



AUS-SPEC

Infrastructure Specifications

0223 Service trenching

0223 SERVICE TRENCHING

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the Cessnock City Council area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) Cessnock City Council customisations (also known as 'office master' text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown **in brown text like this**.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and Cessnock City Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide trenching for underground services, as documented.

1.2 DESIGN

Requirements

General: To DESIGN in *0171 General requirements*.

Responsibility: ~~Design and coordinate all trenching required for proposed inground services, as documented.~~ **Trench design is to be undertaken as per design documentation or as directed by utility services authority design requirements.**

Existing services: Where possible, design to avoid all existing services. Locate existing services to EXECUTION, **EXISTING SERVICES**.

Authority requirements: As per any DA consent conditions.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0136 General requirements (Construction)*.
- ~~0171 General requirements~~.

Limitations

Exclusion: This worksection is not intended to apply to works within the scope of the following:

- *1151 Road openings and restoration*
- *1152 Road openings and restoration (Utilities)*
- *1392 Trenchless conduit installation*.

1.4 STANDARDS

Trenching

Earthworks: To AS 3798 (2007).

Electrical services: To AS/NZS 3000 (2018).

Hydraulic services: To the AS/NZS 3500 series.

Communication services: To AS/CA S009 (2020).

Gas services: AS/NZS 5601

1.5 TOLERANCES

Surface levels

Earthworks: Finish the surface to the required level, grade and shape within the following tolerances:

- Under building slabs and load bearing elements: +0, -25 mm.
- Pavement subgrades: +0, -40 mm.
- Batters: No steeper than the slope shown on the drawings. Make sure flatter slopes do not impact on boundaries or required clearances to buildings, pavements or landscaping.
- Other ground surfaces: ± 50 mm, provided the area remains free draining and matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

Pavement base and subbase: Finish the surface to the required level, grade and shape within the following tolerances:

- Subbase: +10 mm, -25 mm.
- Base: +10 mm, -5 mm.

Finished pavement or paving surface: Conform to the documented level within the following tolerances:

- Asphalt: ± 10 mm.
- Concrete: +10 mm, -0 mm.
- Paving:
 - . Finished level: ± 8 mm.
 - . Height deviation between adjacent units (lippage): ± 2 mm.
- Granular surfaces: ± 10 mm.
- Lippage between restored surface and adjacent existing surface: ± 5 mm.

1.6 SUBMISSIONS

Execution details

Excavation method: Submit details of proposed equipment and method of excavation, including the following:

- Service location and type: A plan of the trench works showing the location and type of service.
- Open excavation: Proposed duration.
- Shuttering and/or bracing of trench sides: If required for safety and stability, provide proposals.
- Geotechnical data: Geotechnical report supporting the procedures proposed for trenching and/or boring, **if there is a risk that existing buildings or works may be compromised or undermined, or if otherwise required at the Superintendent's discretion..**
- Boring: Proposals for the following:
 - . Limits on length.
 - . Existence of other services and method of protection.
 - . Pressure grouting to voids.
 - . The effect of pressure grouting on other services, ground heave and proposals for minimising such effects.
 - . Access to properties outside the site.
 - . Council permits.
 - . Service interruptions including a plan for minimising unintended interruptions.
- Hazards: Identify WHS hazards that may be encountered with deep trenches including toxic gases and liquids.

Off-site disposal location: Submit details of the proposed disposal locations and evidence of conformance with the relevant authorities for the disposal of material required to be removed from the site.

Records

As-built location: Upon completion, submit to the relevant authority as-built documentation showing the location of the installed services.

Tests

Trench backfill: Submit results of the following:

- Compaction tests.
- Density tests.

1.7 INSPECTION**Notice**

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

- **Witness Point:** Items to be measured as listed in **GROUND CONDITIONS, Records of measurement.**
- **Witness Point:** Service trenches excavated before laying the service.
- **Hold Point:** Services laid in trenches and ready for backfilling.
- **Witness Point:** Completed surface restoration.

2 PRODUCTS**2.1 FILL MATERIALS****General**

Suitable material: To AS 3798 (2007) clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Unsuitable materials: Do not use unsuitable material for fill in conformance with AS 3798 (2007) clause 4.3.

