



IDENTIFY, LOCATE AND
PROTECT UNDERGROUND
SERVICES

RIICCM202D



In this unit you will achieve an understanding of the following elements:

- Element 1: Plan and prepare for identify, locate and protect underground services.
- Element 2: Locate underground services.
- Element 3: Conduct House Keeping Activities



Overview

SAFE WORK METHOD STATEMENTS (SWMS)

Safe work method statements (SWMS) assist a PCBU (Person conducting a business or undertaking) to consider how certain activities will be carried out safely. The following should be noted:

- SWMS must be easy to understand, signed and dated;
- SWMS must be amended if there is a change in the activity and a copy must be given to the principal contactor;
- All persons affected by changes must be advised of amendments to the work method statement.

JOB SAFETY ANALYSIS (JSA)

- A job safety analysis is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job.
- Identifies hazards and potential hazards that may be encountered while working.

WORK SAFETY REQUIREMENTS

While at work a worker must take reasonable care for their own health and safety and that of others who may be affected by their actions or omissions. They must also comply, so far as is reasonably able, with any reasonable instruction given by organisation and any reasonable policy or procedure of the organisation to comply with the WHS Act and WHS Regulation.

When working around underground services you have a duty of care. It's important you know what your obligations are when it comes to protecting Australia's underground networks.



DIAL BEFORE YOU DIG (DBYD)



All information relative to the job site should be obtained prior to contact with service providers such as Dial-Before-You-Dig (DBYD). This includes information to enable the clear identification of the work site location, such as the street address, the nearest intersecting street etc., as described in the next section.

- The following information is necessary in order to process your request by:
- Your CIN number (Corporate Identification Number)(if you have one)
- Your name and address
- Your contact telephone number
- Your company name
- Your facsimile number for information return (if available)
- Your email address
- The address of the property (number, street and town or suburb)
- The real property description: Lot and RP or DP numbers
- Map reference grids
- The nearest intersection of the proposed dig
- Which side of the street you will be working on
- The type of work you will be doing
- Commencement date of the proposed work

The Service/Utilities Owners provide plans to the inquirer within **48 hours** (unless it is a particularly large or difficult job) that give an indication of any underground services in the requested worksite. If the Service/Utilities Owners listed on your Caller Confirmation have not contacted you or provided plans prior to commencing work you must take the initiative to phone them on the contact numbers provided.

ASSET OWNERS OF SERVICE AND UTILITIES

Improving the accuracy of existing asset plans relies on cooperation between asset owners and contractors. If during work activities, underground assets are found to be not on the plans or are in a different location, contact should be made with the source of the plans to notify of the missing information and for clarification.

ELECTRICITY CABLES

- Cable records are in the form of plans drawn to scale or on computer based Geographic Information Systems (GIS).
- 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.
- The Asset owner for electricity is Energex.

WATER AND SEWER PIPES

- Water authorities, developers and local councils maintain records of pipeline locations.
- Local city council own the sewer pipes and Urban Utilities own water.

GAS

- The records for all high and low pressure gas distribution mains are maintained in the form of plans.
- The detail of the records will show the size of pipe and the type of material, changes in direction.
- High-pressure transmission pipelines are generally located within a pipeline easement, therefore records of these pipelines are in the form of alignment sheets specific to the individual pipeline.
- One asset owner for Gas is Origin.

TELECOMMUNICATION CABLES

- Telecommunications cables developed for underground installations have changed in line with technology requirements.
- Plans provided by Telstra are circuit diagrams only and indicate the presence of telecommunications plant in the general vicinity of the area shown.
- Telecommunications plant seldom follow straight lines and careful on site investigation is essential to uncover and reveal its exact position.

SAFETY DATA SHEET (SDS)

A safety data sheet (SDS) – previously called material safety data sheet (MSDS) - provides information which allows for the safe handling and use of substance/materials in the workplace. It describes:

- The identity of the product e.g. formulation or chemical name
- The properties and uses of the product health hazard information precautions for use
- Safe handling information
- First aid instructions
- Methods for safe disposal
- Identify materials/substances that the product is incompatible with
- It is important that all waste material is removed from the construction site. This may include: construction materials, oils and fuel, garbage materials such as empty containers, wrappings, excavated soils and rock

TRAFFIC CONTROL PLAN (TCP)

- Traffic control plans (TCP's) are detailed drawings that show the layout of temporary road signs and devices to warn and guide traffic past, around and through the work site safely. A TCP is part of a work health and safety (WHS) requirement of a worksite
- Outline requirements for site isolation and signage for vehicles.

