause an explosion. While there is no combustion, this explosion could be hazardous to any nearby person or buildings.

### c. Liquid Petroleum Gas (LPG)

This gas is heavier than air and tends to collect at ground level, particularly in any depressions such as trenches, pits, or underground storm water drains, etc. Leaking LPG may cause a potentially dangerous situation if the gas ignites. This may be at a considerable distance away from the actual leak.

## Records of services

All gas utilities operating gas distribution systems are required to maintain records of the pipe network in a road reserve. These records are kept in the form of plans drawn to a suitable scale or on computerised mapping systems. The detail of the records will vary with the type of installation. Transmission pipelines may be in areas other than verges in road reserves. They may be under road pavements and either dedicated or shared easements on private lands.

## Pipeline depths

Most pipelines laid in recent years may have a marking tape or polymeric slab laid above the pipeline for identification when excavating. However, these tapes or slabs may have been damaged by other excavations in the area since the initial construction and not replaced. For location purposes, plastic pipelines may have been laid with a metal detector wire or tracing tape. Again, it is important these tracer wires are not interfered with or broken, as it makes future location of these pipes very difficult. Other structures, such as siphon pots, valve pits, regulator pits and other varied components may be installed in the pipeline. Care needs to be taken to locate these before excavation. While the plans may show the expected location of underground services, it is doubtful whether services entering properties will be identified. These services are generally at right angles to the pipeline and are easily damaged by excavation alongside the main pipeline. Properties should be checked to ascertain whether gas meters are present. If so, the services normally run at right angles to the main pipeline to the service connection at the meter. The installed depth of pipelines varies from 600-800 mm for gas mains to 900-1200 mm for transmission pipelines.

# LOCATING UNDERGROUND ASSETS

## WATER PIPES AND SEWERS

### Pipeline types

Water authorities have been operating pipeline networks for more than 100 years. Over this time, a wide variety of materials have been used in the manufacture of sewer and water pipes. These pipes range in size from 15 mm to 1800 mm and may be made from cast iron, mild steel, cement lined steel, asbestos cement, copper, ductile cast iron or PVC. Cast iron and asbestos cement pipes are, in general, over 50 years old and often joined with lead. They are easily disturbed and very brittle. Mild steel and ductile cast iron pipes have external protective coatings which, when damaged, significantly reduce the life of the pipes. Copper pipes are very soft and easily compressed or bent without necessarily breaking, but their flow characteristics can be significantly reduced.

Sewerage and drainage services to houses would generally be earthenware or PVC. Larger sewer lines may be PVC, asbestos cement or concrete.

### Location

Water authorities maintain records of pipeline locations. Water pipes are required to be installed at a minimum depth of 450 mm under footpaths and a minimum of 600 mm under roads. However, these depths may be much less depending on the requirements at the time. Major sewer lines are often installed at greater depths than this, however this should not be assumed. Rising mains may have only 600 mm of coverage. Major sewer lines will have manholes every 90 to 130 m or when there is a change in pipeline direction.

As with other services, there can be great variations in pipeline depths, depending on their age and the amount of surface reconstruction over the years. More recently, water services have been co-located with other services in shared trenches. This raises the potential problem of simultaneous damage to several services.

## TELECOMMUNICATIONS CABLES

### Cables general

Telecommunications cables developed for underground installations have changed in line with technology requirements.

### Paired Cables (multi-wire)

Older cables still in service consist of paper insulated copper conductors contained within a lead sheath. Cable sizes range from one pair used to provide service to individual customers to cables containing many hundreds of pairs. (typically up to 2,400 pairs or larger). Larger cables (over 100 pairs) are often pressurised with dry air and contain alarm systems. Further development of cables saw paper insulation and plastic cable sheaths introduced into the telecommunications network.

The copper paired cable network is divided into three categories:

- Main cable network consisting of cables containing 100 to 2700 pairs
- Distribution cable networks consisting of cables from 10 to 100 pairs
- Lead-in cables, usually two pairs for residential areas but larger cables are provided to industrial/commercial sites.

Distribution and lead-in cables may be paper insulated, lead sheathed, plastic insulated, plastic sheathed air cored cables or plastic insulated, plastic sheathed, grease filled cable.

