EXCAVATION HEALTH AND SAFETY

PURPOSE

To enable organisations to plan and undertake excavation and trenching operations in a safe and consistent manner.

GENERAL REQUIREMENTS

This procedure is applicable to all excavation/trenching works conducted on the organisation’s sites in management and control of the workplace.

Where a contractor has been appointed as Principal to control works on site this procedure shall be adopted as a minimum standard (best practice guidance material) if the Principal Contractor does not have an equivalent procedure.

Personnel supervising excavations must have as a minimum, training in Excavation and / or completed the appropriate NZQA unit standard training in the installation of Trench Support.

### PREPARATION AND PLANNING

When planning and preparing for excavation works, site investigations must be conducted to establish the following:

 Location, positive identification and condition of existing services

 Nature of the ground

 Stability of adjacent structures i.e. power poles, old excavation works, trees etc

 Possibility of flooding

 Working close to unstable ground

 Environmental considerations

 Trench access and egress

 Pedestrian and Traffic movement

### JOB SAFETY ANALYSIS

A Job Safety Analysis (JSEA) shall be developed for all trenching and excavation works. Key hazards specific to trenching and excavation works that should be addressed through the JSEA process include but are not limited to:

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 Earth and rock dislodging and falling

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 Instability of the excavation or any adjoining structure

 The inrush or seepage of water

 Unplanned contact with utility services (electrical, gas, water etc)

 Placement of spoil and materials

 Falls into excavation (such as unprotected edges, during access and egress into excavation)

### NOTIFICATION TO WORKSAFE

The Site Supervisor must ensure that WorkSafe New Zealand is notified of any trench or excavation Work in any pit, shaft, trench, or other excavation in which any person is required to work in a space more than 1.5 metres deep and having a depth greater than the horizontal width at the top.

Notification is given completing an on line form, available from the WorkSafe New Zealand Website:

*https://*[*www.worksafe.govt.nz/worksafe/notifications-forms/*](http://www.worksafe.govt.nz/worksafe/notifications-forms/) *particular-hazardous-work/particular-hazardous-work-notification. pdf*

SERVICE LOCATION AND PROTECTION

### SERVICE LOCATION

When doing any work that involves ground penetration, including digging, placing fence posts, or driving in stakes, make sure that area is clear of any utility services.

Relevant energy suppliers will be able to tell you where electrical cables or gas lines run. In some areas there may be more than one set of gas mains.

These may be supplied on a service map for the area by utility owners.

The organisation’s excavation permit issuing processes will include processes for ensuring marked up plans are provided to the site supervisor prior to work commencing. An Excavation or “Permit to Dig" must be fully completed and issued prior to any excavation work commencing Completed permits shall be retained and filed on site.

It is critical to determine the exact location and positive identification of existing services (gas, electricity, water, sewerage, telecommunications etc).

A pre-excavation survey using pipe and cable locating equipment shall be undertaken prior to any trenching or excavation works.

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Pot holing using non-destructive means shall be undertaken prior to any trenching or excavation works that are within 5 metres of services. Non-destructive excavation may be undertaken via a vacuum boring system / hydrovac or a manual system:

 The vacuum boring system uses water to expose the services which are buried under ground. This system has a high pressure water jet and vacuum system, the water jet is directed at the ground in the location where the service is believed to be and the vacuum sucks up and removes the

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water and loose matter that has to be dislodged by the water jet.

 The manual system uses manual labour to expose the services which are buried under ground. Wooden handled or other insulated implements (i.e. shovels, mattocks etc) should be used when undertaking this system which involves digging down on both sides of the service and then remove the earth in the middle by pulling the clay away (not digging

it away).

EXCAVATION PERMIT

An excavation permit must be fully completed and issued prior to any excavation work commencing on the project. Prior to issue of the Permit the Competent Person shall ensure:

 All underground installations, such as sewer, water, fuel, electrical lines, gas lines, telecommunication lines that will be encountered are recorded on the relevant drawing or sketch.

