



AUS-SPEC

Infrastructure Specifications

0292 Masonry Walls



0292 MASONRY WALLS

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the MidCoast 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) MidCoast 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 MidCoast Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide masonry walls including footings, subsoil drains, masonry wall construction and backfilling, as documented.

1.2 CROSS REFERENCES

General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- 0136 General requirements (Construction).
- 0152 Schedule of rates (Construction).
- 0319 Auxiliary concrete works.
- 1101 Traffic management.
- 1102 Control of erosion and sedimentation (Construction).
- 1111 Clearing and grubbing.
- 1112 Earthworks (Road reserve).
- 1171 Subsurface drainage.
- 1172 Subsoil and formation drains.

1.3 STANDARDS

General

Masonry structures: To AS 3700.

Earth retaining structures: To AS 4678.

Reinforced concrete masonry cantilever retaining walls: To CMAA RW01.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Foundation level: The level at the underside of the 50 mm thick mass concrete blinding layer, below the reinforced concrete footing.

- Masonry: A preformed component, intended for use in masonry construction, either with or without mortar joints.

1.5 TOLERANCES

Construction

Wall position and alignment: To AS 4678 Table 6.1.

Footings

Finished level: ± 10 mm.

Horizontal alignment: ± 25 mm.

Masonry construction

Standard: To AS 3700 clause 12.5 and Table 12.1.

1.6 SUBMISSIONS

Products and materials

Masonry units: Submit evidence that masonry units conform to the requirements of this worksection and AS/NZS 4455.1.

Steel reinforcement: Submit evidence of conformity for galvanized coating mass and thickness.

Samples

Face units: Submit face units of each type, illustrating the range of variation available including colour, texture, surface irregularities, defective arrises, and shape.

- Number of each type: 6.

Sealants: Submit samples of each type, showing the finished colour.

- Quantity: Minimum two of each colour to be used.

Facework sample panel: Provide, in a suitable position, a sample panel of each type of facework including pigmented face or pointing mortar.

- Minimum size (face of panel): 1200 mm high x 1190 mm or closest unit module long.

Tests

Results: Submit results of testing to **ANNEXURE – MAXIMUM LOT SIZE AND MINIMUM TEST FREQUENCIES**.

Variations

Design changes: If changes are proposed to the location, length, height, design levels or strength, submit details for approval before start of excavation.

1.7 INSPECTIONS

Notice

General: **To ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS**. Give notice so that inspection may be made of the following:

- Set-out: Including location of walls, and levels and dimensions of footings.
- Foundation: Foundation for footings on completion of excavation. If unsuitable foundation material is found, give notice for a further inspection after backfilling and re-compaction with sound material.
- Subsoil drains: Drainage line in place.
- Reinforced concrete footing: Commencement of concrete placing with steel reinforcing in place.
- Reinforcement: Steel reinforcing in place before grouting.
- Wall strength: Before backfilling, demonstrate that the wall has achieved 95% of the design strength.
- Clean up before backfilling: Removal of bracing, after completion of clean up with geotextile in place.

2 MATERIALS

2.1 MASONRY UNITS

Properties

Standard: To AS/NZS 4455.1.

Type: Provide one of the following:

- Autoclaved aerated concrete.
- Calcium silicate (sand-lime).
- Concrete (dense or lightweight).
- Dimension stone (cut or dressed).
- Fired clay (with or without shale).

Concrete facing units: Conform to AS/NZS 4455.1 and the following:

- Dimensional category: DW4.
- Minimum characteristic compressive strength: Minimum 10 MPa.
- Salt attack resistance grade: General purpose to AS/NZS 4455.1 Table 2.3.

Concrete units for reinforced masonry walls: Conform to AS/NZS 4455.1 and the following:

- Salt attack resistance grade generally: General purpose to AS/NZS 4455.1 Table 2.3.
- Salt attack for severe environments: Exposure grade to AS/NZS 4455.1 where the masonry is:
 - . Subject to saline wetting and drying.
 - . In aggressive soils.
 - . In severe marine environments.
 - . Subject to saline or contaminated water, including tidal splash zones.
 - . In other severe environments such as subject to attack by corrosive liquids or gases or within 1 km of manufacturing industries where there are chemical pollutants.
- Minimum characteristic compressive strength: Minimum 15 MPa, as documented.