Sulfur content: Do not provide filling with sulfur content exceeding 0.5% within 500 mm of cement bound elements (for example concrete structures or masonry) unless such elements are protected by impermeable membranes or equivalent means.

Re-use of excavated material: Only re-use suitable material in conformance with AS 3798 (2007) clause 4.4.

Material in reactive clay areas: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870 (2011), re-use excavated site material at a moisture content within $\pm 1\%$ of that of the adjoining in situ clay.

Selected material zone: As specified on the Drawings. If shown on the Drawings but not specified, selected material is to be free from stones larger than 100 mm maximum dimension and the fraction passing a 19 mm Australian Standard sieve is to have a 4 day soaked CBR (California Bearing Ratio) value, in conformance with AS 1289.6.1.2, and not less than that of the adjacent selected material zone.

2.2 SURFACE RESTORATION MATERIALS**General**

Re-use: If possible re-use the existing surface materials that were removed during trench excavation, whilst conforming to the documented material requirements.

Subbase and base

Requirement: Provide crushed rock material configured in layers and depths to match existing and adjacent work, as follows:

- Base: 20 mm nominal size.
- Subbase: 40 mm nominal size.

Pathways and paved surfaces generally

Requirement: Provide materials consistent with those of the existing surface before service trenching works commenced.

Concrete surfaces

Material requirements: Normal-class to AS 1379 (2007).

Concrete strength grade: N25.

Slump: Maximum 100 mm.

Asphalt surfaces

Aggregate: To AS 2758.5 (2020) or to AS 2758.2 (2021) for sprayed bituminous surfaces.

Asphalt: To AS 2150 (2020).

Medium cut back bitumen: To AS 2157 (1997).

Bitumen emulsion: To AS 1160 (1996).

Bitumen binder: Class 170.

Pavers

Concrete and clay pavers: To AS/NZS 4455.2 (2010).

Bedding and joint filling sand: Well-graded sand, free of deleterious material, such as soluble salts, that may cause efflorescence.

Stone pavers and setts: Provide sound stone pavers and setts of uniform quality. Reject any with defects liable to affect strength and durability.

Bedding mortar mix (cement:sand): Select from the range 1:3 to 1:4 to obtain satisfactory adhesion. Provide minimum water.

3 EXECUTION**3.1 EXISTING SERVICES****Location**

Requirement: Before commencing service trenching, locate and mark existing underground services in the areas that will be affected by the service trenching operations.

Utility services: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

Excavation

General: Do not excavate by machine within 1 m of existing underground 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.

Paving

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

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

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

Grass

Removal method: Neatly cut grass turf between trench set-out lines into 300 mm squares.

Grass suitable for re-use: Take up and store the turf and water during the storage period.

Unsuitable grass: Remove and dispose of off-site.

Small plants, shrubs and trees

Remove for re-planting: Take up and store. Wrap the rootball in a hessian or plastic bag with drain holes and water during the storage period.

Unsuitable vegetation: Remove and dispose of off-site.

3.3 GROUND CONDITIONS**As found site conditions**

Unexpected conditions: If the following are encountered, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancies to expected ground conditions.
- Rock.

- Springs, seepages.
- Topsoil > ~~400~~ 200 mm deep.

Records of measurement

Over-excavation: The contractor is not entitled to a contract variation or extension of time for excavation in excess of that required by the contract, including excavation below required depths, or additional excavation that the contractor may elect to undertake to permit the use of certain construction plant, and any consequent additional backfilling, compacting or testing.

Excavation and backfilling: If a schedule of rates applies, provisional quantities are specified, or there are variations to the contract levels or dimensions of excavations, do not commence backfilling or place permanent works in the excavation until the following have been agreed and recorded:

- Depths of excavations related to the datum.
- Final plan dimensions of excavations.
- Quantities of excavations in rock.

Rock: If rock is measured for payment purposes, whether as extra over excavation of material other than rock or for adjustment of provisional measurements, do not remove the rock until the commencing levels and the classes of rock have been determined.

