



Excavation

Doc No: CMR WHS STD 005

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1. Introduction

1.1 Purpose

The purpose of this standard is to provide guidance on how to:

- Manage the risks associated with excavations. This is supported by CMR FRM 004b Excavation Bow Tie Risk Assessment.
- Implement the Excavation Core Mandatory Requirement (CMR). This is supported by CMR FRM 004a Excavation Critical Controls.

1.2 Scope

In Scope - All MPC Kinetic controlled work sites.

Out of Scope – Works outside of MPC Kinetic control.

1.3 Authorised User

All Field Employees and Contractors who are:

- Trained and certified in their role related to excavations.
- Authorised under the work permit.

2. Critical Control Implementation

2.1 Design the Excavation

2.1.1 Design Factors

Prior to any excavation works, these design factors must be considered:

- Ground conditions.
- Location.
- Depth.
- Work to be performed within or near the excavation.

2.1.2 Select ground collapse techniques

Authorised persons must select the best ground collapse technique based on:

- Ground or soil conditions
- Static loads near the excavation e.g. buildings
- Dynamic loads near excavation e.g. traffic
- Ground vibration, e.g. trains, pile driving
- Undermining adjacent structures e.g. roads, buildings, power poles
- Water stored in the ground near or close to the work area
- Wherever people are required to enter the excavation or trench
- Location of utility services.

Ground collapse techniques can include:

- Shoring
- Benching
- Battering.



NOTE: Refer to:

- CMR FRM 005d Excavation Standard Training Material
- CMR FRM 005e Excavation Internal Competency Assessment.

- 2.1.3 Notify regulator of excavation** The Victorian and New Zealand regulators must be notified for certain types of excavation work.



NOTE: Review regulators website for more information.

- 2.1.4 Develop Safe Work Method Statement** A documented Safe Work Method Statement (SWMS) or equivalent must be developed to eliminate or minimise the risks associated with excavations deeper than 1.5 meters.

The content of the SWMS must be developed after reviewing the hazards, risks and control measures documented in the relevant HSE Risk Register.

The risk assessment must control these potential risks:

- Falls into the excavation
- Ground collapse
- Airborne contaminants
- Contact with services and structures
- Interactions between vehicles, mobile plant and pedestrians.

2.2 Prevent contact with services and structures

- 2.2.1 Identify services and structures** Services and structures that may be impacted by the excavation work must be identified by:

- Dial Before You Dig (DBYD) plans
- Site survey
- Pipe and cable locators
- Electromagnetic location devices
- Ground penetrating radar (GPR) devices
- Visual site inspection.

The exclusion zones for each service or structure will vary depending on:

- Asset owner requirements
- Risk assessment of the work environment.

The agreed exclusion zones must be communicated to all relevant people.

2.2.2 Working near overhead power services

Working near overhead power services must be eliminated by design or construction methodology.

If elimination is not possible, the Safe Approach Distance (SAD) must be identified and maintained.

The SAD will vary depending on:

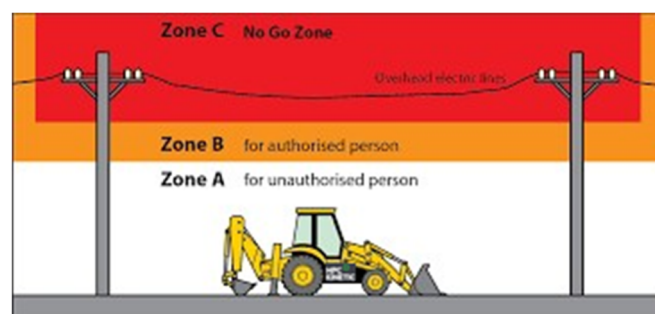
- The voltage
- The level of authorisation of each person carrying out the work
- The asset owner requirements.

The SAD applies to all:

- Parts of a crane, plant or vehicle
- Loads, including lifting gear
- Hand tools or other material held by a person.

The three zones associated with SAD's include:

- Zone A – for unauthorised person
- Zone B – for Authorised person
- Zone C - No Go Zone



2.2.3 Use a spotter

An authorised spotter must be in place when operating near underground or overhead services.

The authorised spotter will:

- Have all service location information
- Assist with visually locating underground or covered services
- Warn of any other unsafe conditions
- Be positioned at a suitable location to effectively observe the work
- Be able to immediately and effectively communicate with the operator
- Not observe more than one work activity at a time
- Have the authority to suspend the work at any time.

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2.2.4 Positively identify underground services

Prior to mechanical excavation, you must use non-destructive methods to positively identify underground services.

Non-destructive methods include:

- Hydro/vacuum excavation
- Hand digging.