Chipped or broken concrete units: Do not use. If required, cut units with a saw.

Colour: Within the approved agreed range.

2.2 CEMENT

Properties

Standard: To AS 3972.

Type: GP.

2.3 SAND

Properties

Standard: To AS 2758.1.

Requirement: Clean and free of salts, vegetable matter and impurities.

2.4 MORTAR

Properties

Standard: To AS 3700 clause 11.4.

Mix: To AS 3700 Table 11.1.

Pigments: To match the colour of the masonry units.

2.5 CONCRETE

Properties

Minimum compressive strength: 20 MPa.

Maximum nominal size of aggregate: 20 mm.

Nominated slump at the point of placement: Maximum 80 mm.

2.6 STEEL REINFORCEMENT

Protective treatment

Galvanizing: If required, conform to the following:

- Average minimum coating thickness: 85 μm of minimum 98% by mass of zinc.

Separation of materials: Do not combine galvanized and uncoated components.

2.7 JOINT SEALANT

Type

Requirement: Elastic polyurethane joint sealant.

2.8 TESTING

Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.

Quality verification: If material/product quality verification can be obtained from the supplier, documented tests need not be repeated.

3 EXECUTION

3.1 ESTABLISHMENT

Set-out

Requirement: Using recovery pegs, set out the location, length and height of masonry walls, as documented.

Foundation

Levels and dimensions: Before setting out, confirm levels and dimensions of the footings to provide satisfactory and stable foundation.

3.2 EXCAVATION

General

Requirement: Excavate to the required width, depths and dimensions of footings, including the 50 mm mass concrete blinding layer.

Loose material: Remove.

Minor rock fissures: Clean out and fill with concrete, mortar or grout.

Surplus excavated material: Use in the construction of embankments or remove from site to a site with an approved development consent to receive fill, or (for contaminated fill) a licenced disposal facility or waste management centre.

Compaction

Base of excavation: Conform to **COMPACTION** and trim so that all levels are 25 mm maximum above the design foundation level.

Base of excavation level: Confirm by survey.

Over-excavation

Over-excavation below foundation level: Conform to the following:

- In rock: Fill with concrete of the same quality as the footing.
- In soil: Backfill and re-compact in conformance with **COMPACTION**.

Foundation

Foundation material: If deemed unsuitable to support the proposed structure, excavate and backfill with sound material, and re-compact in conformance with **COMPACTION**.

Unsuitable foundation material: Remove from site.

Safety

Excavation safety control measures: Provide measures, including sheeting, bracing, formwork and falsework as recommended by *Excavation work* and the *General guide for formwork and falsework* by *Safe Work Australia*.

Dewater: Keep the excavation free of water.

3.3 SUBSOIL DRAINS

General

Requirement: Provide subsoil drainage conforming to 1171 *Subsurface drainage* and 1172 *Subsoil and formation drains* consisting of the following:

- 100 mm diameter slotted corrugated plastic pipe with seamless tubular filter fabric.

- Maximum 100 mm thick Type A filter material, contained within a layer of geotextile fabric, surrounding the plastic pipe.

Location: Provide drainage line at the base of the drainage layer, as documented.

Laying: To an even line and uniform grade of 2% minimum fall towards the outlet.

Outlets: Discharge into adjacent stormwater gully pits or headwalls, or alternatively, through adjacent fill batter.

- Markings: Make sure discharge point markings are clearly visible.

Drainage layer

Geotextile: Provide a layer of geotextile, conforming to the *1171 Subsurface drainage* worksection, between the back of the wall units and the granular drainage layer.

Granular layer: Provide a continuous granular drainage layer behind walls as follows:

- To the full height of the wall.
- In required width, measured perpendicular to the face of the wall.
- Progressively placed in layers of 150 mm maximum, compacted in conformance with **COMPACTION**.