TRAFFIC MANAGEMENT PLAN

In busy areas, motorists, cyclists and pedestrians all come into contact with construction vehicles, heavy equipment on the road around the construction site. The *Traffic Management for Construction or Maintenance Work Code of Practice 2008* notes that: careful consideration should be given to the signing of the worksite, no matter how brief the occupation of the site may be. This should include: protection of workers provision of adequate warning of changes in surface condition, and the presence of personnel or plant engaged in work on the road adequate instruction of road users and their safe guidance through, around or past the worksite, and safe access and egress to and from the worksite.

Using appropriate traffic signage controls the risks associated with working on or near roads and footpaths.

Traffic Signage around a construction area is used to perform the following functions:

- To warn, guide and instruct road users, e.g. signs.
- To draw attention to the work area, personnel and equipment.
- To control the speed or the passage of traffic within and adjacent to the work area, e.g. the Stop/Slow bat, signals and speed limit signs.
- To indicate the direction and width of the available travelled path, e.g. delineators.
- To discourage access to the whole or portion of the work area, e.g. barrier boards and mesh fence.
- To provide physical protection for the work area and its occupants, e.g. safety barriers.

To help manage isolation between pedestrians and vehicles around the construction area the following safety measures should be used:

- Bollards
- Cones
- Traffic control
- Signage
- Witches hats

LOCATING SERVICES

Pipe and Cable technologies can be used to search for and locate underground services. These include Sonic Surveying and Electromagnetic location.

Once the service has been located there are a number of methods to uncover the service.

- **Potholing** - ensuring that the service is not struck by the equipment (shovel, crowbar, pick, mattock)
- **Using air/water** - as a digging mechanism thereby ensuring that services are not struck by equipment or plant.
- **Vacuum extraction** - uses high pressure water and vacuum to remove the soil. It is often used to expose high risk underground services such as fibre optic cables, gas and electrical cables.

After potholing has been completed, you will know exactly where the services are, so excavation can be carried out with minimal risk, or so you would expect. However, things can go wrong.

If some time elapses between potholing and the excavation (the job) and the potholes have been filled in, it is too easy for an operator to come in and not know where the services are to be found. Some secure method is required to mark the location of the services.

- Barricade and secure off the area, leaving the potholes open,
- Insert marker posts in the holes showing the depth of the service, and
- Take survey and GPS (Global Positioning System) co-ordinates and record on a plan before closing the potholes

In the unfortunate event that **damage occurs** to any service during potholing or excavation, the damage must be reported immediately. You should take note of the type of damage, its severity and whether or not there is any kind of leakage of gas or other substances, and immediately report this to:

- Your supervisor – so they are aware of delays and costs
- The utility owner – so the service can be restored and emergency instructions can be provided.

SUPPORT AND PROTECT UNDERGROUND SERVICES.

Care must be taken to protect the asset during potholing and excavation, observing safe excavation techniques. If any damage of any kind should occur, you must protect the service, contact the asset owner without delay and contact the property owner if the service is within a private property boundary.

TECHNIQUES USED TO PROTECT UNDERGROUND SERVICES

Bedding zone

Warning demarcation tape

Haunch support zone

Side support zone

Graded cover materials

ON-SITE MARKERS

Underground utilities can be located from the plans which indicate reference points as well as the distance between identifiers. These can be plotted onto the worksite using markers such as posts with coloured tops or flags, coloured spray paint, or other clearly identified method.

Some utility markers you will encounter on site are:

Telecommunications

Optic fibre markers are usually triangular in cross section and made of solid concrete or metal on top of a round post. Colours are generally white and yellow with black or grey writing. The location and direction of the service may be stamped on the marker.



Electricity

Generally, there are no above-ground markers for electricity and the only signs will be those attached to transformers. The best indication that electricity is present in the area is the presence of streetlights and power poles in the vicinity.



Gas

There are two distinct types of gas utilities that you may encounter; the reticulated service provided to suburban homes and the bulk service pipelines, usually located in industrial areas. Gas utility signs are coloured white, black and red with distinctive "warning" signs. Gas pipelines are further identified by company, e.g. Boral, Incitee, Envestra, etc.



Water

Water services are marked for location by service personnel or emergency services. They may be indicated with a white post with "HP" on the top section, indicating a hydrant point, or a green post with AV for Air Valve on trunk mains.