### Co-axial Cables

Co-axial cables may be either lead or plastic sheathed. Larger co-axial cables may contain four or more co-axial "tubes" plus copper pairs. These cables have the ability to carry very large volumes of circuits including television signals.

With the emergence of Cable TV, four additional co-axial cables have been introduced to the telecommunications network. Solid core 0.5 inch and 0.75 inch co-axial cables are provided for carrying CATV signals along suburban



# LOCATING UNDERGROUND ASSETS

streets, while flexible co-axial cables (Series 6 and 11 cables) are used as lead-in cables to customers' premises.

## **Optical Fibre Cables**

Optical fibre cables have many applications. They are used to provide circuits to pad mounted multiplexing equipment serving approximately 500 customers each. They are used as circuits linking exchange areas, as intrastate and interstate links and more recently to carry Cable TV circuits to distribution points from which co-axial cables radiate. Optical fibre cables are relatively small diameter cables but have a very large circuit capacity.

## **Other Cables**

Multiplexing equipment, CATV systems and pay phones require power cable feeds. These cables are identifiable by electricity industry standards. In some cases, cathodic protection systems cables and earth wires may exist with equipment requiring power cable feeds.

## **Cable installation**

Cables are designed for installation in pipe or direct burial in a suitable stone-free backfill. They are not designed to resist the impact of hand or machine tools or to be left unsupported over any great distance. Where agreement is reached between service owners, cables may share trenches with other utility assets. Power cables are often found in "shared trenches". Over the years, there have been many changes to installation methods and materials used for telecommunications cables. Cable may be buried directly or installed in one or more of the following:

- White PVC pipe – 10 mm to 100 mm internal diameter
- Fibro asbestos cement (FAC) pipes and ducting
- Galvanised iron (GI) pipe – various diameters

Large numbers of conduits (100 mm) may be encased in concrete to provide added support and security.

## **Depth of cover**

Cables installed in shared trenches and in private property are usually laid at a depth of 300 mm or more. Cables in public footways are usually laid at 450 mm, and under roadways at 600 mm. These measurements can vary according to surface level changes over time or where physical obstructions prevent achieving these depths.

## **Alignments**

The majority of telecommunication services at joint locations are housed in pits or manholes. However, the line between these may not be straight if obstructions were encountered during installation.

Direct buried cable in rural areas may be identified by pits/manholes and marker posts. However, it cannot be assumed that a cable follows a direct path between these items.

## **Cable records**

Cable records indicating the type of service installed are maintained by telecommunication carriers. However, the accuracy of information can be confirmed only by either electrical location methods (metal content cables) or by hand excavation (non-metallic optical fibre cables). Cable depths are not recorded.

## **Cable locations**

Persons wanting to identify the location of telecommunications services should telephone 1100 as indicated in the telephone directory.

# LOCATING UNDERGROUND ASSETS

## OTHER PIPELINES

### Pipeline systems

There are many pipelines operated by individual companies on special licences (*Pipelines Act*). Products in these lines could be liquid or gaseous and under high pressure. They may include the following:

- petroleum pipelines (oil, petrol, etc.)
- refinery gases
- liquid flammable gases
- privately owner water pipelines

It is important that thorough searches are made in areas where proposed construction is likely to take place.

### Records of reticulation

Having determined these pipelines may run in the general area of the worksite, the service owner should be approached for the necessary permission or records outlining the pipeline's exact location and characteristics.

## LOCATION OF SERVICES

The Victorian 'Dial Before You Dig' service forms part of the Association of Australian 'Dial Before You Dig' services and is available to assist in the location of most services. Ringing 1100 automatically connects you to the appropriate 'Dial Before You Dig' state service where you can obtain information on the location of members' services and the services of some Local Councils. 'Dial Before You Dig' advises which of its members has underground services in the area intended to be excavated and facilitates communication between parties. The service operates 8am - 5pm Monday to Friday for manual enquiries with the online service available on a 24 hour basis.

