Procedure for Working in or around Excavations
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Procedure: Working in or around Excavations
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1 Purpose

Working in or around excavations can be dangerous. The earth in or around excavations can collapse without warning and cause extensive injuries, or even fatalities, to workers in the vicinity of such work.

The primary purpose of this procedure is to provide guidance to Roads and Maritime Services’ (RMS) staff, contractors, business partners and the public in working in or around excavations.

RMS is committed to the health and wellbeing of all its workers and others. A safe and healthy workplace is the right of every worker.

RMS’ safe systems of work aim to eliminate any risk to RMS staff, contractors and other persons engaged in work in or around excavations. In locations where the risks cannot be eliminated, controls must be implemented to minimise the risks.

It is intended that as an outcome of this procedure:

- The risk of injury to RMS workers and contractors will be prevented
- RMS workers will be consulted in the risk management process
- RMS will provide appropriate WHS training, instruction, information and supervision to its workers and others
- Safe systems for working in or around excavations will be established, especially in relation to emergency planning and procedures

2 Scope

This procedure covers all RMS workplaces and includes:

- RMS workers, contractors or subcontractors, an employee of a contractor or subcontractor, labour hire, trainees, work experience students and volunteers
- Other duty holders who carry out work for RMS or those (such as visitors or apprentices) who are likely to be directly affected by safety issues relating to working in or around excavations

All RMS workers (including contractors) must comply with this procedure. Contractors are also required to have in place an equivalent procedure for managing risks associated with workers engaged in working in or around excavations.
3  General requirements

RMS workers should be able to conduct their work without a risk to their health and safety. For their part, they need to take necessary precautions to prevent and effectively manage any potential hazards and risks, especially when working in or around excavations.

RMS workers and others may be required to work in or around excavations, if they have to dig trenches, holes or openings in the ground; create shafts or wells or tunnels; engage in work involving caissons and cofferdams or any similar work, or are engaged in the removal of soil or rock.

RMS must consult with workers (including RMS contractors) about working in or around excavations. If potential WHS hazards are identified in such work, then appropriate control measures must be used to eliminate or minimize the exposure to these hazards.

4  Definitions

Definitions related to this procedure are specified in Appendix A.

5  Responsibilities

| RMS (through its managers from the executive to the front line) must: | • Comply with legislative requirements and ensure systems are in place to manage potential WHS risks to workers and others  
• Ensure workers and other persons are not exposed to WHS risks from its work activities  
• Ensure WHS responsibilities are appropriately defined and provide resources (including financial and time) to ensure effective hazard and risk management for RMS workers and others  
• Take all reasonable steps to obtain current underground essential services information relating to the workplace and adjacent areas where excavation work is being carried out, prior to the start of such work. Also ensure this information is provided to workers and other persons |
|---|---|
| RMS managers must: | • Implement the requirements set out in WHS legislation, associated codes of practice and Australian Standards  
• Exercise due diligence by ensuring RMS complies with the WHS Act and regulations  
• Participate in the development of Safe Work Method Statements (SWMS) for excavation works and ensure they are communicated to all relevant persons and adopted on site  
• Provide information, instruction and training to RMS staff and ensure that individuals hold all necessary certification  
• Ensure a competent person is designated to supervise all excavation work, as directed by this procedure and NSW law |
- Make sure a timetable of scheduled inspections is in place for excavation works and that a record of these inspections is maintained
- See to it that a written procedure is in place for the alteration of trenches that require engineer approval and that any such approvals are kept onsite
- Ensure emergency procedures are developed, in place, adequate and understood by all on site
- Oversee contractor compliance with this policy and NSW law

### RMS workers

**must:**
- Protect their own health and safety, and not adversely affect the health and safety of other persons in or near excavations
- Follow any reasonable instructions provided to them by managers and health and safety representatives, and cooperate with any WHS policy or procedure relating to excavation work
- Assist in developing SWMS for excavation work from the planning stages and comply with them
- Never work alone in medium or high-risk excavations and wear personal protective equipment (PPE) and maintain them as per instructions
- Never work in a trench outside the supported section
- Actively participate in the training provided to them
- Report any hazards, near misses, incidents, changes in conditions or the surrounding environment that may impact on the health and safety of those in the workplace

