

SECTION 15 SERVICE TRENCHING

1 GENERAL

1.1 RESPONSIBILITIES

General

General: Provide service trenching for underground services.

Design

Steel shoring and trench lining systems: To AS 4744.1.

Hydraulic shoring and trench lining equipment: To AS 5047.

1.2 CROSS REFERENCE

General

Requirement: Conform to the following:

- *General Requirements.*

Precautions to be taken for asbestos containing material

Conform also to the *Preliminaries* and *General Requirements* and *Environmental Requirements* worksections, including to requirements for:

- all imported materials to be certified as free from building waste and asbestos containing material (ACM)
- procedures to be followed if suspected or confirmed ACM is discovered during the course of the Works.

1.3 STANDARDS

General

Earthworks: To AS 3798.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the abbreviations given below apply:

- CBR value: California Bearing Ratio value.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made at the following stages:

- Service trenches excavated before laying the service.
- Services laid in trenches and ready for backfilling.

1.6 SUBMISSIONS

General

Extent: Survey plan of trench works noting the location and type of service.

Program: Duration of open excavation.

Construction: Equipment and method of excavation.

Stability: If shuttering and/or bracing of the sides of a trench is required for safety and stability, provide proposals.

Geotechnical data: Provide a geotechnical report supporting the procedures proposed for trenching and/or boring.

Hazards: Identify OH&S hazards that may be encountered with deep trenches including toxic gases and liquids.

Boring: Submit proposals for the following:

- Limits on length.
- Existence of other services.
- Pressure grouting to voids.
- The effect of pressure grouting on other services and ground heave.
- Access to properties outside the site.
- Council permits.
- Service interruptions including a plan for unintended interruptions.

Off site disposal

Disposal location: Submit the locations and evidence of compliance with the relevant authorities for the disposal of material required to be removed from the site.

2 PRODUCTS

2.1 FILL MATERIALS

General

Fill materials including borrow or imported fill: To the *Earthwork* worksection **Fill materials** and **Borrow or imported fill**.

In reactive clay: In sites classified M, M-D, H, H-D or E to AS 2870, re-use excavated site material at a moisture content within $\pm 1\%$ of that of the adjoining in situ clay.

3 EXECUTION

3.1 EXISTING UTILITY SERVICES

Marking

General: Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.

Contact: DIAL 1100 BEFORE YOU DIG is a free service, from anywhere in Australia, of identifying underground pipe and cables (possible within two working days). See www.1100.com.au.

Locations: Obtain locations of water, sewer, stormwater, gas, electricity and telephone services.

3.2 EXISTING SURFACES

Concrete and asphalt pavements

Method: Sawcut trench set out lines for the full depths of the bound pavement layers except where the set out line is located along expansion joints.

Removal of concrete and asphalt: Break out concrete or asphalt pavement material between the trench set out lines, remove and dispose of off-site.

Segmental paving units

Removal: Take up segmental paving units both full and cut by hand, between the trench set out lines, and neatly stack on wooden pallets at locations as directed.

Concrete edging: Break out, remove and dispose of off-site.

Concrete subbase: If present, sawcut along the trench set out lines.

Grass

Method: Neatly cut grass turf between trench set out lines into 300 mm squares. If the grass is approved as suitable for reuse take up and store the turf at locations as directed and water as directed during the storage period, otherwise remove and dispose of it off-site.

Small plants, shrubs and trees

Storage: If approved for re-planting take up small and store at approved locations. Wrap the root ball in a hessian or plastic bag with drain holes and water as directed during the storage period.

Unsuitable vegetation: Remove and dispose of off-site.

3.3 EXCAVATING

Site preparation

As found site conditions: To the *Earthwork* worksection **Geotechnical**.

If Records of Measurement are required, Records of measurement: To the *Earthwork* worksection **Records of measurement**.

Remove topsoil: To the *Earthwork* worksection **Removal of topsoil**.

Excavation

General: Excavate for underground services:

- To required lines and levels, with uniform grades.
- Straight between personnel access ways, inspection points and junctions.
- With stable sides.
- To a width tolerance of ± 50 mm unless constrained by adjacent structures.
- Excavation: To the *Earthwork* worksection **Excavation and Adjacent structures**.

Trench widths

General: Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of personnel access ways and pits.

Trench depths

General: As required by the relevant service and its bedding method.

Adjacent to footings: If excavation is necessary below the zone of influence of the underside of adjacent footings, give notice, and provide support for the footings as instructed.

Obstructions

General: Clear trenches of sharp projections. Cut back roots encountered in trenches to at least 600 mm clear of services. Remove other obstructions including stumps and boulders which may interfere with services.

Dewatering

General: Keep trenches free of water. Place bedding material, services and backfilling on firm ground free of surface water.

Pumping: Provide pump-out from adjacent sumps or install well points.

Adjacent subsidence: Provide recharge points to isolate the dewatering zone.

Excess excavation

General: If trench excavation exceeds the correct depth, reinstate to the correct depth and bearing value using compacted bedding material or sand stabilised with 1 part of cement to 20 parts of sand by volume.

Stockpiles

Excavated material for approved backfill: Segregate the earth and rock material and stockpile, at sites as directed, for reuse in backfilling operations.

Locations: Do not stockpile excavated material against tree trunks, buildings, fences or obstruct the free flow of water along gutters where stockpiling is permitted along the line of the trench excavation.