'Dial Before You Dig' forwards information requests onto those companies registered with the service. Typically, the asset owner is generally able to respond within three working days of receiving a request for information. Enquiries may be faxed to 1300 652 077 at any time for processing during office hours, the 24 hour online service available for an asset enquiry is available by visiting [www.dialbeforeyoudig.com.au](http://www.dialbeforeyoudig.com.au) and clicking on the State pertaining to your worksite.

To avoid damage to underground services, 'Dial Before You Dig' should be contacted. Registered utility/service providers are then contacted for information to help locate underground services. This is important to avoid injury to individuals, disruption to community services and significant costs associated with injury and third party damage. Potholing, or another endorsed non-destructive method, is the most reliable means of locating underground services at each service crossing and at regular spacing along services.

The availability of information on possible buried services greatly assists any project. Some infrastructure owners and private owners of underground services may not be registered with the 'Dial Before You Dig' service. When the location of services isn't readily known or identifiable, care must always be taken when excavating near utility assets.

All available avenues of information gathering should be utilised when seeking information on the location of underground assets.

Note: Not all asset owners have their infrastructure registered with the 'Dial Before You Dig' service. A list of companies registered with 'Dial Before You Dig' may be found at [www.dialbeforeyoudig.com.au](http://www.dialbeforeyoudig.com.au)

# LOCATING UNDERGROUND ASSETS

## GENERAL INFORMATION

Excavating without checking for underground services is extremely unsafe. Legislation exists to provide a level of safety for the individual and the assets. Should excavation be undertaken near underground services without the appropriate authority or approved processes, or if an individual damages or interferes with the assets legislation provides severe financial penalties.

Before commencing any excavation work, reference shall be made to the details or plans of the utility or private services in the proposed excavation area.

The location of underground services provided by a service or utility provider may not be accurate for many reasons. As complete accuracy cannot be guaranteed, the position of underground services must be proven by hand excavation or equivalent safe, non-destructive excavation technique.

A pipe or cable locator may be used to positively locate any pipes, mains or cables in lieu of using any mechanical equipment. Hand tools providing an appropriate level of safety, or equivalent non-destructive excavation techniques, must be used to prove the location of pipes, mains or cables buried in the ground where a locator is not utilised.

These services must be located prior to the use of any excavation equipment. (Note: any damage to underground services, no matter how minor, must be reported. If not, the service may deteriorate and lead to serious and costly damage at a later date.)

In the case of emergency repairs, as much information as possible should be sought by visual inspection before digging. The individual should prove, by hand excavation or other approved technique, the precise location of all existing underground services prior to digging. Consideration should also be given to an on-site meeting with utility providers in order to locate the asset.

A site meeting with the service provider/s may be required to determine location/s and procedures for dealing with services within the scope of work. This issue should be addressed during initial project development to provide time to establish a regime to manage any risks.

## SAFETY INFORMATION

Individuals must always work safely and proceed with caution, applying the safety rules applicable to the particular operation being carried out. Consideration must be given to the safety of individuals and the community, especially to provide adequate safety barriers and safe pedestrian access around the worksite. Additionally, personal protective equipment applicable to the particular operation must be used.

### **Some of the dangers which may arise when working near underground services are:**

- Gas Services:
  - Damage to gas services can cause gas escapes which may lead to fires or explosions if an ignition source is present. There are two types of leaks following damage to the service:
  - Damage which causes an immediate escape. In this case, there is a risk to those working at the site.
  - Damage which causes an escape some time after the incident. This may be through damage which weakens the service casing or the result of poor reinstatement practice. In this instance, the public is mainly at risk.
- Electricity Service:
  - An injury resulting from damage to live electricity cables is usually caused by the explosive effects of arcing current and by the fire or flames which may follow when the sheath of a cable is penetrated by an object. Damage and injury may also occur if the cable is crushed or contact is made between the individual phases of a cable.