The potholing frequency depends on the type of service and the distance from the planned excavation.

Service Type	Distance from excavation	Required pothole interval
High risk, includes: <ul style="list-style-type: none"> • Electrical • Communication • Gas • Water 	0.0m – 3.0m	4m and change in direction
	3.0m – 6.0m	10m and change in direction
	6.0m-15.0m	Site based risk assessment and change in direction
Low risk, includes: <ul style="list-style-type: none"> • Sewer • Storm water 	0.0m – 3.0m	10m and change in direction
	3.0m – 15.0m	Site based risk assessment and change in direction
Any intersecting service	0.0m	Slot over service

Underground services can be identified by the following coloured conduits or markers:

Service	Colour
Communications	White, or black when on a white background
Drainage	Green
Electricity	Orange
Fire Service	Red
Gas	Yellow
Water	Blue

2.2.5 Permit to Work Requirements

A permit to work must be issued when the excavation:

- Excavation works within 15m of known services / structures
- Excavation works that requires geotechnical approval
- Excavation with ground conditions identified as SC4 and $\geq 1.5\text{m}$ in depth and is occupied by a person [requires all three elements]
- Excavation works $\geq 6\text{m}$ in depth [with the exception of drilling activities].

A permit to work is not required for dry vacuum or hydro excavation works unless required by the asset owner.

The Permit must be issued by an authorised person.

The Permit must be issued in accordance with WHS PRO 056 Permit to Work Procedure or any client requirements.

The Permit must be in writing and recorded on WHS FRM 055 Excavation Permit.

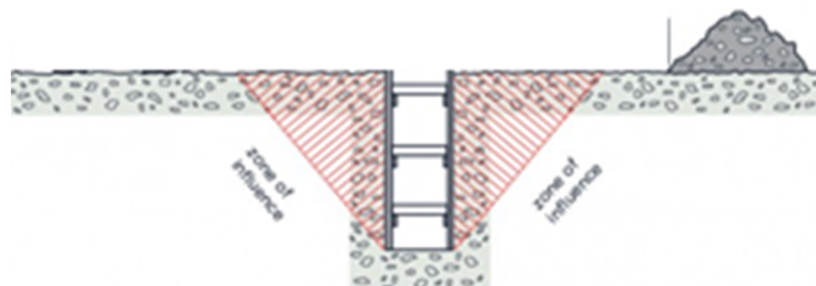
As a minimum, the permit must contain:

- Details about the project, task, location and time frame
- The risk controls that must be put in place.

2.3 Managing the excavation if people are required to enter

2.3.1 Store mobile plant and bulk material

Mobile plant and bulk materials must remain outside the zone of influence when a person is required to enter the excavation, except where a support system has been designed to support the loads.



The zone of influence will vary depending on the ground conditions and the depth of the excavation or trench.

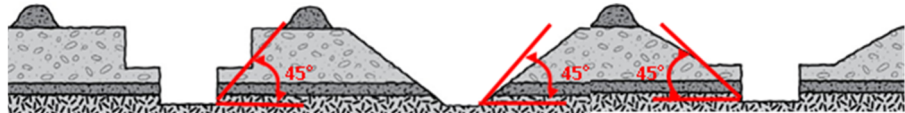
Measures to prevent mobile plant from entering the zone of influence include:

- Temporary concrete barriers
- Temporary water filled barriers
- Earth bunds.

2.3.2 Benching and Battering requirements

Benching and battering requirements include:

- Each bench cut into the side of an excavation must be a minimum of 1.5 metres
- Each bench cut must not be higher than it is wide
- Battering must commence from the bottom of the excavation
- A bench or batter must have an angle of repose of 45° or less.



If the bench or batter has an angle of repose greater than 45°, assessment and written approval must be provided from a Qualified Civil Engineer.



NOTE: Approval can be recorded on CMR FRM 005c - Benching Battering ≤2m Exception Assessment and Approval

2.3.3 Daily excavation inspections

Authorised persons must document daily inspections of the excavation.

The inspection must confirm:

- The ground materials remain stable
- Tension cracks have not appeared
- The sides of the excavation are not being undercut
- The zone of influence has not been impacted
- Ground supports remain stable and in good condition
- Entry and exit points remain unchanged
- Barricades are still in place
- Weather events haven't compromised the excavation.



NOTE: Inspections must be recorded on CMR FRM 005b Excavation Inspection Checklist.

If the inspection shows faults, it must be corrected before any person re-enters the excavation.

Any repair or change to the ground collapse prevention controls must be approved by the Site Excavation Supervisor or a Civil Engineer.