IDENTIFY THE UTILITY

As a general rule, the following colours apply to most utility services you are likely to encounter:

COLOUR	SERVICE
Any colour with a dark blue band	Materials for human consumption
Green	Rural water – all kinds excluding wastewater
Brown	Oils, petrol, diesel and other flammable or combustible liquids. Does not include liquefied gases under pressure.
Yellow or black with yellow stripe	Gases
Violet	Corrosive liquids and gasses

COLOUR	SERVICE
Black	Chemical mixtures, solvents, liquid foodstuffs, sewerage, organic waste, chemical and process wastes. Does not include corrosive or flammable/combustible material.
Red	Dedicated water, foam, other fire extinguishing supply lines. Does not include electrical supply or communication circuits.
Orange	Electricity supply circuits
White	Telephone and other communication circuits and extra-low voltage supply
Light Blue	Air – compressed, vacuum, ventilation, pneumatic conveyor
Lilac	Recycled water

TOOLS AND EQUIPMENT USED WHEN WORKING WITH UNDERGROUND SERVICES.

You must arrive at the worksite fully prepared for the task at hand. This includes selecting the appropriate plant, tools and equipment and ensuring that they are working properly.

TOOL	DEFINITION
Shovels	• Has a blade and handle • Used for digging by hand
Excavators	• Has a boom, bucket and cab on a rotating platform • Used to excavate earth
Backhoes	• Has a four-in-one bucket on the front and a boom and bucket on the rear • Used to dig trenches/holes and move soil
Tip Truck	• Has a liftable end that allows loads to be dumped • Used for moving soil from one place to another • Can only be driven on stable level ground
Crowbar	• An iron bar with a flattened end, used as a lever.
Pick	• Used for breaking up hard ground or rock by hand
Cable locating device	• Has a handle and a sensor • Used to locate the position of services underground • Requires training for use
Vacuum extracting systems	• Has a large tank to collect extracted soil • Uses high pressure to remove soil • Slow to use and very messy

TOOLS AND EQUIPMENT

Maintenance and Inspections

It is also essential that that tools and equipment are checked for serviceability, and any faults are rectified or reported prior to commencement. This requires you to follow all workplace protocols for rectification and reporting applicable to your organisation. These protocols will require you to complete forms, place signage on equipment, and report faults to supervisors. Remember: before you use any equipment identify if there is a maintenance schedule, ensure that there are no discrepancies and that it is signed off.

DEFECTIVE EQUIPMENT PROTOCOL



STOP

1

TAG

2

REPORT

3

RECORD

4

HAZARD REPORT FORMS

Three sections must be completed:

Section 1: Write your name and your department (if you work for a very large company) and the date.

Section 2: Description of Hazard. You must briefly describe the hazard (What is the hazard?).

Section 3: Location of Hazard. You must write *exactly* where the hazard is.

EXAMPLES OF HAZARDS

- Open hole / trench without barricading or fencing
- Potential traffic hazards
- Tripping hazards (e.g. fallen cones, stones, safety tape, tools, water pipe)
- Unstable earth

PLANS

Before commencing any job, you will usually receive specific work instructions which will include plans. The main purpose of plans is to provide a visual representations of the work to be undertaken.

MANUFACTURER SPECIFICATIONS

Manufacturer guidelines and specifications must always be followed. By law these must be made available/provided at the point of sale by the manufacturer. Manufacturer guidelines and specifications can be available for anything on site, but most likely for materials, tools, equipment, heavy machinery, hazardous substances etc.

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

- An Environmental Management Plan (EMP) is a site or project specific plan developed to ensure that appropriate environmental management practices are followed during a project's construction and/or operation.
- Addresses clean up management, noise control and waste management.