# LOCATING UNDERGROUND ASSETS

- Petroleum or oil pipelines:
  - The result of damaging these services is similar to that of gas services. However, there is the additional risk of significant environmental issues, particularly when the liquids gain access to waterways.
- Water pipes and sewers:
  - Damage to water pipes is less likely to cause injury. However, a number of pipelines pump water under high pressure. A break in one of these pipelines can release an extremely powerful jet of water that may propel debris from the pipe or surrounding materials. Some older water pipes are also made from asbestos cement. Damaged water pipes have great potential to affect other services and structures, either directly or by washing away their support. This has significant implications for areas where shared trenches contain a combination of services. Damage to high pressure pipelines or services in a shared trench can have potentially fatal consequences.
  - The main danger from sewer damage is the possibility of contaminating a broken water main or service, damage to the environment or disease from exposure to sewage. Some sewer lines are also pumped under pressure and can present similar hazards to water pipelines. Toxic and explosive gases may also be present in both sewer lines and stormwater drains.

The safety considerations which could be utilised when working within 500 mm of a gas high pressure or medium pressure main include:

- The code of practice for shafts, tunnels & trenches, and the guide to dangers of poorly ventilated workplaces.
  - An appropriate fire extinguishing system.
  - Only one individual at a time should be excavating if hand excavation is being undertaken in a confined space? Another should act as an observer and be able to operate any breathing, escape or fire equipment required.
  - The elimination of an ignition source in the event of an escape.
  - A copy of the emergency plan in a prominent position on-site. This plan should include any contact details required.
  - No mechanical excavation being carried out within 300 mm of a protective cover slab or conduit. (It's important to ensure the underground cable, including any mechanical cover e.g. concrete or polymeric cover slab is not disturbed.)
  - Excavation below underground assets should not be undertaken within a distance of 300 mm below the asset located at the lowest level.

Note: all transmission pipelines involving gas, oil and petrochemical have separate requirements and the asset owners should be contacted.
- The safety considerations when working within 500 mm of underground high voltage or low voltage electrical cables include:
- No mechanical excavation being carried out within 300 mm to the side or below a protective cover slab or conduit. (It's important to ensure the underground cable, including any mechanical cover e.g. concrete or polymeric cover slab is not disturbed.)
  - Careful excavation with non-powered hand tools or other endorsed method up to the protective cover slab or conduit would not require permission from the asset owner.
  - Excavation below underground assets not coming within a distance of 300 mm below the asset located at the lowest level.
  - An appropriate fire extinguishing system.

<sup>2</sup> See the WorkSafe Victoria Code of Practices of Confined Space Entry'

# LOCATING UNDERGROUND ASSETS

Notwithstanding any guidance on the use of blasting as a means of excavation, where blasting is to take place within 30 m of an underground asset, the asset owner should be contacted for any special requirements.

Network Operators of underground services include:

- Electricity Generation, Transmission and Distribution
- Tram and Rail
- VicRoads
- Local Authorities
- Telecommunications
- Private
- Gas Transmission and Distribution
- Petrochemical
- Oil
- Water
- Drainage
- Sewerage

Some of the hazards associated with underground services are:

- Electricity
  - An electric shock and/or flash burns could occur if contact is made with underground cable.
  - Interrupted supply to a hospital or other critical service.
  - Earthing systems are installed for the safe operation of the electrical network. Damage to this system may present electrical hazard/s to individuals at the worksite. This damage may also provide a hazard to individual's off-site.
  - Old electrical cables can discharge voltage or explode if disturbed or damaged.
  - Telecommunication cables
  - Cables containing optical fibres carry light signals generated by Class 3B lasers. This

infra-red beam is invisible to the naked eye and exposure to it should be avoided.

- In most situations, there is no direct risk of injury from damaged telecommunication cables. However, the damage could create a hazardous situation. For example, if emergency services cannot be contacted or if whole communities become isolated.

- Escaping gas or oil

The escape of *highly* flammable gas or liquid poses a risk to the individual, the worksite and the community through:

- Jet fires
- Explosion
- Burns
- Asphyxiation

- Water and Waste services:

Damage to water and waste services is less likely to cause injury. However, a high pressure jet of water from a main can injure individuals, undermine roadways or damage adjacent services. Low-lying areas may also run the risk of flooding from both water and waste effluent.

The main danger from sewerage is water supply contamination and the risk of disease.