### Contractors

**must:**
- Prepare and review a WHS management plan
- Obtain a SWMS before any high-risk work begins
- Establish arrangements to manage work environments, including falls, facilities, first aid, emergency plans and traffic management
- If they are the principal contractor, install signs giving their details and location of any office site. They must also secure the worksite.
- Comply with all contractual requirements at all times
- Comply with the SWMS at all times and revise where circumstances change or additional risks are identified
- Cease work immediately if unsafe (unless unsafe to do so)
- Inform principal contractor, where appointed, of any problems encountered during work onsite or any potential risks by other workers, or workplace structures

### WHS staff

**must:**
- Assist management in monitoring the appropriateness of control measures through audits and site inspections
- Provide informed advice and support
- Assist in incident investigation

### Designers

**must:**
- Ensure the structures they design pose no WHS risks, when used for their appropriate purposes
- Must give RMS a written safety report that specifies the hazards relating to the design of the related structures
- Must factor in all relevant safety control measures when producing any final design documents relating to excavation work
6 Who must be consulted

RMS must consult with workers (including RMS contractors) in relation to working in or around excavations. Consultation with workers and health and safety representatives (HSRs) is required during each step of the risk management process. This is especially true as the excavation work progresses.

During excavation work, RMS workers, contractors and others (such as civil engineers) need to work together in a cooperative and coordinated manner. This will help eliminate or minimise WHS risks as far as possible.

7 Risk management

RMS is committed to managing WHS risks associated with excavations. These risks include the following:

- a worker accidentally falling into an excavation
- a worker being trapped by the collapse of an excavation
- a falling object striking a worker in an excavation
- a worker in an excavation being exposed to an airborne contaminant

In order to manage these risks, the following must also be considered:

- the nature of the excavation
- the type of excavation work, including the various ways in which that work could be carried out
- entry and exit from excavation sites, where applicable

7.1 Identifying hazards

The first step in the risk management process is to identify hazards associated with excavation work. Examples of excavation-related hazards include risks related to striking or damaging cables, pipes or lines that carry underground gas, water, electricity and other supplies. Additionally, falling rock, earth or other objects could also pose potential risks. For further information, please refer to Section 2.1 of the Code of Practice: Excavation Work.

7.2 Assessing the risks

Risk assessments will help determine what control measures maybe needed. They will help identify which workers are at risk; determine what is causing those risks; identify what type of risk control measures are needed, and so on. For further information on risk assessments, please refer to Section 2.2 of the Code of Practice; Excavation Work.
7.3 Risk control measures for working in or around excavations

After identifying the hazard(s), risk(s), and the level of risk for each risk, it is now necessary to identify and implement appropriate risk control(s). Where no single measure is sufficient for this, a number or combination of risk controls is usually required. Some of the potential risk control measures include:

- Having clear and detailed plans of the potential or existing excavation sites. This is essential if the excavation sites are in close proximity to underground or aboveground cables and pipes
- Effective shoring, to minimize any potential trench wall collapses
- Discouraging workers from working alone on excavation sites and constant supervision by a competent person
- Ongoing geotechnical assessments and consulting structural engineers, especially when temporary supports are needed during excavations and suitable backfill after excavation
- Predetermining and clearly marking areas where excavated material is to be placed
- Using appropriate plant and equipment
- Proper material placement and stockpiling, including correct usage, maintenance and storage of PPE, tools and equipment
- Effective dewatering processes and equipment to eliminate any water seepage or flooding of the excavation sites

7.4 Safe Work Method Statements (SWMS) for excavation

Use *WHS Safe Work Method Statements Procedure* to assist in formulating your SWMS