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2.3.4 Identify hazardous atmospheres

Hazardous atmospheres inside the excavation must be identified.

Sources can include:

- Combustion engines
- Acid sulfate soils
- Stagnant water and organic material
- Dust created by cutting, grinding, drilling
- Asbestos materials or minerals
- Nitrogen purging
- Gas emissions.

Identification of these contaminants can mean the excavation is defined as a confined space.



NOTE: Refer to CMR WHS STD 003 Confined Space to review how to identify a confined space.

2.3.5 Control exposure to hazardous atmospheres

Exposure to identified hazardous atmospheres must be managed using the hierarchy of controls.

1. Elimination
2. Substitution
3. Engineering
4. Isolation
5. Administration
6. Personal Protective Equipment (PPE).

2.3.6 Atmospheric monitoring

Authorised persons must confirm atmospheric monitoring:

- Is undertaken for identified hazardous gas, fibres or dusts
- Results are assessed and documented
- Repeat or continuous testing requirements are met and documented.

2.4 Training Requirements

2.4.1 Minimum training requirements

All people must be trained and authorised for their role.

Role	Training Authorisation Requirement
Mobile Plant Operators	<ul style="list-style-type: none"> • TRA PRO 001 HSE Training Procedure. • TRA PRO 002 Verification of Competency Procedure.
Excavation Supervisor	<ul style="list-style-type: none"> • ≥ 3 years excavation experience. • CMR FRM 005e - Excavation Standard Training Material
Excavation Daily Inspections	<ul style="list-style-type: none"> • ≥ 2 years excavation experience. • CMR FRM 005e - Excavation Standard Training Material
Underground service spotters	<ul style="list-style-type: none"> • As per asset owner requirements.
Work near overhead electrical Authorisation	<ul style="list-style-type: none"> • As per asset owner requirements.
Permit to Work	<ul style="list-style-type: none"> • WHS PRO 056 Permit to Work Procedure. Or • Asset Owner Permit to Work requirements.
Benching or battering changes or exceptions	<ul style="list-style-type: none"> • Qualified Civil Engineer.
Shoring Design	<ul style="list-style-type: none"> • RPEQ Certified Engineer.
Shoring Selection	<ul style="list-style-type: none"> • Qualified Civil Engineer.
Install, inspect and remove shoring	<ul style="list-style-type: none"> • RIICCM210 - Install trench support.
Gas atmospheric monitoring	<ul style="list-style-type: none"> • MSMWHS217 - Gas test atmospheres.
Fibre or dust atmospheric monitoring	<ul style="list-style-type: none"> • Third party NATA accredited organisation.

2.5 Using Mobile Plant

2.5.1 Establish barricades

Barricades must be established to prevent:

- Vehicles, wheeled mobile plant and pedestrian interactions
- Falls at the excavation edge
- Unauthorised access
- Inadvertent access.

Selection of the type of barricade must be based on:

- Excavation depth
- Duration the excavation will be open
- Type of mobile plant or vehicles operating in the area
- Volume pedestrian movements
- Surrounding structures or available area.

2.5.2 Use of vehicle and traffic management plans

Vehicles, mobile plant and pedestrian interactions must be minimised by the development of traffic and vehicle management plans.



NOTE: Refer to CMR WHS STD 002 – Plant Lifting & Loading for more details.

2.5.3 Confirm mobile plant is fit for purpose

A mobile plant risk assessment must be documented to confirm mobile plant is fit for purpose.

Assessing the scope of work and the work environment will determine:

- The type of mobile plant required
- The size of the mobile plant
- Operator competency requirements.

All mobile plant must be fitted with:

- Roll over protection devices
- Falling object protection devices
- Audible Reversing
- Revolving Amber beacon.



NOTE: Refer to CMR WHS STD 002 – Plant Lifting & Loading for more details.

2.5.4 Seat belt requirements

Seat belt requirements include:

- All mobile plant must be fitted with a seat belt
- All operators must wear the seat belt during operation.

2.6 Emergency Response Requirements

2.6.1 Develop procedures

Emergency response procedures must be developed based on the risks associated with the work activity.

The potential emergencies related to excavations, include:

- Ground collapse
- Water inrush
- Fall from ground level
- Asphyxiation from airborne contaminants
- Striking underground or overhead service
- Collapse of overhead structure.

2.6.2 Implement procedures

Emergency response procedures must be implemented on-site.

This includes:

- Communicating procedures to the relevant site personnel
- Confirming or arranging specific emergency response training
- Arranging relevant emergency equipment.

The emergency procedures must be checked they are working effectively. This includes:

- Undertaking drills or scenario testing
- Conducting regular inspections.