Granular layer material: Broken stone or river gravel of clean, hard, durable particles graded from 10 mm to 50 mm to AS 1141.11.1 as follows:

- Maximum particle dimension: 50 mm.
- Passing the 9.5 mm AS sieve: Not more than 5% by mass.

3.4 REINFORCED CONCRETE FOOTING

General

Requirement: Provide reinforced concrete footings, as documented.

Concrete blinding slab

Requirement: Provide a 50 mm concrete blinding slab in at the base of the excavation for the footings.

Formwork

Requirement: Provide formwork vertical concrete surfaces to AS 3610.1, as documented.

Placement and compaction

Requirement: Conform to the *0319 Auxiliary concrete works* worksection for the following:

- Placement and compaction of concrete.
- Joints.
- Finishing.
- Curing and protection of concrete.
- Placement of reinforcing steel.

3.5 MASONRY WALL CONSTRUCTION

General

Wall construction: To AS 3700 Section 12.

Laying

First course laying surface: Clean and check for alignment. Correct excessive discrepancies before start of masonry construction.

Placement: Place masonry in horizontal courses, as documented.

Weepholes: Provide weepholes in the wall, as documented.

Rate of construction: Limit the rate of new construction to prevent joint deformation, slumping or instability.

Mortar joints

Bed and perpend joints thickness: 10 mm.

Hollow masonry units: Face shell bedding.

Structural work: Ironed mortar joint.

Joint reinforcement: Provide horizontal joint reinforcement, consisting of two 3.0 mm galvanized wires at 600 mm maximum centres.

Control movement joints

Location: Provide control movement joints built into the masonry as follows:

- Joint spacing: To AS 3700 clause 4.8.
- Joint width: 12 mm.

Joint filling

Joint surfaces: Before filling, make sure joint surfaces are clean and free of hard or incompressible material for the full width and depth of the joint.

Preparation: Insert a suitable backing rod so that it finishes 12 mm below the face of the wall.

Filling: Fill with an elastic polyurethane joint sealant to the sealant manufacturer's recommendations.

Reinforcement

Requirement: Provide reinforcement, as documented, and as follows:

- Tie vertical steel reinforcement to steel starter bars through cleanout holes in each reinforced hollow masonry unit and fix in position at the top of the wall with plastic clips.
- Lay horizontal steel in contact with rebated webs. Hold in position using plastic clips if vertical steel is subsequently positioned to wall construction.
- Maintain cover to horizontal steel in lintel blocks using wheel type plastic clips.
- Provide 15 mm minimum cover to the inside face of the block, unless documented otherwise.

Concrete grout

Preparation: Make sure bottoms of the hollow units are free of loose material before grouting.

Grouting: Completely fill hollow units with concrete grout in conformance with the following:

- Minimum cement content: 300 kg/m³.
- Minimum compressive cylinder strength: 20 MPa.
- Slump: 200 mm nominal.

Cleaning masonry

Standard: Conform to the following:

- Clay masonry: To *Think Brick Manual 13*.
- Concrete masonry: To CMAA CM03.

Free standing wall: Remove all mortar splashes and stains from both sides of the wall.

Acid cleaning: If acid cleaning is required, conform to the following:

- Clay brick acid mixture concentration (hydrochloric acid:water):
 - . Light coloured bricks: Maximum 1:20 parts.
 - . Other bricks: Maximum 1:10.
- Concrete units acid mix concentrations (acid:water): Maximum 1:20 parts for hydrochloric acid and 1:10 parts for milder acids.
- Mortar joints: Minimum 7 days old.
- Prewetting: Before applying acid solution, thoroughly wet the wall by hosing. Keep masonry wall saturated so that acid solution is restricted to the face of the masonry.
- Hosing off: Thoroughly hose off the acid mixture progressively. Do not allow acid and debris to be removed to dry on the face of wall. Restrict treatment area, as required, to maintain this.
- High pressure water jet: If used for cleaning, conform to *Think Brick Manual 13* and CMAA CM03 to prevent damage to the masonry units and mortar joints.