<table>
<thead>
<tr>
<th>Conditions where a Safe Work Method Statement is legally required</th>
<th>Conditions that must be assessed and controlled where identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All work at a depth of greater or equal to 1.5m</td>
<td>• Risks arising from unplanned contact with electricity cables, gas mains and/or other utility services</td>
</tr>
<tr>
<td>• Work involving the use of explosives</td>
<td>• Mobile plant or materials falling into excavations</td>
</tr>
<tr>
<td>• All work near traffic or mobile plant</td>
<td>• The collapse of buildings or structures before, during or after excavation</td>
</tr>
<tr>
<td>• All work over or adjacent to water or where a risk of drowning exists</td>
<td>• The placement of excavated material, especially the separation of materials from the edge of excavations that may endanger people below</td>
</tr>
<tr>
<td>• Construction work in or around gas or electrical installations</td>
<td>• Instability due to persons or plant working adjacent to the excavation</td>
</tr>
<tr>
<td>• All work in tunnels</td>
<td>• The inrush of water</td>
</tr>
<tr>
<td>• All work on construction projects whose cost exceeds $250,000</td>
<td>• The fall or dislodgement of earth/rock or other materials</td>
</tr>
<tr>
<td><strong>Note</strong>: The SWMS must be completed prior to commencement and adjusted whenever there is a change that may introduce additional hazards.</td>
<td>• The instability of the excavations or adjoining structures</td>
</tr>
</tbody>
</table>
### 7.5 Checklist of conditions to be reviewed in inspections

The outcomes of these inspections are to be recorded and used to review the work practices and associated SWMS, especially when work conditions may have changed.

**Note:** This list is **not** exhaustive list and should be adapted to the relevant worksite

<table>
<thead>
<tr>
<th>Factors</th>
<th>Y/N</th>
<th>Corrective Action Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the angle of the batter/benching sufficient to prevent collapse (i.e. maximum of 45 degrees or as approved in writing by an engineer)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has any shoring been removed prematurely?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is shoring stable, secure and free from failure?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is shoring/structural support installed in accordance with the engineer's design?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any nails, spikes or other protrusions sticking out of timbers or shoring?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are any cracks appearing near the edge of the excavation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there any evidence of subsidence alongside the excavation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is any machinery operating in the zone of influence of the excavation causing weight-based pressure and vibration?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the standby person present and outside the zone of influence?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has there been any change to the soil and/or weather conditions?</td>
<td>Y</td>
<td>Re-assess risk and modify work method as required.</td>
</tr>
<tr>
<td>Is any water seeping into the excavation from the sidewalls or base?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is surface water or run-off entering the excavation or accumulating on the surface near the excavation?</td>
<td></td>
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<tr>
<td>Is there any heaving or swelling of the ground at the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Is access and egress to the excavation safe and secure?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the excavation secure during work and when left unattended?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is excavated or other material being placed within the zone of influence of the excavation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are all overhead utilities clear of the swing path of plant operating in or around the excavation?</td>
<td></td>
<td></td>
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<tr>
<td>Is there evidence of undercutting of the excavation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers venturing outside the confines of shoring, benching or battering?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are all workers clear of the swing path of mobile plant?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are workers working alone?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is a competent person supervising the excavation, where relevant?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has contaminated ground become exposed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there fumes, gases, asbestos, silica dust or other substances contaminating the work area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are pumps available and in working order?</td>
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<td></td>
</tr>
</tbody>
</table>

**Note**: The schedule of inspections should be established **in advance**, at a frequency determined by the risk assessment process.
7.6 Requirements for tunnels under construction

The Code of Practice for Tunnels under Construction requires the use of the following minimum controls.

<table>
<thead>
<tr>
<th>Element</th>
<th>Requirement/Control</th>
</tr>
</thead>
</table>
| General | • At least one person on duty outside every tunnel extending 100 metres or more underground, when crew is working underground  
• No solitary work permitted (unless direct communication with surface possible)  
• All hoses are to have a safety chain and/or pin to prevent hose ends from whipping in the event of accidental disconnection  
• No visitors underground, unless inducted and accompanied by a delegated representative and appropriately equipped with PPE and safety equipment  
• A check in/out method must be used to account for all persons underground  
• Evacuation procedure in place, regularly tested and communicated to all relevant persons  
• The unnecessary accumulation of muck, spoil and/or debris must be avoided  
• Maintain clear space at shaft stations, rail areas, places of access, egress and safety alcoves |
### Ventilation
- A continuous supply of clean respirable air containing not less than 20% (and no more than 23%) of oxygen must be supplied to all underground work areas and every place where persons have access. It shall be supplied through an exhaust ventilation system.
- The lineal velocity of the air flow is not less than 10 metres per minute.
- Entire system to be inspected by a competent person at least once a week.
- Air flow velocity to be tested daily within 10m of the face and any other location necessary to ensure compliance.
- Records of all tests and inspections are to be kept.
- Any temporary ducting used is to be positioned as close as possible to the face.