3.4 EXCAVATION

General

Requirement: Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.
- Width tolerance: ± 50 mm, unless constrained by adjacent structures.
- Tree protection: To AS 4970 (2009).

Adjacent structures

Existing footings: If excavation is required within the zone of influence of an existing footing, use methods including (temporary) shoring or underpinning that maintain the support of the footing and make sure that the structure and finishes supported by the footing are not damaged.

Temporary supports: Provide supports to adjacent structures where necessary, sufficient to prevent damage arising from the works, as follows:

- Lateral supports: Provide lateral support using shoring.
- Vertical supports: Provide vertical support where necessary using piling or underpinning or both.

Permanent supports: If permanent supports for adjacent structures are necessary and are not described, give notice and obtain instructions.

Encroachments: If encroachments from adjacent structures are encountered and are not shown on the drawings, give notice and obtain instructions.

Trench widths

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

Trench depths

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

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 that may interfere with services or bedding.

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.

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

Topsoil removal: Stockpile topsoil intended for re-use to a maximum height of 1500 mm.

Excavated material for backfill: If required, segregate the earth and rock material and stockpile, for re-use 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 unsuitable material from the bottom of the trench or at foundation level and dispose of off-site. Replace with trench backfill material.

Boring

Subcontractor: If boring is required instead of trenches, engage a suitably qualified subcontractor to do the work.

3.5 TRENCH BACKFILL**General**

Place fill: To AS 3798 (2007) clauses 6.2.2 and 6.2.6.

Timing: Backfill service trenches as soon as possible after laying and bedding the service, if possible on the same working day.

Removal of supports: Remove temporary supports progressively as backfilling proceeds.

Marking services

Marking tape: Provide marking tape above service, with appropriate labelling, to AS/NZS 2648.1 (1995) and as follows:

- Non-metallic services: Provide tape capable of being detected by inground scanning devices.
- Location: Locate tape approximately half the depth of the service being marked, to a maximum depth of 200 mm below the finished ground level.

Boring: If boring techniques are used to install the service, provide permanent on site labelling at the start and end of the service run and record on the as-built documentation.

Bedding, haunch, side and overlay zones

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

Bedding of services: Surround pipes or conduits on all sides with a minimum of 75 mm compacted bedding sand, or as documented (*whichever is greater*).

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

Trees

Backfill at trees: Backfill minimum 300 mm thick, around tree roots with a topsoil mixture. Place and compact in layers of 150 mm minimum depth to a dry density equal to that of the surrounding soil.

Original surface level: Do not place backfill 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 AS 3798 (2007) clause 6.2.3.

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

Compaction: To AS 3798 (2007) Section 5.

Frequency of testing: To AS 3798 (2007) clause 8.7.

Precautions: Use compaction methods that do not cause damage or misalignment to utility services.

Density tests

Testing authority: Carry out density tests of pipe bedding and backfilling by an Accredited Testing Laboratory.

Test methods: Conform to the following:

- Compaction control tests: To AS 1289.5.4.1 (2007) or AS 1289.5.7.1 (2006).
- Field dry density: To AS 1289.5.3.2 (2004) or AS 1289.5.3.5 (1997).

- Standard maximum dry density: To AS 1289.5.1.1 (2017).
- Dry density ratio: To AS 1289.5.4.1 (2007).
- Density index: To AS 1289.5.6.1 (1998).

Reference: Refer to SA HB 160 (2006) for additional information on soil testing.

3.6 SURFACE RESTORATION

Subbase and base

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% when tested in conformance with AS 1289.5.4.1 (2007).

Compacted layer thickness:

- Maximum: 200 mm.
- Minimum: 100 mm.

Compaction test frequency: Minimum 1/every second layer/50 m² of restoration surface area.

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 5 mm above the adjoining existing surfaces.
- 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~~, Where documented, provide steel reinforcement with dowels into the adjacent concrete.
- Expansion joints: 15 mm thick preformed jointing material of bituminous fibreboard placed in line with joints in existing concrete.
- Control joints:
 - . Form control joints strictly in line with the control joints in existing concrete.
 - . Around service poles: Terminate the concrete paving 200 mm from the pole and fill the resulting space with cold mix asphalt.