## CONTACT OR ARCING WITH AN UNDERGROUND ELECTRICAL CABLE

Should contact be made with an underground cable or arcing occur between the cable and an item of plant and/or employee, the following actions shall be taken:

- All work should cease immediately.
- Operator should remain inside cabin. If it is essential to leave the cab or operators station due to fire or other life-threatening reasons, jump clear of the equipment. Do not touch the equipment and ground at the same time. When moving away from the equipment, the operator should hop slowly, shuffle or jump away from the plant (with feet together) until at least 10 m

# LOCATING UNDERGROUND ASSETS

from the nearest part of the plant item.

- Warn all other personnel / public to keep at least 10 m clear from equipment. Do not touch any part of the equipment or load and do not attempt to approach or re-enter the vehicle until the relevant authorities have determined the site is safe.
- Facilitate First Aid treatment and seek medical aid as required.
- Advise your organisations emergency contact and request they immediately notify the relevant authorities, including the appropriate Utility Company.
- Initiate the emergency management plan and incident investigation process.

## CONTACT OR DAMAGE TO GAS ASSETS

Should an incident occur involving Gas assets, the following actions should be taken:

- All work should cease immediately.
- Operator is to shut down the plant or equipment UNLESS this process may provide an ignition source for any escaping gas. It is essential to leave the cab or operator station, trench or enclosure and maintain an exclusion perimeter due to the risk of explosion or fire. Do not attempt to use any instrument which may provide an ignition source near the gas escape. This may include mobile phones, two way radios, etc.
- Warn all other personnel / public to keep clear from the worksite and equipment. DO NOT attempt to approach or re-enter or start the vehicle until the relevant authorities have determined the site is safe.
- Facilitate First Aid treatment and seek medical aid as required.
- Advise your organisations emergency contact and request they immediately notify the relevant authorities, including the relevant Gas Distribution Company.
- Initiate the emergency management plan and

incident investigation process.

## CONTACT OR DAMAGE TO SEWERAGE ASSETS

Should an incident occur involving sewerage assets, the following actions should be taken:

- All work should cease immediately.
- Operator should remove contaminated clothing immediately.
- Shower or wash down with copious amounts of water.
- Use eye wash if eyes are contaminated.
- If wastewater is ingested, advice from a doctor should be sought immediately regarding a dose of immunoglobulin which can prevent Hepatitis A.
- If a person develops symptoms of nausea, vomiting, diarrhoea or fever then a doctor should be consulted immediately.
- Initiate your emergency plan and incident investigation process.

## TYPES OF UNDERGROUND SERVICES

The various types of underground services include:

### Electrical Cables

- High Voltage, Low Voltage
- Supervisory and signalling cables
- Cathodic protection
  - Cabinets
  - Cables
- Earthing rods and conductors
- Cable pits and chambers
- Conduits and ducts

### Communications Cables

- Phone lines
- Co-axial cables
  - Data cables
  - Signalling cables

# LOCATING UNDERGROUND ASSETS

- Broadband cables
  - Copper cable
  - Fibre optic cable
- Conduits and ducts

## **Water mains and services**

- Pits
- Valves
- Connections

## **Sewerage mains and services**

- Pits
- Tunnels
- Valves
- Connections

## **Stormwater, Grey water and Drainage trunklines and services**

- Pits
- Tunnels
- Shafts

## **VicRoads traffic detection and signalling circuits**

## **Oil transmission pipelines and valves**

### **Gas pipelines**

- Transmission
- Distribution
- LPG (Including Kiosks, Valves and syphons)

## **ON-SITE CHECKING**

Prior to any excavation work, check at least 100 m along the footpath in each direction and around nearby corners for indications of existing services. These include:

- Indicators or markers for underground services
- Drainage pits and manhole covers

- Damaged footpaths, driveways or depressions which may indicate the presence of a trench
- Cables running up a pole
- Overhead cables near the worksite
- Control cabinets
- No overhead wires to a building or premise
- Above ground connection cabinets
- Light poles without an overhead service
- Service pits for gas, water, electricity, communications, sewerage and drainage connections
- Down pipes or vent poles
- Underground storage tank fill points and venting systems
- Kerb markings
- Water valves
- Fire hydrants and plugs
- Sprinkler systems
- Road repairs
- Trap doors or access-covers
  - Access to Underground electricity substations
  - Access to cable jointing pits or tunnels
  - Access to sewerage or stormwater trunks
  - Underground gas regulators, syphons and valve assemblies
  - Access to shafts
- Domestic service pits
- Gas or water meters
- Electricity pillars and meter boxes
- Any other signs out of character with the surrounding area

If such indications exist, the service must be located by hand or another approved method.