Mortar joint cleaning: Clean joints minimum 24 to 36 hours after completing masonry work, depending on brick type and weather (drying) conditions.

3.6 BACKFILLING FOR RETAINING WALLS

Clean up before backfill

Masonry retaining walls: Remove all timbering, bracing and waste before placing backfill.

Wall strength

Curing: Backfill against the retaining walls only after 95% of the design strength of the masonry wall has been achieved.

Placing

Granular drainage material: Conform to **SUBSOIL DRAINS, Drainage layer**.

Other backfill material: Progressively backfill excavations for foundations and construction of masonry walls, to the level of the surrounding ground, with material from cuttings or with other materials conforming to the following:

- Placed behind the drainage layer, using 10 mm crushed rock or materials with 100 mm maximum particle size.
- In layers not exceeding 200 mm thick and 300 mm wide.
- Moisture content: Within 2% of Optimum Moisture Content to achieve 85% Standard Proctor density, determined to ASTM D698.

Sealing tops and ends of walls

Sealing: Completely seal tops and ends of walls with compacted earth or other treatment, as documented.

Extent: Conform to the following:

- Top of wall: Over the full length of wall.
- Ends of walls: Full vertical edge.

Erosion control

Requirement: Where erosion is likely to occur, backfill around the ends of walls using stone fill or lean mix concrete.

3.7 COMPACTION

General

Layers: Compact materials in layers not exceeding 150 mm compacted thickness.

Relative compaction levels table

Foundations or backfill	Relative compaction
Foundations or base of excavation to a depth of 150 mm below foundation levels	95%
Granular drainage layer, subsoil filter material, material replacing unsuitable material and backfill material	95%
Note: Compaction for cohesionless soils may be acceptable:	
- Controlled fill – Class I: Material compacted to minimum 75% density index.	
- Controlled fill – Class II: Material compacted to minimum 65% density index.	

3.8 TESTING

Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE – MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.

4 ANNEXURES

4.1 ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS

For private developments, certain Hold and Witness Points where specifically noted below require representatives of both the Superintendent and the Principal Certifier (e.g. Council) to authorise release.

Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
SUBMISSIONS, Execution details Masonry units	H	Evidence of material conformance.	2 weeks before commencement	Material ordering and delivery
SUBMISSIONS,	H –	Details of design	2 weeks before	Setting out

Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
Execution details Variations	Superintendent and Principal Certifier	changes.	commencement	
INSPECTIONS, Notice Set-out	H	Set-out of walls and footings.	3 days before inspection	Foundation excavation
INSPECTIONS, Notice Foundation	H	Foundation for footings.	3 days before inspection	Subsoil drainage
INSPECTIONS, Notice Subsoil drains	H – Superintendent and Principal Certifier	Drainage line in place.	3 days before inspection	Concrete placing
INSPECTIONS, Notice Reinforced concrete footing	W	Footing formwork and reinforcing.	1 day before inspection	-
INSPECTIONS, Notice Reinforcement	W	Steel reinforcing before grouting.	1 day before grouting	-
INSPECTIONS, Notice Wall strength	H	Strength of retaining wall before backfilling.	3 days before inspection	Backfilling
INSPECTIONS, Notice Clean up before backfilling	W – Superintendent and Principal Certifier	Completed clean up.	1 day before inspection	-

*H = Hold Point, W = Witness Point

4.2 ANNEXURE – MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Alignment	Set-out	1 contract	25 m sections	Survey
Footing	Concrete slump	1 contract	1 per load	AS 1012.3.1
	Concrete strength	1 contract	1 per contract or 100 m ³ (whichever is the lesser)	AS 1012.9
Reinforcing	Steel reinforcement	1 contract	1 per contract	AS/NZS 4680 Appendix G
Concrete grout and mortar	Strength	1 contract	1 per contract	AS 1012.9
Backfilling	Drainage layer grading	1 contract	1 per contract	AS 1141.11.1
Foundations and	Compaction:	1 contract or 200	3 per 200 linear	AS 1289.5.4.1

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
backfill	Generally	linear metres (whichever is the lesser)	metres	
	Compaction: Non-cohesive material	1 contract or 200 linear metres (whichever is the lesser)	3 per 200 linear metres	AS 1289.5.6.1

4.3 ANNEXURE – PAY ITEMS

This Annexure applies to Council projects. For private development works use of this schedule is optional, at the Superintendent's discretion.