Weather: Do not place concrete in ambient temperatures above 30°C or below 10°C, without adequate precautions. Protect surface from rain damage, if required.

Compaction: Compact as follows:

- Thickness 100 mm or less: Compact by placing, screeding and finishing processes. If required use a hand-held vibrating screed at the surface. Do not use immersion vibrators.
- Thickness more than 100 mm and downturns: Use an immersion vibrator.

Curing: Cure by keeping continuously wet for 7 days.

Asphalt surfaces

Placement: To AS 2150 (2020).

Operations: Spread the asphalt mix in layers covering the full width of the trench.

Thickness: Match the adjoining asphalt surface.

Finish: Compact to a smooth even surface.

Sprayed bituminous surfaces: To AS 3727.1 (2016) Section 8.

Pavers

Bedding: Replicate the bedding used for the original paved surface. Use bedding methods and materials that are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material.

Laying: Re-lay to match the pattern and surface levels of the existing paving.

Damaged pavers unsuitable for relaying: Replace with new pavers 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.

Grass: Re-lay stockpiled turf. If existing turf is no longer viable, re-sow grass over the trench and other disturbed areas.

Planted areas: Overfill to allow for settlement.

3.7 COMPLETION

General

As-built documentation: Upon completion, record the location of all installed services on the as-built documentation.

4 ANNEXTURE A – REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS/CA S009	2020	Installation requirements for customer cabling (Wiring Rules)
AS 1160	1996	Bitumen emulsions for construction and maintenance of pavements
AS 1289		Methods of testing soils for engineering purposes
AS 1289.5.1.1	2017	Soil compaction and density tests- Determination of dry density/moisture content relation of a soil using standard compactive effort
AS 1289.5.3.2	2004	Soil compaction and density tests - Sand replacement method using a sand pouring can, with or without a volume displacer
AS 1289.5.3.5	1997	Soil compaction and density tests- Determination of the field dry density of a soil - Water replacement method
AS 1289.5.4.1	2007	Soil compaction and density tests - Compaction control test - Dry density ratio, moisture variation and moisture ratio
AS 1289.5.6.1	1998	Soil compaction and density tests - Compaction control test - Density index method for a cohesionless material
AS 1289.5.7.1	2006	Soil compaction and density tests- Compaction control test - Hilf density ratio and Hilf moisture variation (rapid method)
AS 1289.6.1.2	1998	Soil strength and consolidation tests - Determination of the California Bearing Ratio of a soil - Standard laboratory method for an undisturbed specimen
AS 1379	2007	Specification and supply of concrete
AS 2150	2020	Hot mix asphalt - a guide to good practice
AS 2157	1997	Cutback bitumen
AS/NZS 2648		Underground marking tape
AS/NZS 2648.1	1995	Non-detectable tape
AS 2758		Aggregates and rock for engineering purposes
AS 2758.2	2021	Aggregate for sprayed bituminous surfacing
AS 2758.5	2020	Coarse asphalt aggregates
AS 2870	2011	Residential slabs and footings
AS/NZS 3000	2018	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2018	Water services
AS 3727		Pavements
AS 3727.1	2016	Residential
AS 3798	2007	Guidelines on earthworks for commercial and residential developments
AS/NZS 4455		Masonry units, pavers, flags and segmental retaining wall units
AS/NZS 4455.2	2010	Pavers and flags
AS 4970	2009	Protection of trees on development sites

EN 15804	2012	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO 14025	2006	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 21930	2017	Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services
SA HB 160 Cessnock City Council	2006	Soils testing Development Engineering Handbook

5 ANNEXURE M – CESSNOCK CITY COUNCIL SPECIFIC CLAUSES

M1.	Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's <i>Development Engineering Handbook</i> . Acceptance is to be obtained in writing from: a) an authorised representative of Council's Director of Infrastructure and Engineering Services.	Variation procedure
M2.	This specification applies in addition to any development consent (DA) conditions. If there is any inconsistency, the conditions of consent shall prevail.	DA Conditions
M3.	Refer to the Cessnock City Council Development Engineering Handbook for final inspection, works-as-executed and handover requirements.	Completion

6 AMENDMENT HISTORY

0	15/01/2024	First Published
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