 Where isolations are required liaise with appropriate isolation owners (Electrical or Mechanical) to develop an Isolation List specific to the Excavation Permit.

 When the excavation work approaches the approximate crossing or parallel location of an underground installation and if accidental contact or disturbance is possible ensure:

~ the appropriate means (hand or sonic) for identifying the exact location before proceeding.

~ the requirement for the services to be physically identified (marking paint or similar) at the location of the service.

~ the requirement for a services spotter.

 That provisions have been made for:

~ excavation stability (shoring/benching/battering) based upon the ground conditions to be encountered.

~ precautions necessary to ensure safe access and egress and third party protection including the removal of poles, and other surface encumbrances that may create a hazard to employees involved in excavation work.

~ Emergency Evacuation/Rescue

~ Traffic Management

~ Approved Safe Access/Egress

The Competent Person, once satisfied that all the requirements have been met shall authorise the Excavation Permit.

The Competent Person shall define the period of validity for the proposed excavation as part of the authorisation to commence work.

The Supervisor in charge of the excavation shall acknowledge the Excavation Permit requirements through signing the Permit Holder section and informing all personnel undertaking the work of the requirements.

An Excavation Permit is valid for either the duration of the job or the time period as indicated on the permit.

The Permit Holder shall hand back the Excavation Permit by signing the relinquishment section of the original and duplicate copies of the Excavation Permit and any associated Permits, conditional upon:

 Where excavation conditions have changed the Permit Holder is to inform the Competent Person the nature of the changed conditions and additional precautions required.

 Where a significant change in the precautions associated with the excavation is required then a new Excavation Permit, and JSEA be completed.

EXCAVATION REQUIREMENTS

### GENERAL REQUIREMENTS

All trenches and excavations that are to be entered by a person and where a hazard exists, such as the potential for collapse, or those excavations greater than 1.5m deep must be benched, battered or shored.

A copy of the JSEA, Excavation Permit and associated service / utility documentation and drawings must be held at all times on site by the work crew performing the work.

To ensure standardisation, underground assets shall be marked (colour coded) as per AS 1395:1995 Identification of the Contents or Pipes, Conduits and Ducts.

The below table highlights common services and associated colours.

|  |  |
| --- | --- |
| **SERVICE TYPE** | **COLOUR** |
| Water (Fire Services) | Blue |
| Water (Potable) | Green with a blue band |
| Electricity | Orange |
| Gas | Yellow |
| Sewerage | Black |
| Storm water | Green |
| Telecommunications | White |

In this guideline, ‘competent person’ refers to the temporary works designer, who should be competent to assess and manage the risks relevant to the excavation’s depth and have a working knowledge of this guideline. A competent person is a person

who has acquired through training, qualification or experience the knowledge and skills to carry out a task. Recommended competencies for the competent person are outlined in the “Good Practice Guidelines for Excavation Safety, WorkSafe July 2016".

### BENCHING, BATTERING AND SHORING

All battered or benched excavations must be excavated a maximum one metre from the base of the excavation.

Approximate battering values of this angle for different materials are:

 Clay (dry) 1:1

 Clay (wet) 4:1

 Sand (Clean) 1.5:1

 Rock (Decomposed) 1:1

Benched excavations must be a maximum one metre up and minimum one metre out dependant on the outcome of the risk assessment.

All shoring must adhere to Australian / NZ Standards. All shoring must be lifted into place using approved lifting points, slings and plant with sufficient lifting capacity. The use of soldier sets is a last resort control strategy.

All toms / wailings must be in place no greater than one metre from the base of the trench. Vertical sheeting must reach the base of the excavation.

All shoring must extend to a minimum of 300mm above ground level.

Workers must not:-

 Enter the excavation prior to the installation of shoring;

 Work inside a trench, outside the protection of shoring;

 Remain inside the trench whilst the shoring is being moved;

 Enter a trench after shoring has been removed;

 Step across an excavation enter a shield other than by a ladder.

Spoil must never be less than 1m from the trench edge. If a trench runs across sloping ground, spoil should be placed on the downhill side of the excavation.