Pay items	Unit of measurement	Schedule rate inclusions
0292.1 Excavation	m ³ , measured in bank volume of excavation. Determine the volume by the End Area Method using design cross-sectional areas calculated at each change in height or width of the wall.	Include in the rate for excavation: - Excavation and backfilling of all types of materials, with no separate rates for earth and rock. - The disposal of surplus material. - The control of stormwater runoff. Do not include: - Drying out wet excavated material or replacement of over-excavation beyond the design cross-sectional limits defined above.
0292.2 Unsuitable material below foundation	m ³ , measured as bank volume of excavation below foundation level requiring removal and replacement.	All costs associated with excavating and removing unsuitable material below the foundation level of the concrete footing, backfilling with replacement material and compaction to the foundation level.
0292.3 Reinforced concrete footing	m ³ of reinforced concrete.	All costs associated with the supply and placement of formwork, embedments, reinforcement (including starter bars, if required), concrete (including 50 mm mass concrete blinding layer), stepping of footing, joints, curing and backfilling to the footing. Take the volume from the drawings, excluding the volume of the 50 mm mass concrete blinding layer.
0292.4 Construct masonry wall	m ² , measured as face area of masonry wall, from the top of the footing to the top of the wall.	All costs associated with the supply and placement of materials and workmanship required to complete the

Pay items	Unit of measurement	Schedule rate inclusions
		documented structure including masonry units, granular drainage layer behind the wall, earth backfill and capping, and subsoil drain at the base of the drainage layer.
Traffic management	Lump sum.	To 1101 <i>Traffic management</i> .
Erosion and sedimentation control		To 1102 <i>Control of erosion and sedimentation (Construction)</i> .
Concrete footings		Construction of footings, including concrete, reinforcement and formwork to 0319 <i>Auxiliary concrete works</i> .
Subsoil drainage		Drainage, including granular drainage layer, subsoil drainage pipe and filter material to 1171 <i>Subsurface drainage</i> or 1172 <i>Subsoil and formation drains</i> , as appropriate.

4.4 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1012		Methods of testing concrete
AS 1012.3.1	2014	Determination of properties related to the consistency of concrete - Slump test
AS 1012.9	2014	Compressive strength tests - Concrete, mortar and grout specimens
AS 1141		Methods for sampling and testing aggregates
AS 1141.11.1	2009	Particle size distribution - Sieving method
AS 1289		Methods of testing soils for engineering purposes
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 2758		Aggregates and rock for engineering purposes
AS 2758.1	2014	Concrete aggregates
AS 3610		Formwork for concrete
AS 3610.1	2018	Specifications
AS 3700	2018	Masonry structures
AS 3972	2010	General purpose and blended cements
AS/NZS 4455		Masonry units, pavers, flags and segmental retaining wall units
AS/NZS 4455.1	2008	Masonry units
AS 4678	2002	Earth-retaining structures
AS/NZS 4680	2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
CMAA CM03	2014	Concrete Masonry - Cleaning and maintenance
Think Brick Manual 13	2019	Clay masonry cleaning manual
Safe Work Australia	2018	Excavation work
ASTM D698	2012	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft ³ (600 kN-m/m ³))
CMAA RW01	2013	Concrete Masonry - Reinforced Cantilever Retaining Walls

5 ANNEXURE M – MIDCOAST 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: <ul style="list-style-type: none"> a) an authorised representative of Council's Director of Infrastructure and Engineering Services, or b) an accredited certifier where they are the Principal Certifier and hold the relevant accreditation category for the type of work. 	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 MidCoast Council <i>Development Engineering Handbook</i> for final inspection, works-as-executed and handover requirements.	Completion

6 AMENDMENT HISTORY

0	14/12/2020	First Published
---	------------	-----------------