# LOCATING UNDERGROUND ASSETS

## PLAN OR DRAWING READING

Although each utility/service provider may have their own type of plan, with special notations and legends, the basic principle of map reading can be applied.

Telecommunications plans,<sup>3</sup> and in some cases electrical plans, may provide a detailed representation of the service or network. When reviewing the information:

- Hold the plan/s or drawing/s so the “North symbol” faces the top; or
- If there is no “North symbol”, identify the streets or buildings nearby and position yourself so the streets correspond with the plan/s.
- Use the scale and measurements indicated on the plan/s to pinpoint your exact location.
- Determine if measurements are metric or imperial, or a combination of both.
- Identify nearby pipes or cables and mark their recorded location.
- Cross reference any supplementary plans or details.
- Identify any of the items listed below and assess their relationship to each other to determine if a measurement has altered:
  - Building lines
  - Pits and poles
  - Offsets
  - Turning points
- Assess the exact location of these services by hand or by using a pipe/cable locator.

Note: Inaccuracies can and do occur, both on plans and in the ground.

If in doubt, check with the service provider.  
Never guess!

## WORK BY INDIVIDUALS

When working within 2 m of an underground service, or 3 m in the case of assets licensed under the *Pipelines Act* and recorded on the asset register of the owner, individuals shall ensure care is taken to prevent damage or disturbance to the asset/s, including arranging the assistance of specialist personnel where necessary. It is essential work site personnel be clearly instructed regarding the location of any underground assets near their working location and any conditions imposed by the asset owner.

## INSTALLATION OF ASSETS

Unless otherwise agreed by all parties:

- Different services should be laid with a minimum clearance of 300 mm in a road reserve or 100 mm on private lands from the nearest non-alike asset and shall be maintained for the whole service installation.<sup>4</sup>
- A protective cover slab shall not be removed without obtaining approval from the service or asset owner.

## GENERAL CONDITIONS

Excavation work in the vicinity of underground assets may be performed under the following conditions:

- The excavation will be carried out carefully with unpowered hand tools or other endorsed method that will not disturb any underground asset (including any protective cover slab or conduit)
- The excavation falls outside 500 mm from the edge of underground asset.
- No excavation with mechanical excavating plant shall be carried out within 300 mm of the top of any protective cover slab or conduit.

Note: all transmission pipelines involving gas, oil and petrochemical have separate requirements and the asset owners should be contacted:

<sup>3</sup> Information is available from Telstra on reading their plans at: <http://www.telstra.com.au/dialb4udig/docs/symbols.pdf>

<sup>4</sup> Refer to AS 3000:1991 for electricity and AS/NZS 3500.1.2:1998 5.3 proximity to other services.



# EXCAVATION IN THE VICINITY OF UNDERGROUND ASSETS

## EXCAVATION USING NON-POWERED HAND TOOLS

For more information on how to safely dig near an asset, specific information is provided on the Telstra website via the following link <http://www.telstra.com.au/dialb4udig/digging.html>

Excavation with hand tools shall be carried out carefully up to but not closer than the minimum distances specified as follows:

### a. Top of an underground asset or service

Where underground Assets are mechanically protected, i.e. by concrete/polymeric cover slabs or concrete covers or warning tape is installed, careful excavation using hand tools or other endorsed method can be undertaken with:

- The underground Assets in service.
- This type of excavation is allowed up to the top of the protective cover slabs. No disturbance of the underground assets, including any mechanical cover (e.g. concrete or polymeric cover slab), should occur.

### b. Below an underground asset or service

Excavation must not be carried out below an underground asset unless steps are taken to ensure that:

- The asset/s or the integrity of the asset and support material is not damaged.
- Under-crossing shall be at right angles whenever possible.
- Such excavation below the asset/s should not come within a distance of 300 mm below the asset located at the lowest level.