Mechanical excavation tools and techniques shall not be used within 1 metre of identified underground utility assets.

### FALL PREVENTION

All trenches and excavations are to have fall prevention measures in place. Fall prevention measures include ladders, shields, handrail systems, mesh covers and barricading and signage.

Access ladders should be provided in all trenches where personnel are working.

Ladders must be of industrial Standard (120 Kg SWL) and in good condition. Ladders must be securely positioned at the bottom and secured at the top. Ladders must extend at least 900mm above the level needed to stand or step off.

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If the trench is deeper than 1.5m the ladder must be positioned within the shield.

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If shields are to be used as a falls prevention barricade, shields must be a minimum of 900mm above ground level.

Where shields are not or cannot be used as a falls prevention barricade, handrails must be erected. Handrails must have

a top rail between 900mm and 1100mm high and a mid-rail approximately 500 mm high.

### TEMPORARY BARRICADING AND SIGNAGE

Excavations are to be barricaded using an approved system of barricading and sign posted to prevent access to the excavation (bunting or mesh fencing and star pickets erected 2m back from edge with the following signage “Danger: Authorised Personnel Only” or “Danger: Deep Excavation”);



The section between the end of pipe and excavator where pipes are being laid need not be barricaded as long as constant supervision is available to ensure only competent pipe laying persons approach the trench.

Where possible, all excavations are to be backfilled on the same day they are opened. If an excavation is to be left overnight, flashing lights or retro-reflective markers or a combination of both are to be installed to alert personnel of its presence.

### HAZARDS FROM FALLING OBJECTS

All surface items located adjacent to the excavation that may readily fall shall be removed to a safe location a minimum of 2 metres from the trench or securely supported as necessary.

At no time shall employees be permitted to work on the faces of sloped or benched excavations above other employees.

### WATER ACCUMULATION

Employees shall not work in hazardous excavations in which there is accumulated water or water is accumulating unless there are adequate support systems in place to prevent excavation / trench collapse and there is an adequate de-watering system

in place that can control the amount of accumulating water. The works supervisors must monitor these systems to ensure proper operation.

When excavations change or prevent the natural drainage or flow of surface water or groundwater, suitable means must be provided to prevent the water from entering the excavation or accumulating in, or, adjacent to the excavation. Water removed from excavations or diverted from entering excavations shall be stored, re-used or released in accordance with the site environmental management plan.

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### EXCAVATION INSPECTIONS

The Supervisor in charge of the excavation works must conduct a daily inspection of the excavation to ensure that:

 the trench sides are not being undercut by the excavator bucket;

 the supports are not being overstressed;

 the ground is not fretting or beginning to collapse into the trench;

 tension cracks do not appear along the trench top

 the trench walls do not sag under the increased pressure of the excavator.

Inspections are to be recorded on the Trenching and Excavation Checklist.

If the works supervisor finds evidence of hazardous conditions, all employees at risk of injury must be immediately removed from the excavation until all necessary precautions have been taken and the works supervisor inspects the area and authorizes the work to continue.

Pipes, which are to be laid, and equipment for laying pipes (shovels, haunching materials, etc) should be placed away from the top of the trench to ensure that they do not fall in.

ATTACHMENT

Attachment 1: Trenching and Excavation Checklist

REFERENCES

### WATER NEW ZEALAND PROCEDURES & GUIDELINES:

#### Health and Safety Procedures:

 Contractor Health and Safety Management

 Job Safety Analysis

 Work at Heights

#### Legislation, Regulation and Standards

 Health and Safety at Work Act 2015

 AS 4744.1 – 2000 Steel shoring & trench lining equipment

 AS 4804 - 1997 Occupational health and safety systems - General guidelines on principles, systems and supporting techniques

 Good Practice Guidelines for Excavation Safety, WorkSafe July 2016

[*http://www.worksafe.govt.nz/worksafe/information-guidance/all-*](http://www.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/excavation-safety-gpg)[*guidance-items/excavation-safety-gpg*](http://www.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/excavation-safety-gpg)