PLANS AND LOCATION DETAILS

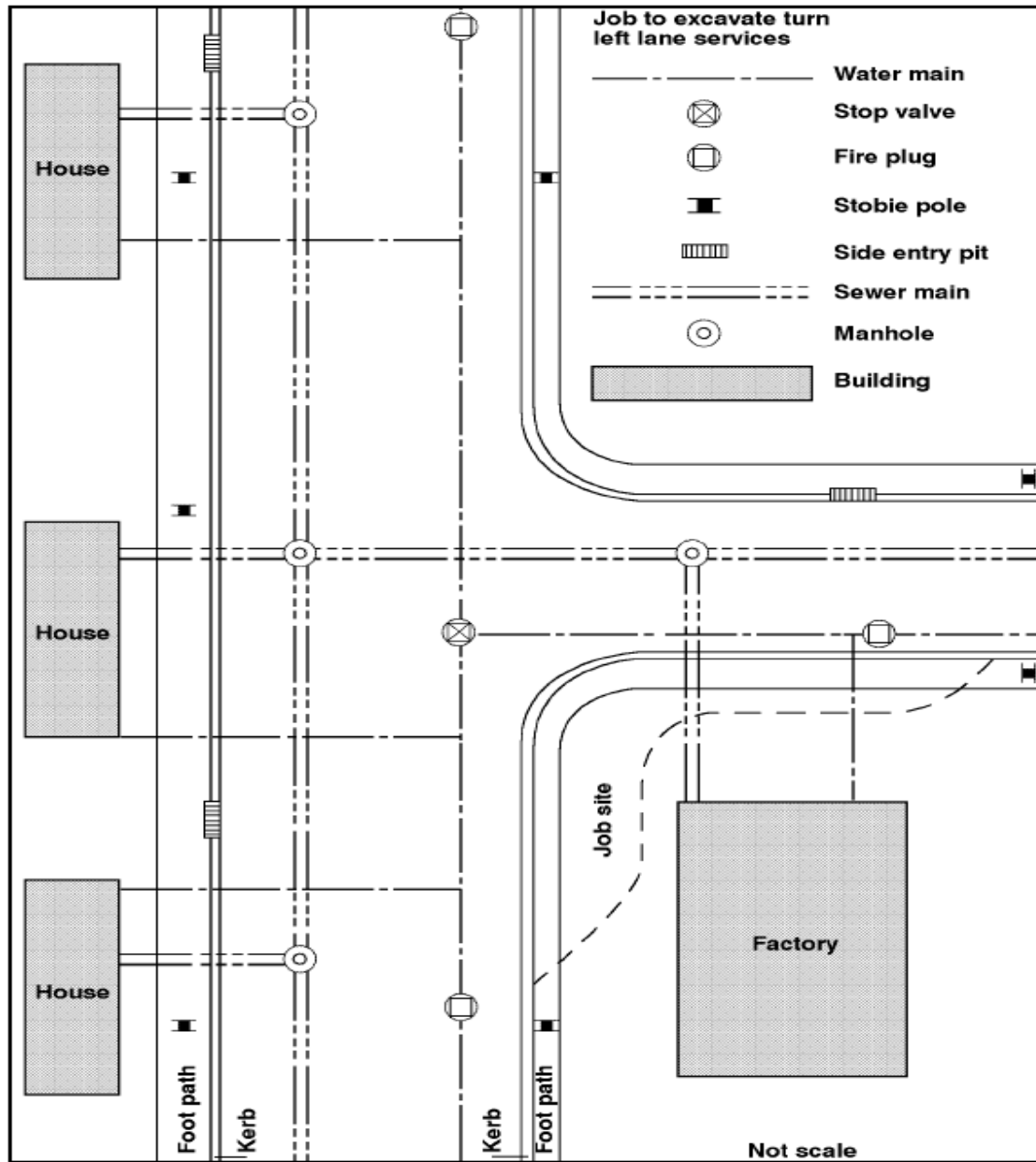
In identifying the physical location of services on site, you will need the utility plans and any other information you have gathered from other sources and any local knowledge you have accumulated over time. On site, there will be some obvious markers for services, but you must be aware that many services are not marked and there could still be some that you have not yet identified

Telecommunications plans, 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!

An example of a set out plan is next





SET OUT PLAN

Telecom		Traverse lines	
Overhead lines	12 P.M.G. No. wires where necessary	Peg	
U/ground cables		Spike	
Coaxial cable		Permanent survey marks	3456
Manhole		Trig points	TRIG
Junction box		Bore holes	
Cable cabinet or pillar		Spot levels	123.45
Phone box		Stadia station	Stn.1
Electricity		Fence Gate	
Overhead lines	4 L.T. No. wires where necessary	Buildings	
U/ground cables		Sewer	
Manhole		Sewer main	 To scale where necessary
Poles		Manhole	
Stobie		Inspection point	
Rolled steel joist (R.S.J.)		Vent	
Transformer pole		Kerb & gutter	
Wood pole		Temporary bench mark	T.B.M. R.L. 101.23
Steel pole			
Gas			
Gas main			
Siphon			
Valve			
Water			
Water main	 To scale where necessary		
Fire plug			
Stop valve			

LEGEND

CLEANING WORK AREA

Clear work area and dispose of or recycle materials in accordance with project environmental management plan.

Cleaning up correctly is just as important as any other task involved in construction. Cleaning up means all debris and waste materials must be collected and removed to the waste storage area and sorted for recycling. Unused materials must be cleaned and returned to the storage area and stacked or stored neatly. Report faults in logbook or site records. The work area must be left clean, safe and secure on completion of the task.



The construction process has particular environmental impacts and mitigation options at each level of work: site establishment and setup; construction work activities; and site restoration after the completion of work. To guard against these environmental impacts ensure that the Environmental Management Plan is adhered to when clean-up activities are undertaken.