Excavation & Trenching – Job Planning Guideline

PROGRAMMED

Doc No: **PRG GHSE G121**	Version: **1.0**	Issue Date: **15/3/2022**	Review Date: **15/3/2027**	Proc. Ref: **PRG HSE PR 0007**

Excavation work generally means work involving the removal of soil or rock from a site to form an open face, hole or cavity, including trenches, shafts and tunnels.

Excavation work should be carefully planned before work starts so it can be carried out safely, without risk of injury or damage to assets.

Prior to any excavation work commencing the following must occur as part of the job planning process;

1) The hazards associated with the excavation process are identified (1.1)
2) The risks associated with the excavation work are assessed and adequate control measures implemented (1.2)
3) Investigation steps are taken to identify and positively locate underground essential services, such as, electric cables, communications, gas, oil, water, irrigation, and sewerage and storm water pipelines (1.3)
4) The necessary permits/authorisations are completed/obtained and authorities/stakeholders notified as required (1.4)

1.1 Associated Hazards

Prior to commencing any excavations, hazards associated with the works must be identified, assessed and controlled. Common hazards associated with excavation work include;

- underground essential services including gas, water, sewerage, telecommunications, electricity, chemicals and fuel or refrigerant in pipes or lines
- the fall or dislodgement of earth or rock
- falls from one level to another
- falling objects
- inappropriate placement of excavated materials, plant or other loads
- the instability of adjoining structures caused by the excavation
- previous disturbance of the ground including previous excavation
- the instability of the excavation due to persons or plant working adjacent to the excavation
- the presence of or possible in-rush of water or other liquid
- hazardous manual tasks
- hazardous chemicals, which may be present in the soil where excavation work is to be carried out
- hazardous atmosphere in an excavation
- vibration and hazardous noise, and
- overhead essential services, such as powerlines, and ground-mounted essential services such as transformers, gas and water meters.

1.2 Risk Management

Job planning and risk assessments should be carried out in consultation with all stakeholders and consider the following as a minimum in relation to any excavation work;

- nature and condition of the ground and working environment (i.e., ground slope, ground water etc.)
- weather conditions
- whether shoring, battering or stepping is required (necessary for all excavations 1.5m deep or greater) and the number/type of access points to be provided into the excavation.
- existing services and their location

- Isolation requirements (i.e. hazardous services)
- nature of the work and other activities that may impact health and safety (i.e., manual tasks)
- static and dynamic loads near the excavation
- interaction with other trades
- site access
- types of equipment used for the excavation work
- Surrounding vehicular activity and ground stability
- Communication systems between mobile plant operators and ground workers
- public safety
- the length of time the excavation is to remain open
- Controlling unauthorised access
- Procedures to deal with emergencies i.e. potential ground slip, engulfment, flooding, gas leak. The risk assessment/SWMS must include actions for the location, rescue and treatment of workers who may be trapped in the excavation for any reason.
- The placement of excavated materials and their effect of the stability, access, egress or depth. Distance from the trench for spoil to equal the depth of the trench plus 1m.
- Heritage locations and protected flora and fauna
- Disposal of excavated material - This may require special arrangements for hazardous or contaminated materials
- Run off – protecting waterways and drains

1.3 Investigation

1.3.1 INVESTIGATE AND IDENTIFY ESSENTIAL SERVICES/ASSETS

One of the key steps in planning any excavation is to investigate the existence of services/assets and other hazards (e.g., ground water, underground cavities, electrical cabling, pipes etc.). Before commencing works, all reasonable steps must be taken to get current information about essential services in the areas at the workplace where the excavation work is to be carried out. Information about essential services in areas adjacent to the site of excavation must also be obtained.

There are five key types of services including:

- Electrical
- Gas
- Petroleum or Oil Pipelines
- Water / Sewer Service
- Telecommunication

Information about services/assets can be obtained by reviewing site plans/drawing and by contacting;

- Dial Before You Dig
- Property owner
- Property lessee/user
- Electrical/water/gas supplier

- Telecommunications provider
- Local council
- Service provider

It is important NOT to proceed with works until you hear from ALL asset owners and relevant parties.

Ensure plans are current and not out of the validity date period.

Visit the excavation site and inspect for any other underground or overhead assets that may not have been registered with 'Dial Before You Dig'. Look for evidence of services (i.e. flagging, markers, tape, pegs, decals and/or equipment boxes) that may be connected to any relevant property but not recorded on the plans received.

Examples of "Above Ground Markers/Indicators

Coloured Ground Stakes

Coloured Ground Buttons

Coloured Warning Signage

Examples of "Electrical Asset' Markers/Indicators

Coloured Electrical Cabinets

Danger and Warning Signage

1.3.2 VERIFY POSITION OF SERVICES/ASSETS

Before excavating, you need to verify the position of services to ensure the information you have received is correct. The use of an underground asset locating device or a certified locator to verify the service location shown on the plans sourced can save time before potholing by hand or employing other non-destructive excavation methods.