During excavation, any clearance requirements of any other underground assets belonging to other authorities should be maintained.

### c. Beside an underground asset

Any excavation within 500 mm from the underground asset requires the appropriate permissioning from the asset owner prior to work commencing. Measures should be agreed upon to ensure the stability of the surrounding soil or material.

## VERTICAL BORING

For any boring within 500 mm of an underground asset, the location of the asset/s shall first be proved by careful hand digging or equivalent asset location techniques and:

- A minimum clearance of 300 mm from the edge of the underground asset shall be maintained for pole hole boring.
- Lead in excavations shall be utilised.

Note: all transmission pipelines involving gas, oil and petrochemical have separate requirements and the asset owners should be contacted<sup>5</sup>:

## DIRECTIONAL BORING

When boring across the line of an underground asset:

- The location of the asset/s shall be proven by hand digging or positively proven by another approved method.
- A minimum clearance of 300 mm from the asset shall be maintained.

For directional boring parallel to the underground asset and at the level of the asset, a clearance of 500 mm shall be maintained from the edge of the nearest asset.

If the boring is above or below the asset, a minimum clearance of 300 mm shall be maintained from the edge of the nearest asset.

Note: see footnote 5.

<sup>5</sup> All transmission pipelines involving gas, water, oil and petrochemical have separate requirements and the asset owners should be contacted.

# EXCAVATION IN THE VICINITY OF UNDERGROUND ASSETS

## MECHANICAL EXCAVATING PLANT

Mechanical excavating plant may be used with care up to but not closer than the minimum distances specified as follows:

- Other excavating plants must not approach the asset/s closer than the following:
  - Where the excavation is being carried out parallel to the underground asset/s the following shall be ensured:
  - Hand excavation or another endorsed method of positively locating the asset shall be undertaken at regular intervals.
  - The side of the excavation shall not be closer than 300 mm to the nearest edge of the asset.
- If an excavation must exceed the depth of the asset and will disturb the protective cover, slab, asset/s or the bedding material around the asset/s, the asset or service owner must be contacted to determine if the asset/s is to be relocated.
- Any excavation within 500 mm from the edge of an underground asset shall be carried out under the processes or procedures provided in these guidelines.
- Where the excavation is being carried out across underground assets, the following shall be ensured:
  - Prior to mechanical excavation, location of the asset/s must be proven by careful hand tool excavation or another endorsed method used to positively locate the asset.
  - A minimum clearance of 300 mm from nearest asset shall be maintained for all non-electrical service installation.
- Any protective cover slab shall not be removed without obtaining approval.
- If the width and/or depth of the excavation will expose the asset, the asset or service owner must be contacted immediately.

Note: see footnote 5.

## HEAVY MACHINERY

Where heavy machinery is required to carry out works over underground assets or ducts, such as in major road reconstruction, a minimum cover of 1000 mm to the top of the underground assets or duct must be maintained.

Note: see footnote 5.

## EXPLOSIVES

If explosives are to be used within 30 m of an asset, the asset owner must be contacted for any specific requirements prior to use.

The use of explosives within 3 m of an underground asset shall not be approved.

Note: see footnote 5.

## PILE DRIVING

Pile driving shall not take place without authority from the owner of the underground asset/s or services. The exact location and depth of all adjacent assets or services shall be physically proved by hand digging or equivalent asset location techniques prior to commencement of work.

Note: see footnote 5.

Guidance Information is also available from:

Office of Gas Safety  
[www.ogs.vic.gov.au](http://www.ogs.vic.gov.au)

Office of Chief Electrical Inspector  
[www.ocei.vic.gov.au/industry/ngzone.html](http://www.ocei.vic.gov.au/industry/ngzone.html)





## VICTORIAN WORKCOVER AUTHORITY

WorkSafe Victoria offers a complete range of health and safety services.

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- Advice, information and education
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- Licensing and certification
- Publications.

## WORKSAFE VICTORIA CONTACTS

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### LOCAL OFFICES

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Dandenong .....8792 9000  
Geelong .....5226 1200  
Melbourne  
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Mildura .....5021 4001  
Mulgrave .....9565 9444  
Preston .....9485 4555  
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