### Hazardous atmosphere
- Any part of a tunnel that is known, or is suspected, to contain a hazardous atmosphere must be tested before any person is allowed to work in that area. Appropriate measures must be implemented, so that workers are not exposed to hazardous atmospheres.
- No person shall enter, work or remain in any section where exposure limits exceed those specified by Safe Work Australia, NOHSC and Division 5 of the WHS Regulation 2001. Such areas shall be adequately signposted.
- Tests are to be carried out as often as necessary in the prevailing conditions.

### Underground support systems
- Must be securely supported by an appropriate support system designed for that purpose.
- Must be designed by a qualified and experienced person and details must be kept on site.
- Workers installing support systems must be adequately protected from falling ground.
- Tunnel portals must be made stable by sloping, benching, installing wire mesh and/or rock bolts or equivalent methods.
- After each blast, tunnel supports within the zone of influence of fly rock or significant vibration must be inspected and adjusted as necessary.
- A shift or daily inspection of the area up to at least 50m from the face must occur.
- Entire tunnel roof and walls to be inspected weekly by a competent person and records kept.
**Places of refuge**

- While mechanical haulage is employed where a person is required to access or egress on foot, or there is less than 1m of clearance between the widest part of the mechanical haulage and the side of the tunnel, there must be at intervals of no more than 60m, places of refuge affording at least 1m clearance from the widest part of the mechanical haulage.
- Every refuge and its access point must be kept clear.
- Must be clearly visible and identifiable.

**Other vehicular traffic and machinery**

- The preferred form of powering plant and equipment is using electric power.
- No petrol driven plant shall be used under any circumstances in any tunnel or shaft.
- All non-electric powered plant used in a tunnel or shaft shall have fitted and maintained an exhaust emission control unit capable of removing impurities from the exhaust that may be injurious to a person’s health or wellbeing.

**Self rescue units for personal use**

- Any person entering a tunnel where self rescue units are required shall have received instruction and training in its use, prior to entering the tunnel.
- Each unit must be capable of supplying at least 30 minutes of life support when properly used.
- There must be enough units to supply each person in the tunnel at any one time.
- Units are required where a person
  - is required to work a distance of 300m or more from the portal or shaft access or
  - proceeding at normal walking speed would take 15 minutes or longer to reach the portal or shaft access from their place of work, or
  - as deemed necessary through a risk assessment.
- Units must be stored in a designated area, clear of water and contaminants. They must be readily available and in close proximity to each person for use in an emergency.

In managing risks associated with excavation works, RMS requires a planned approach:

a) **All excavation work must be planned prior to commencement, in consultation with all relevant persons**
Relevant persons could include the excavation team, geotechnical engineers, any contractors involved in the process, RMS supervisors, the competent person who will supervise the excavation or engineers.

b) An adequate system of safety, involving shoring, earth retention equipment (caissons, cofferdams or similar equipment that control risks from falling or dislodged earth/rock/other materials, instability of excavations, inrush of water etc) or other appropriate measures (such as benching or battering) must be used to control risks such as:

- The fall or dislodgement of earth/rock or other materials
- The instability of the excavation or adjoining structure or an inrush of water (or any other substance, such as from a sewer)
- The placement of excavated material
- Instability due to person or plant working adjacent to the excavation

NOTE: If, due to the slope and nature of excavation walls and other relevant circumstances, there is no reasonable likelihood of a fall or dislodgment of earth, rock or other material from a height of more than 1.5m that may bury, trap or strike a person in the excavation, it maybe unnecessary to use a shoring system. A risk assessment must be conducted and documented to verify these hazards have been identified and assessed.

c) In the case of contracted excavation works on an RMS project, the project manager must ensure the principal contractor has a system in place to ensure contractor compliance with safe work practices, this procedure and legislative obligations.