Disposal: If stockpiling is not permitted, dispose of excavated material off-site.

Unsuitable material

Disposal: Remove any material from the bottom of the trench or at foundation level which is deemed unsuitable and dispose of off-site, replace with backfill material to **Backfill material**.

Boring

Subcontractor: If under road boring is required in lieu of trenches, engage a suitably qualified subcontractor to do the work.

3.4 TRENCH BACKFILL

General

Timing: Backfill service trenches as soon as possible after the service has been laid and bedded, if possible on the same working day.

Marking services: Underground marking tape to AS/NZS 2648.1.

Place fill: To the *Earthwork* worksection **Placing fill**.

Bedding, haunch, side and overlay zones

Installation and material: To the particular utility authority or utility service requirements. Secure pipes against floatation.

Overlay zone thickness: Maximum of 300 mm immediately over the utility service.

Topsoil areas: Complete the backfilling with at least 100 mm of topsoil.

Material in reactive clay areas: In sites classified M, M-D, H, H-D or E to AS 2870, re-use excavated site material at a moisture content within $\pm 1\%$ of that of the adjoining in situ clay.

Selected material zone

Extent: The section of trench within the zone, if applicable.

Backfill material: Selected material free from stones larger than 100 mm maximum dimension and the fraction passing a 19 mm Australian Standard sieve to have a 4 day soaked CBR value, in conformance with AS 1289.6.1.2, and not less than that of the adjacent selected material zone.

Trees

General: Backfill at trees, for a minimum 300 mm thickness, around tree roots with a topsoil mixture, placed and compacted in layers of 150 mm minimum depth to a dry density equal to that of the surrounding soil.

Backfill level: Do not place backfill material above the original ground surface around tree trunks or over the root zone.

Watering: Thoroughly water immediately after backfilling the tree root zone.

Compaction

Control moisture within backfill: To the *Earthwork* worksection **Fill moisture control**.

Layers: Compact all material in layers not exceeding 150 mm compacted thickness. Compact each layer to the relative compaction specified before the next layer is commenced.

Compaction: To the *Earthwork* worksection **Compaction requirements for fill and subgrade** and AS 3798 Section 5.

Frequency of testing: To AS 3798 clause 8.7.

Precautions: If compacting adjacent to utility services, use compaction methods which do not cause damage or misalignment.

Density tests

Testing authority: Have density tests of pipe bedding and backfilling carried out by a Registered testing authority.

Test methods:

- Compaction control tests: To AS 1289.5.4.1 or AS 1289.5.7.1.
- Field dry density: AS 1289.5.3.2 or AS 1289.5.3.5.
- Standard maximum dry density: AS 1289.5.1.1.
- Dry density ratio: AS 1289.5.4.1.
- Density index: AS 1289.5.6.1.

3.5 SURFACE RESTORATION

Subbase and base

Material: Provide crushed rock, DGS20 or DGB20 material, from an approved source and configure in layers and depths to match existing and adjacent work.

Supply and installation: To the *Pavement base and subbase* worksection.

Compaction: Uniformly compact each layer of the subbase and base courses over the full area and depth within the trench to a relative compaction of 100 per cent when tested in conformance with AS 1289.5.4.1.

Tests: Undertake compaction tests at a minimum frequency of 1/ every second layer/50 m² of restoration surface area.

Pathways and paved areas generally

Materials: Consistent with the surface existing before commencement of the works.

Subbase: 150 mm crushed stone DGB20 compacted to 100 percent relative compaction in conformance with AS 1289.5.4.1.

Lippage at patches: Match the surface level at any point along the patch's edge with the adjoining footpath surface within ± 5 mm.

Concrete surfaces

Construction: Conform to the following:

- Prime coat the cut edges of the existing surfaces with cement slurry. Lay and compact concrete so that the edges are flush and the centre is cambered 10 mm above the adjoining existing surfaces.
- Material: 25 MPa concrete
- Surface finish and pattern: Match existing adjoining work.
- Minimum thickness: 75 mm or the adjacent pavement thickness, whichever is thicker.
- Reinforcement and dowels: If required, provide steel reinforcement with dowels into the adjacent concrete.
- Expansion joints: 15 mm thick preformed jointing material of bituminous fibreboard placed where new concrete abuts existing concrete and in line with joints in existing concrete.
- Control joints:
 - Form control joints strictly in line with the control joints in existing concrete.
 - Around electricity supply poles: Terminate the concrete paving 200 mm from the pole and fill the resulting space with cold mix asphalt.

Curing: Cure by keeping continuously wet for 7 days.

Asphalt footpaths

Materials and installation: To the *Asphaltic concrete* or *Sprayed bituminous surfacing* worksections as appropriate.

Thickness: Match the adjoining footpath.

Finish: Compact to a smooth even surface.

Segmental paving units

Materials and installation: To *Segmental pavers – sand bed* or *Segmental pavers – mortar bed* as appropriate and as follows:

- Laying: Re-lay to match the pattern and surface levels of the existing paving.
- Damaged paving units: Replace with new units, paving units which are unsuitable for relaying with new units of the same material, type, size and colour as the existing.

Landscaped areas

In topsoil areas: Complete the backfilling with topsoil for at least the top 100 mm.

Lawn: Re-lay stockpiled turf. If existing turf is deemed unsuitable, re-sow the lawn over the trench and other disturbed areas.

Planted areas: Overfill to allow for settlement.