If there is a significant risk that requires the accurate location to be proved and recorded, use a certified locator to confirm the position, then pothole by hand or use non-destructive excavation methods to find the asset and record its accurate position on the plans.

Where the risks are less and chances of finding the asset from Dial Before You Dig information are good, pothole by hand or use non-destructive excavation methods to find the service at the excavation worksite.

Pothole prior to full excavation

Potholing, excavating by hand or using non-destructive excavation methods along the underground asset is the preferred method to prove the existence and location of an asset/service.

Underground markers that can provide evidence of services may include:

Examples of 'Buried Ground' Markers/Indicators

Coloured Service Tape


Radio Frequency ID Balls


Coloured PVC Conduits

Underground asset-locating devices can also be used to assist with the process and reduce the amount of time spent locating assets and the hand digging required to find the alignment of the asset.

Underground asset location devices and processes

Those using asset-locating devices must be competent in the method and device they are using.

Electromagnetic scanning is the most frequently employed method used to detect underground assets made of or containing conductive materials such as steel or copper. The scanning equipment consists of a transmitter and a receiver to send signals into the ground to locate, trace, and provide depths of the underground cables and metallic pipes.

Vacuum Excavation - Excavation plant that uses a combination of water and/or air jetting to disturb the ground whilst extracting loose material through a suction system.

Ground Penetrating Radar (GPR) - Equipment that uses radar pulses to image the grounds subsurface. This non-destructive method uses electromagnetic radiation in the microwave band (UHF/VHF frequencies) of the radio spectrum, and detects the reflected signals from ground subsurface structures. The GPR can have applications in a variety of media, including rock, soil, pavements, and structures.

Non- conductive Hand Held Tools - Hand held tools constructed with material that reduces the transfer of energy and heat from electrical sources (i.e. fibreglass and polymer shovels).

Mechanical Excavation / Cutting / Drilling - The use of mechanical plant and/or equipment to penetrate and/or cut a surface (i.e. ground, wall, floor) via destructive means.

Determining what service/asset locating device or process to be used will be dependent on risk and how far the proposed excavation will be to the service/asset. The following table can be used as a guide to determine what device or process should be used.

SERVICE DETECTION AND LOCATION METHODS			
If a proximity to indicated services cannot be accurately determine then 'within 3m of Service' measures must be adopted.			
RISK LEVEL	**SERVICE TYPE**	**Working within 3m of a Service**	**Working outside 3m of a Service**
High Risk	Electrical (HV/LV) Gas (HP) Petroleum (HO/LP) NBN	1. Vacuum Excavation 2. Ground Penetrating Radar 3. Non- Conductive Hand Held Tools	1. Electromagnetic scanning (Low/High Voltage) 2. Ground Penetrating Radar 3. Mechanical Excavation
Moderate Risk	Gas (MP/LP) Water/Sewer (HP)	1. Electromagnetic scanning (Low/High Voltage) 2. Ground Penetrating Radar 3. Non- Conductive Hand Held Tools	1. Electromagnetic scanning (Low/High Voltage) 2. Ground Penetrating Radar 3. Mechanical Excavation
Low Risk	Water/Sewer (LP) Communication (All)	1. Electromagnetic scanning (Low/High Voltage) 2. Ground Penetrating Radar 3. Mechanical Excavation	1. Electromagnetic scanning (Low/High Voltage) 2. Ground Penetrating Radar 3. Mechanical Excavation
If asset owner/service authorities require a higher level measure for service identification, then those requirements must be adopted.			

Where mechanical excavation is used, a spotter must be present.

Once the location of services/assets have been positively located and verified, ensure exact location and depth is marked correctly on all relevant documents. Where potholing has occurred, protect the infrastructure by erecting barriers and marking the location of the exposed infrastructure. Ensuring any services that may be impacted by the excavation are documented in the SWMS and communication to all workers on site.

1.4 Permits/Authorisations/Notifications

Any necessary permits and authorisations must be obtained/completed prior to any excavation work. Regulators may also need to be notified depending on regional legislation. Multiple authorisations/permits may be required depending on the number of stakeholders and the activities involved (i.e., confined space or work at heights permits may be required in addition to an excavation permit).

Programmed requires an excavation permit to be completed;

- For excavations with a depth of 1.5m or greater
- Where a worker is required to enter a trench with a depth of 1.5m or greater
- Where there is a risk of engulfment from poor ground conditions
- When using mobile plant on Programmed controlled sites and services are present (regardless of depth of excavation)

The supervisor or person in control of the works on site, is responsible for completing and signing off/authorising the permit (this is applicable to contractors also). The person supervising the works and signing off on the permit must be competent having the necessary experience and skills to effectively identify and manage risk associated with the excavation works.