NOTE: Where the RMS lets a tender, ensure appropriate clauses are included in tender specifications and contract conditions to facilitate active control of WHS performance at a contractual level.

d) All excavations must be secured and barricaded to ensure the safety of persons on site and members of the public. Examples of securing or barricading may include:

- Barricades or hoarding around trenches, pits or excavations within a site
- External fencing of site perimeter
- Covering of cable pits or pile holes when left unattended
- Clear marking of all excavations, at all depths, to alert pedestrian and plant traffic

e) A competent person must be appointed to supervise all excavation work at a depth of more than one metre, work in tunnels, on caissons and cofferdams, compressed air work in an excavation or any high-risk excavation. (Refer to ‘Appendix Definitions’ for a definition of high risk construction work.)

f) The competent person must inspect the excavation regularly.
g) No person works alone where the risk rating for an excavation is high or medium, as per risk rating chart (refer to Risk Management Procedure).

A standby person should be provided and be located outside the zone of influence at all times. In the case where a supervisor is present, they may act as a standby for the purposes of this obligation.

**NOTE:** The zone of influence is the area around an excavation that is susceptible to slippage or collapse.

h) Safe access and egress must be provided in an excavation (including to and from caissons and cofferdams) throughout the works.

Details of access and egress provisions for cofferdams or caissons are to be included in design drawings. If access is not provided in the form of fixed ladders and platforms a further written risk assessment must be done before starting work.

i) Emergency procedures must be developed in advance and circulated to all persons working in or near the excavation.

### 7.7 Training requirements for excavation

The minimum areas that must be covered in training include:

- Describing the work method in which excavation and related work will be carried out
- How to use Safe Work Method Statements (SWMS), in addition to the safety systems to be used
- How to properly use, care, maintain and store personal protective equipment (PPE), tools and equipment
- The correct use of plant and associated equipment, including safety around electricity and the safe handling of hazardous substances
- Ensuring familiarity with emergency and communication procedures
- How to identify critical warning signs for excavation collapses
- Familiarity with other associated policies and procedures (such as RMS’ Working in the Vicinity of Aboveground, Overhead and Underground Utility Services)

**Note:**

The requirement for general and site induction on construction sites still applies, as does any other training that maybe required.
The best training delivery medium is Tool Box Talk (refer to the RMS intranet for the generic toolbox).

8 Reference documents

- Work Health and Safety (WHS) Act 2011
- WHS Regulation 2011
- Code of Practice – Excavation Work
- Code of Practice – Confined Spaces

Appendix A Definitions

<table>
<thead>
<tr>
<th>Competent person</th>
<th>A person who has acquired through training, qualification, or experience the knowledge and skills needed to perform specific tasks. These include: (a) the ability to detect conditions that could result in cave-ins, failures in control measures, hazardous atmospheres, confined spaces and their associated hazards; (b) an understanding of zones of influence, and (c) the authority to take prompt corrective action to eliminate existing and foreseeable hazards and to stop work when required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard</td>
<td>A situation in the workplace that can potentially harm the health and safety of people or cause damage to plant and equipment. The situation could involve a task, chemical or equipment used.</td>
</tr>
<tr>
<td>Risk</td>
<td>The possibility that harm (death, injury or illness) might occur when exposed to a hazard.</td>
</tr>
<tr>
<td>Excavation</td>
<td>Includes the excavation or filling of trenches, ditches, shafts, drifts, rises, wells, tunnels and pier holes, open excavations (where the width is equal to or greater than the depth), work involving the use of caissons and cofferdams or any similar work.</td>
</tr>
</tbody>
</table>
| High risk construction work | • Construction work involving structural alterations that require temporary support  
• Construction work at a height above 3 metres or construction work involving excavation to a depth greater than 1.5 metres  
• Demolition work for which a licence is not required under Chapter 10 of the WHS Regulation 2001 to carry on the business of that work  
• Construction work in tunnels  
• Construction work involving the use of explosives  
• Construction work near traffic or mobile plant  
• Construction work in or around gas or electrical installations  
• Construction work over or adjacent to water where there is a risk of drowning |

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